SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE
(An Autonomous Institution)
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution &
Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

ELECTRIC VEHICLE CLUB REPORT

(Academic Year: 2023 to 2024)

Submitted by
Dr.D .Sivaraj
Assistant Professor
Faculty Coordinator

Preface

The EV Club of the Department of Electrical and Electronics Engineering at Sri Manakula Vinayagar Engineering College serves as a progressive technical platform dedicated to fostering awareness, innovation, and research-oriented learning in the field of sustainable mobility and emerging transportation technologies. The club provides a structured environment where students gain a comprehensive understanding of modern energy-efficient systems, sustainable engineering practices, and evolving mobility solutions through systematic technical engagement and collaborative learning. Guided by faculty coordinators and actively supported by student members, the club organizes expert talks, technical discussions, design challenges, workshops, project-based learning activities, and industry interaction sessions to bridge the gap between academic knowledge and real-world applications. It encourages analytical thinking, system-level understanding, design optimization approaches, and innovation-driven project development, thereby strengthening students' technical competence and problem-solving abilities. By promoting teamwork, leadership qualities, research orientation, and professional ethics, the EV Club plays a vital role in preparing students to contribute effectively to the advancement of sustainable technologies and to meet the growing demands of the modern engineering landscape with responsibility and technical excellence.

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ABOUT THE INSTITUTION

Sri Manakula Vinayaga Educational Trust was founded to provide quality and affordable education to the weaker sections of society. The trust established Sri Manakula Vinayagar Engineering College (SMVEC) in 1999. SMVEC is an autonomous institution affiliated to Pondicherry University. It offers 13 undergraduate, 8 postgraduate and 11 Research programme in engineering. SMVEC has been accredited by NAAC with "A" grade and NBA. The institution is also accredited by TATA consultancy services. The college has a good placement record with students getting job offers from top companies in India and abroad. SMVEC students have won many awards and accolades for their academic achievements.

Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society

Mission

M1: Quality Education: To provide comprehensive academic system that amalgamates the cutting-edge technologies with best practices.

M2: Research and Innovation : To foster value-based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues.

M3: Employability and Entrepreneurship: To inculcate the employability and entrepreneurial skills through value and skill-based training.

M4: Ethical Values: To instill deep sense of human values by blending societal righteousness with academic professionalism for the growth of society.

DEPARTMENT VISION AND MISSION

Vision

To promote proficiency in the field of Electrical and Electronics Engineering by creating a stimulating environment for research, innovation and entrepreneurship.

