



**NARAYANA**  
**ENGINEERING COLLEGE**  
NELLORE (AUTONOMOUS)



Department of  
Electrical and Electronics Engineering

# THUNDER TRENDS

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## Vision of the Institute

To be one of the nation's premier Institutions for Technical and Management Education and a key contributor for Technological and Socio-economic Development of the Nation.

## Mission of the Institute

- To produce technically competent Engineers and Managers by maintaining high academic standards, world class infrastructure and core instructions.
- To enhance innovative skills and multi disciplinary approach of students through well experienced faculty and industry interactions.
- To inculcate global perspective and attitude of students to face real world challenges by developing leadership qualities, lifelong learning abilities and ethical values.

## Vision of the Department

To impart knowledge in the field of Electrical and Electronics Engineering to meet the technical challenges of industry and society with strong innovative skills, leadership qualities and ethics.

## Mission of the Department

- To provide standard training and effective teaching learning process to the students by using the state-of-the-art laboratories, core instruction and efficient faculty.
- To enhance competent, innovative and technical skills amongst the students through training programs by industry and external participation.
- To inculcate leadership qualities, ethical values and lifelong learning skills in learners to serve the society and nation for overall development through value based education.

## Program Educational Objectives (PEOs)

Programme Educational Objectives (PEOs) of B.Tech (Electrical and Electronics Engineering) program are: Within few years of graduation, the graduates will

**PEO-1:** To solve composite problems using mathematics, basic sciences and engineering principles in the domains of testing, design and manufacturing.

**PEO-2:** To achieve higher positions in their profession by demonstrating leadership qualities, research and innovative abilities.

**PEO-3:** To contribute in the field of Electrical and Electronics Engineering to finding solutions for societal problems through their lifelong learning skills and ethical values.

## Program Outcomes (POs)

**PO-1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO-2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO-3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO-4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO-5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO-6:** 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.

**PO-7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO-8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO-9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO-10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with 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.

**PO-11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO-12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Program Specific Outcomes (PSOs)

On completion of the B.Tech. (Electrical and Electronics Engineering) degree, the graduates will be able to

**PSO-1:** Provide alternate solutions to address the problems with specific requirements in the field of Electrical and Electronics Engineering.

**PSO-2:** be ready to work professionally in relevant industries like power systems, control systems and software industries.

**How AI and Automation Are Changing the Nature of Work:** AI, Automation, digital platforms, and other innovations are changing the essential nature of work. AI and automation are transforming how businesses communicate with their consumers, and execute their internal processes, reinventing themselves in the way they operate. Understanding these shifts can help innovators, business leaders, and professionals march forward. This article looks at the top industries impacted by AI and how it's changing the nature of the workforce these industries require.

**Manufacturing:** Artificial intelligence and automation are the keys to future growth across industries, and the manufacturing sector is no exception to it. Manufacturers are using AI-backed analytics and data to reduce unplanned downtime, enhance efficiency, product quality, and the safety of employees. The PwC research also suggests that around 45% of total economic gains by 2030 will be from product enhancements, stimulating consumer demand. AI can significantly enhance the quality and scale of work in the manufacturing industry by improving the capabilities of every manufacturing business function.

**Predictive Maintenance:** AI helps in enhancing asset utilization, and productivity by predicting unplanned machine and equipment breakdown

**Production Enhancement:** With the help of AI engines, businesses can successfully identify underlying causes of yield losses and locate the detractors

**Quality Enhancement:** AI technologies need specialist skills and the automation that manufacturers have already adopted demand skilled workforce. For instance, Cobots, collaborative robots assist humans with complicated tasks. These technologies require humans to program them to perform complex jobs

The adoption of AI in the manufacturing industry should be seen as a positive development, and fruitful results can be achieved through training and re-skilling the existing workforce. AI and automation will allow humans to focus on activities that generate more value for their roles and the business.

