

1.3.2
PERCENTAGE OF
STUDENTS
UNDERTAKING PROJECT
WORK/FIELD
WORK/INTERNSHIP
(DATA FOR THE LATEST
COMPLETED ACADEMIC
YEAR)

1.3.2

**list of students with work
information like their job
title, workplace, and
duration of internship**

• Internship:

A.Y 2018-19

Sr. No	Duration	Name of Intern	Company name	Details	Class
1	15 Days	Abhinav Jadhav Imran Khan	Indian Computer Technology	Marg ERP9+ software	BE
2	37 days	Hrushikesh Akhade Prachi Gijare	Spring Computing	React Native App development	BE
3	37 days	Arvind Jadhav Shruti Havele	Mass Technologies, Narhe Ambegaon	Development of PWA	BE
4	15 days	Sayali Jadhav Akshada Joshi Deepa Ranaware	Mark and Make Media, Shivajinagar	Develop website for GIC	BE
5	15 days	Jyoti Ovhal Sonali Sajan	Mark and Make Media, Shivajinagar	WEB Develop	BE
6	15 days	Renuka Kumbhar Preeti Rawan	Inbality Technologies, Pune	-	BE
7	23 days	Aishwarya Raj Sakshi Wagare	Mass Technologies, Narhe Ambegaon	Hybrid Cloud for secure authorized deduplication	BE
8	30 Days	Yash Nalawade	Dexciss Technology	ERP Development based on odoo	BE
9	30 days	Pranav Nagadi	Quick Reports	BI	BE
10	1 month	Joshua Mckenzie	Seven mentor pvt.ltd	E-library in Java	BE
11	2 months	Sagar Jaiswal	D-zone (Mobile App Development)	Android App Development	BE

• Internship:

A.Y 2019-20

Sr. No	Duration	Name of Intern	Company Name	Details	Class
1.	3 Months	Dnyanraj Shinde	MRND lab Pvt. Ltd.	Internship in MRND lab Pvt. Ltd. Nigadi, Pune started from 4 th Jan. 2020	BE
2.	3 Months	Shubham Bedmutha	MRND lab Pvt. Ltd.	Internship in MRND lab Pvt. Ltd. Nigadi, Pune started from 4 th Jan. 2020	BE
3.	4 Months	Aditya Agashe	Data Science Lab, Pune.w.e.f. 21-09-2019	Internship as a trainee-Associate Consultant	BE
4.	3 Months	Shubham Butala	Monarch Technologies, Pune Pvt. Ltd.	Appoint as junior executive support	BE
5.	3 Months	Sonali Sajan	Amrut Collection	Technical Assistant	BE
6.	6 Months	Chandresh Chari	DARSH Enterprises, Pune	Intern	SE
7.	6 Months	Manali Kadam	XPRESSBEES, Pune	Back Office	SE
8.	6 Months	Nilam Nalkande	Vijay Sales, Pune	Intern	SE



SRTCT'S
SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF ENGINEERING
KHAMSHET

An ISO 9001:2015 Certified Institute
DEPARTMENT OF COMPUTER ENGINEERING

9.	Jan 2020 to May 2020	Pooja Phule	Wisdom Sprout	Working on C, C++ and Python	TE
10.	Jan 2020 to May 2020	Diksha Naikade	Wisdom Sprout	Working on C, C++ and Python	TE
11.	6 Jan 2020 to April 2020	Abhishek Devkhile	MRND Lab	Working on Python	TE
12.	6 months from (26/02/2020)	Pankaj Salunkhe	JKL India Solutions, Phursungi road, Pune-412308	Internship	SE



SRTCT'S
**SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF
 ENGINEERING,
 KHAMSHET**

An ISO 9001:2015 Certified Institute

DEPARTMENT OF COMPUTER ENGINEERING

- **Internship:** Total 16 Students from SE, TE and BE are continuing with the internship. *A.Y 2020-21*

Sr. No	Duration	Name of Intern	Company Name	Details	Class
1.	1st June 2020 onwards	Pankaj Salunke	India Solutions Pvt. Ltd., Pune	Operator	TE Comp
2.	1st June 2019 onwards	Nilam Nalkande	Vijay Sales, Pune	Assistant	TE Comp
3.	8th June 2020 onwards	Devendra Pitaliya	Alpine Technologies, Pune	Sales Team Manager	TE Comp
4.	1st June 2019 onwards	Manali Kadam	Xpress Bees Pvt. Ltd. Pali	Assistant	TE Comp
5.	01/08/2020 to 02/01/2021	Mr. Kamlesh Hugar	MicroFix Solution, Bhosari	Technician (Trainee)	TE Comp
6.	10/09/2020	Darshan Gaikwad	Workex Solutions and Services Private Limited, Bengaluru	Senior Associate	BE Computer
7.	03/01/2020	Atul Birge	Sharda Polytechnic College, Aurad Shahajani, Latur	Technician	BE Computer
8.	01/08/2020	Tushar Nimse	Gazon Communication Pvt. Ltd., Pune	Associate Broadband	BE Computer
9.	03/09/2020	Akshata Hirulkar	Business Benefits Advisory, Bangalore	Internship	TE Computer
10.	06/09/2020	Gunjan Mulik	TATA Motors, Pune	Technical Trainer	TE Computer
11.	29 /08/2020	Pooja Dolai	Brain O Vision Pvt. Ltd., Hyderabad	Trainee	BE Computer
12.	30 /08/2020	Siddhant Panchal	Cogent Web Services, Pune	C # Developer	TE Computer
13.	10-08-2020 to 06-10-2020	Ms. Pooja Dolai	BRAIN O VISION	Internship on Web Development	BE Comp
14.	23 Nov 2020	Ms. Shrutika Sonawane	Gurudatta Electronics (Industrial Electronics Manufacturing & Assembly), Akurdi	Assembler	SE Comp



SRTCT'S
SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF
ENGINEERING,
KHAMSHET

An ISO 9001:2015 Certified Institute
DEPARTMENT OF COMPUTER ENGINEERING

15.	29 Oct 2020	Mr. Shantanu Jagtap	College of Computer Accounts, Pune	Consultant Quality Analyst	SE Comp
16.	wef. 25 May 2021	Sohail Jamil Shaikh	CONNEQT Business Solutions Limited.	Employment as CCE in the Operations	TE

- **Internship:** Total 10 Students from TE and BE are continuing with the internship. **A.Y 2021-22**

Sr. No	Academic Year	Name of Intern	Company Name	Details	Class
1.	2021-22	Akshata Hirulkar	Conneqt Business Solutions Limited, Pune	Operator	BE Computer
2.	2021-22	Gunjan Mulik	Innovative Engineering, Bhosari	Assistant	BE Computer
3.	2021-22	Manali Kadam	XpressBees, Raigad	Sales Team Manager	BE Computer
4.	2021-22	Pankaj Salunke	Ascendas It Park Pvt Ltd-Pune	Assistant	BE Computer
5.	2021-22	Sakshi Chaudari	TECHNOPHILE BUD, Jaipur	Technician (Trainee)	BE Computer
6.	2021-22	Simran Tiwari	Conneqt Business Solutions Limited, Pune	Senior Associate	BE Computer
7.	2021-22	Sohal Shaikh	ONNEQT Business Solutions Limited, Pune	Technician	BE Computer



SRTCT'S
SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF
ENGINEERING,
KHAMSHET

An ISO 9001:2015 Certified Institute
DEPARTMENT OF COMPUTER ENGINEERING

8.	2021-22	Yash_Lahure	Sagar Engineering ,Aurangabad	Associate Broadband	BE Computer
9.	2021-22	Motikar AjayKumar	MRND Pvt.Ltd	Internship	TE Computer
10.	2021-22	Shantanu_Jagtap	CCA Education Pvt Ltd, Pune	Technical Trainer	TE Computer

- **Internship:** Total 16 Students from SE, TE and BE are continuing with the internship.

A.Y 2022-23

Sr. No	Duration	Name of Intern	Company Name	Details	Class
18 BE Students have been registered for internship. TE students going to register for internship on or before this semester					
1	2022-2023	Pratik More	Blankbot Technologies	Internship	SE
2	2022-2023	Pratik More	Spiderweb Technologies	Internship	SE
3	2022-2023	Sidharth Shukla	Technohacks EduTech	Internship	SE
4	2022-2023	Aditya Nanasaheb Bolbhat	Hamari Pahchan NGO	Internship	SE
5	2022-2023	Prathmesh Santosh Kulkarni	Acmegrade	Internship	SE
6	2022-2023	Omkar Ganesh Hajare	Technolight	Internship	SE
7	2022-2023	Narute Dhairyashil Kishorkumar	TechnoLight Pvt. Ltd.	Internship	SE
8	2022-2023	Jay Nodi	Interns Elite	Android App Development Internship on two projects	SE



SRTCT'S
**SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF
ENGINEERING,
KHAMSHET**

An ISO 9001:2015 Certified Institute

				(minor and major)	
9	2022-2023	Prathmesh Santosh Kulkarni	Acmegrade	Internship	SE
10	2022-2023	Sudarshan Chole	Oasis Infobytes Pvt. Ltd.	Internship	SE
11	2022-2023	Yewale Rushikesh Arjun	LetsGrowMore	Selected as Web Developer Intern	TE
12	2022-2023	Tejraj Harishchandra kakade	LetsGrowMore	Selected as Web Developer Intern	TE
13	2022-2023	Pruthviraj Rangrao Sankpal	LetsGrowMore	Selected as Web Developer Intern	TE
14	2022-2023	Tejas Walunj	Game Cloud	Internship	SE
15	2022-2023	Aarya Shinde	Interns Elite	Internship	SE
16	2022-2023	Tejaswini Dhoble	Code Clouse	Internship	TE
17	2022-2023	Fardeen Shaikh	Code Clouse	Internship	TE
18	2022-2023	Pratik More	Spiderweb	Selected as Intern	SE

1.3.2

share sample photos from the fieldwork










1.3.3

**PERCENTAGE OF STUDENTS
UNDERTAKING PROJECT
WORK/FIELD WORK/INTERNSHIP
(DATA FOR THE LATEST
COMPLETED ACADEMIC YEAR)**

**COMPUTER
DEPARTMENT**

PROJECT WORK

 SRTC'S SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF ENGINEERING, KHAMSHET An ISO 9001:2015 Certified Institute									
DEPARTMENT OF COMPUTER ENGINEERING									
Project Title List									Academic Year: 2022-23
Project Title List									Semester-I-II
Sr No	Group No	Name of Group Members	Contact No	Email-ID	Project Topics	Project Title (after topic Finalization by department)	Area of Interest	Project Guide	Sponsored/In house
1	G1	Devika Santosh Torkade	7058983260	devika.191012@srtc.ac.in	Credit Card Fraud Detection		Machine Learning	Prof. Remu R. Dandge	
2		Pooja Sudhakar Ambuskar	7038640855	pooja.162215@srtc.ac.in					
3		Shrutika Pandurane Sonavane	9067265610	shrutika.202143@srtc.ac.in					
4		Disha Babasaheb Gavali	7387718626	disha.202144@srtc.ac.in					
5	G2	Sayali Anand Kamble	9011770411	sayali.202105@srtc.ac.in	ATM machine using Facial Recognition and OTP with Shuffle Keypad		Machine Learning	Prof. Anjali S. More	
6		Pooja Kamalakar Bharambe	7721069963	pooja.191052@srtc.ac.in					
7		Kamini Yasanti Saipute	7843083225	Kamini.202085@srtc.ac.in					
8		Poojanam Nagnuro Gajbhare	8600715790	poojanam.202148@srtc.ac.in					
9	G3	Sankeet Devanand Sabale	8530730017	sankeet.202165@srtc.ac.in	Complaint Box (Sponsor Project)		Cross Platform Development	Prof. Anjali S. More	
10		Vaibhav Balghare	9021261679	vaibhav.202120@srtc.ac.in					
11	G4	Dhanashree Kedari	7040788692	dhanashree.202156@srtc.ac.in	Facial emotion recognition system		Machine learning	Prof. Pooja V. Pawar	
12		Eeshwari Yashwant Kedari	9819340108	eeeshwari.202153@srtc.ac.in					
13		Vaishnavi Ghosalkar	9175466617	vaishnavi.202083@srtc.ac.in					
14		Sarvesh Subhash Pawaskar	9702242920	sarvesh.181004@srtc.ac.in					
15	G5	Omkar Maruti Gaware	9172400987	omkar.202091@srtc.ac.in	Lead Gen Using AI		Web Based Software	Prof. Anjali S. More	
16		Mahera Irfan Nadaf	9172916721	mahera.202167@srtc.ac.in					
17		Simran Ashok Vishwakarma							
18	G6	Siddhant Sanjay Sancheti	8446464339	siddhsancheti24@gmail.com	Cyber Security Intrusion Detection System		ML based Cyber Security	Prof. Anjali S. More	
19		Mollah Arifull Haque	9833287721	arifullhaque.191058@srtc.ac.in					
20		Bhinaid Dhiruv Rajesh	8208212188	dhiruv.191044@srtc.ac.in					
21		Powar Vaishnavi Vasudev	9172849734	vaishnavi.202168@srtc.ac.in					
22	G7	Niranjan Dipak Katore	8999252073	niranjan.202128@srtc.ac.in	CNN based Fire Detection System using video surveillance		ML based	Prof. Satish S. Asane	
23		Yuvraj Subhash Chougule	7020992437	yuvraj.202163@srtc.ac.in					
24		Pallavi Anandsing Pardeshi	7249494921	pallavi.202162@srtc.ac.in					
25		Diksha Laxman Thanambir	7020681609	diksha.202141@srtc.ac.in					
26	G8	Jagtap Shantanu Manish	7875431199	shantanu.202137@srtc.ac.in	DRIVER ATTENTION ASSIST SYSTEM		ML based	Prof. Satish S. Asane	
27		Patil Shubham Sanjay	7410106797	shubham.191051@srtc.ac.in					
28		Shitok Karil Gaanan	9172254594	kapil.181017@srtc.ac.in					
29		Shinde Randhr Shahaji	7218018383	randhr.202101@srtc.ac.in					
30	G9	Harshali Subhash Bodkhe	7719031198	harshali.202173@srtc.ac.in	Smart dustbin using IOT		IOT BASED	Prof. P. V. Pawar	
31		Shivani Deepak Tonape	9359952231	Shivani.202094@srtc.ac.in					
32		Vishal Sambhaji Lonkar	9112314525	vishal.202093@srtc.ac.in					
33		Aiavkumar Suresh Monkar	9762964956	aiavkumar.20284@srtc.ac.in					
34	G10	Vijaya Kisan Madane	7387722217	Vijaya.202151@srtc.ac.in	Handwriting Text Recognition Using Neural Network		Machine learning	Prof. Remu R. Dandge	
35		Mrunali Manohar Bhong	9067903998	Mrunali.191043@srtc.ac.in					
36		Kajal Baban Ovhil	7507906716	Kajal.191011@srtc.ac.in					

Prof. R.R.Dandge
BE-Project coordinator

Prof. Anjali Dalvi
HOD Comp



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Devika Torkade

Department of Computer Engineering, Savitri Bai Phule Pune University, India

TITLE OF PAPER

Review on Psychology behind Fraud in Credit Card: Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2205231006

Certificate No.: 305231035

Date: 30-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Disha Gavali

Department of Computer Engineering, Savitri Bai Phule Pune University, India

TITLE OF PAPER

Review on Psychology behind Fraud in Credit Card: Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2205231006

Certificate No.: 305231035

Date: 30-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Pooja Ambuskar

Department of Computer Engineering, Savitri Bai Phule Pune University, India

TITLE OF PAPER

Review on Psychology behind Fraud in Credit Card: Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2205231006

Certificate No.: 305231035

Date: 30-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Prof.Renu Dandge

Department of Computer Engineering, Savitri Bai Phule Pune University, India

TITLE OF PAPER

Review on Psychology behind Fraud in Credit Card: Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2205231006

Certificate No.: 305231035

Date: 30-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Shrutika Sonavane

Department of Computer Engineering, Savitri Bai Phule Pune University, India

TITLE OF PAPER

Review on Psychology behind Fraud in Credit Card: Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2205231006

Certificate No.: 305231035

Date: 30-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



Pimpri Chinchwad Education Trust's (PCET's)
Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)



Nutan Maharashtra Institute of Engineering & Technology (NMIET)



CERTIFICATE OF APPRECIATION

this certificate is proudly presented to the

Jayali Anand Kamble

for active participation /winner /runner up in the event
Tech - Cult at Tech-Fiesta 2k23 organized by
Nutan Maharashtra Institute of Engineering & Technology, Pune from 18th
to 20th April 2023.

Mr. Rahul Patil
Coordinator
Tech-Fiesta

Mr. Prakash Kshirsagar
Coordinator
Tech-Fiesta

Mr. Kapil Wagh
Coordinator
Tech-Fiesta

Mr. Mahesh Chinchole
Coordinator
Tech-Fiesta

Mr. Spandan Waghmare
Coordinator Tech-Fiesta

Dr. Vilas Deotare
Principal, NMIET

TECH-FIESTA 2K23



Pimpri Chinchwad Education Trust's (PCET's)
Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)



**Nutan Maharashtra Institute of
Engineering & Technology (NMIET)**



CERTIFICATE OF APPRECIATION

this certificate is proudly presented to the

Pooja K. Bharambe

for active participation /winner /runner up in the event

Tech-Cult

at Tech-Fiesta 2k23 organized by

Nutan Maharashtra Institute of Engineering & Technology, Pune from 18th
to 20th April 2023.



**TECH-FIESTA
2K23**

Patil

Mr. Rahul Patil
Coordinator
Tech-Fiesta

Kshirsagar

Mr. Prakash Kshirsagar
Coordinator
Tech-Fiesta

Wagh

Mr. Kapil Wagh
Coordinator
Tech-Fiesta

Chinchole

Mr. Mahesh Chinchole
Coordinator
Tech-Fiesta

Waghmare

Mr. Spandan Waghmare
Coordinator Tech-Fiesta

Deotare

Dr. Vilas Deotare
Principal, NMIET



TECH-FIESTA 2K23



Pimpri Chinchwad Education Trust's (PCET's)
Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)



Nutan Maharashtra Institute of
Engineering & Technology (NMIET)

CERTIFICATE OF APPRECIATION

this certificate is proudly presented to the

Poonam N. Gajbhare

for active participation /winner /runner up in the event

Tech - Cult

at Tech-Fiesta 2k23 organized by

Nutan Maharashtra Institute of Engineering & Technology, Pune from 18th
to 20th April 2023.

Mr. Rahul Patil
Coordinator
Tech-Fiesta

Mr. Prakash Kshirsagar
Coordinator
Tech-Fiesta

Mr. Kapil Wagh
Coordinator
Tech-Fiesta

Mr. Mahesh Chinchole
Coordinator
Tech-Fiesta

Mr. Spandan Waghmare
Coordinator Tech-Fiesta

Dr. Vilas Deotare
Principal, NMIET



Pimpri Chinchwad Education Trust's (PCET's)
Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)



Nutan Maharashtra Institute of Engineering & Technology (NMIET)



CERTIFICATE OF APPRECIATION

this certificate is proudly presented to the

Kamini V. Satpute

for active participation /winner /runner up in the event

Tech-Cult

at Tech-Fiesta 2k23 organized by Nutan Maharashtra Institute of Engineering & Technology, Pune from 18th to 20th April 2023.



TECH-FIESTA 2K23

Mr. Rahul Patil
Coordinator
Tech-Fiesta

Mr. Prakash Kshirsagar
Coordinator
Tech-Fiesta

Mr. Kapil Wagh
Coordinator
Tech-Fiesta

Mr. Mahesh Chinchole
Coordinator
Tech-Fiesta

Mr. Spandan Waghmare
Coordinator Tech-Fiesta

Dr. Vilas Deotare
Principal, NMIET



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

*by
Anjali S. More*

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

by

Sayali A. Kamble

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

by

Pooja K. Bharambe

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

*by
Kamini V. Satpute*

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

*by
Poonam N. Gajbhare*

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET

ISRA
JIF

ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: V Month of publication: May 2023

DOI: <https://doi.org/10.22214/ijraset.2023.51464>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Enhancement in ATM Machine Facility Using Face Recognition Security and OTP with Shuffle Keyboard

Anjali S. More¹, Sayali A. Kamble², Pooja K. Bharambe³, Kamini V. Satpute⁴, Poonam N. Gajbhare⁵

¹Assistant Professor Department of Computer Engineering, SRTTC FOE, Maharashtra, India

^{2, 3, 4, 5}Student, Department of Computer Engineering, SRTTC FOE, Maharashtra, India

(Savitribai Phule Pune University)

Abstract: To enhance the security of the ATM. To avoid ATM robberies and the wrong person misusing the ATM so that they can lead a secure and reliable life. The system is to support the intelligence system. Without hesitation, use ATMs to make the world a conversion community. Once the client inserts the cardboard into the ATM, a session is processed, so the system can start a face detection victimization camera placed close to the ATM and builds short-lived identity information of the clients, and the user face verification to perform on the ATM. A good user would use the traditional method because the invalid user cannot access the ATM card, they offer the secondary identification to the system mechanically, and the unauthorized person would continue the transactions. The objective of the proposed study in this paper is to prevent ATM fraud as well as secure transactions from the user side.

Keywords: ATM, face recognition, LRR, OTP.

I. INTRODUCTION

The ATM security authentication technique is dependent on pin-based verification. Factors such as urgency, memorization of pins, speed of interaction, un-intentional pin sharing affect the system diversely. Cards with magnetic chips are easy to clone. Security and vulnerability are opposite sides of the same coin, an automated machine becomes vulnerable due to the weakness of its security. Automated Teller Machine manufacturers go on adding and strengthening security features of Automated teller machine so that customers can carry out banking transactions hassle-free and without any fear of siphoning amounts from their accounts the same frauds work with similar speed to crack the innovative security feature so that they can access over the Automated teller machine to exploit the accounts of bank customers.

II. PROBLEM STATEMENT

Automated Teller Machines are widely used nowadays by people. Presently, ATM systems use no more than an access card which usually has a magnetic stripe (magstripe) and a fixed Personal Identification Number (PIN) for identity verification. Some other cases utilize a chip and a PIN which sometimes has a magstripe in case the chip fails as a backup for identification purposes. This method is not very secure and prone to an increase in criminal activities. The need for a novel, simple as well as secure method of access is thus imperative. In the present work, a PIN is generated by the user and this PIN is made available to the ATM system by the means of a Subscriber Identity Module (SIM) in the user's Mobile Phone. This PIN can be trapped by any user and can lead to fraud. The user can use the face system and another way is OTP, to maintain privacy.

III. RELATED WORK

Second section deals with the literature review. TABLE 1. refers to the survey that was done all these references are from an effective point of view. In this, the atm has to enhance the security level with an advanced level of technical issues. ATM has very advanced technology which is currently using Fingerprints recognition to detect fingerprints that are unique to all and a major use of it is safe transactions. The feature commonly used is eye detection to verify the true user and the latest technology is used cardless atm means in which the chip was not present, while the misplaced issue not happen in the future. OTP was also getting the high using technology that protects from unauthorized transaction verification for the user which was provided by the bank.

TABLE I

Title Of Paper	Author	Year of Publish	Findings
Facepin: Face Biometric Authentication System for Atm Using Deep Learning [30]	A Kowshika, P.Sumathi , K S Sandra, et al.	2022	An automatic teller machine security model that would combine a physical access card and electronic facial recognition using Deep Convolutional Neural Network. If this technology becomes widely used, face recognition techniques used, and details would be protected as well as their accounts.
Cardless Transaction of ATM Machine with Asecurity of Facial Recognition and OTP with Shuffle Keypad.[9]	Dhamale Omkar, Auti Sahil et al.	2022	An ATM with this system authenticates users by looking at their faces. Every human has a different facial feature, making it possible to identify the individual specifically. The user must scan his face with the sensor before the system takes it and searches the database.
Face Recognition Open CV Based ATM Security System [2]	A.D. Gujar, N.B Sawant, T.L Hake, et al.	2022	The step of feature extraction involves identifying the distinctive elements of the camera image. Check out if all of your facial features are visible. This feature vector effectively represents the face. in order to protect ATMs against theft and prevent ATM robberies. It takes the place of the ATM system used traditionally
Face Recognition Based New Generation ATM Machine [24]	B.Prasad, D. Sahithi, et al.	2021	The usage of nothing involves more than a PIN and access card to confirm uniqueness. By stealing cards, PINs, customer account information, and other security measures, ATMs that use face recognition systems show how easy it is to make false claims and treat people unfairly they use cardless transactions where misuse of a card or stolen card will not by user
The Biometric Cardless Transaction with Shuffling Keypad using Proximity Sensor [25]	Ahsana Hassan, A.George, et al.	2020	The usage of nothing involves more than a PIN and access card to confirm uniqueness. By stealing cards, PINs, customer account information, and other security measures, ATMs that use face recognition systems show how easy it is to make false claims and treat people unfairly.
Enhanced Security for ATM Machine with OTP and Facial Recognition Features[6]	Manikandan , Suriya, et al.	2020	The technology creates magnetic cards with fixed pins and a number of security frames. An SMS-based One-Time Password (OTP) is added to a biometric security technique that uses biometrics to protect one or more of the customer's bank accounts. This approach is carried out using a biometric authentication system.
Security System Atm Machine with One-Time Passcode on M-Banking Application [26]	R. Munadi, A.Irawan , et al.	2019	The technology creates magnetic cards with fixed pins and a number of security frames. An SMS-based One-Time Password (OTP) is added to a biometric security technique that uses biometrics to protect one or more of the customer's bank accounts. This approach is carried out using a biometric authentication system.
ATM Card Security using Bio-metric and Message Authentication Technology [27]	M.Dutta, T.Khatun, et al.	2018	It tries to emulate a cardless payment system in which the user's fingerprint serves as the new card and the user uses it to transact, they use to need a fingerprint as they are unique for all, which the admin can take while opening the account

IV. PROPOSED SYSTEM

The proposed system deals with the idea of an ATM security system based on facial detection that has been developed as a viable security solution for the public. The work's primary focus is designing and implementing an ATM security system that uses face detection and the LRR algorithm. Our proposed approach overcomes the shortcomings of the current system. The system will provide you the opportunity to process any transaction. First-time users will be prompted to "Detect Face" and if the system finds a match with an image stored in the bank's database, they can proceed with the transaction; otherwise, it will be declined after a few warnings.

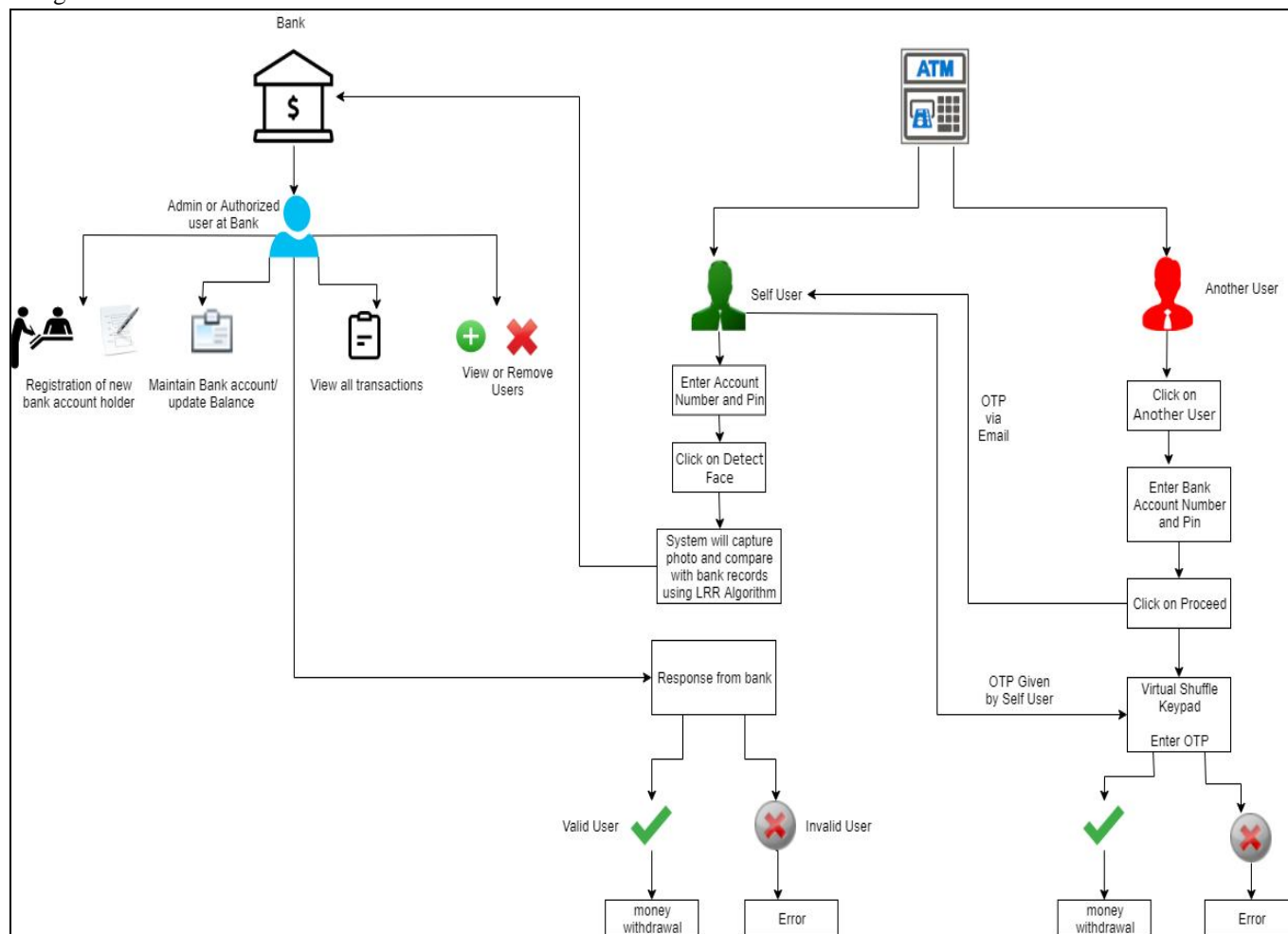


Fig 1: System Architecture

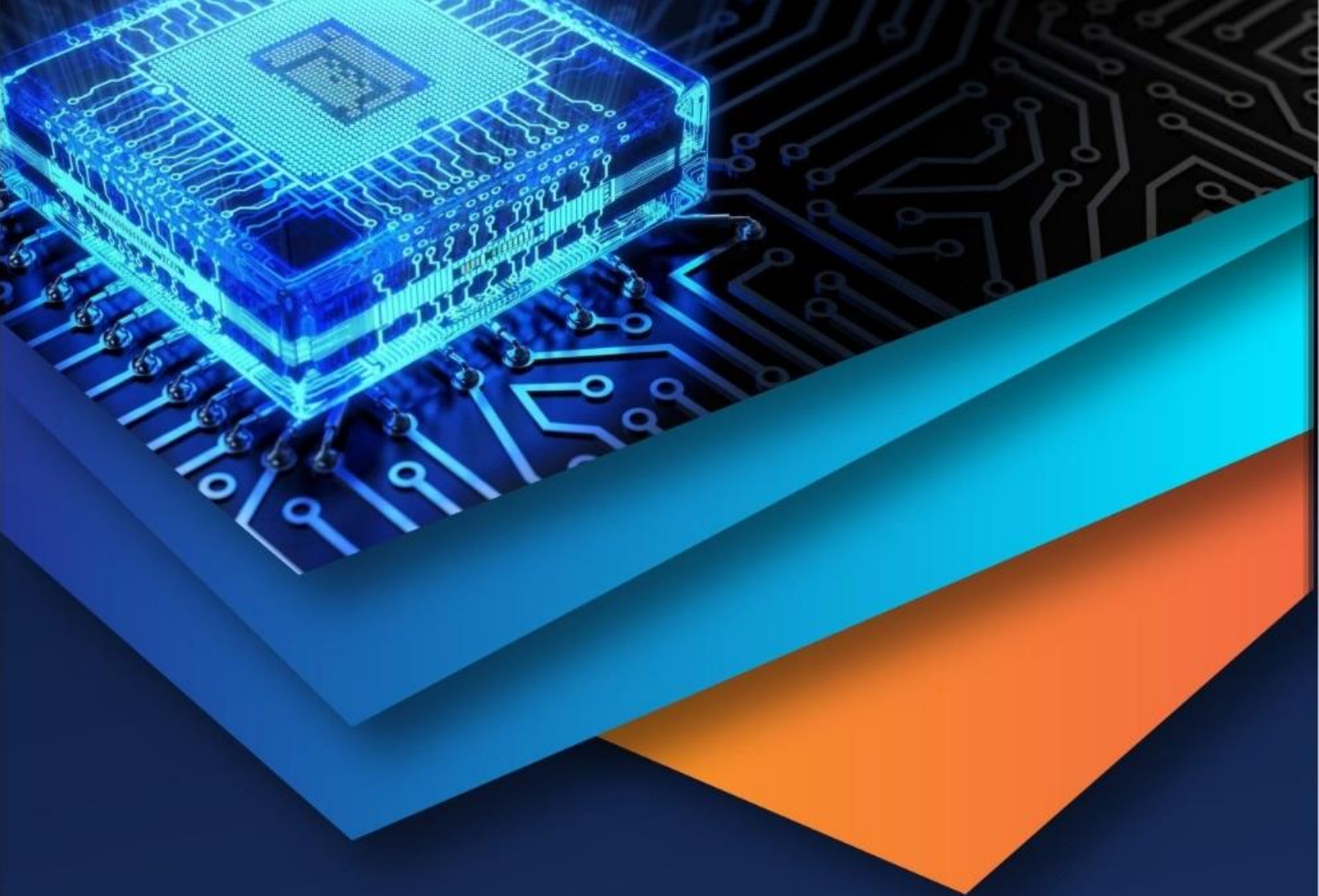
Fig 1 refers to the proposed work on the ATM via using user and bank authentication.

V. CONCLUSION

Thus the study presented in this paper deals with ATM model that has a lot of reliability in providing security by mistreatment biometric authentication software package. By keeping the time passed on within the verification method to a negligible quantity we tend to even try and maintain the potency of this ATM system to a bigger degree. Bioscience suggests that distinguishing and authenticating account owners at the cash dispenser Machines provides the required and far anticipated answer to the matter of felonious transactions. During this paper, we've tried to proffer a solution to the abundant alarming issue of dishonorable transactions through cash dispenser Machines by bioscience that may be created attainable only the account holder is physically gifted. Thus, it eliminates cases of felonious transactions at the ATM points while not the information of the authentic owner. Employing a biometric feature for identifying is powerful, and it's additionally fortified once another is employed at the authentication level.

REFERENCES

- [1] K. J. Peter, G. G. S. Glory, S. Arguman, G. Nagarajan, V. V. S. Devi, and K. S. Kannan, "Improving ATM security via face recognition," in 2011 3rd International Conference on Electronics Computer Technology, 2011.
- [2] P. A. D. Gujar, N. B. Sawant, T. L. Hake, A. A. Shete, and S. M. Deshmukh, "Face recognition open CV based ATM security system," *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 10, no. 5, pp. 1114–1119, 2022.
- [3] J. J. Patoliya and M. M. Desai, "Face detection-based ATM security system using embedded Linux platform," in 2017 2nd International Conference for Convergence in Technology (I2CT), 2017.
- [4] M. Karovaliya, S. Karedia, S. Oza, and D. R. Kalbande, "Enhanced security for ATM machine with OTP and facial recognition features," *Procedia Comput. Sci.*, vol. 45, pp. 390–396, 2015.
- [5] S. Sasipriya, P. M. Kumar, and S. Shenbagadevi, Face recognition based new generation ATM system.
- [6] M. Karovaliya and S. Karedia, Sharad Oza Enhanced Security for ATM Machine with Otp And Facial Recognition Features. 2015.
- [7] L. Wilskott, J.-M. Fellous, and C. Norbertkruger, "Face Recognition by Elastic Bunch Graph Matching," Chapter, pp. 355–396, 1999.
- [8] M. Hamid Khan, Securing, and Biometric, "Securing ATM with OTP and Biometric," *International Journal on Recent and Innovation Trends in Computing and Communication*, no. 4, pp. 2041–2044, 2015.
- [9] D. Omkar, A. Sahil, K. Sahil, and S. D. Gunjal, "Cardless transaction of ATM machine with a security of facial recognition and otp with shuffle keypad," *Irjet.net*. [Online]. Available: <https://www.irjet.net/archives/V9/i1/IJET-V9I115.pdf>. [Accessed: 13-Apr-2023].
- [10] M. Patil, M. Sachin P Wanere, and M. Maighane, "ATM Transaction Using Biometric Fingerprint Technology," *ATM Transaction Using Biometric Fingerprint Technology*, vol. 2, no. 6, pp. 22–27.
- [11] H. I. Neenupreetam, "cardless cash access using biometric atm security system," *International Journal of Enhanced Research in Science Technology & Engineering*, vol. 3, no. 11, pp. 13–17, 2014.
- [12] T. Kwon and S. Na, "SteganoPIN: Two-Faced Human-Machine Interface for Practical Enforcement of PIN Entry Security," *IEEE TRANSACTIONS ON HUMANMACHINE SYSTEMS*, vol. 46, no. 1, pp. 1–8, 2015.
- [13] M. O. Onyesolu and E. Im, "ATM Security Using Fingerprint Bio-metric Identifier: An Investigative Study," *International Journal of Advanced Computer Science and Applications*, vol. 3, no. 4, pp. 68–72, 2012.
- [14] M. O. Onyesolu and E. Im, "ATM Security Using Fingerprint Bio-metric Identifier: An Investigative Study," *International Journal of Advanced Computer Science and Applications*, vol. 3, no. 4, pp. 68–72, 2012.
- [15] R. Babaei, O. Molalapata, and A. A. Pandor, "Face Recognition Application for Automatic Teller Machines (ATM), in *ICIKM*," vol. 45.
- [16] O. Aru and I. Eze, "Facial Verification Technology for Use in ATM Transactions," *American Journal of Engineering Research*.
- [17] I. Taleb, M. E. Ouis, and M. O. Mammam, "Access control using automated face recognition: Based on the PCA & LDA algorithms," in *Proc. 4th Int. Symp. ISKO-Maghreb, Concepts Tools Knowl. Manage. (ISKOMaghreb)*, 2014.
- [18] V. Hiremath and A. Mayakar, Face recognition using Eigenface approach. "Enhanced Principal Component Analysis Recognition Performance.
- [19] S. Kaymak, Enhanced Principal Component Analysis Recognition Performance".
- [20] H. K. Ekenel, J. Stalkamp, H. Gao, M. Fischer, and R. Stiefelhamen, Face Recognition For Smart Interactions, *interact Research*.
- [21] C. Rafael, R. E. Gonzalez, and A. Woods, "Digital Image Processing," *Digital Image Processing*.
- [22] K. Anil and A. Jain, "Introduction to Biometrics," in *Handbook of Biometrics*, K. Anil, P. Jain, and A. A. Flynn, Eds. Springer US, 2008.
- [23] R. Saini and N. Rana, "Rayat 'Comparison of various biometric methods," *International Journal of Advances in Science and Technology (IJAST)*, vol. 2, no. 1, 2014.
- [24] B. Prasad, D. Sahithi, V. Mukesh, K. Rohit, J. Vincent, and M. Supraja, "Face recognition based new generation ATM machine," *Jetir.org*. [Online]. Available: <https://www.jetir.org/download1.php?file=JETIR2105523.pdf>. [Accessed: 12-Apr-2023].
- [25] A. Hassan, A. George, L. Varghese, M. Antony, and K. K. Sherly, "The biometric cardless transaction with shuffling keypad using proximity sensor," in 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), 2020, pp. 505–508.
- [26] R. Munadi, A. I. Irawan, and Y. F. Romiadi, "Security system ATM machine with one-time passcode on M-banking application," in 2019 International Conference on Mechatronics, Robotics and Systems Engineering (MoRSE), 2019, pp. 92–96.
- [27] M. Dutta, K. K. Psyche, T. Khatun, M. A. Islam, and M. A. Islam, "ATM card security using bio-metric and message authentication technology," *IEEE International Conference on Computer and Communication Engineering Technology (CCET)*, 2018, pp. 280–285.
- [28] S. Ramya, R. Sheeba, P. Aravind, S. Gnanaprakasam, M. Gokul, and S. Santhish, "Face biometric authentication system for ATM using deep learning," in 2022 6th International Conference on Intelligent Computing and Control Systems ,2022, pp. 1446–1451.
- [29] Selvakumar, Logesh, M. Vishnu, Maniraj, and P. Kumar, "Face biometric authentication system for ATM using deep learning," in 2022 3rd International Conference on Electronics and Sustainable Communication Systems (ICESC), 2022, pp. 647–655.
- [30] A. Kowshika, P. Sumathi, K. S. Sandra, A. Santhosh kumar, and R. Gokulkrishnan, "Facepin: Face biometric authentication system for ATM using deep learning," *NVEO*, pp. 1859–1872, 2022.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: V Month of publication: May 2023

DOI: <https://doi.org/10.22214/ijraset.2023.52506>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Complaint Box App Implementation Using React Native

Sanket Sabale¹, Vaibhav Balghare², Prof. Anjali S. More³

^{1, 2}Student, Suman Ramesh Tulsiani Technical Campus, Department of Computer Engineering, Pune, Maharashtra, India

³Head of Department, Suman Ramesh Tulsiani Technical Campus, Department of Computer Engineering, Pune, Maharashtra, India,

Abstract: This paper presents the implementation of a complaint box app using React Native, a cross-platform mobile app development framework. The app allows users to submit complaints and suggestions, while the admin panel enables complaint handlers to manage complaints and communicate with users. The app features user authentication, complaint submission, complaint tracking, and real-time communication, while the implementation involved designing the user interface, integrating it with a backend system and a database, and testing its functionality. The paper discusses the benefits and challenges of using React Native for mobile app development and how it can be leveraged to build scalable and efficient complaint box apps. Overall, this paper presents a practical and effective approach to implementing a complaint box app using React Native with an admin panel, which can help organizations capture user feedback and improve their products and services.

Keywords: React Native, Cross Platform Application, Firebase Authentication and Real Time DB

I. INTRODUCTION

We In today's highly competitive world, customer satisfaction is crucial for the success of any organization. One of the most effective ways to gauge customer satisfaction is through feedback, particularly in the form of complaints and suggestions. This paper presents the design and implementation of a complaint box app using React Native, a popular cross-platform mobile app development framework. The app not only allows users to submit complaints and suggestions but also provides an admin panel for complaint handlers to manage complaints and communicate with users. The app's features include user authentication, complaint submission, complaint tracking, and real-time communication, while the implementation involved designing the user interface, integrating it with a backend system and a database, and testing its functionality. The paper also discusses the benefits and challenges of using React Native for mobile app development and how it can be leveraged to build scalable and efficient complaint box apps. Overall, this paper presents a practical and effective approach to implementing a complaint box app using React Native with an admin panel, which can help organizations capture user feedback and improve their products and services.

II. OVERVIEW

This paper presents the implementation of a complaint box app using React Native, a cross-platform mobile app development framework. The app is designed to allow users to submit complaints and suggestions, while the admin panel provides complaint handlers with the ability to manage complaints and communicate with users. The app's features include user authentication, complaint submission, complaint tracking, and real-time communication between users and complaint handlers. The implementation process involved designing the app's user interface, integrating it with a backend system and a database to store complaint data, and testing its functionality. The paper also discusses the benefits and challenges of using React Native for mobile app development, including its efficiency, scalability, and cross-platform compatibility. The use of React Native to develop complaint box apps is a practical and effective approach that can help organizations capture valuable user feedback and improve their products and services.

III. IMPLEMENTATION

The implementation of the complaint box app using React Native involved several steps, including designing the user interface, integrating it with Firebase as the backend system, and testing its functionality. To create an easy-to-use and intuitive user interface, we focused on a simple and minimalist design using React Native's built-in components such as Text, Text Input, and Button. The app's main screen featured a header with a logo, a button to submit a complaint, and a list of previously submitted complaints. User authentication was included to ensure that only registered users could submit complaints. Firebase Authentication was used to handle user authentication. For the backend integration, Firebase was used as the backend system to store complaint data and handle user authentication. Firebase Cloud Firestore was used to store complaint data, while Firebase Authentication was used to handle

user authentication. Firebase Cloud Functions were used to trigger email notifications to complaint handlers when a user submitted a new complaint. The admin panel was also implemented using Firebase as the backend system, which allowed complaint handlers to view all submitted complaints, mark them as resolved, and communicate with users regarding their complaints. Firebase Real time Database powered the messaging feature, which provided real-time communication between users and complaint handlers. The use of Firebase as the backend system and an admin panel made the implementation process smoother and more efficient. The use of React Native, coupled with Firebase, allowed for the creation of a scalable and efficient complaint box app with an easy-to-use UI and an admin panel that allowed for efficient management of complaints.

IV. USER INTERFACE

The implementation of the complaint box app using React Native involved several steps, including designing the user interface, integrating it with Firebase as the backend system, and testing its functionality. We paid special attention to the user interface design to make it easy to use and intuitive.

The login page included fields for Name, Email, and Password for users to sign in. However, before signing up, users needed to verify their phone number using OTP verification. We included OTP verification to ensure that users were legitimate and to prevent spam accounts. Once the user enters their Name, Email, and Password, an OTP verification code is sent to their phone number. The user then needs to enter this code on the login page to complete the verification process. After successful OTP verification, the user can sign up and create an account. To ensure that the login page was user-friendly and accessible, we used React Native's built-in components such as Text, TextInput, and Button to create a simple and minimalist design. The color scheme used for the login page was consistent with the rest of the app, and we made sure to use a font size and style that was legible and readable.

The home page of the complaint box app was a crucial part of the user interface and provided users with access to several essential features, including Complaint, VoterID, Blog, and Chat. The home page's design and functionality were critical in ensuring that users could navigate the app easily and find the information they needed quickly.

The Complaint feature allowed users to submit their complaints easily. The user could access the complaint feature from the home page and fill out a form with clear labels and input fields. We included a feature to attach images to the complaint to provide additional context. This feature was essential in ensuring that users could report issues and problems in their area easily.

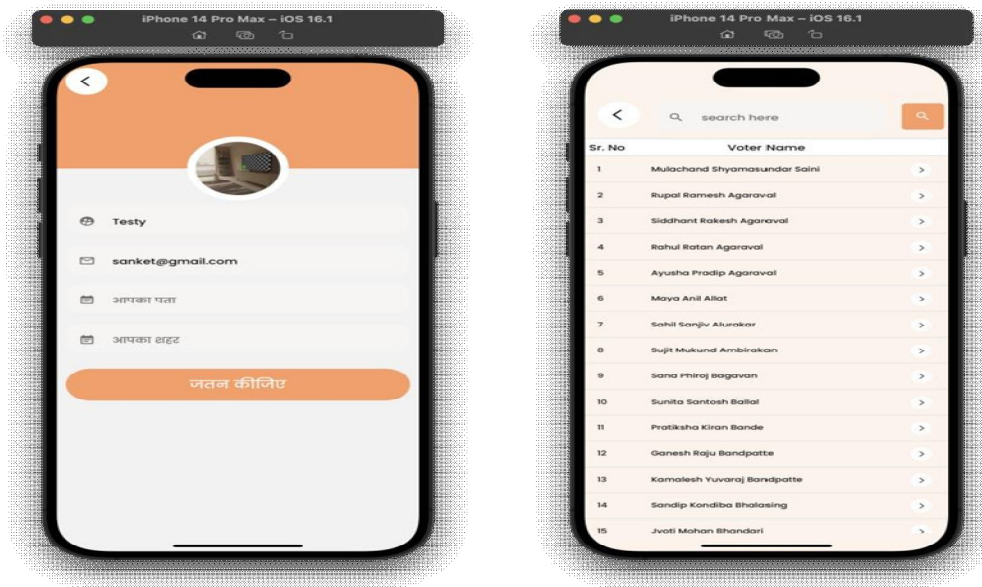
The VoterID feature was designed to allow users to find voter details by name. Users could access this feature from the home page and enter a name in the search field to find the voter's details. This feature was important in ensuring that users could access voter information easily and quickly.

The Blog feature provided users with access to the latest news and updates about Sameer Jawalkar, the Vice President of Pimpri-Chinchwad City. Users could access this feature from the home page and read about the latest activities and initiatives in their area.

The Chat feature allowed users to communicate with the app's admin section. Users could access this feature from the home page and ask any questions or raise any concerns they had about the app or the issues in their area. The chat feature was designed to be user-friendly and intuitive, with clear labels and easy-to-use input fields.



Overall, our focus on creating a simple and easy-to-use home page resulted in an app that was user-friendly and accessible to a wide Range of users. The home page's design and functionality were critical in ensuring that users could navigate the app easily and find the information they needed quickly.



Users to edit their profile details easily. The page allowed users to edit their name, address, email, and city details. However, since the mobile number was verified during the signup process, it was not editable.

To create a user-friendly profile page, we used React Native's built-in components such as Text, TextInput, and Button to create a simple and minimalist design. We made sure to use a font size and style that was legible and readable. The color scheme used for the profile page was consistent with the rest of the app, and we added clear labels to the input fields to ensure that users knew what information was required.

Users could access the profile page by clicking on the profile icon on the home page. Once on the profile page, the user could easily edit their details by typing in the appropriate input fields. We added a "Save" button at the bottom of the page, which allowed users to save their changes.

To ensure that users could access their profile details easily, we added a feature to display the user's name and profile picture on the top of the profile page. This feature allowed users to quickly verify that they were on the correct page and made it easy to access their profile details. Overall, our focus on creating a simple and easy-to-use profile page resulted in an app that was user-friendly and accessible to a wide range of users. The profile page's design and functionality were critical in ensuring that users could edit their details easily and efficiently.

V. MULTIPLICATION LANGUAGE SUPPORT

To make the complaint box app accessible to a wider audience, we added a feature that allowed users to change the language of the app. We incorporated multiple languages, including Hindi, Marathi, and English, to cater to the diverse linguistic needs of users in the Pimpri-Chinchwad area.

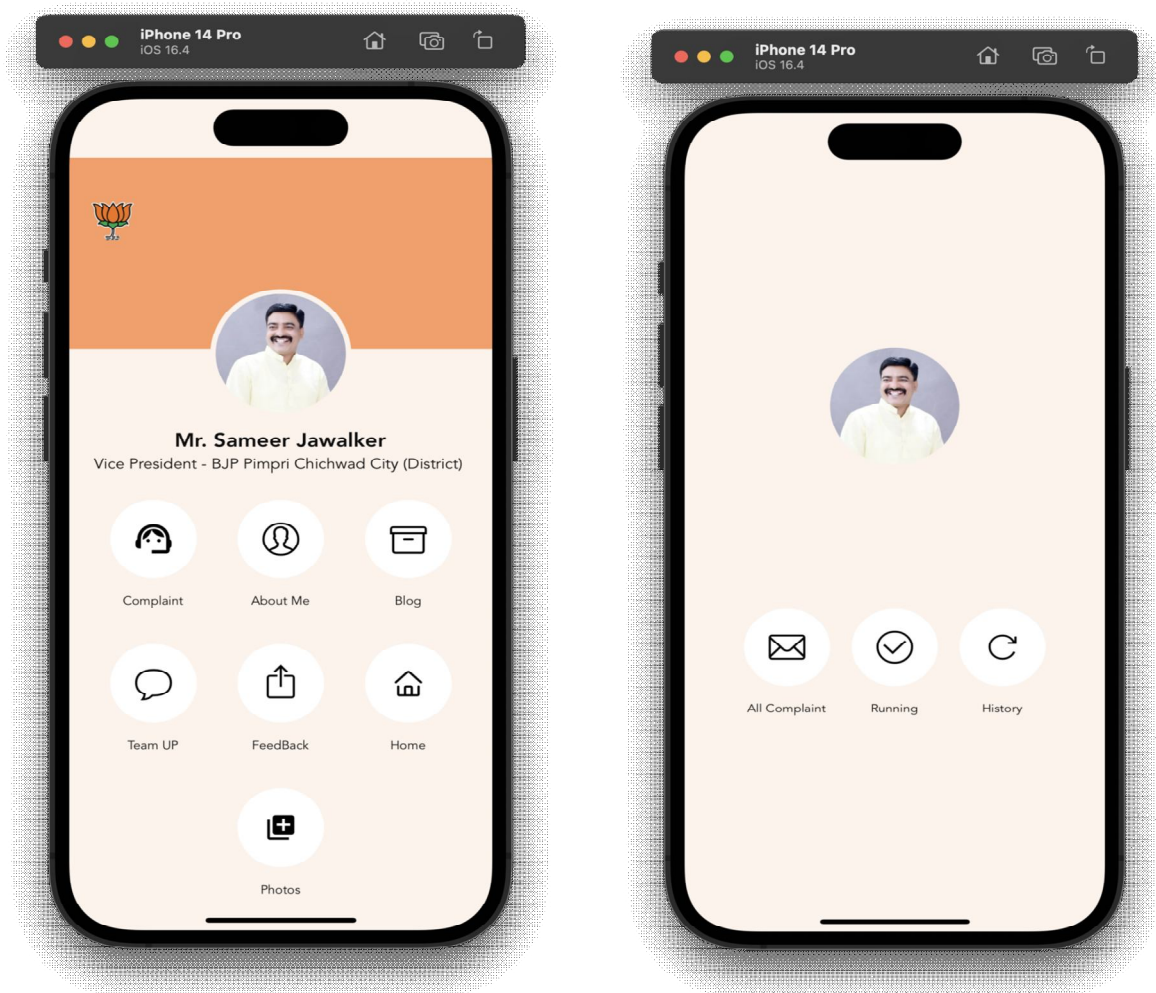
To implement this feature, we used the React Native localization library. This library allowed us to define translations for each of the languages we wanted to support. We created a file for each language that contained the translated strings for the app's text elements. When the user changed the language setting, the app loaded the corresponding file, and all the text in the app was displayed in the selected language.

To make it easy for users to change the language, we added a language selection option in the settings section of the app. Users could choose their preferred language by selecting it from a drop-down menu. Once they selected a language, the app immediately switched to the chosen language.

The multiple language support feature was critical in ensuring that the complaint box app was accessible to all users, regardless of their preferred language. This feature was especially important in a diverse community like Pimpri-Chinchwad, where multiple languages are spoken. By incorporating multiple languages, we were able to create an app that was inclusive and user-friendly.

VI. ADMIN SIDE

The admin app was an essential part of the complaint box app's implementation. The admin app allowed the admin team to manage all aspects of the app, including complaints, blogs, and user profiles. This feature ensured that the app's data was well-organized and easy to manage.



To create the admin app, we used Firebase's Realtime Database to store the app's data. We set up a separate database for the admin app, which allowed the admin team to access and manage the app's data. We also created a web-based admin panel that allowed the admin team to access the admin app's features.

The admin app had several features that allowed the admin team to manage the app's data. The team could view and manage all the complaints submitted by users through the app. They could also manage the blogs section by adding new blog posts or modifying existing ones. Additionally, the team could edit user profiles, including their name, address, email, and city details. The admin app also had features to view user statistics and app usage data, which allowed the team to track the app's performance.

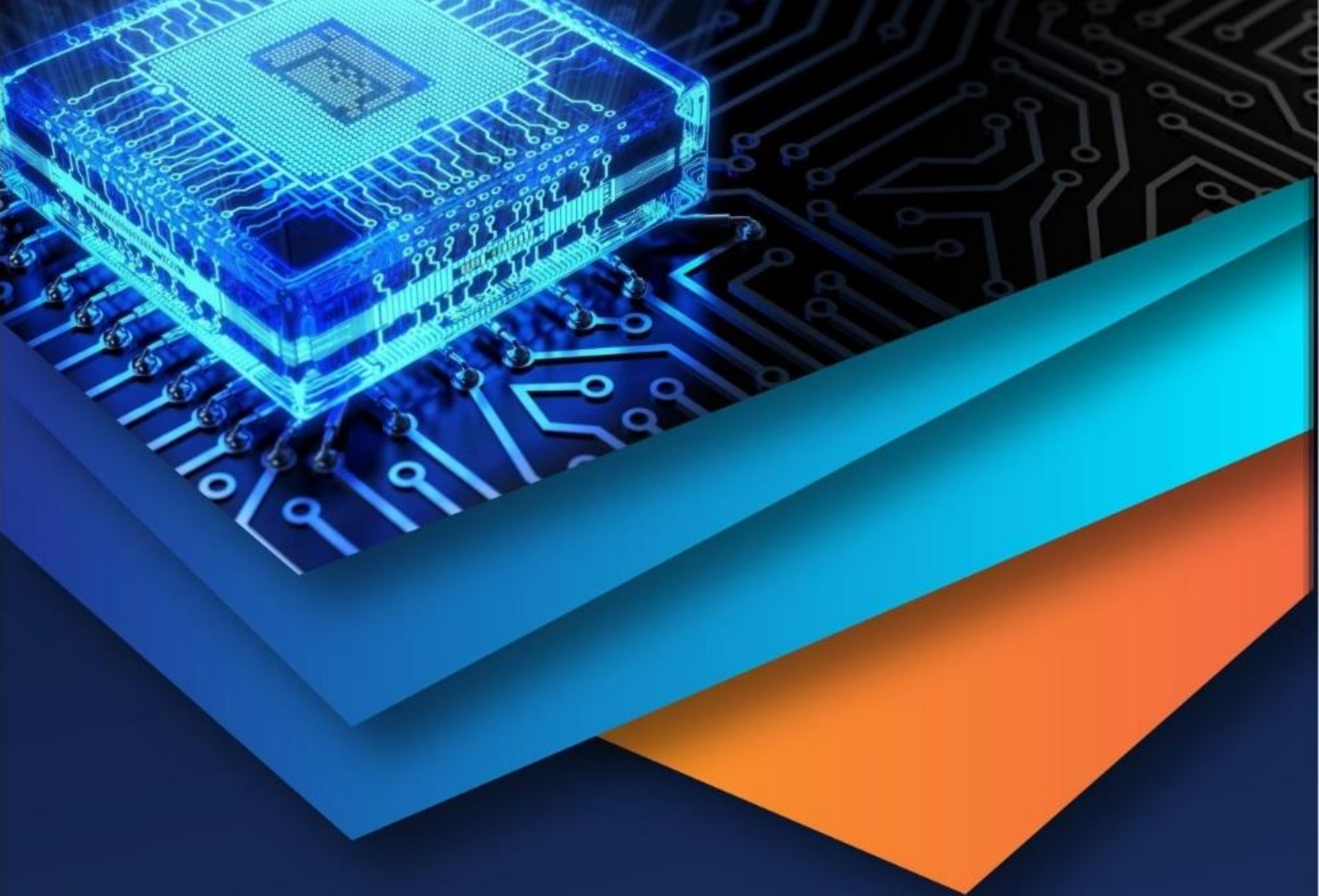
To ensure that the admin app was easy to use, we focused on creating a simple and intuitive user interface. The admin panel was designed to be user-friendly, with clear navigation and easy-to-understand features. We used React Native's built-in components to create a clean and minimalist design that was easy to navigate.

Overall, the admin app was an essential part of the complaint box app's implementation. It allowed the admin team to manage all aspects of the app, ensuring that the data was well-organized and easy to manage. The admin app's features ensured that the app was up-to-date and user-friendly, which was critical in creating an app that was accessible to a wide range of users.



REFERENCES

- [1] Thivanon Kansuwan, Thawatchai chomaski: Authentication Model using the Bundled CAPTCHA OTP Instead of Traditional Password 2019, IEEE.
- [2] Kewal shah, Harsh Sinha, Payal mishra : Analysis of Cross-Platform Mobile App Development Tools, 2019 IEEE.
- [3] Feyzullah Kalyoncu, Engin Zeydan, Ibrahim Onuralp Yigit, and Ahmet Yildirim : A Customer Complaint Analysis Tool for Mobile Network Operators, 2018 IEEE
- [4] Anik Hanifatul Azizah, Siti Zuliatul Faidah, Muhammad Bahrul Ulum, Putri Handayani : Exploration of React Native Framework in designing a Rule-Based Application for healthy lifestyle education, 2021 IEEE.
- [5] Shpetim Kadrija, Agon Memeti, Shkurte Luma-Osmani : Development of mobile app through React Native hybrid framework, 2022 IEEE.
- [6] Shaymaa Sayed El-Kaliouby, Sahar Selim, Ahmed H. Yourself: Native Mobile Applications UI Code Conversion, 2021 IEEE.
- [7] Hugo Brito, Álvaro Santos, Jorge Bernardino, Anabela Gomes : Learning analysis of mobile JavaScript frameworks, 2019 IEEE.
- [8] Andre Julian Irawan, Fenina Adline Twince Tobing, Eunike Endariahna Surbakti : Implementation of Gamification Octalysis Method at Design and Build a React Native Framework Learning Application, 2021 IEEE.
- [9] Anshul Varshav Borawake, Minal Shahakar : Embankment Protection - React Native Application Cross-Platform Application for protection of embankments by crowd sourced data, 2022 IEEE.
- [10] Xingwei Zhou, Wenshan Hu, Guo-Ping Liu : React-Native Based Mobile App for Online Experimentation, 2020 IEEE.
- [11] Kamal Kishore, Shanu Khare, Vaibhav Uniyal, Sahil Verma : Performance and stability Comparison of React and Flutter: Cross-platform Application Development, 2023 IEEE.
- [12] Hugo Brito, Álvaro Santos, Jorge Bernardino. Anabela Gomes : Mobile development in Swift, Java and React Native: an experimental evaluation in audioguides, 2019 IEEE.
- [13] Prof. Anjali S. More, sanket sable, vaibhav balghare : Complaint Box Using Cross Platform Development, 2023 IJARES.M.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52506, entitled

Complaint Box App Implementation Using React Native

by

Sanket Sabale

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52506, entitled

Complaint Box App Implementation Using React Native

by

Vaibhav Balghare

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52506, entitled

Complaint Box App Implementation Using React Native

by

Prof. Anjali S. More

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



Complaint Box Using Cross Platform Development

Prof. Anjali S. More¹, Sanket Sabale², Vaibhav Balghare³

¹Head of Department, Suman Ramesh Tulsiani Technical Campus, Department of Computer Engineering, Pune, Maharashtra, India

^{2,3}Student, Suman Ramesh Tulsiani Technical Campus, Department of Computer Engineering, Pune, Maharashtra, India

ABSTRACT

These is a sponsor project by sameer jawalkar he is the vice president of pimpri-chinwad city and he wants to create an app that can understand the voters problem in there society without contacting any third-party member they can directly contact to him so these is the main objective behind these project. these is an android app but by using the cross platform technology we can create it for ios as well with single code base with many functionalities these app is required some basic authentication and get access of many things like checking that you are under sameer jawalkar ward or you can see your details you can fill a form for complaint as we with minimum information like name, mobile, location (auto picked) and complaint that if some user is don't want to fill the form and its urgent then you will get a button for directly contact via whats-app just one click away from it so the complaint box functionality is become easy but the main thing is form admin side.

INTRODUCTION

We picked react native for cross platform development just because its easy for understand and numerous different libraries and further databases have supported well that make app less complicated to create. also reply native is a great platform for a inventor who comes from reply world its come easy if you introductory of reply but some measure generalities about html and css for design stuff and we've those knowledge so these may a reason to pick up these tech mound. reply native comes with so numerous thinks like a cli but we aren't using the cli because its more complex to handle so we're using exhibit for some better experience we're generated our introductory information that we need to induce and we fill like the exhibit and its internal libraries are further than enough for us to full fill our conditions so reply native with exhibit is make our law better and performance will grandly.

OVERVIEW

React Native can save some amount of time because cross-platform development, meaning it's compatible both Android and iOS, inventors only need to make one app, and in the end two apps are created. This saves time in development of the app, which saves a lot of plutocrat that would have been put into structure separate apps. With React Native businesses can have both apps at formerly for little further than half the cost of erecting one interpretation. Companies no longer have to choose which interpretation to make and launch first due to the cost of erecting two separate apps. In addition conservation and updates are done on both apps at the same- time which saves on unborn costs once the apps are erected and launched. also React Native apps perform nearly exactly like a native app that was erected on the specific iOS or Android platform. They're also presto because the programming language is optimized for mobile bias. rather of substantially using the central processing unit(CPU), Reply Native apps take advantage of the plates recycling unit(GPU). This makes them important faster than cross-platform mongrel technologies. The type of interface used in React Native makes it easy for different inventors on a platoon to jump in where someone differently left off and continue erecting.

OBJECTIVES

Complaint Box app Contains so numerous section in one of them is Fill Your Complaint or Complaint support not only that but also about me section for understanding sameer- jawalkar word, name or id for chancing stoner name is consider in ward or not, blog where stoner can see the post that admin shoot to app for stoner, for joining his platoon stoner can shoot an operation(form) with these section also feedback for app if stoner suppose commodity can be bettered also he communicate to admin directly but all these point can be access to stoner if he logged in or register with valid mobile authentication. admin also have app that can manage the whole effects in druggies app penetrating all movables request or complaints also transferring post editing it transferring prints and changing social media links and nearly all effects which

stoner app is needed to have these is some introductory features of admin and stoner app.

STATEMENT OF SCOPE

The main goal behind these app is to give user more value and solve their problem Yes we are Developing one more app for admin for accessing and getting all complaint after resolving the issue the voter/user will get a notification for that so not only that but admin app can handle almost all thing in app like sending any post or modify any data like that these app is specifically made for sameer jawalkar so it not going to be public and its has more secure authentication as well so admin app and user app both are necessary to create for better outcome. These app can be solve so many problems like if someone want to complaint about power issue in there society and nobody responding on it then these is complaint box application can take the complaint and directly send to the admin app so that no third party is involved in these case and there are high chances that the problem will solve in few days and admin is able to reply that person as well in some situation if user want to see that he is in the ward or not? then in these app we have special access of voter id where you can search your name in any format like first ,last name so there is no issue with that you will get the better result. For admin they can post more blogs and images so that he can connect with people all the time and every user can share with you his feedback as well so it solve more problem in users daily life. The main goal of application is to solve the problems in a society and make the life of the peoples more easier. in this application we have made the feedback function which can help admin to get the review on there work as they done in the society.

SYSTEM ARCHITECHTURE

we are focusing on real world problem as we know the day to day life of every normal person is not easy, they have some issues like water supply, light issues, road issues, job issue. our project is aspired for to overcome this issues. In our project there have a complaint box in that the peoples write down there complaints and we just trying to solve those problems as early as possible, after solving the problems we will get the feedback from the peoples and then we add it into our blog's. we have created a blog's page in that we are show our social work, in that we have photos and text of what social work we have done. After that we have created the team up, in that every person can join us to help other peoples. after sending the blogs or notification from admin, we have created notification receive for user side. the blog have gallery which are show are going to showcase on main screen(only photos or banner).our project have a login/logout and forgot password and also have a create new account functionality. The cooperative filtering algorithm is the fashion which is used to filter the Voter detail severy stoner can search his name in any format for that thing we need to search every single word with database affect name and that the whole thing about these algorithm. In this algorithm, the druggies look at the choosers they may find anther's name or own name are in sameer jawalkars shield or not. In cooperative Filtering algorithm, it finds analogous choosers and recommends what the similarity name like. In recommendation system, it don't use the features of the particulars to recommend, rather we classify the name into the hunt bar of analogous types, and recommend each name name according to the preference of its hunt bar.

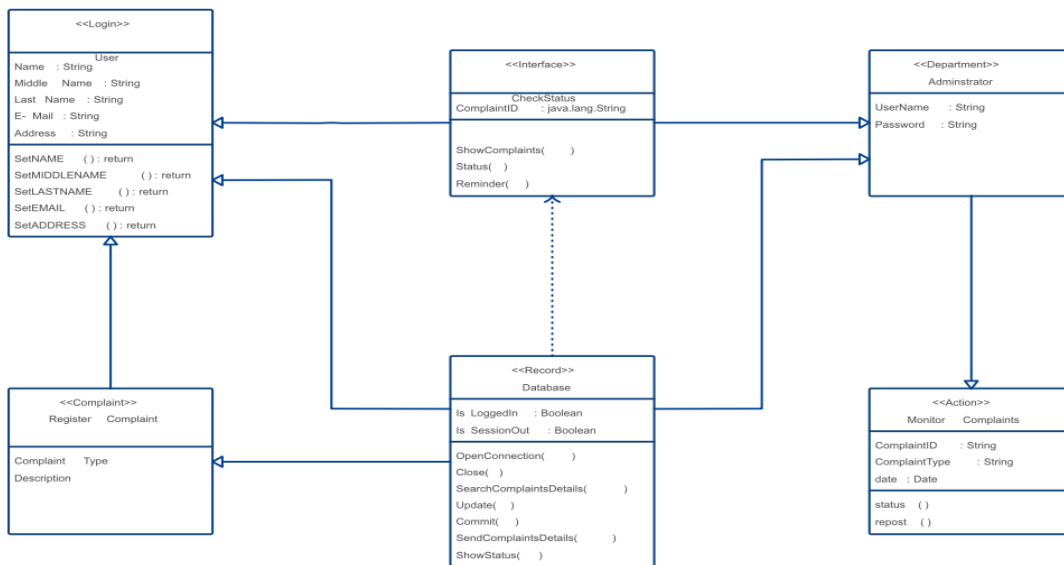
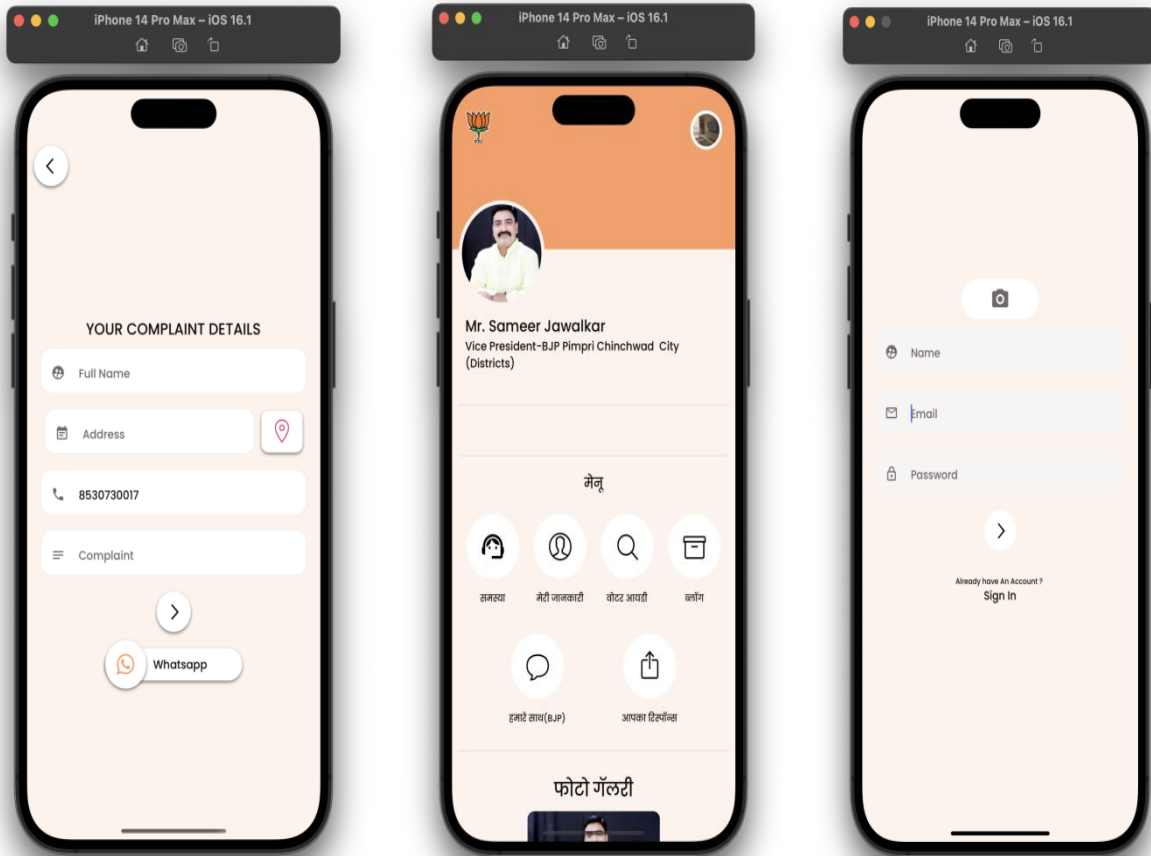


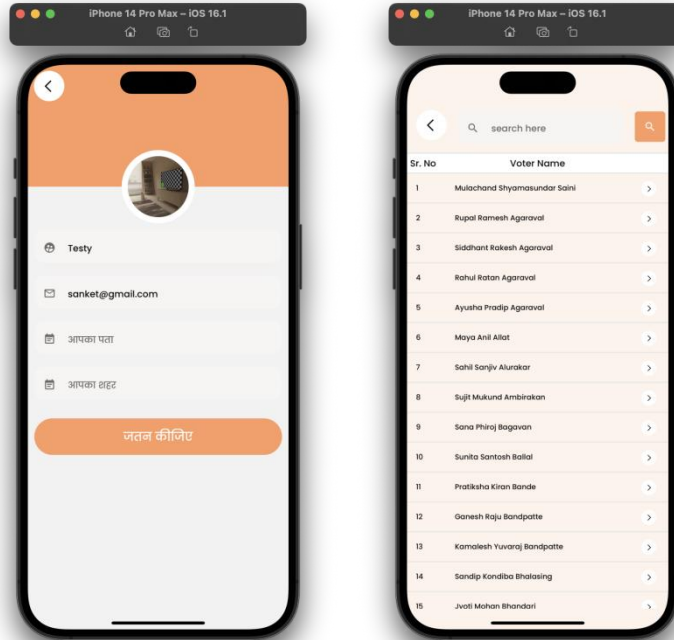
Figure-1: System Architecture



we are focusing on real world problem as we know the day to day life of every normal person is not easy, they have some issues like water supply, light issues, road issues job issue. our project is aspired for to overcome this issues. In our project there have a complaint box in that the peoples write down there complaints and we just trying to solve those problems as early as possible, after solving the problems we will get the feedback from the peoples and then we add it into our blog's. we have created a blog's page in that we are show our social work, in that we have photos and text of what social work we have done. After that we have created the team up ,in that every person can join us to help other peoples. after sending the blogs or notification from admin, we have created notification receive for user side. the blog have gallery which are show are going to showcase on main screen (only photos or banner).our project have a login/logout and forgot password and also have a create new account functionality. The cooperative filtering algorithm is the fashion which is used to filter the Voter detail severy stoner can search his name in any format for that thing we need to search every single word with database affect name and that the whole thing about these algorithm. In this algorithm, the druggies looks at the choosers they may find anther's name or own name are in sameer jawalkars shield or not. In cooperative Filtering algorithm, it finds analogous choosers and recommends what the similarity name like. In recommendation system, it do n't use the features of the particulars to recommend, rather we classify the name into the hunt bar of analogous types, and recommend each name name according to the preference of its hunt bar.In computer wisdom, a succession algorithm or periodical algorithm is an algorithm that's executed succession ally formerly through, from launch to finish, without other processing executing as opposed to coincidentally or in parallel. The term is primarily used to differ with concurrent algorithm or resembling algorithm; most standard computer algorithms are succession algorithms, and not specifically linked as similar, as succession is a background supposition. Concurrency and community are in general distinct generalities. but they frequently lap numerous distributed algorithms are both concurrent and resembling – and therefore" succession" is used to differ with both, without distinguishing which one However, the opposing dyads succession/ concurrent and periodical/ parallel may be used, If these need to be distinguished.

RESULT ANALYSIS





CONCLUSION

These application are splatted in 2 part one application is made for users and one for admin both have different approaches and they both required one single sort of database to put and retrieve value by these study report now understand what things that we need really take care in and how much functionality the application have basically the functionality are made for user app and admin app is handling those things but because its a sponsor project the client requirement is also matter for use if client want to use another way for doing the thing they we need to do some changes into it as well and may impact on our algorithms or some basic things.

ACKNOWLEDGEMENT

We would like to express our deepest appreciation to all those who have contributed to the completion of this research paper on election candidate profiles. A special thanks to our advisor, Prof. Anjali S.More, for their guidance and support throughout the research process. We would also like to thank the election officials and candidates who provided us with valuable information and insights. Finally, we would like to acknowledge the Suman Ramesh Tulsiani Technical Campus (Computer Engineering Department) for providing us with the necessary resources to conduct this research.

REFERENCES

- [1]. Thivanon Kansuwan, Thawatchai chomaski: Authentication Model using the Bundled CAPTCHA OTP Instead of Traditional Password 2019,IEEE.
- [2]. Kewal shah, Harsh Sinha, Payal mishra : Analysis of Cross-Platform Mobile App Development Tools,2019 IEEE.
- [3]. Feyzullah Kalyoncu, Engin Zeydan, Ibrahim Onuralp Yigit, and Ahmet Yildirim : A Customer ComplaintAnalysis Tool for Mobile Network Operators,2018 IEEE.
- [4]. Anik Hanifatul Azizah, Siti Zuliatul Faidah, Muhammad Bahrul Ulum, Putri Handayani : Exploration of React Native Framework in designing a Rule-Based Application for healthy lifestyle education,2021 IEEE.
- [5]. Shpetim Kadrija, Agon Memeti, Shkurte Luma-Osmani : Development of mobile app through React Native hybrid framework,2022 IEEE.
- [6]. Shaymaa Sayed El-Kaliouby, Sahar Selim, Ahmed H. Yourself: Native Mobile Applications UI Code Conversion,2021 IEEE.