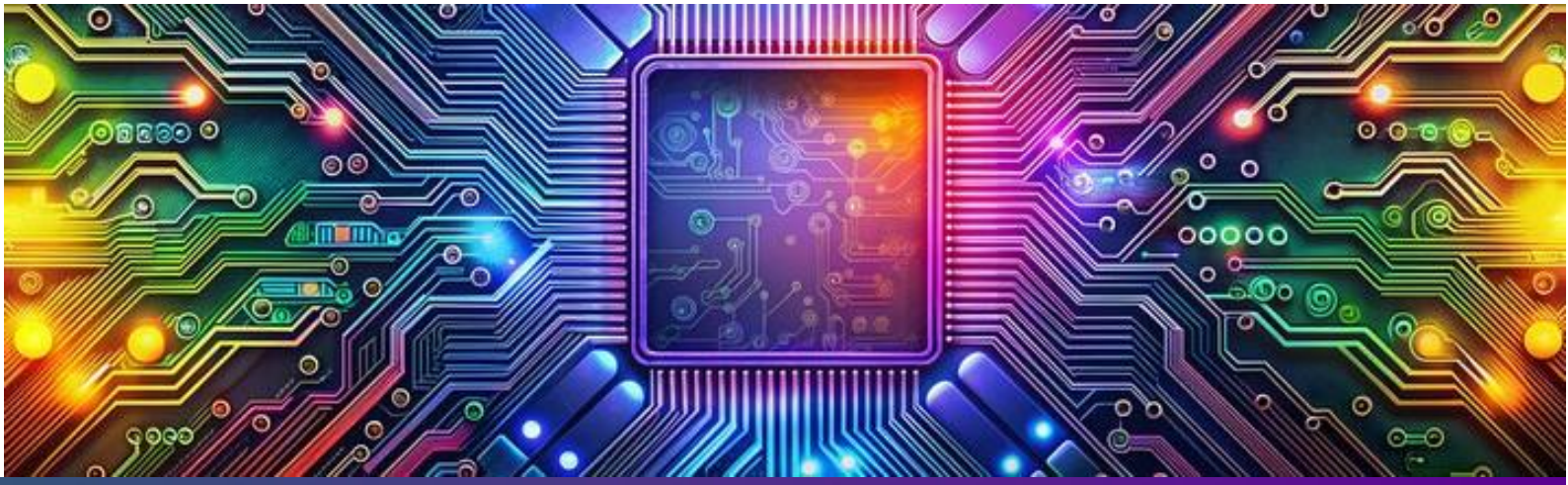
Mission

M1: Quality Education: To impart high quality technical education with problem solving capabilities by innovative pedagogy in emerging technologies.

M2: Industrial and Societal Needs: To cater the dynamic needs of the industry and society by strengthening industry-institute interaction.

M3: Research and Innovation: To nurture the spirit of research attitude by carrying out innovative technologies pragmatically.

M4: Placement and Entrepreneurship: To inculcate the professionalism in career by advancing synergetic skills to compete in the corporate world.



E-VEHICLE CLUB

About Electric Vehicle Club:

Electric Vehicles club serves as a place of community for students to discuss, learn, and working on projects related to Electric Vehicles. Members of the Electric Vehicles club are offered with a range of programs and activities such as seminars, project competitions and exposition. The club is supported the students in strategizing and organising activities that will help them knowledge and skills in Electric Vehicles. The clubs aims to guide students and prepare them to pursue their professional careers in industries specialising in Electric Vehicles.

Objectives:

- To develop basic understanding of Electric Vehicles.
- To develop basic understanding of electric motors, battery technology.
- To aid in enhancing management skills by organizing events and working in teams.
- To give students hands-on learning experience in the field of electric vehicle and battery management system.
- To aid students to build proto-types of electric vehicles
- To conduct technical programmes such as training, workshops, internships, and expert talks in relevant areas.

Functions:

- Provide detail budgeting for making electric vehicle proto-types.
- Model components or modules of electric vehicles using appropriate software
- Take part in electric vehicle competitions.
- The EV club can organize awareness campaigns, workshops, and presentations to introduce and educate the college community about electric vehicles. These initiatives can cover topics such as EV technology, benefits, charging infrastructure, government incentives, and the role of EVs in combating climate change.
- The EV club can organize educational workshops and seminars on campus to deepen the understanding of EV technology, charging infrastructure, and related topic
- The EV club can foster collaboration and networking among students, faculty and industry professionals interested in electric vehicles.

Office Bearers and their Portfolios:

S.No	Name	Position
1.	Dr.D.Sivaraj Assistant Professor / EEE	Staff Coordinators
2.	Mr.R.Ragupathy Assistant Professor / EEE	
3.	Mr. Pavithran. S	President
4.	Mr. Praveenkumar.S	Vice President
5.	Mr. Gopinath.V	Secretary
6.	Mr. A.Tamilvanan	Treasurer
7.	Mr. Mugilan. P	Joint Secretary
8.	Mr. Premkumar T	
9.	Mr. Ramanan	Joint Treasurer
10.	Mr. Navanithiyan K	
11.	Mr. M.Sivaganesh	Executive Members
12.	Mr. Nijanthan S	
13.	Mr. Elamparuthi. K	
14.	Mr. Gandham Nagendra Karthik	Technical Members
15.	Mr.S Raghul	
16.	Mr.Arunaish.R	

