

SRM IST, Ramapuram Campus, Chennai 89

Department of Electrical and Electronics Engineering

**RECENT DEVELOPMENTS IN ELECTRICAL
ENGINEERING**

The conventional electrical engineering is added with the communication technology in the past decade.

With the advent research that is happening in the field of electrical engineering, three new fields have powerfully emerged.

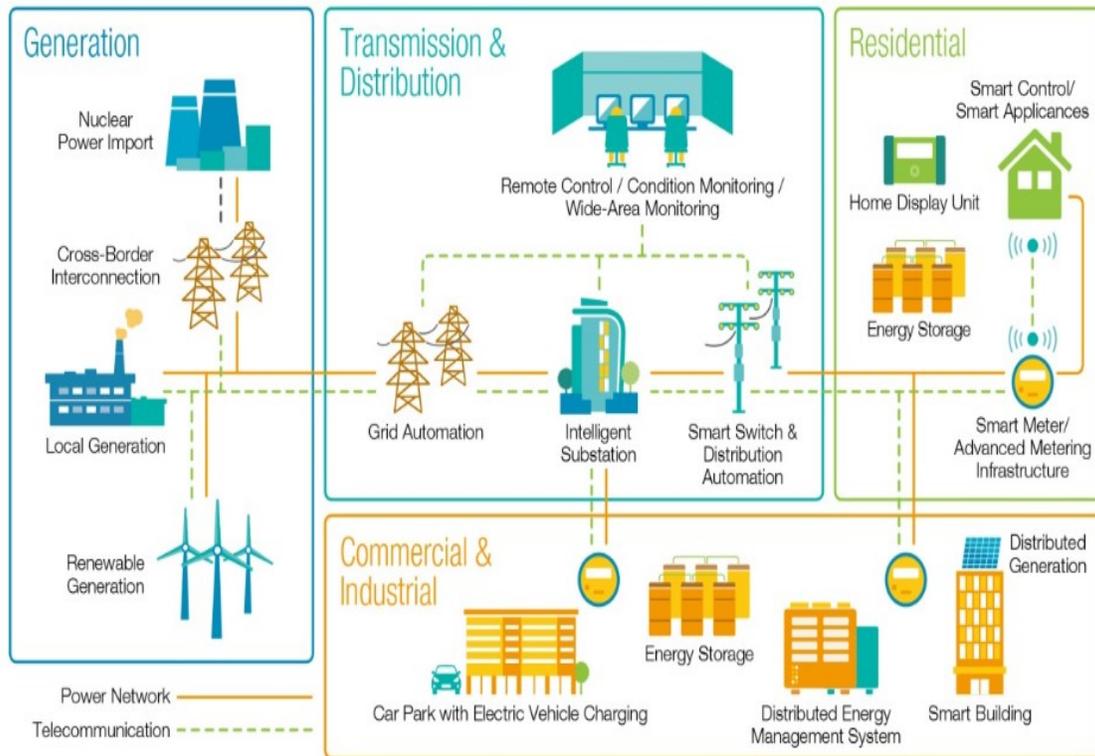
They are:

- ✚ SMART GRID
- ✚ ELECTRIC VEHICLE APPLICATION
- ✚ IOT IN ELECTRICAL ENGINEERING

A small introduction to them, with a focus that B.Tech (EEE) is equipped with all these new technologies.

SMART GRID

GENERATION, TRANSMISSION AND DISTRIBUTION.



