



# VIT<sup>®</sup>

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

## **ELECTRICA**

## **2022**

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**TECHNICAL MAGAZINE FROM THE  
SCHOOL OF ELECTRICAL  
ENGINEERING**

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***DEPARTMENT OF ELECTRICAL &  
ELECTRONICS ENGINEERING***

### **Vision**

To offer an education in electrical engineering that provides strong fundamental knowledge, skills for employability, cross-disciplinary research and creates leaders who provide technological solutions to societal and industry problems.

### **Mission**

- Provide personalized experiential learning in industry sponsored labs to prepare students in electrical engineering with strong critical thinking and employability skills.
- Foster design thinking, creativity and cross-disciplinary research with highly qualified faculty to create innovators and entrepreneurs in the broad area of electrical engineering.
- Collaborate with national and international partners to provide innovative solutions to societal and industry challenges.

# Magazine Credits:

## Chief Editors:(UG final Year Students)

- Sakshi Sharma
- Divyansh Gupta
- Abhinav Awasthi
- Mathew Santosh

## Associate Editors:(UG Third year)

- AnshumanBarpanda
- Arham Jain
- Athul A Augustine
- Darshan Mishra

### From the Magazine Team

“We are delighted to present to you all yet another fascinating issue of this magazine, which has been painstakingly, creatively, and inventively made. This year's issue, a result of perseverance and teamwork, captures the spirit of our department's advancements in a variety of areas this academic year. This edition, which was thoughtfully drafted and properly indexed, is adorned with teacher messages, creative corners, academic accomplishments, and much more. We genuinely hope that these observations will pique your interest, encourage you, and highlight the seemingly endless possibilities of electrical engineering. Explore and celebrate our dynamic community's outstanding accomplishments

HAPPY READING!”

## Assistant Designers:(UG Second year)

- Prajan R
- Devangshi Rout
- TejsvaPandey
- Nandini Walia

## Advisory Team: (PG Students)

- Mohammed Akhil Shariff
- DipteshBarua
- Shweta Sambhavi
- Swati Pandey

## Faculty Coordinator:

- Dr. Indragandhi V  
(Professor)

## Data Support:

- Mrs. S. Padma  
(Sr. Assistant, SELECT)

## Edition 2022:

**“ELECTRICA”**

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING  
SELECT– VIT

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# **CONTENTS:**

## **1. EDITORIAL SECTION**

**1.1 Dean's Reflection**

**1.2 HoD' Foresight**

**1.3 Message from the Faculty Coordinator**

## **2. DEPARTMENT OVERVIEW**

**2.1 History of EEE**

**2.2 Innovations**

**2.3 Facilities**

**2.4 Events**

## **3. ACHIEVERS' SECTION**

**3.1 Student Achievements**

**3.2 Faculty Achievements**

## **4. STUDENTS AND FACULTY CORNER**

**4.1 Projects**

**4.2 Publications**

## **5. AWARDS AND RECOGNITIONS**

## **6. ALUMNI SPOTLIGHT**

## **7. CREATIVE CORNER**

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## 1.1 DEAN'S REFLECTION



Respected readers, It gives me immense pleasure to welcome you all to drift through the pages of a yet another edition of our department's annual magazine, a testament to the achievements, ideas and aspirations that define our department of electrical engineering, SELECT.

Electrical engineering is not merely about circuit analogies and systems. It is rather, the art of innovation that breathes life into technology. From renewable energy systems and intelligent networks to cutting edge advancements in automation and artificial intelligence, this domain has been a driving force behind societal progress. As engineers, we are tasked with not just solving present-day challenges but envisioning a future that aligns with sustainable and inclusive growth.

Innovation is also about adaptability and resilience. In an era of rapid technological evolution, electrical engineers hold the responsibility of leveraging emerging trends like green technologies, energy-efficient systems, and the Internet of Things to redefine how we live and work. The solutions we create today will shape the world for generations to come.

As you traverse through the columns of this magazine, I would encourage you to reflect on the transformative potential of this domain. Let this publication ignite your passion and inspire you to contribute in this ever-evolving field. Together let us continue to shape young hearts, and lead with vision, creativity and purpose.

**Dr. Mathew Mithra Noel**  
Professor (HAG) and DEAN  
School of Electrical Engineering (SELECT)

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## 1.2 HoD's FORESIGHT



As A P J Abdul Kalam once stated, "Dream is not that which you see while sleeping, it is something that does not let you sleep." Learning is always a journey filled with obstacles. As a teacher, I get to witness a variety of students and faculty members working hard to fulfil their goals.

We commemorate the achievements that make our department the centre of creativity and innovation as we continue to navigate the always shifting terrain of our branch. This article demonstrates our department's ground-breaking research, innovative efforts, and exceptional accomplishments. Since we all think that the possibilities are endless, it demonstrates the ingenuity and the incredible accomplishments made by the teachers, students, and researchers in our department.

I want to express my appreciation to the magazine team in our department for bringing the vibrant atmosphere of our department to life. We use this publication as a forum to strengthen our sense of belonging. Undoubtedly, this edition will serve as a memory of the fantastic year we've had.

I hope our department's accomplishments make you proud and inspire you to keep going and realize your goals.

**Dr. Jacob Raeglend Isaac**  
Professor and HOD/EEE  
School of Electrical Engineering (SELECT)

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## 1.3 FACULTY COORDINATOR'S MESSAGE



**Greetings, Readers**

Speaking to you on behalf of the department of Electrical and Electronics Engineering has always been a privilege and a joy. Students are continuously supported by the department, which also helps them develop their innovative skills and abilities. Our department's several priority areas, such as renewable energy and e-vehicles, are aimed at improving people's everyday life. The department empowers students to carry out financed research in well-equipped research laboratories by fostering an innovative and inquisitive environment. To keep them on the cutting edge, we give them a well-planned, up-to-date academic education. We also give them the connections they need to pursue higher education and an entrepreneurial path.

Students that receive holistic development become more responsible, creative, and inventive. As a result, we encourage our students to participate in extracurricular and co-curricular activities in addition to their coursework. They can become future leaders since this method boosts their self-esteem, cultivates a positive outlook, and increases their social and ethical awareness. Their constant development and accomplishments are made possible by their efforts as well as the steadfast support of their parents, instructors, and well-wishers. Little actions taken repeatedly over time add up to success. Never give up because the work you do now will determine the engineer, inventor, and leader you become in the future. I would want to express my sincere gratitude to everyone who helped the EEE department succeed.

**Dr. Indragandhi V**  
**Professor**  
**School of Electrical Engineering (SELECT)**

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## 2.1 HISTORY OF EEE

The B.Tech. Electrical and Electronics Engineering programme had its inception in 1994. The programme lays emphasis on strong theoretical background on electrical engineering concepts in addition to providing avenues for divergent applications related to electromagnetism, power engineering, electronics and renewable resources.

The programme is handled by a team of experienced faculty equipped with wide research expertise in domains such as Smart Grid, Energy Management, E-Vehicle, Renewable and Sustainable Energy, Energy Monitoring, Insulation Diagnosis etc.

The department has excellently furnished laboratories to cater to the needs of both curriculum and research requirements. In addition, industry sponsored Centre of Excellence Schneider Electric Laboratory, Power System Research Lab, Switchgear& Protection Lab with high voltage testing facility for insulation diagnosis etc., provide the students with the essential hands-on experience to tackle real-time industry related challenges.

