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**DEPARTMENT OF ELECTRONICS AND  
TELECOMMUNICATION ENGINEERING**

# **COMMUNICA**

**Vol. 2**



Hope Foundations  
Finolex Academy of Management and  
Technology, Ratnagiri.



**DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

**In Coordination with**

**ASENT**

**presents**

**COMMUNICA**

**Vol. 2**

**"Communica: Where Bytes, Words, and Brushstrokes Converge."**

**AY-2023-24**



# About FAMT



**Finolex Academy of Management and Technology (FAMT) was established in 1996 to impart quality technical education at affordable cost and contribute to the industrial growth of our nation. The academy is approved by All India Council for Technical Education (AICTE), New Delhi; recognized by Directorate of Technical Education (DTE), Government of Maharashtra, affiliated to University of Mumbai, and accredited with B++ Grade by National Assessment & Accreditation Council (NAAC).**

**Situated on the picturesque coast of western Maharashtra, FAMT is one of the reputed engineering institutes in the region and state. The academy is known for its quality technical education and has a distinct identity in the University of Mumbai for its consistently outstanding results. The academy has received appreciation and many awards from various national bodies.**

**FAMT focuses on nurturing young technical professionals who are immensely dedicated and adept in their field and strongly believe in fair play, perseverance and harmonious development of mind and personality of our students. Accordingly, the academy takes efforts to offer a vibrant academic ambiance. The academy provides various incentives in the form of scholarships and prizes, and co-curricular and extracurricular platforms to foster leadership, team skills, creativity and entrepreneurial values among students.**





## Principal's Message

**“Education and technology in unison empower us to explore, change, grow and shape the future of humanity.”**

**Dr. Kaushal K. Prasad**

**Remarkable progress in engineering has accelerated growth and created the most conducive environment of living ever for human beings in last two centuries. The greatest challenge ahead is realigning engineering with sustainable growth that ensures a secure, healthy and productive environment of living for all. Technical education prepares us to face such challenges posed on the way to growth and set the tune for social change.**

**FAMT, a dream conceived by our founder president Late Shri P.P. Chhabria, has opened the avenue of technical education for students from Konkan. The visionary leadership of our president, Mrs Aruna Katara is inspirational in pursuing our aim to be the centre of excellence in the field of technical education. FAMT was established with a vision to nurture professionals in tune with global trends, equipped with engineering knowledge, skills, and creativity; who will contribute in technological advancement of the nation. To accomplish its vision, the academy has launched six undergraduate and two post graduate programmes. The institute offers quality education with excellent infrastructure at affordable cost. Inculcating the culture of play hard and play fair among our students, FAMT has facilitated dream of many engineering aspirants who are now successful professionals and entrepreneurs contributing across globe. Relentless efforts of our faculty and students have earned recognition to the institute in University of Mumbai and across Konkan.**

**In our goal to nurture outstanding technocrats, holistic development of students takes precedence at the institute. Therefore, the institute offers a vibrant academic ambience with excellent amenities, robust training with industry collaborations and student-centered activities on campus to promote professional and personal growth of students. I am confident that the learning experience at FAMT will help students in exploring and fostering their potential to face challenges of global industry. I welcome and offer you my best wishes for enriching learning experience at FAMT.**

# HoD's Message



**"Embark on a journey to excellence in electronics and telecommunication engineering with collective exploration."**

**Dr. Sharada U. Chougule**

**Welcome to the vibrant community of the Electronics and Telecommunication Engineering Department! As the Head of the department, it is my pleasure to guide and inspire our students through a dynamic and evolving educational journey. Electronics and Telecommunication Engineering Department is committed to nurturing a learning environment that not only imparts technical excellence but also encourages innovation and creativity. With a focus on the latest trends in electronics and telecommunication, department aim to equip our students with the skills and knowledge needed to flourish in an ever-changing technological landscape. I invite you to explore the emerging trends in telecom technologies, collaborative learning experiences and diverse opportunities that define our department.**

**Let's explore and pursue excellence in the realm of electronics and telecommunication engineering together.**



# Message from the Committee

**"Embrace the unknown, for it is where opportunities are born and greatness is achieved."**

**Dear Readers,**

**We are thrilled to present the second edition of our department magazine "COMMUNICA", a labor of love brought to life by the dedicated members of the magazine committee. This magazine is a testament to the passion, creativity, and collective effort that define our college community.**

**In these pages, you will find a diverse tapestry of voices, perspectives, and talents. It reflects the spirit of our college, where students come together to learn, grow, and leave their mark on the world.**

**Each article, photograph, and artwork encapsulates the essence of our college journey, from the challenges we've overcome to the triumphs we've celebrated. It's a tribute to our shared experiences, both inside and outside the classroom.**

**We hope this magazine serves as a source of inspiration, information, and entertainment. It's a platform for our voices to be heard, our stories to be shared, and our dreams to be celebrated.**

**As we embark on this exciting new venture, we extend our heartfelt gratitude to everyone who contributed and supported us along the way. We take this opportunity to express our heartfelt thanks to Dr. Sharada V. Chougule (HOD EXTC) to entrust the responsibility to us to bring out this issue, Prof. Madhura Zagade faculty Co-ordinator for her constant bolstering. Together, we have created something special that will be a cherished part of our college's legacy.**

**We invite you to dive into the pages of this magazine and join us in celebrating the vibrant tapestry of our college life. This is just the beginning of a journey filled with countless more stories to tell and memories to make.**

**Thank you for being a part of our inaugural edition. We can't wait to see where this adventure takes us next.**

**Happy Reading!!  
Warm regards,**

**Tejas Samant**

**Editor in-Chief  
and The entire Editorial committee.**

# About Department



The Department of Electronics and Telecommunication Engineering was established in 2008 affiliated to University of Mumbai. Since its commencement, the primary objective of the department has been to develop competent professionals who will be able to contribute effectively to the advancing electronics & telecommunication technologies.