S.No	Name of the student	Year
1	Vaitheeswaran N	III
2	Anjana Berlin	III
3	Kokilavani S	III
4	Mugilan. P	III
5	A.Tamilvanan	III
6	Premkumar T	III
7	Ramanan	III
8	Bhuvanesh M	III
9	Navanithiyan K	III
10	Gopinath.V	III
11	S Raghul	III
12	Aarthi.P	III
13	Praveenkumar.S	III
14	Vishwa	II
15	Lokesh.N	II
16	R.Archana	II
17	Vijayalakshmi.S	II
18	Gandham Nagendra Karthik	II
19	Sowmya.S	II
20	M.Sivaganesh	II
21	Nijanthan S	II
22	Elamparuthi. K	II
23	D.Naveenkumar	I
24	Arunaish.R	I
25	Saileshwar.T	I
26	Nathesh.N.B	I
27	Mohamed Harun Rasheed.S	I
28	Vishva P	I
29	Harinee	I
30	Iyyappan	I
31	Ramesh Kumar. P	I
32	Ragul A	I
33	Mohamed Abdul Kalam.K	I
34	Herwin	I
35	Karmukilan. A	I
36	S. Ramya	I
37	A. Balakumaran	I
38	M.Sivapothiskalicahran	I
39	Callis Joseph. E	I
40	Mohamad Kaseem M	I
41	Thogesh.M	I
42	P.Gopikrishnan	I
43	Srilogeshwaran S	I
44	Mukesh Kumar R	I
45	Thiruvengadam P	I
46	Karthikraja S	I
47	Dhinish.N	I
48	Raakesh.K	I
49	Tharanitharan.M	I
50	Thilipan Siva Hari . S	I

51	Unil Kumar.D	I
52	B. Surya Prakash	I
53	Yuganigan. J	I
54	Poojitha.A	I
55	Gokulraj. R	I
56	Vishva. S	I
57	R.Yugandiran	I
58	G.Praveen	I
59	Arun Pratap	I
60	Tharani	I
61	Ashwin kumar.A	I

ELECTRIC VEHICLE CLUB – Activity Report-1

Project Work Report for consultancy with Lucas-TVS Ltd, Pondicherry.

Project Overview:

The BLDC Motor Torque Enhancement Project, undertaken in collaboration with Lucas-TVS Ltd, Pondicherry, aims to increase the torque output of an existing BLDC motor while improving its efficiency and speed performance.

Project Duration:

October 5, 2023, to March 25, 2024

Project Team:

Four skilled faculties:	Six trained students:
1. Dr.P.Jamuna, 2. Dr.D.Raja, 3. Mr. B. Parthiban, (Co-ordinator) 4. Dr. S. Ganesh Kumaran,	1. Mr. Kirubhanidhi T /4th year 2. Mr.Mohanraji /4th year 3. Mr. Tom Tijo Edattukaran /3rd year 4. Mr. Karthikeyan P /3rd year 5. Mr. Jayakumar D/3rd year 6. Mr.JothiKrishnan/3rd year

Objective:

The primary objective of the project is to enhance the torque output of the BLDC motor from its current 16 N to a targeted range of 36-40 N, while simultaneously improving efficiency and speed performance.

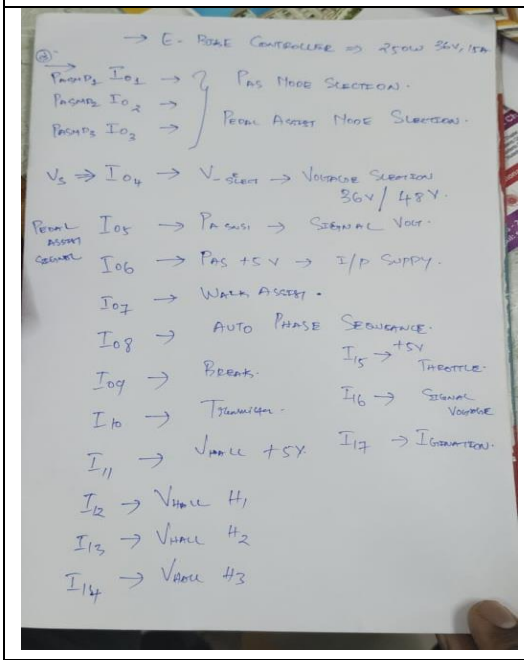
Progress Summary:

The project has progressed through several key phases, including analysis, design, implementation, testing, and optimization.

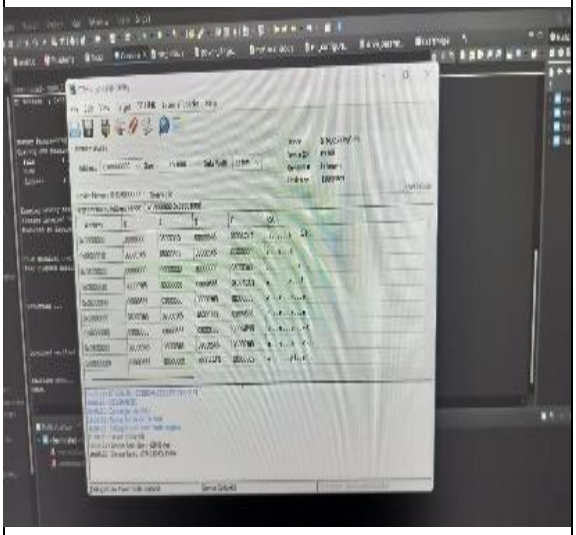
Phase 1: Analysis and Fault Identification (Week 1)

	Conducted a thorough analysis of the existing TVS Lucas fabricated board to identify potential errors and discrepancies.

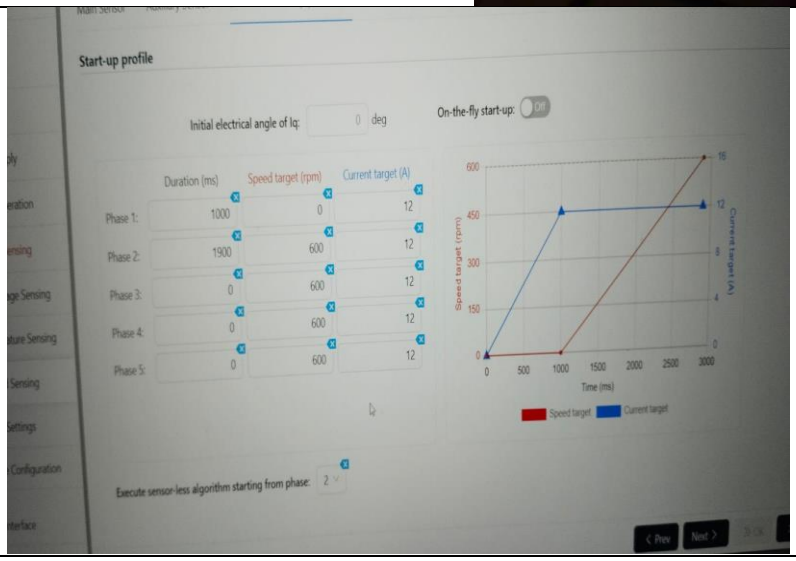
Engaged in discussions with technical experts from Lucas-TVS with Mr.Ramraj and his team to gain insights into fault identification and rectification.