The department has signed several MoUs with various reputed Industries and Universities across the globe. The curriculum of the programme is conceived and formulated in close collaboration with leading experts from industries to ensure effective bridging of the gap between industry and academia.



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## 2.2 INNOVATIONS

### Smart Grid and Energy Storage:

In today's evolving energy landscape, integrating grids with energy storage systems is key to achieving efficient, reliable, and sustainable power management. Engineers, decision-makers, and testing professionals must understand the synergy between these technologies to build a flexible energy infrastructure.

### The Role of Energy Storage:

Energy storage systems are crucial for managing renewable energy by storing excess power during low demand and releasing it during peak times, ensuring a steady electricity supply. Common storage technologies include batteries, flywheels, pumped hydro, and compressed air. Lithium-ion batteries are particularly favored for their high capacity, efficiency, and declining costs.

### The Synergy between Smart Grids and Energy Storage:

The integration of grids with energy storage systems enhances grid stability, efficiency, and reliability. Key benefits include:

- **Improved Grid Stability:** Energy storage helps balance supply and demand, preventing outages and stabilizing the grid.
- **Renewable Integration:** Storage captures excess energy from solar and wind, reducing reliance on fossil fuels.
- **Demand Response & Peak Shaving:** Storage supports energy use reduction during peak hours, easing grid strain and lowering costs.
- **Power Quality & Resilience:** It improves voltage regulation and offers backup power during outages, enhancing grid resilience.
- **Economic Benefits:** Optimizing energy use reduces costs for utilities and consumers, with lower bills through demand response and time-based pricing.



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## 2.3 FACILITIES

The B.Tech Electrical and Electronics Engineering program conceived with industry partners and ensure world-class facilities which provide students with the knowledge and technical expertise in a wide range of Electrical and Electronics domains which include latest research areas like Smart Grid, Power Electronics, and Electric Vehicle etc. The electrical and electronics engineers are required in various core industries, IT companies and PSUs. Besides, the program enhances the creativity of the students to develop innovative projects and eventually results in novel products which help to starts their own company.

### Laboratories:

- Schneider Centre for Excellence Laboratory
- Electrical Machines Laboratory
- Power Systems Research Laboratory
- Protection and Switchgear Laboratory
- Digital Simulation Laboratory

### Major Equipment:

- High Voltage Test & Measuring Equipment – Impulse Test Set (100 kV, 10 kVA AC, 140 kV, 25 mA DC / 140 kV, 980 Joules)
- Fault Analyzer (LL-LG)
- Dielectric Testing and Measurement System for Insulation Diagnosis- Partial Discharge Testing and Measurement System
- 3-Phase Transformer/ differential relay (Transformer Protection Simulator)
- Generator Protection Simulator

- **SCADA Based Setup for Generator Protection Simulator**
- **CYME T & D Power Engineering**
- **Air Circuit Breaker**
- **Typhoon - Real-Time emulator**
- **PMSG Machine coupled with DC motor**
- **ElecNet VT Perpetual**
- **Programmable AC/DC Electronic Load**
- **High Performance GPU Hardware System with Accessories**
- **Driver Control System for Electrical Machines and Driver Test Bench**
- **APLAB make custom built DC power supply. O/P 20-200V/200A**
- **Computerization of testing and controlling Induction Motor bundle (8 slot integrated dual controller Artix-7FPGA, 512 MB RAM and 1GB ROM memory with ethernet cable)**



**Solar Energy Research Lab**

## 2.4 EVENTS

According to the statistical data, students have orchestrated a wide range of events ranging from thons to work shops. These events serve as a platform for creativity, networking, and knowledge exchange, contributing significantly to personal and academic development. These initiatives not only enhance students' organizational and leadership skills but also promote collaboration and innovation across various disciplines.

| Sl. No | Event Title   | From Date  | To Date    | Participants | Level    |
|--------|---|------------|------------|--------------|----------|
| 1.     | Two Day Virtual Industry Conclave on Current Trend in Advanced Instrumentation Next-Generation Control System                                   | 22-04-2022 | 23-04-2022 | 30           | National |
| 2.     | Design And Development of a Four Wheeled Electric Vehicle - Go Kart   | 24-06-2022 | 24-06-2022 | 38           | National |
| 3.     | Virtual Academia-Industry Conclave "Recent Trends in Smart Power Systems"   | 23-06-2022 | 24-06-2022 | 161          | National |
| 4.     | Council of Scientific and Industrial Research (CSIR) Sponsored National Workshop on Recent Trends in Green Energy Drives with Hands-On Practice | 07-04-2022 | 09-04-2022 | 112          | National |
| 5.     | Role of Engineers in India's Commitments Towards Conference of Parties 26   | 23-01-2022 | 23-01-2022 | 80           | National |

## 3.1 STUDENT ACHIEVEMENTS

DETAILS OF EVENTS OUTSIDE THE STATE AY 2021-22

International (AY 2021-22)

| S. No | NAME             | Reg. No.  | Event Name & Place  | Position           | Award Detail  |
|-------|------------------|-----------|---|--------------------|---|
| 1.    | Megha Choudhary  | 18BEE0157 | International Astronomy and Astrophysics competition                                  | Gold Honor         | Significant International Scholarship by Space Generation advisory council  |
| 2.    | Swapnil Banerjee | 18BEE0146 | IEEE 2021 International Conference Shillong, Meghalaya.                               | Best Paper Award   | Best paper of biomedical engineering Technical Session  |
| 3.    | Avishek Banerji  | 18BEE0323 | HPAIR Asia Conference 2021 and online event   | Gold tier delegate | Gold tier from VIT and have represented India in Harvard Asia Conference 2021   |
| 4.    | Avishek Banerji  | 18BEE0323 | Harvard College Project for Asian and International Relations & US                    | Youth delegate     | Youth delegate to 2021 HPAIR Asia Conference  |
| 5.    | Aditya Ghatak    | 18BEE0193 | STPEC-2021 Conference, Chhattisgarh   | Paper Presented    | A Time-Frequency Transform based fault detection and classification methodology for transmission lines paper at STPEC-2021    |
| 6.    | Aditya Ghatak    | 18BEE0193 | ICISSC-2021, Springer smart innovation, conference, Malla Reddy University, Hyderabad | Paper Presented    | Comparative study on estimation of remaining useful life of turbofan engines using machine learning algorithms at ICISSC-2021 |
| 7.    | Tushar Pandit    | 18BEE0244 | ICISSC-2021, Springer smart innovation conference, Malla Reddy University, Hyderabad  | Paper Presented    | Comparative study on estimation of remaining useful life of turbofan engines using machine learning algorithms at ICISSC-2021 |