Pic.1. Electric Power System

- ✚ *The smart grid can be defined as a smart electrical network that combines electrical network and smart digital communication technology.*
- ✚ *Earlier, in the conventional electrical power system, which generates and supplies electricity to all the power consumers, smart electrical network and digital technology were totally absent.*
- ✚ *The conventional electric power system used Under Ground (UG) cables and Over-Head (OH) transmission lines to transmit the generated electric power.*

- ✚ *The 'Electric Power System' is grouped in to four major categories, viz.,*
 - ❖ *Electric Power Generation: this is done in generating station with the help of turbines, AC generators and step-up transformers. For the past 15 years, this new smart technology took over the conventional electrical power system.*
 - ❖ *Electric Power Transmission: power generated in the generating stations are transmitted through UG cables and OH lines to Sub-stations in the cities for proper distribution to various electric customers such as VIPs, industries, theatres, hospitals, domestic consumers, etc.,*
 - ❖ *Electric Power Distribution: power is distributed from these stations to all the above customers using step-down transformers.*
 - ❖ *Electric Power Utilisation: Power received by the various customers are happily utilised.*

- ✚ *In all these four major divisions of electric power system, smart digital technology penetrated, giving rise to smart electric power system – or smart grid.*

- ✚ *A smart grid has capability of providing electrical power from multiple and widely distributed sources, like from wind turbines, solar power systems, and perhaps even plug-in hybrid electric vehicles.*

- ✚ *A smart grid technology is an essential to provide easy integration and reliable service to the consumers, in the recent digital world.*

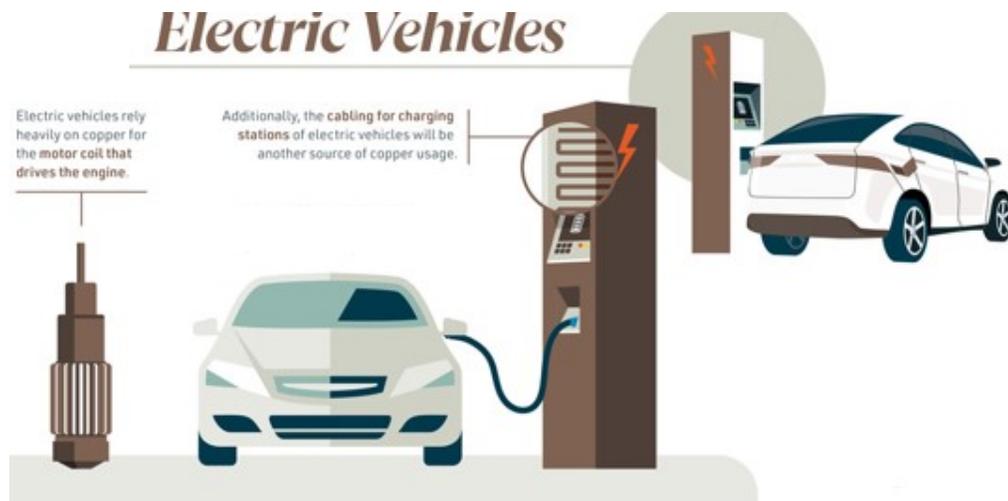
- ✚ *A smart grid system is a self-sufficient electricity network system based on digital automation technology for monitoring, control, and analysis within the supply chain.*

ELECTRIC VEHICLE

EV APPLICATION



Pic.2. Types of EV



Pic.3. A Typical EV Charging System

- ❖ *An electric vehicle (EV) is a vehicle that uses one or more electric motors or traction motors for propulsion.*
- ❖ *An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery, solar panels or an electric generator to convert fuel to electricity.*
- ❖ *EVs include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft.*
- ❖ *Since EVs can be plugged into the electric grid when not in use, there is a potential for battery-powered vehicles to even cut the demand for electricity by feeding electricity into the grid from their batteries during peak use periods (such as mid-afternoon air conditioning use) while doing most of their charging at night, when there is unused generating capacity.*
- ❖ *Conventional vehicles use the petrol/diesel as fuel, which can become limited. Also the environmental hazard and pollutions these conventional vehicles produce is alarming.*
- ❖ *Therefore there was a need for alternative vehicles which can run without damaging the mother nature and also can provide a different and fine experience of driving.*
- ❖ *With this focus EV emerged out in the end of 90s.*
- ❖ *Majorly EVs has three major components:*
 - *Battery Management Systems (BMS)*
 - *Converter technology (power electronics)*