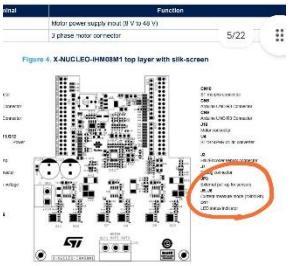
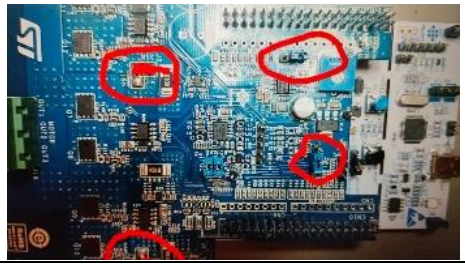
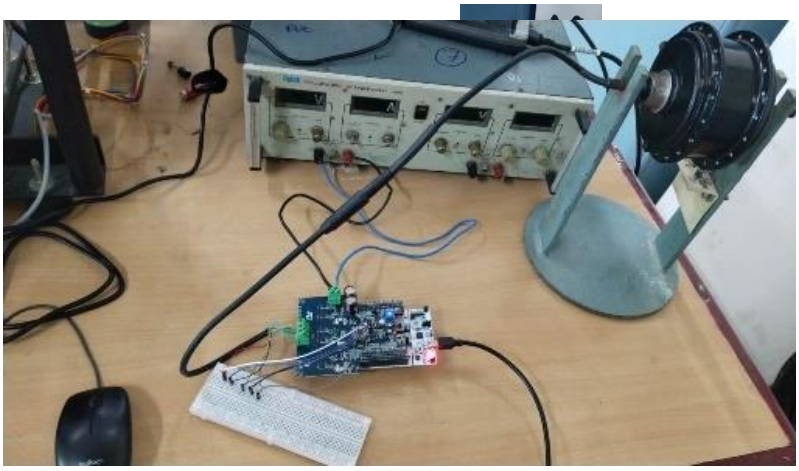
Verified the correctness of the fabricated controller.



Phase 2: Development of Alternate Controller (Week 2)

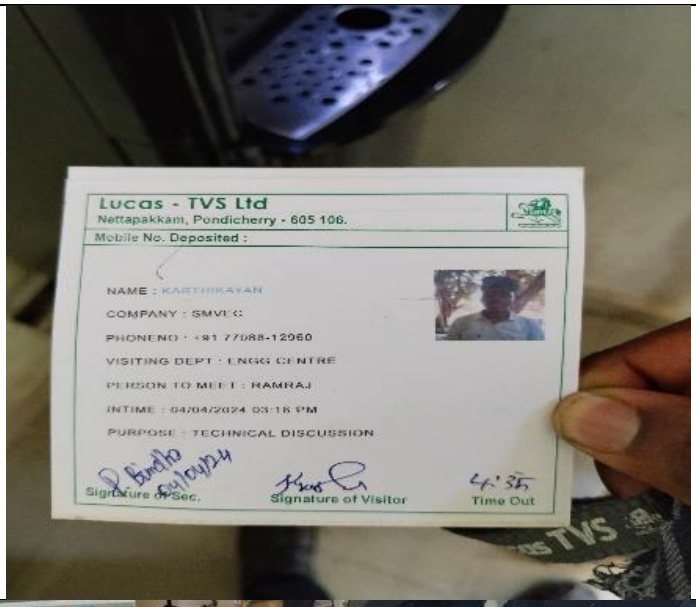
<table>
<tr><td colspan="2">Initiated the development of an alternate controller using the STM32F401RE board.</td></tr>
<tr><td> 
</td><td>Collaborated with Lucas-TVS technical experts to design an alternative controller.</td></tr>
<tr><td>  </td><td>Addressed errors related to crystal oscillator issues.</td></tr>
<tr><td> 
</td><td>updating data for EV controller</td></tr>
</table>

Phase 3: Integration of New Power Module (Week 3)

	Integrated the new power module IHM08M1 with the STM32F401RE board. 
	Optimized the IHM08M1 board to align with the motor's configuration.
	Successfully ensured motor functionality with the new controller setup.

Phase 4: Torque Testing and Optimization (Week 4)

	Conducted torque testing at Lucas-TVS site.