|     |                    |           |  |                 |   |
|-----|--------------------|-----------|--|-----------------|---|
| 8.  | Vignesh Ramanathan | 18BEE0251 | ICISSC-2021, Springer smart innovation conference, Malla Reddy University, Hyderabad | Paper Presented | Comparative study on estimation of remaining useful life of turbofan engines using machine learning algorithms at ICISSC-2021 |
| 9.  | Aditya Ghatak      | 18BEE0193 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia        | Paper Presented | Modelling and analysis of automatic generation control in power systems   |
| 10. | Tushar Pandit      | 18BEE0244 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia        | Paper Presented | Modelling and analysis of automatic generation control in power systems   |
| 11. | Aditya Ghatak      | 18BEE0193 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia        | Paper Presented | Performance analysis of charge controller for electric vehicle with vehicle to grid system                                    |
| 12. | Tushar Pandit      | 18BEE0244 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia        | Paper Presented | Performance analysis of charge controller for electric vehicle with vehicle to grid system                                    |
| 13. | Avishek Banerji    | 18BEE0323 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia        | Paper Presented | IoT based driver optic monitoring and actuation system  |
| 14. | Vignesh Ramanathan | 18BEE0251 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia        | Paper Presented | Wireless ECG with machine learning based diagnostic analysis  |

|     |                             |           |  |                 |  |
|-----|-----------------------------|-----------|--|-----------------|--|
| 15. | Gokul Krishnan S            | 20BEE0184 | Power and advanced computing technologies, i-PACT2021, Kuala Lumpur, Malaysia  | Paper Presented | Cost-effective touch-less doorbell to combat COVID-19  |
| 16. | Tushar Pandit               | 18BEE0244 | SGGES 2021 VIT Vellore   | Paper Presented | Analysis of PV system in grid connected mode and islanded mode paper at SGGES 2021; organized by VIT Vellore, SEE Kyungpook National University (South Korea) and Naresuan University (Thailand) |
| 17. | Karapurkar Shivani Prashant | 17BEE0002 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Design and Analysis of Multi-input CLLC Converter for Charging Application   |
| 18. | Karapurkar Shivani Prashant | 17BEE0002 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Smart Meter Regulations in India   |
| 19. | Ananya Bhatnagar            | 17BEE0012 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Comparative Analysis on Control Techniques of a PMLDC Motor at Different Degree of Commutation   |

|     |                       |           |  |                 |   |
|-----|-----------------------|-----------|--|-----------------|---|
| 20. | Vedant Tomar          | 17BEE0035 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Design of Powertrain Model for an Electric Vehicle using MATLAB/Simulink            |
| 21. | Gobikumaar Sivagnanam | 17BEE0052 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Design and Analysis of Multi-input CLLC Converter for Charging Application          |
| 22. | Gobikumaar Sivagnanam | 17BEE0052 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Smart Meter Regulations in India  |
| 23. | Ayushi Singh          | 17BEE0148 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Optimal Design of Electrical Safety and Protection Systems for Hybrid Electric Cars |



|     |                |           |  |                 |   |
|-----|----------------|-----------|--|-----------------|---|
| 24. | Vaibhav Sharma | 17BEE0155 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Performance Comparison of Conventional and Intelligent method of Charge Estimation  |
| 25. | Neha Singh     | 17BEE0162 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Comparison Analysis of Different Face Detecting Techniques                          |
| 26. | Ankita Mohanty | 17BEE0207 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Optimal Design of Electrical Safety and Protection Systems for Hybrid Electric Cars |
| 27. | Kalpana Zutshi | 17BEE0242 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Performance Comparison of Conventional and Intelligent method of Charge Estimation  |

|     |                     |           |  |                 |   |
|-----|---------------------|-----------|--|-----------------|---|
| 28. | Devatri Banerjee    | 17BEE0300 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Performance Comparison of Conventional and Intelligent method of Charge Estimation                      |
| 29. | Balagurunathan B    | 17BEE0339 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | An Efficient Regenerative Braking System Based on Battery- Ultracapacitor for Electric Vehicles         |
| 30. | Suresh G            | 17BEE0341 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | An Efficient Regenerative Braking System Based on Battery- Ultracapacitor for Electric Vehicles         |
| 31. | Urvisha Shrivastava | 18BEE0029 | 3rd IEEE International Virtual Conference on Innovations in Power and Advanced Computing Technologies, i-PACT 2021, Kuala Lumpur, Malaysia | Paper Presented | Performance Comparison of VSI Fed PMSM Drive with ZSI Fed PMSM Drive Using Different Modulation Schemes |

**DETAILS OF EVENTS OUTSIDE THE STATE AY 2021-22**  
**National (AY 2021-22)**

| S. No | Name of the student   | Reg.No.   | Event Name &Place                             | Position          | Award Detail  |
|-------|-----------------------|-----------|---|-------------------|---|
| 1.    | Shachi Sinha          | 18BEE0199 | FanatiXx spectrum awards                      | Honor certificate | Spectrum budding writer award 2021                                  |
| 2.    | Apurba Ranjan         | 20BEE0203 | DSE MUN<br>University of Delhi                | Best Delegate     | Best Delegate by the Team Convention MBA(IB)                        |
| 3.    | Apurba Ranjan         | 20BEE0203 | Goswami Ganesh Dutta S.D. College, Chandigarh | Participated      | Won High Commendation   |
| 4.    | Apurba Ranjan         | 20BEE0203 | Delhi School of Economics                     | First             | Best Delegate by the Team Convention MBA(IB)                        |
| 5.    | Prayag Jain           | 18BEE0073 | Hackathon 4.0 organized by CISCO              | First             | Category of thingQbator   |
| 6.    | Asutosh Dalei         | 18BEE0289 | Hackathon 4.0 organized by CISCO              | First             | Category of thingQbator   |
| 7.    | Pratham Sudhir Shenoy | 20BEE0185 | TECHCRIO                                      | Second            | Cash prize by Team Infitude and Aero Club Nitte                     |
| 8.    | Ankur Kumar           | 20BEE0236 | Young Leaders Summit 2021                     | Participation     | Delegate for the IIM Bangalore's Vista – Young Leaders' Summit 2021 |

## DETAILS OF EVENTS WITHIN THE STATE AY2021-22

| S. No | NAME          | Regn. No. | Event Name &Place           | Position         | Award Detail   |
|-------|---------------|-----------|-----------------------------|------------------|--|
| 1.    | Harsh Pandey  | 19BEE0086 | WE HACK 3.0 & VIT           | Second           | A HON-V&V CHALLENGE sponsored by Honeywell and organized by SELECT, VIT.                                     |
| 2.    | Arjun M       | 19BEE0156 | WE HACK 3.0 & VIT           | Second           | A HON-V&V CHALLENGE sponsored by Honeywell and organized by SELECT, VIT.                                     |
| 3.    | Sweta Shah    | 17BEE0033 | EPREC2021<br>NIT Jamshedpur | Best Paper Award | Category of Recent Advances in Power Systems-4 (PS-4)  |
| 4.    | Dhruv Mahajan | 17BEE0352 | EPREC2021<br>NIT Jamshedpur | Best Paper Award | Category of Recent Advances in Power Systems-4 (PS-4)  |
| 5.    | Vaidik Jain   | 17BEE0018 | EPREC2021<br>NIT Jamshedpur | Best Paper Award | Category of Recent Advances in Power Systems-4 (PS-4)  |
| 6.    | Aditya Ghatak | 18BEE0193 | ICOSEC 2021<br>Trichy       | Presented paper  | ICOSEC 2021 Conference paper   |
| 7.    | Tushar Pandit | 18BEE0244 | ICOSEC 2021<br>Trichy       | Presented paper  | ICOSEC 2021 Conference paper   |
| 8.    | Aditya Ghatak | 18BEE0193 | SGGES 2021                  | Presented paper  | Organized by SEE Kyungpook National University (South Korea)& Naresuan University (Thailand) and VIT Vellore |
| 9.    | Tushar Pandit | 18BEE0193 | SGGES 2021                  | Presented paper  | Organized by SEE Kyungpook National University (South Korea)& Naresuan University (Thailand) and VIT Vellore |