**Retail:** From the advent of Flippy, the robot hamburger chef, to Bingo Box, an entirely unmanned convenience store in China, and Amazon Go, the cashier-less supermarket, the use of robots and AI in the retail sector is growing at a rapid pace. According to IBM, 85% of retail and 79% of consumer products companies aim to use intelligent automation for supply chain planning by 2021. For example, the famous footwear, apparel, and equipment brand, Nike Inc., has designed a system where customers can create their designs and shoes and go out of the store wearing them. This new automated system uses augmented reality, object tracking and projection systems, and voice activation to completely transform the customer's experience with the brand and its products.

Automation and AI are set to redesign the entire retail industry model and the broader value chain. This transition will result in the emergence of organizations with fewer layers and a better-skilled, and trusted workforce backed by real-time data and analytics. With a more well-rounded team and newer roles that are a hybrid between technology and business, organizations will have a much faster decision-making process.



**Real Estate:** AI has already entered the real estate industry and is affecting a massive change to this \$480 billion industry—from impacting the home search experience to predicting the marketing trends in the real-estate sector.

**Smart Home Search Portals:** AI-enabled home search portals showcase recommended properties that meet customer preferences, personality traits, and requirements. These portals will support fewer, higher-quality properties that suit the needs of the customer better. Chatbots are helping resolve simple questions to help prospective customers find their next home. With AI and Machine Learning, Chatbots are becoming smarter by the day and will soon be able to answer complex search queries through both text and voice, proficiently.

Now you can efficiently focus on contracts, answer telephones, and build customer relationships while AI automates much of the manual work.

**Enhancing the Buying Process:** AI can predict property market values by combining CRM and marketplace data. Robots may soon assist agents in offering a unique buying experience to the customers. Zenplace, a real-estate Startup, is already offering AI-based touring to its customers. AI is slated to play a vital role in enhancing the productivity of agents and offering customers with a user experience that is designed just for them.



**Dr. PRABHURAJ SHANMUGAM**  
PROFESSOR, EEE, NECN

**China's BYD unveils a new battery technology that can charge electric vehicles in just five minutes, significantly reducing the charging time for electric cars.**

Batteries capable of fully charging in five minutes have been produced in a factory for the first time, marking a significant step towards electric cars becoming as fast to charge as filling up petrol or diesel vehicles.

The batteries can be fully charged in five minutes but this would require much higher powered chargers than used today. Using available charging infrastructure, Store Dot is aiming to deliver 100 miles of charge to a car battery in five minutes in 2025.

“The number one barrier to the adoption of electric vehicles is no longer cost, it is range anxiety,” said Doron Myers Dorf, CEO of Store Dot. “You’re either afraid that you’re going to get stuck on the highway or you’re going to need to sit in a charging station for two hours.

But if the experience of the driver is exactly like fuelling [a petrol car], this whole anxiety goes away.”

“A five-minute charging lithium-ion battery was considered to be impossible,” he said. “But we are not releasing a lab prototype, we are releasing engineering samples from a mass production line. This demonstrates it is feasible and it’s commercially ready.”

Existing Li-ion batteries use graphite as one electrode, into which the lithium ions are pushed to store charge. But when these are rapidly charged, the ions get congested and can turn into metal and short circuit the battery.

The new "subcooled flow boiling" technique results in greatly improved heat transfer effectiveness compared to other approaches and could be used to control the temperatures of future systems in space.

This technology can also have applications on Earth: It could make owning an electric car more appealing, the researchers said.

**PENAMALLI MANOJ**  
Roll No.19711A0239, III EEE



**World's first ammonia- fired turbine system**

Mitsubishi Power, a subsidiary of Mitsubishi Heavy Industries (MHI) Group, has commenced development of a 40-megawatt (MW) class gas turbine that is fuelled by 100% ammonia (NH<sub>3</sub>).

The project was started in response to the increasing global focus on decarbonization. As firing of ammonia produces no carbon dioxide (CO<sub>2</sub>), carbon-free power generation is achieved. Going forward, after combustion and other testing, Mitsubishi Power is targeting commercialization in or around 2025.