- [7]. Hugo Brito, Álvaro Santos, Jorge Bernardino, Anabela Gomes : Learning analysis of mobile JavaScript frameworks,2019 IEEE.
- [8]. Andre Julian Irawan, Fenina Adline Twince Tobing, Eunike Endariahna Surbakti : Implementation of Gamification Octalysis Method at Design and Build a React Native Framework Learning Application,2021 IEEE.
- [9]. AnshulVarshav Borawake, Minal Shahakar : Embankment Protection - React Native Application Cross-Platform Application for protection of embankments by crowd sourced data,2022 IEEE.
- [10]. Xingwei Zhou, Wenshan Hu, Guo-Ping Liu : React-Native Based Mobile App for Online Experimentation,2020 IEEE.
- [11]. Kamal Kishore, Shanu Khare, Vaibhav Uniyal, Sahil Verma : Performance and stability Comparison of React and Flutter: Cross-platform Application Development,2023 IEEE.
- [12]. Hugo Brito, Álvaro Santos, Jorge Bernardino. Anabela Gomes : Mobile development in Swift, Java and React Native: an experimental evaluation in audioguides,2019 IEEE.



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Sanket Sabale

Student, Suman Ramesh Tulsiani Technical Campus, Department of Computer
Engineering, Pune, Maharashtra, India

TITLE OF PAPER

Complaint Box Using Cross Platform Development

has been published in

IJARESM, Impact Factor: 7.429, Volume 11 Issue 5, May- 2023

Paper Id: IJ-0405231086

Certificate No.: 055231551

Date: 05-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Vaishnavi Ghosalkar

Department of Computer Student Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Facial Emotion Recognition System (FERS) Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-1405231320

Certificate No.: 225230952

Date: 22-05-2023



Website: www.ijaresm.com

Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Pooja Pawar

Department of Computer Engineering, Professor of Department, SRTTC FOE, SPPU,
MH, India

TITLE OF PAPER

**Facial Emotion Recognition System (FERS) Using Machine
Learning**

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-1405231320

Certificate No.: 225230950

Date: 22-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Eshwari Kedari

Department of Computer Student Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Facial Emotion Recognition System (FERS) Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-1405231320

Certificate No.: 225230954

Date: 22-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Dhanashri Kedari

Department of Computer Student Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Facial Emotion Recognition System (FERS) Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-1405231320

Certificate No.: 225230956

Date: 22-05-2023



Website: www.ijaresm.com

Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Sarvesh Pawaskar

Department of Computer Student Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Facial Emotion Recognition System (FERS) Using Machine Learning

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-1405231320

Certificate No.: 225230958

Date: 22-05-2023



Website: www.ijaresm.com

Email: editor.ijaresm@gmail.com



Authorized Signatory



International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05 /Issue 05 /50500303631

Date: 30/05/2023

Certificate of Publication

This is to certify that author "Dhanashri Kedari" with paper ID "IRJMETS50500303631" has published a paper entitled "FACIAL EMOTION RECOGNITION SYSTEM (FERS) USING MACHINE LEARNING" in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Dhanashri

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05 /Issue 05 /50500303631

Date: 30/05/2023

Certificate of Publication

This is to certify that author "Pooja Pawar" with paper ID "IRJMETS50500303631" has published a paper entitled "FACIAL EMOTION RECOGNITION SYSTEM (FERS) USING MACHINE LEARNING" in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05 /Issue 05 /50500303631

Date: 30/05/2023

Certificate of Publication

This is to certify that author "Eeshwari Kedari" with paper ID "IRJMETS50500303631" has published a paper entitled "FACIAL EMOTION RECOGNITION SYSTEM (FERS) USING MACHINE LEARNING" in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05 /Issue 05 /50500303631

Date: 30/05/2023

Certificate of Publication

This is to certify that author "Sarvesh Pawaskar" with paper ID "IRJMETS50500303631" has published a paper entitled "FACIAL EMOTION RECOGNITION SYSTEM (FERS) USING MACHINE LEARNING" in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05 /Issue 05 /50500303631

Date: 30/05/2023

Certificate of Publication

This is to certify that author "Vaishnavi Ghosalkar" with paper ID "IRJMETS50500303631" has published a paper entitled "FACIAL EMOTION RECOGNITION SYSTEM (FERS) USING MACHINE LEARNING" in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com



FACIAL EMOTION RECOGNITION SYSTEM (FERS) USING MACHINE LEARNING

Pooja Pawar*¹, Vaishnavi Ghosalkar*², Eeshwari Kedari*³, Dhanashri Kedari*⁴,
Sarvesh Pawaskar*⁵

*¹Professor Of Department, Department Of Computer Engineering, SRTTC FOE, Pune, MH, India

*^{2,3,4,5}Student, Department Of Computer Engineering, SRTTC FOE, Pune, MH, India

DOI : <https://www.doi.org/10.56726/IRJMETS40828>

ABSTRACT

Face identification has been around for a while. Moving forward, it will be possible to assess employee emotion based on facial expressions, internal experiences, and recordings in the form of video, electric signals, or images. In order for cutting-edge artificial intelligence systems to replicate and forecast face reactions, human emotion recognition is critically required. This might help people make informed decisions about things like purpose determination, offering advertising, and security-related dangers. The human eye can easily identify emotions in images or videos, but computers find it more challenging to do so, necessitating the employment of different image processing techniques for feature extraction. Several machine learning approaches are suitable for this task.

Before being evaluated against an adequate dataset for any detection or recognition, machine learning algorithms must first be trained. This study looks into a few feature extraction methods and machine learning algorithms that could help identify human mood precisely. In this research, the Facial Emotion Recognition System (FERS) has been presented to automatically detect employee emotions in real time using machine learning. The dataset was used to train the machine learning model. The FERS system can identify six different emotions, including happiness, sadness, surprise, fear, disgust, and fury, by processing the collected images. Results indicate that the intended objectives were achieved. The FER-2013 dataset was used to train the machine learning model. The facial expression image is categorised using neural networks and support vector machines (SVM), which also aid in predicting the right image based on the target image.

Keywords: Local Binary Pattern (LBP), Support Vector Machine (SVM), and Facial Expression Recognition (FER).

I. INTRODUCTION

Overview:

In general, gestures, facial expressions, and unconscious languages are all nonverbal ways that human beings can communicate their intentions and sentiments. Individuals may find this method to be a highly useful nonverbal communication technique. The system's ability to accurately identify or extract face expression from an image is key. The technique is becoming more and more popular since it has potential uses in a wide range of fields, including lie detection, health assessment, and human-computer interaction. The Facial Action Coding System (FACS), which was developed by Ekman in 2002 and is widely used, was first introduced in 1978. People regularly recognise emotions by the particular characteristics they exhibit as part of a facial expression. For example, a smile or an upward shift of the corners of the lips are undoubtedly indications of satisfaction. Similar to how extra deformations specific to each emotion might help to distinguish one emotion from another. Research on the automatic recognition of facial expressions addresses the problems related to the representation and categorization of static or dynamic aspects of these deformations of face pigmentation.

In a variety of circumstances where extra security or private information about the person is required, human emotion detection is applied. We might need to implement a second line of defence where the emotion is also recognised in addition to the face. After face detection, this might be seen as the next stage. It can be useful to validate that the topic in the picture isn't just a flat representation by doing this.

As we've seen, security is the main basis for identifying someone. It might be based on voice recognition, passwords, finger print matching, or retina detection. It can be essential to comprehend the person's intentions in order to avert risks. This can be helpful in sensitive locations like airports, sporting events, and other public

gatherings. There are eight categories of human emotions: fear, disgust, contempt, anger, surprise, sadness, happiness, and neutral. These feelings are quite understated. Due to the limited amount of facial muscle contortions, it can be difficult to distinguish between them because even a slight variation can cause a change in expression.

Additionally, as emotions are highly context dependent, even the same person may display the same emotion differently. Even if we can narrow our attention to just the parts of the face that exhibit the most emotions, such as the area surrounding the mouth and eyes, it is still crucial to understand how we extract these gestures and classify them. For these tasks, neural networks and machine learning have been applied with positive results.

Pattern recognition and classification have been shown to benefit greatly from machine learning techniques. The features are the most crucial components of any machine learning system. In this project, we'll examine the extraction and modification of features for algorithms like Support Vector Machines.

Motivation:

The necessity to protect information or physical property security is growing in importance and difficulty in today's networked society. The rate of crime is rising daily in nations like Nepal. There are no automated systems that can monitor an individual's activity. If we could track people's expressions automatically, we could easily find criminals because facial expressions fluctuate while engaging in different tasks.

We decided to develop a facial expression recognition system as a result. We developed an interest in this subject after reading a few papers in this area. The papers were published in accordance with how the systems for accurate and reliable face expression recognition systems were created. We are therefore extremely driven to create a system that can track a single person's activity and recognise face emotion.

II. METHODOLOGY

Problem Definition and Objectives

- Facial expressions are helpful for effective communication. Six basic expressions—joy, sadness, anger, disgust, fear, and surprise—are the focus of the majority of facial expression recognition research and systems. It is discovered that there is not enough space to fully describe all face expressions, so these expressions are divided into groups depending on facial movements.
- It can be difficult to detect faces and recognise facial expressions since it's crucial to concentrate on basic factors like face structure and alignment.
- Analysing the photographs from the vast collection is difficult due to how similar each image appears.
- To avoid this problem and improve the system's effectiveness and dependability, we are using machine learning classification approaches.

The objective of this project is,

- Using the FER-2013 dataset, create a face expression recognition system.
- To investigate the application of machine learning algorithms in computer vision.
- To use ANN and SVM to identify emotion, enabling intelligent human-computer interaction.

Tools and Technologies Used:-

- Pycharm IDE: The best tool for boosting Python developers' efficiency is PyCharm. An comprehensive development environment that works well. The autocomplete syntax tool is quite beneficial and saves a tonne of effort, which speeds up turnaround.
- Python 3.9: In order to allow Python project maintainers more time to plan the removal of the Python 2 support and the addition of support for Python 3.9, Python 3.9 is the last version to provide the Python 2 backward compatibility layers.

Algorithm Details:

Data acquired using the feature extraction method has a very high dimensionality, thus it is decreased using classification. The Support Vector Machine algorithm will be used to classify objects, hence features should take distinct values for objects belonging to different classes.

Support Vector Machines:

In many different pattern recognition tasks, SVM is commonly employed. Modern statistical learning theory serves as the foundation for the cutting-edge machine learning approach known as SVM. SVM is capable of separating classes as effectively as possible. SVMs that classify facial expressions are trained using the proposed characteristics. SVMs, in general, are the maximal hyperplane classification approach that, by relying on results from statistical learning theory, promises excellent generalisation performance. Support vector machines (SVM) are a useful tool for analysis when a set of data has more predictions than observations.

III. MODELING AND ANALYSIS

Class Diagram:

Below Fig.3.1. is the class diagram of project. Its shows the graphically interaction between different entities like, Fers, Evaluation, Feature Extraction etc., You can use class diagrams to model the objects that make up the system, to display the relationships between the objects, and to describe what those objects do and the services that they provide. It shows graphical representation of relationship between all the entities.

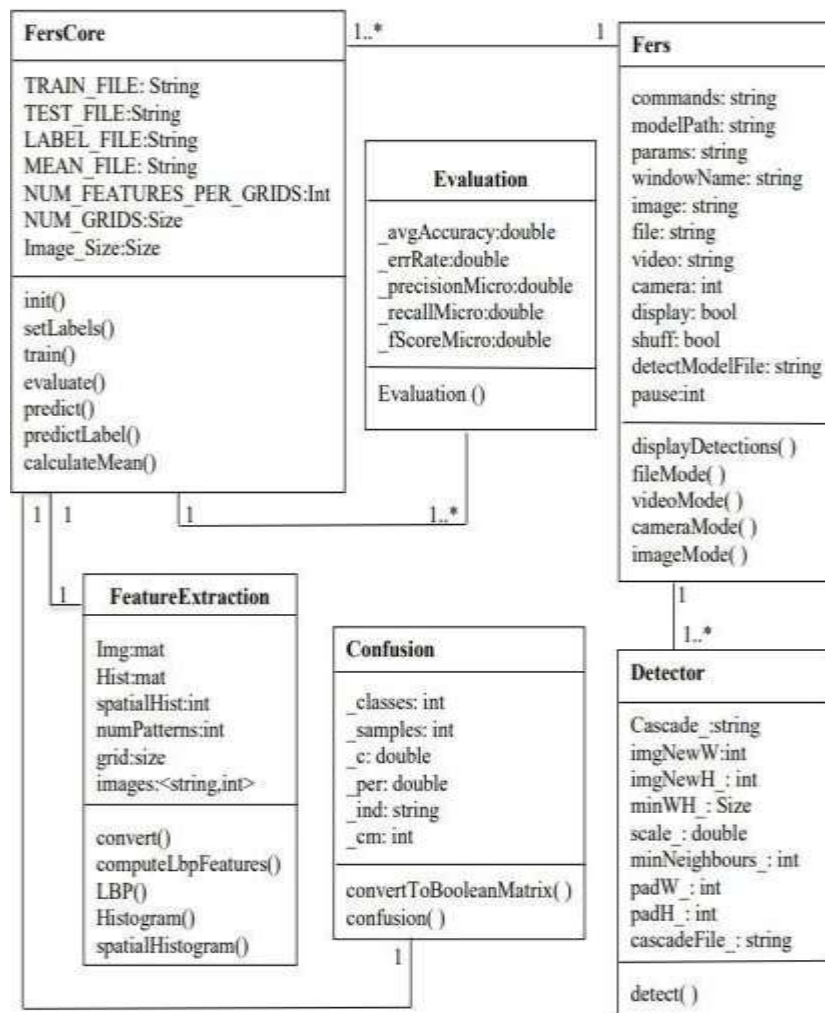


Fig. 3.1 Class Architecture

Sequence Diagram:-

The project's sequential work flow is represented in the diagram below. The event diagram is another name for a sequence diagram. such as Trainer, Tester, and System events. These are the events taking place in the project. It depicts the actor-object interaction during an event. Event representation is done in a sequential fashion. The model will initially be trained using ML methods. The model will then be put to the test using samples from the dataset, and the results will be sent to the actor to produce the result.

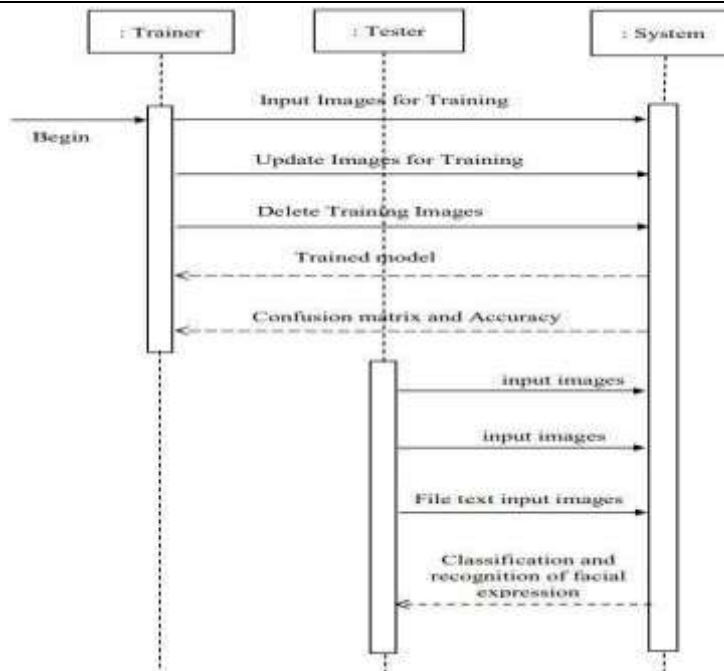


Fig:3.2 Sequence Architecture

System Architecture:-

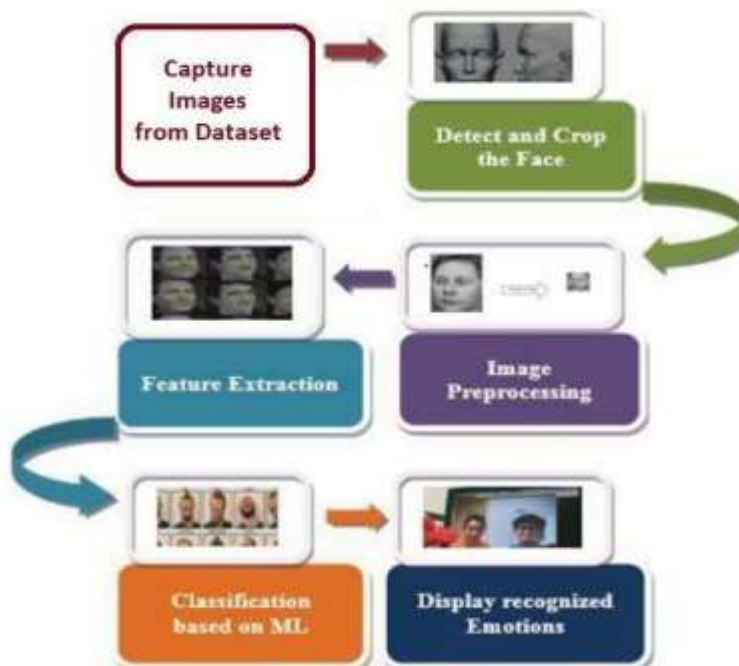


Fig: 4.1. System Architecture

Employee emotions were not given much consideration in the early days of an organisation. However, a lot of research is currently being done to determine how emotions impact work output, morale, and organisational effectiveness. Happy feelings among all employees are always beneficial to the development of the business because they have a direct impact on a variety of current aspects, including customer care service, employee retention, organization's capital investment, and others. As a result, in the current environment, employee emotion detection is crucial to the success and wellbeing of both employers and employees.

In this study, a Facial Emotion Recognition System (FERS) has been presented to automatically and instantly identify employee emotions using machine learning. This technique enables the employer to decide more effectively what is best for the welfare of their staff.

IV. RESULT

Facial expression recognition system is a technology which uses biometric/face detection scanner/Web cam to detect emotions in human faces. More precisely, this technology is a sentiment analysis tool and is able to automatically detect the six basic or universal expressions: happiness, sadness, anger, surprise, fear, and disgust.



Fig 1.1: Image Processing

V. CONCLUSIONS

A system for categorizing facial expressions is suggested in this work. Face identification and facial expression extraction are useful for a variety of applications, including robotic vision, video surveillance, digital cameras, security, and human-computer interaction. The objective of this project was to develop a facial expression recognition system that makes use of computer visions and enhances the advanced feature extraction and classification of face expression recognition.

ACKNOWLEDGEMENT

Inspiration and encouragement during presentations have always been crucial to the accomplishment of any endeavour. We would like to extend our sincere gratitude to Prof. Pooja Pawar, our BE Project Guide, for her encouragement and assistance during our project, particularly for the helpful ideas. We would like to express our gratitude to Prof. Anjali M. Dalvi, Head of the Department of Computer Engineering, for her unflinching support during the entirety of our senior project effort.

VI. REFERENCES

- [1] Junkai Chen, Zenghai Chen, Zheru Chi and Hong Fu (2020), "Facial Expression Recognition Based on Facial Components Detection and HOG Features". Scientific Cooperations International Workshops on Electrical and Computer Engineering Subfields 22-23 August 2014, Koc University, ISTANBUL/TURKEY.
- [2] A. C. Le Ngo, Y. H. Oh, R. C. W. Phan and J. See (2016). "Eulerian emotion magnification for subtle expression recognition". 2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Shanghai.
- [3] K. M. Rajesh and M. Naveenkumar (2016). "A robust method for face recognition and face emotion detection system using support vector machines". 2016 International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT), Mysuru.
- [4] H. Ebine, Y. Shiga, M. Ikeda and O. Nakamura (2000). "The recognition of facial expressions with automatic detection of the reference face". 2000 Canadian Conference on Electrical and Computer Engineering. Conference Proceedings. Navigating to a New Era (Cat. No.00TH8492), Halifax, NS, 2000, pp. 1091-1099 vol.2.
- [5] Zhang, S., Zhao, X., & Lei, B. (2012). Facial expression recognition based on local binary patterns and local fisher discriminant analysis. WSEAS Trans. Signal Process, 8(1), 21-31.
- [6] Happy, S. L., George, A., & Routray, A. (2012). A real time facial expression classification system using Local Binary Patterns. In Intelligent Human Computer Interaction (IHCI), 2012 4th International Conference on (pp. 1-5). IEEE.
- [7] Yusra Khalid Bhatti, Afshan Jamil, Nudrat Nida, Muhammad Haroon Yousaf, Serestina Viriri, and Sergio A. Velastin (2021). "Facial Expression Recognition of Instructor Using Deep Features and Extreme Learning Machine". Computational Intelligence and Neuroscience, Hondawi, Vol. 2021, Article ID 5570870, 17 pages.



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: V Month of publication: May 2023

DOI: <https://doi.org/10.22214/ijraset.2023.52669>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Lead Generation

Anjali S. More¹, Mahera Nadaf², Omkar Gaware³, Sidhant Sancheti⁴, Simran Vishwakarma⁵

¹Assistant Professor Department of Computer Engineering, SRTTC FOE, Maharashtra, India

^{2, 3, 4, 5}Student, Department of Computer Engineering, SRTTC FOE, Maharashtra, India

(Savitribai Phule Pune University)

Abstract: AI-based tools and technologies have emerged as successful solutions for a variety of business problems, including sales and marketing optimization. Although social media marketing is widely used today, it requires domain expertise and human effort, making it expensive, especially for Small and Medium Enterprises (SMEs). To tackle this problem, we recommend an AI-powered system and approach for automated advertising campaign generation, making use of a data-driven approach.

Our Lead Gen tool allows for the tracking and management of every lead based on campaign specifications. With advanced automation, leads are captured, qualified, and instantly distributed to sales reps to ensure no leads are lost. The Lead Gen tool is divided into modules, with roles defined by department, enabling department heads to track campaign behaviour.

In addition, our system includes an inbuilt HRMS management system for leave management at the user level, with admin rights to approve or reject requests. As a web-based campaign management tool, it is efficient and can be accessed from any computer with an internet connection. We have also incorporated a Chat Bot, built using Artificial Intelligence, to address user queries. Our system is flexible, scalable, and offers data protection through the use of cloud computing. With fully redundant and replicated servers, downtime is prevented in case of a disaster.

User Level: The Lead Gen tool enables the tracking and management of leads according to campaign specifications, while the inbuilt HRMS management system facilitates leave management. The Chat Bot addresses user queries.

Admin Level: The admin has the rights to approve or reject leave requests through the HRMS management system. Chat Bot: The Chat Bot is built using Artificial Intelligence to address user queries.

Keywords: Web-Based, Investigation, Research, Industries, Visualization, Social Networking (Online), User Experience, User Interface Design, Marketing Management, Customer Relationship Management.

I. INTRODUCTION

Lead generation (or lead gen for short) refers to the use of AI-powered tools and technologies to automatically generate marketing campaigns. These systems rely on intelligent algorithms that can quickly process raw campaign data from various departments and generate reports. By using a data-driven approach, companies can optimize their sales and marketing efforts.

Effective campaign management is crucial to reaching customers in the best possible way, while meeting marketing objectives.

AI is also the driving force behind smart assistants that can be accessed on most mobile devices today.

A management system is a set of policies, processes, and procedures used by organizations to fulfil their objectives. These objectives can cover a range of operations, including human resource management, campaign status and reporting, data quality, and worker management. To ensure that users receive the most relevant campaigns, their interests are first analysed and compared to available campaigns on the system. This information is then used to provide users with the status of their campaigns.

II. METHODOLOGY

Insertion sort is an algorithm that sorts a list by consuming one input element at a time and producing a sorted output list. At each iteration, the algorithm takes an element from the input data, determines where it belongs in the sorted list, and inserts it there. This process continues until no more elements remain in the input. The sorting is typically done in-place, by iterating through the array and building the sorted list behind it. At each position in the array, the algorithm checks the value against the largest value in the sorted list. If the value is larger, it leaves the element in place and moves on. If it's smaller, it finds the correct position within the sorted list, shifts the larger values up to make room, and inserts the element into the correct position. The algorithm works by analysing a large group of users to find a smaller set with similar tastes to a particular user. It examines the items these users like and combines them to create a ranked list of suggestions. After k iterations, the resulting array has the property that the first k+1 entries are sorted (with +1 because the first entry is skipped). During each iteration, the algorithm removes the first remaining entry from the input and inserts it into the result at the appropriate position.

When selecting a sorting algorithm, it's important to consider the characteristics of the input list. Insertion sort is a good option if the list is mostly sorted, as it has a fast best-case running time. However, for larger or more unordered lists, algorithms with faster worst and average-case running times, like merge sort, are typically a better choice. Despite its limitations, insertion sort offers several advantages, including its simplicity, the preservation of relative order for items with equal keys, and the ability to sort a list in real-time as it's received. Additionally, it's efficient for small data sets and requires only a constant amount of additional memory space (i.e., $O(1)$) compared to other quadratic algorithms.

Insertion Sort Execution Example



Fig. 1

III. SYSTEM ANALYSIS

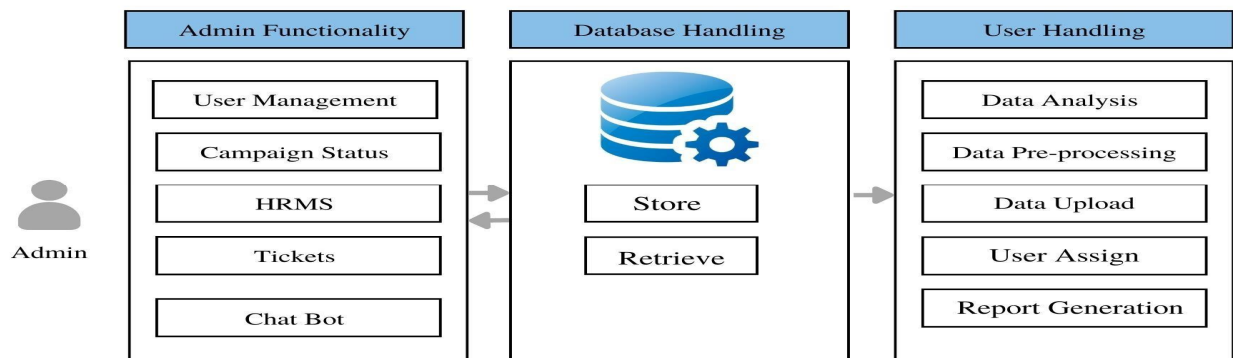


Fig. 2 Proposed System Architecture.

The workflow of the project is illustrated in Figure 2, which outlines the proposed system architecture for an online library book recommendation application. To enable this system, all books in the library are rated and the top-rated books are presented to users. The system is automated, allowing library users to quickly and easily select the best book in their area of interest based on the ratings. Users can borrow or purchase books, and have them delivered to their address, all from the convenience of their computer. To filter the books and provide personalized recommendations to users, a collaborative filtering algorithm is utilized. This approach takes into account user ratings and feedback to suggest books. User identification and authorization are required before shipping the book to the user's address. The system is accurate, reliable, and dynamic, and offers numerous benefits, including time and cost efficiency and reduced manual work. Figure 2 depicts the overall system architecture that will be implemented to achieve the library's goals.

IV. SOFTWARES REQUIRED

A. User Interfaces

Web Base Application Based on Lead Gen System using Artificial Intelligence.

B. Software Interfaces

- 1) Operating System: any
- 2) Coding Language: HTML5, CSS3, JavaScript, Bootstrap, AJAX, PHP, MySQL
- 3) Frontend: HTML5, CSS3, JavaScript, Bootstrap
- 4) Backend: AJAX, PHP
- 5) Database: MySQL
- 6) Browser: Chrome

C. Hardware Interfaces

- 1) Processor: Any
- 2) RAM: 512 MB (min)
- 3) Hard Disk: Not Required
- 4) Key Board: Standard Windows Keyboard
- 5) Mouse: Two or Three Button Mouse
- 6) Monitor: LCD/LED

V. RESULT

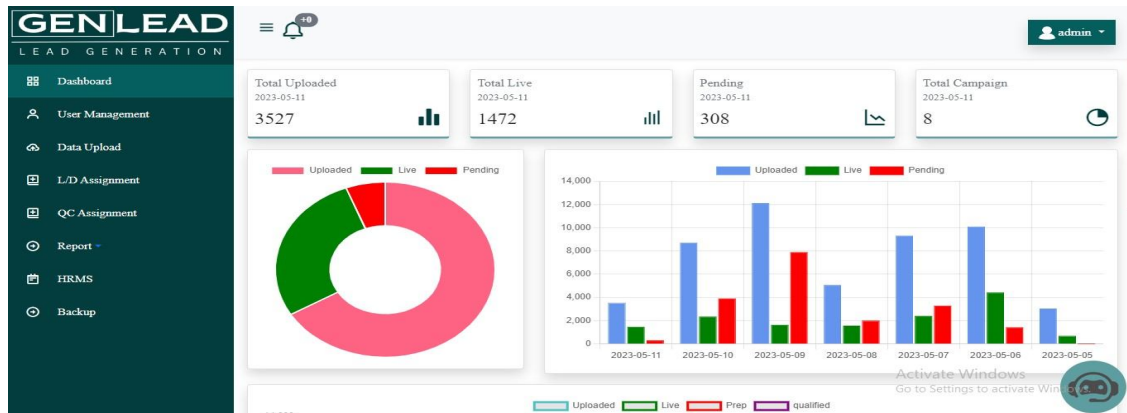
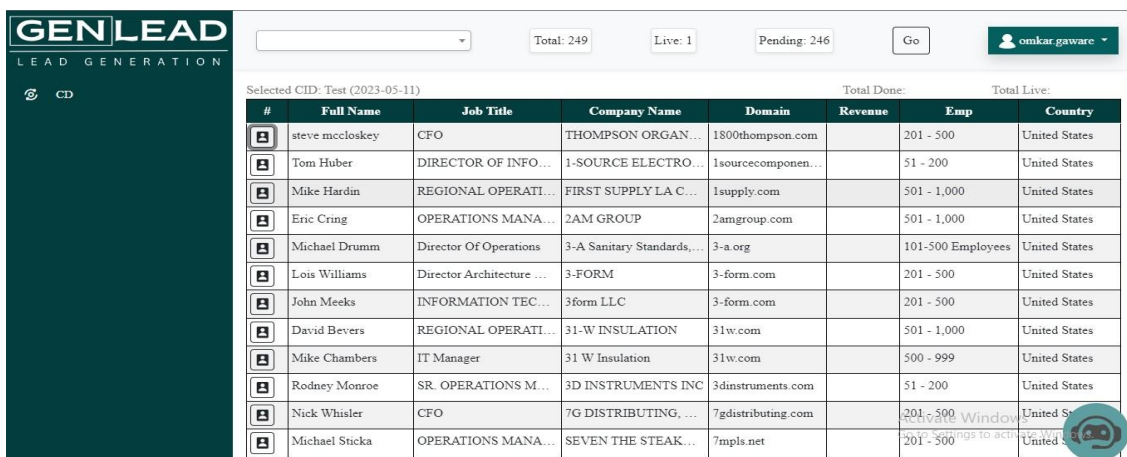


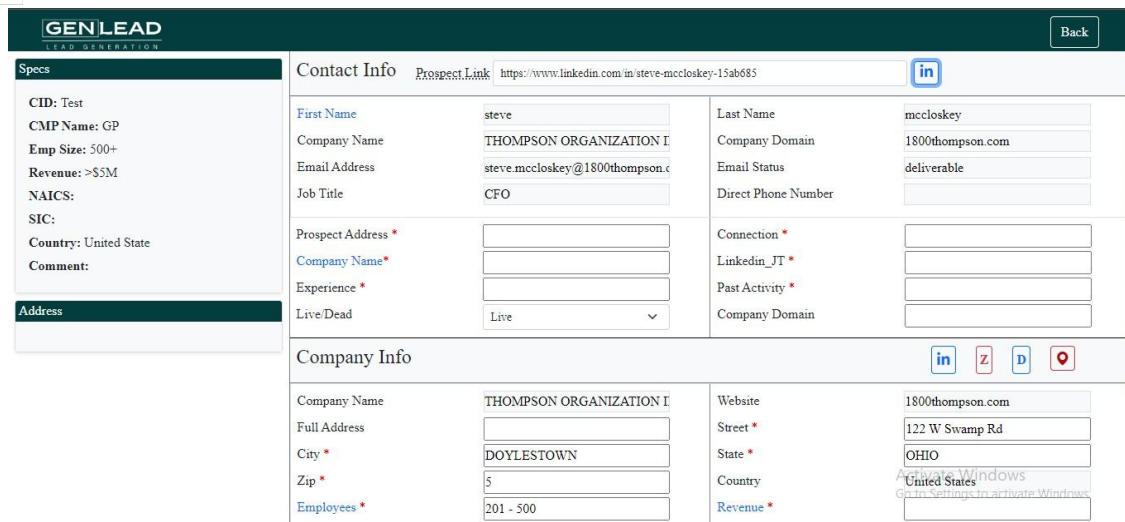
Fig. 3



Selected CID: Test (2023-05-11) | Total Done: 249 | Live: 1 | Pending: 246

#	Full Name	Job Title	Company Name	Domain	Revenue	Emp	Country
1	steve mccloskey	CFO	THOMPSON ORGAN...	1800thompson.com		201 - 500	United States
2	Tom Huber	DIRECTOR OF INFO...	1-SOURCE ELECTRO...	1sourcecomponen...		51 - 200	United States
3	Mike Hardin	REGIONAL OPERATI...	FIRST SUPPLY LA C...	1supply.com		501 - 1,000	United States
4	Eric Cring	OPERATIONS MANA...	2AM GROUP	2amgroup.com		501 - 1,000	United States
5	Michael Drumm	Director Of Operations	3-A Sanitary Standards...	3-a.org		101-500 Employees	United States
6	Lois Williams	Director Architecture ...	3-FORM	3-form.com		201 - 500	United States
7	John Meeks	INFORMATION TEC...	3form LLC	3-form.com		201 - 500	United States
8	David Bevers	REGIONAL OPERATI...	31-W INSULATION	31w.com		501 - 1,000	United States
9	Mike Chambers	IT Manager	31 W Insulation	31w.com		500 - 999	United States
10	Rodney Monroe	SR. OPERATIONS M...	3D INSTRUMENTS INC	3dinstruments.com		51 - 200	United States
11	Nick Whisler	CFO	7G DISTRIBUTING, ...	7gdistributing.com		201 - 500	United States
12	Michael Sticka	OPERATIONS MANA...	SEVEN THE STEAK...	7mpls.net		201 - 500	United States

Fig. 4



Specs

CID: Test
 CMP Name: GP
 Emp Size: 500+
 Revenue: >\$5M
 NAICS:
 SIC:
 Country: United State
 Comment:

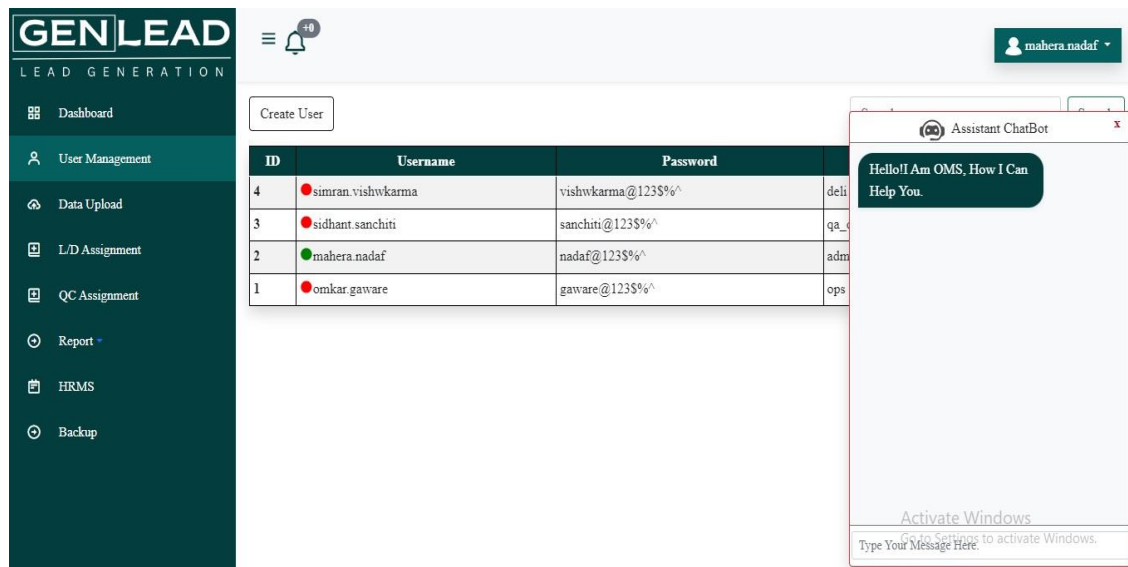
Contact Info Prospect Link: <https://www.linkedin.com/in/steve-mccloskey-15ab685>

First Name	steve	Last Name	mccloskey
Company Name	THOMPSON ORGANIZATION I	Company Domain	1800thompson.com
Email Address	steve.mccloskey@1800thompson.c	Email Status	deliverable
Job Title	CFO	Direct Phone Number	
Prospect Address *		Connection *	
Company Name *		Linkedin_JT *	
Experience *		Past Activity *	
Live/Dead	Live	Company Domain	

Company Info

Company Name	THOMPSON ORGANIZATION I	Website	1800thompson.com
Full Address		Street *	122 W Swamp Rd
City *	DOYLESTOWN	State *	OHIO
Zip *	5	Country	United States
Employees *	201 - 500	Revenue *	

Fig. 5



GENLEAD LEAD GENERATION

Dashboard
 User Management
 Data Upload
 L/D Assignment
 QC Assignment
 Report
 HRMS
 Backup

Create User

ID	Username	Password	
4	simran.vishwkarma	vishwkarma@123\$%^	deli
3	sidhant sanchiti	sanchiti@123\$%^	qa
2	mahera.nadaf	nadaf@123\$%^	adm
1	omkar.gaware	gaware@123\$%^	ops

Assistant ChatBot

Hello! I Am OMS, How I Can Help You.

Activate Windows
 Go to Settings to activate Windows.
 Type Your Message Here

Fig. 6

VI. CONCLUSIONS

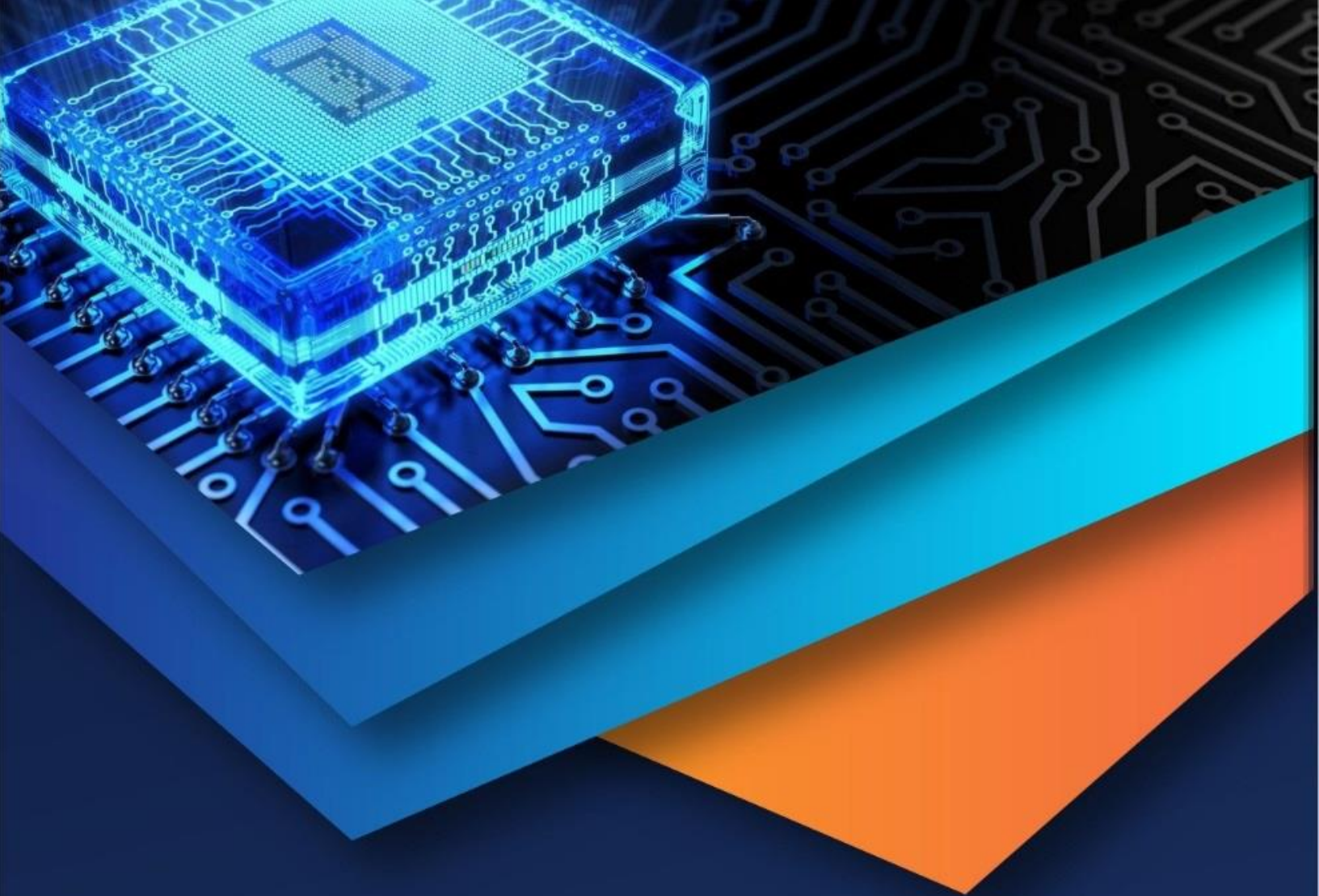
Employing a comprehensive campaign management tool can boost your productivity, regardless of your industry, target market, or company size. By utilizing a reliable lead generation system, you can minimize errors and streamline your campaign planning and management tasks. With the help of a lead generation tool, you can efficiently create, refine, and execute your optimal marketing campaigns. Following the complete set of instructions and keeping up to date with marketing campaign management can enhance your product or service's audience traffic.

REFERENCES

- [1] Rakesh Ranjan, Devika Verma -Department of Computer Science, San José State University, San José, USA, "Camelot:AI-Powered Campaign Management System" 2021 IEEE.
- [2] Fernando Paulo Belfo, Universidade do Minho, Braga, Braga, PT, "Method for Marketing Campaign Development through Database Marketing" 2019 IEEE.
- [3] Naing Naing Khin, Khin Mar some-Natural Language Processing Lab, University of Computer Studies, Yangon, Yangon, Myanmar"University Chatbot using Artificial Intelligence Markup Language" 2020 IEEE.
- [4] Hewage H.A.S.S, Hettiarachchi K.U, Jayarathna K.M.J.B, Hasintha K.P.C., A. N. Senarathne, J. Wijekoon , "Smart Human Resource Management System to Maximize Productivity". 2021 IEEE.



- [5] H. Hippner, W. Leusser, K.D. Wilde- Catholic University of Eichstaett-Ingolstadt, Germany, "Chatbot: An automated conversation system for the educational domain"
- [6] Chaffey, D., Ellis-Chadwick, F., Mayer, R., and Johnston, K., Internet Marketing - Strategy, Implementation and Practice. 3th ed. 2006, Harlow: Pearson Education Limited.
- [7] Keefe, L.M., Marketing defined. Marketing News, 2008. 42(1): p. 28-29.
- [8] Sheth, J.N. and Parvatiyar, A., The evolution of relationship marketing. International business review, 1995. 4(4): p. 397-418.
- [9] Belfo, F. and Sousa, R.D., Reviewing Business-IT Alignment Instruments Under SAM Dimensions. International Journal of Information Communication Technologies and Human Development, 2013. 5(3): p. 18-40.
- [10] B.A. Shawar, E. Atwell, "Arabic question-answering via instance based learning from an FAQ corpus", 2009.
- [11] S.A. Prasetya, A. Erwin, M. Galinium, "IMPLEMENTING INDONESIAN LANGUAGE CHATBOT FOR ECOMMERCE SITE USING ARTIFICIAL INTELLIGENCE MARKUP LANGUAGE (AIML)", 2018.
- [12] S. Hussain, O. A. Sianaki, N. Ababneh, "A Survey on Conversational Agents/Chatbots Classification and Design Techniques", 2019.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52669, entitled

*Lead Generation
by
Anjali S. More*

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023
in*

*International Journal for Research in Applied Science &
Engineering Technology
(International Peer Reviewed and Refereed Journal)*

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52669, entitled

Lead Generation

by

Mahera Nadaf

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By Mahera Nadaf

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52669, entitled

Lead Generation

by

Omkar Gaware

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52669, entitled

Lead Generation

by

Sidhant Sancheti

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

It is here by certified that the paper ID : IJRASET52669, entitled

Lead Generation

by

Simran Vishwakarma

after review is found suitable and has been published in

Volume 11, Issue V, May 2023

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429

LEAD GENERATION

Mahera Nadaf^{*1}, Omkar Gaware^{*2}, Sidhant Sancheti^{*3},

Simran Vishwakarma^{*4}

^{*1,2,3,4}Student, Department Of Computer Engineering, Suman Ramesh Tulsiani Technical Campus-
Faculty Of Engineering, Pune, Maharashtra, India.

DOI : <https://www.doi.org/10.56726/IRJMETS33564>

ABSTRACT

AI-Powered tools and technologies have proven to be successful in solving a variety of business problems including sales and marketing optimization. The social media marketing campaign is something widely used today but requires deep domain expertise and human efforts and hence an expensive approach. This problem is most prevalent in Small and Medium Enterprises (SMEs). We propose a system and methods for Automatic marketing Campaign generation using AI models with a Data-driven approach.

Lead Gen tool facilities you to track and manage every lead according to campaign specification. You will never lose a lead again as Lead Gen take care of capturing qualify and distribute your leads instantly to sales reps with advanced automation.

As it is module/divided as per depart wise role and then respective user level so every department heads has tracking system on behavior of each campaign run through on Lead Gen.

Also Inbuilt HRMS management system for Leave management at user level, admin to manage the rights to approved/not approved.

As it web based campaign management tool so enabled work efficiently and applications can be accessed from any computer through the internet.

Chat Bot: Build using Artificial intelligence as per possible queries with end user.

Increased flexibility and scalability and protecting your data: Through the use of cloud computing, servers can be fully redundant and replicated to prevent downtime as a result of a disaster

Keywords: Web-Based, Investigation, Research, Industries, Visualization, Social Networking (Online), User Experience, User Interface Design, Marketing Management, Customer Relationship Management.

I. INTRODUCTION

In simple words, a lead gen is a system and methods for Automatic marketing Campaign generation using AI models with a Data-driven approach. These systems were evolved as intelligent algorithms, which can generate reports of campaigns. They require a raw campaign data and the preprocessed data from different departments to generate reports in fraction of seconds. AI-Powered tools and technologies have proven to be successful in solving a variety of business problems including sales and marketing optimization. Campaign management enables companies to address customers in the best possible way with suitable campaigns according to given marketing objectives. AI is the backbone of smart assistants, which can be accessed through most phones on the market these days.

A management system is a set of policies, processes and procedures used by an organization to ensure that it can fulfill the tasks required to achieve its objectives. These objectives cover many aspects of the organization's operations (including human resource management system, campaign status/reports, quality of data and worker management.). The user interests are firstly analyzed and the result of the user profile analysis is compared with available campaigns on the system to provide status of the campaigns to the user.

II. METHODOLOGY

Insertion sort iterates, consuming one input element each repetition, and grows a sorted output list. At each iteration, insertion sort removes one element from the input data, finds the location it belongs within the sorted list, and inserts it there. It repeats until no input elements remain. Sorting is typically done in-place, by iterating up the array, growing the sorted list behind it. At each array-position, it checks the value there against the largest value in the sorted list (which happens to be next to it, in the previous array-position checked). If larger,

it leaves the element in place and moves to the next. If smaller, it finds the correct position within the sorted list, shifts all the larger values up to make a space, and inserts into that correct position.

It works by searching a large group of people and finding a smaller set of users with tastes similar to a particular user. It looks at the items they like and combines them to create a ranked list of suggestions. The resulting array after k iterations has the property where the first k + 1 entries are sorted (" +1" because the first entry is skipped). In each iteration the first remaining entry of the input is removed, and inserted into the result at the correct position.

Insertion Sort Be Used?

Insertion sort has a fast best-case running time and is a good sorting algorithm to use if the input list is already mostly sorted. For larger or more unordered lists, an algorithm with a faster worst and average-case running time, such as merge sort, would be a better choice. Insertion sort has several advantages including:

- The pure simplicity of the algorithm.
- The relative order of items with equal keys does not change.
- The ability to sort a list as it is being received.
- Efficient for small data sets, especially in practice than other quadratic algorithms — i.e. $O(n^2)$.
- It only requires a constant amount of additional memory space— $O(1)$.

Insertion Sort Execution Example

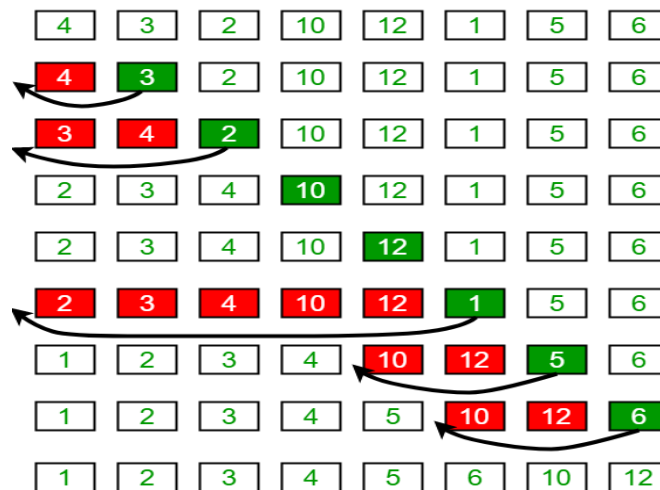


Figure 1

III. SYSTEM ANALYSIS

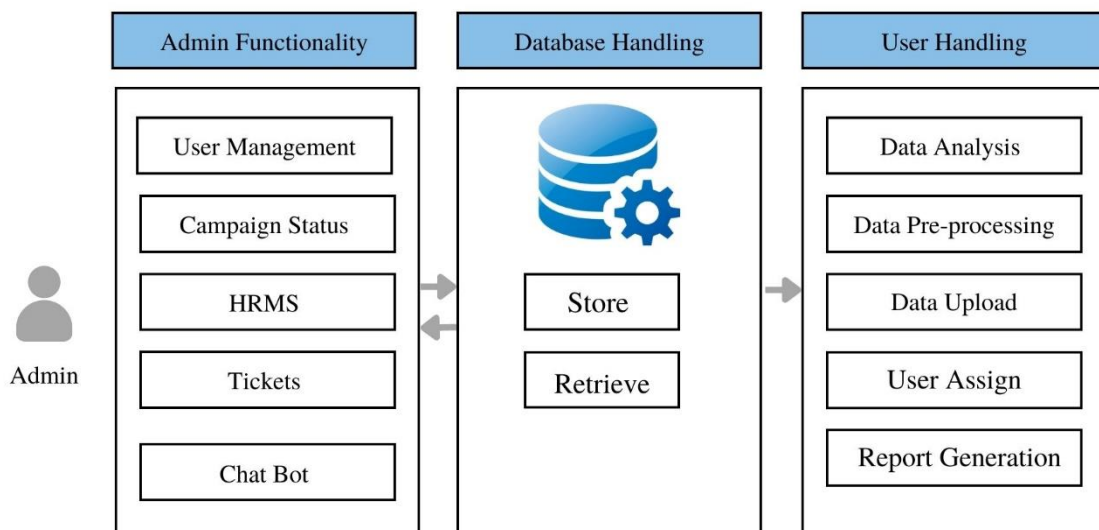


Figure 2: Proposed System Architecture.

The above Figure 2 defines the workflow of the project in a very simple way.

From figure 2 Proposed System Architecture, an online application is developed for the library book recommendation. During this system, all books within the library are given ratings. The top-rated books will be presented the users during this system. This is an automated system which is able to facilitate the library user to settle on the best version of the book of his/ her space of interest at intervals a few seconds reckoning on the ratings given thereto book. The user will select the book, borrow the book and even get the book delivered to his/ her address by simply sitting before of a computer. This technique uses a cooperative filtering algorithmic rule which filters the books supported the ratings and recommendations to the users. This system takes the user ratings and also the user feedback into thought to advocate books to the users. Though this technique gathers the user’s identification and authorization before shipping the book to the user address. This system is accurate, reliable and dynamic. The advantages of this system are it is time and cost- efficient and also reduces manual work. Above figure 2 shows the architecture of the overall system, which will be implemented to achieve the objective of the library to satisfy our goals.

IV. SOFTWARES REQUIRED

USER INTERFACES

Web Base Application Based on Lead Gen System using Artificial Intelligence.

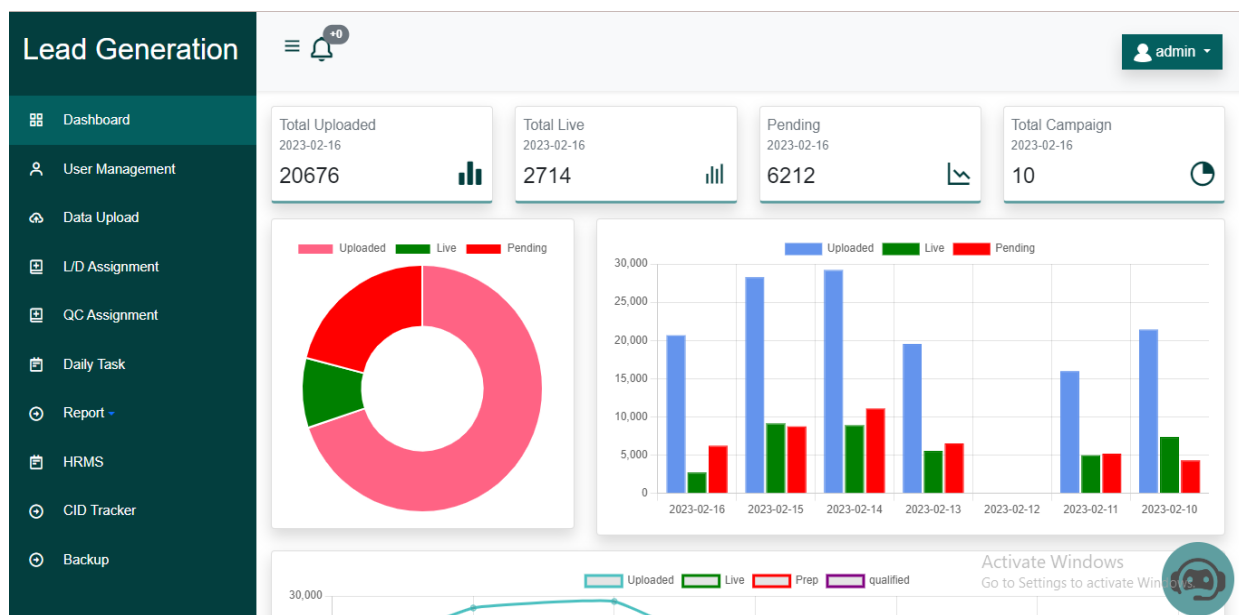
SOFTWARE INTERFACES

- Operating System: any
- Coding Language: HTML5, CSS3, JavaScript, Bootstrap, AJAX, PHP, MySQL
- Frontend: HTML5, CSS3, JavaScript, Bootstrap
- Backend: AJAX, PHP
- Database: MySQL
- Browser: Chrome

HARDWARE INTERFACES

- Processor : Any
- RAM : 512 MB(min)
- Hard Disk : Not Required
- Key Board : Standard Windows Keyboard
- Mouse : Two or Three Button Mouse
- Monitor : LCD/LED

V. RESULT



Result 1

Lead Generation

- Dashboard
- User Management
- Data Upload
- L/D Assignment
- QC Assignment
- Daily Task
- Report
- HRMS
- CID Tracker
- Backup

admin

Assign Task

42554-42562(263)(2023-02-16)

Jayesh Kale
 surekha toranagi
 digvijay mohite

Assign Data

Reassign Task

Reassign Data

Assistant ChatBot

Hello! Am OMS, How I Can Help You.

what is live ? |when the prospect is live ? |Live lead ?

1. If person working in a certain company regularly then he is live. 2. Live means the prospect given in your sheet is live in the company mentioned in your table. 3. Even is there is one connection of the prospect then the prospect is live. 4. If JT(job title) is

Type Your Message Here: activate Windows.

Result 2

Lead Generation

- Dashboard
- User Management
- Data Upload
- L/D Assignment
- QC Assignment
- Daily Task
- Report
- HRMS
- CID Tracker
- Backup

admin

Users Report

CID	Date	CD	Total Leads	Live	Pending	Assigned users	Uploaded By	Download
42291-42289	2023-02-16	0	2327	730	0	21	Sameer.Ghogre	Download
42554-42562	2023-02-16	0	263	170	0	2	Sameer Ghogre	Download
GP Non US	2023-02-16	0	7534	0	0	0	Vinayak Borade	Download
Zen	2023-02-16	0	905	556	4	7	Vinayak Borade	Download
NS	2023-02-16	0	4283	282	2456	12	Rrushabh Pisal	Download
42850	2023-02-16	0	44	22	0	4	Vinayak Borade	Download
43375	2023-02-16	0	2177	485	1430	8	Vinayak Borade	Download
42374	2023-02-16	0	997	410	291	12	Rrushabh Pisal	Download
43382-43430	2023-02-16	0	2116	92	1957	8	Vinayak Borade	Download
39408	2023-02-16	0	30	2	17	2	Vinayak Borade	Download
43123	2023-02-16	0	578	0	0	0	Vinayak Borade	Download
		0	21254	2749	6155			

Result 3

Lead Generation

- Dashboard
- User Management
- Data Upload
- L/D Assignment
- QC Assignment
- Daily Task
- Report
- HRMS
- CID Tracker
- Backup

admin

Specs

CID: 42374

CMP Name:

Emp Size:

Revenue:

NAICS:

SIC:

Country: United States

Comment: Live-Dead

Address

400 Atlantic Street, Stamford, Connecticut, United States, 06901

Contact Info [Prospect Link](#) <http://www.linkedin.com/in/melissa-rausch-0441a67>

First Name	Melissa	Last Name	Rausch
Company Name	Harman International Inds	Company Domain	harman.com
Email Address	melissa.rausch@harman.com	Email Status	deliverable
Job Title	Sr. Director Global Talent Acquisition	Direct Phone Number	
Prospect Address *		Connection *	
Company Name *		Linkedin_JT *	
Experience *		Past Activity *	
Live/Dead	Live	Company Domain	

Company Info

Company Name	Harman International Inds	Website	harman.com
Full Address	400 Atlantic Street, Stamford, Connecticut,	Street *	400 Atlantic Street
City *	Stamford	State *	Connecticut
Zip *	06901	Country	United States
Employees *	22000	Revenue *	8800000000
Phone Number *	(203) 328-3500	Phone Status	
SIC		NAICS	
Industry *	consumer electronics	IP Address *	199.27.116.69
CQ 1		CQ 2	
Source link if any		Disposition	

Result 4

www.irjmets.com

@International Research Journal of Modernization in Engineering, Technology and Science

[1043]

VI. CONCLUSION

A full-featured campaign management tool will help you work quicker, regardless of whatever sector you're in, the market you're targeting, or the size of your company. Using the most acceptable Lead Generation system, you can quickly decrease mistakes and simplify your campaign design and administration operations. You can now create, optimize, and deploy your ideal marketing campaigns through Lead Generation tool. Marketing campaign management can help you to improve the traffic of audience to your products or services if you follow the complete set of instructions and stay updated.

VII. REFERENCES

- [1] Rakesh Ranjan, Devika Verma -Department of Computer Science, San José State University, San José, USA, "Camelot:AI-Powered Campaign Management System" 2021 IEEE.
- [2] Fernando Paulo Belfo, Universidade do Minho, Braga, Braga, PT, "Method for Marketing Campaign Development Through Database Marketing" 2019 IEEE.
- [3] Naing Naing Khin, Khin Mar some-Natural Language Processing Lab, University of Computer Studies, Yangon, Yangon, Myanmar" University Chatbot using Artificial Intelligence Markup Language" 2020 IEEE.
- [4] Hewage H.A.S.S, Hettiarachchi K.U, Jayarathna K.M.J.B, Hasintha K.P.C., A. N. Senarathne, J. Wijekoon , "Smart Human Resource Management System to Maximize Productivity". 2021 IEEE.
- [5] H. Hippner, W. Leusser, K.D. Wilde- Catholic University of Eichstaett-Ingolstadt, Germany, "Chatbot: An automated conversation system for the educational domain"
- [6] Chaffey, D., Ellis-Chadwick, F., Mayer, R., and Johnston, K., Internet Marketing - Strategy, Implementation and Practice. 3th ed. 2006, Harlow: Pearson Education Limited.
- [7] Keefe, L.M., Marketing defined. Marketing News, 2008. 42(1): p. 28-29.
- [8] Sheth, J.N. and Parvatiyar, A., The evolution of relationship marketing. International business review, 1995. 4(4): p. 397-418.
- [9] Belfo, F. and Sousa, R.D., Reviewing Business-IT Alignment Instruments Under SAM Dimensions. International Journal of Information Communication Technologies and Human Development, 2013. 5(3): p. 18-40.
- [10] B.A. Shawar, E. Atwell, "Arabic question-answering via instance based learning from an FAQ corpus",2009.
- [11] S.A. Prasetya, A. Erwin, M. Galinium, "IMPLEMENTING INDONESIAN LANGUAGE CHATBOT FOR ECOMMERCE SITE USING ARTIFICIAL INTELLIGENCE MARKUP LANGUAGE (AIML)", 2018.
- [12] S. Hussain, O. A. Sianaki, N. Ababneh, "A Survey on Conversational Agents/Chatbots Classification and Design Techniques", 2019.



*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

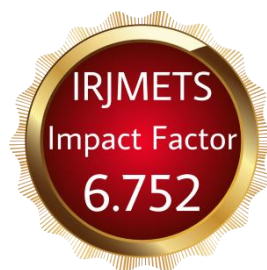
Ref: IRJMETS/Certificate/Volume 05/Issue 02/50200026476

Date: 18/02/2023

Certificate of Publication

This is to certify that author “Mahera Nadaf” with paper ID “IRJMETS502000026476” has published a paper entitled “LEAD GENERATION” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 02, February 2023

A. Dewati



Editor in Chief

We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

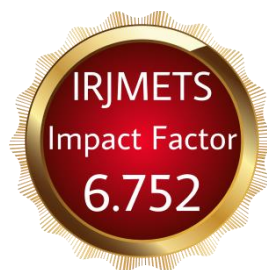
Ref: IRJMETS/Certificate/Volume 05/Issue 02/50200026476

Date: 18/02/2023

Certificate of Publication

This is to certify that author “Omkar Gaware” with paper ID “IRJMETS502000026476” has published a paper entitled “LEAD GENERATION” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 02, February 2023

A. Desai



Editor in Chief

We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

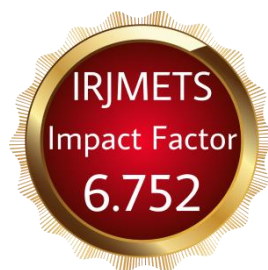
Ref: IRJMETS/Certificate/Volume 05/Issue 02/50200026476

Date: 18/02/2023

Certificate of Publication

This is to certify that author “Sidhant Sancheti” with paper ID “IRJMETS502000026476” has published a paper entitled “LEAD GENERATION” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 02, February 2023

A. Desai



Editor in Chief

We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

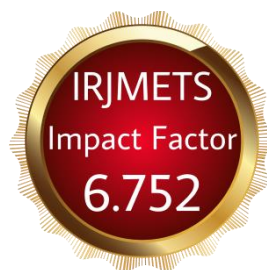
Ref: IRJMETS/Certificate/Volume 05/Issue 02/50200026476

Date: 18/02/2023

Certificate of Publication

This is to certify that author “Simran Vishwakarma” with paper ID “IRJMETS502000026476” has published a paper entitled “LEAD GENERATION” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 02, February 2023

A. Deyshi



Editor in Chief

We Wish For Your Better Future
www.irjmets.com





Cyber Security Intrusion Detection Adopting a Machine Learning Approach

Prof. Anjali S. More¹, Dhruv Rajesh Bhirud², Ariful Hauqe Mollah³,
Vaishnavi Vasudev Powar⁴

^{1,2,3,4}Department of Computer Engineering, Suman Ramesh Tulsiani Technical Campus-Faculty of Engineering, Pune, Maharashtra, India

ABSTRACT

The Intrusion network (INetwork) connects systems, applications, data storage, and services that may be a new gateway for cyber attacks as they continuously offer services in the organization. Currently, software piracy and malware attacks are high risks to compromise the security of the Intrusion network. These intrusions may steal important information that causes economic and reputational damages. In order to identify harmful activity on target computers, a number of systems currently exist; yet, occasionally an external user will produce malicious behaviour and get unauthorized access to the victims' computers. This behavior is referred to as nefarious actions or an intruder. In this paper, we have proposed a combined Machine learning approach to detect pirated software and malware-infected files across the Intrusion network. Machine Learning (ML) algorithms are applied in IDS in order to identify and classify security threats. Numerous machine learning and soft computing techniques are designed to detect the activities in real-time network log audit data. KKDDCUP99 and NLSKDD most utilized data sets to detect the Intruder on the benchmark data set. Two different techniques have been proposed a signature with detection and anomaly-based detection. The experimental analysis demonstrates SVM, Naïve Bayes, and ANN algorithms with various data sets and demonstrates system performance in the real-time network environment.

Keywords: Host Intrusion Detection System, Intrusion Detection System, Network Intrusion Detection System, Perimeter intrusion detection, SVM, Naïve Bayes.

INTRODUCTION

To put it simply, a security incident is when an unauthorized person gains access to a system or its resources without proper authorization. This can happen as a result of one security event or multiple security events. Intrusion Detection Systems (IDS) are used to detect security incidents, including those where unauthorized access is attempted or gained. Signature-based IDSs identify intrusions by matching them to known patterns of malicious instructions used by malware.

The IDS system identifies patterns called signatures. Signature-based IDS can detect attacks that match an existing pattern (signature) in the system. However, it is challenging to detect new malware attacks as their pattern (signature) is unknown. Anomaly detection is another technique where network traffic or host OS behavior is analyzed based on various parameters and compared to normal behavior. If there is any deviation from normal behavior, the system raises an alarm. There are two main categories of Intrusion Detection Systems:

- 1) Network Intrusion Detection System (NIDS): The function of the Network Intrusion Detection System (NIDS) is to capture packets from network traffic and inspect their headers using different criteria to detect any malicious activities.
- 2) Host Intrusion Detection System (HIDS): HIDS scrutinizes essential system files, process behaviors, infrequent resource usage, unauthorized access, and other factors.

In recent years, the application of machine learning has been employed to enhance intrusion detection systems. However, there is a pressing need for an updated and comprehensive classification and overview of recent research in this area. Many studies have used either the KDD-Cup 99 or the DARPA 1999 dataset to test the effectiveness of IDS development, but it remains unclear which data mining techniques are most efficient. Additionally, some IDS techniques have not taken into account the time needed to build the system, which is a crucial factor in determining the effectiveness of online IDSs.

High-profile instances of cybercrime have highlighted the ease with which cyber threats can spread globally, causing disruption to critical business services or facilities. Cybercriminals are motivated to steal information, illegally gain revenue, and identify new targets. Malware is deliberately created to exploit computer systems and take advantage of any vulnerabilities in intrusion detection systems. The Australian Cyber Security Centre (ACSC) conducted a critical examination in 2017 of the various levels of sophistication employed by attackers. Consequently, there is a pressing need to develop a reliable IDS that can detect new and advanced malware. The primary goal of IDS is to identify various types of malware at the earliest possible stage, which cannot be achieved by a conventional firewall. With the increasing prevalence of computer malware, the development of enhanced IDSs has become crucial.

METHODOLOGY

The methodology of building an intrusion detection system (IDS) using Support Vector Machines (SVM) involves the following steps:

- 1. Data Preparation:** The first step is to collect and pre-process the data. This involves selecting the relevant features and removing any redundant or irrelevant ones. The data should also be normalized or standardized to ensure that all features are on a similar scale.
- 2. Data Splitting:** After data pre-processing, the data is split into training and testing sets. The training set is used to train the SVM model, while the testing set is used to evaluate the model's performance.
- 3. SVM Model Training:** In this step, an SVM model is trained on the training set. The SVM algorithm finds the hyperplane that separates the normal data from the intrusion data with the maximum margin. The SVM algorithm also identifies the support vectors that are closest to the hyper plane.
- 4. Model Evaluation:** After training the SVM model, its performance is evaluated on the testing set. The performance metrics used to evaluate the model's performance may include accuracy, precision, recall, F1 score, and area under the receiver operating characteristic curve (AUC-ROC).
- 5. Deployment:** After the model has been trained and optimized, it can be deployed in a real-world environment for intrusion detection.

SYSTEM ANALYSIS

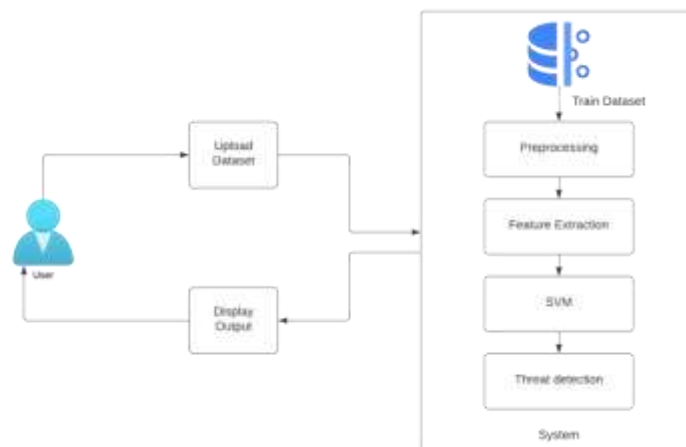


Fig 1 System Architecture

The working of the proposed technical study is illustrated in the above picture which shows the architecture of the following study. The user uploads the dataset of the network which is split between the training set and the testing set. After training and testing the data gets pre-processed and feature extraction is performed. The SVM algorithm is used for the detection of anomalies in the network traffic. Support Vector Machines (SVMs) are a type of machine learning algorithm that can be used for classification and regression tasks. The goal of an SVM is to find the best hyperplane that separates the data into different classes. The hyperplane that maximizes the margin between the classes is chosen as the best one. In SVM, the data points that are closest to the hyperplane are called support vectors. If any anomalies are found then the alarm will be turned on and detection of intrusion will be shown.

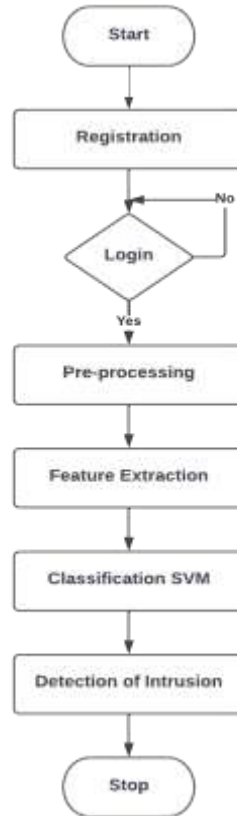


Fig 2 Flow chart

The above diagram is the activity diagram of the following proposed technical study. It illustrates the working of the study performed on the intrusion detection system. As we can see from the above activity diagram we have to register ourselves after starting the intrusion detection system and then login into our account. We then pre-process the dataset and give it as input in our machine learning model as testing. We already have trained our model with dataset from KDD cup 99. The SVM algorithm will now run the test and will give results whether there is anomaly present in it or not. If any anomaly or intrusion is detected then the alarm will be turned on else not. Thus after completing its working the console will go offline.

(SVM ALGORITHM) Algorithm

SVM, or Support Vector Machine, is a supervised learning algorithm used for classification and regression analysis. In classification problems, SVM tries to find a hyperplane that best separates the classes, and in regression problems, it tries to find a hyperplane that minimizes the error between the predicted and actual values.

The basic idea behind SVM is to find the best decision boundary, which is the hyperplane that maximizes the margin between the support vectors of the two classes. Support vectors are the data points closest to the decision boundary and are used to define the margin.

Support Vector Machines (SVMs) are a type of machine learning algorithm that can be used for classification and regression tasks. The goal of an SVM is to find the best hyperplane that separates the data into different classes. The hyperplane that maximizes the margin between the classes is chosen as the best one. In SVM, the data points that are closest to the hyperplane are called support vectors.

SVMs work by mapping the input data into a higher-dimensional space using a kernel function. The kernel function takes two data points as input and computes their similarity in the higher-dimensional space. The most commonly used kernel functions are linear, polynomial, and radial basis function (RBF).

SVMs have several advantages over other machine learning algorithms. They are effective in high-dimensional spaces and can handle a large number of features. They are also memory-efficient, as they only need to store the support vectors. SVMs are also versatile and can be used for both linear and nonlinear classification tasks.

One of the key parameters in SVM is the regularization parameter, which controls the trade-off between maximizing the margin and minimizing the classification error. If the regularization parameter is too high, the model may overfit the data, while if it is too low, the model may underfit the data.

SVMs have been successfully applied in many domains, including image classification, text classification, bioinformatics, and financial forecasting. They have also been used in anomaly detection and intrusion detection in network security.

Overall, SVMs are a powerful machine learning algorithm that can be used for classification and regression tasks. They are versatile, memory-efficient, and effective in high-dimensional spaces.

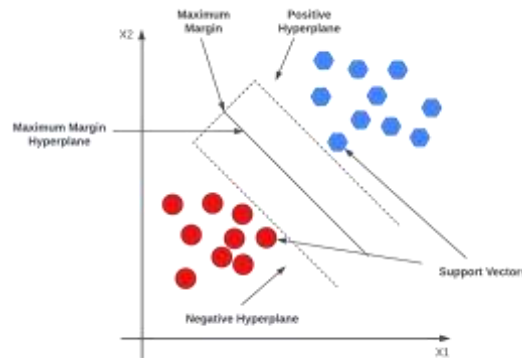


Fig. 3: SVM

SOFTWARES REQUIRED

Software Interfaces

1. Operating System: Windows 10

Latest Operating System that supports all types of installation and development Environment

2. IDE: Spyder, VS code

Best Integrated Development Environment as it gives possible suggestions at the time of typing code snippets that make typing feasible and fast.

3. Coding Language: Python Version 3.5

Highly specified Programming Language for Machine Learning because of the availability of High-Performance Libraries.

Hardware Interfaces

1. RAM: 8 GB

The laptop RAM minimum required is 8 GB. Hard Disk: 40 GB

A data set of CT Scan images is to be used hence minimum 40 GB Hard Disk memory

2. Processor: Intel i5 Processor

PyCharm IDE that Integrated Development Environment is to be used and data loading should be fast hence Fast Processor is required

RESULTS



Fig 4 Login and Register Page



Fig 5 Registration Form



Fig 6 Login form



Fig 7 IDS Control Panel



Fig 8 SVM Test Case1 Intrusion Detected Png



Fig 9: SVM test case2 Intrusion not detected.png

CONCLUSIONS

The study suggests using deep learning to create an efficient intrusion detection system (IDS) based on support vector machines (SVM). The accuracy of anomaly detection was tested using the NSL-KDD synthetic-based intrusion dataset. The researchers intend to implement this IDS in a cloud environment using deep learning techniques. They also analysed and compared different deep learning methods such as NB ANN, RF, and SVM to detect network intrusions on the NSL-KDD dataset.

REFERENCES

- [1]. J. Jabez, B. Muthu kumar" Intrusion Detection System (IDS): Anomaly Detection Using Outlier Detection Approach.
- [2]. Anna L. Buczak, Erhan GuvenA" Survey of Data Mining and Machine Learning Methods for Cyber Security Intrusion Detection.
- [3]. Satish Kumar ,Sunanda Gupta ,Sakshi Arora" Research Trends in Network-Based Intrusion Detection Systems: A Review.
- [4]. Sibi Chakkaravarthy Sethuraman, Sangeetha Dhamodaran, Vaidehi Vijaya kumar" Intrusion detection system for detecting wireless attacks in IEEE 802.11 networks.
- [5]. Huiwen Wang, Jie Gu, Shanshan Wang" An effective intrusion detection framework based on SVM with feature augmentation.
- [6]. Wathiq Laftah Al-Yaseen, Zulaiha Ali Othman, Mohd Zakree Ahmad Nazri" Multi-level hybrid support vector machine and extreme learning machine based on modified K-means for intrusion detection system.
- [7]. Iftikhar Ahmad, Mohammad Basher, Muhammad Javed Iqbal, Aneel Rahim" Performance Comparison of Support Vector Machine, Random Forest, and Extreme Learning Machine for Intrusion Detection.

PROPOSED TECHNICAL STUDY ON CYBER SECURITY INTRUSION DETECTION ADOPTING A MACHINE LEARNING APPROACH

**Prof. Anjali S. More^{*1}, Dhruv Rajesh Bhirud^{*2}, Ariful Hauqe Mollah^{*3},
Vaishnavi Vasudev Powar^{*4}**

^{*1}Professor, Department of computer engineering, Suman Ramesh Tulsiani Technical Campus-Faculty of Engineering, Kamshet, Pune, Maharashtra, India

^{*2,3,4}Student, Department of computer engineering, Suman Ramesh Tulsiani Technical Campus-Faculty of Engineering, Kamshet, Pune, Maharashtra, India

ABSTRACT

The Intrusion network (INetwork) connect systems, applications, data storage, and services that may be a new gateway for cyberattacks as they continuously offer services in the organization. Currently, software piracy and malware attacks are high risks to compromise the security of the Intrusion network. These intrusions may steal important information that causes economic and reputational damages. In order to identify harmful activity on target computers, a number of systems currently exist; yet, occasionally an external user will produce malicious behavior and get unauthorized access to the victims' computers. This behavior is referred to as nefarious actions or an intruder. In this paper, we have proposed a combined Machine learning approach to detect pirated software and malware-infected files across the Intrusion network. Machine Learning (ML) algorithms are applied in IDS in order to identify and classify security threats. Numerous machine learning and soft computing techniques are designed to detect the activities in real-time network log audit data. KDDCUP99 and NLSKDD are the most utilized data sets to detect the Intruder on the benchmark data set. Two different techniques have been proposed a signature with detection and anomaly-based detection. The experimental analysis demonstrates SVM, Naïve Bayes, and ANN algorithms with various data sets and demonstrates system performance in the real-time network environment.