➤ *Motor system (electrical engineerin)*

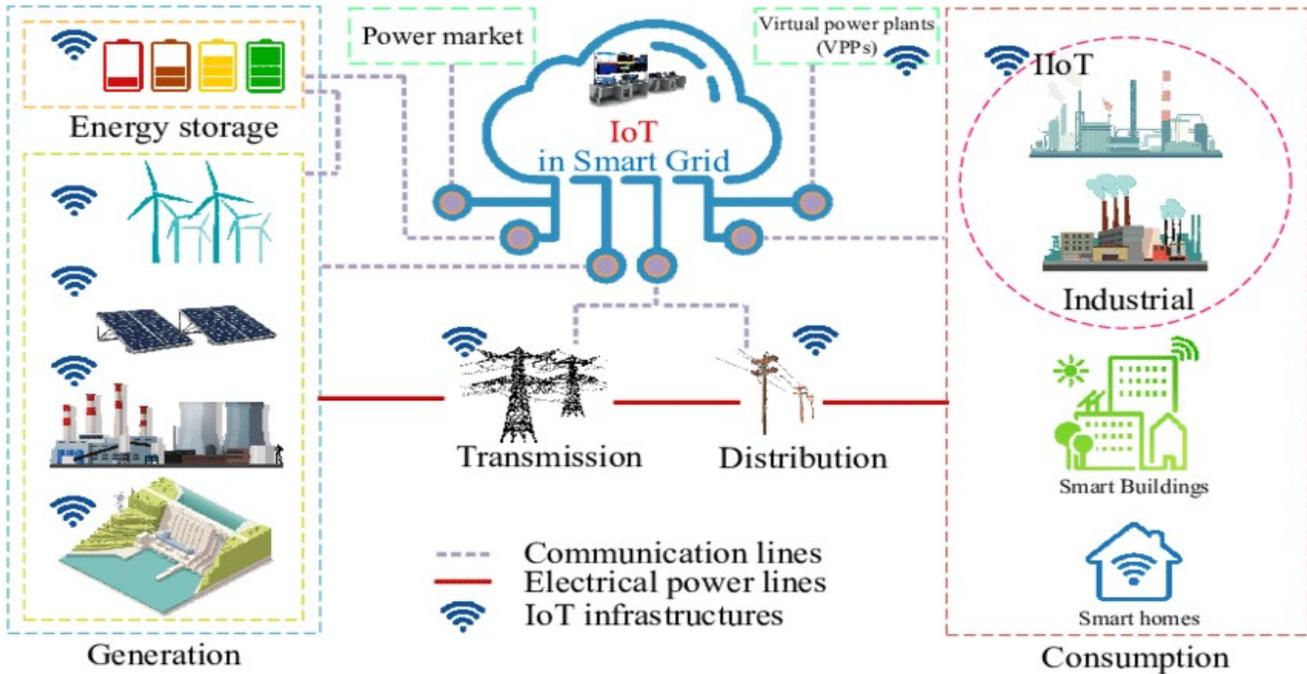
❖ *Thus there is a wide scope for electrical engineers in this fastly emerging vehicle technology.*

❖ *China remains firmly in the lead on our Electric Vehicle Index. But other pockets of growing public- and private-sector commitment to these vehicles have emerged.*

❖ *India has introduced many EV industries which have flourished in the last one decade.*

IOT IN ELECTRICAL ENGINEERING

APPLICATION OF IOT



Pic.4. An IoT Schematic

✚ *The Internet of things (IoT) is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.*

✚ *The Basic Elements of IoT are:*

- *Connected devices. Devices are the primary physical objects connected to the system.*
- *Central Control Hardware. A Control Panel manages the two-way data traffic between different networks and protocols.*
- *Data Cloud*
- *User interface.*
- *Network Interconnection.*
- *System Security and Data Analytics.*

✚ *A beginner can see that IoT has a wide requirement of electrical and electronics engineers. A EEE student acquires all the required fundamental knowledge in devices, interfacing, network interconnections and processor level hardware engineering, so as to fit comfortably in IoT technology.*

✚ *Top 10 IoT applications can be listed as below:*

➤ *Smart Home*

Whenever we think of IoT systems, the most important and efficient application that stands out is the smart home, ranking the highest IoT application on all channels. It is worth to note that there is a huge funding available from government to start companies in this area of application.