The curriculum a broad coverage to all the areas of Electronics and Telecommunication Engineering to give a strong foundation on various courses such as Digital Systems Design, Analog and Digital Communication, Electronic Devices and Circuits, Antenna and Electromagnetic Theory, Digital Signal and Image Processing, Microcontrollers, VLSI Design, Microwave and RF Engineering, Mobile and Satellite Communication, Computer Networks etc.

The students are also provided an opportunity to choose Department Level Optional Courses to focus on their identified areas of interest such as Data Compression and Cryptography, IT Infra and Security, Cloud Computing and Security, Internet Communication Engineering, 5G technology.

The department has a good academic culture and conducive working environment for teaching learning and student activities. The faculty members are well qualified, dedicated, and experienced, with strong commitment to engineering education and excellence in teaching-learning process.

Department has nine well-equipped labs with state-of-the-art equipment and software to satisfy the diverse needs of curriculum, fostering hands-on learning and cutting-edge exploration in their respective fields.

The department hosts its own student association, ASENT (Association of Students of Electronics and Telecommunication Engineering), along with the IETE Student Forum (ISF). These platforms empower students to organize technical events, competitions, seminars, and field trips under the guidance of faculty members. Department organises industrial training and visits for students to get aware of industry requirements

Department aspires the overall growth of students through various co-curricular and extra-curricular activities. The qualities inculcated in students make them not only good engineers but also good human beings.

# VISION & MISSION

## Vision-

To develop competent professionals who will be able to contribute effectively to the advancing electronics & telecommunication technologies.

## Mission-

<b>M1</b>	<b>To provide quality education through practical knowledge and technical skills.</b>
<b>M2</b>	<b>To strengthen industry interaction to meet current and future trends.</b>
<b>M3</b>	<b>To inculcate teamwork spirit, leadership qualities and human values.</b>



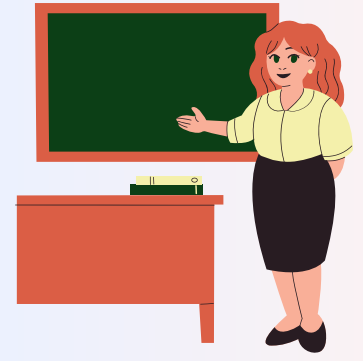
## Program Educational Objectives (PEO)

<b>PEO 1</b>	<b>Integration of knowledge</b>	<b>Integrate fundamental knowledge in mathematics &amp; basic engineering sciences to solve real life technical problems.</b>
<b>PEO 2</b>	<b>Implementation and testing</b>	<b>Train students to understand the concepts of simulation, synthesis, implementation and testing to create and analyze different projects in the various fields of Electronics &amp; Telecommunication engineering.</b>
<b>PEO3</b>	<b>Ethics and Human values</b>	<b>Nurture students for effective communication, cultured mannerism, ethical values, and teamwork and entrepreneurship skills.</b>
<b>PEO4</b>	<b>Professional development</b>	<b>Encourage professional development including higher education to produce graduates who will pursue lifelong learning.</b>

## Program Specific Outcomes (PSO)

<b>PSO1</b>	<b>Utilization of Domain specific knowledge</b>	<b>Students will be able to showcase knowledge gained in the domains of communication engineering, signal processing, RF/microwave engineering, semiconductor technology, digital and embedded systems.</b>
<b>PSO2</b>	<b>Awareness and adaptability to recent trends</b>	<b>Gain awareness regarding design skills, software packages and telecom standards.</b>

# FACULTY MEMBERS



**Dr. Sharada U. Chougule (Professor and Head)**

**Prof. Giri S. Kulkarni (Associate Professor)**

**Dr. Suhasini S. Goilkar (Associate Professor)**

**Prof. Amol R. Sutar (Assistant Professor)**

**Prof. Mansi S. Kolwankar (Assistant Professor)**

**Prof. Sujay D. Mainkar (Assistant Professor)**

**Prof. Neha S. Sakhalkar (Assistant Professor)**

**Prof. Vinayak D. Chavan (Assistant Professor)**

**Prof. Vijay M. Galshetwar (Assistant Professor)**

**Prof. Madhura K. Zagade (Assistant Professor)**

**Prof. Gauri S. Bhosale (Assistant Professor)**

**Prof. Saurabh S. Athalye (Assistant Professor)**



## Staff Members

**Mr. Sandip R. Pardule**

**Mr. B. M. Biradar**





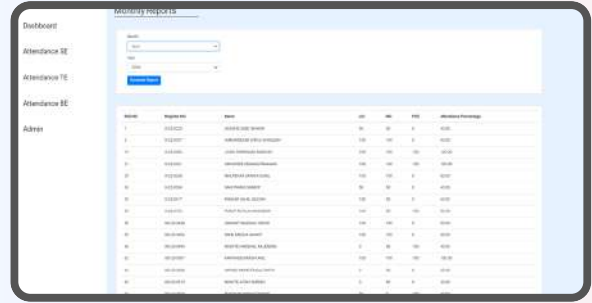
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# ARTICLES

# Report on Wireless Biometric Attendance

By - Madhav Girish Sawant, Mohd Faisal Rafik Kapadi, Nimish Anil Karwade

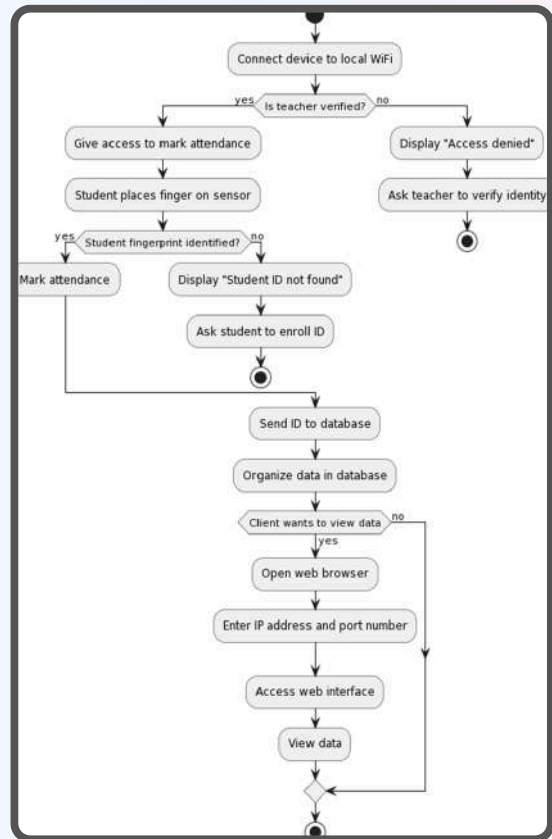


## INTRODUCTION

This project proposes implementing a biometric attendance system in educational institutions to address inefficiencies associated with traditional paper-based systems. Leveraging fingerprint recognition, the proposed system ensures accurate and secure attendance tracking, eliminating the need for manual entry and paper records, thus reducing environmental impact and streamlining administrative processes.