Keywords: Host Intrusion Detection System, Intrusion Detection System, Network Intrusion Detection System, Perimeter intrusion detection, SVM, Naïve Bayes.

I. INTRODUCTION

To put it simply, a security incident is when an unauthorized person gains access to a system or its resources without proper authorization. This can happen as a result of one security event or multiple security events. Intrusion Detection Systems (IDS) are used to detect security incidents, including those where unauthorized access is attempted or gained. Signature-based IDSs identify intrusions by matching them to known patterns of malicious instructions used by malware.

The IDS system identifies patterns called signatures. Signature-based IDS can detect attacks that match an existing pattern (signature) in the system. However, it is challenging to detect new malware attacks as their pattern (signature) is unknown. Anomaly detection is another technique where network traffic or host OS behavior is analyzed based on various parameters and compared to normal behavior. If there is any deviation from normal behavior, the system raises an alarm. There are two main categories of Intrusion Detection Systems:

1) Network Intrusion Detection System (NIDS): The function of the Network Intrusion Detection System (NIDS) is to capture packets from network traffic and inspect their headers using different criteria to detect any malicious activities.

2) Host Intrusion Detection System (HIDS): HIDS scrutinizes essential system files, process behaviors, infrequent resource usage, unauthorized access, and other factors.

In recent years, the application of machine learning has been employed to enhance intrusion detection systems. However, there is a pressing need for an updated and comprehensive classification and overview of recent research in this area. Many studies have used either the KDD-Cup 99 or the DARPA 1999 dataset to test the effectiveness of IDS development, but it remains unclear which data mining techniques are most efficient. Additionally, some IDS techniques have not taken into account the time needed to build the system, which is a crucial factor in determining the effectiveness of online IDSs.

High-profile instances of cybercrime have highlighted the ease with which cyber threats can spread globally, causing disruption to critical business services or facilities. Cybercriminals are motivated to steal information, illegally gain revenue, and identify new targets. Malware is deliberately created to exploit computer systems and take advantage of any vulnerabilities in intrusion detection systems. The Australian Cyber Security Centre (ACSC) conducted a critical examination in 2017 of the various levels of sophistication employed by attackers. Consequently, there is a pressing need to develop a reliable IDS that can detect new and advanced malware. The primary goal of an IDS is to identify various types of malware at the earliest possible stage, which cannot be achieved by a conventional firewall. With the increasing prevalence of computer malware, the development of enhanced IDSs has become crucial.

II. METHODOLOGY

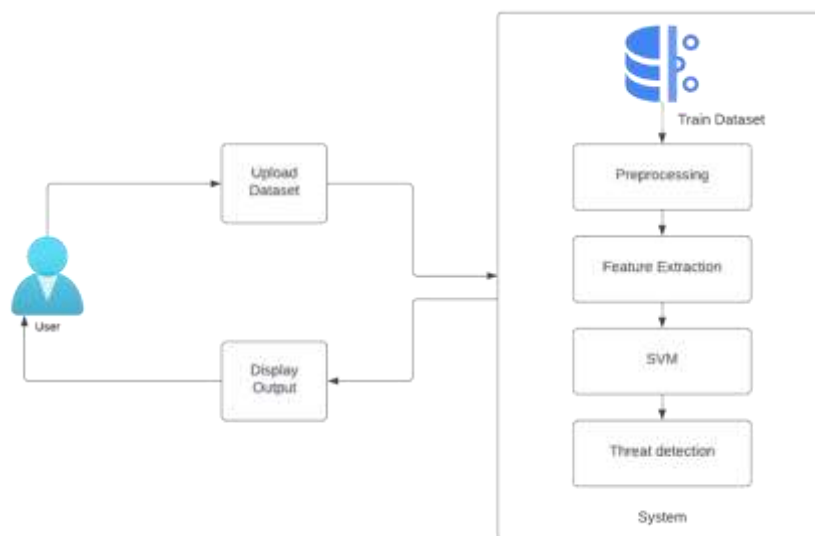


Figure 1: System Architecture

1) NSL KDD dataset -

NSL-KDD is a version of the KDD dataset commonly used to evaluate new IDSs. We used this dataset to analyze and compare network intrusion detection methods. The dataset includes 22,544 data points that are divided into Normal and Anomaly categories based on 42 attributes. The dataset has been discretized and boosted with classification techniques.

2) Anaconda -

Anaconda is a popular open-source distribution of the Python and R programming languages for scientific computing, data science, machine learning, and artificial intelligence. It includes over 1,500 packages such as NumPy, pandas, scikit-learn, Matplotlib, and Jupyter Notebook, among others. Anaconda simplifies package management, dependency resolution, and environment creation. It is available for Windows, macOS, and Linux operating systems and is used by data scientists, researchers, developers, and students worldwide.

3) Spyder -

Spyder is an open-source integrated development environment (IDE) for scientific programming in Python. It provides a rich set of features for editing, debugging, and running Python code. Spyder has a user-friendly interface and is designed for scientific and data-driven development. Some of the features of Spyder include a code editor with syntax highlighting and code folding, a variable explorer, debugging tools, and integrated IPython console. Spyder also provides support for a variety of scientific libraries, including NumPy, SciPy, Matplotlib, and Pandas.

4) Visual Studio Code -

Visual Studio Code (VS Code) is a popular code editor that can be used for various programming languages, including Python. It offers a range of features for Python development, such as code highlighting, IntelliSense (code completion), debugging, and Git integration.

III. MODELING AND ANALYSIS

(SVM ALGORITHM) Algorithm

SVM, or Support Vector Machine, is a supervised learning algorithm used for classification and regression analysis. In classification problems, SVM tries to find a hyperplane that best separates the classes, and in regression problems, it tries to find a hyperplane that minimizes the error between the predicted and actual values.

The basic idea behind SVM is to find the best decision boundary, which is the hyperplane that maximizes the margin between the support vectors of the two classes. Support vectors are the data points closest to the decision boundary and are used to define the margin.

Support Vector Machines (SVMs) are a type of machine learning algorithm that can be used for classification and regression tasks. The goal of an SVM is to find the best hyperplane that separates the data into different classes. The hyperplane that maximizes the margin between the classes is chosen as the best one. In SVM, the data points that are closest to the hyperplane are called support vectors.

SVMs work by mapping the input data into a higher-dimensional space using a kernel function. The kernel function takes two data points as input and computes their similarity in the higher-dimensional space. The most commonly used kernel functions are linear, polynomial, and radial basis function (RBF).

SVMs have several advantages over other machine learning algorithms. They are effective in high-dimensional spaces and can handle a large number of features. They are also memory-efficient, as they only need to store the support vectors. SVMs are also versatile and can be used for both linear and nonlinear classification tasks.

One of the key parameters in SVM is the regularization parameter, which controls the trade-off between maximizing the margin and minimizing the classification error. If the regularization parameter is too high, the model may overfit the data, while if it is too low, the model may underfit the data.

SVMs have been successfully applied in many domains, including image classification, text classification, bioinformatics, and financial forecasting. They have also been used in anomaly detection and intrusion detection in network security.

Overall, SVMs are a powerful machine learning algorithm that can be used for classification and regression tasks. They are versatile, memory-efficient, and effective in high-dimensional spaces.

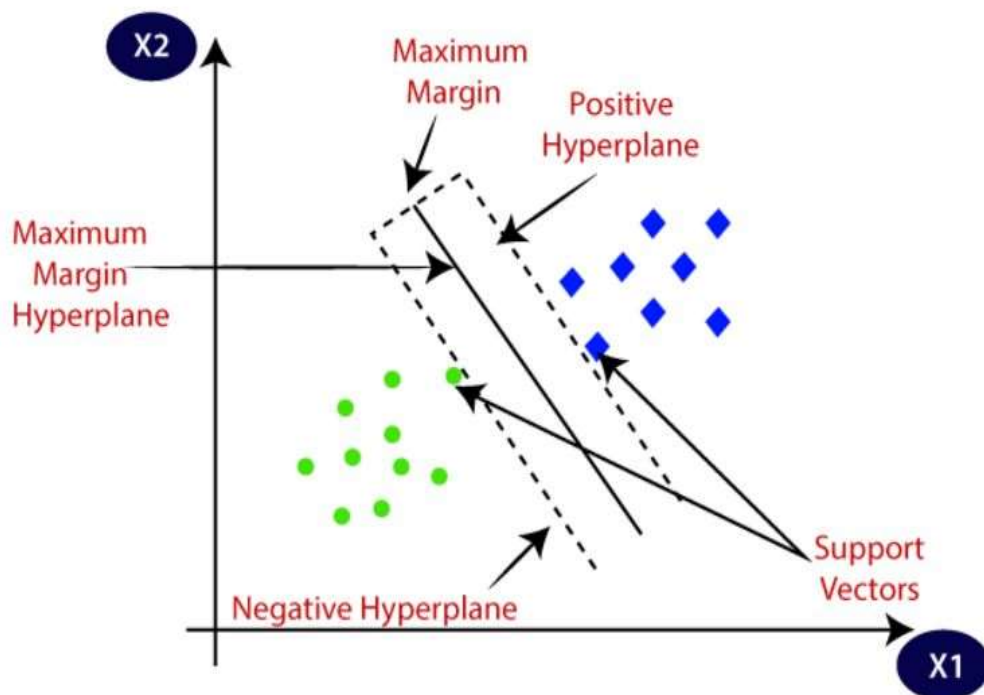


Figure 2: Mathematical Model For SVM Algorithm

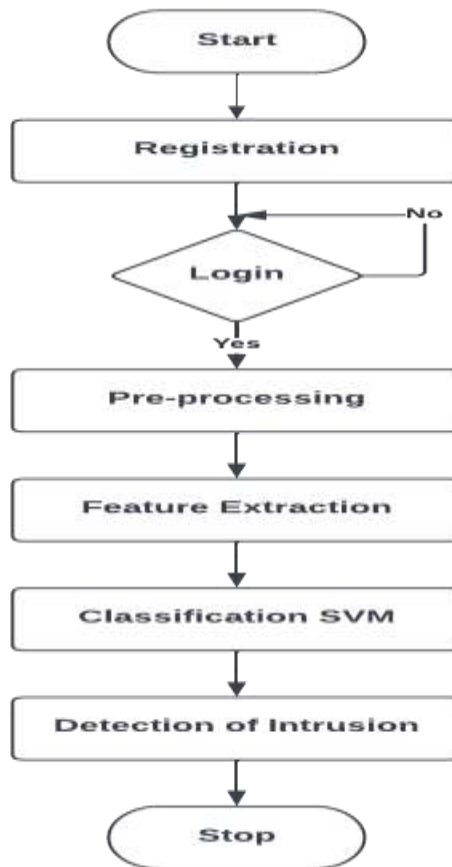


Figure 3: System Flow Chart

Above diagram is the activity diagram of the following proposed technical study. It illustrates the working of the study performed on the intrusion detection system. As we can see from the above activity diagram we have to register ourselves after starting the intrusion detection system and then login into our account. We then pre-process the dataset and give it as input in our machine learning model as testing. We already have trained our model with dataset from KDD cup 99. The SVM algorithm will now run the test and will give results whether there is an anomaly present in it or not. If any anomaly or intrusion is detected then the alarm will be turned on else not. Thus after completing its working the console will go offline

IV. RESULTS



Figure 4: Login And Register Page



Figure 5: Registration Form



Figure 6: Login Form



Figure 7: IDS Control Panel



Figure 8: SVM Test Case1 Intrusion Detected



Figure 9: SVM Test Case2 Intrusion Not Detected

V. CONCLUSION

The study suggests using deep learning to create an efficient intrusion detection system (IDS) based on support vector machines (SVM). The accuracy of anomaly detection was tested using the NSL-KDD synthetic-based intrusion dataset. The researchers intend to implement this IDS in a cloud environment using deep learning techniques. They also analyzed and compared different deep learning methods such as NB ANN, RF, and SVM to detect network intrusions on the NSL-KDD dataset.

VI. REFERENCES

- [1] J. Jabez,B. Muthukumar" Intrusion Detection System (IDS): Anomaly Detection Using Outlier Detection Approach
- [2] Anna L. Buczak, Erhan GuvenA" Survey of Data Mining and Machine Learning Methods for Cyber Security Intrusion Detection
- [3] Satish Kumar, Sunanda Gupta, Sakshi Arora" Research Trends in Network-Based Intrusion Detection Systems: A Review
- [4] Sibi Chakkaravarthy Sethuraman, Sangeetha Dhamodaran, Vaidehi Vijayakumar" Intrusion detection system for detecting wireless attacks in IEEE 802.11 networks
- [5] Huiwen Wang, Jie Gu, Shanshan Wang" An effective intrusion detection framework based on SVM with feature augmentation
- [6] Wathiq Laftah Al-Yaseen, Zulaiha Ali Othman, Mohd Zakree Ahmad Nazri" Multi-level hybrid support vector machine and extreme learning machine based on modified K-means for intrusion detection system
- [7] Iftikhar Ahmad, Mohammad Basher, Muhammad Javed Iqbal, Aneel Rahim" Performance Comparison of Support Vector Machine, Random Forest, and Extreme Learning Machine for Intrusion Detection



Survey Paper On Agro Consultant for farmers Using Machine Learning

Guided By: Prof. Satish.S.Asane

Yuvraj Chougule^[1], Niranjan Katore^[2], Diksha Thanambir^[3], Pallavi Pardesi^[4]

“ Department of Computer Engineering , SRTTC FOE, Maharashtra, India

,SRTTC College of Engineering, Kamshet Pune-412307(Maharashtra)India

Abstract:

A vast fraction of the population of India considers agriculture as its primary occupation. The production of crops plays an important role in our country. Bad quality crop production is often due to either excessive use of fertilizer or using not enough fertilizer. The proposed system of IoT and ML is enabled for soil testing using the sensors, is based on measuring and observing soil parameters. This system lowers the probability of soil degradation and helps maintain crop health. Different sensors such as soil temperature, soil moisture, pH, NPK, are used in this system for monitoring temperature, humidity, soil moisture, and soil pH along with NPK nutrients of the soil respectively. The data sensed by these sensors is stored on the microcontroller and analyzed using machine learning algorithms like random forest based on which suggestions for the growth of the suitable crop are made. This project also has a methodology that focuses on using a convolutional neural network as a primary way of identifying if the plant is at risk of a disease or not.

the agriculture industry faces numerous challenges, including water scarcity, environmental calamities, and a lack of proper knowledge about crops and how to cultivate them. To truly transform India from a developing to a developed country, we must first understand the farmers' concerns and then assist them using today's technologies. So, we devised a method to assist farmers in determining which crop to produce, as well as the stages of growth and the types of seeds, manures, and other cultivation techniques that can be utilized with each crop. As a result, we're creating a system by using machine learning which will predict the yield of crop, and also analyze the factors which are affecting the crop yield

1. Introduction:

Agriculture has been the main activity in every society and civilization that has existed throughout human history. It is not only a huge part of the expanding economy, but it is also necessary for our survival. It is also a vital sector for the Indian economy and the future of humanity. Additionally, it makes up a sizable amount of employment. As time goes on, the demand for production has dramatically expanded. People use technology in an utterly incorrect manner in order to produce in large quantities. Every day, new hybrid kinds are created. These kinds, however, don't offer the same critical components as a crop grown naturally. These artificial methods degrade the soil. All of this causes more environmental deterioration. Most of these unconventional methods are used to prevent losses.

However, the loss is reduced when agricultural growers have access to reliable crop production information. Machine learning is a rapidly expanding methodology that supports decision-making across all industries to

provide the most useful of its applications. The majority of modern gadgets benefit from models being examined before deployment. The fundamental idea is to use machine learning models to boost the agricultural sector's throughput. The amount of knowledge imparted during the training period is another element that influences the prediction, as the number of parameters was higher in comparison. Precision agriculture, which prioritizes quality over unfavourable environmental variables, would be the main focus. To make an accurate prediction and take a stand against the divergent tendencies in Climate and precipitation To encourage a pattern, a variety of machine learning classifiers including Logistic Regression, Naive Bayes, Random Forest, etc. are used. Our analysis of the aforementioned machine learning classifiers led us to the conclusion that the Random Forest method offers the highest level of accuracy. The system forecasts crops based on the collection of historical data. The information is provided using historical data on the weather, temperature, and a number of other variables. Our application runs an algorithm and displays a list of crops that match the inputted data and their anticipated yield values.

2. Literature Survey:

On the Indian government dataset, Aruvansh Nigam, Saksham Garg, and Archit Agrawal[1] carried out trials and found that the Random Forest machine learning method provides the best yield forecast accuracy. Simple Recurrent Neural Network, a sequential model, is more effective at predicting rainfall than LSTM is at predicting temperature. For the purpose of yield forecast, the article combines variables such as rainfall, temperature, season, area, etc. When all parameters are considered, the results show that Random Forest is the best classifier.

Leo Brieman [2] is an expert in the strength, accuracy, and correlation of the random forest method. The random forest algorithm builds decision trees using several data samples, predicts the data from each subset, and then determines the best solution for the system through voting. The data was trained in Random Forest using the bagging approach. The randomness must reduce correlation while retaining strength in order to increase accuracy.

Crop yield prediction has been implemented by Balamurugan [3] using simply the random forest classifier. To anticipate the agricultural output, various factors like rainfall, temperature, and season were considered. On the datasets, no further machine learning methods were used. Because alternative algorithms were lacking, comparison and quantification could not be done, making it impossible to provide the best algorithm.

Mishra [4] has provided a theoretical overview of a number of machine learning approaches that can be used in different forecasting contexts. But because they don't use any algorithms in their work, they can't really say if the suggested work is viable or not.

According to Dr. Y. Jeevan Nagendra Kumar [5], supervised learning allows machine learning algorithms to forecast an objective or outcome. This study focuses on supervised learning methods for predicting crop yields. To obtain , It must create an acceptable function from a set of variables that may map the input variable to the desired output in order to produce the given outputs. According to the paper, crop predictions may be made using the Random Forest ML method, which achieves the best accuracy value while taking into account the fewest number of models.

3. Proposed Work:

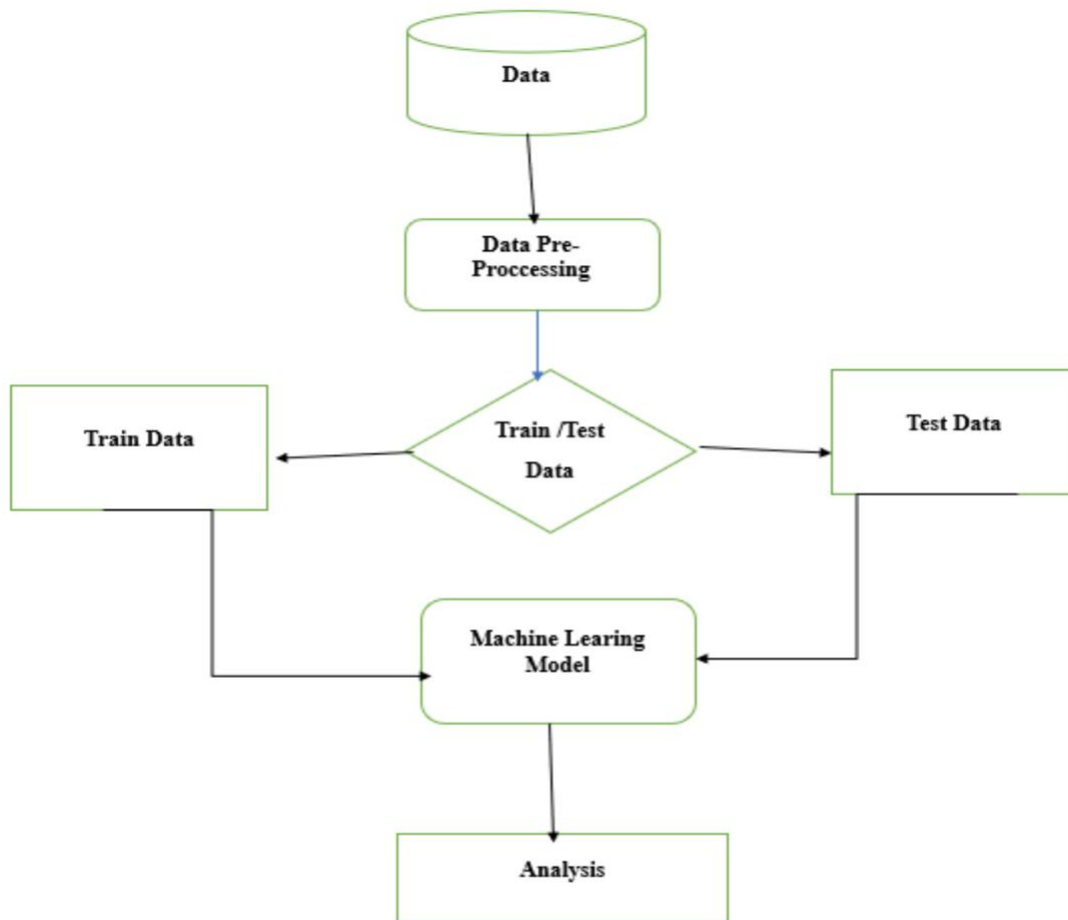


Fig : Architecture Diagram Agro Constant For Farmer Using Machine Learning Model with Application

Before here are the phases of Machine Learning Model for gaining prediction are described below:

A] Data pre-processing, first

A technique called data preprocessing is used to turn the raw data into a clean data set. The data are acquired from various sources, however because they are collected in raw form, analysis is not possible.

B] Factors Affecting Crop Production and Yield

The yield and productivity of any crop are impacted by a wide range of variables. These are essentially the characteristics that aid in estimating a crop's annual yield. We take into account variables like temperature, rainfall, area, humidity, and wind speed in this essay

C. Evaluation and Algorithm Selection for Machine Learning

We must first assess and compare potential algorithms before selecting the one that best fits this particular dataset. The best method for solving the crop production problem practically is machine learning. Numerous machine learning methods are employed to forecast agricultural yield. The following machine learning techniques for selection and accuracy comparison are included in this paper:

D] Predictive Random Forest Model for Crops

A random subset sampled individually, with the same distribution across all of the trees in the forest, is what makes up a random forest, which is an accumulation of tree predictors. The bagging method was utilized by Random Forest to train the data, increasing the accuracy of the outcome.

E] System Architecture

The weather API is the key component of the system architecture shown in Fig. 3, from which we retrieve data on temperature, humidity, rainfall, and other variables. The server module receives the data that was retrieved from the API.

F] Proposed System,

A mobile application that we've suggested predicts the name of the crop and determines its related yield. Numerous factors, such as temperature, humidity, wind speed, rainfall, etc., define the name of the crop, and output is influenced by area and production. The Random Forest classifier is employed in this study to make predictions. It will achieve the best accuracy levels for crop forecast.

REFERENCES

- [1] Aayush Shah, Akash Dubey, Vishesh Hemnani, Divye Gala and D. R. Kalbande "Smart Farming System: Crop Yield Prediction Using Regression Techniques"
- [2] M.Kalimuthu, P.Vaishnavi, M.Kishore, "Crop Prediction using Machine Learning" 978-1-7281-5821-1/20/31.00 IEEE
- [3] "A Machine Learning Approach to Predict Crop Yield and Success Rate" Shivani S. Kale, Preeti S. Patil, Dec 18-20, 2019
- [4] "Crop Yield Prediction Using Random Forest Algorithm" Namgiri Suresh, N.V.K.Ramesh, Syed Inthiyaz, P. Poorna Priya, Kurra Nagasowmika, Kota. V.N.Harish Kumar, Mashkoor Shaik and B. N. K. Reddy [2021]
- [5] "Analysis of agricultural crop yield prediction using statistical techniques of machine learning" Janmejy Pant a, R.P. Pant a, Manoj Kumar Singh a, Devesh Pratap Singh b, Himanshu Pant a.
- [6] "Crop Yield Estimation in India Using Machine Learning" Ms Kavita Information Technology Manipal University Jaipur Jaipur, India, Pratistha Mathur Information Technology Manipal University Jaipur, Jaipur, India.
- [7] "Crop Yield Prediction based on Indian Agriculture using Machine Learning" Potnuru Sai Nishant, Pinapa Sai Venkat, Bollu Lakshmi Avinash, B. Jabber.



Survey Paper On Agro Consultant for farmers Using Machine Learning

Guided By: Prof. Satish.S.Asane

Yuvraj Chougule^[1], Niranjan Katore^[2], Diksha Thanambir^[3], Pallavi Pardesi^[4]

“ Department of Computer Engineering , SRTTC FOE, Maharashtra, India

,SRTTC College of Engineering, Kamshet Pune-412307(Maharashtra)India

Abstract:

A vast fraction of the population of India considers agriculture as its primary occupation. The production of crops plays an important role in our country. Bad quality crop production is often due to either excessive use of fertilizer or using not enough fertilizer. The proposed system of IoT and ML is enabled for soil testing using the sensors, is based on measuring and observing soil parameters. This system lowers the probability of soil degradation and helps maintain crop health. Different sensors such as soil temperature, soil moisture, pH, NPK, are used in this system for monitoring temperature, humidity, soil moisture, and soil pH along with NPK nutrients of the soil respectively. The data sensed by these sensors is stored on the microcontroller and analyzed using machine learning algorithms like random forest based on which suggestions for the growth of the suitable crop are made. This project also has a methodology that focuses on using a convolutional neural network as a primary way of identifying if the plant is at risk of a disease or not.

the agriculture industry faces numerous challenges, including water scarcity, environmental calamities, and a lack of proper knowledge about crops and how to cultivate them. To truly transform India from a developing to a developed country, we must first understand the farmers' concerns and then assist them using today's technologies. So, we devised a method to assist farmers in determining which crop to produce, as well as the stages of growth and the types of seeds, manures, and other cultivation techniques that can be utilized with each crop. As a result, we're creating a system by using machine learning which will predict the yield of crop, and also analyze the factors which are affecting the crop yield

1. Introduction:

Agriculture has been the main activity in every society and civilization that has existed throughout human history. It is not only a huge part of the expanding economy, but it is also necessary for our survival. It is also a vital sector for the Indian economy and the future of humanity. Additionally, it makes up a sizable amount of employment. As time goes on, the demand for production has dramatically expanded. People use technology in an utterly incorrect manner in order to produce in large quantities. Every day, new hybrid kinds are created. These kinds, however, don't offer the same critical components as a crop grown naturally. These artificial methods degrade the soil. All of this causes more environmental deterioration. Most of these unconventional methods are used to prevent losses.

However, the loss is reduced when agricultural growers have access to reliable crop production information. Machine learning is a rapidly expanding methodology that supports decision-making across all industries to

provide the most useful of its applications. The majority of modern gadgets benefit from models being examined before deployment. The fundamental idea is to use machine learning models to boost the agricultural sector's throughput. The amount of knowledge imparted during the training period is another element that influences the prediction, as the number of parameters was higher in comparison. Precision agriculture, which prioritizes quality over unfavourable environmental variables, would be the main focus. To make an accurate prediction and take a stand against the divergent tendencies in Climate and precipitation To encourage a pattern, a variety of machine learning classifiers including Logistic Regression, Naive Bayes, Random Forest, etc. are used. Our analysis of the aforementioned machine learning classifiers led us to the conclusion that the Random Forest method offers the highest level of accuracy. The system forecasts crops based on the collection of historical data. The information is provided using historical data on the weather, temperature, and a number of other variables. Our application runs an algorithm and displays a list of crops that match the inputted data and their anticipated yield values.

2. Literature Survey:

On the Indian government dataset, Aruvansh Nigam, Saksham Garg, and Archit Agrawal[1] carried out trials and found that the Random Forest machine learning method provides the best yield forecast accuracy. Simple Recurrent Neural Network, a sequential model, is more effective at predicting rainfall than LSTM is at predicting temperature. For the purpose of yield forecast, the article combines variables such as rainfall, temperature, season, area, etc. When all parameters are considered, the results show that Random Forest is the best classifier.

Leo Brieman [2] is an expert in the strength, accuracy, and correlation of the random forest method. The random forest algorithm builds decision trees using several data samples, predicts the data from each subset, and then determines the best solution for the system through voting. The data was trained in Random Forest using the bagging approach. The randomness must reduce correlation while retaining strength in order to increase accuracy.

Crop yield prediction has been implemented by Balamurugan [3] using simply the random forest classifier. To anticipate the agricultural output, various factors like rainfall, temperature, and season were considered. On the datasets, no further machine learning methods were used. Because alternative algorithms were lacking, comparison and quantification could not be done, making it impossible to provide the best algorithm.

Mishra [4] has provided a theoretical overview of a number of machine learning approaches that can be used in different forecasting contexts. But because they don't use any algorithms in their work, they can't really say if the suggested work is viable or not.

According to Dr. Y. Jeevan Nagendra Kumar [5], supervised learning allows machine learning algorithms to forecast an objective or outcome. This study focuses on supervised learning methods for predicting crop yields. To obtain , It must create an acceptable function from a set of variables that may map the input variable to the desired output in order to produce the given outputs. According to the paper, crop predictions may be made using the Random Forest ML method, which achieves the best accuracy value while taking into account the fewest number of models.

3. Proposed Work:

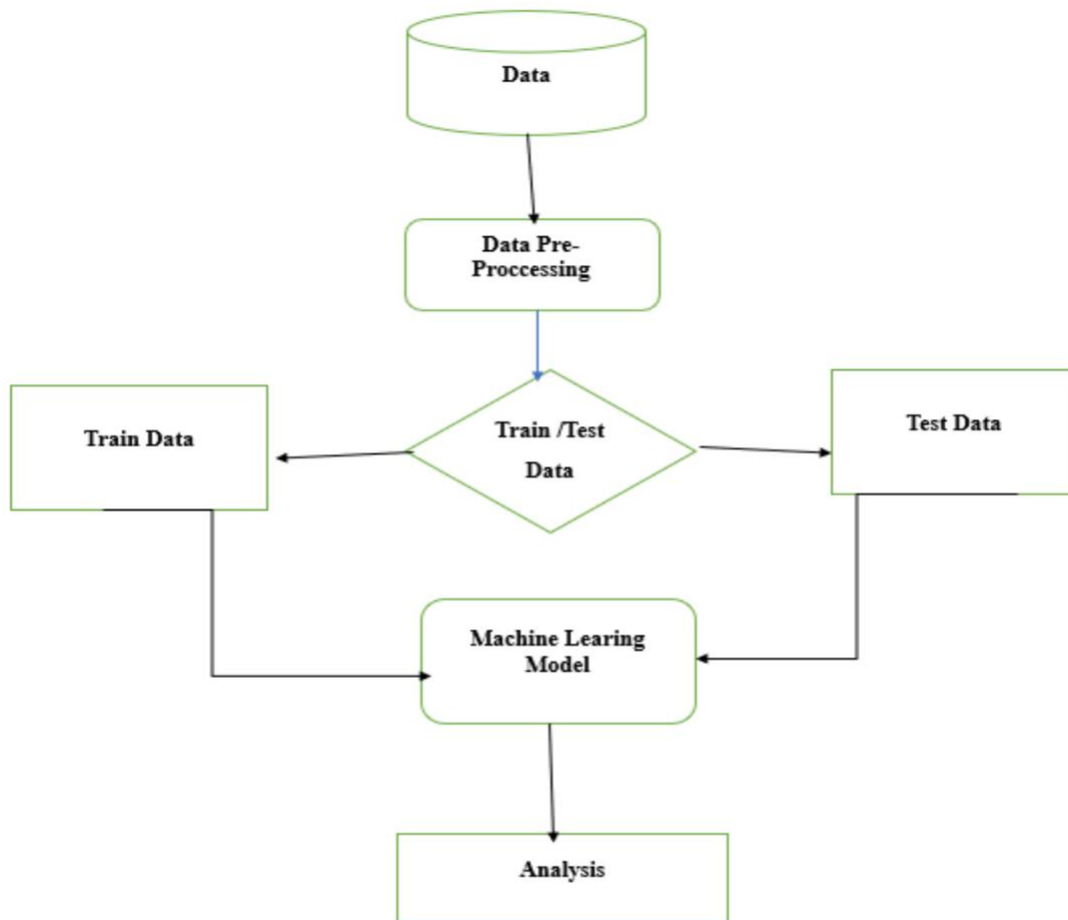


Fig : Architecture Diagram Agro Constant For Farmer Using Machine Learning Model with Application

Before here are the phases of Machine Learning Model for gaining prediction are described below:

A] Data pre-processing, first

A technique called data preprocessing is used to turn the raw data into a clean data set. The data are acquired from various sources, however because they are collected in raw form, analysis is not possible.

B] Factors Affecting Crop Production and Yield

The yield and productivity of any crop are impacted by a wide range of variables. These are essentially the characteristics that aid in estimating a crop's annual yield. We take into account variables like temperature, rainfall, area, humidity, and wind speed in this essay

C. Evaluation and Algorithm Selection for Machine Learning

We must first assess and compare potential algorithms before selecting the one that best fits this particular dataset. The best method for solving the crop production problem practically is machine learning. Numerous machine learning methods are employed to forecast agricultural yield. The following machine learning techniques for selection and accuracy comparison are included in this paper:

D] Predictive Random Forest Model for Crops

A random subset sampled individually, with the same distribution across all of the trees in the forest, is what makes up a random forest, which is an accumulation of tree predictors. The bagging method was utilized by Random Forest to train the data, increasing the accuracy of the outcome.

E] System Architecture

The weather API is the key component of the system architecture shown in Fig. 3, from which we retrieve data on temperature, humidity, rainfall, and other variables. The server module receives the data that was retrieved from the API.

F] Proposed System,

A mobile application that we've suggested predicts the name of the crop and determines its related yield. Numerous factors, such as temperature, humidity, wind speed, rainfall, etc., define the name of the crop, and output is influenced by area and production. The Random Forest classifier is employed in this study to make predictions. It will achieve the best accuracy levels for crop forecast.

REFERENCES

- [1] Aayush Shah, Akash Dubey, Vishesh Hemnani, Divye Gala and D. R. Kalbande "Smart Farming System: Crop Yield Prediction Using Regression Techniques"
- [2] M.Kalimuthu, P.Vaishnavi, M.Kishore, "Crop Prediction using Machine Learning" 978-1-7281-5821-1/20/31.00 IEEE
- [3] "A Machine Learning Approach to Predict Crop Yield and Success Rate" Shivani S. Kale, Preeti S. Patil, Dec 18-20, 2019
- [4] "Crop Yield Prediction Using Random Forest Algorithm" Namgiri Suresh, N.V.K.Ramesh, Syed Inthiyaz, P. Poorna Priya, Kurra Nagasowmika, Kota. V.N.Harish Kumar, Mashkoor Shaik and B. N. K. Reddy [2021]
- [5] "Analysis of agricultural crop yield prediction using statistical techniques of machine learning" Janmejy Pant a, R.P. Pant a, Manoj Kumar Singh a, Devesh Pratap Singh b, Himanshu Pant a.
- [6] "Crop Yield Estimation in India Using Machine Learning" Ms Kavita Information Technology Manipal University Jaipur Jaipur, India, Pratistha Mathur Information Technology Manipal University Jaipur, Jaipur, India.
- [7] "Crop Yield Prediction based on Indian Agriculture using Machine Learning" Potnuru Sai Nishant, Pinapa Sai Venkat, Bollu Lakshmi Avinash, B. Jabber.

DRIVER DROWSINESS ALERT DETECTION

Anjali M. Dalvi¹, Shubham Patil², Shantanu Jagtap³, Kapil Shitole⁴, Randhir Shinde⁵

¹ Head Of Department, Department Of Computer Engineering, SRTTC FOE, MH, India

² Student, Department Of Computer Engineering, SRTTC FOE, MH, India

³ Student, Department Of Computer Engineering, SRTTC FOE, MH, India

⁴ Student, Department Of Computer Engineering, SRTTC FOE, MH, India

⁵ Student, Department Of Computer Engineering, SRTTC FOE, MH, India

ABSTRACT

By implementing this approach, we aim to lower the number of accidents brought on by driver drowsiness and so raise traffic safety. Based on optical data and artificial intelligence, this technology handles the automatic detection of driving fatigue. In order to quantify PERCLOS (% of eye closure) with Softmax for neural transfer function, we identify, track, and evaluate both the driver face and eyes. It will also use alcohol pulse detection to check out the person is normal or abnormal. Due to extended driving times and boredom in crowded environments, driver weariness is one of the main factors in traffic accidents, especially for drivers of large vehicles (such as buses and heavy trucks).

Keyword : - *Machine Learning, Drowsiness, Face aspect ratio.*

1. Introduction:-

The number of vehicles is rapidly increasing, and this trend has led to an increased number of vehicle accidents. The National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System Encyclopedia found that approximately 55,926 vehicles were involved in vehicular accidents in the United States in 2007. Moreover, 9,979 vehicle collision accidents were due to driver fatigue and inattention in 2007. The NHTSA's National Center for Statistics and Analysis also provided a brief statistical summary report indicating that 416,000 accidents were caused by drowsy driving between 2005 and 2009. Traffic vehicle accidents cause many injuries and deaths every day around the world. For instance, the NHTSA stated that approximately 1,500 people were killed in traffic accidents in 2002. Furthermore, there were 71,000 injuries resulting from the 100,000 collisions between 1989 and 1992.

1.1 overview:-

When a driver becomes physically, psychologically, or emotionally exhausted or sleepy, it affects their ability to operate a motor vehicle safely. A key safety risk for the road transportation sector is driver weariness. The main reasons of "drowsy driving" are not getting enough sleep, operating a vehicle when you should be sleeping, and working or remaining awake for excessively extended periods of time. There are three types of ways to identify driver inattention:

1. methods based on vehicles
2. techniques based on behaviour
3. approaches based on physiological signals.

In physiological techniques, the body's physiological signals—such as the electroencephalogram (EEG) for measuring brain activity, the electrooculogram (EOG) for measuring eye movement, and the electrocardiogram (ECG) for measuring heart rate—are assessed to determine whether a driver is drowsy. Recent studies show that the methods using physiological signals (specially the EEG signal) can achieve better reliability and accuracy of driver drowsiness detection compared to other methods.

1.2 Objectives:-

- When it comes to knowledge of the risk of falling asleep, the drivers were confronted with several statements concerning characteristics of drivers who fall asleep (age, sex, physical condition, sleeping problems) in addition to a statement that falling asleep can happen to anyone. Based on the drivers evaluation of these statements, it seems to be a general agreement among them, both private and professionals, that falling asleep can happen to anyone. In addition, they seem to have good knowledge of the actual risk of falling asleep while driving. The private drivers and the professional drivers respectively assumes that an average of 40 and 36 drivers out of a hundred drivers have experienced falling asleep while driving. Calculated in percent these numbers makes up shares that are close to the actual proportions found in this study. it will be also uses alcohole pulse detection to check out the person is normal or abnormal.
- Hence, the knowledge of the actual risk of falling asleep among drivers seems to be quite good.

2. Statement Of Scope:-

The proposed system is a driver face monitoring system that can detect driver hypo vigilance (both fatigue and distraction) by processing of eye and face regions. it will be also uses alcohole pulse detection to check out the person is normal or abnormal.After image acquisition, face detection is the first stage of processing.

2.1 Motivation and Need:-

- The skill of looking up ahead and scanning for hazards depends on the driver's motivation to choose to do so and this will be linked to their awareness of the possible risks or hazards that looking ahead may detect. The motivation behind a driver's decisions will be based on their awareness (knowledge) and their skills to respond to various traffic situations. This involves internalising the driving process and owning the decisions to drive appropriately.
- This contrasts with the simpler example of motivation where a driver slows down if a police officer is in the vicinity. There is little internalizing occurring.
- it will be also uses alcohole pulse detection to check out the person is normal or abnormal.
- In the case of a person driving for their employment, he or she may be motivated to override the need for safe driving behavior in order to meet performance requirements in their work especially if there is an incentive for doing so. The issue for those attending driver training is around their motivation to change their driving behavior. This needs to be driven internally rather than through factors such as enforcement.

2.2 Project Idea:-

Metropolitan bus drivers daily face work in a stressful and draining work environment, exposing them to the serious risk of driver fatigue. However, there has been a dearth of information exploring the unique antecedents and effects of such fatigue. To date, much of the research into metropolitan bus drivers has been under the umbrella of large heavy vehicle driving studies, which include a disproportionately large population of long-haul drivers, who are likely to face a significantly different set of fatigue

3. System Architecture:-

The architecture ,mainly consists of the following components:-

- 1.Camera
- 2.Alcohol sensor
- 3.Bus Driver

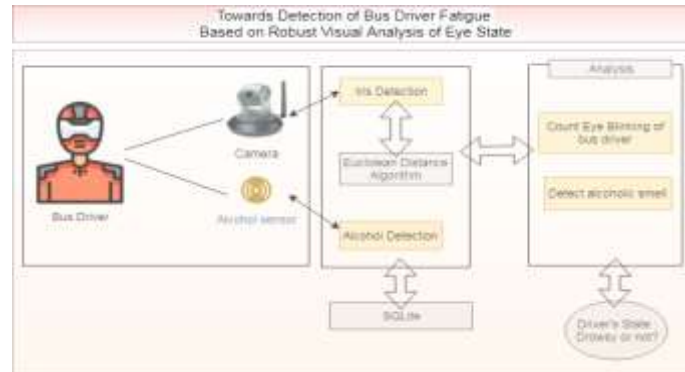


Chart -1: System Architecture (Font-10)

3.1 Existing System:-

A driver falls asleep, then the driver loses control over the vehicle, an action which often results in a crash with either another vehicle or any object. In order to prevent these devastating accidents, there was the previous approach developed, in this system the state of drowsiness of the driver was monitored. The following measures were used widely for monitoring drowsiness:

1. **Vehicle-based detection:** A number of actions/metrics, including deviations from lane position, movement of the steering wheel, pressure on the acceleration pedal, etc., are constantly monitored and any change in these that crosses a specified threshold indicates a significantly increased probability that the driver is drowsy .
2. **Behavioral measures:** The behavior of the driver, including yawning, eye closure, eye blinking, head pose, etc., was monitored through a camera and the driver was alerted if any of these drowsiness symptoms are detected.
3. **Physiological measures:** The correlation between physiological signals (electrocardiogram (ECG), electromyogram (EMG), electrooculogram (EOG) and electroencephalogram (EEG)) and driver drowsiness was studied.

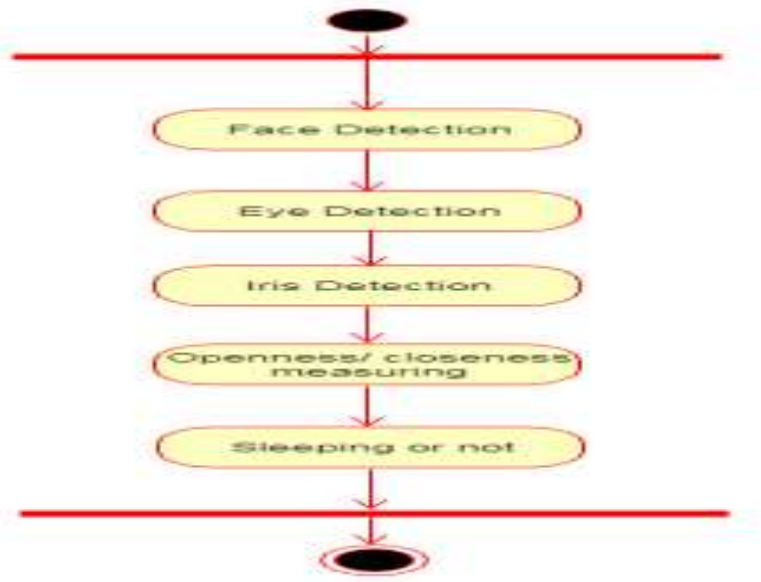


Fig -1: Activity Diagram

4. CONCLUSIONS:-

In this system, we proposed driver assistance System is presented in order to reduce the number of accidents caused by driver fatigue and thus improve road safety. Based on optical data and artificial intelligence, this technology handles the automatic detection of driving fatigue. In order to quantify PERCLOS (% of eye closure) with Soft Max for neural transfer function, we present an approach to find, track, and analyse both the driver face and eyes. We presented a vision-based method and system towards bus driver fatigue detection using existing dome Cameras in buses.

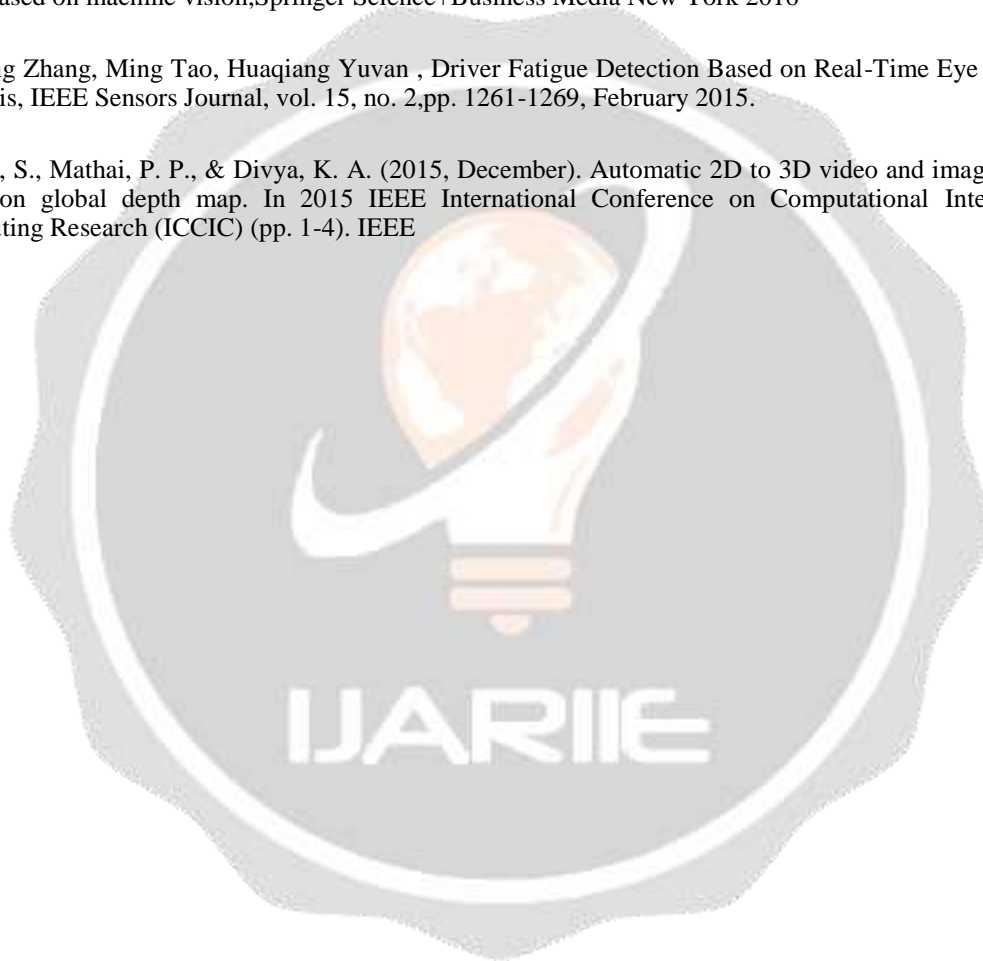
5. ACKNOWLEDGEMENT:-

We take great delight in sharing the project report's preliminary findings on "Drowsiness Alert Detection." I'd want to take this chance to express my gratitude to Prof. Anjali More, my internal mentor, for providing me with all the support and direction I required. I sincerely appreciate their thoughtful assistance. Their insightful advice was quite beneficial. I also like to thank Prof. Anjali More, who is the head of the computer engineering department at the Pune Institute of Computer Technology, for his invaluable advice and support. We would like to extend a special thank you to Other Stuff for offering a variety of resources for Our Project, including a laboratory with all necessary software platforms and a constant Internet connection.

6. REFERENCES:-

- 1) Ierin Babu, R V Siva Balan and Mathai, Paul P., Machine Learning Approaches Used For Prediction In Diverse Fields, International Journal of Recent Technology and Engineering (IJRTE), Volume 8, Issue 2S4, pp. 762-768, July 2019

- 2) Babu, I., Balan, R. S., & Mathai, P. P. (2019, October). Envisaging the Academic Performance of Students. In 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS) (pp. 9094). IEEE.
- 3) Ashfak Md. Shibli, Mohammed Moshuiul Hoque and Lamia Alam, Developing a Vision-Based Driving Assistance System. Springer, 2018.
- 4) Johny, C. P., & Mathai, P. P. (2017). Customer Churn Prediction: A Survey. International Journal of Advanced Research in Computer Science, 8(5).
- 5) Feng You Yao-hua Li Ling Huang Kang Chen Rong-hui Zhang Jian-min Xu, Monitoring drivers sleepy status at night based on machine vision, Springer Science+Business Media New York 2016
- 6) Zusheng Zhang, Ming Tao, Huaqiang Yuwan , Driver Fatigue Detection Based on Real-Time Eye Gaze Pattern Analysis, IEEE Sensors Journal, vol. 15, no. 2, pp. 1261-1269, February 2015.
- 7) Mathai, S., Mathai, P. P., & Divya, K. A. (2015, December). Automatic 2D to 3D video and image conversion based on global depth map. In 2015 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC) (pp. 1-4). IEEE





Driver Attention Assist System

Satish S. Asane¹, Shantanu Jagtap², Shubham Patil³, Kapil Shitole⁴, Randhir Shinde⁵

¹Department of Computer Engineering, Professor of Department, Srttc Foe, Sppu, Mh, India
^{2,3,4,5}Department of Computer Engineering, Student, Srttc Foe, Sppu, Mh, India

ABSTRACT

A major factor in traffic accidents is driver inattentiveness. Driver drowsiness detection devices have been created to identify and warn drivers when they are starting to get sleepy in order to address this problem. In order to track the driver's degree of attentiveness, these systems employ a variety of technologies, including facial recognition, eye tracking, and EEG signals. When the driver's level of attention dips below a predetermined threshold, an alarm is generated based on an algorithm's analysis of the collected data. We give a thorough overview of driver drowsiness detection systems, their underlying technology, and their efficiency in minimising accidents brought on by tired driving in this study. We also talk about potential future advancements as well as the difficulties and restrictions these systems face. Our research demonstrates that driver drowsiness detection systems are a useful tool for avoiding accidents brought on by driving weariness. There are still issues that need to be resolved, such as the requirement for more precise detection techniques and the creation of systems that can be modified to fit various driving circumstances. In conclusion, driver fatigue-related accidents could be greatly decreased by using driver drowsiness detection technologies. These technologies will become even more efficient as technology develops, making all roads safer for everyone.

Keywords:-Drowsiness, Machine Learning, Sensors, Cameras, Signal Processing.

INTRODUCTION

Overview:-

Driver sleepiness is a critical problem that compromises traffic safety and can result in accidents with serious repercussions. The national highway traffic safety administration (nhtsa) estimates that driver drowsiness is to blame for 100,000 accidents annually in the United States. It is crucial to create effective driver sleepiness detection technologies in order to stop accidents and save lives because these collisions cause thousands of fatalities and injuries. Many things, including lack of sleep, sleep disorders, extended driving hours, and medicine, can make a driver drowsy. The chance of accidents rises when a motorist is drowsy because their capacity to respond to environmental stimuli and make decisions is compromised.

To warn the driver and avoid accidents, it is essential to identify driver drowsiness in real-time. The detection of driver drowsiness has been attempted using a variety of techniques throughout the years, including physiological, behavioural, and environmental monitoring. These techniques involve keeping an eye on the driver's vital signs, including eeg signals, heart rate, and breathing rate. The devices also utilise eye-tracking and face recognition technology to identify drowsy-related changes in the driver's behaviour. Electroencephalography (EEG) signals are used as one of the most popular physiological monitoring techniques. Brainwave variations in the driver can be detected by EEG readings, which can also spot drowsiness-related patterns. This technique has been tested extensively and has produced encouraging results for identifying driver inattention. The employment of video-based systems with facial recognition and eye-tracking technology is another often utilised technique.

Electroencephalography (EEG) signals are used as one of the most popular physiological monitoring techniques. Brainwave variations in the driver can be detected by EEG readings, which can also spot drowsiness-related patterns. This technique has been tested extensively and has produced encouraging results for identifying driver inattention.

The employment of video-based systems with facial recognition and eye-tracking technology is another often utilised technique. These devices examine the driver's facial expressions and eye movements to identify behavioural changes brought on by tiredness. These alterations could include yawning, head nodding, and drooping eyes.

Motivation:-

Driver sleepiness is a serious issue since it can have disastrous effects on the road. Driver weariness continues to be a significant factor in accidents all around the world, despite the countless campaigns and educational initiatives aimed at



boosting road safety. According to the World Health organization, driver drowsiness contributes to the 1.35 million fatalities caused by traffic accidents each year.

The understanding of the serious effects of drowsy driving on road safety leads to the necessity for effective driver drowsiness detection technologies. Drowsy drivers have slower reaction times, a shorter attention span, and poorer judgement, which increase their risk of being in accidents. Drowsy driving accidents can have terrible repercussions, including fatalities and property damage.

The development of driver sleepiness detection technologies has drawn more attention in recent years. The need to increase traffic safety and decrease the frequency of accidents brought on by drowsy driving has sparked this interest. Technology breakthroughs, notably in the areas of machine learning and artificial intelligence, have helped with the creation of these systems.

To lessen the frequency of accidents brought on by drowsy driving, driver drowsiness detecting devices have been developed. These programmes seek to alert drivers about tiredness in real time so they can take proper action and avoid accidents. These devices can also assist drivers in controlling their driving schedules, making sure they take enough breaks to stay awake.

Problem Definition:-

Driver fatigue is a serious issue on the road and has been linked to a considerable number of collisions. Driver weariness continues to be a significant factor in accidents all around the world, despite the countless campaigns and educational initiatives aimed at boosting road safety. The creation of driver drowsiness detection technologies that can identify and warn drivers when they are becoming drowsy is necessary to solve this issue

Objectives:-

The main goal of this project is to create a system for properly detecting driver drowsiness in real-time and warning the driver before an accident happens. This system will be built to function in actual driving situations, taking into consideration changes in temperature, lighting, and driver behaviour. Create a reliable and precise system for detecting driver fatigue that takes into consideration several aspects including head position, eye closure, and facial motions. Create a hardware device that can record information from the driver's face in real-time and then use the algorithm to identify sleepiness. Create an intuitive interface that notifies the driver when drowsiness is detected, enabling the driver to react appropriately and prevent accidents.

LITERATURE SURVEY

Sr. No.	Paper Name	Author Name	Year	Review
1	Automatic Detection of Driver Fatigue Using Driving Operation Information for Transportation Safety	Liukui Chen, Jun Peng and Ying Wu	2021	Road accidents are frequently caused by fatigued drivers. As a result, the method in this study is based on the information from the steering wheel angles (SWA) and yaw angles (YA) under actual driving situations. The operating characteristics of SWA and YA are examined under various states of exhaustion, and the approximative entropy characteristics of a brief sliding window on time series are then calculated.
2	Bus Driver Fatigue and Stress Issues Study	Mr. Phil Hanley	2020	This study was conducted with a "regulation neutral" approach. While the information derived from the study may be useful for decision making by FHWA/OMC, the study does not provide recommendations concerning changes to existing



				regulations or the creation of new regulations for the motorcoach industry. Human error is a causative factor in 85 percent or more of all crashes.
3	Bus driver: factors that influences behaviour	M.M. Rohani1, R. Buhari	2020	The behaviour of drivers is influenced by many factors, which include the personal characteristics, environmental and vehicle characteristics. Professional drivers, such as bus drivers, generally have higher levels of training and experience, and by virtue of their profession have attitudes, which are more likely to promote safe driving. However, bus drivers experience the same environmental traffic condition as other drivers, as well as additional constraints imposed by the vehicle characteristics, concern for passengers' comfort/safety and the need to adhere to timetables.
4	Fatigue Factors Affecting Metropolitan Bus Drivers: A Qualitative Investigation.	Herbert Biggsa, Donald Dingsdagb, Nick Stenson	2019	Metropolitan bus drivers daily face work in a stressful and draining work environment, exposing them to the serious risk of driver fatigue. However, there has been a dearth of information exploring the unique antecedents and effects of such fatigue. To date, much of the research into metropolitan bus drivers has been under the umbrella of large heavy vehicle driving studies, which include a disproportionately large population of long-haul drivers, who are likely to face a significantly different set of fatigue factors.

SYSTEM DESIGN

System Model:-

Systems for detecting driver inattentiveness have become a crucial part of contemporary vehicle safety features. These devices are made to keep a watch on the driver's actions and spot drowsy behaviours like diminished eye movement, head nodding, or steering wheel movements. When it is found, the system warns the driver to stop or take a break by providing visual, audio, or tactile feedback.

Sensors, algorithms, and feedback mechanisms are just a few of the parts that make up the system design for driver sleepiness detection. Following a top-down methodology, the design process begins by determining the system requirements before moving on to the design of the individual components. Finding the sensors that will be used to detect driver inattention is the initial step in system design.

Cameras and infrared sensors are the most frequent sensors used in driver sleepiness detection systems. While infrared sensors may detect changes in body temperature and breathing patterns, cameras can only detect head nods and eye movements. To ensure driver comfort, the chosen sensors must be dependable, accurate, and non-invasive. The next

stage is to create algorithms that can interpret sensor data and recognise indicators of tiredness after the sensors have been detected.

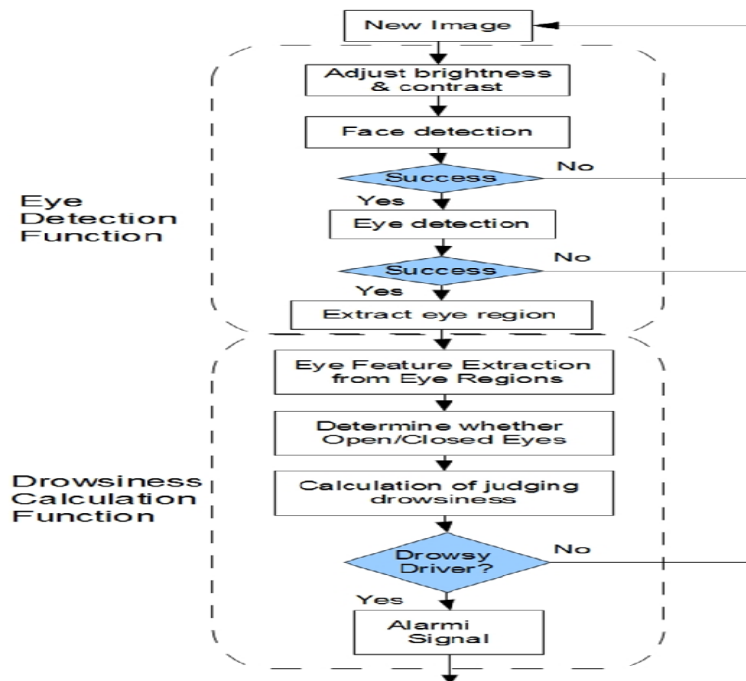


Fig.3.1.1 System Model

3.2 Mathematical Model:-

A vital job in ensuring the safety of drivers and passengers on the road is the detection of driver fatigue. To do this, numerous signals and data from the driver, vehicle, and environment can be analysed using mathematical models. The machine learning algorithm is one of the most popular mathematical models utilised in driver sleepiness detection. To identify patterns linked to drowsiness, this algorithm is trained using a dataset of driving behaviour and physiological signs, such as heart rate, head position, and eye movements. The algorithm may be taught and then used to determine whether a driver is likely to fall asleep at the wheel. The control system is yet another mathematical model that can be applied to the identification of driver drowsiness.

In order to detect the driver's level of attentiveness and offer warnings or take action to prevent accidents, this system uses feedback from a variety of sensors, including the steering wheel angle, the accelerator and brake pedals, and lane departure warnings. The accuracy and dependability of the system can be considerably increased by using mathematical models in the driver sleepiness detection process. These algorithms can assist in preventing accidents and saving lives by analysing massive amounts of data and identifying patterns and trends related to drowsiness. To guarantee the models' efficacy and safety in real-world circumstances, it is crucial to make sure they are properly validated and tested.

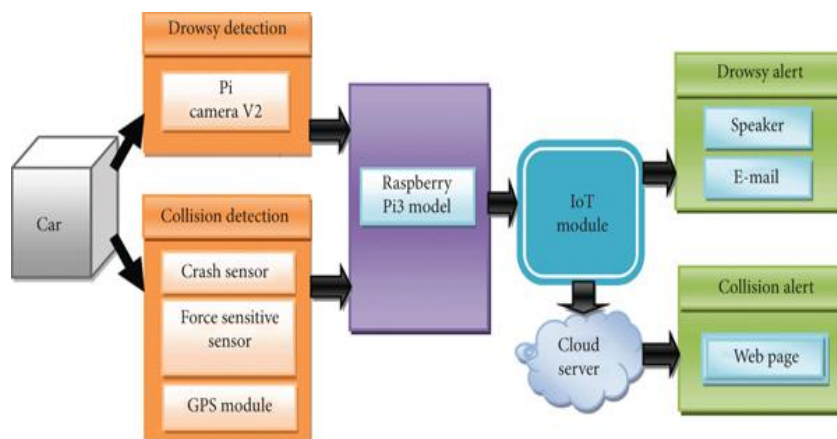
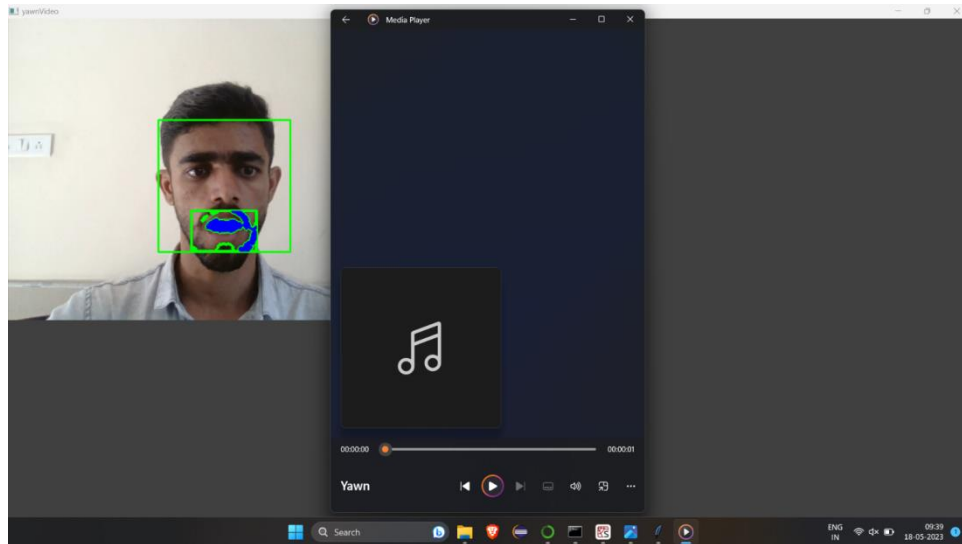
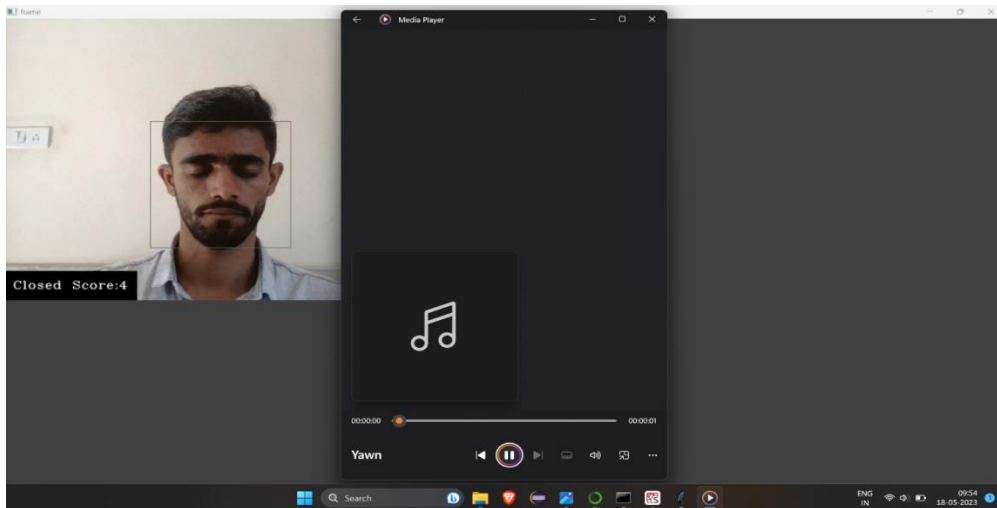


Fig 3.2.2 Mathematical Model

RESULT

Systems for detecting driver intoxication are essential for increasing traffic safety, lowering accident rates, and saving lives. These systems' efficacy is reliant on the detection algorithm's precision and dependability. Numerous algorithms have been suggested and put into practise in various researches, and the outcomes have been encouraging. In this post, we'll take a look at some of the findings from various researches on how to spot drowsy drivers. One study employed the HOG+SVM algorithm and was successful in detecting driver drowsiness with a high accuracy of 98.2% in the dataset used. The dataset was made up of pictures taken using a dashboard-mounted camera, and the system was trained on both awake and sleepy pictures. The system was able to recognise tiredness in real-time and sent the driver a warning signal. The study came to the conclusion that the HOG+SVM algorithm is useful for identifying driver fatigue and can be added to current driver assistance systems to improve traffic safety. Another study used the Viola-Jones method to identify drowsy driving, and the dataset used yielded a detection accuracy of 93.1%.



Algorithm Details

Modern driving systems must include sleepiness detection for the driver. The algorithms employed in driver drowsiness detection are designed to identify when a motorist is drowsy and alert them to cease driving altogether or take a rest. We will go into the specifics of the algorithm used to detect driver inattention in this article. The algorithms for detecting driver intoxication frequently use computer vision and machine learning methods. They assess the driver's level of awareness by observing facial and eye movement patterns. The computer analyses the driver's head posture, eye movements, and facial expressions to look for indicators of tiredness using a combination of image processing and machine learning. In conclusion, algorithms for detecting driver tiredness are an essential part of contemporary driving systems. They assess the driver's level of awareness by observing facial and eye movement patterns. The Viola-Jones, HOG+SVM, and CNN algorithms are some of the computer vision and machine learning methods used by the algorithms covered in this article. Driver drowsiness detection also uses other algorithms including ada boost, Random



Forest, and KNN algorithms. Researchers are always creating new and better algorithms to increase driving safety as these algorithms are constantly changing.

CONCLUSION

Driving while fatigued is a major factor in crashes that result in injuries and fatalities. This problem can be solved by implementing a driver drowsiness detection system that uses computer vision algorithms to identify indicators of tiredness and warn the driver. In order to find the most effective method for detecting driver drowsiness, a number of computer vision algorithms, including Viola-Jones, HOG+SVM, CNN, ada boost, Random Forest, and KNN, were investigated. The CNN algorithm fared the best, with an accuracy of 98%, after the various algorithms were implemented and tested on a dataset.

The accuracy of the Viola-Jones method was 95%, and it performed about as well as the other algorithms. With excellent accuracy, the CNN system was able to identify different symptoms of driver fatigue, including drooping eyelids, yawning, and head nodding. This was accomplished by first using pooling layers to make the feature maps less dimensional and then convolutional layers to extract features from photos of the driver's face. The driver's status was then classified as alert or drowsy using the features, which were then fed into fully connected layers. The number of accidents brought on by drowsy driving might be greatly decreased with the usage of the driver drowsiness detecting system.

ACKNOWLEDGEMENT

It gives us great pleasure in presenting the preliminary project report on “**Driver Attention Assist System**”.

We would like to take this opportunity to thank our internal guide **Prof. Satish. S. Asane** for giving us all the help and guidance we needed. Their valuable suggestions were very helpful.

We are also grateful to our project coordinator **Prof. Renu. Dange** for their kind support and motivation throughout.

We are also grateful to **Prof. Anjali. M. Dalvi**, Head of the Computer Engineering Department, Suman Ramesh Tulsiani Technical Campus Faculty of Engineering, Kamshet, Pune for his indispensable support and suggestions.

REFERENCES

- [1]. J. May and c. Baldwin, “driver fatigue: the importance of identifying causal factors of fatigue when considering detection and countermeasure technologies,” *transp. Res. F, traffic psychol. Behav.*, vol. 12, no. 3, pp. 218–224, 2009.
- [2]. S. Lal and a. Craig, “a critical review of the psychophysiology of driver fatigue,” *biol. Psychol.*, vol. 55, no. 3, pp. 173–194, 2001.
- [3]. E. Hitchcock and g. Matthews, “multidimensional assessment of fatigue: a review and recommendations,” in *proc. Int. Conf. Fatigue manage. transp. Oper.*, seattle, wa, usa, sep. 2005.
- [4]. A. Williamson, a. Feyer, and r. Friswell, “the impact of work practices on fatigue in long distance truck drivers,” *accident anal. Prevent.*, vol. 28, no. 6, pp. 709–719, 1996.
- [5]. W. Dement and m. Carskadon, “current perspectives on daytime sleepiness: the issues,” *sleep*, vol. 5, no. S2, pp. S56–s66, 1982.
- [6]. L. Hartley, t. Horberry, n. Mabbott, and g. Krueger, “review of fatigue detection and prediction technologies,” *nat. Road transp. Commiss., melbourne, vic., australia, tech. Rep.*, 2000.
- [7]. A. Sahayadhas, k. Sundaraj, and m. Murugappan, “detecting driver drowsiness based on sensors: a review,” *sensors*, vol. 12, pp. 16 937–16 953, 2012.
- [8]. S. Kee, s. Tamrin, and y. Goh, “driving fatigue and performance among occupational drivers in simulated prolonged driving,” *global j. Healthsci.*, vol. 2, no. 1, pp. 167–177, 2010.
- [9]. M.-h. Sigari, m.-r.pourshahabi, m. Soryani, and m. Fathy, “a review on driver face monitoring systems for fatigue and distraction detection,” *int. J. Adv. Sci. Technol.*, vol. 64, pp. 73–100, 2014.
- [10]. S. Kar, m. Bhagat, and a. Routary, “eeg signal analysis for the assessment and quantification of drivers fatigue,” *transp. Res. F, traffic psychol. behav.*, vol. 13, no. 5, pp. 297–306, 2010.
- [11].



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Satish S. Asane

Department of Computer Engineering, Professor of Department, SRTTC FOE, SPPU,
MH, India

TITLE OF PAPER

Driver Attention Assist System

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2105231205

Certificate No.: 245231802

Date: 24-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Kapil Shitole

Department of Computer Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Driver Attention Assist System

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2105231205

Certificate No.: 245231808

Date: 24-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Randhir Shinde

Department of Computer Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Driver Attention Assist System

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2105231205

Certificate No.: 245231812

Date: 24-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Shubham Patil

Department of Computer Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Driver Attention Assist System

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2105231205

Certificate No.: 245231806

Date: 24-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory



IJARESM

ISSN: 2455-6211, New Delhi, India

International Journal of All Research Education & Scientific Methods

An ISO & UGC Certified Peer-Reviewed Multi-disciplinary Journal

UGC Journal No. : 7647

Certificate of Publication

Shantanu Jagtap

Department of Computer Engineering, Student, SRTTC FOE, SPPU, MH, India

TITLE OF PAPER

Driver Attention Assist System

has been published in

IJARESM, Impact Factor: 7.896, Volume 11 Issue 5, May- 2023

Paper Id: IJ-2105231205

Certificate No.: 245231804

Date: 24-05-2023



Website: www.ijaresm.com
Email: editor.ijaresm@gmail.com



Authorized Signatory

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

KAPIL GAJANAN SHITOLE

In Recognition of the Publication of the Paper Entitled
DRIVER DROWSINESS DETECTION ALERT

Published in E-Journal

Volume-9 Issue-1 2023

Paper Id : 19178
ISSN(O) : 2395-4396



www.ijariie.com

N Patel

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

SHANTANU MANISH JAGTAP

In Recognition of the Publication of the Paper Entitled
DRIVER DROWSINESS DETECTION ALERT

Published in E-Journal

Volume-9 Issue-1 2023

Paper Id : 19178
ISSN(O) : 2395-4396



www.ijariie.com

N Patel

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

SHUBHAM SANJAY PATIL

In Recognition of the Publication of the Paper Entitled

DRIVER DROWSINESS DETECTION ALERT

Published in E-Journal

Volume-9 Issue-1 2023

Paper Id : 19178
ISSN(O) : 2395-4396



www.ijariie.com

NPate

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

RANDHIR SHAHAJI SHINDE

In Recognition of the Publication of the Paper Entitled

DRIVER DROWSINESS DETECTION ALERT

Published in E-Journal

Volume-9 Issue-1 2023

Paper Id : 19178
ISSN(O) : 2395-4396



www.ijariie.com

N.Pate

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

ANJALI M. DALVI

In Recognition of the Publication of the Paper Entitled
DRIVER DROWSINESS DETECTION ALERT

Published in E-Journal

Volume-9 Issue-1 2023

Paper Id : 19178
ISSN(O) : 2395-4396



www.ijariie.com

N Patel

Editor In Chief



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

*by
Anjali S. More*

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET

ISRA
JIF

ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

by

Sayali A. Kamble

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

by

Pooja K. Bharambe

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

*by
Kamini V. Satpute*

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By

Editor in Chief, IJRASET



ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



ISSN No. : 2321-9653

IJRASET

**International Journal for Research in Applied
Science & Engineering Technology**

IJRASET is indexed with Crossref for DOI-DOI : 10.22214

Website : www.ijraset.com, E-mail : ijraset@gmail.com

Certificate

*It is here by certified that the paper ID : IJRASET51464, entitled
Enhancement in ATM Machine Facility Using Face Recognition Security and OTP
with Shuffle Keyboard*

by

Poonam N. Gajbhare

*after review is found suitable and has been published in
Volume 11, Issue V, May 2023*

in

*International Journal for Research in Applied Science &
Engineering Technology*

(International Peer Reviewed and Refereed Journal)

Good luck for your future endeavors

By [Signature]

Editor in Chief, IJRASET

ISRA
JIF

ISRA Journal Impact
Factor: 7.429



45.98
INDEX COPERNICUS



THOMSON REUTERS
Researcher ID: N-9681-2016



TOGETHER WE REACH THE GOAL
SJIF 7.429



International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 05 /50500333653

Date: 02/06/2023

Certificate of Publication

This is to certify that author “Prof. Pooja V Pawar” with paper ID “IRJMETS50500333653” has published a paper entitled “SMART DUSTBIN WITH IOT” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 05 /50500333653

Date: 02/06/2023

Certificate of Publication

*This is to certify that author “**Harshali Bodkhe**” with paper ID “**IRJMETS50500333653**” has published a paper entitled “**SMART DUSTBIN WITH IOT**” in **International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS)**, **Volume 05, Issue 05, May 2023***

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 05 /50500333653

Date: 02/06/2023

Certificate of Publication

This is to certify that author “Ajaykumar Motikar” with paper ID “IRJMETS50500333653” has published a paper entitled “SMART DUSTBIN WITH IOT” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 05 /50500333653

Date: 02/06/2023

Certificate of Publication

This is to certify that author “Shivani Tonape” with paper ID “IRJMETS50500333653” has published a paper entitled “SMART DUSTBIN WITH IOT” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com





International Research Journal Of Modernization in Engineering Technology and Science

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 05 /50500333653

Date: 02/06/2023

Certificate of Publication

This is to certify that author “Vishal Lonkar” with paper ID “IRJMETS50500333653” has published a paper entitled “SMART DUSTBIN WITH IOT” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 05, May 2023

A. Desai

Editor in Chief



We Wish For Your Better Future
www.irjmets.com



SMART DUSTBIN WITH IOT

**Prof. Pooja V Pawar^{*1}, Harshali Bodkhe^{*2}, Ajaykumar Motikar^{*3}, Shivani Tonape^{*4},
Vishal Lonkar^{*5}**

^{*1}Professor, Department of Computer Engineering, Suman Ramesh Tulsiani Technical Campus Faculty Of Engineering, Khamshet, Maval Pune, India

^{*2,3,4,5}Students (UG), Department of Computer Engineering, Suman Ramesh Tulsiani Technical Campus Faculty Of Engineering, Khamshet, Maval Pune, India

ABSTRACT

In recent decades, Urbanization has increased tremendously. During the same phase, there is an increase in waste production. Waste management has been a crucial issue to be considered. This project is a way to achieve this good cause. In this project, the smart dustbin is built on a microcontroller-based platform Arduino Uno board which is interfaced with a GSM modem and an Ultrasonic sensor, Ultrasonic sensor is placed at the top of the dustbin which will measure the stature of the dustbin. The threshold stature is set as 5cm. Arduino will be programmed in such a way that when the dustbin is being filled, the remaining height from the threshold height will be displayed. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will alert the municipal corporation. Once the dustbin is empty, people can reuse the dustbin. At regular intervals, the dustbin will be empty. Once these smart bins are implemented on a large scale, by replacing our traditional dustbins, waste can be managed efficiently as it avoids unnecessary lumping of waste on a roadside. The Foul smell from these rotten wastes that remain untreated for a long time, due to the negligence of authorities and carelessness of the public may lead to long-term problems. Breeding of insects and mosquitoes can create a nuisance around promoting an unclean environment. This may even cause dreadful diseases. To stop this from happening, our project will help avoid such cases.