	Optimized the controller based on initial testing, achieving a torque output of 18N with desired parameters.
	Further configuration adjustments resulted in achieving a torque output of 20N with a PWM frequency of 25kHz.

Next Steps:

Further optimization and fine-tuning to achieve the desired torque range of 36-40N while ensuring optimal efficiency and speed performance.
Documentation of the entire project process and outcomes for future reference.

Conclusion:

The project has made significant progress towards achieving its objectives, with the torque output of the BLDC motor increased from 18N to 20N.

Acknowledgments:

We extend our gratitude to the Lucas-TVS team for their valuable support and guidance throughout the project duration.

Technical discussion for consultancy with Lucas-TVS Ltd, Pondicherry 24.2.2024.

Project Overview:

The BLDC Motor Torque Enhancement Project, undertaken in collaboration with Lucas-TVS Ltd, Pondicherry, aims to increase the torque output of an existing BLDC motor while improving its efficiency and speed performance.

Target Controller: EVSPIN32G

Discussion with

Lucas-TVS Ltd Team	Four skilled faculties from SMVEC	Six trained students:
1. Mr.N.Sridar, Head-Engineering, TVS Lucas, Nettapakkam, Puducherry 605106. **2. Mr.Ramraj,** Engineer, TVS Lucas, Nettapakkam, Puducherry 605106.	5. Dr.P.Jamuna, 6. Dr.D.Raja, 7. Mr. B. Parthiban, (Co-ordinator) 8. Dr. S. Ganesh Kumaran,	7. Mr. Kirubhanidhi T /4th -A 8. Mr.Mohanraji /4th -A 9. Mr. Tom Tijo Edattukaran /3rd -A 10. Mr. Karthikeyan P /3rd -A 11. Mr. Jayakumar D/3rd -A 12. Mr.JothiKrishnan/3rd -A

Technical discussion

Mr. Sridhar, Plant Engineer Head, visited the IDEA Lab and interacted with students and faculty members. During his visit, he held discussions on project development, innovative ideas, industry requirements, and opportunities for enhancing practical engineering skills through real-time projects.

Mr. Martin interacted with Mr. Sridhar, and faculty members at the IDEA Lab and engaged in meaningful discussions on project development, innovative solutions, and industry-oriented applications.

Technical discussion

Mr. P. Parthiban, Assistant Professor, Department of EEE, held a technical discussion with Mr. Sridhar, Plant Engineer Head, at the Electric Vehicle Laboratory on the development of an EV BLDC Controller Board. The interaction focused on project development, future enhancements, industry requirements, and innovative solutions for electric vehicle applications. During the visit, Mr. Sridhar also interacted with students and faculty members, sharing valuable insights on real-time projects, practical engineering skills, and emerging opportunities in the electric vehicle sector.

Technical discussion

ELECTRIC VEHICLE CLUB – Activity Report-2

Inverter Pulse Generation using ARDIUNO Report

Date: 16.09.2023

Venue: Lecture Hall, EEE Department

Introduction

An inverter is an electronic device that converts direct current (DC) to alternating current (AC). A key component of a modern inverter, especially those designed to produce a pure sine wave output, is the control system that generates the precise switching pulses for the power electronic switches (like MOSFETs or IGBTs). This is where a microcontroller like the Arduino comes in, serving as a low-cost, flexible, and powerful pulse generator. The most common technique used for this purpose is Pulse Width Modulation (PWM).

1. The Role of the Arduino Microcontroller

The Arduino board, with its microcontroller (e.g., the ATmega328P on the Uno), is an excellent platform for generating the complex pulse patterns required by an inverter. Unlike older, dedicated integrated circuits (ICs), an Arduino can be programmed to generate highly customized and flexible waveforms. This allows for the creation of inverters that can produce not just square waves, but also more desirable modified sine waves and pure sine waves.

Key functions of the Arduino in this application include:

Pulse Generation: Creating the timed ON and OFF signals.

Modulation: Varying the width of the pulses to shape the output waveform.