By automating the attendance tracking process with a simple fingerprint scan, the system significantly reduces the time and effort required by teachers, enhancing efficiency and allowing more focus on instructional activities. Moreover, the biometric system enhances security and accountability, minimizing the occurrence of proxy attendance. Transitioning to digital databases promotes a paperless environment, contributing to sustainability efforts, while also providing valuable insights and analytics for stakeholders to address attendance issues and enhance student engagement and retention. Overall, the adoption of a biometric attendance system promises increased efficiency, accuracy, security, and sustainability, modernizing attendance tracking processes and creating a more conducive learning environment for students and educators.

## FLOWCHART



## CONCLUSION

Biometric attendance systems represent a significant improvement over traditional methods of attendance tracking. By utilizing unique physical characteristics such as fingerprints, these systems ensure accurate identification and tracking, thereby eliminating the potential for fraud or buddy punching. They offer enhanced security, real-time tracking, and substantial time and cost savings for organizations. Despite the limitation that these systems currently only work on local host, the effectiveness and popularity of biometric attendance systems remain undiminished. They continue to be a valuable tool for organizations aiming to streamline attendance tracking, improve accuracy, and enhance security.



## Report On

### PATH FOLLOWING ROBOT

By - Naik Paras Sandip, Kanvinde Vedang Prakash, Kamble Abhijit Sandeep, Malvankar Shubham Rajan

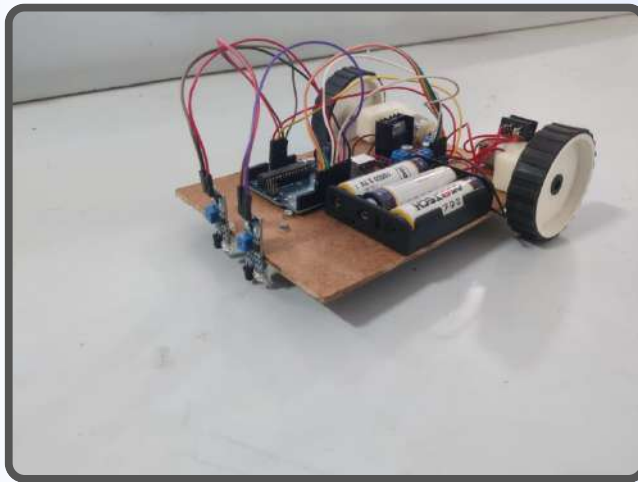
#### INTRODUCTION

As technology becomes increasingly important in today's world, it is invaluable to not only learn how to use technology, but also to understand how to create it. Since being the engineer one should have sound knowledge of the other discipline. Most of the projects have limited scope to only specific discipline. This would limit one's innovation and creativity. This project inspires to make connections across several disciplines rather than learning topics in isolation as it combines electronic, electrical and programming skills.

Path following robot can be further enhanced to let the user decide whether it is a dark line on a white background or a white line on a black background. The robot can also be programmed to decide what kind of line it is, instead of the user interface. These robots offer advantages such as cost-effectiveness, versatility, and educational value. Despite limitations in processing power and sensor support, they provide a solid platform for prototyping and development. With further optimization, path following robots have the potential for accurate and reliable performance. It will deliver the mails within the office building. Deliver medications in a hospital. Industrial automated equipment carrier. Tour guides in museum. It will help to minimize the accidents.

#### WORKING

Working of path follower is very interesting. Path follower robot captures the path with an IR sensor mounted at the front end of the robot. This makes the sensing process of high resolution. Arduino Uno controls the path. To control the movement of the robot, typically DC motors are used. Motor drivers L293D are used. They provide power to the Arduino Uno, motor driver, and motors. Path follower robot senses black path. Path follower robot senses black line by using sensor and then sends the signal to Arduino. Then Arduino drives the motor according to the sensor's output. If the left sensor comes on black line, then the robot turns left. If the right sensor senses black line, then the robot turns right. When moving on a white surface until both sensors come on a white surface. When moving on a black line, the robot stops. Two motors are used for achieving the task. An L293D motor driver IC is used to give motion to the motors.



#### CONCLUSION

Path following robot is like assembling a small, self-driving car. By combining basic components like motors, wheels, and sensors, and programming the Arduino board, you empower the robot to navigate along a predefined path. The process involves setting up sensors to detect the path, writing code to interpret sensor data and control motor movements, and fine-tuning the system for optimal performance. This project offers a hands-on introduction to electronics, programming, and robotics, making it accessible and engaging for beginners. By building and experimenting with the robot, learners can develop essential skills in problem-solving, logic, and creativity. Ultimately, the path-following robot serves as a fun and educational tool for exploring the principles of automation and control systems. With its practical application and interactive nature, this project inspires curiosity and fosters a deeper understanding of technology in a playful and rewarding manner.