## 3.2 FACULTY ACHIEVEMENTS

No. of Books published/Edited/Authoried/Chapter:

| S. No. | Assessment Year | Content Title   | ISBN              | Content Type  |
|--------|-----------------|---|-------------------|---------------|
| 1.     | 2022            | Smart Electrical and Mechanical Systems Machine learning application to power system forecasting - Rakesh Sehgal, Neeraj Gupta, Anuradha Tomar, Mukund Dutt Sharma, Vigna Kumaran | 978-0-323-90789-7 | Book Authored |
| 2.     | 2022            | Electric Power System and distribution analysis Future of Power distribution - K Sathish Kumar S Prabhakar  | 9781789856705     | Book Authored |
| 3.     | 2022            | Basic Electrical and Electronics Engineering (Second edition) - Dr. Vinothkumar K, Dr. Saravanakumar R, DrJagathesanV, DrKowsakya, Dr Mahesh M                                    | 9789354643194     | Book Authored |
| 4.     | 2022            | Basic Electrical and Electronics Engineering - K Vinoth Kumar K Saravanakumar R, JegatheesanV, KowsalyaM, Mahesh M  | 9789354643217     | Book Authored |
| 5.     | 2022            | Electric Motor Drives and their Applications with Simulation Practices - V Indragandhi, R Selvamathi, V. Subramaniaswamy  | 9780323919395     | Book Authored |
| 6.     | 2022            | Renewable Energy Integration to the Grid: A Probabilistic Perspective - Neeraj Gupta, AnuradhaTomar, B RajanarayanPrusty, Pankaj Gupta  | 9780367747947     | Book Authored |

|     |      |  |                                 |             |
|-----|------|--|---------------------------------|-------------|
| 7.  | 2022 | Smart Grids and Green Energy Systems - A. Chitra, V. Indragandhi, W. Razia Sultana   | 9781119872030                   | Book Edited |
| 8.  | 2022 | Applied Fractional Calculus in Identification and Control - Utkal Mehta, Kishore Bingi, Sahaj Saxena                       | 9789811935008                   | Book Edited |
| 9.  | 2022 | Smart grids and microgrids: Technology evolution - Prabhakaran P., Subramaniam U., Krishna S.M., Daya J.L.F., Brijesh P.V. | 9781119760603;<br>9781119760559 | Book        |
| 10. | 2022 | Smart grids and green energy systems - Chitra A., Indragandhi V., Sultana W.R.   | 9781119872061;<br>9781119872047 | Book        |

#### Product Development:

| S. No. | Assessment Year | Patent Title  | Date       | Status    |
|--------|-----------------|---|------------|-----------|
| 1      | 2021-22         | IoT based smart material for EV segment using wire electrical discharge machining thereof | 08-02-2022 | Published |
| 2      | 2021-22         | Mobile-based accident detection and alert system  | 22-07-2021 | Published |
| 3      | 2021-22         | Coconut grater attachment for household mixer grinders                                    | 21-07-2020 | Granted   |
| 4      | 2021-22         | Renewable energy powered wireless e-bicycle charger                                       | 23-04-2021 | Granted   |

## 4.1 STUDENT PROJECTS

| S. No | REG.NO    | Name                                | Guide Name             | Title   | Capstone Project at Inhouse/ Industry/ SAP |
|-------|-----------|-------------------------------------|------------------------|---|--|
| 1     | 18BEE0197 | KUNTA SAI<br>VENKATA<br>MUKESH GOWD | Dr. RAVI K             | SMART CHARGING STRATEGY FRAMEWORK FOR ELECTRIC VEHICLES WITH HIGH PENETRATION OF RENEWABLE ENERGY IN DISTRIBUTION NETWORK | Inhouse                                    |
| 2     | 18BEE0318 | DONTAM<br>YASHWANT                  | Dr. RAVI K             | SMART CHARGING STRATEGY FRAMEWORK FOR ELECTRIC VEHICLES WITH HIGH PENETRATION OF RENEWABLE ENERGY IN DISTRIBUTION NETWORK | Inhouse                                    |
| 3     | 18BEE0336 | JUJARE SAI<br>VARDHAN               | Dr. RAVI K             | SMART CHARGING STRATEGY FRAMEWORK FOR ELECTRIC VEHICLES WITH HIGH PENETRATION OF RENEWABLE ENERGY IN DISTRIBUTION NETWORK | Inhouse                                    |
| 4     | 18BEE0050 | MYLARAM<br>BUNNY SHARAN             | Dr. MEIKANDASIVAM<br>S | SHORT TERM LOAD FORECASTING USING SVM AND RANDOM FOREST   | Inhouse                                    |
| 5     | 18BEE0191 | ARYAN AVICOT<br>JOHN                | Dr. BELWIN EDWARD J    | IOT ENABLED SMART DOOR FOR TEMPERATURE AND FACE MASK DETECTION  | Inhouse                                    |
| 6     | 18BEE0238 | ESHAN NIGAM                         | Dr. BELWIN EDWARD J    | IOT ENABLED SMART DOOR FOR TEMPERATURE AND FACE MASK DETECTION  | Inhouse                                    |



|    |           |                          |                       |  |         |
|----|-----------|--------------------------|-----------------------|--|---------|
| 7  | 18BEE0235 | MANAV MANTRI             | Dr. RUBAN N           | COMPOUND EMOTION RECOGNITION USING PYTHON                              | Inhouse |
| 8  | 18BEE0379 | HARIT GOEL               | Dr. RUBAN N           | COMPOUND EMOTION RECOGNITION USING PYTHON                              | Inhouse |
| 9  | 18BEE0020 | SARANSH GAUTAM           | Dr. UMA SATHYAKAM P   | PLASMONIC INTERCONNECTS  | Inhouse |
| 10 | 18BEE0066 | SUCHIT MEHENGE           | Dr. UMA SATHYAKAM P   | PLASMONIC INTERCONNECTS  | Inhouse |
| 11 | 18BEE0067 | SATYAM CHATURVEDI        | Dr. UMA SATHYAKAM P   | PLASMONIC INTERCONNECTS  | Inhouse |
| 12 | 18BEE0291 | AMIT RANJAN GIRI         | Dr. SONAM SHRIVASTAVA | MULTI-LEVEL SECURE TRANSACTION USING FACIAL AUTHENTICATION             | Inhouse |
| 13 | 18BEE0299 | YATINDRA KUMAR GAUTAM    | Dr. SONAM SHRIVASTAVA | MULTI-LEVEL SECURE TRANSACTION USING FACIAL AUTHENTICATION             | Inhouse |
| 14 | 18BEE0310 | GYAN RANJAN              | Dr. SONAM SHRIVASTAVA | MULTI-LEVEL SECURE TRANSACTION USING FACIAL AUTHENTICATION             | Inhouse |
| 15 | 18BEE0009 | AVULA SATEESH            | Dr. BALAJI S          | SMART REFRIGERATOR-QUALITY AND QUANTITY MONITORING WITH ALERT MESSAGES | Inhouse |
| 16 | 18BEE0023 | KOTHA YAGNA SAI TEJA     | Dr. BALAJI S          | SMART REFRIGERATOR-QUALITY AND QUANTITY MONITORING WITH ALERT MESSAGES | Inhouse |
| 17 | 18BEE0041 | GUDISA AKHIL KUMAR REDDY | Dr. BALAJI S          | SMART REFRIGERATOR-QUALITY AND QUANTITY MONITORING WITH ALERT MESSAGES | Inhouse |