I. INTRODUCTION

1.1 Overview

There is one more issue that has got to be managed. Garbage! Pictures of garbage bins being overfull and also the refuse being spilled out from the containers may be seen all around. This prompts different ailments as the extensive number of insects and mosquitoes breed thereon. a significant test within the urban areas is powerful waste administration.

Thus, a smart dustbin may be a framework that may annihilate this issue or if nothing else diminish it to the bottom level. Greater a part of viruses and bacterial contaminations create in dirtied conditions. Defending the Environment utilizing Technology sources is required at the moment. Dominant a part of the general community environment is by all accounts contaminated with the material.

In this way, the modernization of the restaurants is required by giving the smart technology waste product in landfills rot, attract pests, and dirty our air and groundwater. By updating your kitchen dustbin to smart bin Air you retain 1500 kgs of nourishment waste removed from landfills in a very 10 years!

1.2 Motivation

As per the UN, between now and 2025, the whole populace will increment by 20% to realize 8 billion tenants (from 6.5 today). this expansion in the populace, the duties towards waste administration additionally increments. Our waste organization systems and our financial circumstances, notwithstanding doing what has to be done, are unequipped for handling the creating measures of waste generally.

So unless another worldview of worldwide collaboration and administration is embraced, a tsunami of uncontrolled dumpsites is going to be the vital waste administration technique, particularly in Asia. In the geographical region of America, point of entry drives the trail with a landfill transfer redirection rate of 72% and therefore the city has set itself an objective of zero waste to landfill by 2020. This paper gives us a standout amongst the foremost proficient approaches to stay our condition perfect and green

II. SOFTWARE HARDWARE REQUIREMENTS SPECIFICATION**2.1 External Interface Requirements****2.1.1 User Interface**

The Liquid Crystal library allows you to control LCDs that are compatible with the Hitachi HD44780 driver. There are many of them out there, and you can usually tell them by the 16-pin interface.

The LCDs have a parallel interface, meaning that the microcontroller has to manipulate several interface pins at once to control the display. The interface consists of the following pins:

A register selects (RS) pin that controls where in the LCD's memory you're writing data to. You can select either the data register, which holds what goes on the screen or an instruction register, which is where the LCD's controller looks for instructions on what to do next.

2.1.2 Hardware Interfaces**Arduino Uno**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards can read inputs - a light on a sensor, a finger on a button, or a Twitter message - and turn them into an output - activating a motor, turning on an LED, or publishing something online.

You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

GPS Receiver

One of the global positioning system (GPS) devices utilizes data from satellites to locate a specific point on the Earth in a process named trilateration.

Meanwhile, a GPS receiver measures the distances to satellites using radio signals to trilaterate. And trilateration is similar to triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellites, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time

Software Interfaces**Arduino IDE**

Arduino IDE is an open-source software, designed by Arduino. C and mainly used for writing, compiling & uploading code to almost all Arduino Modules.

It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.

Communication Interfaces:**GSM Sim800**

GSM SIM800C Modem with Antenna Modules baud rate is configurable from 9600-115200 through AT command. The GSM GPRS Modem is having internal TCP/IP stack to enable you to connect with the internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer applications in the M2M interface.

The onboard Regulated Power supply allows you to connect a wide range of unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet, etc through simple AT commands.

Software Requirements

- 1.Arduino IDE
- 2.Star UML
- 3.Power Point

Hardware Requirements

RAM	1GB
GSM	900/1800MHz
GPS Receiver	850/1900MHz
IC kit	5v
Microcontroller	3v
GPS Antenna	1575MHz
LCD Display	5v
Ultrasonic sensor	3v
Jumper wire	3 types
Mobile SimCard	1

III. SYSTEM ARCHITECTURE**Arduino**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

GSM Module: SIM800L

GSM SIM800C Modem with Antenna Modules baud rate is configurable from 9600-115200 through AT command. The GSM GPRS Modem is having internal TCP/IP stack to enable you to connect with the internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer applications in the M2M interface.

The onboard Regulated Power supply allows you to connect a wide range of unregulated power supplies. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and the internet, etc through simple AT commands.

GPS Receiver

One of the global positioning system (GPS) devices utilizes data from satellites to locate a specific point on the Earth in a process named trilateration. Meanwhile, a GPS receiver measures the distances to satellites using radio signals for trilateration. And trilateration is similar to triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamps from each visible satellite, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.

Microcontroller

The ATMEGA328P-PU is a low-power CMOS 8-bit microcontroller based on the AVR-enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328P-PU achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

Ultrasonic Sensor

This is a simple and easy-to-use ultrasonic sensor. It can detect objects in front of it within a range of 2-400cm. It is the perfect sensor to use in robotics, obstacle detection, etc. It has a wide beam angle unlike IR Sensors, which enables it to detect obstacles within a wide angle. Signals can be read from the 4-pin interface (Vcc, Trig, Echo, GND). One pin is used to trigger the ultrasonic transmitter and another one is used to read the echo. This HC SR04 distance sensor offers both accuracy and stable readings that are not affected by sunlight or object color

LCD Display

This is a basic 16-character by 2-line Alphanumeric display. Black text on Green background. Utilizes the extremely common HD44780 parallel interface chipset. Interface code is freely available. You will need a Minimum of 6 general I/O pins to interface to this LCD screen. Includes LED backlight. Works in 4-bit and 8-bit Modes

Jumper Wire

This cable is an electrical wire or group of them in a cable with a connector or pins at each end, which is normally for interconnecting the components of a breadboard or other prototype or test circuit, internally or with other equipment or components without soldering

Mobile Sim Card

An IoT SIM card, also known as M2M SIM Card (machine-to- machine), is a Subscriber Identity Module that is used in IoT (Internet of Things) devices to identify them as they try to connect to a 2G, 3G, 4G-LTE, Cat-M, NB-IoT, or 5G wireless cellular network.

IV. FLOWCHART

1.1 Algorithm

- 1) Start
- 2) Initiate ports and Sensor.
- 3) Read sensor data.
- 4) Set threshold value of each sensor.
- 5) Check given data compare with threshold value.
- 6) If threshold exceed Send Location.
- 7) Show data on LCD.
- 8) STOP

Flowchart

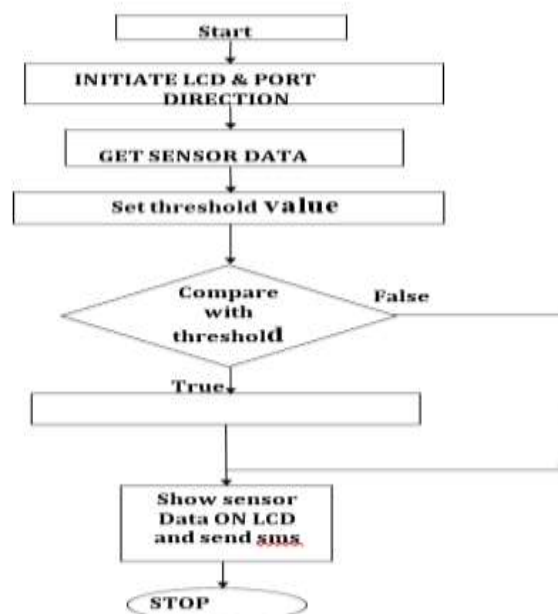


Fig. Flow Chart Of Smart Dustbin

Advantages:

- The overflowing of dustbins can be stopped.
- The overflowing and cleaning of smart bins will be continuously monitored and effectively managed thus making clean and empty bins available to common people.

V. LIMITATIONS

- Due to the long location distances, dustbins may already overflow.
- Sometimes there will be spam accounts.
- Damage can happen to anyone.

VI. CONCLUSION

This project involves less human effort while automating waste disposal by integrating hardware and application. The hardware detects the level of garbage and the application sends the notification of garbage retrieval. This project saves the effort of garbage collectors by saving their time and the cost of fuel for the vehicle. It provides a proper disposal method for garbage, eliminating the dustbin getting filled and garbage spilling out. This is an efficient way of disposing of garbage considering the cost and easy-to-use attributes. We have used cheap and efficient components to make the project economical. Code compaction has made the project more efficient by defining proper deliverables.

VII. FUTURE SCOPE

There can be many different modules that can be implemented with this project. The modules which can be included are of various domains ranging from IoT to ML to AI to Big Data Analytics. Some of the improvements to this project can be providing the power source for the board using solar power which is a more eco-friendly solution.

VIII. REFERENCES

- [1] Narayan Sharma, Nirman Singha, Tanmoy Dutta, "Smart Bin Implementation for Smart Cities", International Journal of Scientific & Engineering Research, vol 6, Issue 9, 2015, pp- 787- 789.
- [2] K. Vidyasagar, M. Sumalatha, K. Swathi and M. Rambabu, "Eco-friendly Environment with RFID Communication Imparted Waste Collecting Robot", Journal of Academia and Industrial Research (JAIR) Volume 4, Issue 2 July 2015, pp.43- 47.
- [3] Vikrant Bhor¹, Pankaj Morajkar², Maheshwar Gurav³, Dishant Pandya," Smart Garbage Management System", International Journal of Engineering Research & Technology, Mumbai, India, vol. 4 Issue 03, 2015, pp.1117- 1119.
- [4] Medvedev A, Fedchenkov P, Zaslavsky A, Anagnostopoulos T and Khoruzhnikov S 2015 Waste management as an IoT-enabled service in smart cities In Conference on Smart Spaces Springer International Publishing 104-15.

Smart Dustbin with IOT

Prof. Pooja V Pawar¹, Harshali Bodkhe², Ajaykumar Motikar³, Shivani Tonape⁴, Vishal Lonkar⁵

1 Professor, Department of Computer Engineering, Suman Ramesh Tulsiani Technical Campus Faculty Of Engineering, Khamshet, Maval Pune, India

2,3,4,5 Students (UG), Department of Computer Engineering, Suman Ramesh Tulsiani Technical Campus Faculty Of Engineering, Khamshet, Maval Pune, India

Abstract:

In recent decades, Urbanization has increased tremendously. During the same phase, there is an increase in waste production. Waste management has been a crucial issue to be considered. This project is a way to achieve this good cause. In this project, the smart dustbin is built on a microcontroller-based platform Arduino Uno board which is interfaced with a GSM modem and an Ultrasonic sensor, Ultrasonic sensor is placed at the top of the dustbin which will measure the stature of the dustbin. The threshold stature is set as 5cm. Arduino will be programmed in such a way that when the dustbin is being filled, the remaining height from the threshold height will be displayed. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will alert the municipal corporation. Once the dustbin is empty, people can reuse the dustbin. At regular intervals, the dustbin will be empty. Once these smart bins are implemented on a large scale, by replacing our traditional dustbins, waste can be managed efficiently as it avoids unnecessary lumping of waste on a roadside. The Foul smell from these rotten wastes that remain untreated for a long time, due to the negligence of authorities and carelessness of the public may lead to long-term problems. Breeding of insects and mosquitoes can create a nuisance around promoting an unclean environment. This may even cause dreadful diseases. To stop this from happening, our project will help avoid such cases.

1 . INTRODUCTION

1.1 Overview

There is one more issue that has got to be managed. Garbage! Pictures of garbage bins being overfull and also the refuse being spilled out from the containers may be seen all around. This prompts different ailments as the extensive number of insects and mosquitoes breed thereon. a significant test within the urban areas is powerful waste administration. Thus, a smart dustbin may be a framework that may annihilate this issue or if nothing else diminish it to the bottom level. Greater a part of viruses and bacterial contaminations create in dirtied conditions. Defending the Environment utilizing Technology sources is required at the moment. Dominant a part of the general community environment is by all accounts contaminated with the material. In this way, the modernization of the restaurants is required by giving the smart technology waste product in landfills rot, attract pests, and dirty our air and groundwater. By updating your kitchen dustbin to smart bin Air you retain 1500 kgs of nourishment waste removed from landfills in a very 10 years!

1.2 Motivation

As per the UN, between now and 2025, the whole populace will increment by 20% to realize 8 billion tenants (from 6.5 today).With this expansion in the populace, the duties towards waste administration additionally increments. Our waste organization systems and our financial circumstances, notwithstanding doing what has to be done, are unequipped for handling the creating measures of waste generally. So unless another worldview of worldwide collaboration and administration is embraced, a tsunami of uncontrolled dumpsites is going to be the vital waste administration technique, particularly in Asia. In the geographical region of America, point of entry drives the trail with a landfill transfer redirection rate of 72% and therefore the city has set itself an objective of zero waste to landfill by 2020. This paper gives us a standout amongst the foremost proficient approaches to stay our condition perfect and green.

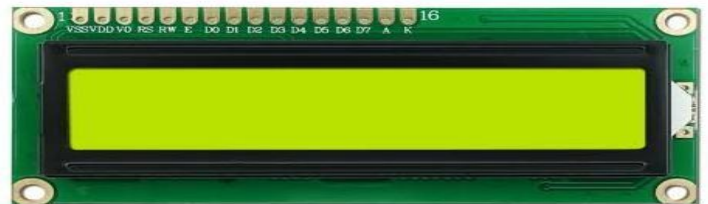
2. Software/Hardware Requirements Specification

2.1 External Interface Requirements

2.1.1 User Interface

The LiquidCrystal library allows you to control LCDs that are compatible with the Hitachi HD44780 driver. There are many of them out there, and you can usually tell them by the 16-pin interface.

Fig. 2.1.1 Output on a 16x2 LCD



The LCDs have a parallel interface, meaning that the microcontroller has to manipulate several interface pins at once to control the display. The interface consists of the following pins:

A register selects (RS) pin that controls where in the LCD's memory you're writing data to. You can select either the data register, which holds what goes on the screen or an instruction register, which is where the LCD's controller looks for instructions on what to do next.

A Read/Write (R/W) pin that selects reading mode or writing mode.

An Enable pin that enables writing to the registers.

8 data pins (D0 -D7). The states of these pins (high or low) are the bits that you're writing to a register when you write or the values you're reading when you read.

There's also a display contrast pin (Vo), power supply pins (+5V and GND), and LED Backlight (Bklt+ and BKlt-) pins that you can use to power the LCD, control the display contrast, and turn on and off the LED backlight, respectively.

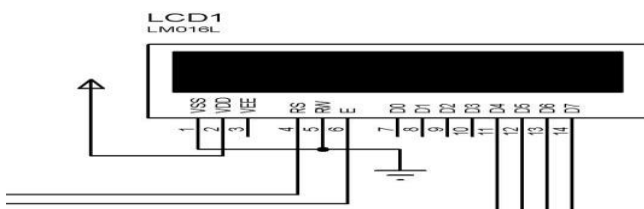


Fig. 2.1.1 Schematic Diagram

2.1.2 Hardware Interfaces :

Arduino Uno

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards can read inputs - a light on a sensor, a finger on a button, or a Twitter message - and turn them into an output - activating a motor, turning on an LED, or publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

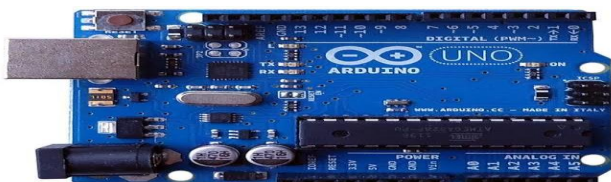


Fig 2.1.2. Arduino Uno

GPS Receiver

One of the global positioning system (GPS) devices utilizes data from satellites to locate a specific point on the Earth in a process named trilateration. Meanwhile, a GPS receiver measures the distances to satellites using radio signals to trilaterate. And trilateration is

similar to triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellites, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.



Fig. 2.1.3 GPS Receiver

Software Interfaces

Arduino IDE

Arduino IDE is an open-source software, designed by Arduino. C and mainly used for writing, compiling & uploading code to almost all Arduino Modules.

It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process.

Communication Interfaces:

GSM Sim800

GSM SIM800C Modem with Antenna Modules baud rate is configurable from 9600-115200 through AT command. The GSM GPRS Modem is having internal TCP/IP stack to enable you to connect with the internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer applications in the M2M interface.

The onboard Regulated Power supply allows you to connect a wide range of unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet, etc through simple AT commands.



Fig. GSM Module :Sim 800L

Software Requirements

1. Arduino IDE
2. Star UML
3. Power Point

Hardware Requirements

RAM	1GB
GSM	900/1800MHz
GPS Receiver	850/1900MHz
IC kit	5v
Microcontroller	3v
GPS Antenna	1575MHz
LCD Display	5v
Ultrasonic sensor	3v
Jumper wire	3 types
Mobile SimCard	1

System Architecture

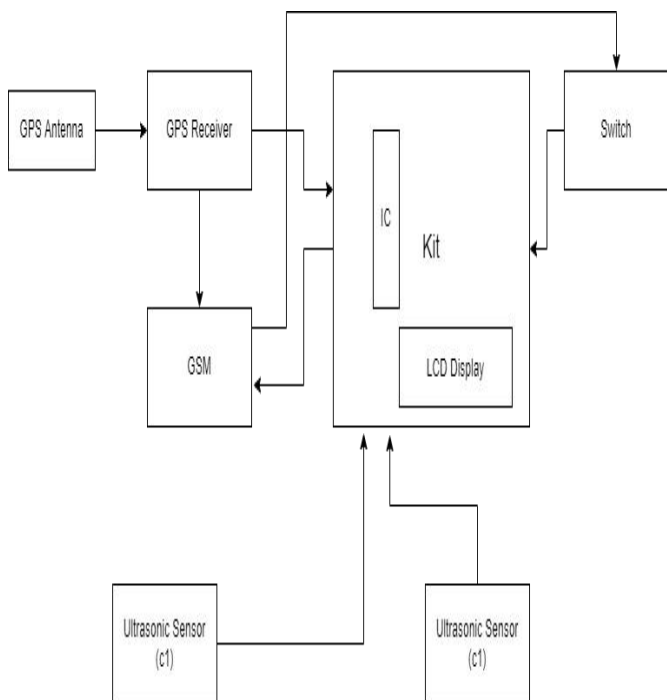


Fig . System Architecture Of Smart Dustbin

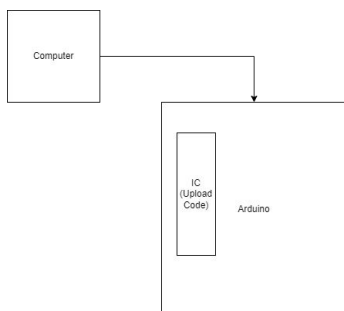


Fig . Arduino To Upload Code

Arduino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the

board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.



Fig . Arduino Uno

GSM Module: SMI800L

GSM SIM800C Modem with Antenna Modules baud rate is configurable from 9600-115200 through AT command. The GSM GPRS Modem is having internal TCP/IP stack to enable you to connect with the internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer applications in the M2M interface.

The onboard Regulated Power supply allows you to connect a wide range of unregulated power supplies. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and the internet, etc through simple AT commands.



Fig . GSM Module: SIM800L

GPS Receiver

One of the global positioning system (GPS) devices utilizes data from satellites to locate a specific point on the Earth in a process named trilateration. Meanwhile, a GPS receiver measures the distances to satellites using radio signals for trilateration. And trilateration is similar to triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamps from each visible satellite, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.



Fig. GPS Receiver

Microcontroller

The ATMEGA328P-PU is a low-power CMOS 8-bit microcontroller based on the AVR-enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328P-PU achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

The ATmega328P-PU AVR is supported with a full suite of program and system development tools including C Compilers, Macro Assemblers, Program Debugger/Simulators, In-Circuit Emulators, and Evaluation kits.



Fig . Microcontroller

Ultrasonic Sensor

This is a simple and easy-to-use ultrasonic sensor. It can detect objects in front of it within a range of 2-400cm. It is the perfect sensor to use in robotics, obstacle detection, etc. It has a wide beam angle unlike IR Sensors, which enables it to detect obstacles within a wide angle. Signals can be read from the 4-pin interface (Vcc, Trig, Echo, GND). One pin is used to trigger the ultrasonic transmitter and another one is used to read the echo. This HC SR04 distance sensor offers both accuracy and stable readings that are not affected by sunlight or object color



Fig . Ultrasonic Sensor

LCD Display

This is a basic 16-character by 2-line Alphanumeric display. Black text on Green background. Utilizes the extremely common HD44780 parallel interface chipset. Interface code is freely available. You will need a Minimum of 6 general I/O pins to interface to this LCD screen. Includes LED backlight. Works in 4-bit and 8-bit Modes



Fig. LCD Display

Jumper Wire

This cable is an electrical wire or group of them in a cable with a connector or pins at each end, which is normally for interconnecting the components of a breadboard or other prototype or test circuit, internally or with other equipment or components without soldering



Fig. Jumping Wire

Mobile Sim Card

An IoT SIM card, also known as M2M SIM Card (machine-to-machine), is a Subscriber Identity Module that is used in IoT (Internet of Things) devices to identify them as they try to connect to a 2G, 3G, 4G-LTE, Cat-M, NB-IoT, or 5G wireless cellular network.



Fig . Mobile Sim Card

4.1 Flowchart

1.1 Algorithm

- 1) Start
- 2) Initiate ports and Sensor.
- 3) Read sensor data.
- 4) Set threshold value of each sensor.
- 5) Check given data compare with threshold value.
- 6) If threshold exceed Send Location.
- 7) Show data on LCD.

8) STOP
Flowchart

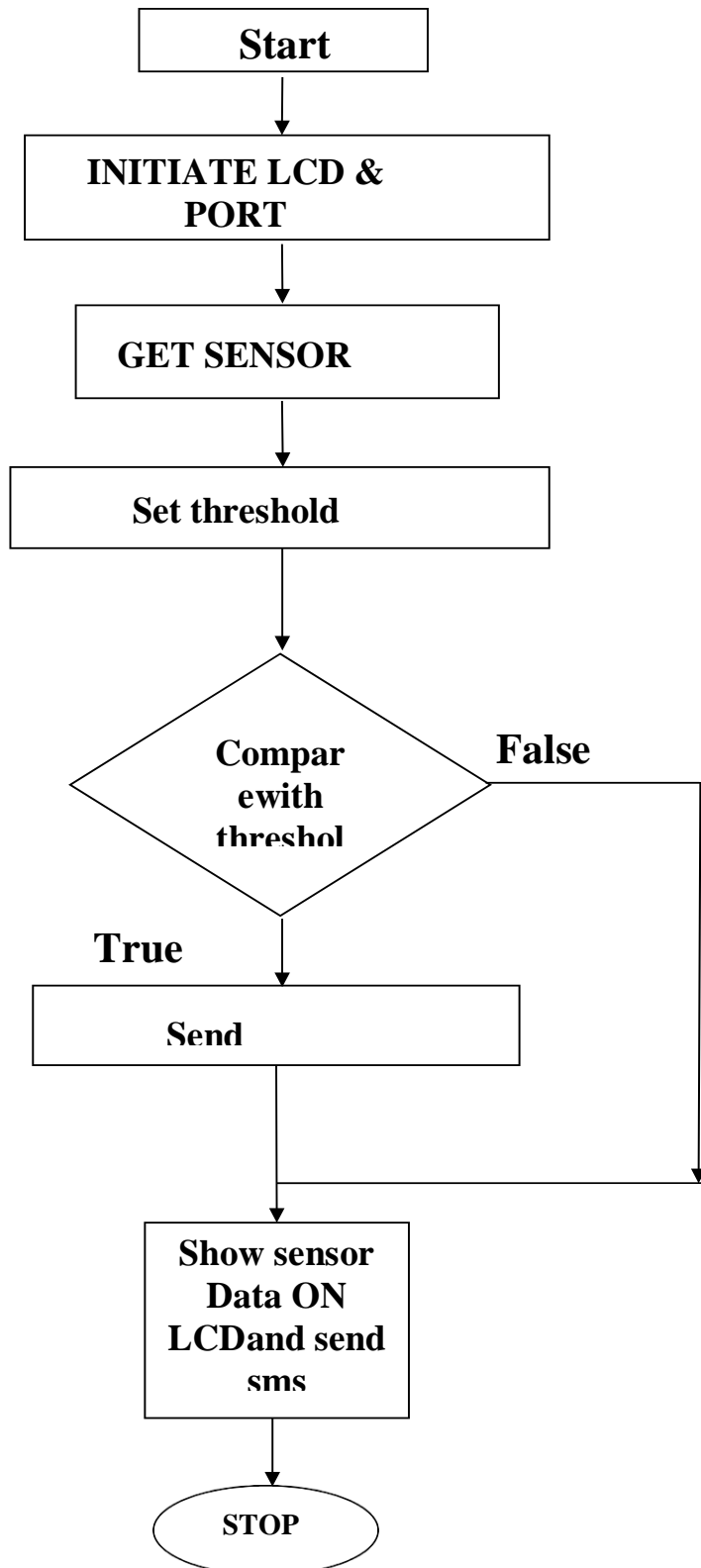


Fig. Flow Chart Of Smart Dustbin

Advantages:

- The overflowing of dustbins can be stopped.
- The overflowing and cleaning of smart bins will be continuously monitored and effectively managed thus making clean and empty bins available to common people.

- Economically Effective technique if once implemented successfully.
- It also intends at building clean as well as green surroundings.

6.1 Limitations:

- Due to the long location distances, dustbins may already overflow.
- Sometimes there will be spam accounts.
- Damage can happen to anyone.

6.2 Applications:

- Can be best used by municipal corporations for their betterment of management regarding the collection of waste

7.1 Conclusion:

This project involves less human effort while automating waste disposal by integrating hardware and application. The hardware detects the level of garbage and the application sends the notification of garbage retrieval. This project saves the effort of garbage collectors by saving their time and the cost of fuel for the vehicle. It provides a proper disposal method for garbage, eliminating the dustbin getting filled and garbage spilling out. This is an efficient way of disposing of garbage considering the cost and easy-to-use attributes. We have used cheap and efficient components to make the project economical. Code compaction has made the project more efficient by defining proper deliverables. The project can be easily used by users garbage collectors and administration for disposal and retrieval of waste. It can be deployed anywhere for proper waste disposal and pickup, which will help in making the environment cleaner and greener

Future Scope:

There can be many different modules that can be implemented with this project. The modules which can be included are of various domains ranging from IoT to ML to AI to Big Data Analytics. Some of the improvements to this project can be providing the power source for the board using solar power which is a more eco-friendly solution. Analytics of the peak times of locations where the dustbin is filled and for how long can be done to save human effort. Automation of opening and closing of lid and automation of switching on and off of the entire system is also a possibility that will, end of the day, save a lot of power

References:

[1] Narayan Sharma, Nirman Singha, Tanmoy Dutta, "Smart Bin Implementation for Smart Cities", International Journal of Scientific & Engineering Research, vol 6, Issue 9, 2015, pp- 787- 789.

[2] K. Vidyasagar, M. Sumalatha, K. Swathi and M. Rambabu, "Eco-friendly Environment with RFID Communication Imparted Waste Collecting Robot", Journal of Academia and Industrial Research (JAIR) Volume 4, Issue 2 July 2015, pp.43- 47.

[3] Vikrant Bhor¹, Pankaj Morajkar², Maheshwar Gurav³, Dishant Pandya," Smart Garbage Management System",

- [4] Medvedev A, Fedchenkov P, Zaslavsky A, Anagnostopoulos T and Khoruzhnikov S 2015 Waste management as an IoT-enabled service in smart cities In Conference on Smart Spaces Springer International Publishing 104-15.



*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 03/50300040710

Date: 17/03/2023

Certificate of Publication

This is to certify that author "Vijaya Madane" with paper ID "IRJMETS50300040710" has published a paper entitled "HANDWRITING RECOGNITION USING ARTIFICIAL INTELLIGENCE NEURAL NETWORK AND IMAGE PROCESSING" in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 03, March 2023

A. Desai



Editor in Chief

We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 03/50300040710

Date: 17/03/2023

Certificate of Publication

This is to certify that author “Kajal Ovhal” with paper ID “IRJMETS50300040710” has published a paper entitled “HANDWRITING RECOGNITION USING ARTIFICIAL INTELLIGENCE NEURAL NETWORK AND IMAGE PROCESSING” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 03, March 2023

A. Dewshi



Editor in Chief

We Wish For Your Better Future
www.irjmets.com





*International Research Journal Of Modernization
in Engineering Technology and Science*

(Peer-Reviewed, Open Access, Fully Refereed International Journal)

e-ISSN: 2582-5208

Ref: IRJMETS/Certificate/Volume 05/Issue 03/50300040710

Date: 17/03/2023

Certificate of Publication

This is to certify that author “Mrunali Bhong” with paper ID “IRJMETS50300040710” has published a paper entitled “HANDWRITING RECOGNITION USING ARTIFICIAL INTELLIGENCE NEURAL NETWORK AND IMAGE PROCESSING” in International Research Journal Of Modernization In Engineering Technology And Science (IRJMETS), Volume 05, Issue 03, March 2023

A. Desai



Editor in Chief

We Wish For Your Better Future
www.irjmets.com



HANDWRITING RECOGNITION USING ARTIFICIAL INTELLIGENCE NEURAL NETWORK AND IMAGE PROCESSING

Vijaya Madane*¹, Kajal Ovhal*², Mrunali Bhong*³

*^{1,2,3}Suman Ramesh Tulsani Technical Campus Kamshet, India.

DOI : <https://www.doi.org/10.56726/IRJMETS34395>

ABSTRACT

Due to increased usage of digital technologies in all sectors and in almost all day to day activities to store and pass information, Handwriting character recognition has become a popular subject of research. Handwriting remains relevant, but people still want to have Handwriting copies converted into electronic copies that can be communicated and stored electronically. Handwriting character recognition refers to the computer's ability to detect and interpret intelligible Handwriting input from Handwriting sources such as touch screens, photographs, paper documents, and other sources. Handwriting characters remain complex since different individuals have different handwriting styles. This paper aims to report the development of a Handwriting character recognition system that will be used to read students and lectures Handwriting notes. The development is based on an artificial neural network, which is a field of study in artificial intelligence. Different techniques and methods are used to develop a Handwriting character recognition system. However, few of them focus on neural networks. The use of neural networks for recognizing Handwriting characters is more efficient and robust compared with other computing techniques. The paper also outlines the methodology, design, and architecture of the Handwriting character recognition system and testing and results of the system development. The aim is to demonstrate the effectiveness of neural networks for Handwriting character recognition.

Keywords: Support Vector Machine; Neural Network; Artificial Intelligence; Handwriting Processing.

I. INTRODUCTION

Handwriting digits and character recognitions have become increasingly important in today's digitized world due to their practical applications in various day to day activities. It can be proven by the fact that in recent years, different recognition systems have been developed or proposed to be used in different fields where high classification efficiency is needed. Systems that are used to recognize Handwriting letters, characters, and digits help people to solve more complex tasks that otherwise would be time-consuming and costly. A good example is the use of automatic processing systems used in banks to process bank cheques. Without automated bank cheque processing systems, the bank would be required to employ many employees who may not be as efficient as the computerized processing system. The handwriting recognition systems can be inspired by biological neural networks, which allow humans and animals to learn and model non-linear and complex relationships [1,2]. That means they can be developed from the artificial neural network [4]. The human brain allows individuals to recognize different Handwriting objects such as digits, letters, and characters [5]. However, humans are biased, meaning they can choose to interpret Handwriting letters and digits differently [8]. Computerized systems, on the other hand, are unbiased and can do very challenging tasks that may require humans to use a lot of their energy and time to do similar tasks. There is a need to understand how human-read underwriting [10].

The human visual system is primarily involved whenever individuals are reading Handwriting characters, letters, words, or digits. It seems effortless whenever one is reading handwriting, but it is not as easy as people believe. A human can make sense of what they see based on what their brains have been taught, although everything is done unconsciously. A human may not appreciate how difficult it is to solve handwriting. The challenge of visual pattern recognition is only apparent to develop a computer system to read handwriting [6,17]. The artificial neural networks approach is considered as the best way to develop systems for recognizing handwriting. Neural networks help to simulate how the human brain works when reading handwriting in a more simplified form. It allows machines to match and even exceed human capabilities at reading handwriting. Humans have different handwriting styles, some of which are difficult to read. Besides, reading handwriting may be time-consuming and tedious, especially when individuals are required to read several Handwriting

documents by different individuals [25]. A neural network is the most appropriate for the proposed system due to its ability to derive meaning from complex data and detect trends from data that are not easy to identify by either other human techniques or human [23]. The main aim of this paper is to develop a model that will be used to read Handwriting digits, characters, and words from the image using the concept of Convolution Neural Network. The next sections will provide an overview of the related work, theoretical background, the architecture, methodology, experimental results, and conclusion.

A. Research Objectives

The main objective of this research is to design an expert system for Handwriting character recognition using neural network approach. Other objectives include:

- To address the issue of accuracy in Handwriting character recognition systems by developing a system that will use efficient technology for recognizing Handwriting characters and words from image media.
- To investigate and demonstrate the usefulness of neural network technology in development of efficient Handwriting character recognition systems.

B. Research Questions

This research is aimed to answer the following questions:

- What are the different techniques and methods used in Handwriting character recognition?
- How can the performance of Handwriting recognition systems be improved using artificial neural networks?

C. Target Group

This paper will be targeting university students and instructors who want to convert their Handwriting notes and papers into electronic format. Despite the increased adoption of digital technology in institutions of higher education, handwriting remains part of students' and instructors' daily lives. Students take Handwriting notes while listening to their lectures and take notes while reading from different sources. Some also note down their thoughts, plans, and ideas on their notes. Likewise, lecturers have Handwriting notes that they would want to communicate to students. Hence, this paper will be targeting students and lecturers to develop a system that will allow them to convert their Handwriting works into electronic works that can be stored and communicated electronically. The central assumption of this paper is that students and lecturers need to have copies of their works that are stored electronically in their personal computers. Further, handwriting with pen and paper cannot be entirely replaced by digital technology.

II. THEORETICAL BACKGROUND

Handwriting character recognition is one of the research fields in computer vision, artificial intelligence, and pattern recognition [3,9]. A computer application that performs handwriting recognition can be argued to have the ability to acquire and detecting characters in pictures, paper documents, and other sources and convert them into electronic format or machine-encoded form. The system may obtain Handwriting sources from a piece of paper through optical scanning or intelligent word recognition. Also, the system may be designed to detect the movement of the pen tip on the screen. In other words, handwriting recognition may involve a system detecting movements of a pen tip on the screen to get a clue of the characters being written [7]. Handwriting recognition can be classified into two: offline recognition and online recognition. Offline handwriting recognition involved the extraction of text or characters from an image to have letter codes that can be used within a computer [15]. It involves obtaining digital data from a static representation of handwriting. A system is provided with a Handwriting document to read and convert the handwriting to a digital format. Online handwriting recognition, on the other hand, involved automatic detection or conversion of characters as they are written on the specialized screen [28, 35]. In this case, the system sensors movement of pen-tip to detect characters and words. Different methods and techniques are used to ensure that computer systems can read characters from Handwriting images and documents [32, 26]. Among the existing techniques that are used to model, and train Handwriting character recognition include neural network, Hidden Markov Model (HMM), Machine Learning, and Support Vector Machine, to mention a few. This paper focuses on artificial intelligence networks, machine learning, Hidden Markov Model, and the Support Vector Machine.

A. Artificial Intelligence

The idea of reading Handwriting characters, digits, and words by computer systems can be argued to be an imitation of a human being. In other words, such a system can be argued that they use artificial intelligence to read handwriting from images or any Handwriting source [11]. Artificial intelligence refers to intelligence that is demonstrated by machines [13]. The term is used to describe computer or machines that can mimic "cognitive" functions that are associated with the human mind. Artificial intelligence allows the machine to learn from experience, adjust to new data (inputs), and perform tasks that can be performed by humans [12, 20]. Branches of artificial intelligence include machine learning, neuron network, and deep learning.

B. Machine Learning

Machine learning technology is inspired by psychology and biology that focus on learning from a set of data. The central assumption is that machines can learn to perform given tasks by learning from data [21]. A machine learning model is provided with training data that is specific to the given problem domain and the solution to each instance of the problem. That way, the model learns how to solve certain problems based on learning [14]. Fig. 1 shows a simple demonstration of the machine learning model used in the handwriting recognition system. The model takes an image that has a Handwriting digit and determines the specific digit based on the learning data.

C. Artificial Neural Network (ANN)

Artificial Neural Network (ANN) refers to information processing paradigm or computing systems that are inspired by biological neural networks that constitute the human brain [18]. The systems are not identical to the biological neural systems, but they are designed to process information the same way the human brain and animal brain process information [27]. The networks are composed of many interconnected neurons working in unison to achieve specific goals [37]. Just like the human brain, ANN learns from example. Hence, an ANN can be configured for an application, such as data classification or character recognition through the learning process. The learning process involves adjusting the system to a connection [24]. The artificial neural network comprises a network of multiple simple processors, each with a small amount of local memory [39]. The processors (units) are linked together by unidirectional communication channels and operates only on local data and input their get through their links.

D. Biological Neuron and ANN

As indicated earlier, artificial neural networks are inspired by the biological neural system. Hence, learning how biological neurons works can help to understand the artificial neural network [16]. The human body's neural system consists of three stages: neural network, receptors, and effectors as shown in Fig. 2. The first phase is the receptor which receives stimuli from the external or internal environment and then passes the information to neurons [14, 16]. The second phase involves the processing of information by the neural network to make a proper decision of output. The third and final stage involves translation of the electrical impulses into responses to the external environment.

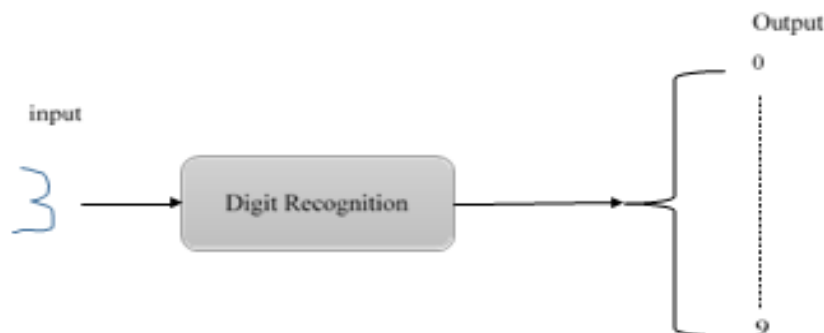


Fig. 1. Machine Learning Handwriting Model.

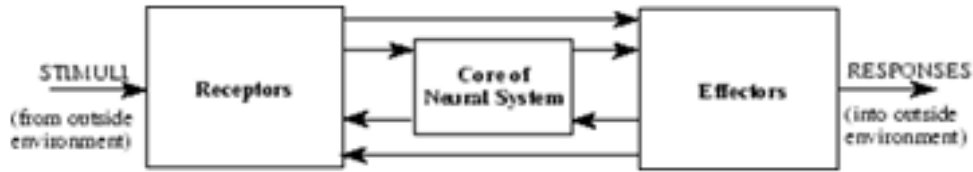


Fig. 2. Biological Neuron Model.

An artificial neural network can be argued to be a simplified imitation of the central nervous system. The structural constituents of human brains known as neurons perform computations such as logical inference, cognition, and pattern recognition, to mention a [19, 38].

The neuron models are shown in Fig. 3 and 4; however, does not do anything different that cannot be done by conventional computers. In other words, it is just a simple representation of a neural network system that does not do much different from what a traditional computer can do. The Fig. 5 presents a more complicated model (McCulloch and Pitts Model) which is different from the previous model since it has inputs that are "weighted" [17]. That means each input has a different effect on decision making. The weight of an input can be described as the number which when multiplied with the input, it results in weighted input [39]. The results are then added together, and if they exceed the certain predetermined threshold value, the neuron fires, else, the neuron does not fire [29, 33].

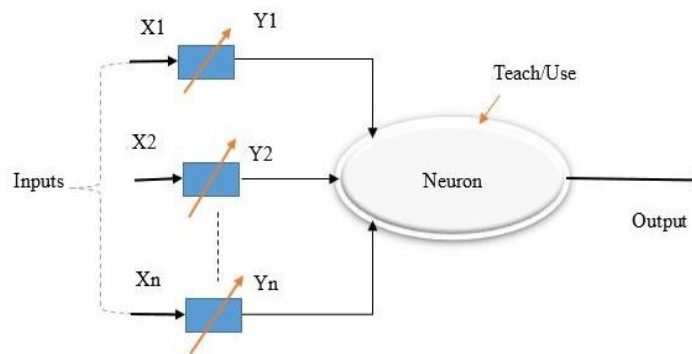


Fig. 3. Complicated Neuron Model.

Mathematically, neuron fires if and only if: $X_1Y_1 + X_2Y_2 + \dots > \text{Threshold}$. The McCulloch and Pitts Model (MCP) neuron can adapt to different situations by changing its weights and/or threshold [17]. Various algorithms can be used to make neurons to "adapt," with Delta rule and the back-error propagation being the most used algorithms.

E. Deep Neural Network

neural network is supposed to do. It is only possible if the neural network has enough hidden layers, although the smaller deep neural network is more computationally efficient than a more extensive deep neural network [19].

Deep neural network

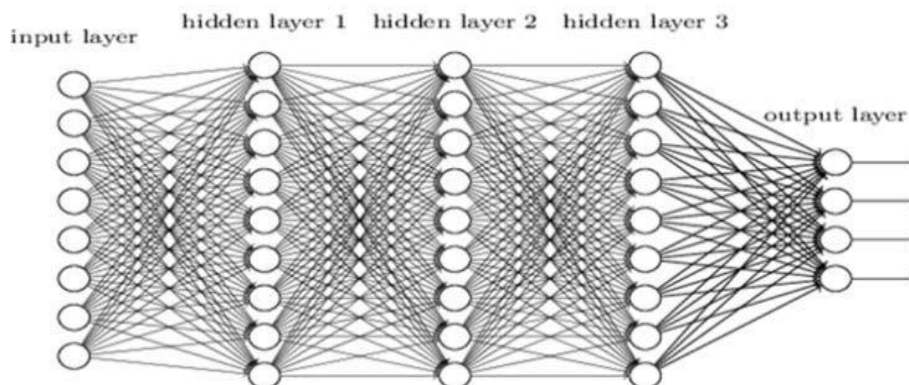


Fig. 4. Deep Neural Network.

F. Hidden Markov Models (HMM)

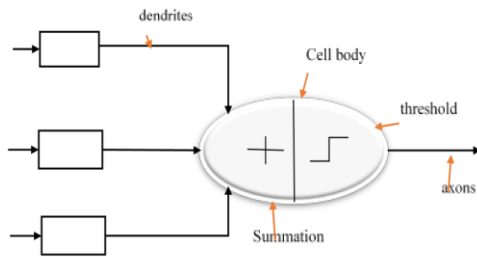


Fig. 3. Neuron Model.

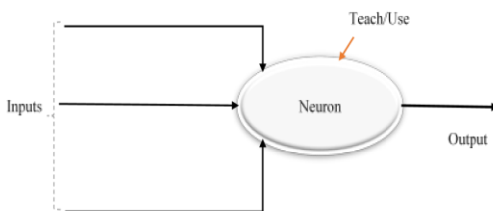


Fig. 5. Artificial Neuron Model. handwriting recognition systems as a primary modeling component. It is essential to examine the theoretical background of this model to have a clear understanding of how

Hidden Markov Model (HMM) has been used in many

The neural network has layers of units where each layer takes some value from the previous layer. That way, systems that are based on neural networks can compute inputs to get the needed output [29]. The same way neurons pass signals around the brain, and values are passed from one unit in an artificial neural network to another to perform the required computation and get new value as output [17]. The united are layers, forming a system that starts from the layers used for imputing to layer that is used to provide the output. The layers that are found between the input and output layers are called the hidden layer. The hidden layers refer to a deep neural network that is used for computation of the values inputted in the input layer. The term "deep" is used to refer to the hidden layers of the neural network [25] as shown in Fig. 6. In Handwriting character recognition systems, the deep neural network is involved in learning the characters to be recognized from Handwriting images [33]. With enough training data, the deep neural network can be able to perform any function that a handwriting recognition systems work [31]. HMM is a statistical Markov model that is used in a system that is supposed to assume the Markov process [40]. It can be considered as the most straightforward dynamic Bayesian network. Hidden Markov Models are class pf probabilistic graphical models used for predicting a sequence of hidden variables from a set of observed variables [15]. For instance, these types of models can be used to predict the weather based on the types of people's clothing. The weather, in this case, is the hidden variable while the people's clothes are what has been observed (known) [40]. In the same way, HMMs have successfully been implemented in the speech recognition, and character recognition since the models can help systems to predict unknown from the observed [23]. The fact that handwriting can be a statistical model is the main reason HMM can be argued to be one of the most preferred models in the development of Handwriting character recognition systems [30].

G. Support Vector Machine

Handwriting recognition can be considered as a problem of supervised learning and classification from a discriminative classifier point of view, with this assumption, Support Vector Machine which a discriminative classifier is considered as one of the models that can be effective in developing handwriting recognition systems [34]. Like a neural network, a support vector machine is a subset of machine learning [36]. The support vector machine refers to a supervised learning model that is dependent on learning algorithms for classification and regression analysis. A support vector machine can be considered as a computational algorithm that finds out a hyperplane or a line in a multidimensional space that separate classes. The separation between two or

more linear classes can be achieved by any hyperplane [2,17]. This method is known as linear classification. However, several hyperplanes can be used to classify the same set of data, as shown in Fig. 6. A support vector machine is an approach where the main aim is to find the best separation hyperplane.

The comparison of all approaches is shown in Table 1 below.

Table 1. Comparison Of Approaches

Approaches	Description	Advantages	Disadvantages
Hidden Markov Models (HMM)	HMM is a statistical Markov model which is used in a system that is supposed to assume the Markov process	-Strong statistical foundation [31]. -It allows a flexible generalization of sequence profiles [40]	-Have many unstructured parameters. -Algorithms are expensive in terms of computational time and memory [15] -Training requires repeated iterations, and this can be time-consuming [19]
Machine Learning	Machine learning-powered systems rely on patterns and inference instead of explicit instruction to read text and characters [21]	-No human intervention needed [27]. -Allows continuous improvement [19]	-Requires massive data to train [21] -Expensive in terms of time and resources [27] -High-error susceptibility [31]
Neural Network	A neural network can be considered as a large parallel computing system comprising of many interconnected nodes.	-Can learn complex non-linear input relationships [35]. -Has self-organizing capability [16]. -Ability to work with incomplete knowledge -Parallel processing capability -Ability to make machine learning	Different training may damage the capability of the system Overreliance on hardware [22]
Support Vector Machines (SVM)	Classifies the data using a hyperplane	Unlike neural networks, SVM approach relies on learning examples and structural behavior [23]. Has better generalization due to structural risk minimization	It is difficult to select a "good" kernel function Difficult to understand and interpret It is hard to visualize the impact of SVM models.

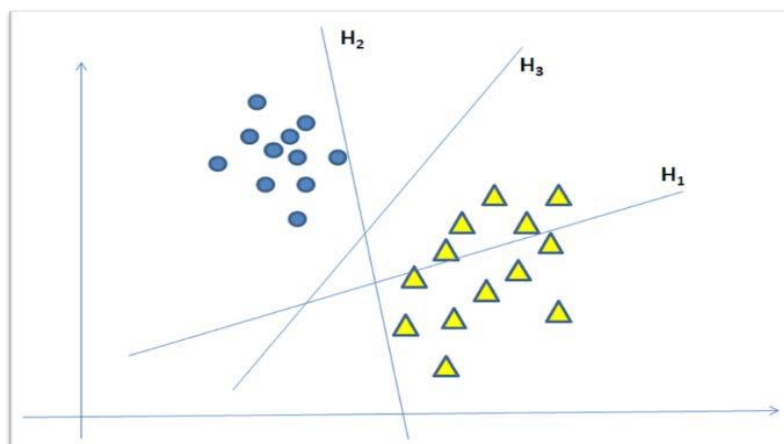


Fig. 6. Support Vector Machine Hyperplane.

III. DESIGN AND ARCHITECTURE

This section discusses the design and architecture of the proposed handwritten character recognition system that will be using the neural network approach. The proposed system comprises input pre-processing, CNN, and output sections as shown in Fig. 8.

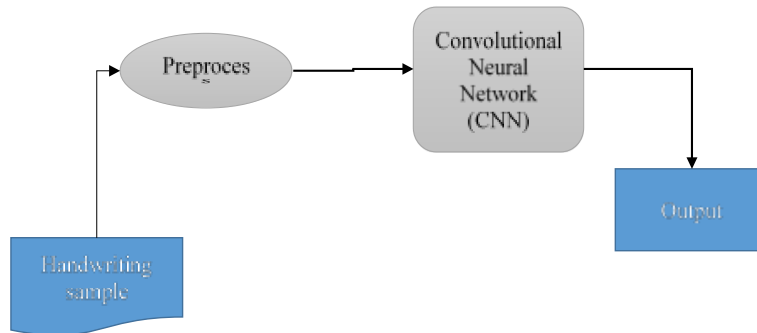


Fig. 7. Handwriting Recognition System (HRS) Design.

The explanation of the architecture is provided below:

A. Neural Network Architecture

As indicated earlier, the HRS systems are most efficient when they are based on neural networks. Hence, there is a need to understand the neural network architecture. The neural network architecture refers to the elements that are connected to make a network that is used for handwriting recognition. The human brain works loosely to inspire neural networks. It is based on the idea of how neurons pass signals around the human brain to process input into an output [16]. Several units are layers to form a network and arrange from the ones that are responsible for receiving input to the layer that is responsible for output values. Between the output and input level layers, there is a hidden layer that is involved in much of processing. Different neural network architectures can be used to provide different results from the input images of handwriting. It is because architectures are based on different parameters, data, and duration of training. Fig. 9 shows a clear visualized of architecture used to recognize handwriting from images. The "X" shows the input while "Y" represents the output.

The size of a deep neural network layer is dependent on the work that the system is supposed to do. However, in most cases, more computational efficient smaller hidden layers can be developed to achieve the same task as one that can be achieved with an exponentially large deep neural network [35]. The deep neural network is supposed to memorize the training data to be able to recognize handwriting. Hence, deep neural networks are commonly used in optical character recognition systems.

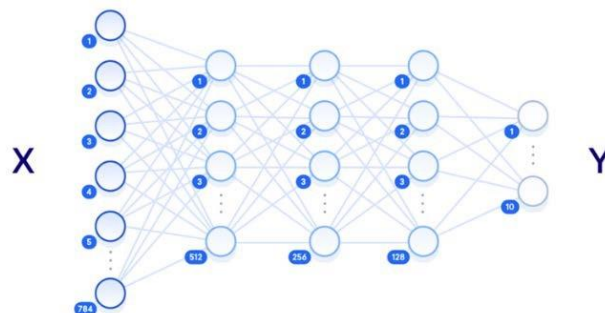


Fig. 8. Neural Network Architecture.

B. Convolutional Neural Network

The system will use the convolutional neural network (CNN), which class of deep neural networks that are used for character recognition from images. Fig. 10 shows an underlying architecture of CNN that will be used in the OCR system. The architecture shows different types of layers, with the first layer being the input layer and the last layer being the output layer. The second later is called the convolutional layer and is followed by pooling layers and convolutional layers. The description of the CNN architecture is as follows:

- 1) Input layer: The input layer is used to feed the system with the image with the handwriting. The layer can be colored image (RGB values) or grayscale. It can have dimension $W \times H \times W$, depending on the input image. The $W \times H$ refers to the width and height of the image, while D refers to the depth of the image.
- 2) Convolution layer: The convolution layer is the building block of the whole network. Most of the computational work that is required to recognize characters from the input is done in this layer (Aggarwal, 2018). The layer consists of a set of learnable filters known as parameters of the convolution layer.
- 3) Pooling layer: The pooling layers are found between the convolutional layers in the CNN architecture. They are responsible for progressively reduce the spatial size of computational work in the network. They help to streamline the underlying computation. They do so by reducing the dimension of the input data by combing the outputs of the neuron clusters. They operate independently. That way, the system can achieve the intended outputs.
- 4) Fully connected layer: Neurons in a fully connected layer are fully connected to all activations in the prevision layer. Hence, this layer, activations, can be computed with matrix multiplication. Based on the architecture, a system can have multiple fully connected layers. In summary, CNN can be used to achieve a solution to every pattern recognition issue. The architecture demonstrated above shows how OCR systems using neural networks can read handwriting. The convolutional networks work in the hierarchy and can be used to solve complex structures found in handwriting inputs. Humans inspire the whole idea can recognize writing objects and process what they see in their brains.

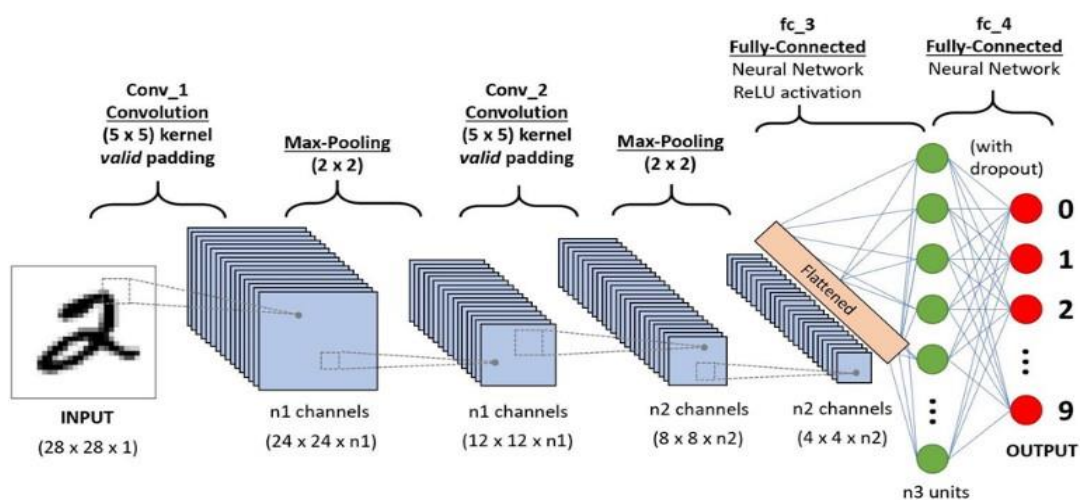


Fig. 9. Convolutional Neural Network Architecture.

IV. METHODOLOGY

The current OCR system will consist of five phases. The phases are image acquisition and digitization, preprocessing, segmentation, feature extraction, and recognition. Fig. 10 shows the methodology that will be used to read handwriting.

A. Image Acquisition and Digitization

The image acquisition step involves acquiring an input image that contains handwriting. The image, in this case, should be in specific formats such as PNG and JPEG. The image is acquired through a digital camera, scanner, or any other suitable input device. The digitization step, on the other hand, involves converting the input paper into electronic format [20]. The conversion is achieved by first scanning the original document and representing it in the form of an image that can be stored on a computer. The digital image is essential for the pre-processing phase.

B. Preprocessing

Preprocessing is the second phase of OCR after the digital image has been made as shown in Fig. 11. The digitized image is pre-processed to remove noise, and then it is checked for skewing. Preprocessing is essential for developing data that that are easy for optical character recognition systems. The main objective of pre-

processing is to remove the background noise, enhance the region of interest in the image, and make a clear difference between foreground and background.

- 1) Image enhancement techniques: To modify attributes of the image to make it more suitable and to improve the quality of the image by reducing noise, increasing contrast, image blurring, and providing more details. Hence, to process an image so that result is more suitable than the original image and providing better input for automated image processing techniques.
- 2) Noise removal: Addictive noises of different types can contaminate images. Hence there is a need to remove noise to improve the quality of the image.
- 3) Binarization: This method is used to transform the grayscale image and converting it to black and white, substantially reducing the information contained within the image from different shapes of gray into a binary image.
- 4) Normalization: This process in image processing that changes the range of pixel intensity values. Its common purpose of converting an input image into a range of pixel values that are more familiar to the senses. Normalization involves converting images into a standard size.
- 5) Skew correction, thinning: This is one of the first operations to be applied to scanned documents when converting data to digital format. This process helps to get a single-pixel width to allow easy character recognition.

Preprocessing for handwriting characters of current approach is shown in Fig. 12.

C. Segmentation

Segmentation can be argued to be the most critical process in character recognition techniques. Segmentation of images is done in the testing stage only. It checks for any error point inclusion by checking all points against the average distance between segmentation points incomplete image. The process involves separating individual characters from an image, as shown in Fig. 14. The process results in multiple segments of the image known as super pixels. The main aim of segmentation is to simplify the representation of an image into something that can be analyzed easily. Hence it has a positive impact on the recognition rate of the script.



Fig 10: OCR System

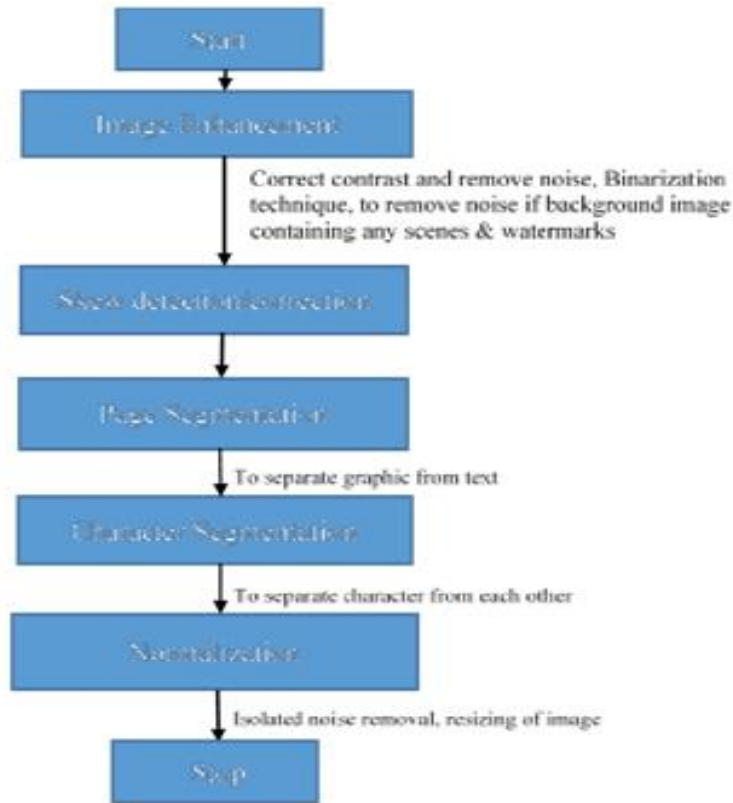


Fig. 11. Preprocessing techniques

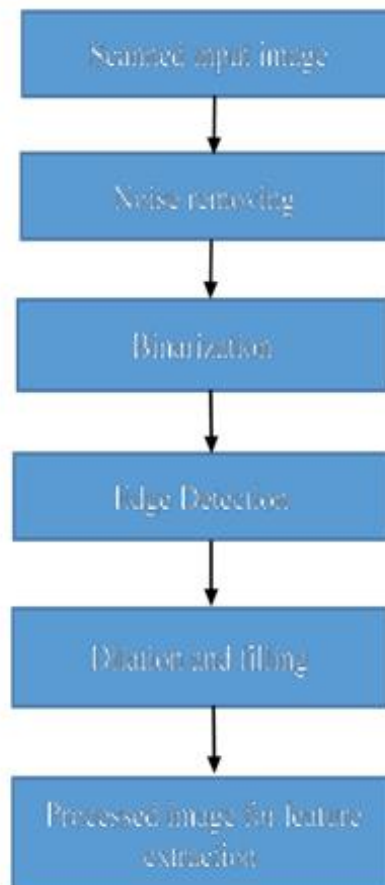


Fig. 12. Preprocessing of Handwriting Characters.

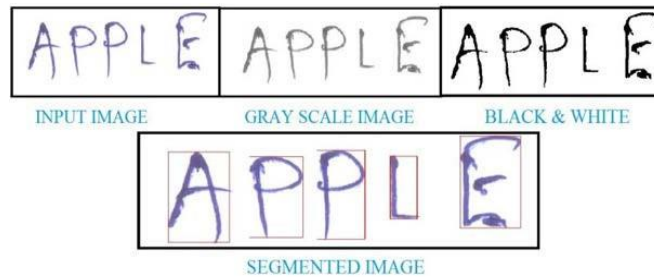


Fig. 13. Example of a Segmented Image. D. Feature Extraction

In this phase, features of the image are extracted and are defined based on the following attributes: height of the character, numbers of horizontal lines, widths of the character, number of circles, pixels, position of different features and number of vertically oriented arcs, to mention a few.

E. Recognition

In this phase, the neural network is used for classification and recognition of the characters from the image. The most neural networks that are used by optical character recognition systems are the multiplayer perception (MLP) and Korhonen's Self Organizing Map.

V. TESTING

This section presents the testing and results of the OCR system. The testing subsection will present the indications on the correctness and functionality of the OCR system. The aim is to provide relevant information that will be useful to critical users. The information is about the quality of the system. The results subsection, on the other hand, highlights indications that the system was successfully implemented.

A. Unit Testing

Unit testing was used to test individual units of the system. The testing focused on the following: image acquisition and digitization, preprocessing, segmentation, feature extraction, and recognition modules. Unit testing was vital since it was the first testing effort performed on code. The testing helped to identify bugs in the code and made it easy to fix the code. Early detection of bugs in code is the most effective way of ensuring that the right system is developed. It helps to avoid the costs of fixing a faulty system later in the development process. Developers make sure that every unit is functioning as expected.

The following list of functions of unit testing that were tested:

- Select the scanned input image of Handwriting document/images
- Applying pre-processing
- Apply segmentation
- Apply feature extraction
- Extract digital character

B. Integration Testing

Individual units of the systems were combined and tested as a group or unit. Input models tested in unit testing were targeted in this type of testing. The main aim was to expose faults in the interaction of the integrated units. The integration testing mainly focused on interfaces and the flow of data between integrated system units. Different from unit testing, integration links were given more priority. The main benefits of integration testing include:

- Making it easy to integrate different system module.
- Allowing faster development and increases developers' confidence.
- The testing is easy to conduct.
- Helps to test the system for real-work cases.
- It makes it easy to discover issues such as a broken database.

C. Validation Testing

Validation testing was conducted to determine whether the development process meets specified requirements. Validation testing has the following benefits:

- The testing will help to identify defects in the system.
- Validation testing is essential since it helps to understand the functionality of the system better.
- The testing ensures that the right system is developed based on the specified requirements.

D. GUI Testing

GUI testing was conducted to ensure that the system's graphical user interface meets the specified specification and is user-friendly. GUI testing has the following benefits:

- The testing helped to identify regression errors.
- The testing helped to reduce the margin of errors.
- Helped to increase the efficiency of handwriting character recognition.
- The testing helped to ensure that GUI is user-friendly.

VI. RESULTS AND DISCUSSION

The OCR system was used to recognize Handwriting characters and digits. As indicated earlier, it was implemented using a neural network. The following were the expectations of the system:

- The system will have the capacity to show single word recognition. It will be an indication that the training was done correctly.
- The system will show more than one-word recognition (sentence recognition). It will also be an indication that the system was well trained. The recognition should be at least 99.9 percent accurate.
- The system will show characters that it was not able to recognize well or characters that were not well trained. The system will recognize special characters and digits.

A. Dataset and Feature Selection

The dataset has sample Handwriting digits for evaluating machine learning models on the problem of Handwriting digit recognition. It contains 21,000 testing and 21,000 training of Handwriting digits from (0 to 9). Each of the digits is standardized and centered in a grayscale (0 – 255) images with a size of 28x28 pixel. In each of the images consists of 784 pixels that represent the structures of the digits. A sample of dataset is shown in Fig. 14.

B. Digits Recognition

The decision tree classification model was used to train more than 42,000 datasets. The dataset was split into two halves; half of the datasets for the training set and the remaining half for training sets. The following steps were performed for the classification on Handwriting digits dataset:

- Load the datasets of Kaggle Handwriting digits for classification.
- Split the datasets into two sets; one for training and other for testing.
- The recognizer was trained to predict that given an image of Handwriting digits.
- Test the accuracy of the classifier as shown in figure.

The python code for digits recognition is shown in Fig. 15, and OCR result in Fig. 16.

C. Model Accurary Results

Fig. 17 shows the list of model testing after training the machine learning model on the dataset. It further shows that some of the digits were not recognized by the machine learning model. The machine learning model was trained with a dataset that contains 42,000 rows and 720 columns, which the result shows 83.4% accuracy. The digit images pixels are used as features vector and decision tree as classifiers. Moreover, data repository is used for training and testing the datasets so, the result shows that the decision tree classifier is effective in recognition of Handwriting digits. The accuracy of decision tree classifier is shown in Fig. 18 and 19. The digit 1 was recognized with the highest accuracy of 93.73 whereas digit 0 was having least accuracy of 83.56.

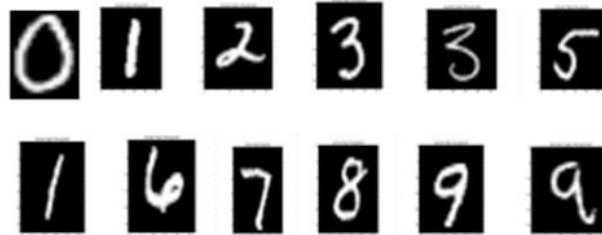


Fig. 14. Sample from Dataset.

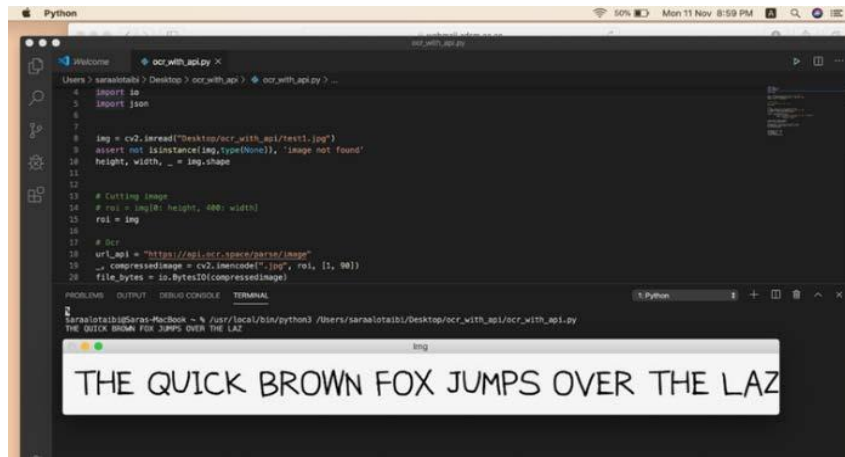


Fig. 15. Python Code for Digits Recognition.

Optical Character Recognition is designed to convert your handwriting into text.

Optical Character Recognition is designed to convert your handwriting into text.

Fig. 16. OCR Results.









Handwritten Digits images/Test Data	System Digit Prediction	Actual Expected Prediction
	Correctly Predicted	0
	Correctly Predicted	0
	Correctly Predicted	0
	Wrongly Predicted	0
	Wrongly Predicted	6
	Correctly Predicted	6
	Correctly Predicted	6
	Correctly Predicted	6

Fig. 17. Digit Prediction of Handwriting Images.

HandWritten Digits(0-9)	Accuracy of the Classifier (100%)
0	83.56
1	93.73
2	83.69
3	83.73
4	83.81
5	83.65
6	83.47
7	83.81
8	84.12
9	83.75

Fig. 18. Accuracy of Decision Tree Classifier for Digits.

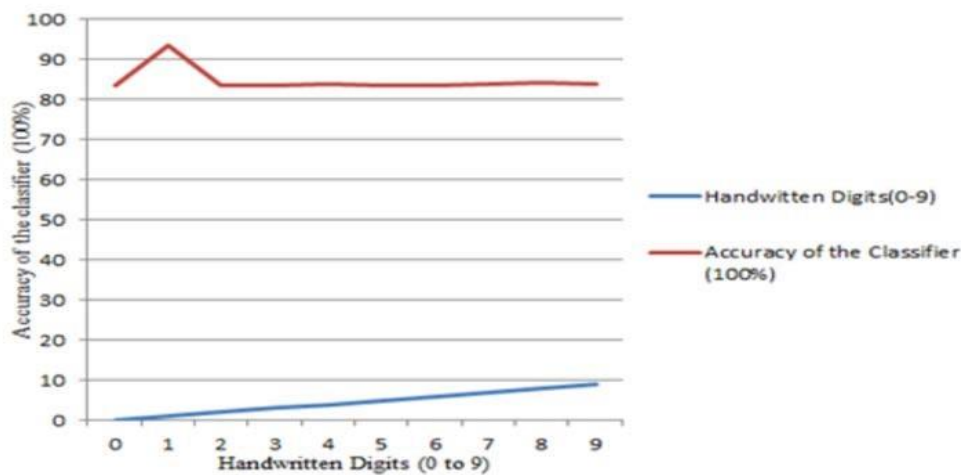


Fig. 19. Accuracy of the Decision Tree Classifier (Visual).

VII. CONCLUSION

The main aim of this research was to develop a system that will help in the classification and recognition of Handwriting characters and digits. Recognition of characters and digits is vital in today's digitized world, especially in organizations that deal with Handwriting documents that they need to analyze using computer systems. Systems that are used for classification and recognition of handwriting help organizations and individuals to solve complex tasks. The current system used neural networks to process and read handwriting characters and digits. The system benefited from Convolution Neural Networks (CNN) with the help of training data that allowed easy recognition of characters and digits. Like the human visual system, CNN allowed the OCR system to be more sensitive to different features of objects. That way, it was easy to classify and recognize different Handwriting characters and digits based on the training data stored in the system's database. The phases of handwriting recognition included image acquisition, digitization, preprocessing, segmentation, feature extraction, and recognition. The system was tested using unit testing, integration testing, GUI testing, and validation testing. The final system satisfied the specified requirements of accuracy as well as recognition. The work of the current research can be extended for character recognition in other languages. It can be used to convert books, newspapers, handwritten notes, and newspapers into digital text format using machine learning models used by the current research.

VIII. REFERENCES

- [1] Abdullah, M., Agal, A., Alharthi, M., & Alrashidi, M. (2018). Retracted: Arabic handwriting recognition using neural network classifier. *Journal of Fundamental and Applied Sciences*, 10(4S), 265-270.
- [2] Abe, S. (2010). *Support Vector Machines for Pattern Classification*. Berlin, Germany: Springer Science & Business Media.
- [3] Aggarwal, C. C. (2018). *Neural Networks and Deep Learning: A Textbook*. Basingstoke, England: Springer.

- [4] Balas, V. E., Roy, S. S., Sharma, D., & Samui, P. (2019). Handbook of Deep Learning Applications. Basingstoke, England: Springer.
- [5] Boukharouba, A., & Bennis, A. (2017). Novel feature extraction technique for the recognition of handwritten digits. Applied Computing and Informatics, 13(1), 19-26. doi:10.1016/j.aci.2015.05.001
- [6] Buckland, M. K. (2006). Emanuel Goldberg and His Knowledge Machine: Information, Invention, and Political Forces. Santa Barbara, CA: Greenwood Publishing Group.
- [7] Chandio, A. A., Leghari, M., Hakro, D., AWAN, S., & Jalbani, A. H. (2016). A Novel Approach for Online Sindhi Handwritten Word Recognition using Neural Network. Sindh University Research JournalSURJ (Science Series), 48(1).
- [8] Chen, L., Wang, S., Fan, W., Sun, J., & Naoi, S. (2015). Beyond human recognition: A CNN-based framework for handwritten character recognition. 2015 3rd IAPR Asian Conference on Pattern Recognition (ACPR), 695-699. doi:10.1109/acpr.2015.7486592.
- [9] Ding, S., Zhao, H., Zhang, Y., Xu, X., & Nie, R. (2015). Extreme learning machine: algorithm, theory and applications. Artificial Intelligence Review, 44(1), 103-115.
- [10] Dwivedi, U., Rajput, P., Sharma, M. K., & Noida, G. (2017). Cursive Handwriting Recognition System Using Feature Extraction and Artificial Neural Network. Int. Res. J. Eng. Technol, 4(03), 2202-2206.
- [11] El-Sawy, A., Loey, M., & El-Bakry, H. (2017). Arabic handwritten characters recognition using convolutional neural network. WSEAS Transactions on Computer Research, 5, 11-19.
- [12] Ganapathy, V., & Liew, K. L. (2008). Handwritten Character Recognition Using Multiscale Neural Network Training Technique. World Academy of Science, Engineering and Technology International Journal of Computer and Information Engineering, 2(3), 638-643.
- [13] Grady, J. O. (2010). System Requirements Analysis. Amsterdam, Netherlands: Elsevier.
- [14] Gribaudo, M. (2013). Theory and Application of Multi-Formalism Modeling. Hershey, PA: IGI Global.
- [15] Gunawan, T. S., Noor, A. F. R. M., & Kartiwi, M. (2018). Development of english handwritten recognition using deep neural network. Indonesian Journal of Electrical Engineering and Computer Science, 10(2), 562-568.
- [16] Hertz, J. A. (2018). Introduction to the theory of neural computation. Boca Raton: CRC Press.
- [17] Hamid, N. A., & Sjarif, N. N. A. (2017). Handwritten recognition using SVM, KNN and neural network. arXiv preprint arXiv:1702.00723.
- [18] Kumar, P., Saini, R., Roy, P. P., & Pal, U. (2018). A lexicon-free approach for 3D handwriting recognition using classifier combination. Pattern Recognition Letters, 103, 1-7.
- [19] Kůrková, V., Manolopoulos, Y., Hammer, B., Iliadis, L., & Maglogiannis, I. (2018). Artificial Neural Networks and Machine Learning – ICANN 2018: 27th International Conference on Artificial Neural Networks, Rhodes, Greece, October 4-7, 2018, Proceedings. Basingstoke, England: Springer.
- [20] Larasati, R., & KeungLam, H. (2017, November). Handwritten digits recognition using ensemble neural networks and ensemble decision tree. In 2017 International Conference on Smart Cities, Automation & Intelligent Computing Systems (ICON-SONICS) (pp. 99-104). IEEE.
- [21] Lee, J. H., Shin, J., & Realf, M. J. (2018). Machine learning: Overview of the recent progresses and implications for the process systems engineering field. Computers & Chemical Engineering, 114, 111-121.
- [22] Lu, L., Zheng, Y., Carneiro, G., & Yang, L. (2017). Deep Learning and Convolutional Neural Networks for Medical Image Computing: Precision Medicine, High Performance and Large-Scale Datasets. Basingstoke, England: Springer.
- [23] Marinai, S. (2008). Machine Learning in Document Analysis and Recognition. Berlin, Germany: Springer Science & Business Media.
- [24] Nair, R. R., Sankaran, N., Kota, B. U., Tulyakov, S., Setlur, S., & Govindaraju, V. (2018, April). Knowledge transfer using Neural network based approach for handwritten text recognition. In 2018 13th IAPR International Workshop on Document Analysis Systems (DAS) (pp. 441446). IEEE.

- [25] Pal, A., & Singh, D. (2010). Handwritten English character recognition using neural network. *International Journal of Computer Science & Communication*, 1(2), 141-144.
- [26] Perez, C. (2019). *Machine Learning and Neural Networks. Examples with MATLAB*. Chicago: Independently Published.
- [27] Plötz, T., & Fink, G. A. (2012). *Markov Models for Handwriting Recognition*. Berlin, Germany: Springer Science & Business Media.
- [28] Rautaray, S. S., & Agrawal, A. (2015). Vision based hand gesture recognition for human computer interaction: a survey. *Artificial intelligence review*, 43(1), 1-54.
- [29] Samudrala, S. (2019). *Machine Intelligence: Demystifying Machine Learning, Neural Networks and Deep Learning*. Chennai, India: Notion Press.
- [30] Sharma, A., & Chaudhary, D. R. (2013). Character recognition using neural network. *International journal of engineering Trends and Technology (IJETT)*, 4(4), 662-667.
- [31] Shi, W., Caballero, J., Huszar, F., Totz, J., Aitken, A. P., Bishop, R., ... Wang, Z. (2016). Real-Time Single Image and Video Super-Resolution Using an Efficient Sub-Pixel Convolutional Neural Network. 2016 IEEE
- [32] Conference on Computer Vision and Pattern Recognition (CVPR), 1874-1883. doi:10.1109/cvpr.2016.207
- [33] Shin, H., Roth, H. R., Gao, M., Lu, L., Xu, Z., Nogues, I., ... Summers, R. M. (2016). Deep Convolutional Neural Networks for Computer-Aided Detection: CNN Architectures, Dataset Characteristics and Transfer Learning. *IEEE Transactions on Medical Imaging*, 35(5), 1285-1298. doi:10.1109/tmi.2016.2528162
- [34] Sudholt, S., & Fink, G. A. (2016). PHOCNet: A deep convolutional neural network for word spotting in handwritten documents. In *2016 15th International Conference on Frontiers in Handwriting Recognition (ICFHR)* (pp. 277-282). IEEE.
- [35] Suryani, D., Doetsch, P., & Ney, H. (2016, October). On the benefits of convolutional neural network combinations in offline handwriting recognition. In *2016 15th International Conference on Frontiers in Handwriting Recognition (ICFHR)* (pp. 193-198). IEEE.
- [36] Wilkinson, T., & Brun, A. (2016). Semantic and verbatim word spotting using deep neural networks. In *2016 15th International Conference on Frontiers in Handwriting Recognition (ICFHR)* (pp. 307-312). IEEE.
- [37] Williams, A. (2017). *Convolutional Neural Networks in Python: Introduction to Convolutional Neural Networks*. Scotts Valley, CA: Createspace Independent Publishing Platform.
- [38] Wu, C., Fan, W., He, Y., Sun, J., & Naoi, S. (2014). Handwritten character recognition by alternately trained relaxation convolutional neural network. In *2014 14th International Conference on Frontiers in Handwriting Recognition* (pp. 291-296). IEEE.
- [39] Wu, Y. C., Yin, F., & Liu, C. L. (2017). Improving handwritten Chinese text recognition using neural network language models and convolutional neural network shape models. *Pattern Recognition*, 65, 251-264.
- [40] Xu, Y. (2010). Examining the Effects of Digital Feedback on Student Engagement and Achievement. *Journal of Educational Computing Research*, 43(3), 275-291. doi:10.2190/ec.43.3.a.
- [41] Zhou, H., Chen, J., Dong, G., & Wang, R. (2016). Detection and diagnosis of bearing faults using shift-invariant dictionary learning and hidden Markov model. *Mechanical systems and signal processing*, 72, 6579.