## Report On

# LASER LIGHT SECURITY USING ARDUINO

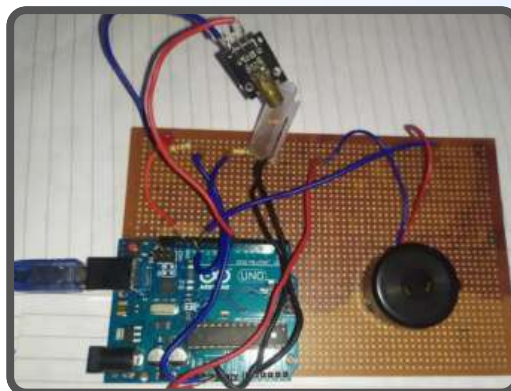
By - Tanaya Narsule, Reetu Satope, Manali Patil, Bhakti Sawant

### INTRODUCTION:

Laser based Security System is a type of security and alarm system that uses laser light and a light sensor. A security system protects our homes, offices, banks, lockers etc. from intrusion and unauthorised access. There are different types of security systems available and laser based security system is an important and efficient type. A Laser security system can act as a standalone system, which makes some sound or noise when it detects any irregular activity, or can be part of a much bigger security and home automation system, which can send messages, call the owner etc. In this project, we have designed a simple DIY laser based security system, which acts as a tripwire like security system and triggers an alarm when the laser is interrupted.

### WORKING:

A simple and effective laser based security system is developed in this project. In our Project we can use laser diode Module, Red LED, 220 and 10k ohm resistors, buzzer, light dependent resistor (LDR). We can write the code in C++ programming language and upload this code in Arduino UNO. Laser based Security System is a type of security and alarm system that uses laser light and a light sensor. A security system protects our homes, offices, banks, lockers etc. from intrusion and unauthorised access. There are different types of security systems available and laser based security system is an important and efficient type. A Laser security system can act as a standalone system, which makes some sound or noise when it detects any irregular activity, or can be part of a much bigger security and home automation system, which can send messages, call the owner etc. A simple and effective laser based security system is developed in this project. In our Project we can use laser diode Module, Red LED, 220 and 10k ohm resistors, buzzer, light dependent resistor (LDR).



### CONCLUSION:

Laser security systems are a high tech technology that used to be a part of home security only available to the wealthy. It is manually switch dependent sensors and a basic alarm unit. In Laser security system, if a person moves in front of the motion sensor, that person's body heat triggers the system's alarm.

## Report On

# EU Battery Management System

By - Sahil Shivalkar, Mukul Sagavekar, Nishant Salvi, Tejas Samant

### INTRODUCTION:

An Electric Vehicle Battery Management System (BMS) is a crucial component in electric vehicles (EVs) responsible for managing and monitoring the rechargeable batteries. Its primary function is to ensure the safety, efficiency, and longevity of the battery pack. The BMS operates by monitoring various aspects of the battery's performance, including:

**Cell Monitoring:** It oversees individual battery cells within the pack, ensuring each cell operates within safe voltage and temperature limits. This monitoring helps prevent overcharging, over-discharging, or overheating of individual cells, which can be detrimental to the battery's health.

**Balancing:** To maintain the overall health and capacity of the battery pack, the BMS ensures that all cells are balanced, meaning they have the same state of charge. Balancing prevents weaker cells from being overworked and helps in maximizing the overall capacity and lifespan of battery.

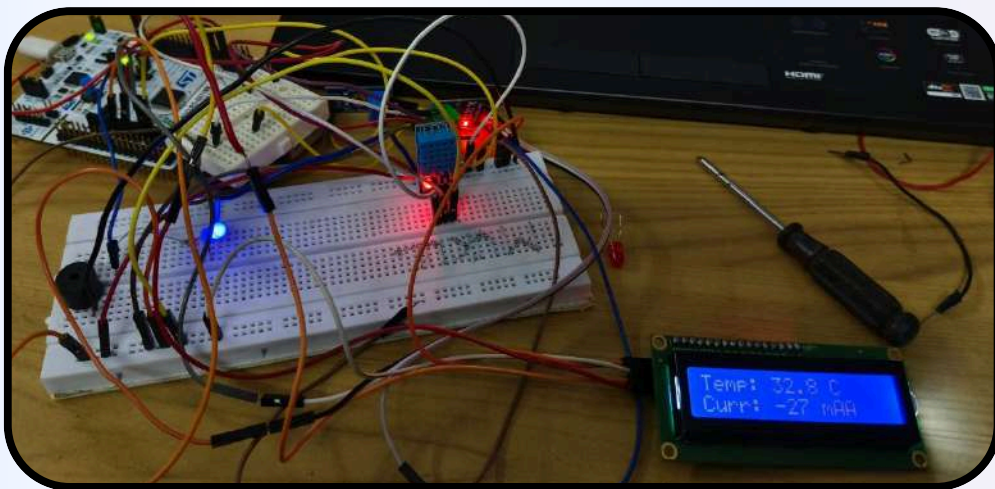
**Temperature Regulation:** Monitoring and controlling the temperature of the battery cells are crucial for safety and performance. The BMS can initiate cooling or heating mechanisms to keep the battery within an optimal temperature range, enhancing both safety and performance.

**Safety Mechanisms:** BMS systems include protective mechanisms such as overcurrent protection, over voltage protection, and short circuit protection to safeguard the battery and the vehicle in case of any unexpected issues.

### WORKING:

The Electric Vehicle (EV) Battery Management System (BMS) continuously monitors key parameters such as temperature, voltage, and current using integrated sensors. These sensors constantly measure the values of each battery cell to ensure safe and efficient operation. The temperature sensors detect any overheating or abnormal cooling, while voltage sensors keep track of each cell's charge level, and current sensors monitor the flow of electricity within the system. When the BMS identifies any drastic changes in these parameters—such as a sudden rise in temperature, a drop in voltage, or an abnormal current spike—it triggers an alert.

This alert is then displayed on a 16x2 LCD screen, which provides real-time information to the user. The display might show messages like "ALERT: Temp High!" or "Voltage Drop Detected!" to notify the user of the issue, allowing for timely intervention to prevent damage or ensure the safe operation of the EV battery system.



### CONCLUSION:

As electric vehicles become increasingly popular and the technology surrounding batteries continues to evolve, the BMS will remain a critical component for ensuring the safety, reliability, and overall efficiency of electric vehicles. Continued research and development in BMS technology will be pivotal in enhancing the performance and durability of electric vehicle batteries in the future.