|    |           |                          |                          |   |         |
|----|-----------|--------------------------|--------------------------|---|---------|
| 18 | 18BEE0372 | R RANJITH KUMAR          | Dr. THIRUMALAIVASAN R    | MODELLING AND SIMULATION OF PERMANENT MAGNET SYNCHRONOUS MOTOR FOR ELECTRIC VEHICLE APPLICATION           | Inhouse |
| 19 | 18BEE0201 | DUMBRE SUCHEET VIKRAM    | Dr. SATHISHKUMAR K       | PREVENTION OF COVID-19 FROM IoT SOLUTIONS   | Inhouse |
| 20 | 18BEE0157 | MEGHA CHOUDHARY          | Dr. RAJA SINGH R         | FAULT DIAGNOSIS AND RELIABILITY ANALYSIS OF SQUIRREL CAGE INDUCTION MOTOR USING WAVELET TRANSFORM AND ANN | Inhouse |
| 21 | 18BEE0134 | NANOTI RUTURAJ           | Dr. SELVAKUMAR K         | GPU BASED ACCELERATION FOR IMAGE AND POINT CLOUD PROCESSING   | Inhouse |
| 22 | 18BEE0135 | AMITVIKRAM SANJEEV PUJAR | Dr. SELVAKUMAR K         | GPU BASED ACCELERATION FOR IMAGE AND POINT CLOUD PROCESSING   | Inhouse |
| 23 | 18BEE0166 | NISHITH NAYAN            | Dr. SELVAKUMAR K         | GPU BASED ACCELERATION FOR IMAGE AND POINT CLOUD PROCESSING   | Inhouse |
| 24 | 18BEE0102 | KUMAR PRIYANSH           | Dr. B RAJANARAYAN PRUSTY | IMPROVEMENT OF PREDICTAION ACCURACY IN POWER SYSTEMS VIA METHOD OF FORECAST COMBINATION                   | Inhouse |
| 25 | 18BEE0190 | PRATEEK BAPAT            | Dr. INDRAGANDHI V        | SOLAR POWERED CHARGING STATION FOR EV   | Inhouse |
| 26 | 18BEE0208 | GEETIK JAIN              | Dr. INDRAGANDHI V        | SOLAR POWERED CHARGING STATION FOR EV   | Inhouse |
| 27 | 18BEE0228 | B SREYAS                 | Dr. INDRAGANDHI V        | SOLAR POWERED CHARGING STATION FOR EV   | Inhouse |

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|----|-----------|--------------------------|---------------------|---|---------|
| 28 | 18BEE0008 | SIDDARTH S MENON         | Dr. RAJA SINGH R    | PERFORMANCE ANALYSIS OF PV BASED PSFB DC/DC CONVERTER FOR ELECTRIC VEHICLES | Inhouse |
| 29 | 18BEE0069 | RISHABH RAJ PRASAD       | Dr. RAJA SINGH R    | PERFORMANCE ANALYSIS OF PV BASED PSFB DC/DC CONVERTER FOR ELECTRIC VEHICLES | Inhouse |
| 30 | 18BEE0194 | CHRISTIANA JOHN          | Dr. UMA SATHYAKAM P | REPEATER DESIGN AND OPTIMIZATION FOR CNT INTERCONNECTS                      | Inhouse |
| 31 | 18BEE0198 | MADHAV KOODANA MADHU     | Dr. UMA SATHYAKAM P | REPEATER DESIGN AND OPTIMIZATION FOR CNT INTERCONNECTS                      | Inhouse |
| 32 | 18BEE0250 | NAGDA JAINIL ASHWIN      | Dr. UMA SATHYAKAM P | REPEATER DESIGN AND OPTIMIZATION FOR CNT INTERCONNECTS                      | Inhouse |
| 33 | 18BEE0070 | GOURANGA SATAPATHY       | Dr. SANTHAKUMAR R   | CONTROLLING HOME APPLIANCES USING AUGMENTED REALITY                         | Inhouse |
| 34 | 18BEE0321 | FAIZAN ALI PIPAWALA      | Dr. SANTHAKUMAR R   | CONTROLLING HOME APPLIANCES USING AUGMENTED REALITY                         | Inhouse |
| 35 | 18BEE0171 | VENKATA SRIKAR POTHARAJU | Dr. JANA K I M      | A SOLAR PV ARRAY BASED MULTIFUNCTIONAL EV CHARGER                           | Inhouse |
| 36 | 18BEE0327 | G YASWANTH               | Dr. JANA K I M      | A SOLAR PV ARRAY BASED MULTIFUNCTIONAL EV CHARGER                           | Inhouse |
| 37 | 18BEE0341 | DEBANIK MUKHERJEE        | Dr. CHITRA A        | PERFORMANCE ANALYSIS OF PV BASED PSFB DC/DC CONVERTER FOR ELECTRIC VEHICLES | Inhouse |

## 4.2 PUBLICATIONS

Students are encouraged to submit articles to magazines that are pertinent to the most recent advancements in the fields of Electrical and Electronics Engineering, as well as other engineering disciplines. The received articles are reviewed by the team members and the selected articles are published in ELECTRICA magazine.

| S.No. | Name of the article   | Name of the contributed student   | Description  |
|-------|---|---|--|
| 1     | Efficient Approximate Multiplier Design and Analysis for Image Processing Application | Arham Virendra Dodal<br>(20BEE0054)                                     | Designing and refining multipliers specifically for use in image processing applications was the main goal of the research. The main goal was to investigate new designs and approaches that would improve multipliers' performance and efficiency while meeting the unique needs of image processing applications.  |
| 2     | Design and Hardware Analysis of Approximate Multipliers                               | Divya Kant Gupta<br>(21BEI0028)<br>Pranav Pravin Akhauri<br>(21BEI0097) | Conventional computing prioritizes accuracy, which often comes at the cost of power consumption and processing speed. While this is critical for applications that require high accuracy, it may not be necessary for error-tolerant applications such as image processing, which can tolerate some inaccuracies. This is where approximate computing comes in - a technique that trades off slight reductions in accuracy for significant gains in performance. |