Control and Safety: Implementing features like dead time and over-current protection.

2. Pulse Generation Technique: Sinusoidal Pulse Width Modulation (SPWM)

For a pure sine wave inverter, the most effective method is Sinusoidal Pulse Width Modulation (SPWM). This technique creates a series of pulses with varying widths. The width of each pulse is proportional to the amplitude of a sine wave at that specific point in time. When these pulses are filtered through an LC (inductor-capacitor) filter, they synthesize a smooth, high-quality sine wave.

3. Arduino Programming and Code Structure

The Arduino code for a pure sine wave inverter is typically structured to perform the following tasks:

Setup Function (setup()):

Initialize the required digital pins as outputs for the H-bridge switches.

Configure the hardware timers to generate PWM signals at a specific frequency (e.g., 20 kHz for the carrier wave).

Lookup Table: A pre-calculated array of integer values (ranging from 0 to 255 for an 8-bit timer) is stored in the program memory. Each value in the array represents the duty cycle of a single PWM pulse and is a sample of a sine wave.

Conclusion

The Arduino microcontroller provides a robust and accessible platform for generating the complex pulse patterns required by an inverter. By utilizing hardware timers and the Sinusoidal Pulse Width Modulation (SPWM) technique, it is possible to create a high-quality AC sine wave output from a DC source. While the Arduino serves as the "brain" of the inverter, it must be paired with appropriate power electronics and filter circuits to handle the high voltages and currents. This combination offers a powerful and cost-effective solution for both educational projects and practical applications in renewable energy, power backup systems, and custom electronics.

Inverter Pulse Generation using ARDIUNO
Attendance Sheet

Date: 16.09.2023

Sl.No	Student Name	Present/Absent
1.	ABDUL HAFREED H	Present
2.	ARCHANA R	Present
3.	DEVANATHAN A	Present
4.	DHIVYASHREE M	Present
5.	DINESH R S	Present
6.	ELAMPARUTHI K	Present
7.	GANDHAM NAGENDRA KARTHIK	Present
8.	GAYATHRY G	Present
9.	GLADSON JOSHUA PAULRAJ I	Present
10.	GUNAPRIYA S	Present
11.	GURUDEVAN L	Present
12.	HEMANATHAN D	Present
13.	JAYAKUMAR D	Present
14.	JEEVASUDHAN G	Present
15.	JOTHIKRISHNAN.K	Present
16.	KALAIYARASSI M	Present
17.	KARTHIKEYAN P	Present
18.	KARTHIKRAJA S.D	Present
19.	KASTHURI C	Present
20.	KAVEEYA K	Present
21.	KAVIARASAN M	Present
22.	KAVIYA S	Present
23.	KEERTHIRAJ. V	Present
24.	LOGESH.S	Present
25.	LOKESH N	Present
26.	LOKESHWARI D	Present
27.	MAHEYNDIRAN.S	Present
28.	MOHAN LAL S	Present
29.	MURUGAN.S	Present
30.	NIRMAL D	Present

31.	NIVEDHA G	Present
32.	PRANAV B	Present
33.	PRIYADHARSHINI A	Present
34.	RAGHUL R	Present
35.	RAHUL T	Present
36.	RAMANAKRISHNAN S	Present
37.	ROSHAN ARVIND. V	Present
38.	SABARIGIREESANE J	Present
39.	SABARISH R	Present
40.	SAI SIDDARTH T S	Present
41.	SANJAI S	Present
42.	SANTHANA KRISHNAN E	Present
43.	SATHISH FRANCIS XAVIER R	Present
44.	SIVAGANESH M	Present
45.	SONIYA V	Present
46.	SOWMYA.S	Present
47.	SREE VARDNI P	Present
48.	SRIDHASAN NAMBI	Present
49.	SRINIVASAN S	Present
50.	SUSANGATI SAMANTARAY	Present
51.	SWETHA S	Present
52.	THAMIZHARASAN. S	Present
53.	THILAK BASKARAN C M	Present
54.	TOM TIJO EDATTUKARAN	Present
55.	VENKATESHWARAN R	Present
56.	VIGNESHWARAN V	Present
57.	VIJAYALAKSHMI S	Present
58.	VINISHA LAXMI G	Present
59.	YOGARAJAN R	Present
60.	YOGESH .R	Present