# Report On

## Mustistage Constant Current Charging of battery

By-Prof. Amol R.Sutar

### Abstract:

Temperature and charging time are critical parameters during charging period of a battery as temperature rise affects battery life. In a particular charging method, setting high current minimizes charging time but raises temperature. In this study attention is given to multistage constant current charging approach to shorten charging time while maintaining battery temperature below preset range. Battery charging characteristics of various methods are studied, and their performance is compared.

The proposed multistage charging method is compared with constant current constant voltage and traditional multistage charging method. The experimental results obtained show that, the proposed method reduces the charging time by 42.22 % and 9.3 % as compared to the constant current constant voltage and conventional multistage charging method respectively, while limiting the rise in battery's temperature to 5°C above room temperature. Further in the proposed method, battery temperature is reduced by 20% as compared to the conventional multistage method.

### Introduction:

Electronics devices like digital cameras, mobile phones, laptops, electronic toys and many other uses Lithium-ion battery as a main power source due to its advantages like high durability, high energy density, low maintenance requirement etc. Due to these advantages, they are also used in electric vehicles in which very high-capacity battery is required. It takes several hours to charge the battery using traditional/onboard chargers. Lack of charging infrastructure and long charging time are major reasons for the low demand of electric vehicles. A lot of research has been underway on battery charging methods to improve the performance of battery.

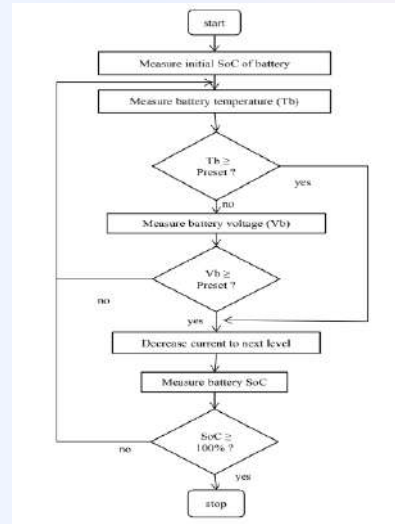
Battery charging time, energy efficiency, State of Charge (SoC) and temperature are all significant parameters of the battery. Charging time of battery is a critical factor that must be minimized to overcome the problem of driving range anxiety in case of electric vehicles. Energy efficiency of the battery is the measure of amount of power delivered by the battery in a charge cycle. SoC is the measure total amount of charge present in the battery to the total charge capacity. Charging time, energy efficiency, SoC as well as temperature of the battery depends on charging current. Pumping large current into battery has demerits like- increased battery temperature; reduced SoC; reduced energy efficiency; and reduced battery life . On the contrary, low charging current maintains battery temperature under threshold value and improves charging efficiency and SoC but it prolongs charging time. Therefore, the charging current should be selected properly, so that the battery will be charged fast and safely .

### PROPOSED WORK:

The traditional MSCC method measures battery temperature initially but doesn't consider it during charging, leading to a significant temperature increase. The proposed MSCC approach aims to reduce charging time while keeping the battery temperature within safe limits. It is similar to the traditional method but incorporates continuous monitoring of both battery voltage and temperature, preventing them from exceeding preset limits. When either voltage or temperature surpasses these limits, the battery current is reduced. The charging process stops when the State of Charge (SoC) reaches 100%. Coulomb's counting method is used to estimate SoC, as defined by an equation

$$SoC = SoC(initial) + \frac{\int_{t_0}^{t_0+\tau} I_b \cdot \Delta\tau}{Ah}$$

Where, SoC(initial) is initial value of battery SoC,  $I_b$  is battery current during charging and Ah is total charge capacity of the battery in ampere-hour.



Control algorithm of proposed battery charging

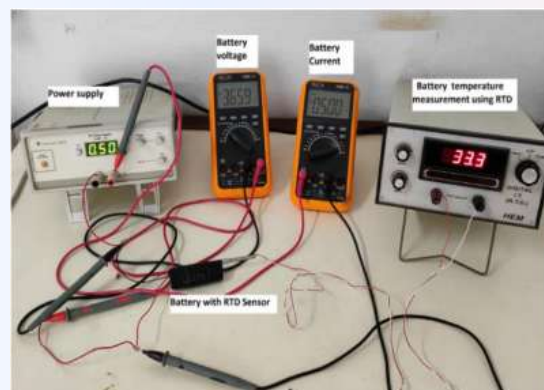
### EXPERIMENTATION:

In this work a cylindrical ICR-18650 rechargeable Lithium-ion battery is used. Specifications of the battery used for experimentation are given in the Table

Battery parameter	Value
Nominal voltage	3.7V
Maximum charging voltage	4.2V
Maximum charging current	1C
Nominal battery capacity	2600mAh
Discharge capacity	3C/ 7.8A
Size (cylindrical)	65x18mm

Next Figure depicts the experimental setup used to study battery characteristics. The real time experiments were conducted at room temperature (@30°C). The charging current is limited below maximum permissible charging current of magnitude 1C (i.e. 2.6 A) for each charging method. CCCV tests were performed at different charging rates as 0.4C and 0.6C and 1C.

The traditional and proposed MSCC tests were performed by progressively decreasing current from 1C to 0.2C. After each charge cycle the battery is relaxed for two hours and then discharged at constant current until battery reaches to lower cut-off voltage.



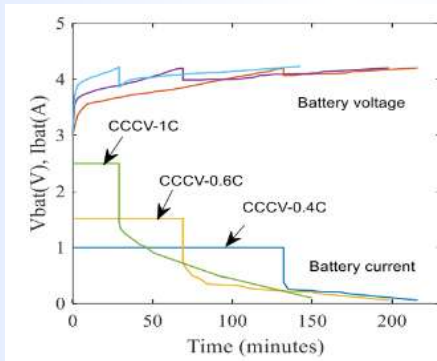
Before running new test, first the battery is charged slowly until the SoC reaches 5%. Following steps were used in each experiment:

1. Discharge the battery at constant current (0.25C) until lower cut-off reached.
2. Record total discharge time.
3. Let the battery relax for two hours.
4. Charge the battery at low current until SoC = 5%.
5. Apply next charging method.
6. Record the battery voltage, current, temperature and SoC after every minute.
7. Let the battery relax for two hours after test is over.
8. Go to step 1

The impact of CCCU, traditional and proposed MSCC charging methods on SoC, temperature and energy efficiency of battery is observed and compared. Results of different charging methods and their comparison are presented in result and discussion section.

