



Loyola-ICAM College of Engineering and Technology (LICET)
Department of Electrical and Electronics Engineering
Electrical Engineers League (EEL)

Under

AICTE – Scheme for Promoting Interest, Creativity and Ethics among Students
(SPICES)

Event Report

Category: **Industrial Conclave**

Title of the Event: **EV Ecosystem**

Date: 23-02-2023

Venue: G01

Details of Participants

- Total No. of Participants: 117
- I EEE (Batch: 2021 – 2025): 60
- II EEE (Batch: 2021 – 2025): 57
- III EEE (Batch: 2020 – 2024):57
- IV EEE (Batch: 2019 – 2023):51

Technological/ Academic/ Other benefits generated by conducting the event with respect to:

(a) the institution	<ul style="list-style-type: none">● Networking & building brand recognition - promote the institution and help people connect with our brand● Showcase the facilities at the institution by bringing the faculty from premium institutions
(b) the faculty	<ul style="list-style-type: none">● Strengthen faculty community and build relationships with each other● Meet like-minded individuals in person and encourage active engagement
(c) Students	<ul style="list-style-type: none">● To stay on the top of current trends, especially with technology, causing rapid change across many different industries.● Academic engagement/ engagement in scholarly activities
(d) Industry/ Society	<ul style="list-style-type: none">● Clarifying the image of the avenues of development in the near future● Contributing to make the literacy rate rise higher thereby helping build a more educated, empowered and aware society

Proceedings of the event

Category: Industrial Conclave

Report on EV Ecosystem

Date: 23-02-2023

Time: 10:10 am to 12:40 pm

Venue: G01

Resource People: Mr. Sandeep Chittaranjan – Manufacturing Head at Tempel.

Mr. Sambasivaiah Puchallapali – PhD Research Scholar at Indian Institute of Technology Delhi.

Mr. Aashik Joe Navis – Graduate Engineering Trainee – Reep Motors.

Audience: Students and Faculty of Department of EEE (Members of EEL)

The vast potential of Electric Vehicles in India was put forth by the principal in his welcome address. He briefed that the large number of population and the young working minds are the causes for the EV boom in India. He also briefed the audience about Design Thinking and how important it is to integrate core department with other departments in order to meet the industrial needs. On striking the right note the industrialists and the officials were welcomed.

Next, we had in our midst Mr. Sandeep Chittaranjan who dealt with Motor and Battery Packing. He started by introducing the VUCA – Volatility, Uncertainty, Complexity and Ambiguity) principle. He then delved into various topics such as grid infrastructure, charging infrastructure and government policies related to the energy sector. Mr. Sandeep went on to discuss the unique features of the Tempel manufacturing industry. He mentioned that the company had achieved a net worth of 5 billion dollars and also explained their manufacturing process. The use of electric steel, a special type of steel with low loss and high efficiency was highlighted by him. He also stated that the residue in the lamination should not exceed 2 mg and therefore high level of cleanliness to avoid short circuit due to the impurities present on the manufacturing parts is ensured by the company. He stated that the company mainly focusses on Decarbonization and by the year 2050 they aim towards Zero Carbon Emission. He had also dealt with the importance of sustainable development in EV industries and the focus on Net Zero Carbon Footprint. Towards the end of the presentation, Mr. Sandeep briefly explained the concept of Tempel Smart Factory and the recent implementation of automation in their manufacturing process.

Next, we had Mr. Sambasivaiah Puchallapali amidst us. His main focus was towards Electric Motors and Drives. He began by telling the students about why one must replace internal combustion engines with electric vehicles. He dealt with the data analysis related to oil consumption and how EV's reduce oil production and its demand. As stated by Mr. Sambasivaiah the advantages of electric vehicles are – Energy efficiency, Less dependance of oil import, No fuel and therefore no emission, Wide range of speed (300 miles per charge), Health benefits, Light weight due to less moving parts, Cheaper to maintain and minimal temperature rise. Then he briefed the audience about Well To Wheel Approach. Different storage units including Ultra Capacitors was also explained by the speaker. He also

mentioned how center of gravity plays a vital role in automobile manufacturing. Discussions about the timeline of EV evolution was also stated by him. He then discussed about the Basic Drive systems in EV such as Power Electronic Converter. Then he stated that the control system for electric drives include the Speed Sensor which measures the rotational speed of the motor. He also added that the speed of the motor can be controlled by using Torque Control Methodologies. He then classified EV configurations based on Voltage levels such as – High Voltage Drive and Low Voltage Drive. He then concluded by briefing us about EV configuration for 3-wheeler application.

Next, we had amidst us Mr. Aashik Joe Navis who mainly focused on Battery Management System and Battery Packing. He started by discussing about the types of 3 wheelers based on speed – L3 (25 km/hr.) and L5 (more than 25 km/hr.). Battery Energy Storage Systems (BESS) was the main area of focus. Applications of Lithium Ferro Phosphate Battery was also briefed by him. He informed that China manufactures 95% of LFP batteries and India is now focusing on Sustainable Recycling of LFP batteries. Next, he dealt with the Stages of Battery Pack Design. Later, he briefed us about Series and Parallel connection of cells. Then he highlighted a few points about the Battery Management System (BMS) and stated that the main function of BMS is to balance the charging and discharging of all the cells. He finally touched upon a few points on BMS Communication and BMS Architecture.

Then the conclave was open to Panel Discussion. Firstly, the skills expected from Core engineering perspectives were discussed. Expertise in design of Converter, Motor and Controller was one of the expectations from Core Engineering. Knowledge about batteries could be another important skill to be acquired. Also Mr. Sandeep stated that being strong in basics was another important need. Then Mr. Prabhu Shankar dealt with the 3 E's – Exposure, Experience, Expertise and discussions related to the 3 E's were made by the panel of Dignitaries. Questions about Employability, Trainability and deplorability were raised. The industrialists concluded that continuous Learning and Unlearning are the key points to be remembered in order to sustain in an industrial environment. They concluded that employees must learn to unlearn. Later discussions on how faculties must train the students to meet the industrial needs was also discussed. Later discussions on Protection system in EV's were being made. The industrialists mainly focused on the different types of sensors that are available to sense the various parameters such as voltage and current when the drive is in operation. They also helped the students to understand about MOC and AOC. The next question that was put forth was about Swapping Batteries. Mr. Aashik Joe Navis stated that batteries have fixed voltage and therefore it becomes difficult to swap batteries as parallel voltage changes and the motor cannot run. However, Mr. Sandeep stated that it is not entirely impossible to swap batteries. The next topic of discussion was about Electric Vehicle Charging Stations where the industrialists introduced about the two government policies which are – Fast Charging and Slow Charging. Mr. Aashik Joe Navis stated that BESS can be employed to charge many EV's as they contain many batteries inbuilt in them and they get charged with the help of Solar Panels. The dignitaries also added that in order to set up charging station for electric vehicles the manufacturers of all companies must consider standard port design. The next topic of discussion was Ultra Capacity system and how it varies from normal system. The session was then ended by discussing about the opportunities available for Control engineers and the growing Employment opportunities in the field of Electric Vehicles.

Relevant Courses in the current semester

EE3303 Electrical Machines – I

- Electric Motors

EE3503 Control systems

- Control system for electric drives

EE3405 Electrical Machine – II

- Induction motors used in electric vehicles

Relevant Program Outcomes

- PO5 – Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PO6 – The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7 – Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- PO8 – Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9 – Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10 – Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- PO12 – Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Feedback