ELECTRIC VEHICLE CLUB – Activity Report-3

Recent Technology in Electric Vehicles Report

Date: 29.09.2023
Venue: Lecture Hall, EEE Department
Here is a report on recent technology in electric vehicles, covering key innovations in batteries, motors, and charging infrastructure.

1.Battery Technology:

The core of an electric vehicle's performance is its battery, and this is an area of rapid innovation.

Solid-State Batteries: This is one of the most significant advancements on the horizon. Unlike traditional lithium-ion batteries that use a liquid electrolyte, solid-state batteries use a solid electrolyte. This promises several advantages, including enhanced energy density, faster charging times, and improved safety due to a reduced risk of thermal runaway and fire hazards.

Improved Lithium-Ion Chemistries: While solid-state technology is maturing, current lithium-ion batteries are also being improved.

Lithium Iron Phosphate (LFP): LFP batteries are gaining popularity, especially in China. They are cheaper and safer than nickel-manganese-cobalt (NMC) batteries, though they have a slightly lower energy density, which can result in a shorter range.

High-Nickel and Manganese-Rich Cathodes: Manufacturers are developing new chemistries that use a higher proportion of nickel or manganese to increase energy density and reduce reliance on expensive and ethically problematic cobalt.

Sodium-Ion Batteries: These batteries are emerging as a potentially cost-effective alternative to lithium-ion, as they do not rely on critical minerals. They are particularly suitable for smaller EVs and e-bikes.

Advanced Battery Management Systems (BMS): Sophisticated software and hardware systems are being developed to monitor and control battery health, temperature, and charging/discharging cycles. This helps to extend battery life, prevent damage, and optimize performance.

2. Electric Motor Technology

Electric motors are becoming more efficient, powerful, and compact.

Axial Flux Motors: This type of motor is gaining attention for its "pancake-like" shape, which makes it significantly more compact and lighter than traditional radial flux motors. They also offer higher torque density and efficiency, making them ideal for high-performance applications.

Permanent Magnet Synchronous Motors (PMSMs): These motors are the most widely used type in modern EVs due to their high efficiency and power density. Ongoing advancements are focused on reducing their reliance on rare-earth magnets, which can be expensive and difficult to source.

Conclusion:

The innovations across battery, motor, and charging technologies are collectively addressing the key barriers to mass EV adoption: range anxiety, charging time, and cost. Improved battery chemistries and the promise of solid-state technology are delivering greater energy density and enhanced safety. Simultaneously, more efficient and compact motor designs are boosting performance and reducing the reliance on rare-earth materials. The expansion of ultra-fast charging networks, coupled with the introduction of wireless and bidirectional (V2G) charging, is transforming the refueling experience and integrating EVs into the broader energy ecosystem.

Recent Technology in Electric Vehicles

Attendance Sheet

Date: 29.09.2023

Sl.No	Student Name	Present/Absent
1.	ABDUL HAFREED H	Present
2.	ARCHANA R	Present
3.	DEVANATHAN A	Present
4.	DHIVYASHREE M	Present
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46.	SOWMYA.S	Present
47.	SREE VARDNI P	Present
48.	SRIDHASAN NAMBI	Present
49.	SRINIVASAN S	Present
50.	SUSANGATI SAMANTARAY	Present
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54.	TOM TIJO EDATTUKARAN	Present
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57.	VIJAYALAKSHMI S	Present
58.	VINISHA LAXMI G	Present
59.	YOGARAJAN R	Present
60.	YOGESH .R	Present