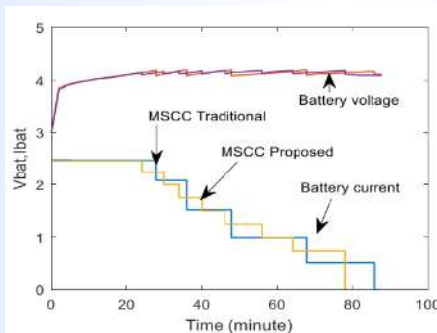
## Results:

Following figures illustrate the experimental charging characteristics of CCCU (Constant Current Constant Voltage) and MSCC (Modified Sequential Charging with Current Control) modes for a battery. In the CCCU mode, the battery was charged at different rates (0.4C, 0.6C, and 1C) during the constant current phase. At a 0.4C charging rate, it took 135 minutes to reach 4.2V, at 0.6C, it took 70 minutes, and at 1C, it took 35 minutes to reach the same voltage. However, after the constant current phase, the battery experienced a more prolonged charging period during the constant voltage phase. During this phase, the battery current initially decreased rapidly and then decreased more slowly.



Battery voltage and current in CCCU method

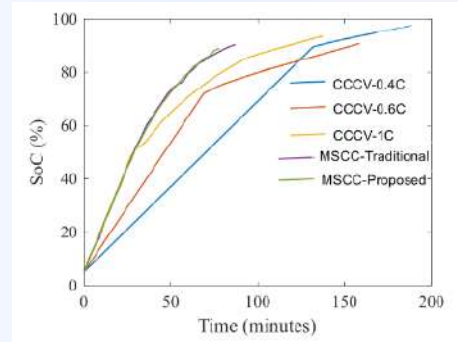
In proposed MSCC method, the battery is charged in 8 constant current steps and the results are compared with 5 step traditional MSCC method. The battery voltage and temperature both are monitored in the proposed method. It is found that, in proposed method charging time is reduced while maintaining battery temperature under preset limit and performs equally well as traditional MSCC method.



Battery voltage and current in MSCC method

In next figure, the State of Charge (SoC) characteristics for different charging modes are presented. In the CCCU charging mode, at charging rates of 0.4C, 0.6C, and 1C during the constant current phase, the battery's SoC increased to 90%, 73%, and 54% within 135, 70, and 35 minutes, respectively. The constant voltage phase, which extends charging time, is not considered for comparison with the MSCC method.

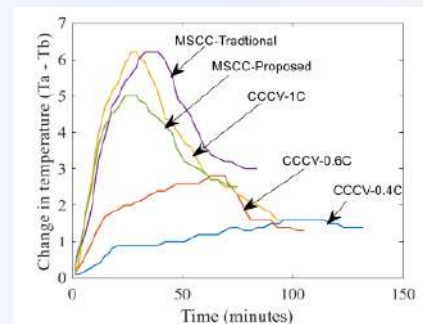
In the traditional MSCC charging mode with an initial maximum charging rate of 1C, the battery reached a 90% SoC in 86 minutes. In contrast, in the proposed MSCC charging mode, the battery achieved a 90% SoC in 78 minutes.



SoC of battery for different charging methods

Next figure illustrates the difference in battery temperature compared to room temperature for CCCU and MSCC charging modes. In the CCCU charging mode, at charging rates of 0.4C, 0.6C, and 1C, the battery temperature increased by 1.6°C, 2.8°C, and 6.2°C, respectively, during the constant current phase.

In the traditional MSCC charging mode with an initial maximum charging rate of 1C, the battery temperature increased by 6.3°C. However, in the proposed MSCC method, the rise in battery temperature was limited to 5°C, showing better temperature control compared to the traditional MSCC mode.



Temperature variation of battery for different charging methods

Charging method	Charging time in minutes	Energy efficiency (%)	SoC (%)	Temperature rise (°C)
CCCV method	0.4C	97	96	1.6
	0.6C	96	90	2.8
	1C	90	90	6.1
Traditional MSCC method	86	94	90	6.2
Proposed MSCC method	78	94	90	5

Experimental results

## Conclusion:

The research aimed to improve battery performance by minimizing charging times and controlling temperature. The proposed MSCC method effectively shortens charging times by 42.22% compared to CCCU (1C) charging, maintaining energy efficiency and State of Charge (SoC), while keeping the battery temperature within 5°C of room temperature. Furthermore, it reduces battery temperature by 20% and charging time by 9.3% compared to the traditional MSCC method.

# POEMS





हा में कर्ण हूं  
जिस सूर्य को तुम पूजते हो उसिका में किरण हू  
वचनों का रखवाला हू  
और दान का प्रतीक हू  
लड़खड़ाया था मैं तब ये दुनिया हस रही थी  
योद्धा जो बना हू मैं तो उनकी नजरे झुक रही थी  
ना बल की कमी थी  
ना बुद्धि की कमी थी  
पर हूँ रहा था जिसे मैं उसी सम्मान की कमी थी  
अंग राज कह के मुझको  
सम्मान उसने सौप दिया  
क्या गलत था मैं  
जो दुर्योधन को मिल गया  
माता पिता भाई बहन सारे रिश्ते व्यर्थ थे  
हौसला दिया जिसने वो उसी दुर्योधन के शब्द थे  
कार्यों को उसके मेरा भी समर्थन नहीं था  
पर क्या करूँ मैं भी  
उसके सिवा कोई और रिश्ता भी नहीं था  
मुकर गए रिश्ते सारे मुझे दूर से देख के  
ना मुकरा ये पुत्र कुन्ती माता का  
बक्शी थी जान सारे पांडवों की  
थामा उन्होंने हाथ था