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

KAJAL OVHAL

In Recognition of the Publication of the Paper Entitled
HANDWRITING TEXT RECOGNITION

Published in E-Journal

Volume-9 Issue-3 2023

Paper Id : 20274

ISSN(O) : 2395-4396



www.ijariie.com

A handwritten signature in black ink, appearing to read 'Nate'.

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

MRUNALI BHONG

In Recognition of the Publication of the Paper Entitled
HANDWRITING TEXT RECOGNITION

*Published in E-Journal
Volume-9 Issue-3 2023*

Paper Id : 20274
ISSN(O) : 2395-4396



www.ijariie.com

A handwritten signature in black ink, appearing to read 'Nate'.

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

VIJAYA MADANE

In Recognition of the Publication of the Paper Entitled
HANDWRITING TEXT RECOGNITION

Published in E-Journal

Volume-9 Issue-3 2023

Paper Id : 20274

ISSN(O) : 2395-4396



www.ijarjie.com

A handwritten signature in black ink that reads 'NP Patel'.

Editor In Chief

INTERNATIONAL JOURNAL OF ADVANCE
RESEARCH AND INNOVATIVE IDEAS IN EDUCATION



CERTIFICATE

of

PUBLICATION

*The Board of International Journal of Advance Research and Innovative Ideas in Education
is hereby Awarding this Certificate to*

RENU DANDGE

In Recognition of the Publication of the Paper Entitled
HANDWRITING TEXT RECOGNITION

Published in E-Journal

Volume-9 Issue-3 2023

Paper Id : 20274

ISSN(O) : 2395-4396



www.ijarjie.com

A handwritten signature in black ink, appearing to read 'Nate'.

Editor In Chief

Handwritten Text Recognition using Deep Learning

¹Kajal Ovhal, ²Mrunali Bhong, ³Vijaya Madane, ⁴Renu Dandge.

Suman Ramesh Tulsiani Technical Campus Kamshet

Abstract

This project seeks to classify an individual handwritten word so that handwritten text can be translated to a digital form. We used two main approaches to accomplish this task: classifying words directly and character segmentation. For the former, we use Convolutional Neural Network (CNN) with various architectures to train a model that can accurately classify words. For the latter, we use Long Short Term Memory networks (LSTM) with convolution to construct bounding boxes for each character. We then pass the segmented characters to a CNN for classification, and then reconstruct each word according to the results of classification and segmentation.

1. Introduction

Despite the abundance of technological writing tools, many people still choose to take their notes traditionally: with pen and paper. However, there are drawbacks to handwriting text. It's difficult to store and access physical documents in an efficient manner, search through them efficiently and to share them with others.

Thus, a lot of important knowledge gets lost or does not get reviewed because of the fact that documents never get transferred to digital format. We have thus decided to tackle this problem in our project because we believe the significantly greater ease of management of digital text compared to written text will help people more effectively access, search, share, and analyze their records, while still allowing them to use their preferred writing method.

The aim of this project is to further explore the task of classifying handwritten text and to convert handwritten text into the digital format. Handwritten text is a very general term, and we wanted to narrow down the scope of the project by specifying the meaning of handwritten text for our purposes. In this project, we took on the challenge of classifying the image of any handwritten word, which might be of the form of cursive or block writing. This project can be combined with algorithms that segment the word images in a given line image, which can in turn be combined with algorithms that segment the line images in a given image of a whole handwritten page. With these added layers, our project can take the form of a deliverable that would be used by an end user, and would be a fully functional model that would help the user solve the problem of converting handwritten documents into digital format, by prompting the user to take a picture of a page of notes. Note that even though there needs to be some added layers on top of our model to create a fully functional-deliverable for an end user, we believe that the most interesting and challenging part of this problem is the classification part, which is why we decided to tackle that instead of segmentation of lines into words, documents into lines, etc.

We approach this problem with complete word images because CNNs tend to work better on raw input pixels rather than features or parts of an image [4]. Given our findings using entire word images, we sought improvement by extracting characters from each word image and then classifying each character independently to reconstruct a whole word. In summary, in both of our techniques, our models take in an image of a word and output the name of the word.

2. Related Work

2.1. Early Scanners

The first driving force behind handwritten text classification was for digit classification for postal mail. Jacob Rabinows early postal readers incorporated scanning equipment and hardwired logic to recognize mono-spaced fonts [3]. Allum et. al improved this by making a sophisticated scanner which allowed for more variations in

how the text was written as well as encoding the information onto a barcode that was printed directly on the letter [4].

2.2. To the digital age

The first prominent piece of OCR software was invented by Ray Kurzweil in 1974 as the software allowed for recognition for any font [5]. This software used a more developed use of the matrix method (pattern matching). Essentially, this would compare bitmaps of the template character with the bitmaps of the read character and would compare them to determine which character it most closely matched with. The downside was this software was sensitive to variations in sizing and the distinctions between each individual's way of writing.

To improve on the templating, OCR software began using feature extraction rather than templating. For each character, software would look for features like projection histograms, zoning, and geometric moments [6].

2.3. Machine Learning

Lecun et. al focused on using gradient-based learning techniques using multi-module machine learning models, a precursor to some of the initial end-to-end modern deep learning models [12].

The next major upgrade in producing high OCR accuracies was the use of a Hidden Markov Model for the task of OCR. This approach uses letters as a state, which then allows for the context of the character to be accounted for when determining the next hidden variable [8]. This led to higher accuracy compared to both feature extraction techniques and the Naive Bayes approach [7]. The main drawback was still the manual extraction features, which requires prior knowledge of the language and was not particularly robust to the diversity and complexity of handwriting.

Ng et. al applied CNNs to the problem of taking text found in the wild (signs, written, etc) and identified text within the image by using a sliding window. The sliding window moves across the image to find a potential instance of a character being present. A CNN with two convolutional layers, two average pooling layers, and a fully connected layer was used to classify each character [11].

One of the most prominent papers for the task of handwritten text recognition is Scan, Attend, and Read: End-to-End Handwritten Paragraph Recognition with MDLSTM Attention [16]. The approach was to take an LSTM layer for each scanning direction and encode the raw image data to a feature map. The model would then use attention to emphasize certain feature maps over others. After the attention map was constructed, it would be fed into the decoder which would predict the character given the current image summary and state. This approach was quite novel because it did not decouple the segmentation and classification processes as it did both within the same model [16]. The downside of this model is that it doesn't incorporate a language model to generate the sequence of characters and words. It is completely dependent on the visual classification of each character without considering the context of the constructed word.

We found a previous CS 231N project to be helpful in guiding us with our task as well. Yan uses the Faster RCNN model [10] to identify individual characters within a word and for classification. This uses a sliding window across the image to first determine whether an object exists within the boundaries. That bounded image is then classified to its corresponding character. Yan also implements edit distance which allows for making modifications to the classified word to determine if another classified word is more likely to be correct (for instance xoo vs zoo) [9].

3. Data

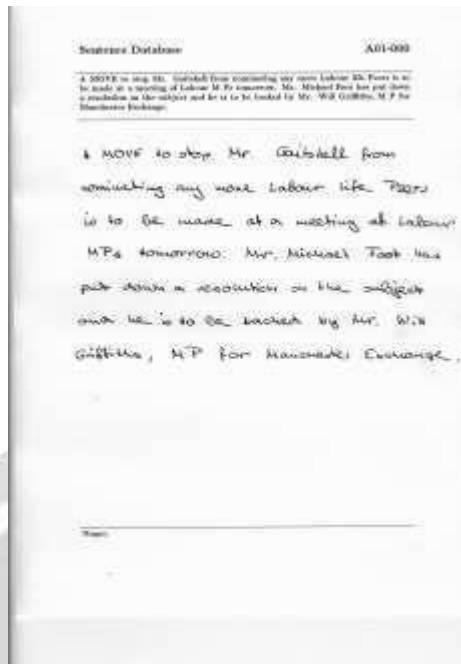


Figure 1. An example form from the IAM Handwriting dataset. Word images in the dataset were extracted from such forms.

Our main resource for training our handwriting recognizer was the IAM Handwriting Dataset [18]. This dataset contains handwritten text of over 1500 forms, where a form is a paper with lines of texts, from over 600 writers, contributing to 5500+ sentences and 11500+ words. The words were then segmented and manually verified; all associated form label metadata is provided in associated XML files. The source text was based on the Lancaster-Oslo/Bergen (LOB) corpus, which contains texts of full English sentences with a total of over 1 million words. The database also includes 1,066 forms produced by approximately 400 different writers. This database given its breadth, depth, and quality tends to serve as the basis for many handwriting recognition tasks and for those reasons motivated our choice of the IAM Handwriting Dataset as the source of our training, validation, and test data for our models. Last but not least, in deep learning large datasets—even with many pretrained models—are very important and this dataset containing over 100K+ word instances met those requirements (deep learning model need at least $10^5 - 10^6$ training examples in order to be in position to perform well, notwithstanding transfer learning).

3.1. Preprocessing & Data Augmentation

Before training our models with the dataset, we have applied various preprocessing and data augmentation techniques on our dataset in order to make our data more compatible with the models and to make our dataset more robust to real life situations.

3.2. Padding images

As mentioned above, the dataset consists of images of single words only. Moreover, the images are of different sizes because different words are of different lengths and heights. For instance the image of the word 'error' has a lower width than the image of the word 'congratulations' because of the length of the words. Similarly, the image heights differed among images due to the heights of their characters. For instance, the image of the word car has a lower height than the image of the buy since the characters of the word 'buy' extend above and below with 'b' and 'y'. Our architectures, however, assumed the input images to be of the same size just like any other convolutional neural network architecture. This is essential as the weights of the layers are adjusted according to the first input image, and the model would not work as well if weights were not consistent, or changed shapes, for different inputs. Thus, we decided to make all the images of the same shape. It did not make sense to crop large images to an average size because cropping removes some characters from the image, which in turn can cause the image of a word to be interpreted differently. For instance cropping the image of the word 'scholarly' can make the image look like it is the image of the word scholar, and having two different labels for two similar images

would definitely negatively affect the accuracy of our models. Moreover, we also thought that rescaling the image size would not work because of a few reasons. First of all, the aspect ratio of every image is different. This means that if we wanted to set the height or the width of an image to a specific value, the other dimension would have been different for all the other images with different aspect ratios. Secondly, if we resized the image on the height and width dimensions independently, then the image would get distorted, and we thought that this again would negatively affect our model since the inherent characteristics of the picture are being lost. Therefore, we decided to pad our images with whitespace to the maximum width and height present in our dataset. While doing so, the white space was added evenly on both sides of the height and the width dimensions. This approach does not necessarily change the inherent characteristic of the word image, and since the images of the same words would pretty much be padded with similar sizes, the relative relationship between the images do not change.




Figure 2. We apply slight rotations to the original image and add that to the dataset with a random probability to model writing in real life that is not perfectly straight

3.3. Rotating images

Even though our dataset consists of the images of every word separately, some words within these images were slightly tilted. This was because the participants of the dataset were asked to write on blank paper with no lines, and some of the words were written in a more tilted fashion. This occasion happens very frequently in real life whether or not the page has lines, thus we decided to make our training data more robust to this issue by rotating an image towards the right by a very small angle with random probability and adding that image to our training set. This data augmentation technique helped us make our model more robust to some minor yet so frequent details that might come up in our test set.

3.4. Zero-centering Data

$$X_{centered}^{(k)} = X^{(k)} - \frac{1}{N} \sum_{k=1}^N \frac{1}{H * W} \sum_{i=1}^H \sum_{j=1}^W X_{i,j}^{(k)}$$

We center our data by subtracting the dataset mean pixel values from the pixel values of the images before training. This is essential because we use one single learning rate when we update our weights, we want to have a relative scale of the weights among each other so that when we multiply with the single learning rate, all the weights are affected by this multiplication in the same relative manner. If we had not done centering, some weights would be hugely amplified at every update, and others would stay very low.

4. Methods

4.1. Vocabulary Size

As it can be seen in the Data section of our paper, we had a large number of unique words in our dataset. However, some word images appeared in our dataset only a few times, which made it very hard for us to train on these images. This issue, along with the fact that our dataset already had a large vocabulary, encouraged us to cut off some of the words in our dataset and not include those words in our training/validation/test dataset that we were going to use with our models. We therefore limited our data with word images that appeared at least 20 times in our dataset (before splitting into train and validation sets). However, still then we had around 4000 unique words with at least 20 occurrences in our dataset. To speed our training process up, we decided to limit our vocabulary size significantly down to 50 words, which still took 5-6 hours for training and validation. Our models and algorithms are not dependent on hardcoded number of images and would thus have worked with any number of examples, but we decided to narrow the number of words down for efficiency purposes.

4.2. Word-Level Classification

For our word-level classification model, we first constructed a vocabulary based on randomly selecting 50 words with at least 20 occurrences in our dataset. We trained our word classifier with multiple CNN architectures: VGG-19, RESNET-18, and RESNET-34. The VGG convolutional network architecture was one of the first very deep neural nets to achieve state-of-the-art results on key deep learning tasks. Defying the standard practice at the time, VGG employed much smaller convolutional filters (3 X 3) and a fewer number of receptive field channels

in exchange for increasing depth in their networks to balance computational costs for the ImageNet 2014 Challenge. By moving from the traditional 3-7 layers of previous CNNs to 16-19 layers for different iterations of their model, their model not only obtained first and the second places in the localization and classification tracks, respectively, but also was found to generalize well to other computer vision tasks [9]. However, soon after, Residual Networks (RESNETs) topped VGG in first place at the ImageNet challenge[20]. Recognizing that very deep learning networks were difficult to train, in part because of the stagnation of gradient flow to earlier layers in the network. He et. al developed the notion of the residual layer, which instead learned difference functions with respect to the inputs to the layers of the function. Therefore, a layer in a very deep residual network would have the option of learning a zero residual (this tendency can be incrementally enforced with regularization) and thus preserving the input and, during backpropagation, preserving the gradient to earlier layers. This formulation allowed RESNETs with 100+ layers to train comparably in terms of efficiency and parametrization as previous deep learning models and with many more layers. RESNETs are as of the date of this paper one of the most likely candidate cutting-edge deep learning models attempted for computer vision projects.

4.3. Training

We trained all of our models with the ADAM Optimizer on a cross-entropy loss function after softmax activation. For the VGG and RESNET models, we otherwise maintained the same architectures except for altering the last fully connected output layer to instead map to the number of classes (word/character vocabulary). We trained the word and character classifier from scratch. For the character seg-



Figure 3. These are the filters from the first convolutional layer of the RESNET-18 word segmentation model with the example word "much"

mentation model, we used a fine-tuned Tesseract model. *Softmax*

Loss:

$$L_i = -\log\left(\frac{e^{f_{y_i}}}{\sum_j e^{f_{j_i}}}\right)$$

4.4. Segmentation

For word-level classification, we suspected that our performance was suffering because of the large softmax layer output size (there were over 10,000 words in our training vocabulary and well over 100,000 words in the English language alone) and the difficulty of fine-grained recognition of images of words. We decided that character-level classification may be a more promising approach because a fairly comprehensive character vocabulary is relatively much smaller than a similarly comprehensive word vocabulary (the characters A-Za-z09 are only 62 distinct symbols), significantly limiting the computational complexity of the softmax. Furthermore, recognition of a character in an image is a simpler task than recognition of a word in an image because of the limited range of characters. However, the first main challenge we would have to encounter in order to test this approach would be segmentation of word images into their component character images. The second main challenge would be recognizing word breaks in image and stringing together consecutive recognized characters in between these word breaks to form words. We will address the earlier of these challenges in this section. In order to implement this task, we employed the new Tesseract 4.0 neural networkbased CNN/LSTM engine[13]. This model is configured as a textline recognizer originally developed by HP and now maintained by Google that can recognize more than 100 languages out of the box. For Latinbased languages, including English, the Tesseract model had been trained on about 400000 textlines spanning about 4500 fonts. We then finetuned the parameters of this pretrained model on our IAM handwriting dataset. After we finetuned the model, we segmented the original word input images into their hypothesized component character images, feeding in these output segmented character images into our character-level classification.

4.5. Character-Level Classification

The character-level classification model was quite similar to the word-level classification model. The main differences included passing in character images instead of word images, utilizing a character-level vocabulary

instead of a word-level vocabulary, and training a different parametrization of each of the variants of our very deep learning models. The architectures of these models were otherwise the same as our word-level models.

5. Experiment

5.1. Word-Level Classification Model

We began training our Word-level classification model using VGG-19. Firstly, we found this model to be slow to train given the amount of parameters that it requires. Our initial approach was to use the entire vocabulary, but we found that the run time was too slow. To be able to produce results, we reduced the vocabulary to 50 randomly-selected words that appeared at least 20 times in our dataset. Training was still extremely slow because some of the words that were selected, such as 'the', had thousands of training examples. We limited each word to 20 examples in order to have sufficient data to benchmark results with a better tradeoff on the run time.

Once we narrowed our VGG-19 model, we began training using multiple hyperparameters. Our first runs produced poor final training and validation accuracy because our learning rate was too high. We raised the learning rate of our Adam Optimizer and got 28 percent for training accuracy and 22 percent for validation accuracy.

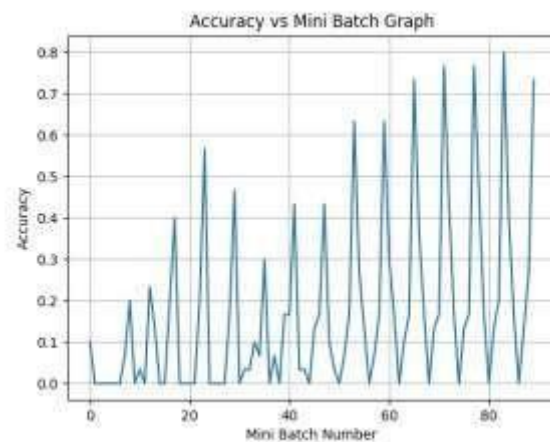


Figure 4. We initially set our learning rate too high when training, which lead to a fluctuation of accuracy.

We realized that VGG-19 was quite slow as a result of the amount of parameters it uses, so we sought other architectures to compare to. The CNN-benchmarks we found [13] hinted that RESNET-18 could produce similar results at much higher speeds. Furthermore, we also believed that the residual layer of the RESNET architecture that can be learned by our model would help our accuracies especially with deeper networks since the residual layer would be adjusted/learned to achieve optimality by our model.

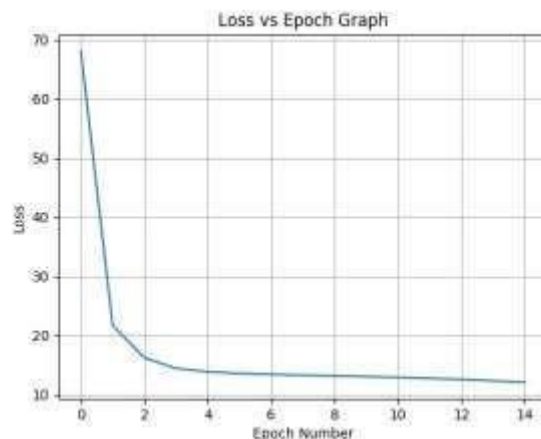


Figure 5. After making revisions to our learning rate and model input, we found that we found we had a consistently decreasing loss.

One technique we have found to be useful during experimentation was keeping the number of epochs low when trying out different hyperparameters. Since our training and validation processes took a long time, and we wanted

to find the optimal hyperparameters, we trained our model on 2 epochs, compared the results, and reran our model on more epochs with a subset of hyperparameters that achieved the best results and the ones whose loss/accuracy graphs looked the most promising. This approach certainly saved us a lot of time in training; however, it also had its own disadvantages. For instance, there could have been some hyperparameters that would have taken a longer time to converge, but would have reached optimality in the long run. We might have missed those hyperparameters if their graphs did not look promising enough and their results were poor when compared to the other hyperparameters. This was a challenge we faced due to scarcity of resources, but we tried to eliminate it by considering the graphs of the hyperparameters in addition to the raw numbers that they produced.

At the beginning of our training efforts, the validation accuracy was effectively random and this was because the weight updates were dominated by one class only, and at the end, all the examples were classified as that class. After having printed the weights and their updates for two examples, we realized that the issue was indeed with the weights and the updates were too large, saturating weight values at the beginning and preventing learning.

Figure 6. Word Level and Character Level Classification Results

Architecture	Training Accuracy	Validation Accuracy	Test Accuracy
VGG-19	28%	22%	20%
RESNET-18	31%	23%	22%
RESNET-34	35%	27%	25%
Char-Level	38%	33%	31%

Given our results of RESNET-18, we deepened the network by implementing RESNET-34 to use with our model. We achieved a training accuracy of 35 percent and validation of accuracy of 27 percent.

We chose a relatively large mini-batch size of 50 because if we picked a smaller mini-batch size, parameter updates would happen very frequently, slowing down our model. A larger mini-batch size would capture too much information at once to make a representative step in the direction of the gradient. This was important for our model because we needed to have semi-frequent updates while also not having a corrupted value for the gradient.

Qualitatively, the results of word classification are promising; they show we can achieve decent accuracy for a very complex problem, even given data limitations. However, we realize that higher vocabulary sizes will make the data necessary hard to obtain and also reduce accuracy significantly, which would undermine the ability to accurately translate handwritten text to a digital form. This led us to begin exploring the character segmentation approach.



Figure 7. A graph of our training accuracies for each epoch with different architectures for word segmentation and for character segmentation

5.2. Character Segmentation Model

In order to improve the results of directly doing classification for a word, we moved on to segmenting characters and then reconstructing the word by classifying each character individually. First, we downloaded the Tesseract LSTM with convolution model pretrained on the aforementioned English language dataset and then finetuned the model on our dataset [14]. We had to transform our input data to include not only the input image but the bounding box information for each of the component characters (that is, the labels of the characters and the four-corners–

best approximation of the top leftmost, bottom leftmost, top rightmost, and bottom leftmost positions of each character), which we extracted from the XML data.

Tesseract contained scripts to generate this dataset automatically given the relevant information [14] We then made a character vocabulary consisting of uppercase and lowercase letters and single-digit numbers. Our final model ended up also using the same optimization procedure, Adam, but a different form of loss suited for the problem called CTC loss. Briefly, CTC (Connectionist Temporal Classification) is a method/loss function developed by Graves et. al. for training recurrent neural networks to label output sequences (labels for characters in our case) from unsegmented input data (the input word image also in our case)[1]. Also used for such tasks as labeling speech signal data with word-level transcriptions, RNNs with CTC loss have been demonstrated to be more effective than more traditional approaches such as CRFs (Conditional Random Fields) and HMMs because of their automated learning process, only needing an input/output data representation as opposed to large handengineered features, and can more generally capture context over time and space in their hidden state. Roughly,

CTC can segment and label unstructured input data by evaluating network outputs as "a probability distribution over all possible label sequences, conditioned on a given input sequence" created by considering segmentation of the input sequence given a certain minimum segment size and starting training of the network from there [15]. As stated before, after finetuning and finalizing our segmentation model, we passed in these final segmented character images to our model.

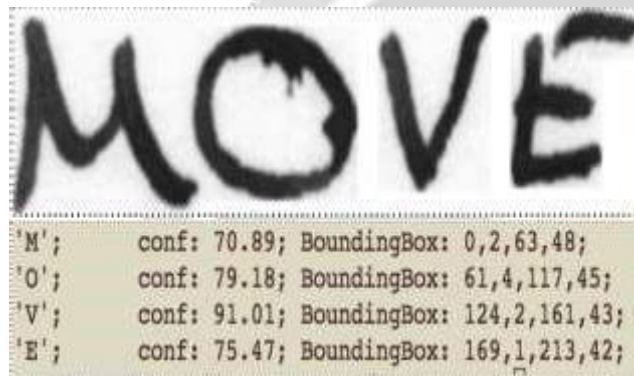


Figure 8: Using the Tesseract LSTM, for every word, we can segment out each character. For instance, when feeding in the word "MOVE", we retrieve the coordinates of where each character begins and ends.

As demonstrated in the accuracy graph for character v. word-level classification, we found that the characterlevel classification was more successful given the same model architectures for classification and even given the potential for error in the segmentation. These results confirmed our intuition that the much smaller scope of the model's initial feature representation problem for characters as opposed to words and final labeling problem helped boost the performance. We believed that our model did not perform even better because of the lack of sufficient data for the scope of our problem and imperfections in the segmentation model. Our model, as most segmentation models do, struggled with segmenting cursive characters because of the breakdown in boundaries in between some cursive characters. In fact, since we trained our segmentation model separately from our character classification model, we were not able to finely attribute the cause of error to our classification or segmentation model. Lastly, there is great diversity in handwriting for particular words/characters among writers, thus making the task of recognizing all of the different ways in which a character or word is written very challenging. We believed that, as often is the case with deep learning problems, even more data (over the course of millions more words) would have helped our model learn a more generalized feature representation for the problem to help it perform better.

6. Future Work

Firstly, to have more compelling and robust training, we could apply additional preprocessing techniques such as jittering. We could also divide each pixel by its corresponding standard deviation to normalize the data.

Next, given time and budget constraints, we were limited to 20 training examples for each given word in order to efficiently evaluate and revise our model.

Another method of improving our character segmentation model would be to move beyond a greedy search for the most likely solution. We would approach this by considering a more exhaustive but still efficient decoding algorithm such as beam search. We can use a character/word-based language-based model to add a penalty/benefit score to each of the possible final beam search candidate paths, along with their combined individual softmax

probabilities, representing the probability of the sequence of characters/words. If the language model indicates perhaps the most likely candidate word according to the softmax layer and beam search is very unlikely given the context so far as opposed to some other likely candidate words, then our model can correct itself accordingly.

References

- [1] Alex Graves, Santiago Fernandez, Faustino Gomez, Jrgen Schmidhuber, Connectionist temporal classification: labelling unsegmented sequence data with recurrent neural networks, Proceedings of the 23rd international conference on Machine learning. 2006
- [2] Convolutional Neural Network Benchmarks:<https://github.com/jcjohnson/cnn-benchmarks>
- [3] Elie Krevat, Elliot Cuzzillo. Improving Off-line Handwritten Character Recognition with Hidden Markov Models. [4] Fabian Tschopp. Efficient Convolutional Neural Networks for Pixelwise Classification on Heterogeneous Hardware Systems [5] George Nagy. Document processing applications.
- [6] Mail encoding and processing system patent: <https://www.google.com/patents/US5420403>
- [7] Kurzweil Computer Products. <http://www.kurzweiltech.com/kcp.html>
- [8] H. Bunke¹, M. Roth¹, E.G. Schukat-Talamazzini. Offline Cursive Handwriting Recognition using Hidden Markov Models.
- [9] K. Simonyan, A. Zisserman Very Deep Convolutional Networks for Large-Scale Image Recognition arXiv technical report, 2014
- [10] Lisa Yan. Recognizing Handwritten Characters. CS 231N Final Research Paper.
- [11] Oivind Due Trier, Anil K. Jain, Torfinn Taxt. Feature Extraction Methods for Character Recognition–A Survey. Pattern Recognition. 1996
- [12] Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun. Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks. Neural Information Processing Systems (NIPS), 2015
- [13] Tesseract Model: <https://github.com/tesseractocr/tesseract/wiki/TrainingTesseract-4.00> [14] Tesseract 4.0: <https://github.com/tesseractocr/tesseract/wiki/4.0-with-LSTM>
- [15] How many words are there in the English language?: <https://en.oxforddictionaries.com/explore/howmany-words-are-there-in-the-english-language>
- [16] Thodore Bluche, Jrme Louradour, Ronaldo Messina. Scan, Attend and Read: End-to-End Handwritten Paragraph Recognition with MDLSTM Attention.
- [17] T. Wang, D. Wu, A. Coates, A. Ng. "End-to-End Text Recognition with Convolutional Neural Networks" ICPR 2012.
- [18] U. Marti and H. Bunke. The IAM-database: An English Sentence Database for Off-line Handwriting Recognition. Int. Journal on Document Analysis and Recognition, Volume 5, pages 39 - 46, 2002.
- [19] Y. LeCun, L. Bottou, Y. Bengio and P. Haffner: Gradient-Based Learning Applied to Document Recognition, Intelligent Signal Processing, 306-351, IEEE Press, 2001
- [20] Zhang, X., He, K., Ren, S., Sun, J.: Deep residual learning for image recognition. In: CVPR. (2016)

INTERSHIP

Timestamp	Email Address	Name of the student	Doing Internship/Job	Company Name	Mobile No.	Offer letter
12/9/2022 15:14:47	nayakrohan3669@gmail.com	Rohan Nayak	Internship	KPIT Technologies	7028893889	https://drive.google.com/open?id=17-a0wX64RmWxilqyuE11dBAR4eYLssx4
12/9/2022 15:20:51	prathmeshkulkarni309@gmail.com	Prathmesh Santosh Kulkarni	Internship	Acmegrade	7397877643	https://drive.google.com/open?id=1RrRZh4UCUqJUM7hvPMwcbK3Xv0m61z8Y
12/9/2022 20:03:01	Shwetapawar282001@gmail.com	Pawar Shweta Shashikant	Internship	Sai service pvt ltd Fugew	8237405731	https://drive.google.com/open?id=1S7_DQmY5zcomFOOD0C39i4BAXCGIkUjYR
12/11/2022 15:38:28	sarthaksawant2003@gmail.com	SARTHAK SURAJ SAWANT	Internship	DTDC COURIER AND CA	8600328956	https://drive.google.com/open?id=1DtyJAAia0h1U2kX3w3KgdC-iBYjgOdeC
12/11/2022 22:44:04	ashish.kamble2314@gmail.com	Ashish chandrakant kamble	Internship	Hari Narayan broadband	7796569900	https://drive.google.com/open?id=1v4KEjoUN02dUTnokXDRtO_k5W8jnEGeO
12/12/2022 5:11:33	dknarute1012@gmail.com	Narute Dhairyashil Kishorkumar	Internship	TechnoLight Pvt. Ltd.	9322329852	https://drive.google.com/open?id=1RlbkFTTJzzAIVBux4GbktdErHXaA5OW
12/12/2022 21:22:51	jenithswamy2003@gmail.com	Swamy Jenith Arun	Internship	MVS DATA CORPORATION	07028830145	https://drive.google.com/open?id=16vfl548xuxL3E1i_6JglGlyYW50Wn1TD
12/13/2022 10:13:04	bolbhat.aditya123@gmail.com	Aditya Nanasahab Bolbhat	Internship	Hamari Pahchan NGO	09146236767	https://drive.google.com/open?id=1YpZvtVL_WcIVMqV-cKpC8aPw_519cE3P
12/14/2022 22:13:16	omkar.211161@srttc.ac.in	Omkar Ganesh Hajare	Internship	Technolight	8380076151	https://drive.google.com/open?id=1_nces3i6VU8jRq2npuNmQ-l4UguDX2mt
12/19/2022 11:23:19	ganeshbhosale816@gmail.com	Ganesh Bhosale	Internship	KSPG Automotive	8381019098	https://drive.google.com/open?id=1KKPenIDH33d6WuVKN-8b3A145YfJcTxZ
2/3/2023 13:32:40	sudarshanchole11@gmail.com	Sudarshan dilip chole	Internship	Oasis infobyte	8668759902	https://drive.google.com/open?id=1e1_JXmGdjmY5DRxyKFPMYaWbq0TFoxff
2/3/2023 13:33:03	jenithswamy2003@gmail.com	Swamy Jenith Arun	Internship	MVS Data Corporation Pvt	07028830145	https://drive.google.com/open?id=1MkiNtilu9ijZrYx_Fp8_eYfOqdSGi2R
2/3/2023 13:34:13	prathmeshkulkarni309@gmail.com	Prathmesh santosh kulkarni	Internship	Prep bytes/Acmegrade	7397877643	https://drive.google.com/open?id=1E7XKw1bXc7l65xiUH_TyIqJZKivSq4_0
2/3/2023 13:40:01	Shwetapawar282001@gmail.com	Pawar Shweta Shashikant	Internship	Sai service Pvt ltd phugev	8237405731	https://drive.google.com/open?id=1y6tf3yBIGsZqt25C9zXi48sDU-KKfMcq
2/3/2023 23:23:07	joshiraj5000@gmail.com	Raj Joshi	Internship	Grosoft technology	8265009296	https://drive.google.com/open?id=1PT_IBHjKgXTy7cUR-ekteWjX4yqvznyY
2/4/2023 15:51:54	surajchavan1532@gmail.com	Suraj Chavan	Internship	Info byte	+917559378124	https://drive.google.com/open?id=1JuWwJzJZuQmqdVWOqVnuhMfsuxF2kqsN
2/4/2023 20:04:32	Pratikmore161@gmail.com	pratik suhas more	Internship	SpiderWeb	+919423270394	https://drive.google.com/open?id=1QeCuwl_fQb0maXFMwYjeLbiRtxEj1F8u
2/4/2023 20:05:34	Pratikmore161@gmail.com	pratik suhas more	Internship	BlankBot Technologies	+919423270394	https://drive.google.com/open?id=15z7FXuAoJv6uxtAqahUS_M02UFLpsWZL
2/10/2023 11:13:08	dhairyashil.211053@srttc.ac.in	Narute Dhairyashil Kishorkumar	Internship	TechnoLight	9322329852	https://drive.google.com/open?id=1QCLRULjigKYVTFECzPrZS4Sbt6tjs3w
2/12/2023 22:55:44	yogesh.211162@srttc.ac.in	Yogesh Khatkale	Internship	Technolight	9890040156	https://drive.google.com/open?id=1aLkv4vE6MfNBTeJ5GvbrGnze64jevTMZ
3/2/2023 19:30:46	lalit222359@srttc.ac.in	Lalit Ashok Tatar	Internship	Star Industries,Nashik	9175566754	https://drive.google.com/open?id=1PrzRi0CZiqQygT63mWOLFwJA-QdKiyive
3/17/2023 13:38:42	manthan.m4226@gmail.com	Manthan bharat more	Internship	Q connect	9762163743	https://drive.google.com/open?id=1EE3MTd-r4bcKgG02oYtbO0KTW7M3xG9

Offer Letter and Terms of Employment

Date: 07.10.2022

Dear **Rohan Santoshkumar Nayak**,

At the outset, we would like to extend our sincere thanks for exploring career opportunities with KPIT. Further to our discussions, we are delighted to extend you an offer of employment.

This offer is based on your profile, relevant work experience and performance in the selection process.

- Designation: **Trainee**
- Grade: **A Grade**
- Base Location: **PuneHinj-Phase3**
- Joining Date: **10.10.2022**

Your Total Target Compensation including all benefits will be INR 300,000.00/- (Three Lakh) per annum. Annexure A provides a detailed break-up of the compensation package.

You shall be governed by the terms and conditions of service during your employment with KPIT as per existing policies and those that may be amended from time to time.

Kindly confirm your acceptance in writing within 7 days from the date of this offer beyond which this offer is considered null and void. Your offer is subject to a positive background check and in case the background check comes out negative, company reserves the right to terminate your services with immediate effect.

You will be eligible for Gratuity, Mediclaim and Group Personal Accident Insurance benefits as per the company policy. The duly signed appointment letter will be issued to you on the first day of your joining at KPIT only upon submitting your valid testimonials and related joining formalities.

A new assignment, work place and colleagues, await you to jump start to achieve the company's vision of building a global Mobility Organization. Work life at KPIT is all about mobility, enabling our customers by accelerating implementation of next generation mobility technologies. We value fun as an integral part of our culture.

As a token of your acceptance of the above terms and conditions of the offer, please sign the duplicate copy of this letter and indicate the date on which you can begin your employment with us.

Yours Sincerely,
For: KPIT Technologies Limited

Rahul Uplap
Associate Vice President
Global Head - Education & Competency Development (ECoDe)

COMPENSATION & BENEFITS

The details of your compensation and benefits are given below:

Basic Salary

- Your Basic Salary will be **INR 16,500.00/-** per month.

House Rent Allowance

- Your HRA will be **INR 3,220.00/-** per month.

Monthly Bonus

- You will be eligible for monthly bonus of **INR 3,300.00/-**.

Employer's contribution to Provident Fund

- You will be a member of the Provident Fund as per the provisions of "The Employees Provident Fund and Miscellaneous Provisions Act, 1952", and KPIT will contribute 12% of your basic salary every month towards Provident Fund, as per the provisions of the said Act
- You are required to submit your Universal Account Number (UAN), if any, issued by your previous employer on the Declaration Form (Form 9) so as to link your UAN with KPIT PF / Pension account

Flexi Basket (FB)-

- FB offers you the flexibility to design part of your compensation within the defined framework, once in a financial year
- To design your FB you may access the link in the "myWorld", KPIT's internal portal
- Your tax will be deducted as per income tax guidelines

Components under FBP are listed below -

Children Education Allowance

- o Maximum for 2 Children - **INR 1200/-** per child per annum
- o Tax exemption - on submission of original bills for children tuition fee
- o Paid on monthly basis

Professional Development Allowance

- o Maximum upto **INR 50,000/-** per annum
- o Tax exemption - on submission of original bills for self ONLY
- o Paid on monthly basis

Meal Allowance

- o Option of **INR 13200/-** or **INR 26400/-** per annum
- o Tax - Exemption - On subscribing Sodexo Food Card or PayTM Food Wallet only
- o No bills required

Hostel Allowance

- o Max for 2 Children - **INR 3600/-** per child p.a.
- o Tax - Exemption - On submission of original bills for children's Hostel Fees ONLY
- o Paid Monthly

National Pension Scheme (NPS)

- o Min **INR 6015/-** p.a. and Max up to 10% of Basic
- o Amount contributed in PRAN account monthly (if subscribed for the same)

Leave Travel Allowance (LTA)

- o Maximum upto **INR 50,000/-** per annum
- o Tax - Exemption - On submission of original bills for Self/Spouse/dependents which can be claimed twice in a block of 4 year
- o Paid Once in a year
- o If not claimed by Dec Payroll cutoff date, the amount shall be paid in March pay Salary as taxable.

Other Allowance

- Fully Taxable, this is balance amount post FB restructuring

Total Targeted Compensation (TTC)

- TTC is the sum of all components namely - Basic Salary, HRA, Monthly Bonus, Employer PF contribution, FB, Special Allowance and VPI.

KPIT Technologies Limited

Registered & Corporate Office: Plot 17, Rajiv Gandhi Infotech Park, MIDC-SEZ, Phase III, Maan, Taluka - Mulshi, Hinjawadi, Pune - 411057, India. | CIN: U74999PN2018PLC174192

O +91 20 6770 6000
E info@kpit.com
W kpit.com

Gratuity

- You will be entitled to gratuity as per the provisions of the Gratuity Act 1972.

Employer's contribution to Insurance Premium

- Amount mentioned is an indicative average cost incurred by Company towards Group Medclaim, Group Personal Accident and Group Term Life Insurance premium

Other benefits

- It's a sum of gratuity and employer's contribution to insurance premium

Cost to Company (CTC)

- CTC is the sum of all components namely - Basic Salary, HRA, Monthly Bonus, Employer PF contribution, FB, Special Allowance, VPI, Gratuity and Employer's Contribution to Insurance Premium.

OTHER BENEFITS

Bond

- You will also be required to sign a Bond of **22** months prior to your appointment. This covers the cost of training that we will provide to you. In the event of breaching the bond, there will be a penalty of **INR 200,000.00/-** payable to the company in lieu of training costs.

Annual Leave

- You will be eligible for Annual Leave as per the Employer's Leave Policy, the policy however can be modified time to time at Employer's discretion. You can refer to the Leave Policy on the "myWorld", KPIT's internal portal

Holidays

- You are entitled to Public Holidays applicable in India every year at the regular rate of pay. If placed at a customer site, you must follow holidays observed by customer.

Benefits Coverage

- Group Medical Insurance cover of **INR 6,00,000.00/-**
- Group Term Life Insurance cover of **INR 11,00,000.00/-**
- Group Personal Accident Insurance cover of **INR 20,00,000.00/-**

* The above Plan however can be modified on yearly basis at Employer's discretion

ANNEXURE A

Components	Monthly [Amount (in INR)]	Yearly [Amount (in INR)]
Basic Salary	16,500.00	198,000.00
House Rent Allowance	3,220.00	38,640.00
Monthly Bonus	3,300.00	39,600.00
Employer's contribution to Provident Fund	1,980.00	23,760.00
Other Allowance (Flexi Basket)	0.00	0.00
Fixed Compensation**	25,000.00	300,000.00
Total Target Compensation	0.00	300,000.00
Notional Provision for Statutory Gratuity****	0.00	9,524.00
Employer's contribution to Insurance Premium*****	0.00	5,200.00
Other Benefits	0.00	14,724.00
Cost to Company	0.00	314,724.00

- ** Fixed compensation is payable subject to adherence of all applicable policies of the organization.
- **** As per Payment of Gratuity Act.
- ***** The amount mentioned is an indicative average cost incurred by Company towards Group Medclaim, Group Personal Accident and Group Term Life Insurance premium.

Kindly note -

- The above salary break-up is per annum and is provided based on the existing company policies and may undergo change from time to time.
- As per the company policy you are required to maintain total confidentiality of your compensation details.
- Certain figures mentioned in this Letter of Offer, including financial information have been subject to rounding-off adjustments. In certain instances,
 - The sum change of such numbers may not match exactly to the total figure given; and
 - The sum of the numbers in a column or row in certain tables may not match exactly to the total figure given for that column or row.

Terms of Employment -

Working Hours

- Your working hours are governed by applicable law. You may be required to work in shifts and/or over time depending upon the business exigencies as permitted by law.

Mobility

- KPIT reserves the right to transfer / utilize your services at any of its offices, work sites, or outside India, on the terms and conditions as applicable to you at the time of transfer.

Salary Review, Increments and Promotions

- Your performance and contribution to the company will be an important consideration for salary Review, increments and promotions
- You will be considered for salary review and promotions as per the company's policies effective from time to time.

Alternative Employment

- As a full-time employee of KPIT, you are not permitted to undertake any other business, assume any public office, honorary or remunerative, without the written permission of KPIT

Confidentiality Agreement

- As part of the joining formalities, you are required to sign a confidentiality agreement, which aims to protect the intellectual property rights and business information of KPIT and its clients

Overseas Agreement / International Assignment Agreement

- If you are on international assignment, you will be covered by the KPIT International Assignment policy from the date of deputation, accordingly, you will be required to sign the applicable Overseas Deputation / International Assignment Agreement(s).
- In case of every international assignment that exceeds 30 days, you will be required to serve notice period KPIT as per the policy. This is to ensure that the knowledge and information gained by you during your assignment is shared and available to KPIT and its associates. This transfer of knowledge and information is essential for KPIT to continue to serve its clients and customers better
- If you are deputed internationally for training, you will be required to sign an agreement to serve KPIT for a minimum period of 12 months on completion of training

KPIT Code of Conduct

- You are required to sign the KPITs Code of Conduct and follow the same in your day to day conduct as an employee of KPIT

Notice Period

- During your employment with KPIT, either you or KPIT can terminate the appointment by giving 90 calendar day's written notice or 3 month's basic salary in lieu of the notice.
- The Company reserves the right to release the employee prior to the notice period taking into consideration business needs and work exigencies and the Company will not be liable to make any payment to the employee in lieu of the notice period. If you are covered under Deputation Agreement / International Assignment Agreement, either you or KPIT can terminate the appointment by giving 90 calendar days' written notice as set out in the Separation Policy of KPIT
- KPIT reserves the right, if it is in the interest of the business and current assignment, to ask you to complete your notice period or decide whether your existing earned vacation or basic salary in lieu of notice period may be adjusted against the entire or partial notice period.
- In case you decide to end your employment with the Company or the Company terminates your services for any reason before you complete one year of employment with the Company,
- The company retains the right to recover from you any expenses incurred by it about your recruitment including, but not limited to, fees paid to consultant, joining benefits paid to you (if any), etc. and
- The company retains the right to recover from you any expenses incurred by it for processing any visa/ work permit for you and/or any of your family members.
- The Company also reserves the right to recover the period costs of any specific expenditure incurred, either on processing a visa/ work permit or for any specific training given for an assignment and where you are unable, for any reason, to fulfil your part of the obligation, either to travel or to complete the assignment.

Retirement

- You will retire from the services of the Company on reaching your 60th birthday as per the proof of age submitted by you at the time of joining.

Employment in India

- In case, you are not a citizen of India, this offer is subject to your obtaining a work permit and or any other permissions and / or documentation as prescribed by the Government of India for permanent employment with KPIT. Keeping your permit / permission up to date during the course of employment with KPIT and submitting a valid copy of that to KPIT is your responsibility

Letter of Appointment

- You will be issued a letter of appointment at the time of your joining and completing joining formalities as per KPITs policy

Terms and Conditions

- The above terms and conditions of employment are specific to your employment in India and there can be changes to the said terms and conditions in case of deputation on international assignments during the course of your employment

Rules and Regulations of the Company

- Your appointment will be governed by the policies, rules, regulations, practices, processes and procedures of KPIT as applicable to you and the changes therein from time to time.

Compliance to all clauses

- You will be required to fulfill all the terms and conditions mentioned in this letter of offer. Any failure to fulfill any term and / or condition would entitle KPIT in withdrawing this offer letter at its sole discretion.

KPIT Technologies Limited

Registered & Corporate Office: Plot 17, Rajiv Gandhi Infotech Park, MIDC-SEZ, Phase III, Maan, Taluka - Mulshi, Hinjawadi, Pune - 411057, India. | CIN: U74999PN2018PLC174192

O +91 20 6770 6000
E info@kpit.com
W kpit.com

Validity:

- This offer is valid for a period of 7 days from the date of issue. Also, the company has made the offer of employment on the basis of the bonafide statements and facts provided by you. At the time of employment or during employment if the company finds the information provided to be false or misleading, it reserves the right to take appropriate disciplinary action against you which also includes termination of employment.
- In case you decide to end your employment with the Company or the Company terminates your services for any reason before you complete one year of employment with the Company,
- the company retains the right to recover from you any expenses incurred by it in connection with your recruitment including, but not limited to, fees paid to consultant, joining benefits paid to you (if any), etc. and
- the company retains the right to recover from you any expenses incurred by it for processing any visa/ work permit for you and/or any of your family members

Arbitration

- Any dispute concerning the subject matter of the present appointment letter or Confidentiality & IPR Assignment Undertaking or the breach, termination or validity thereof which shall include but not limited to issue as to the interpretation, operation, or effect of any clause contained in it or any other difference arising (a 'Dispute') shall be first attempted to be settled mutually, failing in which, the dispute shall be referred to the sole arbitrator to be appointed mutually.
- In case the Arbitrator is not appointed mutually, the dispute shall be referred to the arbitrator that shall be appointed by the High Court of Judicature of Bombay on an application in that behalf by either of the party as per the provisions of the Arbitration and Conciliation Act 1996.
- The place of arbitration shall be city of Pune, Maharashtra. The language of proceedings shall be English. The dispute shall be subject to and governed by the laws prevalent in India. However, in case of any difference on provisions of law in State Law and Central Law on a particular subject, state laws applicable in state of Maharashtra shall prevail.

Document submission

1. Standard X and XII marksheets / equivalent
2. Degree certificate and marksheets for all semesters
3. Postgraduate Degree certificate and marksheets for all semesters
4. Passport / Driving License / Ration Card
5. Experience certificate from previous employers indicating the following:
 - a. Period of employment
 - b. Technology areas you have worked on
 - c. Certificates for any training provided by your previous employers in various technologies
 - d. Relieving letter and experience letter from current and all previous employers indicating date of release
6. PAN card
7. Aadhar Card
8. Work permit or any other documentation required to take up permanent employment with KPIT
9. Photograph to be uploaded in TalentOjo as per the specification in Annexure B
10. Provident Fund Number
11. Name Change Documents (If applicable)

DATA CORPORATION PVT LTD
REG. NO. 22

To,

Ms. JENITH SWAMY

Pune.

SUB: LETTER OF OFFER

We are glad to inform you that we have decided to give you an opportunity for joining our organization on the post of "Office Assistant" from the dated 07.10.2022 for Pune location. You will be report to the supervisor of your respective location. Your performance will be reviewed on completion of 16 month. You would be paid gross Rs.7,000.00/- (Rupees: Seven Thousand only) deduction if applicable per month as per company rule.

At the time of joining please submit the following documents:

- Proof of Age /proof of identity & Residence
- Copy of Academic certificates
- Relieving letter of last employer & Proof of compensation last drawn, of any
- 2 passport size photographs/ Aadhar card /Pan card

Terms and conditions given below:

- Your basic salary will be paid to you by 10th to 15th of every month.
- If you want to leave the job, you will be required to give the notification of one month. If
- You are not allowed to make any commitment related to work with any other organization.
- You shall not be allowed to disclose confidential information of the company to anyone.
- On confirmation, this appointment may be terminated by our side or leaving job by your side **by giving one months' notice or one months' salary in lieu of notice period.**

Please sign & return the duplicate copy of this letter as a token of your acceptance. If you fail to indicate your acceptance within five days from the date of the offer letter received, this offer of employment will be deemed to have been withdrawn & canceled.

All other items & conditions will be governed by the company's policies as stated from time to time. We look forward to your joining us for a long, successful & mutually beneficial association.

Thanking you,

Yours faithfully,



For MVS Data Corporation Pvt Ltd

(Authorized Signatory)

I accept the appointment on the terms & conditions contained herein & will report for duty on

Date: 01/10/202

Name: JENITH SWAMY

Place: PUNE

Signature:

Head Office

Flat No 1, Bldg A1, Om Sadabahar Complex,
Hole Wasti, Wanwadi,
Pune 411040 (MAH)

Branch Office

Office No. 706, 7th Floor,
Lloyds Chambers, 409 Mangalwar Peth,
Opp Ambedkar Bhawan, Pune - 411011.

+91 7276060485

helpdesk@mvsCorp

www.mvsCorp.in



SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

Date; 04/11/2020

SHWETA SHASHIKANT PAWAR
NEW VANJARI CHAWL
KASARWADIPUNE 411034

REF: FUGEWADI/MARUTI/REINSURANCE/EXECUTIVE TELE MARKETING/P24674

LETTER OF APPOINTMENT

Dear Mr./Ms. SHWETA SHASHIKANT PAWAR

After successfully processing your application, interview and discussions, we have pleasure of offering you appointment in our Company as EXECUTIVE TELE MARKETING-REINSURANCE w.e.f. 04/11/2020 based at FUGEWADI. You will be working with VAISHALI SHEKHAR SHIVESHWARKAR, SENIOR MANAGER. The terms and conditions of your appointment will be as follows

1. **Salary Details:**

As per offer, the compensation details are attached in Annexure 1.

p

2. **Retiral Benefits:**

You will be entitled to Provident Fund & Gratuity as per the respective enactments and Superannuation as per the Company policy.

3. **Leave:**

You will be eligible for leaves as per the Leave Policy of the Company.

4. **Tax Applicability:**

Income Tax, as applicable, will be deducted from the compensation payable to you, as per the contract of employment, through the payroll system of the Company.

5. **Code of Conduct:**

The Company has framed and implemented, under-mentioned policies, for the due observance and compliance by the employees of the Company, in the course of employment with the Company.

These policies are integral part of this letter of appointment, which have been provided to you separately. These policies are also available on the intranet HR portal of the Company. By accepting this letter, you undertake to abide by these policies. The Company reserves its right to modify or amend these policies, from time to time. Failure to abide by these policies will lead to appropriate disciplinary action.

6. **Probation & Notice Period:**

- You will be on probation for a period of 6 (six) months from the date of joining. Your probationary period may be extended, if considered necessary by the Company. During the period of probation, employee shall have the right to resign from the service of the Company, without giving any notice. Similarly Company will have the option to terminate the service of the employee, without any notice or salary in lieu thereof, without assigning the reason.

- On satisfactory completion of the Probation Period including extension, if any, either party can terminate this contract of the employment by giving 1 (one) calendar month notice in writing or payment of the basic salary in lieu of notice period or part thereof.



SAI SERVICE[®]

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117

Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

You may also be eligible for Productivity / Attendance /Performance Linked Incentives, earned Leave as per Company policy and statutory regulations.

Incentive is not only linked to production and productivity but also mainly to the profits of the Company, therefore the annual bonus payable to you as per the provisions of the Payment of Bonus Act will be adjusted from the incentives and balance amount if any would be payable as per the respective provisions. The Management reserves the right to change, alter/ modify, amend or withdraw this incentive scheme in future. This will not be considered as a service condition and no lien or right can be established by you on payment arising out of this scheme.

7. Retirement Age:

You will retire from the services of the Company on attaining age of 58 years. You will retire on the last day of the month in which you complete the age of 58 years.

8. Transfer:

As an employee of the Company, you undertake to accept a certain mobility of career, which may lead the Company to offer you transfer(s) to different Cities/positions. Your services can be transferred to any of our plants / offices / departments / establishments/business vertical situated throughout the country . In such cases, there will be no change in your compensation.

9. Confidentiality:

You covenants with the Company that you shall not disclose, divulge or otherwise make use of any information, in respect of the business of the Company or its affiliates, which you may, acquire, receive or access during, or in the course of employment with the Company ('**Confidential Information**'). Such Confidential Information may, include without limitation, information pertaining to new projects, business plans, specifications, operational data, trade secrets, memoranda, photographs, materials, quality control and test methods and data, reports, analysis, costs and pricing, financial information, marketing and sales data and plans, customer information, supplier details, product applications including computer software, programs etc. The obligation under this clause shall continue for a period of 5 (five) years from the date of the termination of the contract of employment with the Company.

10. Jurisdiction:

This Agreement is governed by, and shall be construed in accordance with, the laws of India. This contract of employment shall be subject to the exclusive jurisdiction of the courts at Pune alone.

11. Other Terms & Conditions:

- The services to be rendered by you to the Company will require your full time and attention and therefore, you will not take up any assignment, honorary or otherwise or any academic course of study or take up any employment, part time or full time, without our prior consent.
- This appointment will be valid subject to your being found medically fit, as certified by the registered medical practitioner in India.
- All communication sent to you by the Company, at your last given address (including email address) shall be deemed to have been properly served upon you.
- The compensation payable to you under this contract of employment is confidential and you should refrain yourself from sharing the same with your colleagues.

SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

We request you to kindly confirm your acceptance to this contract of employment by putting your signatures (on all pages) and return back to us one copy of the same as token of your acceptance.

We welcome you to the Sai Service family and wish you a successful career.

Yours sincerely,
For Sai Service Pvt Ltd

Atul Dandgaval
A.G.M. - HR & Administration



Sandhu
HR Representative

I, Mr./Ms./Mrs. _____ hereby accept and confirm that the terms and conditions of this contract of employment with SAI SERVICE PVT LTD are acceptable to me.

Signature of Employee: *Shawar* (Date: _____)

ORIGINAL



Date: 15 December 2022

To,

Prathmesh Santosh Kulkarni
prathmeshkulkarni309@gmail.com

Congratulations and Welcome to Campus Business Manager!

On behalf of Campus Team, PrepBytes, We are glad to offer you an internship opportunity as **Campus Business Manager**.

This position is scheduled to begin 15 December 2022 and will be a three-month internship opportunity. As a part of this programme, you will be representing PrepBytes in your Campus and within your connections. We are sure that you will play a vital role in helping us realize our vision of creating a world full of opportunities for the students.

1. Your Appointment as an CBM and benefits is attached herewith in **Annexure- A**.
2. Your appointment with us shall be governed by the specific terms and conditions referred to in **Annexure-B**.

Warm Regards,

Amritash Verma

Amritash Verma
Community Head, PrepBytes



www.prepbytes.com



support@prepbytes.com



+91-8448446601



10th Floor, M3M cosmopolitan, Golf course extension, Sector 66, Gurugram, 122101, Haryana

Annexure- A

Date of Joining: 15 December 2022

Duration of Internship: 3 Months

Location: Work from Home

Rewards: Performance Based

Roles and Responsibility:

1. SPOC of PrepBytes and create a coding environment in your college by organizing multiple events like Coding Event/ Webinar specifically within your college to make a student confident in Programming.
2. Spreading Coding Culture within the Campus by spreading multiple events/ Workshops and Hackathons.
3. Content Creation over different social media platforms like Quora, LinkedIn, Instagram etc.
4. Propagate the idea and maximize the reach of PrepBytes amongst your peers.
5. Creating awareness about Campus Business Manager and getting new students applied for the Internship for the same role.



Rewards and Benefits:

1. Being a Campus Business Manager, You can refer to PrepBytes courses within your Campus and within your Connection with an additional 10% discount applicable on all the Courses.
2. For every course referred to by your CBM Code. you will receive a 10% Paytm cashback of the paid amount.
3. Personalized LinkedIn recommendation.
4. A great learning and leadership opportunity.
5. Letter of Recommendation after the Successful Internship Completion.
6. Paid Internship Opportunity at our office in Gurugram.

Gifts/PrepBytes Swags	Redeemable Points to be Earned
Sipper + Laptop Sticker	500
PrepBytes T- Shirt + Laptop Sticker	800
JBL Earphones	1000
PrepBytes T-Shirt + Sipper	1400
PrepBytes Backpack	2000
Boat Headphone + PrepBytes T-shirt	2500
JBL Speaker	3000
PrepBytes Goodies Kit	3400
MI Band	3800
Realme Earbuds	4500
JBL Headphones	5000
Alexa/ PrepBytes Foundation Course	6000
PrepBytes DataStructure Course	7500
PrepBytes Competitive Programming Course	13000
Amazon Voucher	13000+

Note: Referring Students to Upskill themselves via enrolling in the course will always provide you the Additional Earning which will directly reflect into your Paytm as a cashback. You can earn as much you are capable to earn via referring the students.



www.prepbytes.com



support@prepbytes.com



+91-8448446601



10th Floor, M3M cosmopolitan, Golf course extension, Sector 66, Gurugram, 122101, Haryana

Annexure - B

Terms and Condition of Internship

1. It is imperative to remain active and participate in the weekly and Monthly tasks and activities.
2. It is mandatory to earn a minimum of **800 Redeemable Points** to get yourself a Letter of Internship Completion.
3. If the Campus Team of PrepBytes **finds you Inactive for more than 30 days**. In that case your Internship Completion letter can be on hold.
4. You agree that during your internship with PrepBytes shall not in any manner either directly or indirectly not enrol in the Internship at the same position which is directly or indirectly competition with PrepBytes.
5. You must not, during or after the Internship, use or disclose any Confidential information to others related to the PrepBytes business, which you received during your Internship.





Certificate of Selection

Aditya Bolbhat

from **Suman Ramesh Tulsiani Technical Campus-Faculty Of Engineering** has successfully secured **Social Entrepreneurship** internship at **Hamari Pahchan NGO** through Internshala.

Sarvesh Agrawal
Founder & CEO, Internshala

Date of certification: December 12, 2022

Certificate Number: 1A9D64C4-842A-1B57-F397-768C017179A3
For certificate authentication please visit https://internshala.com/verify_certificate

HARINARAYAN BROADBAND SERVICES PVT LTD

Shivnagari, Bijali Nagar Chinchwad Pune-411033

14/10/2021

Offer Letter

Dear **Ashish Chandrakant Kamble**,

Congratulations! We are pleased to confirm that you have been selected to work for our company. We are delighted to make you the following job offer:

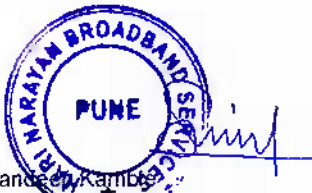
The position we are offering you is that of "**Network Engineer**" with an annual cost to company of 255000. This position reports to Mr.Sandeep Kamble Manager

We would like you to start work on 14 October 2021 , Please report to Mr.Sandeep Kamble Manager for documentation and orientation. If this date is not acceptable, please contact me immediately. On joining, you will be invited to our HR tool (XPayroll) in which you may be required to upload your documents.

Please sign the enclosed copy of this letter and return it to me by 25 october 2021 to indicate your acceptance of this offer.

We are confident you will be able to make a significant contribution to the success of Harinarayan Boadband services pvt ltd and look forward to working with you.

Sincerely,



Sandeep Kamble
Harinarayan Broadband
Services Pvt Ltd

ashish

Accepted By
Mr.Ashish Chandrakant Kamble

Ref: OFFRD_0031
Date: 09 OCT 2022

Sarthak Suraj Sawant
DP road hadapsar near tupe
washing center ,
PUNE, MAHARASHTRA,
PIN: 411028

Offer of Employment

Dear Sarthak Suraj Sawant

Further to our discussions, we are pleased to appoint you as **SALES & OPERATIONS EXECUTIVE** with DTDC COURIER AND CARGO PVT LTD, as per the terms and conditions stated below:

1. Your offer letter is valid till 2022-12-16 and you are required to confirm acceptance of the offer and join on 2022-10-01. If you do not confirm your acceptance, this offer is treated as withdrawn. To confirm your acceptance of this offer, you are required to respond via email to dattawadi_new.pnq@fr.dtdc.com.

2. Reporting and Responsibilities:

You will report to the undersigned and complete the joining formalities. Your working location will be at **Pune**. We will communicate you about your reporting manager on joining the organization and completing the joining formalities.

Note: On your joining date, please bring Soft copies of (i) the original offer letter duly signed and dated by you; (ii) Passport size photograph (Soft copy), (iii) the originals and 1 set of soft copies of the following documents:

- Education degree certificate
- Relieving letter or resignation acceptance letter from your most recent employer
- Proof of identity. Bring the following documents: AADHAR card/Passport and PAN card (mandatory)

Please note that all the above documents are mandatory, and you will not be allowed to join without them.

3. Compensation

During your probation period, you will be eligible for a compensation of **INR 150000** per annum as CTC (Cost to Company) as mentioned in the annexure III. Your compensation and other benefits, if any, shall be subject to the deductions of all Governmental and local taxes, statutory contribution, etc. as required to be made under the laws of India and shall be paid in accordance with the practices of the Company.

4. Working hours

- a. Your working hours are from **9:30 am to 6:30 pm**, Monday to Friday
- b. The Company reserves the right to require you to work outside your normal working hours if necessary, in furtherance of your duties.
- c. You will be eligible for leave and other benefits as per the rules of the company.

5. Responsibilities

You must effectively, diligently and to the best of your ability perform all responsibilities and duties and ensure successful completion of the assignments given to you time to time by your reporting manager.

6. Non - disclosure obligations and intellectual property

At all times during and after your employment, you will hold in strictest confidence and not use for your own purposes or the purposes of others or disclose anything on the intellectual property belonging to the Company as defined in the Annexure 1 ("**IntellectualProperty**"), to any person, firm, corporation or third party, without prior authorization in writing by the Company.

You agree that the results and proceeds of your services hereunder, including, without limitation, any works of authorship resulting from your services during your employment and any works in progress, shall be works-made-for-hire and the Company shall be deemed the sole and exclusive owner throughout the universe in perpetuity of any and all rights of whatsoever nature therein, whether or not now or hereafter known, existing, contemplated, recognized or developed, with the right to use the same in perpetuity in any manner the Company determines in its sole discretion without any further payment to you whatsoever.

If, for any reason, any of such results and proceeds shall not legally be a work-made-for-hire and/or there are any rights which do not accrue to the Company under the foregoing provisions, then you hereby irrevocably assign and agree to assign any and all of your right, title and interest thereto in all Intellectual Property, including, without limitation, any and all copyrights, patents, patent applications, trade secrets, trademarks and/or other rights of whatsoever nature therein, whether or not now or hereafter known, existing, contemplated, recognized or developed to the Company, and the Company shall have the right to use the same in perpetuity throughout the universe in any manner the Company may deem useful or desirable to establish or document Company's sole and exclusive ownership of any and all rights in any such results and proceeds, including, without limitation, the execution of appropriate copyright and/or patent applications or assignments. To the extent that you have any rights in the results and proceeds of your services that cannot be assigned in the manner described above, you unconditionally and irrevocably waive the enforcement of such rights. This paragraph is subject to, and shall not be deemed to limit, restrict, or constitute any waiver by the Company of any rights of ownership to which the Company may be entitled by operation of law by virtue of the Company or any of its affiliates being your employer.

You hereby unconditionally and irrevocably waive all rights that you may have now or in future with respect to any Intellectual Property / work done by you during your employment including any rights that you may have to prevent the alteration/ translation/ destruction of any such Intellectual Property / work. You agree that this waiver may be invoked by the Company and by any of its authorized agents / assignees, in respect of any of Intellectual Property / work done by you during the employment period.

For the avoidance of doubt, all Intellectual Property/ work done by you during your employment shall be for the sole benefit of the Company and its customers and shall be the exclusive property of the Company.

The Company will have sole discretion to deal with the same, and in respect of all the work done by you during the employment together with all rights thereto, including patent and patent application rights and copyrights, shall vest in the Company. You agree that you shall do all further things that may be reasonably necessary or desirable in order to give full effect to the rights and title of the Company in respect of the foregoing.

7. Confidentiality

In consideration of the opportunities, training and access to new techniques and know-how that will be made available to you, you will be required to comply with the confidentiality policy of the Company. Therefore, please ensure that you maintain as secret the confidential information as defined in Annexure II ("Confidential Information") and shall not use or divulge or disclose any such Confidential Information except as may be required under obligation of law or as may be required by the Company in the course and scope of your employment. This covenant shall endure during the employment and shall survive the cessation of your Contract with the Company, irrespective of the circumstances of, or the reasons for, the cessation. In the event of any doubt regarding what constitutes Confidential Information, you shall consult your superiors. You agree to execute and enter into a confidentiality and assignment agreement with the Company upon the Company's request.

8. Company property

Any and all memoranda, notes, records, books, other documents, art works, art assets, circular, files, items of equipment, laptops, parts of PC of the Company, whether tangible or intangible, including all information stored in electronic form, made or composed by you or which might be supplied/ made available to you in connection with your work during the employment, or in any way relating to the business or affairs of the Company, its subsidiaries, divisions, affiliates, or clients shall at all times remain the property of the Company and shall be returned to the Company upon your ceasing to be in the Company's employment or at any other time at the request of the Company. Further, you undertake not to use any of the memoranda, notes, records, or other documents made or composed by you or copies thereof, upon the termination of your Contract.

In the event of the termination of your employment for any reason, and subject to any other provisions hereof, the Company reserves the right, to the extent required by law, and in addition to any other remedy the Company may have, to deduct from any monies otherwise payable to you the following: the full amount of any specifically determined debt you owe to the Company or any of its affiliates at the time of or subsequent to the termination of your employment with the Company and (ii) The value of Company's property which you retain in your possession after the termination of your employment with the Company following Company's written request for such item(s) return and your failure to return such items within ten (10) days of receiving such notice. In the event that the law of any state or other jurisdiction requires the consent of an employee for such deductions, this Letter shall serve as such consent.

9. Notice of Change

Any change in your personal information including residential address, marital status, number of children and education qualification should be notified to the Company in writing within 7 days. Any notice required to be given to you shall be deemed to have been duly and properly given if delivered to you personally or sent by post at your address as recorded in the Company's records. You agree to keep the Company informed in writing of any change in your address.

10. Termination

You are entitled to receive from the Company and you are required to give the Company the following period of notice, in writing, to terminate your employment without cause, such notice, in each case, to expire as stated below:

- a. During the probation period, either party may terminate this contract by giving **60 days'** notice in writing or

payment in lieu of salary (net of provident fund contribution). However, the Company reserves the right not to accept payment in lieu of notice and at its sole discretion and enforce the notice period.

- b. Your employment may be terminated forthwith by the Company without prior notice if any declaration/statement or information forthwith given by you in your application or in connection with your contract at any time found to be false or untrue or any material particulars are suppressed.
- c. Further the Company shall have the right to terminate your services without any notice or salary in lieu thereof for misconduct, negligence of duty, disloyalty, dishonesty, indiscipline, disobedience, irregular attendance, or long period of absence from duty due to ill-health, infirmity or accident or inefficiency.
- d. Without limiting the general effect of clause 10 (c), if you absent yourself without leave or remain absent beyond the period of leave originally granted or subsequently extended, you shall be considered as having voluntarily terminated your employment without giving any notice.
- e. After your confirmation, the notice period for both sides shall be 60 days or pay in lieu of the same. And on any such failure from employee's side, company will be forced to take necessary legal action against you in a court of law and you alone will be held responsible for all the costs, compensation, loss or legal consequences if any. Further, in such circumstances, issuance of relieving letter, conduct certificate, experience certificate etc will be solely at the discretion of the company.
- f. Upon separation from the company, you shall hand over all company's property under your custody to your reporting manager.

11. Exclusivity / Prior Commitment

Unless prior written agreement is given to you by the Company, you agree to work exclusively for the Company, within the context of the responsibilities defined above, and not to accept or perform any other paid/ unpaid employment or consulting in addition to this, even temporary. You agree, represent and warrant to the Company that (i) you are not subject to/party to any covenants, agreements or restrictions, including, without limitation, any covenants, agreements or restrictions arising out of any prior contracts or independent contractor relationships, which would be breached or violated by your execution of this Contract or performance of your duties hereunder; (ii) there is no order of any court or other authority disqualifying you for appointment under this contract; and (iii) you are not financially interested in any other person, firm or corporation engaged in the production, distribution or exhibition of motion pictures or television programs or the animation business (including, without limitation, motion pictures, television programming produced for, distributed to or exhibited on free, cable, pay, satellite and/or subscription television, music and/or interactive), anywhere in the world.

12. Non-Compete / Non-Solicit

Non-Competition. You covenant and agree that, during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, anywhere in the Territory, on behalf of any Competitive Business perform the same or substantially the same Job Duties, which is directly in competition with the company.

Non-Solicitation of Customers, Customer Prospects, and Vendors. You also covenant and agree that during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, solicit or attempt to solicit any business from any of the Company's Customers, Customer Prospects, or Vendors with whom you had Material Contact during the last two years of your employment with the Company.

Non-Solicitation of Employees. You also covenant and agree that during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, on your own behalf or on behalf of or in conjunction with any person or legal entity, recruit, solicit, or induce, or attempt to recruit, solicit, or induce, any non-clerical employee of the Company with whom you had personal contact or supervised while performing your Job Duties, to terminate their employment relationship with the Company

13. Notices

All notices required to be given hereunder shall be given in writing, by personal delivery or by mail and confirmed by fax at the respective addresses of the parties hereto set forth above, or at such address as may be designated in writing by either party, and in the case of the Company, to: **DTDC COURIER AND CARGO PVT LTD, Dattawadi Mahsoba Cowk Near Shani Mandir**

14. Jurisdiction

The jurisdiction concerning this contract will be with the courts in Chennai which you undertake to not contest. The contract shall be governed by and interpreted in accordance with the laws of India.

With best wishes,

For **DTDC COURIER AND CARGO PVT LTD**

Suraj
HR EXECUTIVE

Candidate Undertaking:

I have carefully read and understood the terms and conditions mentioned above and in the Annexure I and II attached.

I acknowledge that while I am working for DTDC COURIER AND CARGO PVT LTD, I will take proper care of all company equipment that I am entrusted with. I further understand that upon termination, I will return all company property and that the property will be returned in proper working order. I understand I may be held financially responsible for lost or damaged property. This agreement includes, but is not limited to, laptops, cell phones and other equipment. I understand that failure to return equipment will be considered theft and may lead to criminal prosecution by Company.

I accept all the terms and conditions mentioned therein. I shall commence my probation with effect from _____

Name:

Date:

Signature:

Annexure I: Intellectual property

The term 'Intellectual' or 'Company owned property' as it is used in this schedule, shall include, but not be limited to the following:

1. Business or financial records, strategies, patents, patent applications, trademarks, trade secrets, forecasts, budgets projections, Licenses, prices of products and services, Clients list, Goodwill, Personnel information's, and other information regarding formulas, patterns, complications, programs.
2. All work ** created and /or developed by you solely or a team during your work hours on our premises and /or using Company labour resources, equipment, software and /or facilities shall be deemed to be Company's intellectual property and that the said work is deemed to be owned by the Company. (The work** includes but not limited to the following items and all other rights related to your work; patents; patent applications; trademarks; trade secrets; copy rights; transparencies; materials; inventions; improvements; reports; techniques; discovery; methods; processes; models; mock-ups; miniatures; job notes; storyboards; specials effects; animations; modelling, designs; technology; know-how; software programs; concepts for programs; object descriptions; art assets; art work; paintings; drawing; sketching; model work; ideas or information made and practiced by the Company;)
3. All materials*** provided to or created by you solely or as a part of team during your work hours on our premises is deemed to be owned by the Company; (The Materials*** includes but not limited to the following:- all motion pictures; films; taps; Cassettes; cables and otherwise, software programs; all software and hardware related to any interactive devices; storage medium such as CD-ROM; CD; floppy or similar disc system, interactive cable, fiber optic; interactive telephone and any other devices or methods now know or later created or any other computer based system. Instruments required for drawing and painting. The materials also include by way of illustration only sequel and remake, art characters, any publications; literature; training material, books; documents)

Name:

Date:

Signature:

Annexure II: Confidential Information

"Confidential Information" includes but is not limited to information which is or fairly can be considered to be of a confidential nature, which is obtained whether (without limitation) in graphic, written, electronic or machine readable form on any media, by you; and whether or not the information is expressly stated to be confidential or marked as such, in writing (provided that the confidentiality of such information is reasonably apparent), and also includes all Intellectual Property (as defined in Annexure I), but is not limited to:

- i. Information of value or significance to the Company, its subsidiaries, divisions, affiliates, customers or its competitors (present or potential) such as:
 - o Customer data, in particular, key contact names, addresses, sales figures and sales conditions of the Company and its past, present or prospective clients.
 - o Business data, particularly data relating to new products, promotion campaigns, distribution strategies, license agreements and joint ventures in which the Company is involved.
 - o Software data, particularly information relating to the software and the modules thereof as well as any devices designed by the Company to prevent unauthorized copying.
 - o Research and development data, particularly information relating to the software and hardware developments of the Company.
 - o Financial data, in particular, concerning budgets, the fees and revenue calculations, sales figures, financial statements, profit expectations and inventories of the Company.
 - o Procedures for computer access and passwords to the Company's Confidential Information, due diligence reports and all other documentation normally related to the business of the Company.
 - o Lists of or information about personnel seeking employment with or who are already employed by the Company.
 - o Any and all other information or materials or documents of a commercially sensitive nature relating to the Company's operations, research, plans, strategies, objectives, development, purchasing, marketing, and selling activities.
- ii. Original information supplied by the Company;
- iii. Information not known to competitors of the Company nor intended by the Company for general dissemination, including but not limited to, policies, strategies, the identity of various product-suppliers or service-providers, billing schedules, needs of its clients, information as to the profitability of specific accounts, and information about the Company itself and its executives, officers, directors and employees;
- iv. Any business or technical information relating to the Company, including but not limited to financial information, equipment, documentation, strategies, marketing plans, prospective leads or target accounts, pricing information, information relating to existing, previous and potential customers and contracts disclosed by the Company to you;
- v. Any copies of the above-mentioned information; but does not include:
 - a. That which is in the public domain, other than by your breach of this contract or of any other confidentiality agreement.
 - b. That which was previously known as established by your written records prior to receipt from the Company and in your possession prior to the date of this contract;
 - c. That which was lawfully obtained by you from a third party; and
 - d. That which was developed independently by you without reference to the Confidential Information provided by the Company.

Name:

Date:

Signature:

**DTDC COURIER AND CARGO PVT
LTD**
Dattawadi Mahsoba Cowk Near
Shani Mandir

Compensation Structure		
Name	Sarthak Suraj Sawant	
Designation	SALES & OPERATIONS EXECUTIVE	
Grade	SALES & OPERATIONS EXECUTIVE	
Location	Pune	
Salary component	Amount in INR	Payable
Basic	5,000	
HRA	1,500	
Special allowance	4,294	
Gross Monthly Salary [a]	10,794	
Deductions		
Employee contribution to EPF	1,115	
Employee contribution to ESI	81	
Professional Tax	200	
Total Deductions (before TDS) [b]	1,396	
Net Monthly Salary (before TDS) [c]=[a]-[b]	9,398	Per month
Employer Contribution:		
EPF	1,115	
ESI	351	
Gratuity	240	Retiral
Group Insurance	0	
Total Employer Contribution (Monthly) [d]	1,706	
Total Fixed CTC (Per Month) [e]=[a]+[d]	12,500	
Total Fixed CTC (Per Annum) [f]=[e]*12	150,000	
Total CTC (Per Annum) [rounded off]	150,000	
NOTE:		
1. Gratuity is a retirement benefit credited to the employee and eligible as per gratuity policy		
2. Performance based Incentive is payable monthly after completion of probation. Performance evaluation will be carried out once in 6 months.		

For: DTDC COURIER AND CARGO PVT LTD

SURAJ
HR Executive



SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

Date; 04/11/2020

SHWETA SHASHIKANT PAWAR
NEW VANJARI CHAWL
KASARWADIPUNE 411034

REF: FUGEWADI/MARUTI/REINSURANCE/EXECUTIVE TELE MARKETING/P24674

LETTER OF APPOINTMENT

Dear Mr./Ms. SHWETA SHASHIKANT PAWAR

After successfully processing your application, interview and discussions, we have pleasure of offering you appointment in our Company as EXECUTIVE TELE MARKETING-REINSURANCE w.e.f. 04/11/2020 based at FUGEWADI. You will be working with VAISHALI SHEKHAR SHIVESHWARKAR, SENIOR MANAGER. The terms and conditions of your appointment will be as follows

1. **Salary Details:**

As per offer, the compensation details are attached in Annexure 1.

p

2. **Retiral Benefits:**

You will be entitled to Provident Fund & Gratuity as per the respective enactments and Superannuation as per the Company policy.