➤ *Wearables*

Just like smart homes, wearables remain a hot topic among potential IoT. Every year, consumers all across the globe await the release of the latest Apple smartwatch. Apart from this, there are plenty of other wearable devices that make our life easy.

➤ *Smart City*

Smart cities, like its name suggests, is a big innovation and spans a wide variety of use cases, from water distribution and traffic management to waste management and environmental monitoring. In Chennai itself we have TIRUMAZHISAI marked as a smart city to be developed in the near future. IoT solutions offered in the smart city sector solve various city-related problems, comprising of traffic, reducing air and noise pollution, and helping to make cities safer.

➤ *Smart Grids*

Smart grids are another area of IoT technology that stands out. A smart grid basically promises to extract information on the behaviors of consumers and electricity suppliers in an automated fashion to improve the efficiency, economics, and reliability of electricity distribution.

Industrial Internet

One way to think of the Industrial Internet is by looking at connected machines and devices in industries such as power generation, oil, gas, and healthcare. A system embedded with the IoT

tends to include devices such as fitness bands for heart monitoring or smart home appliances. These systems are functional and can provide ease of use.

Connected Car

Connected car technology is a vast and an extensive network of multiple sensors, antennas, embedded software, and technologies that assist in communication to navigate in our complex world. It has the responsibility of making decisions with consistency, accuracy, and speed.

Connected Health (Digital Health/Telehealth/Telemedicine)

Healthcare IoT can allow patients to spend more time interacting with their doctors, which can boost patient engagement and satisfaction. From personal fitness sensors to surgical robots, IoT in healthcare brings new tools updated with the latest technology. IoT helps to revolutionize healthcare and provide pocket-friendly solutions for both the patient and healthcare professional.

➤ **Smart Retail**

Retailers have started adopting IoT solutions and using IoT embedded systems across a number of applications that improve store operations, increasing purchases, reducing theft, enabling inventory management, and enhancing the consumer's shopping experience. Through IoT physical retailers can regain their lost market share and attract consumers into the store.

➤ **Smart Supply Chain**

Supply chains offer solutions to problems like tracking of goods while they are in transit and help suppliers exchange inventory information. With an IoT enabled system, factory equipment that contains embedded sensors communicate data about different parameters, such as pressure, temperature, and utilization of the machine. The IoT system can also process workflow.

➤ **Smart Farming**

Smart farming is an often overlooked in IoT applications. The Internet of Things started to revolutionize the way farmers operate day to day. Smart farming has the potential to become an important application field, specifically in the agricultural-product exporting countries.

Dear Engineering Graduation Aspirants...

The department of EEE at SRM IST Ramapuram campus has expertise in all the above three excellently emerging areas of electrical engineering.

We offer Smart Grid, Electric Vehicles and Internet of Things to our EEE students at SRM IST Ramapuram and make them competent in these three new technologies.

Three separate subjects are offered to make the EEE students at SRM IST Ramapuram to enable the students to become employable-ready to appear for core company interviews.

Elective courses are also offered to educate the EEE students at SRM IST Ramapuram to enhance their knowledge in the Advanced Topics of smart grid, EV and IoT.

In order that these three recent technologies deeply understood, there is a need for a proper understanding of micro-controllers and embedded technology. The department of EEE at SRM IST Ramapuram campus offers these two courses in the second year itself and make the students ready to undertake new technology subjects.

Three research teams are working in these three vibrant electrical fields. About 6 faculty members in the EEE department at SRM IST Ramapuram are trained and made skilled to teach and train students in smart grid, EV and IoT.

***COME AND GET GRIP OVER THE
CORE FIELDS OF ELECTRICAL ENGINEERING***

AT

THE DEPARTMENT OF EEE

SRM IST, RAMAPURAM CAMPUS

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