|   |   |   |  |
|---|---|---|--|
| 3 | Real-Time Flu Detection Using Cough Sounds and Machine Learning   | Ancha Yohitha Sai (20BEE0035)<br>Anusha Abraham (20BEEE0295)          | This work provides an advanced real-time cough sound classifier developed by combining healthcare and technological advancement knowledge for rapid detection of influenza. The framework enables seamless integration of a USB microphone with a laptop and then a three-stage processing paradigm: preprocessing, spectral analysis through Mel-Frequency Cepstral Coefficients (MFCCs), and the k-Nearest Neighbor (kNN) analysis power algorithm. Our vision is to exceed an 80% accuracy rate in flu diagnosis, representing a new high in flu detection approaches |
| 4 | Analysis of Si, SiC, and GaN MOSFETs for Electric Vehicle Power Electronics System                      | Shri Karan K (19BEI0040)<br>S Krithik (19BEI0047)                     | The electric vehicle industry has seen significant advancements since the 1960s, with current flagship vehicles capable of 550-600 miles on a single charge. High-power converters, including MOSFETs, capacitors and high-frequency switching equipment play a crucial role in power transfer and conversion. This project aims to optimize and innovate these converters for better functioning. Various types of MOSFETs, including Si, SiC and GaN, were analyzed in various converters using LT spice simulation software.  |
| 5 | Optimization of PID Controller Gains for Enhanced Speed Control of BLDC Motors: A Golden Eagle Approach | (21BEE0072 )<br>Adhiraj Kaushik<br>Tushnika Chattopadhyay (21BEE0005) | This article analyzes the physical modeling of a 3-Phase BLDC motor and proposes a six-step commutation logic design with a two-level MOSFET-based inverter configuration. A closed-loop speed control system using a PI controller is proposed using Golden Eagle Optimization (GEO) to determine optimal gains. This approach enhances operational efficiency and performance in automated manufacturing plants, with real-time results showcasing the system's performance under different operating conditions.  |

## 5.0 AWARDS & RECOGNITION

| S. No | Faculty Name             | Awarding Agency   | Name of Award   | Award Type  |
|-------|--------------------------|---|---|-------------|
| 1     | Dr. UMA SATHYAKAM P      | Web of Science  | Reviewer certificate from Web of Science                      | Recognition |
| 2     | Dr. BALAJI S             | IEEE, WSPC  | Reviewer  | Recognition |
| 3     | Dr. SATHISHKUMAR K       | VIT   | Fund generated through VAP and revenue generated around 18000 | Extension   |
| 4     | Dr. DHANAMJAYULU C       | Session Chair   | IEEE Record   | Awards      |
| 5     | Dr. DHANAMJAYULU C       | Reviewer  | IEEE Record C   | Awards      |
| 6     | Dr. MAHALAKSHMI P        | Reva University   | Member of Board of Studies                                    | Recognition |
| 7     | Dr. RAZIA SULTANA W      | Vellore Institute of Technology Vellore                 | ASC appreciation certificate                                  | Recognition |
| 8     | Dr. SITHARTHAN R         | Alper Doger Scientific Index                            | Ranking for scientist   | Extension   |
| 9     | Dr. KARTHIKEYAN A        | VIT University  | Reviewer  | Awards      |
| 10    | Dr. MAHALAKSHMI P        | Institutions Innovation Council VIT                     | Smart India Hackathon Evaluator of projects                   | Extension   |
| 11    | Dr. B RAJANARAYAN PRUSTY | International Transactions on Electrical Energy Systems | Academic Editor   | Recognition |
| 12    | Dr. SUDHAKAR N           | Wiley International                                     | Top Cited Article   | Awards      |
| 13    | Dr. B RAJANARAYAN PRUSTY | Mathematical Problems in Engineering                    | Academic Editor   | Recognition |
| 14    | Dr. SHARMILA A           | AD Scientific Index                                     | Ranking for Scientist   | Recognition |
| 15    | Dr. MONICA SUBASHINI M   | World Scientist and University Rankings 2021            | World Scientist and University Rankings 2021                  | Recognition |
| 16    | Dr. CHITRA A             | Pondicherry Engineering College                         | Board of studies member                                       | Recognition |

|    |                                |                                 |  |             |
|----|--------------------------------|---------------------------------|--|-------------|
| 17 | Dr. MAHALAKSHMI P              | IEEE i-PACT                     | Technical Reviewer in International Conference                               | Recognition |
| 18 | Dr. VENKATA LAKSHMI NARAYANA K | Office of Academic Research VIT | Raman Research Award   | Awards      |
| 19 | Dr. RAVI K                     | VIT                             | VIT RESEARCH AWARD   | Recognition |
| 20 | Dr. SHARMILA A                 | VIT                             | VIT Research Award for the year 2019 and 2020                                | Awards      |
| 21 | Dr. JACOB RAGLEND I            | Vellore Institute of Technology | Research Award   | Awards      |
| 22 | Dr. JACOB RAGLEND I            | Vellore Institute of Technology | Research Award   | Awards      |
| 23 | Dr. RASHMI RANJAN DAS          | RESEARCH AWARD                  | VIT  | Recognition |
| 24 | Dr. YASHWANT SAWLE             | NIT Silchar                     | 1st International Conference on Emerging Electronics & Automation (E2A) 2021 | Recognition |
| 25 | Dr. YASHWANT SAWLE             | MANIT BHOPAL                    | Invited as a Co-chair in IEEE conference organized by MANIT Bhopal           | Recognition |
| 26 | Dr. DHANAMJAYULU C             | Session Chair                   | IEEE IPACT Conference  | Recognition |
| 27 | Dr. UMA SATHYAKAMP             | iPACT conference committee VIT  | Reviewer Certificate iPACT   | Recognition |
| 28 | Dr. WASHIMA TASNIN             | Universiti Malaya               | Best Paper Award   | Awards      |
| 29 | Dr. DHANAMJAYULU C             | Reviewer                        | IEEE IPACT Conference  | Recognition |
| 30 | Dr. SATHISHKUMAR K             | VIT                             | Research and H Index Award   | Awards      |
| 31 | Dr. CHITRA A                   | IEEE                            | Best paper award   | Recognition |
| 32 | Dr. DHANAMJAYULU C             | Best paper                      | IEEE IPACT Conference  | Awards      |
| 33 | Dr. SHARMILA A                 | Universiti of Malaya and VIT    | Session Chair for iPACT 2021   | Recognition |




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|----|--------------------------|--|---|-------------|
| 34 | Dr. SHARMILA A           | Universiti of Malaya and VIT                         | Reviewer for iPACT 2021 Conference  | Recognition |
| 35 | Dr. DHANAMJAYULU C       | VIT  | Research award  | Awards      |
| 36 | Dr. UMA SATHYAKAM P      | IEEE   | Reviewer Certificate for conference   | Recognition |
| 37 | Dr. SITHARTHAN R         | Stanford University                                  | Top 2% Scientists ranking and Clarivate Analytics publishes the Highly Cited Researchers list | Recognition |
| 38 | Dr. SRIHARI MANDAVA      | Samsung  | Samsung Prism   | Recognition |
| 39 | Dr. YASHWANT SAWLE       | Rashtrasantukadoji Maharaj Nagpur University, Nagpur | External examiner/ defense of PHD thesis  | Recognition |
| 40 | Dr. SUDHAKAR N           | IEEE   | Best paper  | Awards      |
| 41 | Dr. WASHIMA TASNIN       | IT-ITeS Sector Skill Council                         | Certified IoT Domain Analyst Master Trainer   | Recognition |
| 42 | Dr. B RAJANARAYAN PRUSTY | Journal of Electrical Engineering and Technology     | Associate Editor  | Recognition |
| 43 | Dr. RANI C               | Glasgow Caledonian University Scotland               | Visiting Research Fellow  | Recognition |

| S. No | Faculty Name                 | Innovation Title                 | Award Agency | Level         | Type     |
|-------|------------------------------|----------------------------------|--------------|---------------|----------|
| 1     | Dr. INDRAGANDHI V            | Guest Editor                     | MDPI         | International | Research |
| 2     | Dr. MEDARAMETLA PRAVEENKUMAR | research award                   | VIT          | VIT           | Research |
| 3     | Dr. GEETHA M                 | Research Award For The Year 2020 | VIT          | Institute     | Research |
| 4     | Dr. GEETHA M                 | Research Award For The Year 2019 | VIT          | Institute     | Research |