**The status quo:** Until now, Mitsubishi Power has pursued technological developments enabling a transition from natural gas fuel used in Gas Turbine Combined Cycle (GTCC) systems,

which currently emit the lowest amount of CO<sub>2</sub> among thermal power generation systems, to hydrogen, which emits no CO<sub>2</sub>. In tandem with pursuing active use of ammonia, the company has also been developing

a system in which the waste heat from a gas turbine reconverts ammonia into hydrogen and nitrogen for use in hydrogen gas turbines.

**Why ammonia?** Ammonia, which is a compound consisting of hydrogen and nitrogen, is a highly efficient hydrogen carrier, and it can also be directly combusted as fuel. In recent years, attention has begun to focus on ammonia from two perspectives: achieving carbon neutrality through transition to a hydrogen society, and minimizing environmental impact caused by existing energy modes. Expectations are held that early introduction of ammonia-based power generation equipment at power companies and Independent Power Providers (IPPs) will promote ammonia's future use as a carbon-free fuel.

**The future plan** Going forward, Mitsubishi Power will work to advance the energy transition as a member of MHI Group. By prioritizing its resources into expanding its gas turbine power generation and other efficient, environmentally friendly generation technologies, the company will contribute to the stable supply of power, indispensable to global economic development, and the protection of the environment through the promotion of decarbonization.



*H-25 Series gas turbine...*

**SHAIK NEHA SULTHANA**  
Roll No. 19711A0245, III EEE

## Tesla introduces its latest electric vehicle, the Model Y, in China, where it is expected to be a popular choice among consumers

The Tesla Model Y is a battery electric compact crossover manufactured by Tesla, Inc. Unveiled in March 2019, it started production at its Fremont plant in January 2020, and started deliveries on March 13, 2020.

The Model Y is based on the Model 3 sedan platform. It shares an estimated 75 percent of its parts with the Tesla Model 3, which includes a similar interior and exterior design and electric powertrain. The Model Y fills a smaller and less expensive segment than the mid-sized Tesla Model X. Like the Model X, the Model Y offers optional third-row seats for a seven-passenger seating capacity.

On January 1, 2021, Tesla started selling the Model Y in China, and it sold out its planned production (an unknown quantity) for Q1 2021 within 6 days.

On January 7, 2021, Tesla released the Standard Range Rear Wheel Drive Model Y as well as the optional 7-seat, third-row seating configuration.

On July 25, 2021, CEO Elon Musk revealed that Tesla was planning to release an updated design for the Model Y by the end of 2021. In addition, Tesla planned to implement their new structural battery pack to improve range. These new cars would be manufactured by the two new Tesla production facilities in Austin, Texas and Berlin, Germany. If Tesla was not able to roll out the new 4680 battery cells by the end of 2021, they would use the standard battery cells until the 4680's are ready.



## CESL Launches Scheme for Sale of Electric Two-Wheelers and Digital Marketplace for Kerala

State-owned Convergence Energy Services Limited (CESL), a wholly-owned subsidiary of Energy Efficiency Services Limited (EESL) – an entity under the Ministry of Power, Government of India, has launched an electric two-wheeler programme in Kerala. The programme is customdesigned for employees of the Government of Kerala, and vehicles are made available by CESL through its relationship with vehicle manufacturers.

All vehicles will benefit from the Central Government's subsidy programme FAME II, which allows customers to access a significant subsidy that brings electric vehicles closer to the cost of their fossil fuel equivalents. This programme is carried out in collaboration with the Energy Management Centre (EMC), Government of Kerala. The Scheme was inaugurated by the Hon'ble Minister for Electricity, Shri. K. Krishnankutty, in the presence of Hon'ble MLA, Shri V.K. Prasanth, Mayor of Thiruvananthapuram Corporation, Smt. Arya Rajendran and Transport Secretary, Shri Jyotilal, amongst other dignitaries.