3. **Leave:**

You will be eligible for leaves as per the Leave Policy of the Company.

4. **Tax Applicability:**

Income Tax, as applicable, will be deducted from the compensation payable to you, as per the contract of employment, through the payroll system of the Company.

5. **Code of Conduct:**

The Company has framed and implemented, under-mentioned policies, for the due observance and compliance by the employees of the Company, in the course of employment with the Company.

These policies are integral part of this letter of appointment, which have been provided to you separately. These policies are also available on the intranet HR portal of the Company. By accepting this letter, you undertake to abide by these policies. The Company reserves its right to modify or amend these policies, from time to time. Failure to abide by these policies will lead to appropriate disciplinary action.

6. **Probation & Notice Period:**

- You will be on probation for a period of 6 (six) months from the date of joining. Your probationary period may be extended, if considered necessary by the Company. During the period of probation, employee shall have the right to resign from the service of the Company, without giving any notice. Similarly Company will have the option to terminate the service of the employee, without any notice or salary in lieu thereof, without assigning the reason.

- On satisfactory completion of the Probation Period including extension, if any, either party can terminate this contract of the employment by giving 1 (one) calendar month notice in writing or payment of the basic salary in lieu of notice period or part thereof.



SAI SERVICE[®]

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117

Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

You may also be eligible for Productivity / Attendance /Performance Linked Incentives, earned Leave as per Company policy and statutory regulations.

Incentive is not only linked to production and productivity but also mainly to the profits of the Company, therefore the annual bonus payable to you as per the provisions of the Payment of Bonus Act will be adjusted from the incentives and balance amount if any would be payable as per the respective provisions. The Management reserves the right to change, alter/ modify, amend or withdraw this incentive scheme in future. This will not be considered as a service condition and no lien or right can be established by you on payment arising out of this scheme.

7. Retirement Age:

You will retire from the services of the Company on attaining age of 58 years. You will retire on the last day of the month in which you complete the age of 58 years.

8. Transfer:

As an employee of the Company, you undertake to accept a certain mobility of career, which may lead the Company to offer you transfer(s) to different Cities/positions. Your services can be transferred to any of our plants / offices / departments / establishments/business vertical situated throughout the country . In such cases, there will be no change in your compensation.

9. Confidentiality:

You covenant with the Company that you shall not disclose, divulge or otherwise make use of any information, in respect of the business of the Company or its affiliates, which you may, acquire, receive or access during, or in the course of employment with the Company ('**Confidential Information**'). Such Confidential Information may, include without limitation, information pertaining to new projects, business plans, specifications, operational data, trade secrets, memoranda, photographs, materials, quality control and test methods and data, reports, analysis, costs and pricing, financial information, marketing and sales data and plans, customer information, supplier details, product applications including computer software, programs etc. The obligation under this clause shall continue for a period of 5 (five) years from the date of the termination of the contract of employment with the Company.

10. Jurisdiction:

This Agreement is governed by, and shall be construed in accordance with, the laws of India. This contract of employment shall be subject to the exclusive jurisdiction of the courts at Pune alone.

11. Other Terms & Conditions:

- The services to be rendered by you to the Company will require your full time and attention and therefore, you will not take up any assignment, honorary or otherwise or any academic course of study or take up any employment, part time or full time, without our prior consent.
- This appointment will be valid subject to your being found medically fit, as certified by the registered medical practitioner in India.
- All communication sent to you by the Company, at your last given address (including email address) shall be deemed to have been properly served upon you.
- The compensation payable to you under this contract of employment is confidential and you should refrain yourself from sharing the same with your colleagues.

SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

We request you to kindly confirm your acceptance to this contract of employment by putting your signatures (on all pages) and return back to us one copy of the same as token of your acceptance.

We welcome you to the Sai Service family and wish you a successful career.

Yours sincerely,
For Sai Service Pvt Ltd

Atul Dandgaval
A.G.M. - HR & Administration



Sandhu
HR Representative

I, Mr./Ms./Mrs. _____ hereby accept and confirm that the terms and conditions of this contract of employment with SAI SERVICE PVT LTD are acceptable to me.

Signature of Employee: *Sandhu* (Date: _____)

ORIGINAL



Company Confidential

09th February 2023

**Manthan Bharat More,Pune,
Maharashtra
India.**

Dear **Manthan**,

We are pleased to inform you that based on your application and subsequent discussions you had with us, it has been decided to provide you an opportunity to undergo on the job practical training at our **Conneqt Business Solutions Limited** Offices / Centre for a period of **12 Months** from Date of Joining. You shall report to the training on or **09th February 2023** failing which it will be deemed that the opportunity given to you is withdrawn automatically.

You shall undergo the training strictly in accordance with the scheme of training of the company. If found not satisfactory, the training period may be extended for a further period of one month or the opportunity given to you will be discontinued at the discretion of the Management.

During the period of training you will be placed in different work locations of the company and your first placement for training will be at **Pune**. You will undergo on the job training under the supervision of designated supervisors, informed to you at the start of training.

During the period of training you will be required to participate in the assessment process implemented by the company from time to time to assess your learning on the job and skill levels.

During the course of evaluation, if it is found that your learning is not up to the mark as per the expectations of the management, the opportunity given for training will be discontinued and you shall have no claim what so ever on the company.

This offer of training is subject to verification of the particulars submitted by you and in case any particulars submitted by you are found to be false or incorrect, your training will be terminated without notice and you are required to pay equivalent to the One month Stipend Amount in lieu of notice.

The company works in shifts and hence the on the job training will take place in all the shifts. In view of the same you are required to attend to your training in shifts as advised by the officials of the company from time to time.

If you undergo training regularly on all the working days of the company you would be eligible for the Leaves as per the company policy.

You shall follow the same working days, working hours and holidays of the company. You shall be regular to your training. If you fail to attend the training continuously for a period of 8 working days, it will be treated that you have discontinued the training and hence the company reserves its right to claim compensation from you.

You may discontinue the training by giving thirty days' notice in writing to the company and similarly, the company may discontinue your training by giving thirty days' notice. Any deviation w.r.t the notice period is solely at the discretion of the company.

At any time, if your conduct, behavior, learning on the job etc., are not in conformity with the rules, regulations and expectations of the company, your training will be discontinued without any notice and payment in lieu thereof.

You shall be entitled to a monthly stipend as per the below mentioned grid.

Component	Amount (Rs.) Per Month
A. BASIC STIPEND	16190.00
B. PERFORMANCE INCENTIVE: This will be payable on a monthly basis. The payout shall vary from 0% to 150% based on your PMI Rating. There would be no payout during the training period. The details of the policy will be communicated to you separately.	
PERFORMANCE PAY (5% of the Basic Stipend)	810.00
C. GROSS STIPND (A + B)	17000.00

You will be covered under insurance as per the company policy which can change time to time as per the management discretion.

During the period of training you will be paid Stipend of **Rs. 17000.00** per month. Tax Deductions will be as applicable.

You are eligible for Performance Incentive: This will be payable on a monthly basis. The payout shall vary from 0% to 200% based on your PMI Rating. There would be no payout during the training period. The details of the policy will be communicated to you separately.

On successful completion of training, at the discretion of the Management, you may be offered an **Apprentice - Customer Support** position as a **Probationer**. You are required to work for a minimum period of one year with the company. If you leave the services without completing the mandatory period or if you fail to take up the employment as probationer, you are liable to pay the cost of training incurred by the company together with the stipend paid to you.

In all matters not mentioned herein above, you shall be governed by the rules, regulations or practices of the company pertaining to trainees from time to time.

Kindly note that you will not be entitled to any other benefits or perquisites.

This letter of training is sent to you in duplicate and we request you to kindly sign the duplicate copy of this letter as a token of acceptance of the terms and return it to us at the earliest.

With Best Regards.

For Conneqt Business Solutions Limited.



Tony Jacob Joseph
Associate Vice President – Human Resources.

I hereby read and fully understood the terms of my training letter. I hereby accept the terms of my training.

Signature:

Name: **Manthan Bharat More**

Date: **09th February 2023**



OASIS INFOBYTE

INTERNSHIP OFFER LETTER

OIB/F2/12577

Dear Chavan Suraj Tanaji

2/1/2023

We are delighted to welcome you for the internship of **Web Development and Designing** in our fellowship. This internship is observed by **Oasis Infobyte** as being a learning opportunity for you.

In essence, your internship will embrace orientation and give emphasis on learning new skills with a deeper understanding of concepts through hands-on application of the knowledge you gained as an intern. Our team is confident that you will acknowledge your obligation to perform all work allocated to you to the best of your ability within lawful and reasonable direction given to you.

We look forward to a worthwhile and fruitful association which will make you equipped for future projects. Wishing you the most enjoyable and truly meaningful internship program experience.

Thank you
Team Oasis Infobyte



contact@oasisinfobyte.in



www.oasisinfobyte.in



MSME
MICRO, SMALL & MEDIUM ENTERPRISES
सूक्ष्म, लघु एवं मध्यम उद्यम

CN082142221

Model Contract of Apprenticeship Training for Major/Minor* Apprentices

1. Name and Registered Address of Establishment : Talensetu Services Pvt. Ltd. (E02212700203)
with Telephone no. & E-mail address : 2nd Floor, Tanna Towers, Near Nal Stop Chowk,
PunePune, Maharashtra
: 020-25360023
: shailesh.joshi@talensetustaffing.com
2. (a) Name of Apprentice (Block Letters) : GANESH GAUTAM BHOSLE (A062186898)
(b) Father's/Mother's /Spouse's Name : Gautam Bhosale
3. Address of apprentice : Lonavla, Pune, Pune, Maharashtra
4. Gender : Male
5. Date of Birth : 07-09-2000
6. (a) Whether belongs to SC/ST/OBC/PwD/ Minority : No
(b) Name of the Category : General
7. Educational Qualification (Highest) : Diploma
8. (a) Category of Apprenticeship : Optional
(b) Name of the trade for which Apprentice is training : CNC Operator/Machining Technician L3
9. (a) Whether Basic Training is to be provided as part of Apprenticeship : No
(b) If Basic Training is exempt - reason for exemption
(i) Name of the Course : Diploma
(ii) Duration of Training/Course : N/A
(iii) Name of the Institute : Maharashtra State Board of Technical Education
(iv) Name of the Sector Skill Council (if applicable) : N/A
10. Apprenticeship Training duration (Total) : 2016 Hours
(a) Duration of Basic Training : N/A
Period of Basic Training : N/A
(b) Duration of On-the-Job Training : 2016 Hours
Period of On-the-Job Training : From 08-08-2021 to 02-08-2023
(c) Training Type : Sequential
11. Apprenticeship Training Location : KSPG Automotive India Pvt. Ltd.
(a) Name and address of facility where Basic Training is to be provided : N/A
(b) Name and address of the facility where On-the-Job Training is to be provided : Talensetu Services Pvt. Ltd.
KSPG Automotive India Pvt. Ltd.
Pune
Maharashtra
12. (a) Date of execution of contract : 21-08-2021
(b) Age of Apprentice on the date of execution of contract : 20 years, 11 months and 14 days
13. Is the establishment opting for benefits under NAPS*? : Yes
*If yes, Annexure 2 to this contract will also be applicable.
14. Monthly stipend amount
(a) During 1st year of training : 12000
(b) During 2nd year of training : 13200



(c) During 3rd and 4th year of training : N/A

The Establishment agrees and understands that the minimum monthly stipend amount is prescribed in the Rule 11(1) of Apprenticeship Rule, 1992. The Establishment confirms that the agreed monthly stipend amount entered above must be higher than these minimum rates.

If the minimum rates are modified through legislation (either through modification of rules, or through modification of minimum wages payable) during the course of apprenticeship, this revised rates will apply as the minimum payable to Apprentice

15. (a) Name and Address of Guardian In case Apprentice is under 18 years of age (Minor) : N/A

(b) Relationship with the Apprentice : N/A

16. (a) Whether Apprentice was identified through approved Third Party Aggregator : No

(b) Name of TPA (if applicable) : N/A

17. We, the Establishment, Apprentice/Guardian solemnly declare that we have read the Apprentices Act, 1961 and the Apprenticeship Rules, 1992 as amended from time to time, regarding the contract of apprenticeship training including obligations and terms and conditions contained in Schedule V and VI of the said rules and will comply with the same.

18. I, the Apprentice, declare that all details shared by me, including educational qualifications and other personal information shared, is correct and will provide original documents for verification at any time

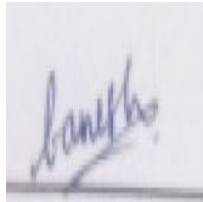
19. We, the Establishment, have examined the Apprentice's information, including personal details, and will seek relevant documentation for verification as and when required.

20. In case of default by either the apprentice or the employer, we agree to compensate the other party as per the provisions of the Apprenticeship Rules, 1992 (Main Provisions of the Rules may be seen in the Annexure 1).

21. The Establishment, Apprentice/Guardian hereby also declares to comply with the terms and conditions of National Apprenticeship Promotion Scheme (NAPS),if applicable.



Signature of the Employer with seal



Signature of Apprentice

Signature of Guardian

FOR OFFICE USE ONLY

Contract Registration No. : CN082142221
(To be given by the Office of the Apprenticeship Adviser)
(Mandatory only for Registered Trades)

Signature of Registering Authority
(Apprenticeship Advisor)
(Registration required for Designation trade only)

Annexure 1 Contract of Apprenticeship Training

Some provisions of the Apprenticeship Rules relating to the Contract of Apprenticeship Training are reproduced below for sake of convenience.

Both the Establishment and Apprentices have read and are bound by the provisions of the directions in have read the Apprentices Act, 1961 and the Apprenticeship Rules, 1992, which will apply to this Contract of Apprenticeship

1. The stipend for a particular month shall be paid by the tenth day of the following month. No deduction shall be made from the stipend for the period during which an apprentice remains on casual leave or medical leave. Stipend shall, however, not be paid for the period for which an Apprentice remains on extraordinary leave.
2. Where the Contract of Apprenticeship is terminated through failure on the part of the employer in carrying out the terms and conditions of the Contract (as notified under the Apprenticeship Rules, 1992), he shall pay to the apprentice compensation as determined by Apprenticeship Advisor.
3. In the event of premature termination of Contract of Apprenticeship for failure on the part of apprentice to carry out the terms and condition of the contract (as notified under the Apprenticeship Rules, 1992), the apprentice hereby guarantees to employer the payment of such amount as determined by the Apprenticeship Adviser as and towards the cost of training.

Annexure -2 | Covenants and conditions specific to NAPs scheme

1. For availing benefit under NAPS scheme, the course under which apprenticeship training is being provided, should be NSQF aligned.
2. Assessment and Certification shall be done jointly by the establishment and SSC/ NCVT/ other bodies as notified from time to time under NAPS guidelines.
3. The Establishment warrants and confirms that they have studied, understood and agree to comply with the guidelines that are applicable to Establishments that are part of the NAPS scheme. These guidelines are published at (<https://apprenticeshipindia.org>) and maybe updated from time to time.

To:

26 November 2022

Pratik Suhas

Khutwad Nagar, Nashik, 422008 MH

We are pleased to offer you an internship at our company in the Digital Transformation department at our Bangalore office. Your internship shall commence on 1st December 2022 and shall end on 30th May 2023 ("Term"). The terms and conditions of your internship with the Company are set forth below:

1. Subject to your acceptance of the terms and conditions contained herein, your project and responsibilities during the Term will be determined by the supervisor assigned to you for the duration of the internship.
2. You are eligible for a stipend of Rs. 8,000 during the Term which shall be paid on completion of the tasks assigned to you during your internship to the satisfaction of the Company.
3. Your timings will be from 10:00AM to 06:00 PM, Monday to Friday. Please be sure to bring Required Documents with you on your first day to complete your profile.
4. You will sign a confidentiality agreement with the company before you commence your internship.
5. The internship cannot be construed as an employment or an offer of employment with BlankBot Technologies Pvt Ltd.

Please confirm your acceptance of the terms of this offer by 30 Nov 2022 - failing which, we have the right to cancel the internship. We look forward to having you on our team! If you have any questions, please feel free to reach out to us.

Sincerely



Balwinder Kumar

Internship Coordinator, Human Resources

Accepted by,

Pratik Suhas

To:

26 November 2022

Pratik Suhas

Khutwad Nagar, Nashik, 422008 MH

We are pleased to offer you an internship at our company in the Digital Transformation department at our Bangalore office. Your internship shall commence on 1st December 2022 and shall end on 30th May 2023 ("Term"). The terms and conditions of your internship with the Company are set forth below:

1. Subject to your acceptance of the terms and conditions contained herein, your project and responsibilities during the Term will be determined by the supervisor assigned to you for the duration of the internship.
2. You are eligible for a stipend of Rs. 8,000 during the Term which shall be paid on completion of the tasks assigned to you during your internship to the satisfaction of the Company.
3. Your timings will be from 10:00AM to 06:00 PM, Monday to Friday. Please be sure to bring Required Documents with you on your first day to complete your profile.
4. You will sign a confidentiality agreement with the company before you commence your internship.
5. The internship cannot be construed as an employment or an offer of employment with BlankBot Technologies Pvt Ltd.

Please confirm your acceptance of the terms of this offer by 30 Nov 2022 - failing which, we have the right to cancel the internship. We look forward to having you on our team! If you have any questions, please feel free to reach out to us.

Sincerely



Balwinder Kumar

Internship Coordinator, Human Resources

Accepted by,

Pratik Suhas

Ref: OFFRD_0031
Date: 09 OCT 2022

Sarthak Suraj Sawant
DP road hadapsar near tupe
washing center ,
PUNE, MAHARASHTRA,
PIN: 411028

Offer of Employment

Dear Sarthak Suraj Sawant

Further to our discussions, we are pleased to appoint you as **SALES & OPERATIONS EXECUTIVE** with DTDC COURIER AND CARGO PVT LTD, as per the terms and conditions stated below:

1. Your offer letter is valid till 2022-12-16 and you are required to confirm acceptance of the offer and join on 2022-10-01. If you do not confirm your acceptance, this offer is treated as withdrawn. To confirm your acceptance of this offer, you are required to respond via email to dattawadi_new.pnq@fr.dtdc.com.

2. Reporting and Responsibilities:

You will report to the undersigned and complete the joining formalities. Your working location will be at **Pune**. We will communicate you about your reporting manager on joining the organization and completing the joining formalities.

Note: On your joining date, please bring Soft copies of (i) the original offer letter duly signed and dated by you; (ii) Passport size photograph (Soft copy), (iii) the originals and 1 set of soft copies of the following documents:

- Education degree certificate
- Relieving letter or resignation acceptance letter from your most recent employer
- Proof of identity. Bring the following documents: AADHAR card/Passport and PAN card (mandatory)

Please note that all the above documents are mandatory, and you will not be allowed to join without them.

3. Compensation

During your probation period, you will be eligible for a compensation of **INR 150000** per annum as CTC (Cost to Company) as mentioned in the annexure III. Your compensation and other benefits, if any, shall be subject to the deductions of all Governmental and local taxes, statutory contribution, etc. as required to be made under the laws of India and shall be paid in accordance with the practices of the Company.

4. Working hours

- a. Your working hours are from **9:30 am to 6:30 pm**, Monday to Friday
- b. The Company reserves the right to require you to work outside your normal working hours if necessary, in furtherance of your duties.
- c. You will be eligible for leave and other benefits as per the rules of the company.

5. Responsibilities

You must effectively, diligently and to the best of your ability perform all responsibilities and duties and ensure successful completion of the assignments given to you time to time by your reporting manager.

6. Non - disclosure obligations and intellectual property

At all times during and after your employment, you will hold in strictest confidence and not use for your own purposes or the purposes of others or disclose anything on the intellectual property belonging to the Company as defined in the Annexure 1 ("**IntellectualProperty**"), to any person, firm, corporation or third party, without prior authorization in writing by the Company.

You agree that the results and proceeds of your services hereunder, including, without limitation, any works of authorship resulting from your services during your employment and any works in progress, shall be works-made-for-hire and the Company shall be deemed the sole and exclusive owner throughout the universe in perpetuity of any and all rights of whatsoever nature therein, whether or not now or hereafter known, existing, contemplated, recognized or developed, with the right to use the same in perpetuity in any manner the Company determines in its sole discretion without any further payment to you whatsoever.

If, for any reason, any of such results and proceeds shall not legally be a work-made-for-hire and/or there are any rights which do not accrue to the Company under the foregoing provisions, then you hereby irrevocably assign and agree to assign any and all of your right, title and interest thereto in all Intellectual Property, including, without limitation, any and all copyrights, patents, patent applications, trade secrets, trademarks and/or other rights of whatsoever nature therein, whether or not now or hereafter known, existing, contemplated, recognized or developed to the Company, and the Company shall have the right to use the same in perpetuity throughout the universe in any manner the Company may deem useful or desirable to establish or document Company's sole and exclusive ownership of any and all rights in any such results and proceeds, including, without limitation, the execution of appropriate copyright and/or patent applications or assignments. To the extent that you have any rights in the results and proceeds of your services that cannot be assigned in the manner described above, you unconditionally and irrevocably waive the enforcement of such rights. This paragraph is subject to, and shall not be deemed to limit, restrict, or constitute any waiver by the Company of any rights of ownership to which the Company may be entitled by operation of law by virtue of the Company or any of its affiliates being your employer.

You hereby unconditionally and irrevocably waive all rights that you may have now or in future with respect to any Intellectual Property / work done by you during your employment including any rights that you may have to prevent the alteration/ translation/ destruction of any such Intellectual Property / work. You agree that this waiver may be invoked by the Company and by any of its authorized agents / assignees, in respect of any of Intellectual Property / work done by you during the employment period.

For the avoidance of doubt, all Intellectual Property/ work done by you during your employment shall be for the sole benefit of the Company and its customers and shall be the exclusive property of the Company.

The Company will have sole discretion to deal with the same, and in respect of all the work done by you during the employment together with all rights thereto, including patent and patent application rights and copyrights, shall vest in the Company. You agree that you shall do all further things that may be reasonably necessary or desirable in order to give full effect to the rights and title of the Company in respect of the foregoing.

7. Confidentiality

In consideration of the opportunities, training and access to new techniques and know-how that will be made available to you, you will be required to comply with the confidentiality policy of the Company. Therefore, please ensure that you maintain as secret the confidential information as defined in Annexure II ("Confidential Information") and shall not use or divulge or disclose any such Confidential Information except as may be required under obligation of law or as may be required by the Company in the course and scope of your employment. This covenant shall endure during the employment and shall survive the cessation of your Contract with the Company, irrespective of the circumstances of, or the reasons for, the cessation. In the event of any doubt regarding what constitutes Confidential Information, you shall consult your superiors. You agree to execute and enter into a confidentiality and assignment agreement with the Company upon the Company's request.

8. Company property

Any and all memoranda, notes, records, books, other documents, art works, art assets, circular, files, items of equipment, laptops, parts of PC of the Company, whether tangible or intangible, including all information stored in electronic form, made or composed by you or which might be supplied/ made available to you in connection with your work during the employment, or in any way relating to the business or affairs of the Company, its subsidiaries, divisions, affiliates, or clients shall at all times remain the property of the Company and shall be returned to the Company upon your ceasing to be in the Company's employment or at any other time at the request of the Company. Further, you undertake not to use any of the memoranda, notes, records, or other documents made or composed by you or copies thereof, upon the termination of your Contract.

In the event of the termination of your employment for any reason, and subject to any other provisions hereof, the Company reserves the right, to the extent required by law, and in addition to any other remedy the Company may have, to deduct from any monies otherwise payable to you the following: the full amount of any specifically determined debt you owe to the Company or any of its affiliates at the time of or subsequent to the termination of your employment with the Company and (ii) The value of Company's property which you retain in your possession after the termination of your employment with the Company following Company's written request for such item(s) return and your failure to return such items within ten (10) days of receiving such notice. In the event that the law of any state or other jurisdiction requires the consent of an employee for such deductions, this Letter shall serve as such consent.

9. Notice of Change

Any change in your personal information including residential address, marital status, number of children and education qualification should be notified to the Company in writing within 7 days. Any notice required to be given to you shall be deemed to have been duly and properly given if delivered to you personally or sent by post at your address as recorded in the Company's records. You agree to keep the Company informed in writing of any change in your address.

10. Termination

You are entitled to receive from the Company and you are required to give the Company the following period of notice, in writing, to terminate your employment without cause, such notice, in each case, to expire as stated below:

- a. During the probation period, either party may terminate this contract by giving **60 days'** notice in writing or

payment in lieu of salary (net of provident fund contribution). However, the Company reserves the right not to accept payment in lieu of notice and at its sole discretion and enforce the notice period.

- b. Your employment may be terminated forthwith by the Company without prior notice if any declaration/statement or information forthwith given by you in your application or in connection with your contract at any time found to be false or untrue or any material particulars are suppressed.
- c. Further the Company shall have the right to terminate your services without any notice or salary in lieu thereof for misconduct, negligence of duty, disloyalty, dishonesty, indiscipline, disobedience, irregular attendance, or long period of absence from duty due to ill-health, infirmity or accident or inefficiency.
- d. Without limiting the general effect of clause 10 (c), if you absent yourself without leave or remain absent beyond the period of leave originally granted or subsequently extended, you shall be considered as having voluntarily terminated your employment without giving any notice.
- e. After your confirmation, the notice period for both sides shall be **60 days** or pay in lieu of the same. And on any such failure from employee's side ,company will be forced to take necessary legal action against you in a court of law and you alone will be held responsible for all the costs , compensation, loss or legal consequences if any. Further, in such circumstances , issuance of relieving letter, conduct certificate, experience certificate etc will be solely at the discretion of the company.
- f. Upon separation from the company, you shall hand over all company's property under your custody to your reporting manager.

11. Exclusivity / Prior Commitment

Unless prior written agreement is given to you by the Company, you agree to work exclusively for the Company, within the context of the responsibilities defined above, and not to accept or perform any other paid/ unpaid employment or consulting in addition to this, even temporary. You agree, represent and warrant to the Company that (i) you are not subject to/party to any covenants, agreements or restrictions, including, without limitation, any covenants, agreements or restrictions arising out of any prior contracts or independent contractor relationships, which would be breached or violated by your execution of this Contract or performance of your duties hereunder; (ii) there is no order of any court or other authority disqualifying you for appointment under this contract; and (iii) you are not financially interested in any other person, firm or corporation engaged in the production, distribution or exhibition of motion pictures or television programs or the animation business (including, without limitation, motion pictures, television programming produced for, distributed to or exhibited on free, cable, pay, satellite and/or subscription television, music and/or interactive), anywhere in the world.

12. Non-Compete / Non-Solicit

Non-Competition. You covenant and agree that, during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, anywhere in the Territory, on behalf of any Competitive Business perform the same or substantially the same Job Duties, which is directly in competition with the company.

Non-Solicitation of Customers, Customer Prospects, and Vendors. You also covenant and agree that during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, solicit or attempt to solicit any business from any of the Company's Customers, Customer Prospects, or Vendors with whom you had Material Contact during the last two years of your employment with the Company.

Non-Solicitation of Employees. You also covenant and agree that during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, on your own behalf or on behalf of or in conjunction with any person or legal entity, recruit, solicit, or induce, or attempt to recruit, solicit, or induce, any non-clerical employee of the Company with whom you had personal contact or supervised while performing your Job Duties, to terminate their employment relationship with the Company

13. Notices

All notices required to be given hereunder shall be given in writing, by personal delivery or by mail and confirmed by fax at the respective addresses of the parties hereto set forth above, or at such address as may be designated in writing by either party, and in the case of the Company, to: **DTDC COURIER AND CARGO PVT LTD, Dattawadi Mahsoba Cowk Near Shani Mandir**

14. Jurisdiction

The jurisdiction concerning this contract will be with the courts in Chennai which you undertake to not contest. The contract shall be governed by and interpreted in accordance with the laws of India.

With best wishes,
For **DTDC COURIER AND CARGO PVT LTD**

Suraj
HR EXECUTIVE

Candidate Undertaking:

I have carefully read and understood the terms and conditions mentioned above and in the Annexure I and II attached.

I acknowledge that while I am working for DTDC COURIER AND CARGO PVT LTD, I will take proper care of all company equipment that I am entrusted with. I further understand that upon termination, I will return all company property and that the property will be returned in proper working order. I understand I may be held financially responsible for lost or damaged property. This agreement includes, but is not limited to, laptops, cell phones and other equipment. I understand that failure to return equipment will be considered theft and may lead to criminal prosecution by Company.

I accept all the terms and conditions mentioned therein. I shall commence my probation with effect from _____

Name:

Date:

Signature:

Annexure I: Intellectual property

The term 'Intellectual' or 'Company owned property' as it is used in this schedule, shall include, but not be limited to the following:

1. Business or financial records, strategies, patents, patent applications, trademarks, trade secrets, forecasts, budgets projections, Licenses, prices of products and services, Clients list, Goodwill, Personnel information's, and other information regarding formulas, patterns, complications, programs.
2. All work ** created and /or developed by you solely or a team during your work hours on our premises and /or using Company labour resources, equipment, software and /or facilities shall be deemed to be Company's intellectual property and that the said work is deemed to be owned by the Company. (The work** includes but not limited to the following items and all other rights related to your work; patents; patent applications; trademarks; trade secrets; copy rights; transparencies; materials; inventions; improvements; reports; techniques; discovery; methods; processes; models; mock-ups; miniatures; job notes; storyboards; specials effects; animations; modelling, designs; technology; know-how; software programs; concepts for programs; object descriptions; art assets; art work; paintings; drawing; sketching; model work; ideas or information made and practiced by the Company;)
3. All materials*** provided to or created by you solely or as a part of team during your work hours on our premises is deemed to be owned by the Company; (The Materials*** includes but not limited to the following:- all motion pictures; films; taps; Cassettes; cables and otherwise, software programs; all software and hardware related to any interactive devices; storage medium such as CD-ROM; CD; floppy or similar disc system, interactive cable, fiber optic; interactive telephone and any other devices or methods now know or later created or any other computer based system. Instruments required for drawing and painting. The materials also include by way of illustration only sequel and remake, art characters, any publications; literature; training material, books; documents)

Name:

Date:

Signature:

Annexure II: Confidential Information

"Confidential Information" includes but is not limited to information which is or fairly can be considered to be of a confidential nature, which is obtained whether (without limitation) in graphic, written, electronic or machine readable form on any media, by you; and whether or not the information is expressly stated to be confidential or marked as such, in writing (provided that the confidentiality of such information is reasonably apparent), and also includes all Intellectual Property (as defined in Annexure I), but is not limited to:

- i. Information of value or significance to the Company, its subsidiaries, divisions, affiliates, customers or its competitors (present or potential) such as:
 - o Customer data, in particular, key contact names, addresses, sales figures and sales conditions of the Company and its past, present or prospective clients.
 - o Business data, particularly data relating to new products, promotion campaigns, distribution strategies, license agreements and joint ventures in which the Company is involved.
 - o Software data, particularly information relating to the software and the modules thereof as well as any devices designed by the Company to prevent unauthorized copying.
 - o Research and development data, particularly information relating to the software and hardware developments of the Company.
 - o Financial data, in particular, concerning budgets, the fees and revenue calculations, sales figures, financial statements, profit expectations and inventories of the Company.
 - o Procedures for computer access and passwords to the Company's Confidential Information, due diligence reports and all other documentation normally related to the business of the Company.
 - o Lists of or information about personnel seeking employment with or who are already employed by the Company.
 - o Any and all other information or materials or documents of a commercially sensitive nature relating to the Company's operations, research, plans, strategies, objectives, development, purchasing, marketing, and selling activities.
- ii. Original information supplied by the Company;
- iii. Information not known to competitors of the Company nor intended by the Company for general dissemination, including but not limited to, policies, strategies, the identity of various product-suppliers or service-providers, billing schedules, needs of its clients, information as to the profitability of specific accounts, and information about the Company itself and its executives, officers, directors and employees;
- iv. Any business or technical information relating to the Company, including but not limited to financial information, equipment, documentation, strategies, marketing plans, prospective leads or target accounts, pricing information, information relating to existing, previous and potential customers and contracts disclosed by the Company to you;
- v. Any copies of the above-mentioned information; but does not include:
 - a. That which is in the public domain, other than by your breach of this contract or of any other confidentiality agreement.
 - b. That which was previously known as established by your written records prior to receipt from the Company and in your possession prior to the date of this contract;
 - c. That which was lawfully obtained by you from a third party; and
 - d. That which was developed independently by you without reference to the Confidential Information provided by the Company.

Name:

Date:

Signature:

**DTDC COURIER AND CARGO PVT
LTD**
Dattawadi Mahsoba Cowk Near
Shani Mandir

Compensation Structure		
Name	Sarthak Suraj Sawant	
Designation	SALES & OPERATIONS EXECUTIVE	
Grade	SALES & OPERATIONS EXECUTIVE	
Location	Pune	
Salary component	Amount in INR	Payable
Basic	5,000	
HRA	1,500	
Special allowance	4,294	
Gross Monthly Salary [a]	10,794	
Deductions		
Employee contribution to EPF	1,115	
Employee contribution to ESI	81	
Professional Tax	200	
Total Deductions (before TDS) [b]	1,396	
Net Monthly Salary (before TDS) [c]=[a]-[b]	9,398	Per month
Employer Contribution:		
EPF	1,115	
ESI	351	
Gratuity	240	Retiral
Group Insurance	0	
Total Employer Contribution (Monthly) [d]	1,706	
Total Fixed CTC (Per Month) [e]=[a]+[d]	12,500	
Total Fixed CTC (Per Annum) [f]=[e]*12	150,000	
Total CTC (Per Annum) [rounded off]	150,000	
NOTE:		
1. Gratuity is a retirement benefit credited to the employee and eligible as per gratuity policy		
2. Performance based Incentive is payable monthly after completion of probation. Performance evaluation will be carried out once in 6 months.		

For: DTDC COURIER AND CARGO PVT LTD

SURAJ
HR Executive

TechnoLight

Light of Learning Education

Letter of Appointment

Date: November 25th 2022

Dear Mr. Dhairyashil Kishorkumar Narute,

Congratulations! We are pleased to confirm you have been selected to work for TechnoLight Pvt. Ltd. (hereby referred as "Company"). We are delighted to make you the following job offer.

We are offering you a 6 months probationary position as Tableau Developer.

We would like you to start work on November 28th 2022 and report to Mr. Ajinkya Ghorpade for documentation and orientation. If this date is not acceptable, please contact us immediately. We are confident you will be able to make a significant contribution to the success of TechnoLight and looking forward to working with you.

Your contract with us will be governed by Terms & Conditions as detailed in Annexure -A.

Sincerely,

Pratima

Mrs. Pratima Salvi

Director, TechnoLight Pvt. Ltd.

I accept the offer as outlined above.



D. Narute

Mr. Dhairyashil Kishorkumar Narute,

Date: 26/11/2022

Address : TechnoLight, Paras Boys Hostel, Gurudwara Colony, Moni Baba Ashram Road,
Near Akurdi Railway Station, Chinchwad, Pune 411033.
Contact : 7385291434 | **Email :** pritamkasliwal1576@gmail.com

TechnoLight

Light of Learning Education

Letter of Appointment

Date: November 29th 2022

Dear Mr. Omkar Hajare,

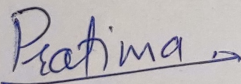
Congratulations! We are pleased to confirm you have been selected to work for TechnoLight Pvt. Ltd. (hereby referred as "Company"). We are delighted to make you the following job offer.

We are offering you a 6 months probationary position as Tableau Developer.

We would like you to start work on December 1st 2022 and report to Mr. Ajinkya Ghorpade for documentation and orientation. If this date is not acceptable, please contact us immediately. We are confident you will be able to make a significant contribution to the success of TechnoLight and looking forward to working with you.

Your contract with us will be governed by Terms & Conditions as detailed in Annexure -A.

Sincerely,



Mrs. Pratima Salvi

Director, TechnoLight Pvt. Ltd.



I accept the offer as outlined above.

Mr. Omkar Hajare,

Date:

Address : TechnoLight, Paras Boys Hostel, Gurudwara Colony, Moni Baba Ashram Road,
Near Akurdi Railway Station, Chinchwad, Pune 411033.
Contact : 7385291434 | **Email :** pritamkasliwal1576@gmail.com



OASIS INFOBYTE

INTERNSHIP OFFER LETTER

OIB/SIP31716

Dear Sudarshan Chole

We are delighted to welcome you for the internship of **Web Development and Designing** in our fellowship. This internship is observed by **Oasis Infobyte** as being a learning opportunity for you.

In essence, your internship will embrace orientation and give emphasis on learning new skills with a deeper understanding of concepts through hands-on application of the knowledge you gained as an intern. Our team is confident that you will acknowledge your obligation to perform all work allocated to you to the best of your ability within lawful and reasonable direction given to you.

We look forward to a worthwhile and fruitful association which will make you equipped for future projects. Wishing you the most enjoyable and truly meaningful internship program experience.

Thank you
Team Oasis Infobyte



contact@oasisinfobyte.in



www.oasisinfobyte.in



GROSOFT TECHNOLOGIES

WEB SOLUTIONS + INNOVATION + CREATIVITY



From :
HR Department ,
Grosoft Technologies ,
Pune Branch, Baner
Date : 04/08/2022

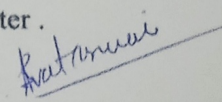
TO,
Raj P. Joshi
Pune.

Subject: Regarding Your Internship in our company

Dear Raj,

We would like to confirm that your application for internship letter position of
Programmer has been accepted.

This letter is provided on request of your internship appointment letter .


Rahul Avtarmani
Project Head
Grosoft Technologies



Grosoft technologies - 100 % Digital Enterprise ,
Part of Green revolution,
Email Id: grosoft100tech@gmail.com
H.Q. -201, Shiv sagar estate , Dr. Anni besant RD, worli, Mumbai, Maharashtra 400018,

STAR INDUSTRIES

All Types of Metals Finishing Work and Mfg. Soft Luggage & Hard Luggage
Pull Handle

INTERNSHIP OFFER LETTER

10-02-2023

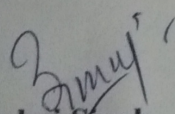
This is to certify that LALIT ASHOK TATAR, a student of Savitribai Phule Pune University, Pune, will be undergoing internship program at **STAR INDUSTRIES**.

He will be undertaking his internship in our software department. The internship will be of six months and shall commence from 13-02-23 in our Star Industries at Gate No.57, In front of Panjarpol gate, Chunchale gaon, Satpur, Ambad link road, Nashik

For further any queries, please contact the undersigned or the HR department.

For, Star Industries

**Gate No.57, In front of Panjarpol gate,
Chunchale gaon, Satpur to Ambad link road,
Nashik-422010.**


Pankaj Singh



Internship Coordi nator

Star Industries

Office: Plot No.Gat No 57, Infront of Panjarpol Gate, Chunchale Gaon, Satpur to
Ambad Link Road, Nashik -422010.

Maharashtra Mobile No. 8600178721, 9527635469, 9325997191

E-mail: starindustries.bsa@gmail.com

2023.03

TechnoLight

Light of Learning Education

Letter of Appointment

Date: November 25th 2022

Dear Mr. Dhairyashil Kishorkumar Narute,

Congratulations! We are pleased to confirm you have been selected to work for TechnoLight Pvt. Ltd. (hereby referred as "Company"). We are delighted to make you the following job offer.

We are offering you a 6 months probationary position as Tableau Developer.

We would like you to start work on November 28th 2022 and report to Mr. Ajinkya Ghorpade for documentation and orientation. If this date is not acceptable, please contact us immediately. We are confident you will be able to make a significant contribution to the success of TechnoLight and looking forward to working with you.

Your contract with us will be governed by Terms & Conditions as detailed in Annexure -A.

Sincerely,

Pratima

Mrs. Pratima Salvi

Director, TechnoLight Pvt. Ltd.

I accept the offer as outlined above.

Dhairyashil Narute

Mr. Dhairyashil Kishorkumar Narute,



Date: 26/11/2022

Address : TechnoLight, Paras Boys Hostel, Gurudwara Colony, Moni Baba Ashram Road,
Near Akurdi Railway Station, Chinchwad, Pune 411033.
Contact : 7385291434 | **Email :** pritamkasliwal1576@gmail.com



SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

Date; 04/11/2020

SHWETA SHASHIKANT PAWAR
NEW VANJARI CHAWL
KASARWADIPUNE 411034

REF: FUGEWADI/MARUTI/REINSURANCE/EXECUTIVE TELE MARKETING/P24674

LETTER OF APPOINTMENT

Dear Mr./Ms. SHWETA SHASHIKANT PAWAR

After successfully processing your application, interview and discussions, we have pleasure of offering you appointment in our Company as EXECUTIVE TELE MARKETING-REINSURANCE w.e.f. 04/11/2020 based at FUGEWADI. You will be working with VAISHALI SHEKHAR SHIVESHWARKAR, SENIOR MANAGER. The terms and conditions of your appointment will be as follows

1. **Salary Details:**

As per offer, the compensation details are attached in Annexure 1.

p

2. **Retiral Benefits:**

You will be entitled to Provident Fund & Gratuity as per the respective enactments and Superannuation as per the Company policy.

3. **Leave:**

You will be eligible for leaves as per the Leave Policy of the Company.

4. **Tax Applicability:**

Income Tax, as applicable, will be deducted from the compensation payable to you, as per the contract of employment, through the payroll system of the Company.

5. **Code of Conduct:**

The Company has framed and implemented, under-mentioned policies, for the due observance and compliance by the employees of the Company, in the course of employment with the Company.

These policies are integral part of this letter of appointment, which have been provided to you separately. These policies are also available on the intranet HR portal of the Company. By accepting this letter, you undertake to abide by these policies. The Company reserves its right to modify or amend these policies, from time to time. Failure to abide by these policies will lead to appropriate disciplinary action.

6. **Probation & Notice Period:**

- You will be on probation for a period of 6 (six) months from the date of joining. Your probationary period may be extended, if considered necessary by the Company. During the period of probation, employee shall have the right to resign from the service of the Company, without giving any notice. Similarly Company will have the option to terminate the service of the employee, without any notice or salary in lieu thereof, without assigning the reason.

- On satisfactory completion of the Probation Period including extension, if any, either party can terminate this contract of the employment by giving 1 (one) calendar month notice in writing or payment of the basic salary in lieu of notice period or part thereof.



SAI SERVICE[®]

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117

Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

You may also be eligible for Productivity / Attendance /Performance Linked Incentives, earned Leave as per Company policy and statutory regulations.

Incentive is not only linked to production and productivity but also mainly to the profits of the Company, therefore the annual bonus payable to you as per the provisions of the Payment of Bonus Act will be adjusted from the incentives and balance amount if any would be payable as per the respective provisions. The Management reserves the right to change, alter/ modify, amend or withdraw this incentive scheme in future. This will not be considered as a service condition and no lien or right can be established by you on payment arising out of this scheme.

7. Retirement Age:

You will retire from the services of the Company on attaining age of 58 years. You will retire on the last day of the month in which you complete the age of 58 years.

8. Transfer:

As an employee of the Company, you undertake to accept a certain mobility of career, which may lead the Company to offer you transfer(s) to different Cities/positions. Your services can be transferred to any of our plants / offices / departments / establishments/business vertical situated throughout the country . In such cases, there will be no change in your compensation.

9. Confidentiality:

You covenants with the Company that you shall not disclose, divulge or otherwise make use of any information, in respect of the business of the Company or its affiliates, which you may, acquire, receive or access during, or in the course of employment with the Company ('**Confidential Information**'). Such Confidential Information may, include without limitation, information pertaining to new projects, business plans, specifications, operational data, trade secrets, memoranda, photographs, materials, quality control and test methods and data, reports, analysis, costs and pricing, financial information, marketing and sales data and plans, customer information, supplier details, product applications including computer software, programs etc. The obligation under this clause shall continue for a period of 5 (five) years from the date of the termination of the contract of employment with the Company.

10. Jurisdiction:

This Agreement is governed by, and shall be construed in accordance with, the laws of India. This contract of employment shall be subject to the exclusive jurisdiction of the courts at Pune alone.

11. Other Terms & Conditions:

- The services to be rendered by you to the Company will require your full time and attention and therefore, you will not take up any assignment, honorary or otherwise or any academic course of study or take up any employment, part time or full time, without our prior consent.
- This appointment will be valid subject to your being found medically fit, as certified by the registered medical practitioner in India.
- All communication sent to you by the Company, at your last given address (including email address) shall be deemed to have been properly served upon you.
- The compensation payable to you under this contract of employment is confidential and you should refrain yourself from sharing the same with your colleagues.

SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

We request you to kindly confirm your acceptance to this contract of employment by putting your signatures (on all pages) and return back to us one copy of the same as token of your acceptance.

We welcome you to the Sai Service family and wish you a successful career.

Yours sincerely,
For Sai Service Pvt Ltd

Atul Dandgaval
A.G.M. - HR & Administration



Sandhu
HR Representative

I, Mr./Ms./Mrs. _____ hereby accept and confirm that the terms and conditions of this contract of employment with SAI SERVICE PVT LTD are acceptable to me.

Signature of Employee: *Shawar* (Date: _____)

ORIGINAL



SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

Date; 04/11/2020

SHWETA SHASHIKANT PAWAR
NEW VANJARI CHAWL
KASARWADIPUNE 411034

REF: FUGEWADI/MARUTI/REINSURANCE/EXECUTIVE TELE MARKETING/P24674

LETTER OF APPOINTMENT

Dear Mr./Ms. SHWETA SHASHIKANT PAWAR

After successfully processing your application, interview and discussions, we have pleasure of offering you appointment in our Company as EXECUTIVE TELE MARKETING-REINSURANCE w.e.f. 04/11/2020 based at FUGEWADI. You will be working with VAISHALI SHEKHAR SHIVESHWARKAR, SENIOR MANAGER. The terms and conditions of your appointment will be as follows

1. Salary Details:

As per offer, the compensation details are attached in Annexure 1.

p

2. Retiral Benefits:

You will be entitled to Provident Fund & Gratuity as per the respective enactments and Superannuation as per the Company policy.

3. Leave:

You will be eligible for leaves as per the Leave Policy of the Company.

4. Tax Applicability:

Income Tax, as applicable, will be deducted from the compensation payable to you, as per the contract of employment, through the payroll system of the Company.

5. Code of Conduct:

The Company has framed and implemented, under-mentioned policies, for the due observance and compliance by the employees of the Company, in the course of employment with the Company.

These policies are integral part of this letter of appointment, which have been provided to you separately. These policies are also available on the intranet HR portal of the Company. By accepting this letter, you undertake to abide by these policies. The Company reserves its right to modify or amend these policies, from time to time. Failure to abide by these policies will lead to appropriate disciplinary action.

6. Probation & Notice Period:

- You will be on probation for a period of **6 (six) months** from the date of joining. Your probationary period may be extended, if considered necessary by the Company. During the period of probation, employee shall have the right to resign from the service of the Company, without giving any notice. Similarly Company will have the option to terminate the service of the employee, without any notice or salary in lieu thereof, without assigning the reason.

- On satisfactory completion of the Probation Period including extension, if any, either party can terminate this contract of the employment by giving **1 (one) calendar month** notice in writing or payment of the basic salary in lieu of notice period or part thereof.



SAI SERVICE[®]

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117

Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

You may also be eligible for Productivity / Attendance /Performance Linked Incentives, earned Leave as per Company policy and statutory regulations.

Incentive is not only linked to production and productivity but also mainly to the profits of the Company, therefore the annual bonus payable to you as per the provisions of the Payment of Bonus Act will be adjusted from the incentives and balance amount if any would be payable as per the respective provisions. The Management reserves the right to change, alter/ modify, amend or withdraw this incentive scheme in future. This will not be considered as a service condition and no lien or right can be established by you on payment arising out of this scheme.

7. Retirement Age:

You will retire from the services of the Company on attaining age of 58 years. You will retire on the last day of the month in which you complete the age of 58 years.

8. Transfer:

As an employee of the Company, you undertake to accept a certain mobility of career, which may lead the Company to offer you transfer(s) to different Cities/positions. Your services can be transferred to any of our plants / offices / departments / establishments/business vertical situated throughout the country . In such cases, there will be no change in your compensation.

9. Confidentiality:

You covenants with the Company that you shall not disclose, divulge or otherwise make use of any information, in respect of the business of the Company or its affiliates, which you may, acquire, receive or access during, or in the course of employment with the Company ('**Confidential Information**'). Such Confidential Information may, include without limitation, information pertaining to new projects, business plans, specifications, operational data, trade secrets, memoranda, photographs, materials, quality control and test methods and data, reports, analysis, costs and pricing, financial information, marketing and sales data and plans, customer information, supplier details, product applications including computer software, programs etc. The obligation under this clause shall continue for a period of 5 (five) years from the date of the termination of the contract of employment with the Company.

10. Jurisdiction:

This Agreement is governed by, and shall be construed in accordance with, the laws of India. This contract of employment shall be subject to the exclusive jurisdiction of the courts at Pune alone.

11. Other Terms & Conditions:

- The services to be rendered by you to the Company will require your full time and attention and therefore, you will not take up any assignment, honorary or otherwise or any academic course of study or take up any employment, part time or full time, without our prior consent.
- This appointment will be valid subject to your being found medically fit, as certified by the registered medical practitioner in India.
- All communication sent to you by the Company, at your last given address (including email address) shall be deemed to have been properly served upon you.
- The compensation payable to you under this contract of employment is confidential and you should refrain yourself from sharing the same with your colleagues.

SAI SERVICE®

SAI SERVICE PRIVATE LIMITED

Corporate Office : 889/90, J. M. Road, Deccan Gymkhana, Pune - 411 004. Ph. : 020 - 41401117
Head Office : Mumbai - Pune Road, Fugewadi, Pune - 411 012. Ph. : 020-46404417

We request you to kindly confirm your acceptance to this contract of employment by putting your signatures (on all pages) and return back to us one copy of the same as token of your acceptance.

We welcome you to the Sai Service family and wish you a successful career.

Yours sincerely,
For Sai Service Pvt Ltd

Atul Dandgaval
A.G.M. - HR & Administration



Sandhu
HR Representative

I, Mr./Ms./Mrs. _____ hereby accept and confirm that the terms and conditions of this contract of employment with SAI SERVICE PVT LTD are acceptable to me.

Signature of Employee: *Sandhu* (Date: _____)

ORIGINAL



OASIS INFOBYTE

INTERNSHIP OFFER LETTER

OIB/F2/12577

Dear Chavan Suraj Tanaji

2/1/2023

We are delighted to welcome you for the internship of **Web Development and Designing** in our fellowship. This internship is observed by **Oasis Infobyte** as being a learning opportunity for you.

In essence, your internship will embrace orientation and give emphasis on learning new skills with a deeper understanding of concepts through hands-on application of the knowledge you gained as an intern. Our team is confident that you will acknowledge your obligation to perform all work allocated to you to the best of your ability within lawful and reasonable direction given to you.

We look forward to a worthwhile and fruitful association which will make you equipped for future projects. Wishing you the most enjoyable and truly meaningful internship program experience.

Thank you
Team Oasis Infobyte



contact@oasisinfobyte.in



www.oasisinfobyte.in



MSME
MICRO, SMALL & MEDIUM ENTERPRISES
सूक्ष्म, लघु एवं मध्यम उद्यम

Subject - Here's the offer letter and Agreement for the position of WordPress Developer at Spiderweb.

OFFER LETTER

Date: 10-10-2022.

To,
Pratik Suhas More,
Pune, Maharashtra.

Dear Mr. Pratik,

With reference to your application and subsequent interviews, it is our pleasure to offer you the position of WordPress Developer. You are expected to join duty on 10 Oct 2022.

Your internship will take effect from the date of joining, You are expected to join on or before the given date.

This is a full-time position. The timing of work is flexible.

The starting salary is 5,000 INR per month and is paid on a monthly basis. Direct deposit is available.

The offer are canceled in case of any failure to follow the terms of the Agreement.

We take this opportunity of welcoming you to the **Spiderweb** family for a long and fruitful association and invite you to participate in the enriching experience of building the organization towards greater heights of achievements.

Please feel free to reach out if you have any questions at +918308008433 or at web@spiderweb.co.in.

We wish you good luck with your future endeavors.

Sincerely,
Dnyaneshwar Pawar
Spiderweb.

CN082142221

Model Contract of Apprenticeship Training for Major/Minor* Apprentices

1. Name and Registered Address of Establishment : Talensetu Services Pvt. Ltd. (E02212700203)
with Telephone no. & E-mail address : 2nd Floor, Tanna Towers, Near Nal Stop Chowk,
PunePune, Maharashtra
: 020-25360023
: shailesh.joshi@talensetustaffing.com
2. (a) Name of Apprentice (Block Letters) : GANESH GAUTAM BHOSLE (A062186898)
(b) Father's/Mother's /Spouse's Name : Gautam Bhosale
3. Address of apprentice : Lonavla, Pune, Pune, Maharashtra
4. Gender : Male
5. Date of Birth : 07-09-2000
6. (a) Whether belongs to SC/ST/OBC/PwD/ Minority : No
(b) Name of the Category : General
7. Educational Qualification (Highest) : Diploma
8. (a) Category of Apprenticeship : Optional
(b) Name of the trade for which Apprentice is training : CNC Operator/Machining Technician L3
9. (a) Whether Basic Training is to be provided as part of Apprenticeship : No
(b) If Basic Training is exempt - reason for exemption
(i) Name of the Course : Diploma
(ii) Duration of Training/Course : N/A
(iii) Name of the Institute : Maharashtra State Board of Technical Education
(iv) Name of the Sector Skill Council (if applicable) : N/A
10. Apprenticeship Training duration (Total) : 2016 Hours
(a) Duration of Basic Training : N/A
Period of Basic Training : N/A
(b) Duration of On-the-Job Training : 2016 Hours
Period of On-the-Job Training : From 08-08-2021 to 02-08-2023
(c) Training Type : Sequential
11. Apprenticeship Training Location : KSPG Automotive India Pvt. Ltd.
(a) Name and address of facility where Basic Training is to be provided : N/A
(b) Name and address of the facility where On-the-Job Training is to be provided : Talensetu Services Pvt. Ltd.
KSPG Automotive India Pvt. Ltd.
Pune
Maharashtra
12. (a) Date of execution of contract : 21-08-2021
(b) Age of Apprentice on the date of execution of contract : 20 years, 11 months and 14 days
13. Is the establishment opting for benefits under NAPS*? : Yes
*If yes, Annexure 2 to this contract will also be applicable.
14. Monthly stipend amount
(a) During 1st year of training : 12000
(b) During 2nd year of training : 13200



(c) During 3rd and 4th year of training : N/A

The Establishment agrees and understands that the minimum monthly stipend amount is prescribed in the Rule 11(1) of Apprenticeship Rule, 1992. The Establishment confirms that the agreed monthly stipend amount entered above must be higher than these minimum rates.

If the minimum rates are modified through legislation (either through modification of rules, or through modification of minimum wages payable) during the course of apprenticeship, this revised rates will apply as the minimum payable to Apprentice

15. (a) Name and Address of Guardian In case Apprentice is under 18 years of age (Minor) : N/A

(b) Relationship with the Apprentice : N/A

16. (a) Whether Apprentice was identified through approved Third Party Aggregator : No

(b) Name of TPA (if applicable) : N/A

17. We, the Establishment, Apprentice/Guardian solemnly declare that we have read the Apprentices Act, 1961 and the Apprenticeship Rules, 1992 as amended from time to time, regarding the contract of apprenticeship training including obligations and terms and conditions contained in Schedule V and VI of the said rules and will comply with the same.

18. I, the Apprentice, declare that all details shared by me, including educational qualifications and other personal information shared, is correct and will provide original documents for verification at any time

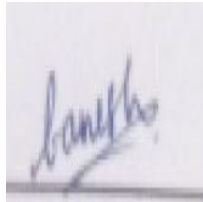
19. We, the Establishment, have examined the Apprentice's information, including personal details, and will seek relevant documentation for verification as and when required.

20. In case of default by either the apprentice or the employer, we agree to compensate the other party as per the provisions of the Apprenticeship Rules, 1992 (Main Provisions of the Rules may be seen in the Annexure 1).

21. The Establishment, Apprentice/Guardian hereby also declares to comply with the terms and conditions of National Apprenticeship Promotion Scheme (NAPS),if applicable.



Signature of the Employer with seal



Signature of Apprentice

Signature of Guardian

FOR OFFICE USE ONLY

Contract Registration No. : CN082142221
(To be given by the Office of the Apprenticeship Adviser)
(Mandatory only for Registered Trades)

Signature of Registering Authority
(Apprenticeship Advisor)
(Registration required for Designation trade only)

Annexure 1 Contract of Apprenticeship Training

Some provisions of the Apprenticeship Rules relating to the Contract of Apprenticeship Training are reproduced below for sake of convenience.

Both the Establishment and Apprentices have read and are bound by the provisions of the directions in have read the Apprentices Act, 1961 and the Apprenticeship Rules, 1992, which will apply to this Contract of Apprenticeship

1. The stipend for a particular month shall be paid by the tenth day of the following month. No deduction shall be made from the stipend for the period during which an apprentice remains on casual leave or medical leave. Stipend shall, however, not be paid for the period for which an Apprentice remains on extraordinary leave.
2. Where the Contract of Apprenticeship is terminated through failure on the part of the employer in carrying out the terms and conditions of the Contract (as notified under the Apprenticeship Rules, 1992), he shall pay to the apprentice compensation as determined by Apprenticeship Advisor.
3. In the event of premature termination of Contract of Apprenticeship for failure on the part of apprentice to carry out the terms and condition of the contract (as notified under the Apprenticeship Rules, 1992), the apprentice hereby guarantees to employer the payment of such amount as determined by the Apprenticeship Adviser as and towards the cost of training.

Annexure -2 | Covenants and conditions specific to NAPs scheme

1. For availing benefit under NAPS scheme, the course under which apprenticeship training is being provided, should be NSQF aligned.
2. Assessment and Certification shall be done jointly by the establishment and SSC/ NCVT/ other bodies as notified from time to time under NAPS guidelines.
3. The Establishment warrants and confirms that they have studied, understood and agree to comply with the guidelines that are applicable to Establishments that are part of the NAPS scheme. These guidelines are published at (<https://apprenticeshipindia.org>) and maybe updated from time to time.

TechnoLight

Light of Learning Education

Letter of Appointment

Date: November 25th 2022

Dear Mr. Yogesh Bhagwat Khatkale,

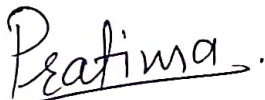
Congratulations! We are pleased to confirm you have been selected to work for TechnoLight Pvt. Ltd. (hereby referred as "Company"). We are delighted to make you the following job offer.

We are offering you a 6 months probationary position as an Tableau Developer.

We would like you to start work on November 28th 2022 and report to Mr. Ajinkya Ghorpade for documentation and orientation. If this date is not acceptable, please contact us immediately. We are confident you will be able to make a significant contribution to the success of TechnoLight and looking forward to working with you.

Your contract with us will be governed by Terms & Conditions as detailed in Annexure -A.

Sincerely,



Mrs. Pratima Salvi

Director, TechnoLight Pvt. Ltd.



I accept the offer as outlined above.



Mr. Yogesh Bhagwat Khatkale,

Date: 26/11/2022

Address : TechnoLight, Paras Boys Hostel, Gurudwara Colony, Moni Baba Ashram Road,
Near Akurdi Railway Station, Chinchwad, Pune 411033.
Contact : 7385291434 | **Email :** pritamkasliwal1576@gmail.com



Date: 27/11/2022

Dear **Kulkarni Prathmesh**,

Congratulations on making it through the selection process of AcmeGrade and we are more than glad to welcome you to the position of Campus Ambassador.

Appointment

You have been appointed as the Campus ambassador within your University after the selection process. Your duties and responsibilities will be assigned to you by your senior executives from time to time for the said duration and you shall comply with the directions given to you by the company until the Internship period is completed.

Benefits

- The intern will be provided a stipend of ₹ 150 per registration of students who have taken part in our programs through the campus ambassador.
- The Campus ambassador should make sure to get Registrations of at least 10 in total in order to take up a program by himself/herself.
- Letter of Recommendation based on their performance.
- Internship/Placement opportunities at AcmeGrade and partner Companies after the completion of Internship based on performance.



Description

Campus Ambassadors are selected throughout the country from different colleges and different streams. On commencement of internship, the Campus Ambassadors will have to represent AcmeGrade as a brand and will indulge in tasks as follows:

- Work on Lead Generation for the Company directly under the Marketing/lead gen team through usage of platforms including digital and social media platforms.
- Work on Revenue generation through finding potential clientele within the University and getting them to register in their sphere of Interest and working on the other tasks that have been provided by our Executives in the field of Digital Marketing

We are pleased to have you as part of our team and look forward to seeing you perform admirably.

With Regards,
Rupal Kumar Singh.
VP – Human Resources,
AcmeGrade Pvt. Ltd.



Company Confidential

09th February 2023

**Manthan Bharat More,Pune,
Maharashtra
India.**

Dear **Manthan**,

We are pleased to inform you that based on your application and subsequent discussions you had with us, it has been decided to provide you an opportunity to undergo on the job practical training at our **Conneqt Business Solutions Limited** Offices / Centre for a period of **12 Months** from Date of Joining. You shall report to the training on or **09th February 2023** failing which it will be deemed that the opportunity given to you is withdrawn automatically.

You shall undergo the training strictly in accordance with the scheme of training of the company. If found not satisfactory, the training period may be extended for a further period of one month or the opportunity given to you will be discontinued at the discretion of the Management.

During the period of training you will be placed in different work locations of the company and your first placement for training will be at **Pune**. You will undergo on the job training under the supervision of designated supervisors, informed to you at the start of training.

During the period of training you will be required to participate in the assessment process implemented by the company from time to time to assess your learning on the job and skill levels.

During the course of evaluation, if it is found that your learning is not up to the mark as per the expectations of the management, the opportunity given for training will be discontinued and you shall have no claim what so ever on the company.

This offer of training is subject to verification of the particulars submitted by you and in case any particulars submitted by you are found to be false or incorrect, your training will be terminated without notice and you are required to pay equivalent to the One month Stipend Amount in lieu of notice.

The company works in shifts and hence the on the job training will take place in all the shifts. In view of the same you are required to attend to your training in shifts as advised by the officials of the company from time to time.

If you undergo training regularly on all the working days of the company you would be eligible for the Leaves as per the company policy.

You shall follow the same working days, working hours and holidays of the company. You shall be regular to your training. If you fail to attend the training continuously for a period of 8 working days, it will be treated that you have discontinued the training and hence the company reserves its right to claim compensation from you.

You may discontinue the training by giving thirty days' notice in writing to the company and similarly, the company may discontinue your training by giving thirty days' notice. Any deviation w.r.t the notice period is solely at the discretion of the company.

At any time, if your conduct, behavior, learning on the job etc., are not in conformity with the rules, regulations and expectations of the company, your training will be discontinued without any notice and payment in lieu thereof.

You shall be entitled to a monthly stipend as per the below mentioned grid.

Component	Amount (Rs.) Per Month
A. BASIC STIPEND	16190.00
B. PERFORMANCE INCENTIVE: This will be payable on a monthly basis. The payout shall vary from 0% to 150% based on your PMI Rating. There would be no payout during the training period. The details of the policy will be communicated to you separately.	
PERFORMANCE PAY (5% of the Basic Stipend)	810.00
C. GROSS STIPND (A + B)	17000.00

You will be covered under insurance as per the company policy which can change time to time as per the management discretion.

During the period of training you will be paid Stipend of **Rs. 17000.00** per month. Tax Deductions will be as applicable.

You are eligible for Performance Incentive: This will be payable on a monthly basis. The payout shall vary from 0% to 200% based on your PMI Rating. There would be no payout during the training period. The details of the policy will be communicated to you separately.

On successful completion of training, at the discretion of the Management, you may be offered an **Apprentice - Customer Support** position as a **Probationer**. You are required to work for a minimum period of one year with the company. If you leave the services without completing the mandatory period or if you fail to take up the employment as probationer, you are liable to pay the cost of training incurred by the company together with the stipend paid to you.

In all matters not mentioned herein above, you shall be governed by the rules, regulations or practices of the company pertaining to trainees from time to time.

Kindly note that you will not be entitled to any other benefits or perquisites.

This letter of training is sent to you in duplicate and we request you to kindly sign the duplicate copy of this letter as a token of acceptance of the terms and return it to us at the earliest.

With Best Regards.

For Conneqt Business Solutions Limited.



Tony Jacob Joseph
Associate Vice President – Human Resources.

I hereby read and fully understood the terms of my training letter. I hereby accept the terms of my training.

Signature:

Name: **Manthan Bharat More**

Date: **09th February 2023**

Ref: OFFRD_0031
Date: 09 OCT 2022

Sarthak Suraj Sawant
DP road hadapsar near tupe
washing center ,
PUNE, MAHARASHTRA,
PIN: 411028

Offer of Employment

Dear Sarthak Suraj Sawant

Further to our discussions, we are pleased to appoint you as **SALES & OPERATIONS EXECUTIVE** with DTDC COURIER AND CARGO PVT LTD, as per the terms and conditions stated below:

1. Your offer letter is valid till 2022-12-16 and you are required to confirm acceptance of the offer and join on 2022-10-01. If you do not confirm your acceptance, this offer is treated as withdrawn. To confirm your acceptance of this offer, you are required to respond via email to dattawadi_new.pnq@fr.dtdc.com.

2. Reporting and Responsibilities:

You will report to the undersigned and complete the joining formalities. Your working location will be at **Pune**. We will communicate you about your reporting manager on joining the organization and completing the joining formalities.

Note: On your joining date, please bring Soft copies of (i) the original offer letter duly signed and dated by you; (ii) Passport size photograph (Soft copy), (iii) the originals and 1 set of soft copies of the following documents:

- Education degree certificate
- Relieving letter or resignation acceptance letter from your most recent employer
- Proof of identity. Bring the following documents: AADHAR card/Passport and PAN card (mandatory)

Please note that all the above documents are mandatory, and you will not be allowed to join without them.

3. Compensation

During your probation period, you will be eligible for a compensation of **INR 150000** per annum as CTC (Cost to Company) as mentioned in the annexure III. Your compensation and other benefits, if any, shall be subject to the deductions of all Governmental and local taxes, statutory contribution, etc. as required to be made under the laws of India and shall be paid in accordance with the practices of the Company.

4. Working hours

- a. Your working hours are from **9:30 am to 6:30 pm**, Monday to Friday
- b. The Company reserves the right to require you to work outside your normal working hours if necessary, in furtherance of your duties.
- c. You will be eligible for leave and other benefits as per the rules of the company.

5. Responsibilities

You must effectively, diligently and to the best of your ability perform all responsibilities and duties and ensure successful completion of the assignments given to you time to time by your reporting manager.

6. Non - disclosure obligations and intellectual property

At all times during and after your employment, you will hold in strictest confidence and not use for your own purposes or the purposes of others or disclose anything on the intellectual property belonging to the Company as defined in the Annexure 1 ("**IntellectualProperty**"), to any person, firm, corporation or third party, without prior authorization in writing by the Company.

You agree that the results and proceeds of your services hereunder, including, without limitation, any works of authorship resulting from your services during your employment and any works in progress, shall be works-made-for-hire and the Company shall be deemed the sole and exclusive owner throughout the universe in perpetuity of any and all rights of whatsoever nature therein, whether or not now or hereafter known, existing, contemplated, recognized or developed, with the right to use the same in perpetuity in any manner the Company determines in its sole discretion without any further payment to you whatsoever.

If, for any reason, any of such results and proceeds shall not legally be a work-made-for-hire and/or there are any rights which do not accrue to the Company under the foregoing provisions, then you hereby irrevocably assign and agree to assign any and all of your right, title and interest thereto in all Intellectual Property, including, without limitation, any and all copyrights, patents, patent applications, trade secrets, trademarks and/or other rights of whatsoever nature therein, whether or not now or hereafter known, existing, contemplated, recognized or developed to the Company, and the Company shall have the right to use the same in perpetuity throughout the universe in any manner the Company may deem useful or desirable to establish or document Company's sole and exclusive ownership of any and all rights in any such results and proceeds, including, without limitation, the execution of appropriate copyright and/or patent applications or assignments. To the extent that you have any rights in the results and proceeds of your services that cannot be assigned in the manner described above, you unconditionally and irrevocably waive the enforcement of such rights. This paragraph is subject to, and shall not be deemed to limit, restrict, or constitute any waiver by the Company of any rights of ownership to which the Company may be entitled by operation of law by virtue of the Company or any of its affiliates being your employer.

You hereby unconditionally and irrevocably waive all rights that you may have now or in future with respect to any Intellectual Property / work done by you during your employment including any rights that you may have to prevent the alteration/ translation/ destruction of any such Intellectual Property / work. You agree that this waiver may be invoked by the Company and by any of its authorized agents / assignees, in respect of any of Intellectual Property / work done by you during the employment period.

For the avoidance of doubt, all Intellectual Property/ work done by you during your employment shall be for the sole benefit of the Company and its customers and shall be the exclusive property of the Company.

The Company will have sole discretion to deal with the same, and in respect of all the work done by you during the employment together with all rights thereto, including patent and patent application rights and copyrights, shall vest in the Company. You agree that you shall do all further things that may be reasonably necessary or desirable in order to give full effect to the rights and title of the Company in respect of the foregoing.

7. Confidentiality

In consideration of the opportunities, training and access to new techniques and know-how that will be made available to you, you will be required to comply with the confidentiality policy of the Company. Therefore, please ensure that you maintain as secret the confidential information as defined in Annexure II ("Confidential Information") and shall not use or divulge or disclose any such Confidential Information except as may be required under obligation of law or as may be required by the Company in the course and scope of your employment. This covenant shall endure during the employment and shall survive the cessation of your Contract with the Company, irrespective of the circumstances of, or the reasons for, the cessation. In the event of any doubt regarding what constitutes Confidential Information, you shall consult your superiors. You agree to execute and enter into a confidentiality and assignment agreement with the Company upon the Company's request.

8. Company property

Any and all memoranda, notes, records, books, other documents, art works, art assets, circular, files, items of equipment, laptops, parts of PC of the Company, whether tangible or intangible, including all information stored in electronic form, made or composed by you or which might be supplied/ made available to you in connection with your work during the employment, or in any way relating to the business or affairs of the Company, its subsidiaries, divisions, affiliates, or clients shall at all times remain the property of the Company and shall be returned to the Company upon your ceasing to be in the Company's employment or at any other time at the request of the Company. Further, you undertake not to use any of the memoranda, notes, records, or other documents made or composed by you or copies thereof, upon the termination of your Contract.

In the event of the termination of your employment for any reason, and subject to any other provisions hereof, the Company reserves the right, to the extent required by law, and in addition to any other remedy the Company may have, to deduct from any monies otherwise payable to you the following: the full amount of any specifically determined debt you owe to the Company or any of its affiliates at the time of or subsequent to the termination of your employment with the Company and (ii) The value of Company's property which you retain in your possession after the termination of your employment with the Company following Company's written request for such item(s) return and your failure to return such items within ten (10) days of receiving such notice. In the event that the law of any state or other jurisdiction requires the consent of an employee for such deductions, this Letter shall serve as such consent.

9. Notice of Change

Any change in your personal information including residential address, marital status, number of children and education qualification should be notified to the Company in writing within 7 days. Any notice required to be given to you shall be deemed to have been duly and properly given if delivered to you personally or sent by post at your address as recorded in the Company's records. You agree to keep the Company informed in writing of any change in your address.

10. Termination

You are entitled to receive from the Company and you are required to give the Company the following period of notice, in writing, to terminate your employment without cause, such notice, in each case, to expire as stated below:

- a. During the probation period, either party may terminate this contract by giving **60 days'** notice in writing or

payment in lieu of salary (net of provident fund contribution). However, the Company reserves the right not to accept payment in lieu of notice and at its sole discretion and enforce the notice period.

- b. Your employment may be terminated forthwith by the Company without prior notice if any declaration/statement or information forthwith given by you in your application or in connection with your contract at any time found to be false or untrue or any material particulars are suppressed.
- c. Further the Company shall have the right to terminate your services without any notice or salary in lieu thereof for misconduct, negligence of duty, disloyalty, dishonesty, indiscipline, disobedience, irregular attendance, or long period of absence from duty due to ill-health, infirmity or accident or inefficiency.
- d. Without limiting the general effect of clause 10 (c), if you absent yourself without leave or remain absent beyond the period of leave originally granted or subsequently extended, you shall be considered as having voluntarily terminated your employment without giving any notice.
- e. After your confirmation, the notice period for both sides shall be 60 days or pay in lieu of the same. And on any such failure from employee's side, company will be forced to take necessary legal action against you in a court of law and you alone will be held responsible for all the costs, compensation, loss or legal consequences if any. Further, in such circumstances, issuance of relieving letter, conduct certificate, experience certificate etc will be solely at the discretion of the company.
- f. Upon separation from the company, you shall hand over all company's property under your custody to your reporting manager.

11. Exclusivity / Prior Commitment

Unless prior written agreement is given to you by the Company, you agree to work exclusively for the Company, within the context of the responsibilities defined above, and not to accept or perform any other paid/ unpaid employment or consulting in addition to this, even temporary. You agree, represent and warrant to the Company that (i) you are not subject to/party to any covenants, agreements or restrictions, including, without limitation, any covenants, agreements or restrictions arising out of any prior contracts or independent contractor relationships, which would be breached or violated by your execution of this Contract or performance of your duties hereunder; (ii) there is no order of any court or other authority disqualifying you for appointment under this contract; and (iii) you are not financially interested in any other person, firm or corporation engaged in the production, distribution or exhibition of motion pictures or television programs or the animation business (including, without limitation, motion pictures, television programming produced for, distributed to or exhibited on free, cable, pay, satellite and/or subscription television, music and/or interactive), anywhere in the world.

12. Non-Compete / Non-Solicit

Non-Competition. You covenant and agree that, during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, anywhere in the Territory, on behalf of any Competitive Business perform the same or substantially the same Job Duties, which is directly in competition with the company.

Non-Solicitation of Customers, Customer Prospects, and Vendors. You also covenant and agree that during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, solicit or attempt to solicit any business from any of the Company's Customers, Customer Prospects, or Vendors with whom you had Material Contact during the last two years of your employment with the Company.

Non-Solicitation of Employees. You also covenant and agree that during the term of your employment with the Company and for twelve months after the termination thereof, regardless of the reason for the employment termination, you will not, directly or indirectly, on your own behalf or on behalf of or in conjunction with any person or legal entity, recruit, solicit, or induce, or attempt to recruit, solicit, or induce, any non-clerical employee of the Company with whom you had personal contact or supervised while performing your Job Duties, to terminate their employment relationship with the Company

13. Notices

All notices required to be given hereunder shall be given in writing, by personal delivery or by mail and confirmed by fax at the respective addresses of the parties hereto set forth above, or at such address as may be designated in writing by either party, and in the case of the Company, to: **DTDC COURIER AND CARGO PVT LTD, Dattawadi Mahsoba Cowk Near Shani Mandir**

14. Jurisdiction

The jurisdiction concerning this contract will be with the courts in Chennai which you undertake to not contest. The contract shall be governed by and interpreted in accordance with the laws of India.

With best wishes,

For **DTDC COURIER AND CARGO PVT LTD**

Suraj
HR EXECUTIVE

Candidate Undertaking:

I have carefully read and understood the terms and conditions mentioned above and in the Annexure I and II attached.

I acknowledge that while I am working for DTDC COURIER AND CARGO PVT LTD, I will take proper care of all company equipment that I am entrusted with. I further understand that upon termination, I will return all company property and that the property will be returned in proper working order. I understand I may be held financially responsible for lost or damaged property. This agreement includes, but is not limited to, laptops, cell phones and other equipment. I understand that failure to return equipment will be considered theft and may lead to criminal prosecution by Company.