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|----|------------------------|--|---|---------------|------------|
| 5  | Dr. KISHORE BINGI      | Research Award for the Year 2020                                 | Academic Research Office                    | VIT           | Research   |
| 6  | Dr. VENKATARAMAN M. N  | Certificate of Appreciation                                      | Vellore Institute of Technology             | Institute     | Research   |
| 7  | Dr. MAHALAKSHMI P      | Research Award   | VIT-Vellore                                 | VIT           | Research   |
| 8  | Dr. JAGANATHAPANDIAN B | Research Award 2020  | VIT   | Institute     | Research   |
| 9  | Dr. JACOB RAGLEND I    | Research Award   | VIT   | VIT           | Research   |
| 10 | Dr. SHARMILA A         | Research Award   | VIT   | VIT           | Research   |
| 11 | Dr. SHARMILA A         | Research Award   | VIT   | VIT           | Research   |
| 12 | Dr. UMA SATHYAKAM P    | VIT Research award 2020  | VIT   | Institute     | Research   |
| 13 | Dr. RAJINI G.K         | Defining The Problem Statement                                   | Laki Reddy Balireddy College Of Engineering | Institute     | Innovation |
| 14 | Dr. VIDHYA SAGAR G     | Research Award   | VIT   | VIT           | Research   |
| 15 | Dr. BALAJI S           | Best Paper Award   | VIT and University of Malasiya              | International | Best Paper |
| 16 | Dr. BALAJI S           | Publication in Peer Reviewed Journals                            | Vellore Institute of Technology             | VIT           | Research   |
| 17 | Dr. SARAVANAN B        | Research Award   | VIT   | VIT           | Research   |
| 18 | Dr. SANTHAKUMAR R      | IoT Technology Applications and Challenges A Contemporary Survey | VIT University                              | VIT           | Research   |

|    |                   |   |   |               |            |
|----|-------------------|---|---|---------------|------------|
| 19 | Dr. SUDHAKAR N    | An Effective Emi Mitigation Technique Using Chaotic PWM For Interleaved Boost Converter | IEEE Chapter Chaitanya Bharathi Institute of Technology CBIT Hydrabad India | International | Best Paper |
| 20 | Dr. KISHORE BINGI | An Inertia Weight Concept Based Salp Swarm Optimization Algorithm                       | IEEE Madras Section International Conference                                | International | Best Paper |
| 21 | Dr. KISHORE BINGI | Adaptation of Spiral Radius and Angle in Hypotrochoid Spiral Dynamic Algorithm          | IEEE Madras Section International Conference                                | International | Best Paper |
| 22 | Dr. KISHORE BINGI | Development of Hybrid Algorithm Using Moth Flame and Particle Swarm Optimization        | IEEE Madras Section International Conference                                | International | Best Paper |

## 6.0 ALUMNI SPOTLIGHT



**Aakarsh Nayyar** · 3rd  
Co-founder and CIO at Aliste Technologies (100x Class 08) | Featured on Shark Tank India

**Aiste Technologies**  
Vellore Institute of Technology

- **B-Tech in Electrical and Electronics Engineering, VIT, Vellore Campus, 2016-2020.**

Elevate the comfort of your home. Aliste helps you make your home smart without making you burn a hole through your pocket. Our aim is to redefine the way people live by imparting luxury and maximising convenience through our products. Our Smart Home product line and mobile applications have been lauded by our users and industry - experts. Join us in making the Indian home, a more secure & comfortable place to live.

Website: <http://www.alistetechnologies.com>,

Phone: 8791644744

Industry: Automation Machinery Manufacturing

Company size: 11-50 employees

Headquarters: Noida, Uttar Pradesh

Founded: 2020

# 7.0 CREATIVE CORNER



DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING  
SELECT - VIT, VELLORE

## RECOGNITION PAYMENT SYSTEM SECURELY ENCRYPTED BY SM4 ALGORITHM

AMIT RANJAN GIRI (18BEE0291), YATINDRA KUMAR GAUTAM (18BEE0299)

This project explores the integration of face recognition technology and secure payment systems, leveraging the SM4 encryption algorithm to ensure data protection. The primary objective is to implement a payment system where user authentication is based on facial recognition, with all transactions encrypted using the SM4 algorithm, a Chinese block cipher that is part of the national standard for cryptography. The system is designed to capture and verify the user's facial features, using a camera to generate a facial image, which is processed and matched against a pre-stored database of registered users. Once the identity is verified, the payment process is initiated. To secure this process, all sensitive data, including facial templates and transaction details, are encrypted using the SM4 algorithm, ensuring the confidentiality and integrity of the information. The SM4 encryption algorithm operates with a 128-bit key and a block size of 128 bits. It is known for its efficiency in hardware and software implementations, making it suitable for high-performance applications. The system integrates SM4 encryption at various stages, from storing facial data to transmitting payment information, preventing unauthorized access.



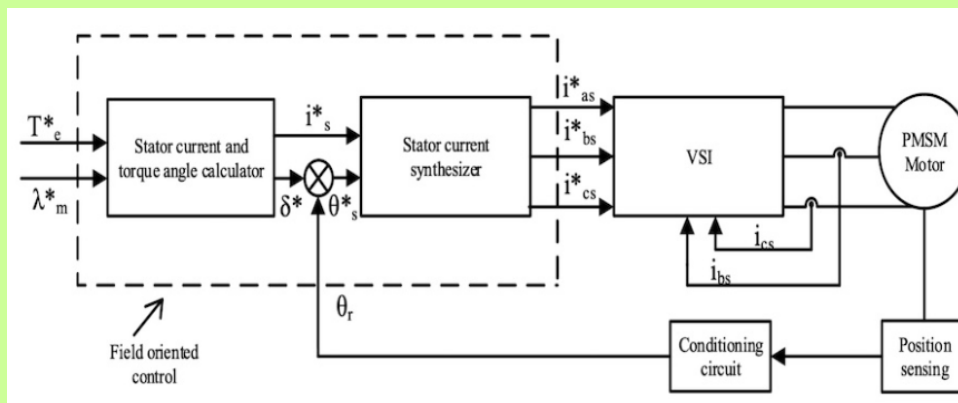
For performance evaluation, the system was tested under various conditions, including different lighting environments and user facial variations. The accuracy of facial recognition was assessed using standard datasets, and the encryption efficiency was evaluated by measuring processing times and resource consumption.

The results showed that the system provides high accuracy in facial recognition and robust encryption performance, with minimal delays in processing. The SM4 algorithm was effective in securing the data, maintaining fast transaction speeds, and ensuring the overall security of the payment process.