Kerala is the first state in the CESL portfolio to move ahead and ordering two-wheelers. The launch of this Scheme, therefore, makes Kerala the first user of the digital marketplace – MyEV which will enable easy access to consumers for booking and buying electric two-wheelers. Special design features have enabled a virtual experience to come as close to being at a showroom – designed to reduce physical visits to retail outlets with the COVID pandemic still looming in the country. Interested consumers can visit [www.MyEV.org.in](http://www.MyEV.org.in) or download Mobile App: MyEV via playstore on Speaking about this association, Ms. Mahua Acharya, MD and CEO, CESL said, "I am glad that Kerala government is taking this initiative with CESL to increase EV penetration in the state. EMC has shown great leadership in developing and implementing this programme, and programmes such as these could become trendsetters for the adoption of green mobility across the country. We are working towards achieving the goals set by Prime Minister Narendra Modi and NITI Aayog for the induction of green modes of transportation in different categories in the next five years.

With this level of demand witnessed from cities, fleet operators, and financing entities, it is clear that the market is ready for a complete transition to electric mobility."

A four-day exhibition of the electric 2wheelers will be organised by EMC & CESL at the Institution of Engineers in the state capital where the vehicles can be test-driven. Through this exhibition, CESL is supporting OEMs to set up their base in Kerala and also plan an 'Experience Zone' where users may wish to test ride vehicles, learn about the technology, and feel the EV experience.

Deployment of Electric Two-Wheelers (E2W) amongst state government officials is another important step through which the state government aims to generate a demand for 10,000 electric two-wheelers from government officials and state offices across Kerala.



**BHASKAR SNEHA**  
Roll No. 20711A0212, II EEE

## General Motors announces plans to invest \$35 billion in electric and autonomous vehicles by 2025, as it aims to become a leader in the electric vehicle market

The company now expects its first-half EBIT-adjusted will be between \$8.5 and \$9.5 billion due to continued strong demand, betterthan-expected results at GM Financial, and improved near-term production from the pull forward of semiconductors from the third quarter. GM expects the second half of 2021 will continue to be complex and fluid. The company will provide additional updates on its year-to-date financial results and outlook for the second half of 2021 during its second-quarter earnings conference call on Aug. 4. GM Chief Financial Officer Paul Jacobson will also participate in the virtual Deutsche Bank investor conference today at 1:20 p.m. EDT. GM is also confirming that it will host an Investor Day in the Detroit area Oct. 6-7.

GM's additional investments and new collaborations are far-reaching and designed to create even greater competitive advantages for the company. They include:

Accelerating Ultium battery cell production in the United States: GM is accelerating plans to build two new battery cell manufacturing plants in the United States by mid-decade to complement the Ultium Cells LLC plants under construction in Tennessee and Ohio. Further details about these new U.S. plants, including the locations, will be announced at a later date. Commercializing U.S.-made Ultium batteries and HYDROTEC fuel cells: In

addition to collaborating with Honda to build two EVs using Ultium technology – one SUV for the Honda brand and one for the Acura brand – GM announced June 15 it has signed a memorandum of understanding to supply Ultium batteries and HYDROTEC fuel cells to Wabtec Corporation, which is developing the world's first 100 percent battery-powered locomotive.

Separately, GM will supply HYDROTEC to Navistar, Inc., which is developing hydrogen-powered heavy trucks to launch in 2024, and Liebherr-Aerospace, which is developing hydrogen-powered auxiliary power units for aircraft. Lockheed Martin and GM also are teaming up to develop the next generation of lunar vehicles to transport astronauts on the surface of the Moon, leveraging GM's expertise in electric propulsion and autonomous technology.

Today, GM is confirming plans to launch its third-generation HYDROTEC fuel cells with even greater power density and lower costs by middecade. GM manufactures its fuel cells in Brownstown Charter Township, Michigan, in a joint venture with Honda.

Expanding and accelerating the rollout of EVs for retail and fleet customers: In November 2020, GM announced it would deliver 30 new EVs by 2025 globally, with two-thirds available in North America. Through the additional investments.

announced today, GM will add to its North America plan new electric commercial trucks and other products that will take advantage of the creative design opportunities and flexibility enabled by the Ultium Platform.

In addition, GM will add additional U.S. assembly capacity for EV SUVs. Details will be announced at a later date.