I accept all the terms and conditions mentioned therein. I shall commence my probation with effect from _____

Name:

Date:

Signature:

Annexure I: Intellectual property

The term 'Intellectual' or 'Company owned property' as it is used in this schedule, shall include, but not be limited to the following:

1. Business or financial records, strategies, patents, patent applications, trademarks, trade secrets, forecasts, budgets projections, Licenses, prices of products and services, Clients list, Goodwill, Personnel information's, and other information regarding formulas, patterns, complications, programs.
2. All work ** created and /or developed by you solely or a team during your work hours on our premises and /or using Company labour resources, equipment, software and /or facilities shall be deemed to be Company's intellectual property and that the said work is deemed to be owned by the Company. (The work** includes but not limited to the following items and all other rights related to your work; patents; patent applications; trademarks; trade secrets; copy rights; transparencies; materials; inventions; improvements; reports; techniques; discovery; methods; processes; models; mock-ups; miniatures; job notes; storyboards; specials effects; animations; modelling, designs; technology; know-how; software programs; concepts for programs; object descriptions; art assets; art work; paintings; drawing; sketching; model work; ideas or information made and practiced by the Company;)
3. All materials*** provided to or created by you solely or as a part of team during your work hours on our premises is deemed to be owned by the Company; (The Materials*** includes but not limited to the following:- all motion pictures; films; taps; Cassettes; cables and otherwise, software programs; all software and hardware related to any interactive devices; storage medium such as CD-ROM; CD; floppy or similar disc system, interactive cable, fiber optic; interactive telephone and any other devices or methods now know or later created or any other computer based system. Instruments required for drawing and painting. The materials also include by way of illustration only sequel and remake, art characters, any publications; literature; training material, books; documents)

Name:

Date:

Signature:

Annexure II: Confidential Information

"Confidential Information" includes but is not limited to information which is or fairly can be considered to be of a confidential nature, which is obtained whether (without limitation) in graphic, written, electronic or machine readable form on any media, by you; and whether or not the information is expressly stated to be confidential or marked as such, in writing (provided that the confidentiality of such information is reasonably apparent), and also includes all Intellectual Property (as defined in Annexure I), but is not limited to:

- i. Information of value or significance to the Company, its subsidiaries, divisions, affiliates, customers or its competitors (present or potential) such as:
 - o Customer data, in particular, key contact names, addresses, sales figures and sales conditions of the Company and its past, present or prospective clients.
 - o Business data, particularly data relating to new products, promotion campaigns, distribution strategies, license agreements and joint ventures in which the Company is involved.
 - o Software data, particularly information relating to the software and the modules thereof as well as any devices designed by the Company to prevent unauthorized copying.
 - o Research and development data, particularly information relating to the software and hardware developments of the Company.
 - o Financial data, in particular, concerning budgets, the fees and revenue calculations, sales figures, financial statements, profit expectations and inventories of the Company.
 - o Procedures for computer access and passwords to the Company's Confidential Information, due diligence reports and all other documentation normally related to the business of the Company.
 - o Lists of or information about personnel seeking employment with or who are already employed by the Company.
 - o Any and all other information or materials or documents of a commercially sensitive nature relating to the Company's operations, research, plans, strategies, objectives, development, purchasing, marketing, and selling activities.
- ii. Original information supplied by the Company;
- iii. Information not known to competitors of the Company nor intended by the Company for general dissemination, including but not limited to, policies, strategies, the identity of various product-suppliers or service-providers, billing schedules, needs of its clients, information as to the profitability of specific accounts, and information about the Company itself and its executives, officers, directors and employees;
- iv. Any business or technical information relating to the Company, including but not limited to financial information, equipment, documentation, strategies, marketing plans, prospective leads or target accounts, pricing information, information relating to existing, previous and potential customers and contracts disclosed by the Company to you;
- v. Any copies of the above-mentioned information; but does not include:
 - a. That which is in the public domain, other than by your breach of this contract or of any other confidentiality agreement.
 - b. That which was previously known as established by your written records prior to receipt from the Company and in your possession prior to the date of this contract;
 - c. That which was lawfully obtained by you from a third party; and
 - d. That which was developed independently by you without reference to the Confidential Information provided by the Company.

Name:

Date:

Signature:

**DTDC COURIER AND CARGO PVT
LTD**
Dattawadi Mahsoba Cowk Near
Shani Mandir

Compensation Structure		
Name	Sarthak Suraj Sawant	
Designation	SALES & OPERATIONS EXECUTIVE	
Grade	SALES & OPERATIONS EXECUTIVE	
Location	Pune	
Salary component	Amount in INR	Payable
Basic	5,000	
HRA	1,500	
Special allowance	4,294	
Gross Monthly Salary [a]	10,794	
Deductions		
Employee contribution to EPF	1,115	
Employee contribution to ESI	81	
Professional Tax	200	
Total Deductions (before TDS) [b]	1,396	
Net Monthly Salary (before TDS) [c]=[a]-[b]	9,398	Per month
Employer Contribution:		
EPF	1,115	
ESI	351	
Gratuity	240	Retiral
Group Insurance	0	
Total Employer Contribution (Monthly) [d]	1,706	
Total Fixed CTC (Per Month) [e]=[a]+[d]	12,500	
Total Fixed CTC (Per Annum) [f]=[e]*12	150,000	
Total CTC (Per Annum) [rounded off]	150,000	
NOTE:		
1. Gratuity is a retirement benefit credited to the employee and eligible as per gratuity policy		
2. Performance based Incentive is payable monthly after completion of probation. Performance evaluation will be carried out once in 6 months.		

For: DTDC COURIER AND CARGO PVT LTD

SURAJ
HR Executive

HARINARAYAN BROADBAND SERVICES PVT LTD

Shivnagari, Bijali Nagar Chinchwad Pune-411033

14/10/2021

Offer Letter

Dear **Ashish Chandrakant Kamble**,

Congratulations! We are pleased to confirm that you have been selected to work for our company. We are delighted to make you the following job offer:

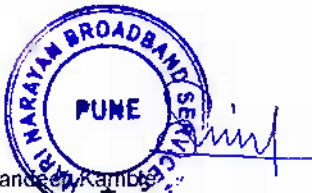
The position we are offering you is that of **"Network Engineer"** with an annual cost to company of 255000. This position reports to Mr.Sandeep Kamble Manager

We would like you to start work on 14 October 2021 , Please report to Mr.Sandeep Kamble Manager for documentation and orientation. If this date is not acceptable, please contact me immediately. On joining, you will be invited to our HR tool (XPayroll) in which you may be required to upload your documents.

Please sign the enclosed copy of this letter and return it to me by 25 october 2021 to indicate your acceptance of this offer.

We are confident you will be able to make a significant contribution to the success of Harinarayan Boadband services pvt ltd and look forward to working with you.

Sincerely,



Sandeep Kamble
Harinarayan Broadband
Services Pvt Ltd

ashish

Accepted By
Mr.Ashish Chandrakant Kamble



Date: 15 December 2022

To,

Prathmesh Santosh Kulkarni
prathmeshkulkarni309@gmail.com

Congratulations and Welcome to Campus Business Manager!

On behalf of Campus Team, PrepBytes, We are glad to offer you an internship opportunity as **Campus Business Manager**.

This position is scheduled to begin 15 December 2022 and will be a three-month internship opportunity. As a part of this programme, you will be representing PrepBytes in your Campus and within your connections. We are sure that you will play a vital role in helping us realize our vision of creating a world full of opportunities for the students.

1. Your Appointment as an CBM and benefits is attached herewith in **Annexure- A**.
2. Your appointment with us shall be governed by the specific terms and conditions referred to in **Annexure-B**.

Warm Regards,

Amritash Verma

Amritash Verma
Community Head, PrepBytes



www.prepbytes.com



support@prepbytes.com



+91-8448446601



10th Floor, M3M cosmopolitan, Golf course extension, Sector 66, Gurugram, 122101, Haryana

Annexure- A

Date of Joining: 15 December 2022

Duration of Internship: 3 Months

Location: Work from Home

Rewards: Performance Based

Roles and Responsibility:

1. SPOC of PrepBytes and create a coding environment in your college by organizing multiple events like Coding Event/ Webinar specifically within your college to make a student confident in Programming.
2. Spreading Coding Culture within the Campus by spreading multiple events/ Workshops and Hackathons.
3. Content Creation over different social media platforms like Quora, LinkedIn, Instagram etc.
4. Propagate the idea and maximize the reach of PrepBytes amongst your peers.
5. Creating awareness about Campus Business Manager and getting new students applied for the Internship for the same role.



www.prepbytes.com



support@prepbytes.com



+91-8448446601



10th Floor, M3M cosmopolitan, Golf course extension, Sector 66, Gurugram, 122101, Haryana

Rewards and Benefits:

1. Being a Campus Business Manager, You can refer to PrepBytes courses within your Campus and within your Connection with an additional 10% discount applicable on all the Courses.
2. For every course referred to by your CBM Code. you will receive a 10% Paytm cashback of the paid amount.
3. Personalized LinkedIn recommendation.
4. A great learning and leadership opportunity.
5. Letter of Recommendation after the Successful Internship Completion.
6. Paid Internship Opportunity at our office in Gurugram.

Gifts/PrepBytes Swags	Redeemable Points to be Earned
Sipper + Laptop Sticker	500
PrepBytes T- Shirt + Laptop Sticker	800
JBL Earphones	1000
PrepBytes T-Shirt + Sipper	1400
PrepBytes Backpack	2000
Boat Headphone + PrepBytes T-shirt	2500
JBL Speaker	3000
PrepBytes Goodies Kit	3400
MI Band	3800
Realme Earbuds	4500
JBL Headphones	5000
Alexa/ PrepBytes Foundation Course	6000
PrepBytes DataStructure Course	7500
PrepBytes Competitive Programming Course	13000
Amazon Voucher	13000+

Note: Referring Students to Upskill themselves via enrolling in the course will always provide you the Additional Earning which will directly reflect into your Paytm as a cashback. You can earn as much you are capable to earn via referring the students.



www.prepbytes.com



support@prepbytes.com



+91-8448446601



10th Floor, M3M cosmopolitan, Golf course extension, Sector 66, Gurugram, 122101, Haryana

Annexure - B

Terms and Condition of Internship

1. It is imperative to remain active and participate in the weekly and Monthly tasks and activities.
2. It is mandatory to earn a minimum of **800 Redeemable Points** to get yourself a Letter of Internship Completion.
3. If the Campus Team of PrepBytes **finds you Inactive for more than 30 days**. In that case your Internship Completion letter can be on hold.
4. You agree that during your internship with PrepBytes shall not in any manner either directly or indirectly not enrol in the Internship at the same position which is directly or indirectly competition with PrepBytes.
5. You must not, during or after the Internship, use or disclose any Confidential information to others related to the PrepBytes business, which you received during your Internship.



Offer Letter and Terms of Employment

Date: 07.10.2022

Dear **Rohan Santoshkumar Nayak**,

At the outset, we would like to extend our sincere thanks for exploring career opportunities with KPIT. Further to our discussions, we are delighted to extend you an offer of employment.

This offer is based on your profile, relevant work experience and performance in the selection process.

- Designation: **Trainee**
- Grade: **A Grade**
- Base Location: **PuneHinj-Phase3**
- Joining Date: **10.10.2022**

Your Total Target Compensation including all benefits will be INR 300,000.00/- (Three Lakh) per annum. Annexure A provides a detailed break-up of the compensation package.

You shall be governed by the terms and conditions of service during your employment with KPIT as per existing policies and those that may be amended from time to time.

Kindly confirm your acceptance in writing within 7 days from the date of this offer beyond which this offer is considered null and void. Your offer is subject to a positive background check and in case the background check comes out negative, company reserves the right to terminate your services with immediate effect.

You will be eligible for Gratuity, Mediclaim and Group Personal Accident Insurance benefits as per the company policy. The duly signed appointment letter will be issued to you on the first day of your joining at KPIT only upon submitting your valid testimonials and related joining formalities.

A new assignment, work place and colleagues, await you to jump start to achieve the company's vision of building a global Mobility Organization. Work life at KPIT is all about mobility, enabling our customers by accelerating implementation of next generation mobility technologies. We value fun as an integral part of our culture.

As a token of your acceptance of the above terms and conditions of the offer, please sign the duplicate copy of this letter and indicate the date on which you can begin your employment with us.

Yours Sincerely,
For: KPIT Technologies Limited



Rahul Uplap
Associate Vice President
Global Head - Education & Competency Development (ECoDe)

COMPENSATION & BENEFITS

The details of your compensation and benefits are given below:

Basic Salary

- Your Basic Salary will be **INR 16,500.00/-** per month.

House Rent Allowance

- Your HRA will be **INR 3,220.00/-** per month.

Monthly Bonus

- You will be eligible for monthly bonus of **INR 3,300.00/-**.

Employer's contribution to Provident Fund

- You will be a member of the Provident Fund as per the provisions of "The Employees Provident Fund and Miscellaneous Provisions Act, 1952", and KPIT will contribute 12% of your basic salary every month towards Provident Fund, as per the provisions of the said Act
- You are required to submit your Universal Account Number (UAN), if any, issued by your previous employer on the Declaration Form (Form 9) so as to link your UAN with KPIT PF / Pension account

Flexi Basket (FB)-

- FB offers you the flexibility to design part of your compensation within the defined framework, once in a financial year
- To design your FB you may access the link in the "myWorld", KPIT's internal portal
- Your tax will be deducted as per income tax guidelines

Components under FBP are listed below -

Children Education Allowance

- o Maximum for 2 Children - **INR 1200/-** per child per annum
- o Tax exemption - on submission of original bills for children tuition fee
- o Paid on monthly basis

Professional Development Allowance

- o Maximum upto **INR 50,000/-** per annum
- o Tax exemption - on submission of original bills for self ONLY
- o Paid on monthly basis

Meal Allowance

- o Option of **INR 13200/-** or **INR 26400/-** per annum
- o Tax - Exemption - On subscribing Sodexo Food Card or PayTM Food Wallet only
- o No bills required

Hostel Allowance

- o Max for 2 Children - **INR 3600/-** per child p.a.
- o Tax - Exemption - On submission of original bills for children's Hostel Fees ONLY
- o Paid Monthly

National Pension Scheme (NPS)

- o Min **INR 6015/-** p.a. and Max up to 10% of Basic
- o Amount contributed in PRAN account monthly (if subscribed for the same)

Leave Travel Allowance (LTA)

- o Maximum upto **INR 50,000/-** per annum
- o Tax - Exemption - On submission of original bills for Self/Spouse/dependents which can be claimed twice in a block of 4 year
- o Paid Once in a year
- o If not claimed by Dec Payroll cutoff date, the amount shall be paid in March pay Salary as taxable.

Other Allowance

- Fully Taxable, this is balance amount post FB restructuring

Total Targeted Compensation (TTC)

- TTC is the sum of all components namely - Basic Salary, HRA, Monthly Bonus, Employer PF contribution, FB, Special Allowance and VPI.

KPIT Technologies Limited

Registered & Corporate Office: Plot 17, Rajiv Gandhi Infotech Park, MIDC-SEZ, Phase III, Maan, Taluka - Mulshi, Hinjawadi, Pune - 411057, India. | CIN: U74999PN2018PLC174192

O +91 20 6770 6000
E info@kpit.com
W kpit.com

Gratuity

- You will be entitled to gratuity as per the provisions of the Gratuity Act 1972.

Employer's contribution to Insurance Premium

- Amount mentioned is an indicative average cost incurred by Company towards Group Mediclaim, Group Personal Accident and Group Term Life Insurance premium

Other benefits

- It's a sum of gratuity and employer's contribution to insurance premium

Cost to Company (CTC)

- CTC is the sum of all components namely - Basic Salary, HRA, Monthly Bonus, Employer PF contribution, FB, Special Allowance, VPI, Gratuity and Employer's Contribution to Insurance Premium.

OTHER BENEFITS

Bond

- You will also be required to sign a Bond of **22** months prior to your appointment. This covers the cost of training that we will provide to you. In the event of breaching the bond, there will be a penalty of **INR 200,000.00/-** payable to the company in lieu of training costs.

Annual Leave

- You will be eligible for Annual Leave as per the Employer's Leave Policy, the policy however can be modified time to time at Employer's discretion. You can refer to the Leave Policy on the "myWorld", KPIT's internal portal

Holidays

- You are entitled to Public Holidays applicable in India every year at the regular rate of pay. If placed at a customer site, you must follow holidays observed by customer.

Benefits Coverage

- Group Medical Insurance cover of **INR 6,00,000.00/-**
- Group Term Life Insurance cover of **INR 11,00,000.00/-**
- Group Personal Accident Insurance cover of **INR 20,00,000.00/-**

* The above Plan however can be modified on yearly basis at Employer's discretion

ANNEXURE A

Components	Monthly [Amount (in INR)]	Yearly [Amount (in INR)]
Basic Salary	16,500.00	198,000.00
House Rent Allowance	3,220.00	38,640.00
Monthly Bonus	3,300.00	39,600.00
Employer's contribution to Provident Fund	1,980.00	23,760.00
Other Allowance (Flexi Basket)	0.00	0.00
Fixed Compensation**	25,000.00	300,000.00
Total Target Compensation	0.00	300,000.00
Notional Provision for Statutory Gratuity****	0.00	9,524.00
Employer's contribution to Insurance Premium*****	0.00	5,200.00
Other Benefits	0.00	14,724.00
Cost to Company	0.00	314,724.00

- ** Fixed compensation is payable subject to adherence of all applicable policies of the organization.
- **** As per Payment of Gratuity Act.
- ***** The amount mentioned is an indicative average cost incurred by Company towards Group Medclaim, Group Personal Accident and Group Term Life Insurance premium.

Kindly note -

- The above salary break-up is per annum and is provided based on the existing company policies and may undergo change from time to time.
- As per the company policy you are required to maintain total confidentiality of your compensation details.
- Certain figures mentioned in this Letter of Offer, including financial information have been subject to rounding-off adjustments. In certain instances,
 - The sum change of such numbers may not match exactly to the total figure given; and
 - The sum of the numbers in a column or row in certain tables may not match exactly to the total figure given for that column or row.

Terms of Employment -

Working Hours

- Your working hours are governed by applicable law. You may be required to work in shifts and/or over time depending upon the business exigencies as permitted by law.

Mobility

- KPIT reserves the right to transfer / utilize your services at any of its offices, work sites, or outside India, on the terms and conditions as applicable to you at the time of transfer.

Salary Review, Increments and Promotions

- Your performance and contribution to the company will be an important consideration for salary Review, increments and promotions
- You will be considered for salary review and promotions as per the company's policies effective from time to time.

Alternative Employment

- As a full-time employee of KPIT, you are not permitted to undertake any other business, assume any public office, honorary or remunerative, without the written permission of KPIT

Confidentiality Agreement

- As part of the joining formalities, you are required to sign a confidentiality agreement, which aims to protect the intellectual property rights and business information of KPIT and its clients

Overseas Agreement / International Assignment Agreement

- If you are on international assignment, you will be covered by the KPIT International Assignment policy from the date of deputation, accordingly, you will be required to sign the applicable Overseas Deputation / International Assignment Agreement(s).
- In case of every international assignment that exceeds 30 days, you will be required to serve notice period KPIT as per the policy. This is to ensure that the knowledge and information gained by you during your assignment is shared and available to KPIT and its associates. This transfer of knowledge and information is essential for KPIT to continue to serve its clients and customers better
- If you are deputed internationally for training, you will be required to sign an agreement to serve KPIT for a minimum period of 12 months on completion of training

KPIT Code of Conduct

- You are required to sign the KPITs Code of Conduct and follow the same in your day to day conduct as an employee of KPIT

Notice Period

- During your employment with KPIT, either you or KPIT can terminate the appointment by giving 90 calendar day's written notice or 3 month's basic salary in lieu of the notice.
- The Company reserves the right to release the employee prior to the notice period taking into consideration business needs and work exigencies and the Company will not be liable to make any payment to the employee in lieu of the notice period. If you are covered under Deputation Agreement / International Assignment Agreement, either you or KPIT can terminate the appointment by giving 90 calendar days' written notice as set out in the Separation Policy of KPIT
- KPIT reserves the right, if it is in the interest of the business and current assignment, to ask you to complete your notice period or decide whether your existing earned vacation or basic salary in lieu of notice period may be adjusted against the entire or partial notice period.
- In case you decide to end your employment with the Company or the Company terminates your services for any reason before you complete one year of employment with the Company,
- The company retains the right to recover from you any expenses incurred by it about your recruitment including, but not limited to, fees paid to consultant, joining benefits paid to you (if any), etc. and
- The company retains the right to recover from you any expenses incurred by it for processing any visa/ work permit for you and/or any of your family members.
- The Company also reserves the right to recover the period costs of any specific expenditure incurred, either on processing a visa/ work permit or for any specific training given for an assignment and where you are unable, for any reason, to fulfil your part of the obligation, either to travel or to complete the assignment.

Retirement

- You will retire from the services of the Company on reaching your 60th birthday as per the proof of age submitted by you at the time of joining.

Employment in India

- In case, you are not a citizen of India, this offer is subject to your obtaining a work permit and or any other permissions and / or documentation as prescribed by the Government of India for permanent employment with KPIT. Keeping your permit / permission up to date during the course of employment with KPIT and submitting a valid copy of that to KPIT is your responsibility

Letter of Appointment

- You will be issued a letter of appointment at the time of your joining and completing joining formalities as per KPITs policy

Terms and Conditions

- The above terms and conditions of employment are specific to your employment in India and there can be changes to the said terms and conditions in case of deputation on international assignments during the course of your employment

Rules and Regulations of the Company

- Your appointment will be governed by the policies, rules, regulations, practices, processes and procedures of KPIT as applicable to you and the changes therein from time to time.

Compliance to all clauses

- You will be required to fulfill all the terms and conditions mentioned in this letter of offer. Any failure to fulfill any term and / or condition would entitle KPIT in withdrawing this offer letter at its sole discretion.

KPIT Technologies Limited

Registered & Corporate Office: Plot 17, Rajiv Gandhi Infotech Park, MIDC-SEZ, Phase III, Maan, Taluka - Mulshi, Hinjawadi, Pune - 411057, India. | CIN: U74999PN2018PLC174192

O +91 20 6770 6000
E info@kpit.com
W kpit.com

Validity:

- This offer is valid for a period of 7 days from the date of issue. Also, the company has made the offer of employment on the basis of the bonafide statements and facts provided by you. At the time of employment or during employment if the company finds the information provided to be false or misleading, it reserves the right to take appropriate disciplinary action against you which also includes termination of employment.
- In case you decide to end your employment with the Company or the Company terminates your services for any reason before you complete one year of employment with the Company,
- the company retains the right to recover from you any expenses incurred by it in connection with your recruitment including, but not limited to, fees paid to consultant, joining benefits paid to you (if any), etc. and
- the company retains the right to recover from you any expenses incurred by it for processing any visa/ work permit for you and/or any of your family members

Arbitration

- Any dispute concerning the subject matter of the present appointment letter or Confidentiality & IPR Assignment Undertaking or the breach, termination or validity thereof which shall include but not limited to issue as to the interpretation, operation, or effect of any clause contained in it or any other difference arising (a 'Dispute') shall be first attempted to be settled mutually, failing in which, the dispute shall be referred to the sole arbitrator to be appointed mutually.
- In case the Arbitrator is not appointed mutually, the dispute shall be referred to the arbitrator that shall be appointed by the High Court of Judicature of Bombay on an application in that behalf by either of the party as per the provisions of the Arbitration and Conciliation Act 1996.
- The place of arbitration shall be city of Pune, Maharashtra. The language of proceedings shall be English. The dispute shall be subject to and governed by the laws prevalent in India. However, in case of any difference on provisions of law in State Law and Central Law on a particular subject, state laws applicable in state of Maharashtra shall prevail.

Document submission

1. Standard X and XII marksheets / equivalent
2. Degree certificate and marksheets for all semesters
3. Postgraduate Degree certificate and marksheets for all semesters
4. Passport / Driving License / Ration Card
5. Experience certificate from previous employers indicating the following:
 - a. Period of employment
 - b. Technology areas you have worked on
 - c. Certificates for any training provided by your previous employers in various technologies
 - d. Relieving letter and experience letter from current and all previous employers indicating date of release
6. PAN card
7. Aadhar Card
8. Work permit or any other documentation required to take up permanent employment with KPIT
9. Photograph to be uploaded in TalentOjo as per the specification in Annexure B
10. Provident Fund Number
11. Name Change Documents (If applicable)



Certificate of Selection

Aditya Bolbhat

from **Suman Ramesh Tulsiani Technical Campus-Faculty Of Engineering** has successfully secured **Social Entrepreneurship** internship at **Hamari Pahchan NGO** through Internshala.

Sarvesh Agrawal
Founder & CEO, Internshala

Date of certification: December 12, 2022

Certificate Number: 1A9D64C4-842A-1B57-F397-768C017179A3
For certificate authentication please visit https://internshala.com/verify_certificate

To:

26 November 2022

Pratik Suhas

Khutwad Nagar, Nashik, 422008 MH

We are pleased to offer you an internship at our company in the Digital Transformation department at our Bangalore office. Your internship shall commence on 1st December 2022 and shall end on 30th May 2023 ("Term"). The terms and conditions of your internship with the Company are set forth below:

1. Subject to your acceptance of the terms and conditions contained herein, your project and responsibilities during the Term will be determined by the supervisor assigned to you for the duration of the internship.
2. You are eligible for a stipend of Rs. 8,000 during the Term which shall be paid on completion of the tasks assigned to you during your internship to the satisfaction of the Company.
3. Your timings will be from 10:00AM to 06:00 PM, Monday to Friday. Please be sure to bring Required Documents with you on your first day to complete your profile.
4. You will sign a confidentiality agreement with the company before you commence your internship.
5. The internship cannot be construed as an employment or an offer of employment with BlankBot Technologies Pvt Ltd.

Please confirm your acceptance of the terms of this offer by 30 Nov 2022 - failing which, we have the right to cancel the internship. We look forward to having you on our team! If you have any questions, please feel free to reach out to us.

Sincerely



Balwinder Kumar

Internship Coordinator, Human Resources

Accepted by,

Pratik Suhas

**MECHANICAL
DEPARTMENT**

SRTCT'S
Suman Ramesh Tulsiani technical campus
KHAMSHET

An ISO 9001:2015 Certified Institute
DEPARTMENT OF MECHANICAL ENGG

Group No	GR. No.	Name of the Student	Email ID Official	Email ID Personal	Contact No	Project Title	Project Guide	Sponse/Industry	Company Name
	191008	Avinash Taur	avinash.191008@srffc.ac.in	Avinash.taur15@gmail.com	8855970044	Design and Analysis of different fin thickness of engine using CFD	Dr. Jitendra Satpute	NA	NA
	191009	Ankita Taur	ankita.191009@srffc.ac.in	ankita9taur@gmail.com	8551053592				
	191006	Prashant Deore	Prashant.191006@srffc.ac.in	pdeore029@gmail.com	8805207128				
	191010	Dhanashri Shinde	dhanashri.191010@srffc.ac.in	dhanashrishinde854@gmail.com	7378994636				
	202059	aniket vanjari		vanjarianiket031@gmail.com	8446263122	REDUCTION IN CARBON FOOTPRINT BY SAVING POWER AND FUEL	Dr. Jitendra Satpute	Industry	PRASOL CHEMICAL LTD.
	202130	mahesh sangolikar		sangolikarm@gmail.com	9763629211				
	202133	jayesh patil	jayesh.202133@srffc.ac.in	jayeshpatil1994.jp@gmail.com	8976867693				
	202079	Jayesh kamble	jayeshkamble9987@gmail.com	jayeshkamble9987@gmail.com	9579208922	Design and development of floating bag..	Prof.M.A.Mane		
	202161	Abhishek Pawar	abhishek.202161@srffc.ac.in	abhishekpawar86@gmail.com	9049006308				
	202127	Jayraj Kharote	jayraj_kharote@yahoo.com	Jayraj_kharote@yahoo.com	9881143050				
	202078	Mayur Shinde	mayurshinde1911@gmail.com	mayurshinde1911@gmail.com	9370003706				
	202086	shivajte patil	shivajtepatil706624@gmail.com	shivajtepatil706624@gmail.com	7066243644	Design, Development & Manufacturing of Emergency Evacuation System	Dr. Jitendra Satpute	NA	NA
	202076	Sanket Kulkarni	sanket.202076@srffc.ac.in	sanketkulkarni17@gmail.com	899598606				
	202102	Sameer Shah	sameer.202102@srffc.ac.in	sameershah90701@gmail.com	7058694996				
	181018	Rajsinh Chittodiya	rajsingh.181018@srffc.ac.in	rajsinghchittodiya@gmail.com	7020579762				
	202070	vijaydutta bharat mulay	Vijay.202070@srffc.ac.in	vijaymulay92@gmail.com	8459039781	DESIGN, ANALYSIS AND FABRICATION OF LOAD CARRIER BOGIE FOR SHOP FLOOR	Dr. Jitendra Satpute	Industry	Trimurti Enterprises
	121117	Venkatesh suryawanshi	venkatesh.121117@srffc.ac.in	venkatesh.suryawanshi@gmail.com	8182831881				
	192166	Shubham patil	shubham.192166@srffc.ac.in	sbp6968@gmail.com	9028469070				
	202104	Prajakta Lad	prajakta.202104@srffc.ac.in	ladprajakta2899@gmail.com	9145401756				
	171012	MukeshSingh kumpavat	Mukesh.171012@srffc.ac.in	Mukeshsinghkumpavat@gmail.com	7774907258	Numerical investigation of thermal absorber design in photovoltaic thermal system	Dr. Jitendra Satpute	NA	NA
	202159	Ganesh Thakar	ganeshthakar205@gmail.com	ganeshthakar205@gmail.com	9604055239				
	202075	nilesh langhi	nilesh.202075@srffc.ac.in	nileshlanghi9@gmail.com	7507926902				
	202111	pravin bale	pravin.202111@srffc.ac.in	mr.xpravin2k17@gmail.com	9764007164	Rework Reduction in Upper Cross Member	Prof.M.A.Mane	industry	Gestamp Automotive india pvt Ltd.
	202166	mantoo kumar	kumarmantoo633@gmail.com	kumarmantoo633@gmail.com	9112161870				
	202164	omkar dalvi	omkardalvi9856@gmail.com	omkardalvi9856@gmail.com	9762810560				
	202119	jinishkumar	jinishkumar272@gmail.com	jinishkumar272@gmail.com	9730223392				
	202090	Rahul Gonate	gonaterahul@gmail.com	gonaterahul@gmail.com	8380858256	Friction and Wear Behaviour Analysis of Different Bearing Materials	Prof. N. V. Dhumal	INDUSTRY	Shree Om Sai Engineering
	202132	Akash B Badar	akash.202132@srffc.ac.in	akashbadar8887@gmail.com	7798913736				
	202158	Nikhil Bharatrao Ambhure	nikhil.202158@srffc.ac.in	ambhurenikhil1997@gmail.com	7798429922				
	202160	Amay Sanjay chavan	amay.202160@srffc.ac.in	chavanamay65@gmail.com	8390141432	Automatic brake in hill station	Prof.M.Mane	NA	NA
	202115	Omkar Ganeshrav Shinde	omkar.202115@srffc.ac.in	shindeomkar1803@gmail.com	8600566216				
	202107	Shantanu Ramprasad Gat	shantanu.202107@srffc.ac.in	shantanu.202107@srffc.ac.in	7263871880				
	202140	siddharam ashok dhanshetti	sid1110111@gmail.com	sid1110111@gmail.com	9637497606				
	202175	pankaj sakpale	pankajsakpale706@gmail.com	pankajsakpale706@gmail.com	8379036591				
	182053	Aniket Rathod	aniketathod115@gmail.com	aniketathod115@gmail.com	7350314189				
	192139	Akash kank	kankakash8@gmail.com	kankakash8@gmail.com	9673776959				

Prof. P V Bute
HEAD, MED



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: IV Month of publication: April 2023

DOI: <https://doi.org/10.22214/ijraset.2023.50326>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Investigation of Fin Thickness on Heat Transfer Characteristics of Engine

Ankita Taur¹, Dhanashri Shinde², Avinash Taur³, Prashant Deore⁴, Jitendra Satpute⁵

^{1, 2, 3, 4}UG Students, Department of Mechanical Engineering, Suman Ramesh Tulsiani Technical Campus - Faculty of Engineering, Khamshet, Pune, Maharashtra

⁵Assistant Professor, Department of ME, Suman Ramesh Tulsiani Technical Campus - Faculty of Engineering, Khamshet, Pune, Maharashtra

Abstract: Fins are one of the important key cooling elements. The main purpose of pin fins is to increase the rate of heat transfer to the surroundings by improving convection. The transferred heat will exist in the form of conduction, convection and radiation. If the temperature coefficient of heat transfer increases, the cooling rate will also increase. The main objective of our project is to increase the rate of heat transfer in different types of fins with different shapes. 3D models were designed in Catia and tested in Ansys. Use the developed fins in various applications.

I. INTRODUCTION

Heat transfer is a subject of general interest to students of engineering courses, practicing engineers and technicians engaged in the design, construction, testing and operation of the many forms of heat exchange equipment. Heat required in science and industrial technology.

Electrical engineers apply their knowledge of heat transfer to the design of cooling systems for automobiles, generators and transformers. Chemical engineers deal with the evaporation, condensation, heating, and cooling of liquids. Understanding the laws of heat transfer flux is important for civil engineers who construct dams and structures, and for architects who design buildings. Mechanical engineers deal with heat transfer in internal combustion engines, steam generation, refrigeration, heating, and ventilation.

In order to estimate the cost, feasibility and size of the equipment needed to transfer a given amount of heat for a given duration, a detailed heat transfer analysis must be performed. The size of boilers, heaters, refrigerators and heat exchangers depends not only on the amount of heat to be transferred, but also on the rate at which it can be transferred under given conditions. Proper operation of equipment components such as turbine blades and gas turbine combustor walls depend on the ability to cool certain metal components by removing heat from surfaces in rapid succession. These various examples show that in almost all branches of engineering, one encounters heat transfer problems that cannot be solved by thermodynamic reasoning alone, but require analysis based on the science of heat transfer.

A. Selection of Material:

Aluminum was chosen as the fin material for further analysis by ANSYS. Aluminum is a very light metal with a specific weight. The use of aluminum in vehicles reduces dead weight and energy consumption while increasing load capacity. Aluminum is a good reflector of visible light and heat.

The main function of the fins is to dissipate the heat generated by the engine, essentially an engine cooling technique.

In terms of material selection, a material that can absorb engine heat at a higher rate and quickly dissipate it to the air passing through it would be preferred. Aluminum is an ideal material with this quality. It has excellent thermal conductivity, heat dissipation and heat dissipation performance.

The most common heatsink material is aluminum alloy, which has one of the highest thermal conductivity values at 229 W/mK but is mechanically more flexible copper has approximately twice the thermal conductivity of aluminum and absorbs heat faster and more efficiently.

But it is more expensive than aluminum. The thermal conductivity of copper decreases with increasing temperature, but in the case of aluminum, the thermal conductivity increases with increasing temperature. It is cheap and easy to extrude into fin extensions. Aluminum is good and efficient. Now a days, widely used material is Aluminium. Aluminium is quite light weighted than copper.

II. PROPERTIES OF FINS

- 1) High thermal conductivity
- 2) Lightweight
- 3) Castability
- 4) Corrosion-resistant

III. APPLICATIONS

- 1) Combined convection is symmetrical or asymmetrical heated passage used in various modern systems such as electronic equipments for cooling purpose.
- 2) The effect of wall heating on stability of low Reynolds Number flow in a horizontal tube is important in a variety of Engineering situations including compact heat exchangers, solar energy collector and heat exchanger designed for viscous fluid in chemical and food industries. Heat is transferred by combined convection as buoyancy influence becomes significant.
- 3) Study of unsteady mixed convection is very important in horizontal chemical vapor deposition (CVD) reactors. CVD involves the deposition of molecules from fluid phase on to a substrate, with a deposition rate being governed by the rate of diffusion from fluid in the surface and by chemical kinetics.
- 4) Steady laminar flow of “power law” fluids past heated two-dimensional bodies is strongly influenced by the rate of fluid mass transfer at the value of buoyancy force. This is important in the boundary layer controlling of airfoils, transpiration cooling of turbine blades, lubrication of ceramic machine parts and food processing.
- 5) Longitudinal fins attached at the heated bottom surface of parallel plate channel can enhance secondary flow and heat transfer with increase in “Rayleigh Number”

However, mixed convection and buoyancy driven secondary fluids also enhance the heat transfer above the forced convection level. The combination of extended surface and mixed convection yields levels of heat transfer enhancement unattainable when either mechanism acts independently.

Natural and mixed convective waves generated by isolated thermal source are of interest in many practical problems such as positioning of heating elements in furnace and fire in enclosures and cooling of electronic circuitry.

IV. LITERATURE REVIEW

- 1) *Computational Analysis of Heat Transfer through Fins with Different Types of Notches*, K. Sathishkumar, K. Vignesh, N. Ugesh, P. B. Sanjeevaprath, S.

In this paper it represents the Engine as one of the important components in an automobile which is subjected to high temperature and thermal stresses. In order to cool the engine, the fins are another component which are used to dissipate the heat from the Engine. Fins are generally used to increase the heat transfer rate from the system to the surroundings.

- 2) *Analysis of Varying Geometry Structures of Fins using Radiators* K. Chinnarasu1, M. Ranjithkumar, P. Lakshmanan, K. B. Hariharan, N. K. Vigneshwaran and S. Karan

In this literature it presents as radiators are heat exchangers used to transfer thermal energy from one medium to another medium. In the existing plain fins type radiator are commonly used, which are usually set up in a crossflow arrangement made up of aluminum and copper alloy. Powerful fan and water pump is accompanied in this to greatly improve heat dissipation rate. For higher cooling capacity of radiator, addition of fins is one of the approaches to increase the cooling rate of the radiator.

- 3) *Finite Element Thermo-Structural Methodology for Investigating Diesel Engine Pistons with Thermal Barrier Coating*, Paolo Baldissera, Cristiana Delprete, Politecnico di Torino

In this paper it presents a combustion engine application, metallic materials have been widely employed due to their properties castability and machinability with accurate dimensional tolerances, good mechanical strength even at high temperatures, wear resistance, and affordable price.

However, the high thermal conductivity of metallic materials is responsible for consistent losses of thermal energy and has a strong influence on pollutant emission. A possible approach for reducing the thermal exchange requires the use of thermal barrier coating (TBC) made by materials with low thermal conductivity and good thermo-mechanical strength.

- 4) J.-J. Shu, I. Pop, "Thermal interaction between free convection and forced convection along a vertical conducting wall, *International Journal of Heat and Mass Transfer* .

In this journal it presents the conjugate heat transfer across a vertical finite wall separating two forced and free convection flows at different temperatures. It is assumed that the heat conduction in the wall is only in the transversal direction. He also assumed that countercurrent boundary layers are formed on both sides of the wall. The governing equations of this problem and their corresponding boundary conditions are all cast into a dimensionless form by using a non-similarity transformation. These resulting equations, which are singular at the points $\eta = 0$ and 1 , are solved numerically using a very efficient singular perturbation method. The effects of the resistance parameters and of the Prandtl numbers on heat transfer characteristics are investigated.

- 5) Wei Du, Lei Luo, Songtao Wang, Xinghong Zhang 'Effect of the dimple location and rotating number on the heat transfer and flow structure in a pin finned channel',

The problem of natural convection heat transfer from fin arrays with inclination is studied experimentally and theoretically to find the effect of inclination of the base of the fin array on heat transfer rate.

- 6) Heat Transfer Analysis by CFD Simulation for Different shapes of Fins, Mohsin A. Ali and Prof. (Dr.) S.M Kherde

In this article it represents an air-cooled motorcycle engine releases heat to the atmosphere through the mode of forced convection to facilitate this, fins are provided on the outer surface of the cylinder. The heat transfer rate depends upon the velocity of the vehicle, fin geometry and the ambient temperature. Insufficient removal of heat from engine will lead to high thermal stresses and lower engine efficiency. The cooling fins allow the wind to move the heat away from the engine. Low rate of heat transfer through fins is the main problem of air-cooling system.

V. CONCLUSIONS

- 1) In this study, CFD simulations were performed on different fins to obtain an optimized model. Initially, CFD simulations were performed to obtain the best and most efficient shapes to list circular, triangular and parabolic fin targets around the engine.
- 2) It was observed from CFD simulations that the parabolic fins were the most efficient design in the current study, with greater heat dissipation and the standard design size material that was ultimately used for design purposes. manufacturing and testing.

VI. ACKNOWLEDGEMENT

Presentation inspiration and motivation have always played a key role in the success of any venture. We express our sincere thanks to our BE Project Guide Prof. Jitendra. B. Satpute and for his encouragement and support throughout our project, especially for the useful suggestions. We would like to thank Prof. P.V. Bute, Head of Mechanical Engineering Department for his unwavering support during the entire course of this final year project work.

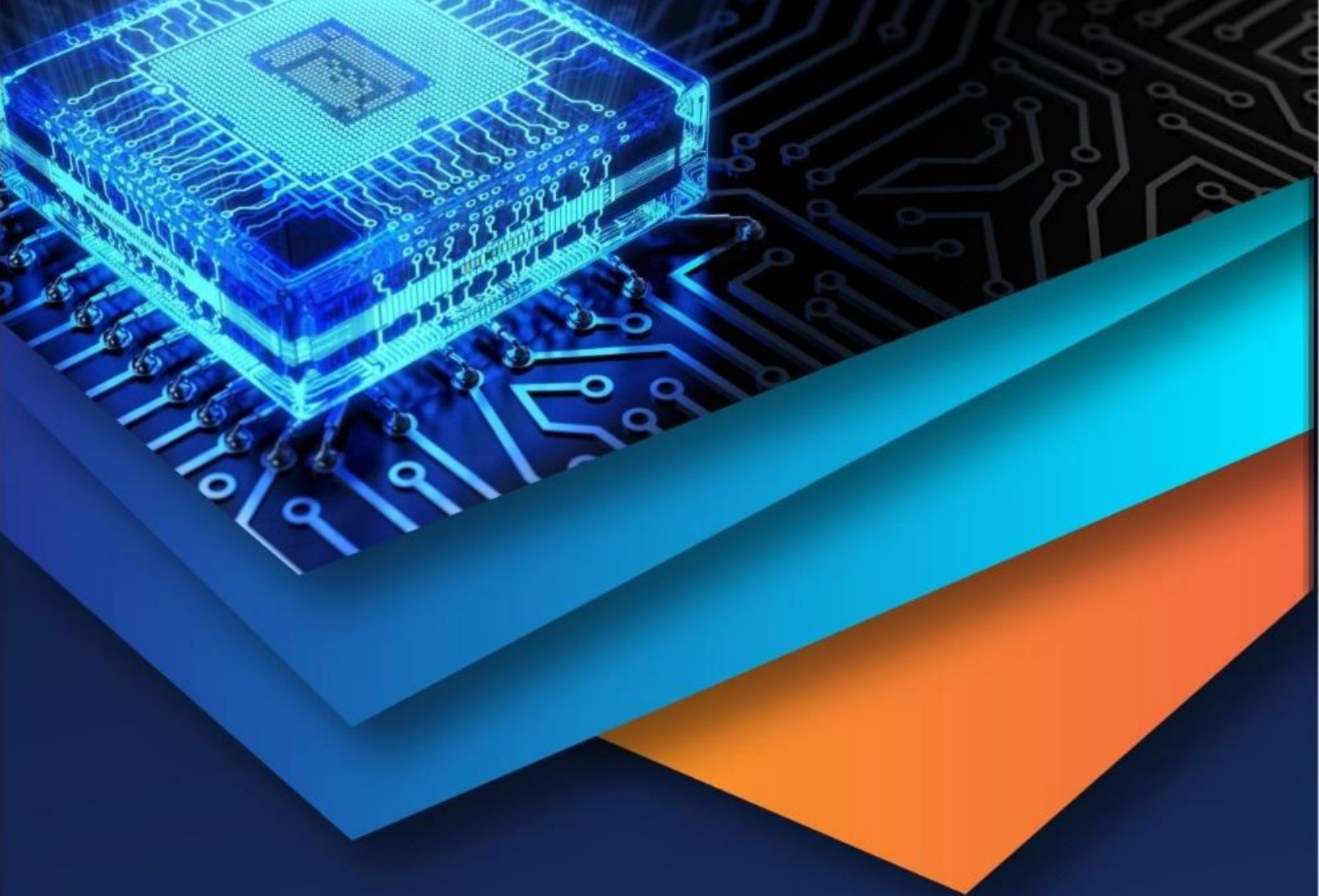
Last but not least, many thanks go to the seminar guide, Prof. Mukesh Mane who has given his full effort in guiding the goal as well as his encouragement to maintain our progress in track. I would appreciate the guidance given by other supervisor as well as the panels especially in our seminar presentation that has improved our presentation skills by their comments and tips.

REFERENCES

- [1] Computational Analysis of Heat Transfer through Fins with Different Types of Notches, K. Sathishkumar, K. Vignesh, N. Ugesh, P. B. Sanjeevaprath, S. Balamurugan, International Journal of Advanced Engineering Research and Science (IJAERS) [Vol-4, Issue-2, Feb- 2017], ISSN: 2349-6495(P) | 2456-1908(O)
- [2] Analysis of Varying Geometry Structures of Fins using Radiators K. Chinnarasu1, M. Ranjithkumar, P. Lakshmanan, K. B. Hariharan, N. K. Vigneshwaran and S. Karan, Journal of Applied Fluid Mechanics, Vol. 11, Special Issue, pp. 115-119, 2018. Selected papers from International Conference on Newer Techniques and Innovations in Mechanical Engineering (ICONTIME 2K18), 2018 Available online at www.jafmonline.net, ISSN 1735-3572, EISSN 1735-3645.
- [3] Finite Element Thermo-Structural Methodology for Investigating Diesel Engine Pistons with Thermal Barrier Coating, Paolo Baldissera, Cristiana Delprete, Politecnico di Torino, Italy, SAE International by SAE MOBILUS Open Platform, Thursday, January 10, 2019
- [4] J.-J. Shu, I. Pop, "Thermal interaction between free convection and forced convection along a vertical conducting wall, *International Journal of Heat and Mass Transfer*
- [5] Wei Du, Lei Luo, Songtao Wang, Xinghong Zhang 'Effect of the dimple location and rotating number on the heat transfer and flow structure in a pin finned channel', *International Journal of Heat and Mass Transfer* 127 (2018) 111-129" Published on 13 August 2018
- [6] Heat Transfer Analysis by CFD Simulation for Different shapes of Fins, Mohsin A. Ali and Prof. (Dr.) S.M Kherde, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 3 Issue II, February 2015 ISSN: 2321-9653



- [7] Design Modification and Analysis of Two-Wheeler Engine Cooling Fin, Rashin Nath.KK, Jayee K Varghese, International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE) Vol 2, Issue 7, July 2017, ISSN 2456-1290
- [8] Analysis of I.C. Engine Fins for Effective Cooling Performance, Akash M Vyas Ruchir Parikh, IJSTE - International Journal of Science Technology & Engineering | Volume 5 | Issue 1 | July 2018 ISSN 2349-784
- [9] Heat transfer simulation of motorcycle fins under varying velocity using CFD method
- [10] K.Shahril, Nurhayati Binti Mohd Kasim, and M.Sabri, 2nd International Conference on Mechanical Engineering Research (ICMER2013) IOP Publishing IOP Conf. Series :Materials Science and Engineering 50 (2013)
- [11] Thermal Analysis of Engine Fins with Different Geometries, L.Natrayan , G.Selvaraj , N.Alagirisamy , M.S.Santhosh, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 5, May 2016
- [12] Heat Transfer Simulation by CFD from Fins of an Air-Cooled Motorcycle Engine under Varying Climatic Conditions, Pulkit Agarwal, Mayur Shrikhande and P. Srinivasan, Proceedings of the World Congress on Engineering 2011 Vol III WCE 2011, July 6 - 8, 2011, London, U.K.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)

Investigation of Fin Thickness on Heat Transfer Characteristics of Engine

Ankita Taur¹, Dhanashri shinde², Avinash Taur³, Prashant Deore⁴, Jitendra Satpute⁵

^{1,2,3,4} UG Students, Department of Mechanical Engineering, Suman Ramesh Tulsiani Technical Campus - Faculty of Engineering, Khamshet, Pune, Maharashtra

⁵ Assistant Professor, Department of ME, Suman Ramesh Tulsiani Technical Campus - Faculty of Engineering, Khamshet, Pune, Maharashtra

Abstract – Fins are one of the important key cooling elements. The main purpose of pin fins is to increase the rate of heat transfer to the surroundings by improving convection. The transferred heat will exist in the form of conduction, convection and radiation. If the temperature coefficient of heat transfer increases, the cooling rate will also increase. The main objective of our project is to increase the rate of heat transfer in different types of fins with different shapes. 3D models were designed in Catia and tested in Ansys. Use the developed fins in various applications.

Index Terms—About four key words or phrases in alphabetical order, separated by commas.

1. INTRODUCTION

Heat transfer is a subject of general interest to students of engineering courses, practicing engineers and technicians engaged in the design, construction, testing and operation of the many forms of heat exchange equipment. Heat required in science and industrial technology. Electrical engineers apply their knowledge of heat transfer to the design of cooling systems for automobiles, generators and transformers. Chemical engineers deal with the evaporation, condensation, heating, and cooling of liquids. Understanding the laws of heat transfer flux is important for civil engineers who construct dams and structures, and for architects who design buildings. Mechanical engineers deal with heat transfer in internal combustion engines, steam generation, refrigeration, heating, and ventilation.

In order to estimate the cost, feasibility and size of the equipment needed to transfer a given amount of heat for a given duration, a detailed heat transfer analysis must be performed. The size of boilers, heaters, refrigerators and heat exchangers depends not only on the amount of heat to be transferred, but also on the rate at which it can be transferred under given conditions. Proper operation of equipment components such as turbine blades and gas turbine combustor walls depend on the ability to cool certain metal components by removing heat from surfaces in rapid succession. These various examples show that in almost all branches of engineering, one encounters heat transfer problems that cannot be solved by thermodynamic reasoning alone, but require analysis based on the science of heat transfer.

• Selection of Material:

Aluminum was chosen as the fin material for further analysis by ANSYS. Aluminum is a very light metal with a specific weight. The use of aluminum in vehicles reduces dead weight

and energy consumption while increasing load capacity. Aluminum is a good reflector of visible light and heat.

The main function of the fins is to dissipate the heat generated by the engine, essentially an engine cooling technique.

In terms of material selection, a material that can absorb engine heat at a higher rate and quickly dissipate it to the air passing through it would be preferred. Aluminum is an ideal material with this quality. It has excellent thermal conductivity, heat dissipation and heat dissipation performance.

The most common heatsink material is aluminum alloy, which has one of the highest thermal conductivity values at 229 W/mK but is mechanically more flexible.

Copper has approximately twice the thermal conductivity of aluminum and absorbs heat faster and more efficiently.

But it is more expensive than aluminum. The thermal conductivity of copper decreases with increasing temperature, but in the case of aluminum, the thermal conductivity increases with increasing temperature. It is cheap and easy to extrude into fin extensions. Aluminum is good and efficient. Now a days, widely used material is Aluminium. Aluminium is quite light weighted than copper.

• Properties of aluminium are as follows:

- Good heat conductivity
- Malleability is high
- Easily casted
- Corrosion resistance
- Light weight than other metal
- Abundant availability
- Easily recyclable

2. LITERATURE REVIEW

1. Computational Analysis of Heat Transfer through Fins with Different Types of Notches, K. Sathishkumar, K. Vignesh, N. Ugesh, P. B. Sanjeevaprath, S.

In this paper it represents the Engine as one of the important components in an automobile which is subjected to high temperature and thermal stresses. In order to cool the engine, the fins are another component which are used to dissipate the heat from the Engine. Fins are generally used to increase the heat transfer rate from the system to the surroundings.

2. Analysis of Varying Geometry Structures of Fins using Radiators K. Chinnarasu¹, M. Ranjithkumar, P. Lakshmanan, K. B. Hariharan, N. K. Vigneshwaran and S. Karan

In this literature it presents as radiators are heat exchangers used to transfer thermal energy from one medium to another medium. In the existing plain fins type radiator are commonly used,

which are usually set up in a crossflow arrangement made up of aluminum and copper alloy. Powerful fan and water pump is accompanied in this to greatly improve heat dissipation rate. For higher cooling capacity of radiator, addition of fins is one of the approaches to increase the cooling rate of the radiator.

3.Finite Element Thermo-Structural Methodology for Investigating Diesel Engine Pistons with Thermal Barrier Coating, Paolo Baldissera, Cristiana Delprete, Politecnico di Torino

In this paper it presents a combustion engine application, metallic materials have been widely employed due to their properties castability and machinability with accurate dimensional tolerances, good mechanical strength even at high temperatures, wear resistance, and affordable price. However, the high thermal conductivity of metallic materials is responsible for consistent losses of thermal energy and has a strong influence on pollutant emission. A possible approach for reducing the thermal exchange requires the use of thermal barrier coating (TBC) made by materials with low thermal conductivity and good thermo-mechanical strength.

4. J.-J. Shu, I. Pop, “Thermal interaction between free convection and forced convection along a vertical conducting wall, “International Journal of Heat and Mass Transfer

In this journal it presents the conjugate heat transfer across a vertical finite wall separating two forced and free convection flows at different temperatures. It is assumed that the heat conduction in the wall is only in the transversal direction. He also assumed that countercurrent boundary layers are formed on both sides of the wall. The governing equations of this problem and their corresponding boundary conditions are all cast into a dimensionless form by using a non-similarity transformation. These resulting equations, which are singular at the points $nc. 0$ and 1 , are solved numerically using a very efficient singular perturbation method. The effects of the resistance parameters and of the Prandtl numbers on heat transfer characteristics are investigated.

5.Wei Du, Lei Luo, Songtao Wang, Xinghong Zhang ‘Effect of the dimple location and rotating number on the heat transfer and flow structure in a pin finned channel’,

The problem of natural convection heat transfer from fin arrays with inclination is studied experimentally and theoretically to find the effect of inclination of the base of the fin array on heat transfer rate.

6.Heat Transfer Analysis by CFD Simulation for Different shapes of Fins, Mohsin A. Ali and Prof. (Dr.) S.M Kherde

In this article it represents an air-cooled motorcycle engine releases heat to the atmosphere through the mode of forced convection to facilitate this, fins are provided on the outer surface of the cylinder. The heat transfer rate depends upon the velocity of the vehicle, fin geometry and the ambient temperature. Insufficient removal of heat from engine will lead to high thermal stresses and lower engine efficiency. The cooling fins allow the wind to move the heat away from the engine. Low rate of heat transfer through fins is the main problem of air-cooling system.

3.PROCEDURE FOR PAPER SUBMISSION

A. Review Stage

- Find out research papers and develop the literature on the engine overheating issue.
- Finalize the 3 designs of the engine fins to perform the analysis.
- Develop the different types of CAD model using 3D design software with different thickness.
- Perform the Computational Fluid Dynamics on the engine fins with existing thickness.
- Find out the heat transfer coefficient of the engine fins.

B. Final Stage

- Perform the CFD analysis on the other 2 model to find out difference between them.
- Check out the result using CFD post tool and compare the result and characteristics.
- Finalize the optimized model.

C. Figures

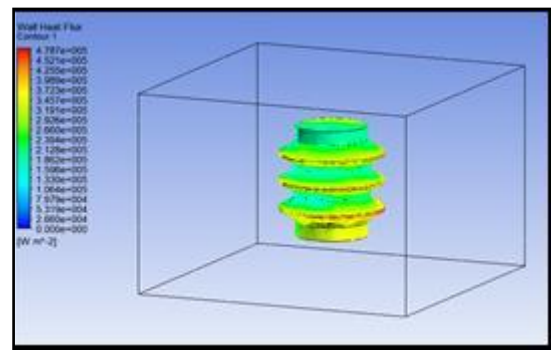


Fig. 1. Parabolic fin CFD analysis

4. MODAL SELECTION

Aluminium is selected as a fin material for further analysis by ANSYS. Aluminium is a very light metal with a specific weight. The use of Al in vehicle reduces dead weight and energy consumption while increasing load capacity. Al is a good reflector of visible light as well as heat.

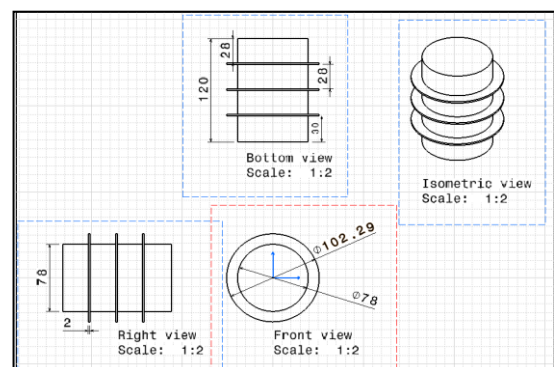


Fig. 2. Dimensions of circular fins

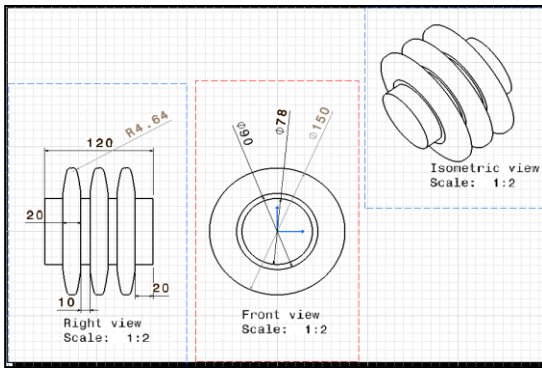


Fig. 3. Dimensions of triangular fins

Wall Heat Transfer Coefficient ↑
W/m²

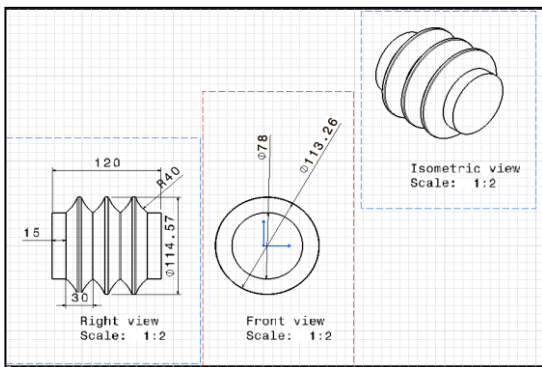
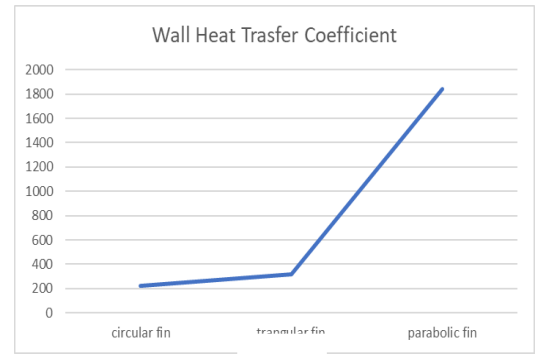
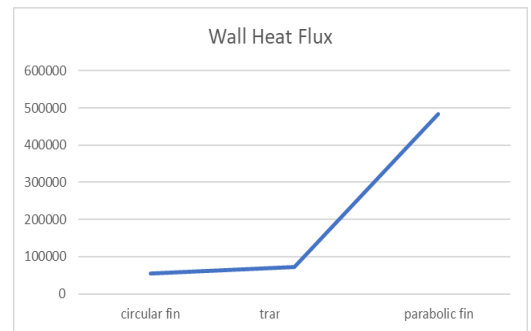


Fig. 4. Dimensions of parabolic fins

Wall Heat Flux ↑
W/m²



Mesh Metric	Value
Skewness	0.24226
Orthogonality	0.75585

- During CFD simulation following steps are performed.
- Selection of k epsilon model with wall scalable function along with material as air as fluid and base material for model are selected.
- Inlet velocity of 12 m/s is defined with initial temperature and engine surface temperature as 300 degrees Celsius for solution initialization hybrid is selected.
- Number of iterations of approx. 200 is provided and calculation is performed.

As per results we found that parabolic fin has more wall heat flux and high wall heat transfer coefficient. So, we have finalized parabolic fins.

Type of Fin	Wall Heat Flux (W/m ²)		Wall Heat Flux Coefficient (W/m ² K)	
	Min	Max	Min	Max
Circular	0	55631	28.518	221.305
Triangular	0	72216.1	38.3092	320.722
Parabolic	0	483152	57.0603	1840.58

Skewness is a measure of the asymmetry of a distribution. A distribution is asymmetrical when its left and right side are not mirror images. A distribution can have right (or positive), left (or negative), or zero skewness. A right-skewed distribution is longer on the right side of its peak, and a left-skewed distribution is longer on the left side of its peak.

Orthogonality, a property synonymous with perpendicularity when applied to vectors but applicable more generally to functions.

- In above plot it is observed that triangular fin has maximum heat (flux) transfer rate as 483152 W/m² and heat transfer coefficient as 1840.58 W/m²k.
- As per results we found that parabolic fin has more wall heat flux and high wall heat transfer coefficient. So, we have finalized parabolic fins.

We have got above values for Skewness and Orthogonality.

3. CONCLUSIONS

1. In this study, CFD simulations were performed on different fins to obtain an optimized model. Initially, CFD simulations were performed to obtain the best and most efficient shapes to list circular, triangular and parabolic fin targets around the engine.

2. It was observed from CFD simulations that the parabolic fins were the most efficient design in the current study, with greater heat dissipation and the standard design size material that was ultimately used for design purposes. manufacturing and testing.

REFERENCES

- [1] Computational Analysis of Heat Transfer through Fins with Different Types of Notches, K. Sathishkumar, K. Vignesh, N. Ugesh, P. B. Sanjeevaprath, S. Balamurugan, International Journal of Advanced Engineering Research and Science (IJAERS) [Vol-4, Issue-2, Feb- 2017], ISSN: 2349-6495(P) | 2456-1908(O)
- [2] Analysis of Varying Geometry Structures of Fins using Radiators K. Chinnarasu1, M. Ranjithkumar, P. Lakshmanan, K. B. Hariharan, N. K. Vigneshwaran and S. Karan, Journal of Applied Fluid Mechanics, Vol. 11, Special Issue, pp. 115-119, 2018. Selected papers from International Conference on Newer Techniques and Innovations in Mechanical Engineering (ICONTIME 2K18), 2018 Available online at www.jafmonline.net, ISSN 1735-3572, EISSN 1735-3645.
- [3] Finite Element Thermo-Structural Methodology for Investigating Diesel Engine Pistons with Thermal Barrier Coating, Paolo Baldissera, Cristiana Delprete, Politecnico di Torino, Italy, SAE International by SAE MOBILUS Open Platform, Thursday, January 10, 2019
- [4] J.-J. Shu, I. Pop, "Thermal interaction between free convection and forced convection along a vertical conducting wall," International Journal of Heat and Mass Transfer
- [5] Wei Du, Lei Luo, Songtao Wang, Xinghong Zhang 'Effect of the dimple location and rotating number on the heat transfer and flow structure in a pin finned channel', "International Journal of Heat and Mass Transfer 127 (2018) 111–129" Published on 13 August 2018
- [6] Heat Transfer Analysis by CFD Simulation for Different shapes of Fins, Mohsin A. Ali and Prof. (Dr.) S.M Kherde, International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 3 Issue II, February 2015 ISSN: 2321-9653
- [7] Design Modification and Analysis of Two-Wheeler Engine Cooling Fin, Rashin Nath.KK, Jayee K Varghese, International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE) Vol 2, Issue 7, July 2017, ISSN 2456-1290
- [8] Analysis of I.C. Engine Fins for Effective Cooling Performance, Akash M Vyas Ruchir Parikh, IJSTE - International Journal of Science Technology & Engineering | Volume 5 | Issue 1 | July 2018 ISSN 2349-784
- [9] Heat transfer simulation of motorcycle fins under varying velocity using CFD method
- [10] K.Shahril, Nurhayati Binti Mohd Kasim, and M.Sabri, 2nd

International Conference on Mechanical Engineering Research (ICMER2013) IOP Publishing IOP Conf. Series :Materials Science and Engineering 50 (2013)

[11] Thermal Analysis of Engine Fins with Different Geometries, L.Natrayan , G.Selvaraj , N.Alagirisamy , M.S.Santhosh, International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 5, May 2016

[12] Heat Transfer Simulation by CFD from Fins of an Air-Cooled Motorcycle Engine under Varying Climatic Conditions, Pulkit Agarwal, Mayur Shrikhande and P. Srinivasan, Proceedings of the World Congress on Engineering 2011 Vol III WCE 2011, July 6 - 8, 2011, London, U.K.



International Advanced Research Journal in
Science, Engineering and Technology

A monthly peer-reviewed / Refereed journal

Impact Factor 8.066

Indexed by Google Scholar, Mendeley, NAAS Accredited Science Journal,

UGC approved in year 2017, ISO 3297:2007 Certified

Thomson Reuters ID I-8645-2017



CERTIFICATE OF PUBLICATION

JAYESH KAMBLE

MECHANICAL ENGINEERING, SUMAN RAMESH TULSIANI TECHNICAL
CAMPUS-FACULTY OF ENGINEERING, KAMSHET, PUNE, INDIA

Published a paper entitled

**REDUCTION IN CARBON FOOTPRINT BY SAVING
POWER AND FUEL**

Volume 10, Issue 5, May 2023

DOI: [10.17148/IARJSET.2023.105104](https://doi.org/10.17148/IARJSET.2023.105104)

Certificate# 10.17148/2023/1

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

Tejass Publishereers
DOI: 10.17148/IARJSET


Editor-in-Chief
IARJSET



International Advanced Research Journal in Science, Engineering and Technology

A monthly Peer-reviewed / refereed journal

Indexed by NAAS, Google Scholar, Crossref, Mendeley



DOI 10.17148/IARJSET



REDUCTION IN CARBON FOOTPRINT BY SAVING POWER AND FUEL

ANIKET VANJARI¹, JAYESH PATIL², MAHESH SANGOLIKAR³, JAYESH KAMBLE⁴

MECHANICAL ENGINEERING, SUMAN RAMESH TULSIANI TECHNICAL CAMPUS-FACULTY OF ENGINEERING, KAMSHET, PUNE, INDIA¹⁻⁴

Abstract: Prasol is a top producer of speciality chemicals, serving more than 50 countries with products for Paints & Coatings, Agrochemicals, Personal Care, Lubricants, Surfactants, Pharmaceuticals, and other industries. By combining our efforts to provide consistently high-quality products and first-rate after-sales support, we want to bring success to our customers. Our humble beginnings are anchored in the production of chemicals based on phosphorous, from which we further diversified into chemistry based on acetone, with a fully integrated value chain across the product line.

I. INTRODUCTION

The purpose of this study is to provide an overview of the area's greenhouse gas (GHG) emissions and to identify practical steps to cut down on energy use and GHG emissions from own operational activities. Employee participation at various group levels is required for the data gathering.

The organisation can measure performance indicators and assess development over time with the use of the yearly carbon footprint accounting report. The Greenhouse Gas Protocol Initiative (GHG-protocol) was created to control greenhouse gas emissions. Carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆) are the six most significant greenhouse gases taken into account by the technique.

The carbon accounting report should provide useful data that may be used to make decisions for both internal and external operations. The operational control approach specifies what should be included in the carbon inventory and how the emissions are divided into direct and indirect emissions.

II. LITERATURE REVIEW

Product carbon footprints provide an estimate of the total amount of greenhouse gases (GHGs) emitted during the life cycle of goods and services. Carbon labels are a public declaration of the carbon footprint of a given product. Each of the greenhouse gases has different impacts on the atmosphere, termed their global warming potential (GWP). To simplify discussion of the impacts of different mixes of GHGs, the global warming potential of 1 kg of each gas is compared to that of 1 kg of carbon dioxide. Energy use continues to rise and with it the emissions of CO₂.

Energy efficiency methods have been applied across sectors, but residential, work place, leisure, and service sectors still use large amounts of energy and produce large emissions of CO₂. Successful strategies used in the processing industry for integrating energy systems, namely Total Site targeting, have been applied to locally integrated energy sectors.

Carbon capture and storage (CCS) facilities coupled to coal-fired power plants provide a climate change mitigation strategy that potentially permits the continued use of fossil fuels while reducing the carbon dioxide (CO₂) emissions. Potential design routes for the capture, transport and storage of CO₂ from United Kingdom (UK) power plants are examined. Energy and carbon analyses were performed on coal-fired power stations with and without CCS.

Cost estimates are reported in the context of recent UK industry-led attempts to determine opportunities for cost reductions across the whole CCS chain. Possible key advances for CO₂ capture technology over the next 50 years are also identified. Understanding the impact of your carbon footprint is an important step towards reducing greenhouse gas emissions, one of the leading causes of climate change. There are many ways to reduce your carbon footprint and contribute to a more sustainable future.

III. PROBLEM STATEMENT

Study of carbon emission and rise in temperature from

1. Furnace oil
2. Power
3. Emission of gases & rise in temperature (Generation of number of kcal. From 1kg offurnace oil)
4. Emission of carbon & rise in temperature while generating 1kwh of electrical power.

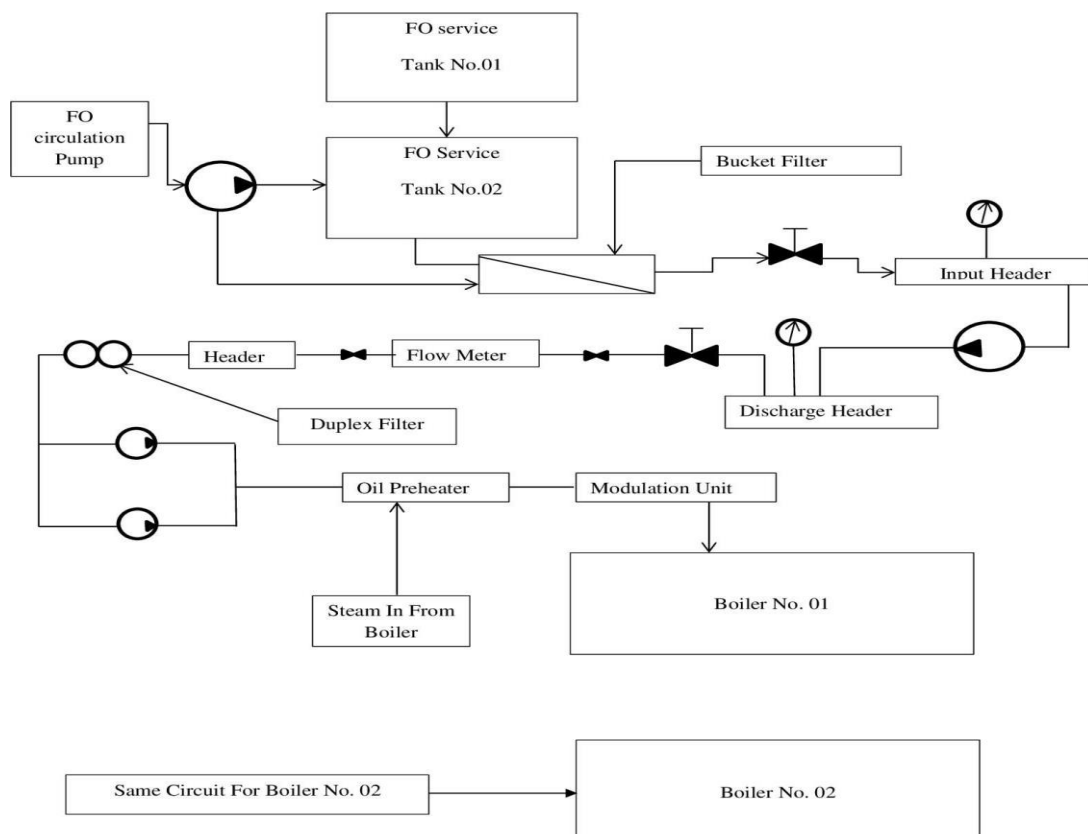
To reduce carbon emission by saving furnace oil. What is furnace oil?

Fuel oil (also known as heavy oil, marine fuel or furnace oil) is a fraction obtained from petroleum distillation, either as a distillate or a residue. In general terms, fuel oil is any liquid fuel that is burned in a furnace or boiler for the generation of heat or used in an engine for the generation of power, except oils having a flash point of approximately 42 °C (108 °F) and oils burned in cotton or wool-wick burners. Fuel oil is made of long hydrocarbon chains, particularly alkanes, cycloalkanes and aromatics. The term fuel oil is also used in a stricter sense to refer only to the heaviest commercial fuel that can be obtained from crude oil, i.e., heavier than gasoline and naphtha.

Each gas's effect on climate change depends How much is in the atmosphere ? Concentration, or abundance, is the amount of a particular gas in the air. Larger emissions of greenhouse gases lead to higher concentrations in the atmosphere. Greenhouse gas concentrations are measured in parts per million, parts per billion, and even parts per trillion. One part per million is equivalent to one drop of water diluted into about 13 gallons of liquid (roughly the fuel tank of a compact car). Some gases are more effective than others at making the planet warmer and thickening the Earth's blanket. Carbon dioxide (CO₂) is the primary greenhouse gas emitted through human activities. In 2023

For each greenhouse gas, a Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO₂). Gases with a higher GWP absorb more energy, per pound emitted, than gases with a lower GWP, and thus contribute more to warming Earths.

IV. PROCEDURE



Polymer Plant

Previously in the polymer plant, as shown in fig. to recover the condensate there was a condensate pump. But that system was gone, failed, due to the number of lines connected & flash steam pressure was high i.e. 3kg/cm² and a lot of condensate was going wasted.



Tank installation

Thus we decided by consulting an authorized person to install a big size capacity tank of 1.5 m³ at a suitable level with a centrifugal pump & electrically operated level switch for transferring condensate to a boiler feed water tank. Flash steam wastage



For flash steam recovery, a flash vessel will be connected and that flash steam will also heat the feed water. As shown in fig

V. METHODOLOGY

Condensate forms as the steam transfers its heat and condenses. It is irresponsible to waste this by-product. The clean water is without dissolved solids or gases that are ready for use again in your boiler.

Correcting Insulation

As there are certain lines for transferring steam, as it could have minute holes or small cracks which can cause leakage of steam and also condensate leaks from pumps where it does not have correct maintenance.

Regular cleaning of fire side and water side of boiler

Cleaning boiler fire sides: Excessive fireside deposits of soot, scale, and slag cause the following conditions: reduced boiler efficiency, corrosion failure of tubes and parts, reduced heat transfer rates and boiler capacity, blocking of gas passages with high draft loss and excessive fan power consumption.

**VI.CONCLUSION**

Our group project is Reduction in Carbon Footprint by Saving Power and Fuel. We saved power & fuel that we converted in CO₂ and tried to compare how much carbon used less to produce same product per M³.

But numbers of factors are affecting to produce same product with standard yield that are:

1. Failure of electricity while reaction.
2. Quality of raw material.
3. Wastage of batch.
4. Environmental issues like humidity.
5. Heavy water.
6. Human negligence, etc.

Due to these factors it can be seen in graph 5.5.1 that there are variations in production but after completion of our project the range of CO₂ emission is less and there is some consistency. To produce products in any manufacturing unit numbers of activities are carried out like, producing its raw material up to that units, transport facilities for employees, pumping of water for process, burning of fuel for steam and electricity generation, transportation of steam and water for reaction, running of machineries for operations collection and transportation of generated waste, transportation of finished goods up to cooking of food for employees.

From all these activities numbers of gases are emitting which are affecting environment all these gases collectively called Greenhouse gases and converted in the form of CO₂ by device called GH protocol.

REFERENCES

- [1] Design of a load carriage system oriented to reduce acceleration forces when carrying a backpack by camilo eduardo perez and oscar ivan campo in feb 2008
- [2] Soldier load carriage : historical , physiological , biomechanical and medical aspects by joseph j. Knapik , katy l. Reynolds and everett harman in aug 2010
- [3] Suspended load backpack final report by mathew esper , mathew vanderpool , megan van weiren , prof r. Brent gillespi and melinda sedon in april 2006
- [4] Biomechanical analysis on human gait and posture for development of floating backpack- putra, n. K. ;khagi in april2022
- [5] Suspended-load ergonomic-backpack developed that dramatically reduces the dynamic forces on the body by laurence c rome, andy l ruina.sep 2012
- [6] importance to evaluate the kinematic responses to existing load carriage operations by deepthi majumdar, madhu sudan pal, dhurjati majumdar.dec 2020
- [7] studies into the biomechanics of load carriage by joseph f seay.jun 2015dynamic modeling and simulation of the suspended-load backpack to obtain optimal suspension and reducing effect of grf by narendra kurnia putra , suprijanto , and andar bagus sriwarno 2011 oct

Design, Development & Manufacturing of Emergency Evacuation System

Sameer Shah¹, Vijay Mulay², Rajsingh Chittodiya³, Sanket Kulkarni⁴, Jitendra Satpute⁵

^{1,2,3,4} UG Students, Department of Mechanical Engineering, Suman Ramesh Tulsiani Technical Campus - Faculty of Engineering, Khamshet, Pune, Maharashtra

⁵ Assistant Professor, Department of ME, Suman Ramesh Tulsiani Technical Campus - Faculty of Engineering, Khamshet, Pune, Maharashtra

Abstract – In present work, “Design, Development & Manufacturing of Emergency Evacuation System” Is Introduced. For Escaping in High Rise Building Is Very Important in Case of Fire, Terrorist Attack Accident or Any Other Cases. This Machine Is Intended to Provide an Evacuee with An Alternative Evacuation Route That Is Only to Be Used As A Last Resort During Emergency Situations. If The Primary Roots of Exit Are Unavailable Overwhelmed or Obstructed In Any Way. There Is A Better Way Than Waiting To Be Rescued. Experiment Of This Prototype Machine Shows That This Equipment Can Release Escape the Person in Time and Bring Evacuee More Safety and Escape Efficiency. This Machine Is Developed to Provide the User and Serve Ability into The Building Evacuation System When The Stairs And Elevators Are Not Possible Or Damaged. It Gives the Individual A Chance to Make Their Escape from A Building In The Critical Minutes Before Rescue Services Arrived. The Machine Which We Have Designed Here Is Suitable for Any Age Group Or Any Weight. This Prototype Is Designed For 100 Kg Load, The Machine Is Equipped With Unique Governor Mechanism For Downfall Speed Control And Speed Can Be Adjusted Instantly. The Machine Is Reusable Again And Again, Any Quantity Of Evacuee Can Escape Through This Machine. Experiments Of Its Prototype In Results, Shows That This Equipment Can Release Evacuee On Time With Safety.

Index Terms—About four key words or phrases in alphabetical order, separated by commas.