**By- Mhapankar Rahul Prasad**  
**BE EXTC**



सार काही हरून सुद्धा जिकण काही सोप नसत  
 सार काही लढुण सुद्धा मरण काही सोप नसत  
 सर काही मिळून सुद्धा जपन काही सोप नसत  
 सार काही पाहून सुद्धा जगणं काही सोप नसत  
 सार काही अनुभवून सुद्धा किस्से काही नवलच असतात  
 मिळून सारे आपणास उरत मात्र शून्यच  
 शेवटी सार काही जगून सुद्धा उरतात मात्र आठवणीच...  
 म्हणताना काय म्हणू सुचत नाहीय  
 माझ्या आयुष्यातला आनंदाचा काळ कसा व्यक्त करू सुचत नाहीय  
 म्हणवा तर आनंद, बघावी तर व्यथा  
 आयुष्याचा वळणावरती जेव्हा कर्तव्या ची जाणिव झाली तेव्हा मीच बदलून गेले  
 चालता चालता वाट काही संपेना आणि लक्ष मात्र येई ना तेव्हा, मीच दमून गेले  
 वेळ आहे, वेळ आहे करत अवघं आयुष्य कधी निघून गेलं काही समजलच नाही  
 झाडावरील पाने गळून पडतात जशी, तसेच गळती आयुष्यातले क्षण काही  
 एकटीच मी चालते ह्या वाटेवरती वळून पाहता दिसेना कुणी  
 खरंच आयुष्य किती छान आहे...  
 खर्च थोडे केलं, थोडे गहाण आहे  
 ह्यात मैत्री आणि प्रेमाची तहान आहे  
 छोट्याशा डोळ्यात स्वप्न किती महान आहेत  
 पूर्ण होतील का ओ कधी ती??  
 खरंच आयुष्य किती छान आहे...  
 आली वेळ काहीतरी करून दाखवण्याची  
 म्हटलं तर काहीतरी आगळं-वेगळं, बघितलं तर कर्तव्य  
 सारं काही असून आता वेळ मात्र राहिला नाही...  
 आयुष्याच्या शर्यतीत आता धावण्या शिवाय दुसरा पर्याय नाही...  
 खरंच आयुष्य किती छान आहे...  
 जन्माला आलो आहोत तर थोडं जागून पाहूया  
 जीवनात दुःख खूप आहेत थोडं सोसून पाहूया  
 डाव मांडणं सोपं आहे थोडं खेळून बघूया  
 रडणं सोपं आहे थोडं हसून बघ  
 खरंच आयुष्य किती छान आहे...  
 जगणं कठीण आहे म्हणून हार मानू नकोस  
 आयुष्य कठीण असला तरी खूप छान आहे थोडं जगून बघ  
 जिणं- मरणं एक कोडं आहे  
 जाता जाता येवढं सोडवून बघ  
 खरंच आयुष्य किती छान आहे....

**By- SUWARE GAYATRI SANTOSH**  
**TE EXTC**

गुपितांचे पुस्तक  
पाहिले कुणी डोकावूनी  
नकळत माझ्या अंतर्मणी  
कळले त्यास गुपित माझे  
जे ठेवले होते जपूनी.

पुस्तक माझ्या मनाचे उलगडूनी  
वाचले एक-एक पान मग्न होऊनी  
निःशब्द झाले बोल त्याचे  
पानांवरच्या कथा वाचूनी.

आश्चर्याचे भाव घेऊनी  
विचार आले त्याचे मनी  
आहे कशी ही पूर्ण वेडी  
ठेवते मनात सगळे दडवूनी

या पुस्तकाचा आधार घेऊनी  
अनेक क्षण पक्के समजुनी  
जाणले मला अनोळखी असूनही  
फुटले काही शब्द त्याच्या मुखातूनी,

“जगाच्या या नियमांनी  
केले तिला संयमी  
आले कितीही संकटे  
तरी राहिल ती निर्भयी ”

वाटले मी धाडसी जरी  
तरी कोमल आहे आतूनी  
माझ्या या हळव्या मनाला  
कठोर केले अनुभवांनी.

**By- LOHAR SANIKA JAYSING  
BE EXTC**

तो वर्षा ऋतू

निळसर दिसणार आकाशही

आज काळभोर पडलं

वर्षभराचं मौनव्रत सोडावं

बहुतेक असच त्याने ठरवलं

रापली होती माय माझी

त्या भास्करालाही कळलं

घ्यावी विश्रांती आपणही त्या मऊशार गादीवरती

असच त्याने ठरवलं

दिवसरात्र डोळे आकाशाकडे वळूवन

केविलवाण्या नजरेने ते सर्व विणवत होते

"यंदा कधी आगमन होणार बाबा तुझं ?"

बहुतेक असंच काहीसं बोलत होते

ऐकलं असेल त्यानेही मग

म्हणूनच काल भेटीला आला

"काही दिवस मुक्कामाला येतोय आता"