Safely deploying self-driving technology at scale: Cruise, GM's majority-owned subsidiary, recently became the first company to receive permission from regulators in California to provide a driverless AV passenger service to the public. Cruise also was recently selected as the exclusive provider of AV rideshare services to the city of Dubai and is working with Honda to begin development of an AV testing program in Japan. In addition, GM Financial will provide a multi-year, \$5 billion credit facility for Cruise to scale its Cruise Origin fleet.

Developed through a partnership between GM, Honda and Cruise, the Cruise Origin will be built at GM's Factory ZERO Detroit-Hamtramck Assembly Center starting in early 2023.

General Motors (NYSE:GM) is a global company focused on advancing an all-electric future that is inclusive and accessible to all. At the heart of this strategy is the Ultium battery platform, which will power everything from mass-market to high-performance vehicles.



**JANGALA VIGNANALEKHANA**  
Roll No. 20711A0220, II EEE

**CESL launches Grand Challenge for deployment of E-Buses in nine major cities**



Giving a big thrust to the adoption of electric buses for public transport in the country, Convergence Energy Services Limited (CESL), a wholly-owned subsidiary of Energy Efficiency Services Limited (EESL), today announced the floating of the 'Grand Challenge' – a set of homogenized demand for electric buses aggregated across nine cities.

The Grand Challenge Invites State Transport Undertakings (STUs) to express their

demand for electric buses and access the FAME II subsidy, for which a total of 3472 buses of subsidy equivalent is available. CESL will then aggregate this demand and based on a rating system, STUs will be allocated their total number of buses. The aggregated demand will be tendered out for the participation of OEMs and/or operators for the discovery of prices on the basis of rupees per kilometre.

Through the Grand Challenge, CESL intends to enhance its support to state governments in achieving their electric mobility targets and further build an infrastructure for electric mobility in the country. This tender is seen as a big step in the series of initiatives to fulfil the commitments made by the Prime Minister, Narendra Modi for making India a Net Zero nation by 2050 and getting closer to achieving Energy Independence by 2047.

Sharing her views about the Grand Challenge, Mahua Acharya, MD & CEO, CESL said the Grand Challenge is the beginnings of aggregating demand for electric buses. It is based on an innovative, asset-light model that incentivizes the electrification of public transit. We hope that STUs will see the benefits of this exercise and come forward with their demand for buses.

She further added, "By reducing carbon emissions, I am confident that this mandate will help India in successfully meeting the net-zero target as defined by Prime Minister, Narendra Modi. The Grand Challenge will certainly encourage the faster transition to green mobility across the country while creating a synergy between private operators and state governments. We are already running successful 2-wheeler and 3-wheeler EV initiatives in states like Kerala and Andhra Pradesh and are optimistic that this new development will further our goal to attain transformation to EVs from fossil fuels in the coming

years throughout the country".

Ms. Mahua Acharya further acknowledged USAID's SPARC programme for their continuous support to CESL's E-mobility initiative.

Shri. Ashish Kundra, Principal Secretary cum-Commissioner, Transport, Government of Delhi; Shri. Rajinder Kumar Kataria, Secretary, Transport Department, Bengaluru Metropolitan Transport Corporation; Shri Laxminarayan Mishra, CMD, Pune Mahanagar Parivahan Mahamandal Limited; Shri Rajanvir Singh Kapoor, Managing Director, West Bengal Transport Corporation and Dr Rajesh Pandya; Deputy Municipal Commissioner, Surat Municipal Corporation participated in the event and shared their views

**MUTHUKURU CHETHAN**  
Roll No. 20711A0226, II EEE

**Tesla announces plans to build a new factory in Texas, which will produce the Cybertruck and other electric vehicles for the US market**

The billionaire, who is known for his wild promises, has made sensational claims in recent months regarding the Cybertruck. "Cybertruck will be almost exactly what was shown. We're adding rear wheel steering, so it can do tight turns & manoeuvre with high agility," the billionaire said on July 2021. "Other trucks look like copies of the same thing, but Cybertruck looks like it was made by aliens from the future".



**VADA CHARITHA SREE**  
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