## **SIMULATION OF PERMANENT MAGNET SYNCHRONOUS MOTOR FOR ELECTRIC VEHICLE APPLICATION**

**R RANJITH KUMAR (18BEE0372)**

This project focuses on the simulation of a Permanent Magnet Synchronous Motor (PMSM) for use in electric vehicles (EVs). The primary goal is to analyze the performance characteristics of the PMSM, which is widely recognized for its high efficiency, compact design, and superior torque density, making it ideal for EV applications. The simulation model was developed using MATLAB/Simulink, a powerful tool for simulating electrical systems. The PMSM is powered by permanent magnets, which eliminates the need for external excitation, reducing complexity and enhancing reliability. The system's key parameters, such as motor speed, torque, and power, were simulated under various operating conditions, including different loads and speeds typical of EV driving scenarios. During the simulation, the motor's torque-speed characteristics were analyzed, and performance metrics like efficiency, power factor, and electrical losses were evaluated. The results showed that the PMSM provides excellent torque response and efficiency across a wide range of operating speeds, with minimal losses, making it suitable for the high demands of electric vehicle propulsion.



The simulation also highlighted the control strategies used to optimize motor performance, including field-oriented control (FOC) to ensure smooth and efficient operation. The PMSM was found to offer good dynamic performance, with rapid acceleration and deceleration, crucial for EV driving.

In conclusion, the simulation demonstrated that the Permanent Magnet Synchronous Motor is an effective and efficient choice for electric vehicle applications, offering high performance with low energy losses. Further optimization and testing in real-world conditions can enhance its potential in electric vehicle propulsion systems.

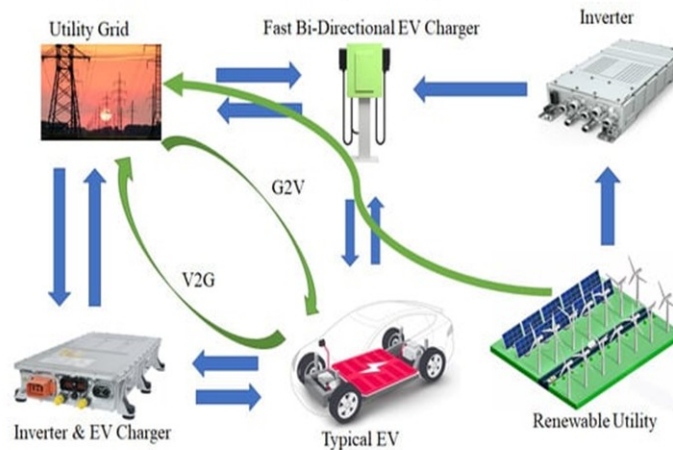
## **POWER CONVERTER TOPOLOGIES FOR VEHICLE TO GRID (V2G) AND GRID TO VEHICLE (G2V)**

**UTKARSH SRIVASTAVA (18BEE0016)**

This project investigates power converter topologies for Vehicle to Grid (V2G) and Grid to Vehicle (G2V) applications, which are crucial for integrating electric vehicles (EVs) with the electrical grid. The V2G and G2V technologies enable bidirectional energy flow, allowing EVs to either supply power to the grid (V2G) or receive power from it (G2V), supporting grid stability and optimizing energy use.

The focus of the report is on analyzing various power converter topologies used to facilitate efficient energy transfer in both directions. Common converter types discussed include bidirectional DC-DC converters, bidirectional AC-DC converters, and three-phase inverters, each chosen based on their ability to handle varying voltage levels, current ratings, and efficiency requirements for both charging and discharging modes.

Key converter topologies like the full-bridge and half-bridge configurations were evaluated, considering factors such as power rating, cost, and control complexity. These converters are crucial for ensuring reliable power exchange while maintaining the safety and stability of both the vehicle battery and the grid.



The report also covers the importance of control strategies like maximum power point tracking (MPPT) for optimizing energy exchange between the EV and the grid. For performance evaluation, the system was tested under various conditions, including different lighting environments and user facial variations. The accuracy of facial recognition was assessed using standard datasets, and the encryption efficiency was evaluated by measuring processing times and resource consumption. The results highlight that bidirectional converters offer high efficiency, flexibility, and compactness, making them suitable for V2G and G2V applications.



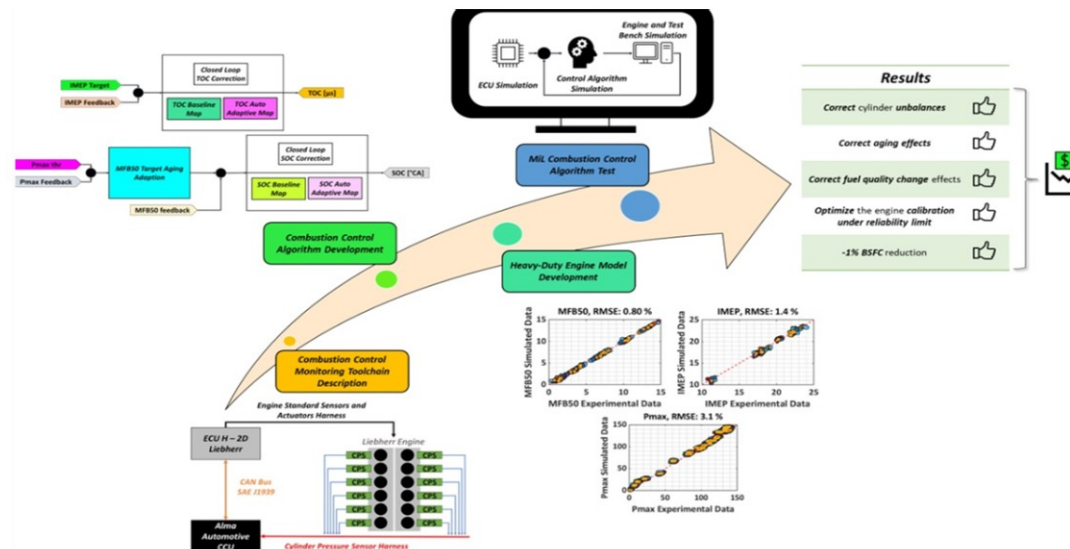
## SAFETY AND RELIABILITY ENHANCEMENT IN THE SPM MACHINES ON H SERIES CYLINDER BLOCK LINE

**SANTHOSH T (18BEE0101)**

This project focuses on enhancing the safety and reliability of Special Purpose Machines (SPM) used in the H-Series cylinder block production line. The aim is to improve the operational performance of these machines, ensuring higher safety standards and reducing the risk of machine failures during the manufacturing process.

The primary focus is on identifying key areas where safety and reliability can be improved, including the design of machine components, safety systems, and maintenance practices. Several measures were implemented, such as incorporating advanced sensors for real-time monitoring of critical parameters, enhancing machine guarding, and implementing fail-safe mechanisms to prevent accidents during operation.

The reliability enhancement strategies include the use of predictive maintenance techniques, where data from sensors is analyzed to predict potential failures before they occur, thereby reducing unplanned downtime. Additionally, vibration analysis and thermal management were optimized to ensure that machine components operate within safe limits, preventing overheating and mechanical failures.



Results from the implementation showed a significant improvement in both machine uptime and safety. The enhanced safety features reduced the risk of accidents, and the reliability improvements led to fewer breakdowns, resulting in a more efficient and consistent production process for the H-Series cylinder block line.