असं आश्वासन देऊन गेला

**By- Narsule Tanaya Sudan**  
**BE EXTC**



# **DRAWINGS**

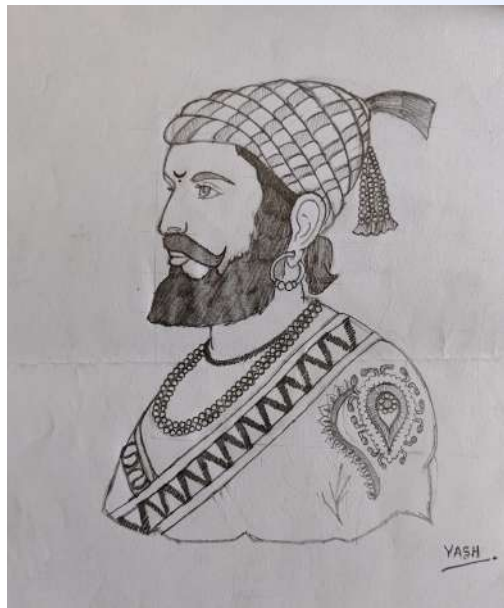




**By-Sagavekar Mukul Mahesh  
BE EXTC**



**By- Lohar Sanika Jaysing  
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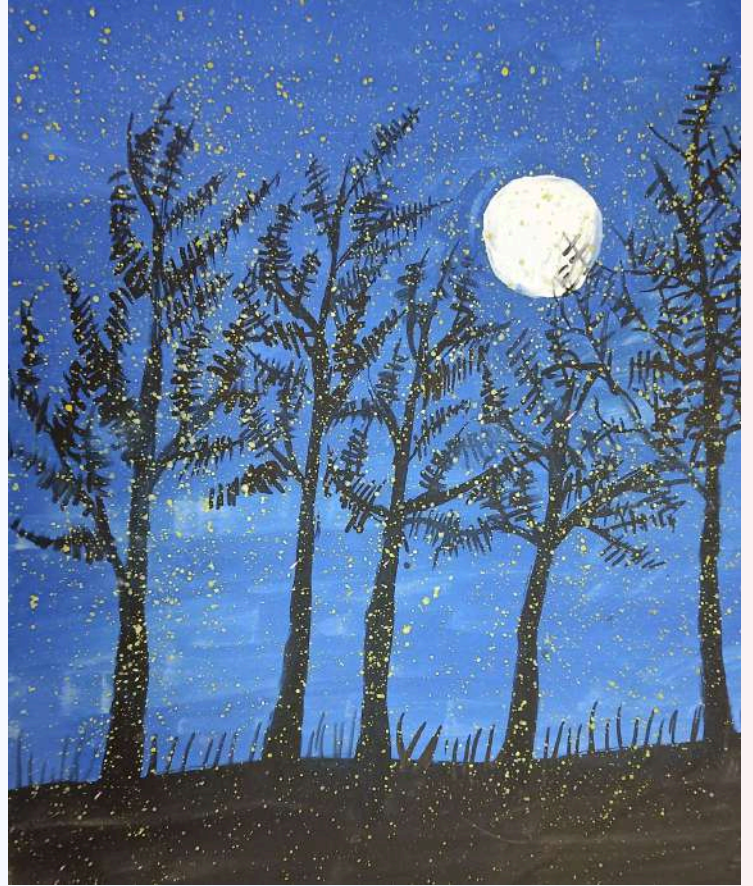


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**By- Gaikwad Gargee Sadanand  
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By- Lad Atmaya Umesh  
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# **RANGOLI COMPETITION**





**MS. MANALI PANCHAL**

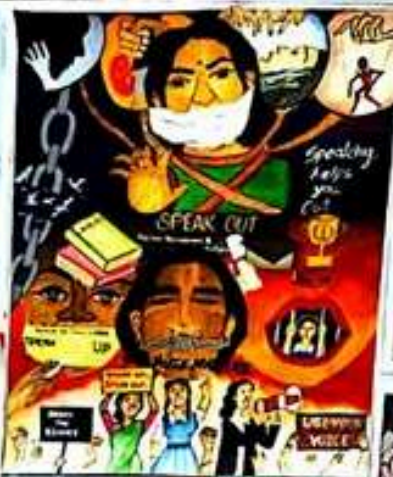


**MS. ATMAYA LAD**



# **POSTER COMPETITION**





**ZERO TOLERANCE TO SEXUAL HARASSMENT AT WORKPLACE**

**WAYS PREVENTION SOLUTION**

**What is Sexual Harassment?**  
Sexual harassment includes unwanted sexual advances, requests for sexual favors, and other verbal or physical harassment of a sexual nature in violation of company policy, according to the POSH Act.

**What Constitutes Sexual Harassment?**

- Unwelcome sexual advances
- Requests for sexual favors
- Verbal abuse of a sexual nature
- Physical contact of a sexual nature
- Display of pornography
- Making sexually suggestive remarks
- Stalking
- Sexual abuse
- Sexual harassment through electronic means

**Your Rights for Retribution**

- If it is safe and if you are confident, speak to harasser
- Report to your manager or Human Resources
- Go to local police in violation of the harassment conditions
- Make a formal complaint
- If you are threatened or assaulted, contact the police

**Is It Harassment To You**

- Remember it is not your fault
- Talk to someone you can trust
- Document incidents
- Learn about your rights and options for getting the harassment to stop

**POSH ACT 2013**

The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 commonly referred as the 'Vishakha Act' as well as the POSH Act with objectives of creating workplaces safer for women by preventing, prohibiting and redressing acts of sexual harassment against them in the workplace.



# PHOTOGRAPHY







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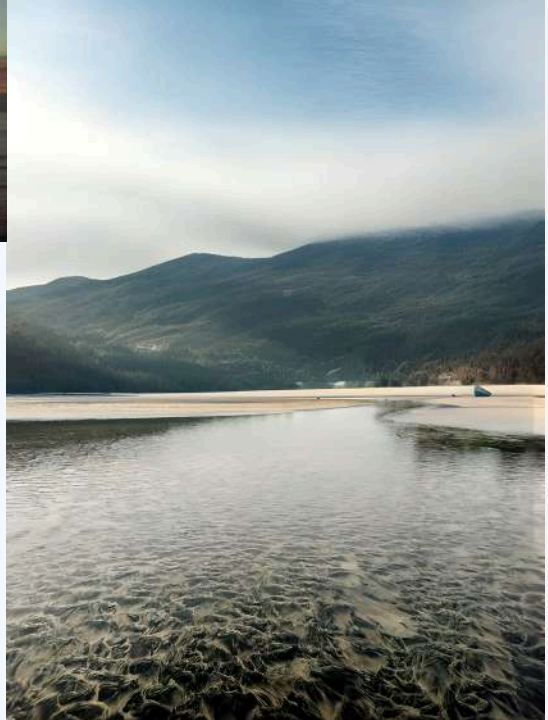
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