1. INTRODUCTION

Safe escape in the fire disaster of high-rise buildings is a world-wide unsolved problem because of the complicated structure of the building and the huge amounts of resident. Fires can cause devastating harm to property and even death to many people. The risk of being injured in a fire or becoming a fire casualty is higher for people with mental, physical and sensory disabilities. The excellent news is that deaths by fires are preventable provided that the person is educated on how to escape from a fire and equipped with devices like a fire alarm and a Emergency Evacuation System. Everyone has a diminished capacity to react in a fire emergency so everyone needs to be careful. Emergency Evacuation System is a unique personal rescue device which uses an individual harness to help a user safely escape from an emergency situation in a multi-story building for many users. The Emergency Evacuation System devices for escaping in high-rise building become important for collective escape, which is easy to use and runs at high speed without extra power. Experiments of its prototype will shows that this equipment can release escape person in time, and

bring evacuee more safety and escape efficiency. Emergency Evacuation System is a unique personal rescue device which uses an individual harness to help a user safely escape from an emergency situation in a multi-story building. As such, there are certain personal considerations that must be taken into account before a Emergency Evacuation System device is issued. The high-rise fire will suffer more loss because of the huge amounts of staff and equipment's. In common situation, it is difficult for the stair to escape safely because of many disadvantages in the normal escape entrance, such as, long evacuation line, long waiting time and low efficiency. As for this, a simple, fast and effective collective escape equipment will be the necessity of solving the escape problems in high-rise building. Fires can cause devastating harm to property and even death to many people. The risk of being injured in a fire or becoming a fire casualty is higher for people with mental, physical and sensory disabilities. The excellent news is that deaths by fires are preventable provided that the person is educated on how to escape from a fire and equipped with devices like a fire alarm and a Emergency Evacuation System

2. LITERATURE REVIEW

Research Paper 1 –

Title: Design and Stress Analysis of Watt and Porter Governor, International Journal of Scientific and Research Publications(IJSRP)

Authors: Ravindra Singh Rana, Rajesh Purohit, Alok Singh

The Objective Our Investigation to Identify the Stress Concentration Areas, Areas Which Are Most Susceptible To Failure When Governor Is Rotating About Its Axis, Also The Value Of These Stresses Is Measured. The Displacement Of The Various Elements Of The Spindle From The Base Is Also Calculated And The Graphs Are Plotted. Effect Of The “Weight Of The Arms” Is The Major Area Of Concern For Our Study And All The Calculations Are Done Considering The Weight Of The Arms

In This Paper, In Our Work, They Have Done The Stress Analysis On A Particular Configuration Of Governor Assembly And Then Various Materials Are Suggested On A Theoretical Basis. The Stress Concentration Areas, Which Are Most Susceptible To Fail, So To Avoid Failure We Have To Increase The Strength In Those Areas And To Achieve This Diameter Of The Shaft Should Be Increased Near The Base.

Research Paper 2 –

Title: Study on New Escape Chute Device of High-rise Building (2012), Advanced Materials Research, Trans Tech Publications, Switzerland

Authors: Yao Yansheng

Its Storage Box Can Release The Chute Pipe To Position, Cool The Passage Automatically. The Material Of Flexible Chute Is Fire-Proof And Smog-Proof. In Addition, The Device Can Offer Several People Enter Into The Escape Pipe At The Same Time. The Experiments Of Prototype Show That Its Mechanical Structure And Control System Is Reasonable And Advanced. This Escape Equipment Can Be Popularized And Applied To The Protection Of High-Rise Building, Especially To The Rescue In Emergency.

The Major Disadvantage Of This Device Is It Cannot Be Used In The Direction Of Suppose You Have Installed It This Device In East Side And Fire Occurred In East Side So You Cannot Escape Through This But In Emergency Evacuation System We Have Improved It Can Be Installed And Taken To Any Direction Opposite To The Direction Where There Is No Fire.

Research Paper 3 –

Title: FIRE ESCAPE APPARATUS FOR USE IN HIGH-RISE BUILDINGS AND THE LIKE

Authors: Orey C. Orgeron, 706 Souvenir Gate, Lafayette

A personnel escape mechanism for emergency evacuation of a high-rise building. An escape support for personnel in the form of harnesses or a protective cage is suspended from a trolley, riding on a rail extending externally from the building. The escape support is suspended by cable from a constant speed rotationally braked cable payout mechanism mounted in the trolley. The support and trolley are impelled to the outside of the building through a frangible wall opening, and then lowered to a safe ground location by the braked cable pay-out mechanism. In a preferred embodiment of the invention, a steel cage is provided on wheels near window of safety glass. This cage is suspended from a cable wound on a cable drum, which is rotationally coupled to a hydraulic pump controlled by a restricted, closed loop flow path. The cable drum and pump are mounted in a trolley which rides on an I-beam projecting out of the building through the safety glass.

Research Paper 4 –

Title: Analysis & Investigation on Watt Governor to Improve the Speed Range of the Governor(2016)

Authors: Sumit Kumar1, Rajeev Kumar2, Harish Kumar3

In The Current Investigation Watt Governor Is Modified Such That It Increases The Controlling Force .In Modification The Fly-Ball Is Fixed On The Lower Arm At The Small Distance Below From The Point Of Intersection Of Arms. The Analysis Is Carried Out By Mounting The Flyball At The Various Positions On The Lower Arm.

Here in the paper the modification is made for increase the working range of the watt governor. And it is concluding that the working speed range can be enhanced by the modification discussed. From the example it is found that the speed range is increased from 66.89 - 77.24 rpm to 77.72 - 90.01 rpm by taking $c = 10$. Range can be enhanced by selecting the suitable value of c .

Research Paper 5 –

Title: BUILDING EVACUATION SYSTEM

Authors: Anthony Talucci, 2045 Valley Drive, Syracuse, N.Y. 1320

A system for emergency evacuation of individuals from a multi-story building. A hollow, vertically disposed tube of sufficient cross section to accommodate a person in a sitting position is affixed to the outside of the building, parallel to a side wall, and inclined tubes provide access from a doorway through the building wall at each floor to the interior of the vertical tube. Pivotaly mounted platforms are disposed within the tube at vertical intervals of a few feet and attached to weighted lever arms which normally maintain the platforms in a blocking position across the interior of the tube. The weight of an individual will overcome the bias of the counterweight and rotate the platform to an unblocking position, allowing the individual to drop to the next platform. A controlled rate of descent is provided by the time required for the individual's weight to overcome the inertia and biasing force of the counterweights attached to the lever arms at each successively lower level. A number of optional features are also disclosed, including automatic adjustment of the biasing force on the platform in accordance with the weight of each individual, and safety indicators and interlocks.

Research Paper 6 –

Title: FIRE ALARM SYSTEM WITH METHOD OF BUILDING OCCUPANT EVACUATION

Authors: Robert Right, Bradenton Beach, FL (US); Hilario Costa, Myakka, FL (US)

A fire alarm system is provided including a controller having a signaling delay, a plurality of Smoke and/or heat detectors, a plurality of audible devices which may include sirens, public announcement devices and the like, and a plurality of visible devices which may include strobes, fluorescent lighting and the like. The system provides a directional path to areas of safety for occupants in harms way.

The foregoing needs are met, to a great extent, by the present invention, wherein in one aspect an apparatus is provided that in some embodiments provides a direct and timely path of egress in an emergency situation.

In accordance with one aspect of the present invention, a fire alarm system is provided, comprising a controller; a plurality of detectors; a plurality of audible devices; and a plurality of visible devices, wherein the controller is electrically connected to the detectors and controls the audible devices and the visible devices. The fire alarm system also includes the controller having memory and a delay control.

In accordance with another aspect of the present invention, a method of controlling a fire alarm system is provided comprising assigning an address to each of a plurality of detectors, audible devices and visible devices; storing said address of each detector, audible device and visible device; correlating each stored addresses to a physical location; activating a general alarm on each audible device and each visible device; determining activated detector's address and physical location; determining correlation of activated detector in proximity to each audible device and each visible device; assigning a sequence number to each audible device and each visible device; and activating each audible device and visible device according to their sequence number.

3.METHODOLOGY

- ❖ Introduction of concept
- ❖ Designing of simple mechanism for reuse it by any person
- ❖ Select material rope, brake and all components
- ❖ Mathematical calculation of size for every components
- ❖ CAD design of each and every component
- ❖ Manufacture for the obtained parameters.
- ❖ Testing by dead weight and generate result table and graph

40	4.26	4.6
50	4.26	2.1

A. Figures

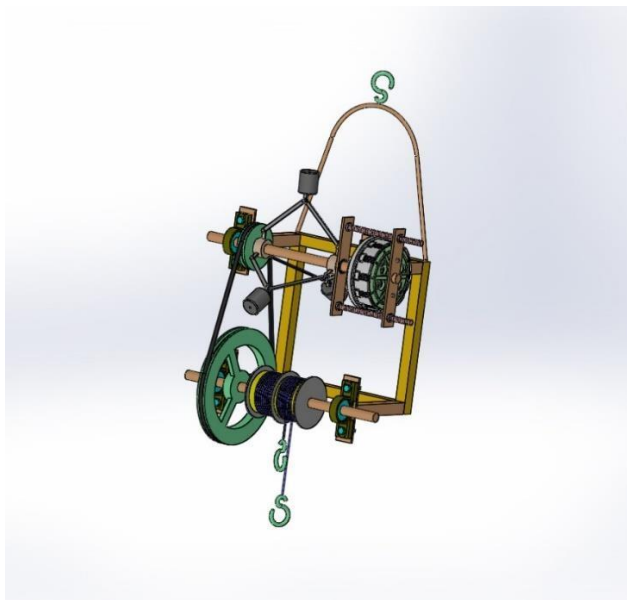


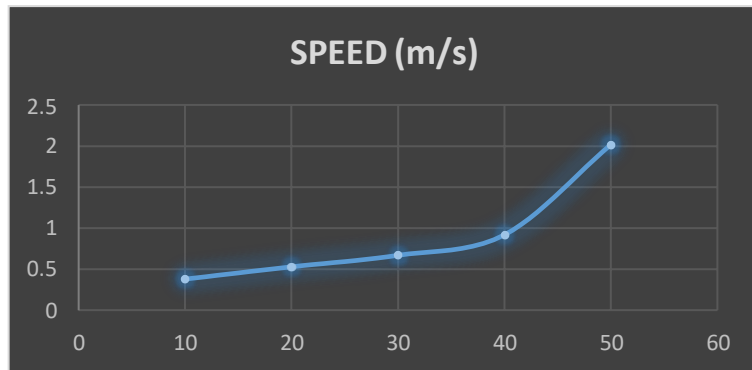
Fig. 1. Parabolic fin CFD analysis

4. MODEL SELECTION

The results and discussion may be combined into a common section or obtainable separately. They may also be broken into subsets with short, revealing captions. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. This section should be typed in character size 10pt Times New Roman.

Table 1. Comparison of displacement of all 5 cases

10	4.26	11.2	0.38
20	4.26	8	0.53
30	4.26	6.3	0.67



X- axis = weight (kg)
Y- axis = speed (m/s)

Figure 2: Weight VS Speed

5. CONCLUSIONS

1. The weight pulled on Emergency Evacuation System machine goes at a moderate speed of 1 m/s which will not harm the person hanging on it and also take him down quickly. One single machine can save multiple lives in case of emergency. The developed prototype exhibits the expected results. Further modifications and working limitations will put this work in the main league of use. This concept saves time & energy which leads to efficient working. This further line should be modeled using equations and an experimental agreement. The product will act as a pioneer in firefighting systems.

5.REFERENCES

- [1] R. S. Khurmi, and J. K. Gupta. Theory of machines. S. Chand, 2001
- [2] B. D. Shiwalkar “Design Data For Machine Element”
- [3] DR. P Kannaiah ‘Machine Design’ SciTech publication (I) pvt ltd-2003
- [4] R.S KHURMI “A text book of machine design” edition 2004
- [5] N.D BHATT AND V.M PANCHAL “Machine Drawing” Charotar publishing house 24th edition.
- [6] PANDYA AND SHAH “Machine design” Charotar publishing house 13th edition.

A Review Paper on Design and Fabrication of Bogie to Carry the Load around Shop Floor

Venkatesh Suryawanshi¹, Shubham Patil², Mukeshsingh Kumpavat³, Prajakta Lad⁴, Jitendra Satpute⁵
^{1,2,3,4}UG Students, Department of Mechanical Engineering, Suman Ramesh Tulsiani Technical Campus -
Faculty of Engineering, Khamshet, Pune, Maharashtra

⁵Assistant Professor, Department of ME, Suman Ramesh Tulsiani Technical Campus - Faculty of
Engineering, Khamshet, Pune, Maharashtra

Abstract: We are presenting paper on “Design and Fabrication of bogie to carry the load around shop floor” which is creating a bogie that will minimize the effort required to push or pull load on it. Motor is used in this system to help to push or pull load. A bogie system is the key equipment in industrial applications. To carry large weighted material without effort is important to avoid accidents, waste of material and time delay. Rigorous practical evaluation of bogies is still a challenge. Presently, there is overreliance on part-specific experiments in practice. In the present work, a risk evaluation index system of a bogie system has been established based on the inspection data and experts’ evaluation. Then, considering quantitative and qualitative aspects, the risk state of a bogie system has been evaluated using an extension theory and an entropy weight method.

I. INTRODUCTION

The load carrier is a recent technology that enables workers to work comfortably without experiencing any difficulties or danger to their health. It may be utilized in settings like factories, ports, construction sites, etc., or almost anywhere big loads need to be lifted and carried by hands, shoulders, or heads. The ergonomic design of this carrier lowers the danger of head, shoulder, hand, and other body injury while also improving the working environment for workers. The major goal is to enable the workers to carry the loads in three simple ways: over the head, at the back, and by pushing or pulling. Easy to prepare and inexpensive. Making it also doesn't take a lot of expert labour. The many tools and load carriers that are presented here are the latest and best inventions for transporting things simply and safely without causing any harm to the head, neck, shoulder, legs, or hands, among other body parts. These new load carriers are made to be lightweight, simple to use, and work without putting undue strain on the body's muscles or other organs. The primary goal of all devices, regardless of their intended function, is to minimize bodily strain and injury levels in any way that is possible. Some are employed in industry, while others are employed in domestic settings, such as gardening. Each of the devices listed below has a specific use and mode of usage, as well as a variety of advantages over earlier iterations and contemporary devices.

We are going to create a bogie, or carrier, that can move forward and backward while also allowing us to adjust the motor's speed. The bogie can carry a load of approximately 100 kg. We'll utilize an Arduino motor control circuit to perform this operation, and we'll modify the variable speed accordingly.

II. PROBLEM STATEMENT

The bogie which is being utilized for has such a lot of weight to convey so it isn't so natural to move the bogie by the human exertion, which will make the work drearier and less productive. To that end we are making a system which can work the bogie and control the speed of the bogie as well.

III. OBJECTIVES

1. Creating a bogie that will minimize the effort expected to push or pull load on it.
2. Creating a mechanism on the bogie which will make the bogie to move at a controlled speed.
3. Creating a system for transmission movement which can carry the load of 200 kg.

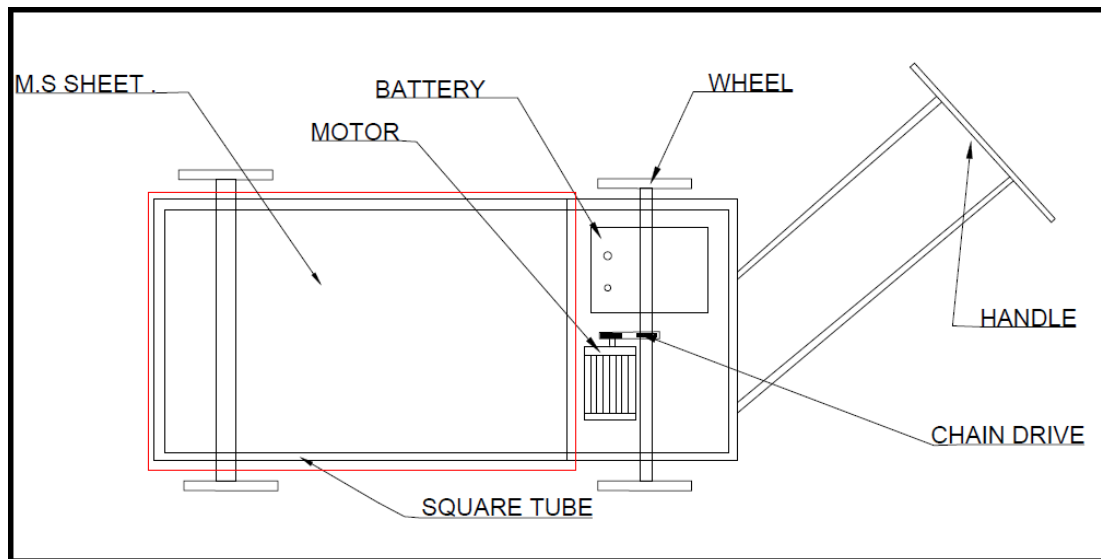
IV. SCOPE

1. Expanded functional proficiency through standardization of operations.
2. Decrease in occurrence of mistakes in work.
3. Uncovering of loopholes in production or processes.
4. Builds efficiency of the staff.
5. Positive effect on the income of an assembling business.

V. CONCEPTUAL DIAGRAM

It is creating a bogie that will minimize the effort required to push or pull load on it. A bogie system is the key equipment in industrial applications. To carry large weighted material without effort is important to avoid accidents, waste of material and time delay. Rigorous practical evaluation of bogies is still a challenge. Presently, there is overreliance on part-specific experiments in practice. In the present work, a risk evaluation index system of a bogie system has been established based on the inspection data and experts' evaluation. Then, considering quantitative and qualitative aspects, the risk state of a bogie system has been evaluated using an extension theory and an entropy weight method.

It consist of Motor, Battery, chain drives and MS square tubes for fabrication.



VI. ADVANTAGES

1. Load carrier is a new creation to assist the workers with working easily with no issue and no risk of any kind of damage and medical problems.
2. It could be utilized at places like construction sites, industries, ports, etc. or we can say where there is need to lift and convey weighty burdens by hands or on shoulders and head. This is an ergonomically designed carrier to improve the working condition of labours and reduce the risk of injuries to head, shoulders, hands, waist, etc.
3. The main objective is to provide the workers with the facility to carry the loads in three simple ways which are over the head, at the back and push or pull activity.
4. These new load carriers are designed so that they are light in weight, simple to utilize and work effectively with practically no strain to the muscles and the body parts

VII. DISADVANTAGES

1. This machine is not suitable for rough roads

VIII. LITERATURE SURVEY

Design and Fabrication of Rocker Bogie Mechanism Geosurvey Rover, B.Babu, N.Dhayanidhi, S.Dhamocharan [1] - The Project work "Rocker Bogie system Geosurvey Meanderer" manages the significant part of working on the wanderer from its past plans. The Geosurvey meanderer needs to work on unpleasant and brutal conditions for which it was planned yet a few variables limit its functional capacities, so the focal point of our examination is to beaten limitations or to decrease it to inside a satisfactory reach for its smooth presentation.

Prospects for Development of Load – Carrying Elements of Freight Car Bogie, O.V. Makhnenko, G.Yu. Saprykina, I.V. Mirzov and A.D. Pustovoj [2] - As of late mishaps connected with break of cast load-conveying components of three-piece intruders of cargo vehicles have become more continuous in the

rail lines of Ukraine and Russia. The work proves the judiciousness of advancement and utilization of all-welded load-conveying components of cargo vehicle bogie (FCB), working on their functional dependability. Welded designs of FCBs are generally applied in West Europe. Endeavors to foster designs of all-welded components of FCBs indispensable with cast structures are made in Ukraine and Russia. In any case, none of the created welded structures is right now applied at customary freight transportation, due to non-ideal plan of bogie welded components as far as guaranteeing the necessary weariness obstruction edge.

Design of all-Terrain Vehicle using Rocker Bogie Mechanism, M. Vigneshwaran, R. Siddhartha, G. Vijay and S. Pravin Kumar [3] - The requirement for creating a very stable suspension system that can function on various terrains while maintaining full wheel contact with the ground to create a system that can navigate terrains where the left and right rockers must each climb a different obstacle separately. To maintain an angle of tilt more than 50 degrees without falling over. For conducting scientific examination of goals that are separated by many meters to tens of kilometers, rocker bogie are crucial.

Study of Failure Pattern on Load Bearing Wall, Anurag Wahane, Vinay Kumar Sahu, Ritik kumar Sahu, Hemendra kumar Sahu [4] - The study of load-bearing wall structure models is the topic of the work. This masonry load-bearing wall may collapse due to instability if it is subjected to vertical concentric and eccentric loading. In this study, the failure patterns of masonry load-bearing walls of various sizes were examined using compressive strength tests and shaking table tests. The outcome demonstrates that the bearing wall cannot support enormous loads, however increasing thickness may result in reduced structural damage.

Risk Evaluation of Bogie System Based on Extension Theory and Entropy Weight Method, Yanping Du, Yuan Zhang, Xiaogang Zhao, and Xiaohui Wang [5] - The essential component of railroad vehicles is a bogie system. Bogies continue to have difficulties in rigorous practical examination. In practice, part-specific experiments are currently used excessively. Based on inspection data and expert evaluation, a risk evaluation index system for a bogie system has been constructed in the current study. The danger status of a bogie system has then been assessed utilizing an extension theory and an entropy weight approach while taking into account quantitative and qualitative features. Finally, four distinct samples' bogie systems have been evaluated using the approach. Results indicate that this method can precisely determine a bogie system's risk state.

Bogie Steering System Improving Alignment of the Urban Railway Vehicle in Track, Michał Podalski, Maciej Slabuszewski [6] - Low-radius curves, which provide significant challenges for contemporary rail vehicles, are a common feature of urban rail systems. To address such issue, numerous technologies have been created over time. One category of these is bogie steering systems, which are in charge of improving the alignment of cars in a curve, improving ride comfort, and minimizing wear on the wheels and rails. The goal of these systems is to reduce the angle of attack by correcting the relative settlement of bogies and car bodies during curve negotiations. This paper describes one of those systems in terms of design, operation, and verification. Results from some simulations and experiments are given and analyzed.

IX. CONCLUSION

The result of the project was the execution of free directional control using least drive modules which builds the effectiveness.

At the same time, A progression of portability experiments in the farming area, rough roads, inclined, steps and obstacles surfaces concluded that rocker bogie can accomplish some distance navigates on field. This work shows how rocker bogie system works on various surfaces.

X. REFERENCES

- [1] Design and Fabrication of Rocker Bogie Mechanism Geosurvey Rover, B.Babu, N.Dhayanidhi, S.Dhamotharan.
- [2] Prospects for Development of Load – Carrying Elements of Freight Car Bogie, O.V. Makhnenko, G.Yu. Saprykina, I.V. Mirzov and A.D. Pustovoj.
- [3] Design of all-Terrain Vehicle using Rocker Bogie Mechanism, M. Vigneshwaran, R. Siddhartha, G. Vijay and S. Pravin Kumar.
- [4] Study of Failure Pattern on Load Bearing Wall, Anurag Wahane, Vinay Kumar Sahu, Ritik kumar Sahu, Hemendra kumar Sahu.
- [5] Risk Evaluation of Bogie System Based on Extension Theory and Entropy Weight Method, Yanping Du, Yuan Zhang, Xiaogang Zhao, and Xiaohui Wang.
- [6] Bogie Steering System Improving Alignment of the Urban Railway Vehicle in Track, Michał Podalski, Maciej Slabuszewski.
- [7] Fabrication of Rocker Bogie Suspension System, Mohd. Rafeeq Ur Rehman, S. Venu Madhav, P. Aravind, D. Nikhil Reddy, G.S.S. Srinivas.
- [8] Design and Fabrication of Rocker Bogie Mechanism using Solar Energy, Rajat Murambikar¹, Vinay Omase², Vivek Nayak³, Karan Patil⁴, Prof. Yogesh Mahulkar.
- [9] Remote Controlled Rover Using Rocker Bogie Mechanism, Nilesh Badgujar, Mohit Mahale, Shreya Dani, Tribhuvan Bharati, Prof. Iqbal Mansuri.

Literature Review on Thermal Absorber Design in Photovoltaic Thermal System

Mr. Pravin M. Bale, Mr. Ganesh B. Thakar, Mr. Nilesh D. Langhi, Mr. Mantoo Kumar Razak

Department of Mechanical Engineering
Suman Ramesh Tulsiani Technical Campus
Faculty of Engineering,
Kamshet, Pune, India

mr.xpravin2k17@gmail.com, ganeshthakar205@gmail.com, nileshlanghi9@gmail.com

Abstract- This paper concerned with work performed by the various researchers in the field of solar energy. A literature survey was performed considering design, material, performance, economics, and application of solar energy with the different solar collector. Literature deals with thermal performance improvement technique and application of photovoltaic in the field of solar energy were included in the paper.

Keywords- Solar energy, Photovoltaic, Cooling, Co-generation, Renewable energy.

I. INTRODUCTION

Photovoltaic thermal collector (pvt) can be categorized into two popular types; water-based pvt and air-based pvt in accordance with the fluid used in the system. Recently, numerous studies were conducted in developing pvt collector based on water or air. In this section, pvt collectors will be examined with a focus on water-based pvt collector.

II. PAGE LAYOUT

1. Type of Collector:

1.1 PVT Air Collector:

The performances of the photovoltaic-thermal air collectors have been studied extensively by researchers. The behavior of single-pass and double-pass joined PV/T were analyzed with steady state conditions. The outcomes indicated that the double-pass PV/T collector had superior behavior over the single-pass PV/T collector. At a length of 1m, a mass flow rate of 200–300 kg/h, and pack factor of 0.5, the thermal, PV, and PV/T efficiencies were 24–28%, 6–7%, and 30–35% respectively for the single-pass PV/T. The thermal, PV, and PV/T efficiencies were 32–34%, 8–9%, and 40–45% respectively for the double-pass PV/T. To enhance thermal extraction from the PV cell as a PV/T based air by natural flowing, a thinner metal sheet was placed at the center or fins were placed to the rear wall of the air-channel.

REF module contains a basic air channel placed at the back of the PV cells, whereas the TMS has a thinner metal sheet placed at the center of the air channel and the FIN model contains fins of rectangular shapes placed on the other side of the wall to the PV back surface parallel to a flowing direction. The enhanced model showed good workability than the normal type. For the glazed enhanced model, the TMS possessed about 41°C and FIN possessed about 10°C less thermal rate than that of the REF module at a channel

depth of 15cm and showed, accordingly, about 4% and 10% enhancement in output energy.

1.2 PVT Water Collector:

The performances of a Photovoltaic Thermal (PV/T) solar water heater were recorded from February until April 2007. It was noticed that the storage tank water thermal rate in February 2007 changed from a minimum of 29°C at 10:00 to a maximum of 59°C at 14:00; from 32°C at 10:00 to 80°C at 15:00 in March 2007; and from 34°C at 9:00 to 62°C at 16:00 in April 2007. Figure 2 presents the hourly changes in cell thermal rate and cell efficiency. It can be seen in the figure that the increase in the cell thermal rate reduced the cell effectiveness. When the cell thermal rate at 10:00 was about 34°C, the cell effectiveness was about 11.6%. When the cell thermal rate at 13:00 was about 50°C, the cell effectiveness was about 10.7%.

The heat, electricity and energy gains of combined photovoltaic thermal (PVT) water-based separate fixed collected thermal type for two distinguished models referred to as condition A (collector partly wrapped by the PV cell) and condition B (collector totally wrapped by the PV cell) were investigated. It was found that condition A was much preferable for hot water generation, whereas condition B was better for electrical energy generation. The outcomes showed that the yearly thermal power utilization was 4167.3 kWh and 1023.7 kWh, and the total yearly electricity utilization was 320.65 kWh and 1377.63 kWh for condition A and B respectively. The yearly total thermal power gains were reduced by 9.48% and the yearly total exergy gain was reduced by 39.16% from condition A to condition B.

2. The behavior of facade-integrated combined:

PV/T models with EPV (film cell) and BPV (single silicon cell) cells for usage in the resident houses of Hong Kong were accomplished. The outcomes indicated that the yearly

electrical effectiveness of the combined EPV/T and BPV/T models were 4.3% and 10.3% for a west-facing panel, and the yearly total heat effectiveness were 58.9% and 70.3% respectively. The yearly effectiveness of the water heater models were 47.6% (for EPV) and 43.2% (for BPV). The equivalent amount of days in a year if the water thermal in the storage tank gets 45°C and more were 195 and 217. The decrease of space-heating utilization via the two types of combined PV/T collector's wall was recorded at 53.0% and 59.2% respectively, in comparison to the normal concrete wall.

The thermal and PV effectiveness of two types of thermal collectors in a commercial system PV/T model were investigated in a tropical weather situation of Singapore. Type A is thermal collectors with mono-crystalline Si solar panels and combined with a tube and sheet. Type B is thermal collectors with multi-crystalline Si solar panels and combined with a parallel plate. Figure 3 shows the cross-sectional areas of the flow channels for the two types of PV/T.

The electrical and thermal behaviors of the heat-pipe Photovoltaic/Thermal (HP-PV/T) models were analyzed in Hong Kong, Lhasa, and Beijing; three places representing the different weather conditions in China. A part of aluminum plate was selected as the base panel. The evaporator part of the heating pipes was attached to the rear of the aluminum plate and the condenser part was attached to a water tank. It was observed that the yearly thermal power was 1665.05–1872.22 MJ/m², 2939.67–3328.25 MJ/m², and 2111.07–2352.95 MJ/m² when the model with an auxiliary heating system was used in Hong Kong, Lhasa, and Beijing respectively. The yearly electricity generated were 261.32–264.98 MJ/m², 462.14–466.1 MJ/m², and 322.84–328.15 MJ/m² in Hong Kong, Lhasa, and Beijing respectively. It can be concluded that the solar thermal production primarily relied on the existing solar radiations and the hot-water load per unit collection area (Mw/Ac). With the Mw/Ac at 64.5kg/m², the yearly solar thermal production of the HP-PV/T model in Hong Kong, Lhasa, and Beijing were recorded at 68.5%, 80.5%, and 64.7% respectively.

The PV/T water heater model was developed with a normal circulation and experimental tests were carried out with various water masses and various primary water thermal rates in an outside environment. Figure 4 illustrates the setup of the combined PV/T water collector. The hardware setup was implemented from 15 battens, with an overall heat-collection area of 1.76m². The overall PV/T design was covered in an Al-alloy framework, obtaining the total dimension of 1.33m and 1.5m.

The outcomes showed that as the heated water load per unit heat-collection area was more than 80kg/m², the diurnal electrical effectiveness was about 10.15%, the features diurnal thermal effectiveness was more than 45%, the

features diurnal overall effectiveness was more than 52%, and the features diurnal initial energy saved was about 65%, for this model with a PV panel covering factor of 0.63 and a front-glazing.

III. CONCLUSION

The present study concludes that photovoltaic thermal collectors are promising technology to generate electrical and thermal energy simultaneously. In the study various designs of photovoltaic thermal collectors are investigated and operating and performance parameters are discussed.

It was observed that air and water based photovoltaic thermal collectors are very popular due to ease and lost fluid and have multiple applications. It is also important to note that fluid must be selected considering its thermo physical properties and area of application.

IV. ACKNOWLEDGMENT

I would like to express my gratitude and appreciation to all those who gave me the possibility to complete this report. I am extremely thankful to Dr. J. B. Sankpal, Principal SRTTC, Kamshet for providing me infrastructural facilities to work in, without which this work would not have been possible.

I would also like to acknowledge with much appreciation the crucial role of Prof. M. A. Mane, project co-ordinator who gave the permission to use all required machinery and the necessary material to complete the project.

REFERENCES

- [1] Mosteiro-Romero, Martín, Uta Krogmann, Holger Wallbaum, York Ostermeyer, Jennifer S. Senick, and Clinton J. Andrews. "Relative importance of electricity sources and construction practices in residential buildings: A Swiss- US comparison of energy related life-cycle impacts." *Energy and Buildings* 68 (2014): 620-631.
- [2] McGlade, Christophe, and Paul Ekins. "The geographical distribution of fossil fuels unused when limiting global warming to 2 C." *Nature* 517, no. 7533 (2015): 187.
- [3] Ellabban, Omar, Haitham Abu-Rub, and Frede Blaabjerg. "Renewable energy resources: Current status, future prospects and their enabling technology." *Renewable and Sustainable Energy Reviews* 39 (2014): 748-764.
- [4] Jeffrey R.S. Brownson, *Solar Energy Conversion Systems*, 1st Editio. No. January 2000. ACADEMIC PRESS, 2014.
- [5] Michael, Jee Joe, Iniyan Selvarasan, and Ranko Goic. "Fabrication, experimental study and testing of a novel

- photovoltaic module for photovoltaic thermal applications." *Renewable Energy* 90 (2016): 95-104.
- [6] Hedayatzadeh, Mahdi, Yahya Ajabshirchi, Faramarz Sarhaddi, Ali Safavinejad, Said Farahat, and Hossein Chaji. "Thermal and electrical assessment of an integrated solar photovoltaic thermal (PV/T) water collector equipped with a compound parabolic concentrator (CPC)." *International journal of green energy* 10, no. 5 (2013): 494-522.
- [7] Xu, Peng, Xingxing Zhang, Jingchun Shen, Xudong Zhao, Wei He, and Deying Li. "Parallel experimental study of a novel super-thin thermal absorber based photovoltaic/thermal (PV/T) system against conventional photovoltaic (PV) system." *Energy Reports* 1 (2015): 30-35.
- [8] Ibrahim, Adnan, Mohd Yusuf Othman, Mohd Hafidz Ruslan, M. Alghoul, M. Yahya, Azami Zaharim, and Kamaruzzaman Sopian. "Performance of photovoltaic thermal collector (PVT) with different absorbers design." *WSEAS Transactions on Environment and Development* 5, no. 3 (2009): 321-330.
- [9] Khelifa, A., K. Touafek, H. Ben Moussa, I. Tabet, and H. Haloui. "Analysis of a hybrid solar collector photovoltaic thermal (PVT)." *Energy Procedia* 74 (2015): 835-843.
- [10] Allan, James, Zahir Dehouche, Sinisa Stankovic, and Lascelle Mauricette. "Performance testing of thermal and photovoltaic thermal solar collectors." *Energy Science & Engineering* 3, no. 4 (2015): 310-326.
- [11] Kadhim, Ali Najah, Mohammad H. Yazdi, Azher M. Abed, Mohd Hafidz, and K. Sopian. "Study On The Performance Of Photovoltaic Thermal Collector (PV/T) with Rectangular Tube Absorber Design." *Computer Applications in Environmental Sciences and Renewable Energy, kuala lumpur* (2013): 5-10.
- [12] Kim, Jin-Hee, and Jun-Tae Kim. "The experimental performance of an unglazed PVT collector with two different absorber types." *International Journal of Photo energy* 2012 (2012).
- [13] Rosli, Mohd, Mohd Afzanizam, Sohif Mat, Kamaruzzaman Sopian, Mohd Yusof Sulaiman, Elias Ilias Salleh, and Mohd Khairul Anuar Sharif. "Thermal performance on unglazed photovoltaic thermal polymer collector." In *Advanced Materials Research*, vol. 911, pp. 238-242. Trans Tech Publications, 2014.
- [14] Hussain, F., M. Y. H. Othman, Kamaruzzaman Sopian, Baharudin Yatim, H. Ruslan, and H. Othman. "Design development and performance evaluation of photovoltaic/thermal (PV/T) air base solar collector." *Renewable and Sustainable Energy Reviews* 25 (2013): 431- 441.
- [15] Matuska, Tomas. "Performance and economic analysis of hybrid PVT collectors in solar DHW system." *Energy Procedia* 48 (2014): 150-156.
- [16] Singh, G. K., Sanjay Agrawal, and Arvind Tiwari. "Analysis of different types of hybrid photovoltaic thermal air collectors: a comparative study." *J Fund Renew Energy Appl* 2 (2012): 1-4.
- [17] Aste, Niccolò, Claudio Del Pero, and Fabrizio Leonforte. "Thermal-electrical optimization of the configuration a liquid PVT collector." *Energy Procedia* 30 (2012): 1-7.
- [18] Rosli, M. A. M., Suhaimi Misha, Kamaruzzaman Sopian, Sohif Mat, Mohd Yusof Sulaiman, and Elias Salleh. "Thermal Efficiency of the Photovoltaic Thermal System with Serpentine Tube Collector." *Applied Mechanics & Materials* 699 (2014). Thermal module air collector." *Solar Energy* 86, no. 9 (2012): 2826-2838

FRICITION AND WEAR BEHAVIOR ANALYSIS OF DIFFERENT BEARING MATERIALS

Amay S.Chavan, Nikhil B.Ambhure, Shantanu R.Gat, Omkar G.Shinde, Prof. N.V.Dhumal

Department of Mechanical Engineering, Suman Ramesh Tulsiani Technical Campus Faculty of Engineering, Pune, Maharashtra, India

ABSTRACT

Tribology is the science and technology of interacting surfaces in relative motion of related subjects and practices. Sliding and rolling surfaces represent the key to much of our technological society. Understanding of tribological principles is essential for successful design of machine elements. When two nominally flat surfaces are placed in a contact, surface roughness causes contact to occur at a discrete contact spots and an interfacial adhesion occurs. Friction is the resistance to motion that is experienced whenever one solid body moves over another. Wear is the surface damage or removal of material from one or both of two solid surfaces in a moving contact. Materials, coatings and surface treatments are used to control friction and wear. One of the most effective means of controlling friction and wear is by proper lubrication, which provides smooth running and satisfactory life of machine elements. Lubricants can be liquid, solid, gas. Present scenario works on solid lubricant as per demands from the industries. For different application such as non-lubricant compressor, gears in micro machinery parts require lubrication. But wet lubrication is not beneficial or not much more significant effects, due to contamination of oil. Some application such as compressors and juice extracting machine, where oil contamination with food and various food products is a serious problem. Some applications have too complicate design and some application has to be installed in complicate placeless where periodically oiling requires for its better performance. The aim of the project work is to find the better combination of metal matrix solid lubricant that acts as solid lubricant for different application. With mixing the brass with different filler material such as. Aluminium, steel (EN08) and Brass, Copper, were investigated in dry sliding conditions. Friction and wear experiments were conducted on pin-on-disc apparatus, using composite pins against polished EN31 steel counterparts, performed within the various

I. INTRODUCTION

1.1 Problem statement

In the petroleum, food processing and chemical industry where high temperatures often evolved, special materials have to be used. The high wear rate at high temperature and high load is a serious problem in a large number of industrial applications such as elevated temperature compressor piston rings and bearings. Meanwhile to meet the combination of light weight and high strength demands, alloy as well as metal matrix

composites materials are increasingly used in many industries. However, wet lubrication is not beneficial or not much more significant effects, due to contamination of oil. Some application such as compressors and juice extracting machine, where oil contamination with various food products has a serious problem. Some applications have to complicate design and some application has to be installed in complicate place less where periodically oiling requires for its better performance. In such cases lubrication is also serious problem because of machine location e.g. Fan and blower etc. and complicate design. So present paper includes the testing of

wear rate analysis or estimation of different bearing materials performed at various operating conditions

1.2 Objectives

- To conduct the wear test and Study the effect on metal composites for following parameter at different operating conditions.
 - a. Wear
 - b. Coefficient of Friction
 - c. Frictional Force.
- To study the effect on wear with different test parameters like normal load on friction and wear behaviour of Brass, Aluminium, copper, EN08.
- To study the relationship between normal loads coefficient of friction wear rate and wear resistance.
- To find percentage improvement in wear resistance due to addition of wet test as compare to the dry test.

1.3 Scope

- This work is expected to introduce a new class of functional liquid lubricant.
- This project will also help in performance of some materials under liquid lubricant which can be used for high temperature applications and different loading conditions.
- New materials under liquid lubricant help for replacement of present material with more advantages for different applications at different operating condition

1.4 Methodology

The experiment was performed in following steps, This chapter describes the details of processing of the composites and the experimental procedures followed for their characterization and tribological evaluation.

The raw material used in this work is

1. Brass
2. Aluminium
3. Copper
4. Steel (EN08)

6.1 Processing of the Bearing materials:

6.1.1 Specimen preparation:

Commercially available Brass was supplied and machined by Omkar Industries,

Ahmednagar. Aluminium of some diameter also supplied by Omkar Industries, Ahmednagar. Copper used also brought from Omkar Industries, Ahmednagar. Steel is also brought from Omkar Industries, Ahmednagar. And the Disk which is made up of Steel (EN31) is also brought from Omkar Industries, Ahmednagar. Which is hardened upto 50 to 52 HRC.

1. Material selection for hydrodynamic bearing
2. Shaft material Steel EN31
3. Preparation of Disk
4. Manufacturing of pins for different bearing materials.
5. **Testing of specimen:**

i) Mechanical Test

- a) Compressive Test
- b) BHN Test

ii) Tribological Test

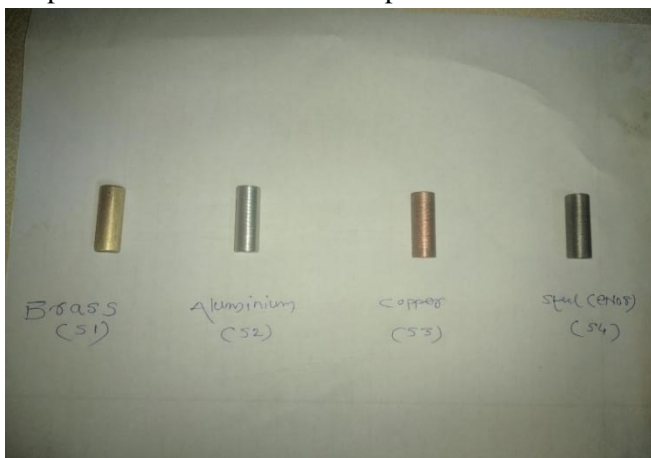
- a) Selection of operating parameter
- b) Analysis of resulting data

Table 6.1.1 Material List

Specimen	Materials
S1	BRASS
S2	ALUMINIUM
S3	COPPER
S4	STEEL (EN08)

Sample preparation for wear test:

The specimen for wear test has been produced by the machining on lathe machine. The Brass and aluminium, copper and steel has fitted in chuck and various instruments are there for measuring purposes. First disk is machined manually on lathe. This mixture than put in cylindrical die with dimensions of 100 mm long and 20 mm in diameter. This die and plunger assembly with raw metal are kept to compression testing machine and applied the load 150 KN for 30 minutes. Similarly, different sample has produced by compacting machine. After the compacting of sample, it has kept in the hot furnace for heating process. The hardening temperature were set from 800 °C to 850 °C for 1 hr duration and sample were cooled inside the furnace up to 2 hr and then removed from the furnace, again it allows to cooled at ambient temperature and time measure to bring it temperature for room temperature was 2 hr.



Frictional force of Steel (EN08)

Fig 7.4.3 show the effect of frictional force vs Time on characteristics. It has been found that the frictional force initially was 18 N and increased with respect to time to 26 N. As the time interval advanced and formation of transfer film on the counter surface of the rotating part. This avoids the friction and value of frictional force lowered down to 2.6N.

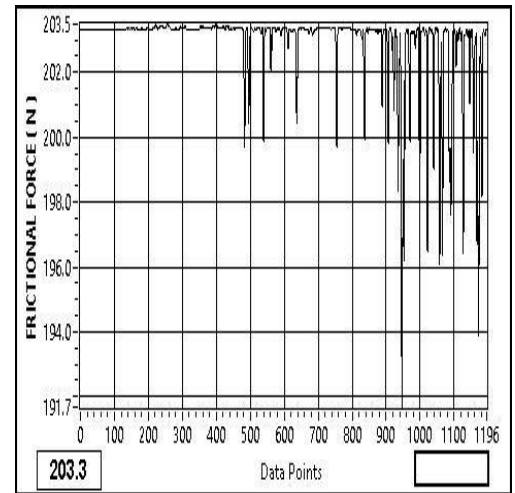
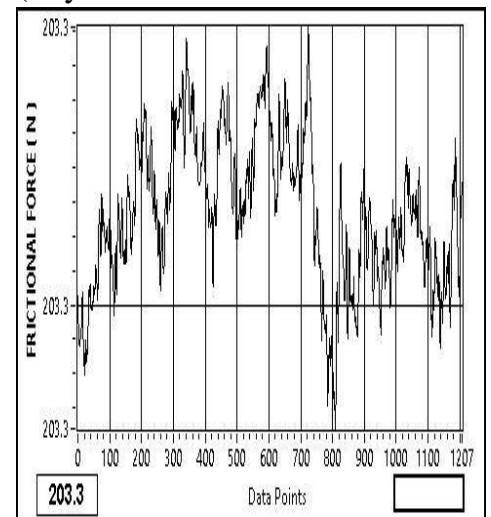


Fig. 7.4.3 Graph Frictional Force Vs Time of Steel (EN08) (Dry)



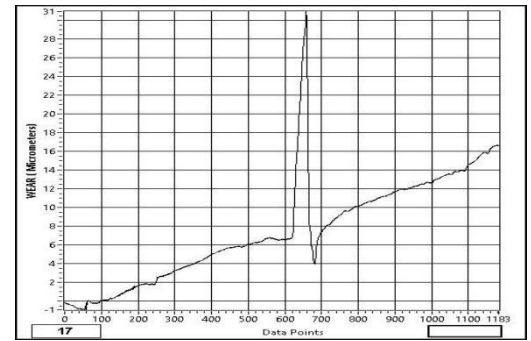
Friction Force of Aluminium (Dry test)

Fig.7.3.3. shows the effect of Time on coefficient of friction characteristics on Aluminium. It was observed that the frictional force and coefficient of friction

has same significant characteristics. The value of coefficient of friction also initially very high because of large value of frictional force exerted on the pin surface but after formation of thin lubricating film this value dropped down to $\mu = 0.267$.

Friction Force of Copper (Dry test)

Fig.7.2.3 shows the effects of Time Vs Coefficient of friction characteristic. From the graph of coefficient of friction, it has been observed that the at the time of start the value of coefficient of friction was large approximate $\mu = 0.28$. This is due to the sudden application of normal load on pin and apposite drag created on the pin due rotation of disc, it developed friction between pin contacts to disc hence increased the value of coefficient of friction. As the time interval advanced the value of coefficient of friction dropped down, this is due to the formation of thin lubrication of the counter surfaces of disc which enable to avoid metal to metal contact and reduced the friction. the value of coefficient of friction obtained after the 20-minute test was $\mu = 0.26$.



Wear characteristic for Brass (Dry Test)

The Fig. 7.1.1 shows the effects of Time Vs Wear characteristic for Brass. It has been observed during wear test on wear testing machine for same operating parameters discussed in above, the wear characteristic increased for same operating conditions with respect to time. As time increased there was continuous and linear growth of wear characteristic against the time. For the 30-minute duration the wear for Brass was found approximate 591 micron. And the specific wear value calculated from the formulae mentioned calculation and it was found to $3.48 \times 10^{-4} \text{ mm}^3 / \text{Nm}$.



ISSN: 2582-3930

Impact Factor: 8.176

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Amay S.Chavan

in recognizaton to the publication of paper titled

FRICITION AND WEAR BEHAVIOR ANALYSIS OF DIFFERENT BEARING MATERIALS

published in IJSREM Journal on Volume 07 Issue 05 May, 2023

Editor-in-Chief
IJSREM Journal

www.ijsrem.com

ijsremjournal@gmail.com



ISSN: 2582-3930

Impact Factor: 8.176

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Nikhil B. Ambhure

in recognition to the publication of paper titled

FRICITION AND WEAR BEHAVIOR ANALYSIS OF DIFFERENT BEARING MATERIALS

published in IJSREM Journal on Volume 07 Issue 05 May, 2023

Editor-in-Chief
IJSREM Journal

www.ijsrem.com

ijsremjournal@gmail.com



ISSN: 2582-3930

Impact Factor: 8.176

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Shantanu R. Gat

in recognition to the publication of paper titled

FRICITION AND WEAR BEHAVIOR ANALYSIS OF DIFFERENT BEARING MATERIALS

published in IJSREM Journal on Volume 07 Issue 05 May, 2023

Editor-in-Chief
IJSREM Journal

www.ijsrem.com

ijsremjournal@gmail.com



ISSN: 2582-3930

Impact Factor: 8.176

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Omkar G. Shinde

in recognition to the publication of paper titled

FRICITION AND WEAR BEHAVIOR ANALYSIS OF DIFFERENT BEARING MATERIALS

published in IJSREM Journal on Volume 07 Issue 05 May, 2023

Editor-in-Chief
IJSREM Journal

www.ijsrem.com

ijsremjournal@gmail.com



ISSN: 2582-3930

Impact Factor: 8.176

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING & MANAGEMENT

An Open Access Scholarly Journal || Index in major Databases & Metadata

CERTIFICATE OF PUBLICATION

International Journal of Scientific Research in Engineering & Management is hereby awarding this certificate to

Prof. N.V.Dhumal

in recognition to the publication of paper titled

FRICITION AND WEAR BEHAVIOR ANALYSIS OF DIFFERENT BEARING MATERIALS

published in IJSREM Journal on Volume 07 Issue 05 May, 2023

Editor-in-Chief
IJSREM Journal

www.ijsrem.com

ijsremjournal@gmail.com

Rework Reduction in Upper Cross Member

Rahul Gonate , Akash Badar, Jinash Kumar Raju, Omkar Dalvi

1. INTRODUCTION

Now-a-days in mass production, it is often required data to automate the manufacturing processes that were conventionally done manually. In presence, various welding techniques are used for the welding processes such as CO2 welding or Electric arc welding, TIG (tungsten inert gas welding), in that, various fixtures are used for various welding processes but in many applications, we use some techniques which does not work efficiently & accurately. Moving the electrode along the welding line is a skill full work and especially for circular components it becomes much more difficult.

Many different energy sources can be used for welding, including a gas flame, an electric arc, a laser, an electron beam, friction, and ultrasound. While often an industrial process, welding can be done in many different environments, including open air, under water and in outer space. Regardless of location, welding remains dangerous, and precautions are taken to avoid burns, electric shock, eye damage, poisonous fumes, and overexposure to ultraviolet light.

1.1 PROBLEM ON HAND

Gestamp weld shop supply total 30 welded assemblies for Skoda Auto VW India for underbody built. Out of 30, 29 assembly is having Note 3 that means is quality of part is good need no any rework requirement. Upper cross member is only assembly required for 100% checking to insure the quality of product due to variation in assembly after Mig welding. Rework percentage of upper cross member is up to 40 to 50%.So in order to achieve customer demand we need to improve our product quality by eliminating rework. The cost of rework is about Rs 2.0 Lakh per month. Rework is carried out with Hook & Flange rework and welding rework. About 3% cases are rejected.

1.2 IMPORTANCE OF THE PROBLEM

There is management target to reduce the rework cost & produce the upper cross member parts first time right with build in Quality. The average rework is very high (40 to 50% of the production). The rework time is 3 minutes. Monthly rejection scrap is 550 to 600 Kg. Thus it is wastage of manpower, machine hours and cost employed on reduction.

As per agreement between company management and clients we need to manufacture product with quality and as per design standards. First of all no any deviation in assembly and if there is any deviation in part then it is consistent. The requirement of upper cross member for customer per shift is 300 units and per month 7500 unit and in this manufactured production need to rework each assembly and after rework need to check in checking fixture for whether it ok or not ok. Thus this project had been taken up to fulfil the aggregate customer's demand.

1.3 PROBLEM STATEMENT

1.3.1 DETAILS OF PROBLEM

Upper cross member assembly is completed in 2 stages, Resistance welding and MIG welding. In resistance welding fixture is used for welding locating, holding and clamping of Centre bearing and corner bracket. After resistance welding part loaded in 2nd stage MIG welding for Hook welding. This process is carried out with manual MIG welding. After completing this 2 stages deviation in assembly ISO fix bracket in X&Z and gap between rear wheel house to upper cross member and corner assembly LH/Rh side. This process requires rework. The rework area is shown in the following figure which is not conforming the standard dimensions.

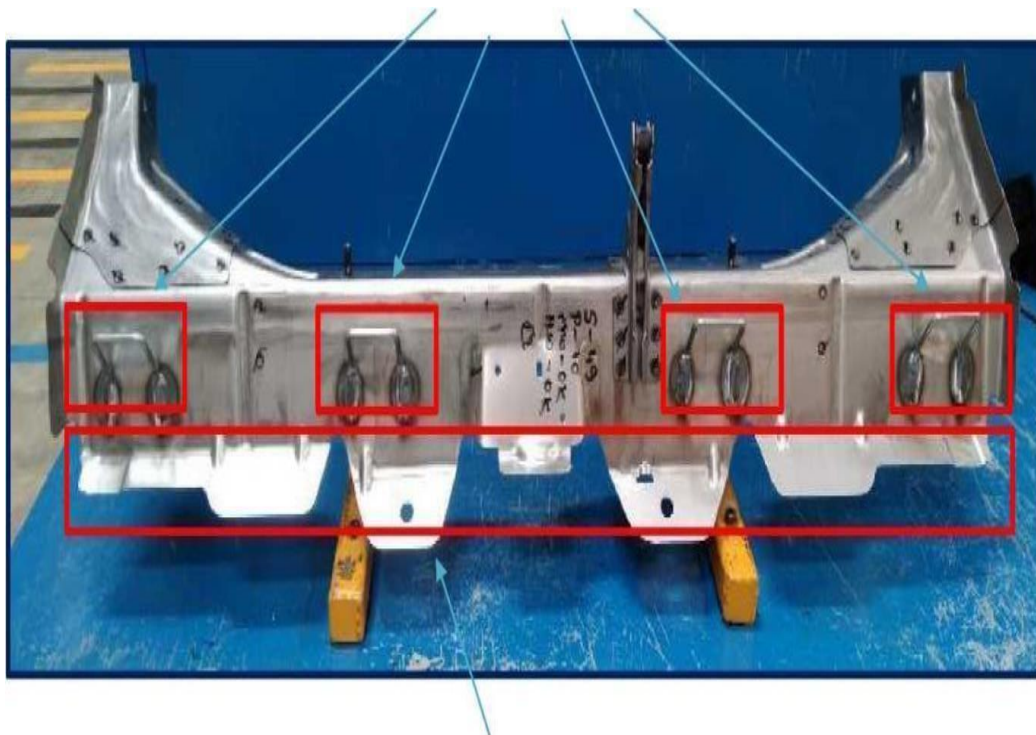


Fig 1: Matching flange area of ISO fix bracket

1.3.2 HISTORICAL PERSPECTIVE

In above 3.1 table showing the month wise non conformity and as per the data percentage of rework is calculated for problem description. Average rework is 42% and rejection is 3%

Name of machine		Cross member 5QP.814.149			
Month	Manpower in hr.	Scrap weight in Kg	Cost of rework	Cost of rejection	Total Cost
Aug-21	207	504	103450	31192	165677
Sep-21	276	540	137800	33420	212560
Oct-21	266	486	133000	30078	202978
Nov-21	186	585	93100	36205	157235
Dec-21	296	819	147950	50687	243022
Average	246	587	123060	36316	196294

1.4 OBJECTIVES:

- 1) To review the manufacturing process and identify causes of rework and rejection.
- 2) To take initiative for improving process and suggest corrections
- 3) To change tool and reduce vibrations
- 4) To monitor the process for 3 months after implementation
- 5) Reduce Rework cases by 50%.

6) Cost Saving.

2 LITERATURE REVIEW

S.K Sharma et.al; (2008). The electrode is a continuous stream of wire, with a direct current source, fed at a continuous rate through the welding gun. Carbon dioxide gas is supplied directly to the welding zone, which acts to protect the area from atmospheric contaminants. The wire electrode, produces an 'arc', in the same way as electric arc (stick) welding, which heats the welding area and fuses the wire electrode with the base metal (metal being welded).

O. P. Gupta and A. De, (1998) states that - MIG welding is ideal for aluminum, mild steel, stainless steel, copper and copper alloys.

This research paper **Nicol C, Anderson, (2014)** this is relevant to our case. This case study demonstrates how the Lean Six Sigma methodology can be applied successfully in the turnaround industry to address issues such as reducing welding defects.

Arc welding in any form can be dangerous if proper precautions are not taken as per **American Welding Society, (2004)**. Since MIG employs an electric arc, welders must wear suitable protective clothing, including heavy gloves and protective long sleeve jackets, to minimize exposure to the arc itself, as well as intense heat, sparks and hot metal.

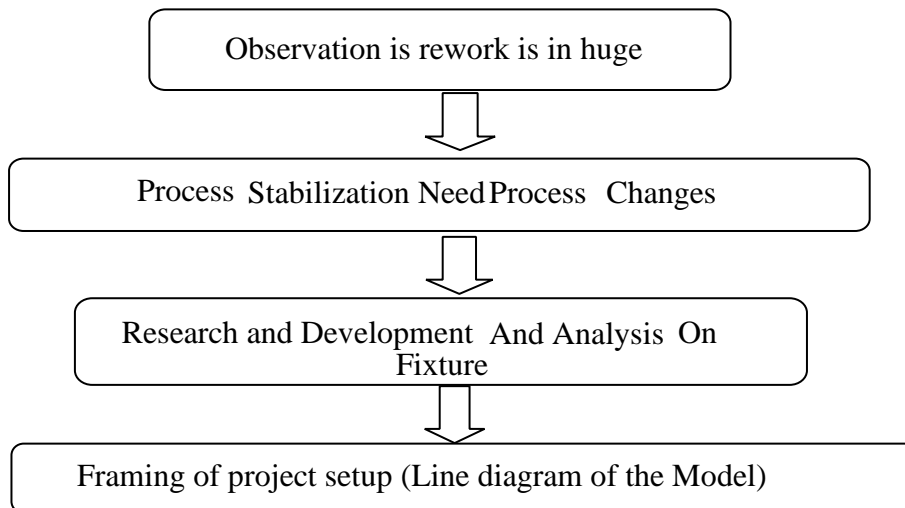
3 METHODOLOGY

3.1 PROCEDURE

We will undertake the detailed study for the MIG welding and spot welding for the sheet metal process. Various alternatives we have found during research and study. The most suitable alternatives will be adopted for action. In order to reduce the rework upper cross member first of all we have examined the process of assembly. Stage wise analysis done for the process variation. Stage wise assembly checking with CMM for the process variation. MIG welding and spot welding station CMM report compared for process variation. Fixture correction done for the process stabilization.

3.2 METHODOLOGY OF WORKING PROCESS

Flow Chart For Working Process



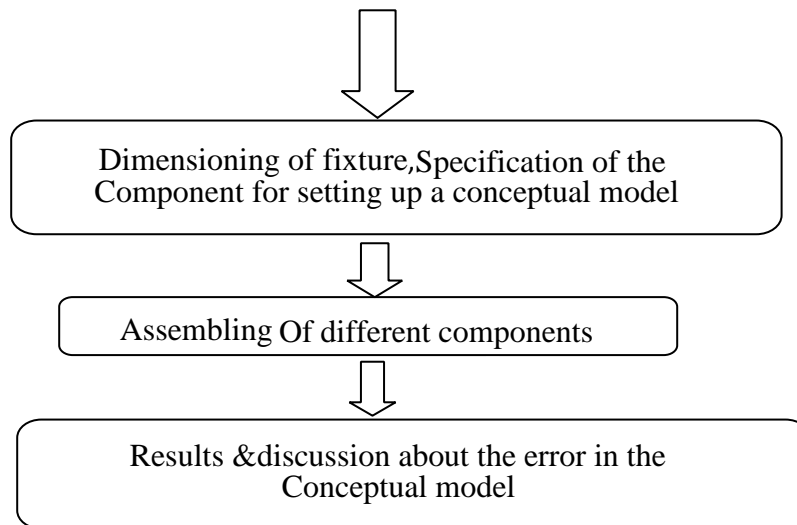


Chart 1: Flow Chart for Working Process

SYSTEM DESIGN

Specification:

- **Size of Block:**
 - Length - 90 mm**
 - Width – 70 mm**
 - Height – 28 mm**
- **Material of Block : Copper**

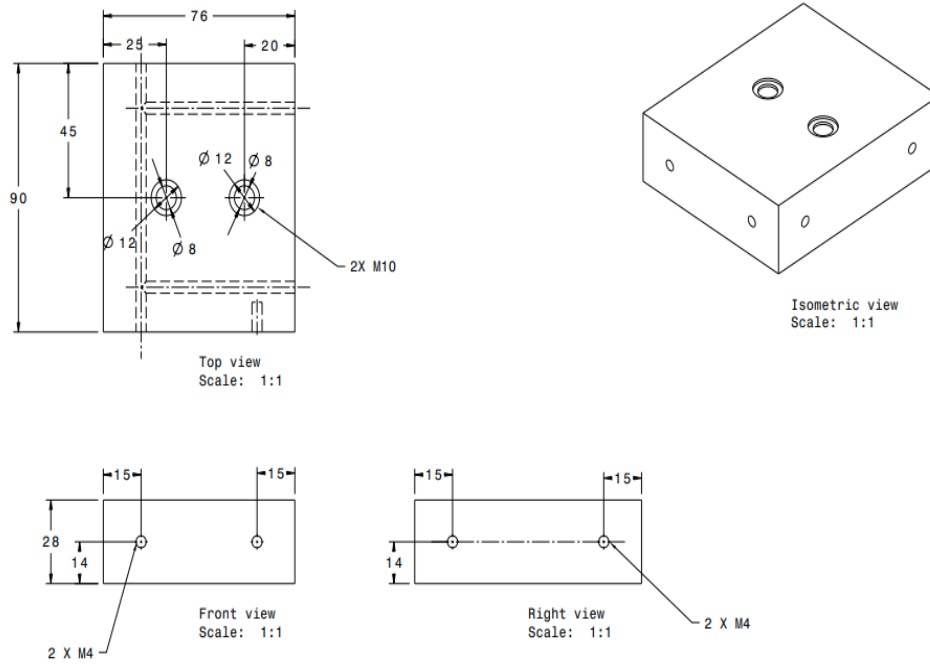


Fig 2 : Heat Exchanger copper unit 2D

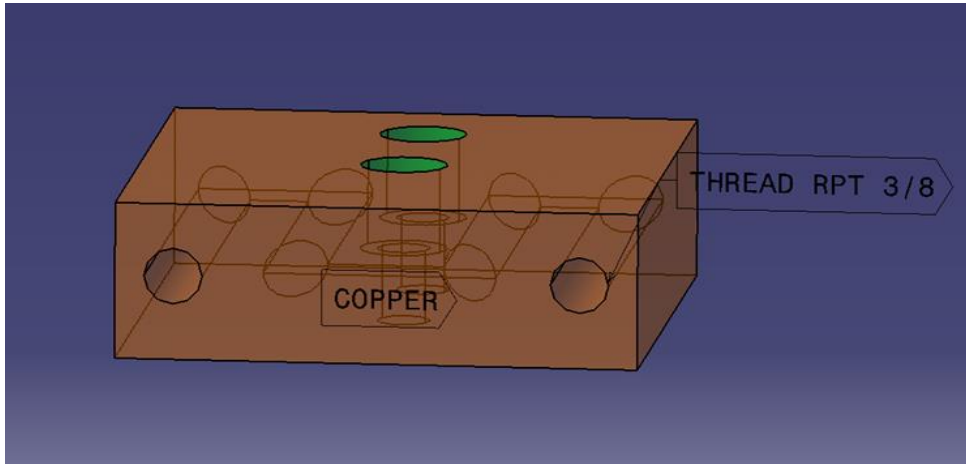


Fig 3 : Heat Exchanger copper unit 3D

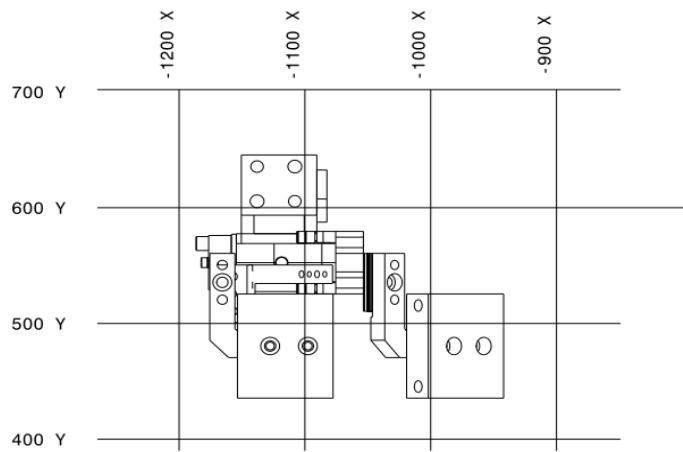


Fig 4 : 2D diagram With X & Y axis dimension

11 BILL OF MATERIAL:

Sr.No	Componet Name	Quantity	Cost/Part
1	Pnumatic Cylinder	4	14900
2	5/2 DEV	1	1520
3	1/8*10 Connector	8	60
4	Flow Control Valve1/8	8	215
5	Hose Pipe	8 Mtr	1000
6	T Connector (M10)	2	150
7	Copper Block	4	4300
8	Grub Screw (M4)	12	10
9	M10 Allen Bolt	8	125
10	Myler	4	525

3.12 ADDITION OF WATER COOLING BLOCK

In this section we have added water cooling block on fixture on each hanger welding area for heat dissipation. In previous process there is no any cooling arrangement for the upper cross member to avoid welding distortion. Water cooling block for the process is as shown in blows figure.



Fig. 5: With Copper Unit Addition

This is the process we have used to avoid welding distortion.

PROCESS CHANGE FOR THE 20MM MAG WELD LENGTH

In this section we have reduced the MAG welding length to reduce the welding distortion in process. Due to this we have got saving in welding material consumption and also in other resources required for the process.



Fig. 6 : MIG Weld Before



Fig7 : MIG Weld After

4 RESULT AND DISCUSSION

4.1 RESULT

1. Reduce the Rework cost upto 50%.
2. Man Hours save
3. Reduction in Rejection cases
4. Reduction in Scrap weight.
5. Improvement in Quality performance
6. Improve Productivity.
7. Easy to preventive Maintenance
8. Reduction in maintenance cost.

We have described the details of corrective actions which are recommended during the project work. All these actions are carried out in the month of April and project is implemented. Necessary drawings and concept behind it is explained. Each section is devoted for a recommendation.

In order to reduce the rework and rejection in upper cross member, we have examined process and find out root cause for the process. After root cause analysis we have decided action for the process.

In this process we have found welding distortion in upper cross member after welding to reduce the welding distortion we have added water cooling block in area of the hook welding for heat dissipation. Operator having different in each shift and skill also having different. So to reduce MAG welding issues we have implemented robotic welding for quality improvement in welding. In hook to eliminate dimensional variation we have added hook profile myler and also reduced the weld length 30mm to 20mm to reduce the heat dissipation in upper cross member.

REDUCTION IN REWORK CASES

In this section we have presented the rework of upper cross member before and after implementation of the project. We have already given 8 moth before data and 4 month after implementation of the project. The following histogram shows the before and after rework of upper cross member assemblies. It indicates the improvement in process after implementation of the project.

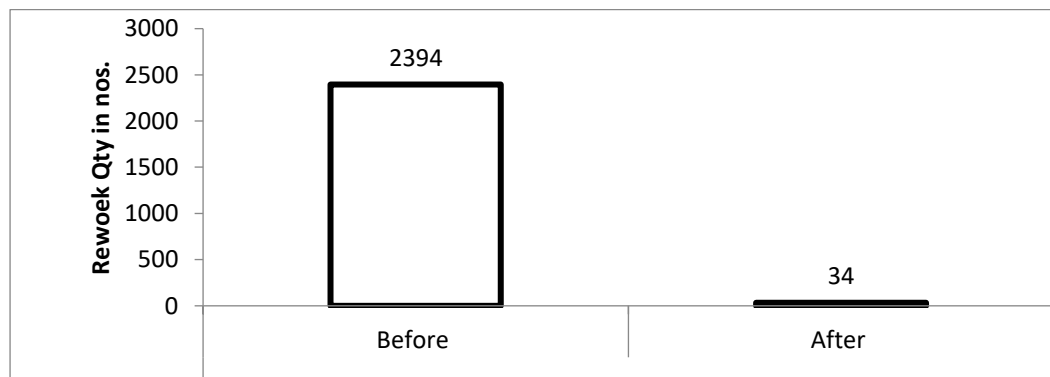


Chart – 2 : Rework quantity before and after (in Nos.)

REDUCTION IN REJECTION CASES

In this section we have described the rejection cases reduced after implementation of the project. In this before we have average rejection cases per month is about 65 quantities after implementation of the project we have reduced to average 11 nos. rejection from the welding process.

Graph not proper give month wise rejection before and after here using scatter plot and bar diagram for average.

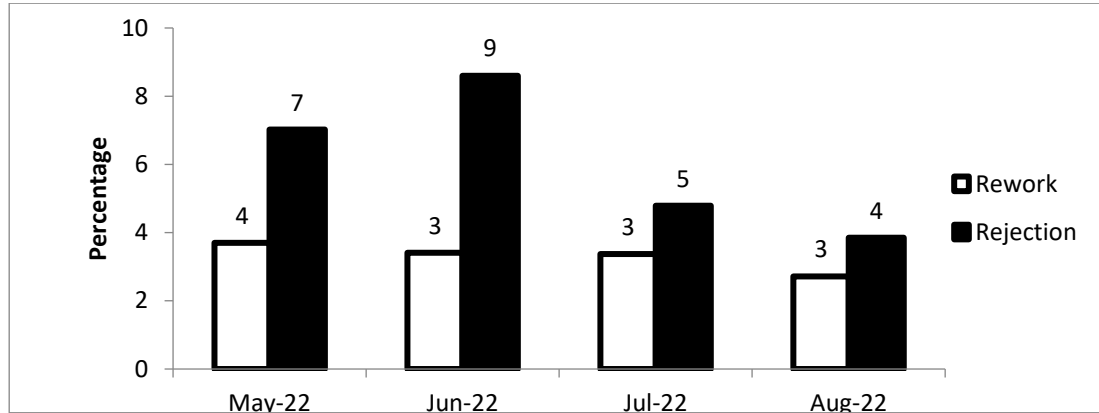


Chart – 3 : Reduction per month and % reduction.

MAN-HOURS SAVED

In This section we have described the total man-hours saved after implementation of the project. In this we have calculated total man-hours lost on the basis of rework time. Before implementation of this project average loss of man-hours per month is 269 hours after implementation of the project man-hours loss reduced to average 17 hours per month. Total average percentage reduction in man-hours is 94%.



Chart – 4 : Man-hours loss before and after in hours

COST OF REWORK SAVED

In this section we have described the cost saving in rework after implementation of the project. In this project we have saved cost in various resources used for the rework activity like, electricity, welding wire, shield gas and manpower required for rework activity. Consumption of the resources decreases as the rework decreases.

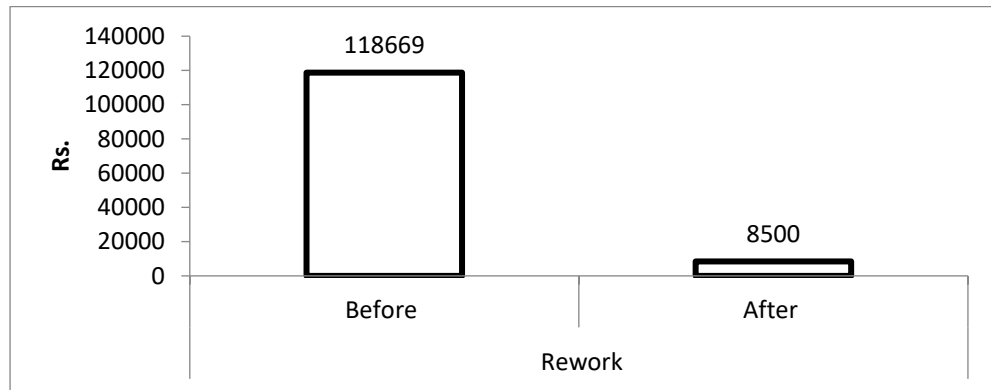


Chart – 5 : Rework cost before and after in Rs.

COST OF REJECTION SAVED

In this section we have described the average rejection cost reduced after implementation of the project. Rejection cost is based on the rejection of the assemblies Rejection cost is 557 Rs. for the single assembly. So rejection value is calculated on the basis of rejected count into Rs. 557.

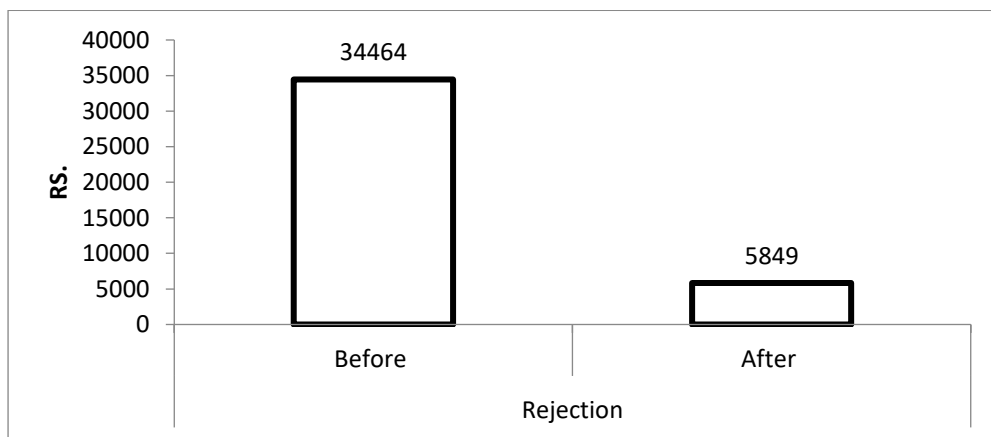


Chart – 6 : Rejection cost before and after in RS.

5 CONCLUSION

The use time analysis (pareto chart, Histogram) and cause effect diagram helped to identify the correct causes of failures by which the suitable countermeasures are developed and implemented, By Adding Copper cooling block and Reduce the length of welding

The average production per month is 5500. Before implementation of this project 45% average rework is there for process. Now the customer demand for quality perspective is high so we need to reduce this rework and improve quality of the product. In this rework process require resources also high it's also impacting cost for the product. This project is to fulfill the customer demand and the improving rework cost up to 80% of the present situation.

Also, quality improvement and Reduce rework in assembly. Company will enjoy benefits of improved lead time, quality. We gained unique experience of integrating and evaluating theory and practical aspects of design. This helps us to extract valuable knowledge and data. We are sure that this valuable experience will be helpful in our future in all aspect.

6 FUTURE SCOPE

The water cooling system is very cheap & less cost process so we used that process to reduce temperature. The "Cooling System in MIG Welding by using Water cooling System" can also be applicable in TIG welding. It enhances the production rate as well as improves the quality of the welding. It has a wide range of applications such as Automobile, Aerospace, and Marine and can also be used in small workshops. The liquid cooling systems becoming the priority cooling solution in the future, there is always a scope for education and economic viability. The cooling system is the most important factor in manufacturing sector

6.1. REFERENCES

1. American Welding Society, 2004, Welding Handbook, Welding Processes, Part1.Miami: American Welding Society. p. 150.
2. Vidhate, 2015 National conference on, Modeling, optimization and control, 4th-6th3/2015, NCMOC -2015; 03/2015 At: Vishwakarma Institute of Technology Pune.
3. Nicole C. Anderson & Jamison V. Kovach (2014) Reducing Welding defects in turn around Projects. A lean Six Sigma case study, Quality engineering
4. O. P. Gupta and A. De, 1998, An Improved Numerical Modelling for Resistance Spot Welding Process and Its Experimental Verification, J. Manuf. Sci. Eng., vol. 120, pp.246-252, 1998.
5. S.K.Sharma et.al;2008, Industrial Engineering and operation management, 2nd edition. New Delhi, Kataria & Sons, Ch.34 pp.714-725.
6. Kasuya, T.: Reduction of Welding Deformation Using Steel Materials and Welding Consumables.

**CIVIL
DEPARTMENT**



SRTCT'S
SUMAN RAMESH TULSIANI TECHNICAL CAMPUS – FACULTY OF ENGINEERING,
KHAMSHET
An ISO 9001:2015 Certified Institute
DEPARTMENT OF CIVIL ENGINEERING

APF-	Project Topic List	Academic Year: 2022-23
Issue No.:02		Semester: I
Revision No: 0		Date :- 08/08/2022
Rev. Date: 15/06/2018		Class :- BE

Sr. No	Group No	GR No	Name of Student	Project Title	Name of Guide	Sign
1	1	202123	Araenavaru Sagar Parameshwar	Application of Ferro Cement Concrete	Prof. S.S.Deshpande	
		202126	Londhe Jayesh Digambar			
		202125	Swami Prashant Chidanand			
		202062	Swami Kanchan Vivekanand			
2	2	202122	Bodake Pankaj Kaluram	An Assessment of Cross Intersection : A Case Study of Lonavala-Pune Road	Prof. S.S.Deshpande	
		202061	Thosar Omkar Shankar			
		202136	Adkar Avinash Balu			
		202138	Chavan Pranav Dhanaji			
		202092	Wasave Supriya Bhima			
		202069	Garud Prajakta Ekanath	Use of Waste Polyethylene in Bituminous Road	Prof. S.S.Deshpande	
		202068	Garud Gayatri Balasheb			
		202088	Bansode Neeta Mohan			
		202171	Murke Bhagyashree Ashok			
4	4	202089	Shinde Ganesh Anandrao	Manufacturing of Plastic Sand Bricks	Prof. S.S.Deshpande	
		202066	Rathod Baswraj Chandar			
		202110	Shejwal Sumantkumar Mahadev			
		141110	Hulawale Vaibhav Dilip			
		202064	Khair Shubham Dipak			
5	5	202106	Shedge Yash Naresh	Experimental Investigation of Bubble Deck Slab	Prof. S.S.Deshpande	
		202087	Ghare Sanjyot Raghunath			
		202157	Dalvi Udhav Ramdas			
		202095	Jadhav Ashutosh Jitendra			
		202060	Valsangakar Santosh Jagdish			
6	6	202170	Rasal Swanand Pradip	Flood Mapping & Damage Assessment Using Google Earth Engine	Prof. S.S.Deshpande	
		202098	Gaikwad Sourabh Sanju			
		202122	Bodke Rohan Dilip			
		202197	Dasare Rahul Maruti			
		202082	Rokade Tushar Raghunath			

Prof. S. S. Deshpande

HOD