RAMA UNIVERSITY, KANPUR, UTTAR PRADESH, INDIA

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERIONG

STRATEGY PLAN
2026-2031

CONTENTS

1. Strategic Development Process

The Chairman, Secretary, and members of the Governing Body identified the need to develop a formal Strategic Development Plan for 2026–2031 and assigned this responsibility to the Principal.
Departments play a crucial role in achieving institutional goals. Their implementation plans include details such as budget, required resources, responsible leaders, and timelines. Heads of Departments (HODs), under the guidance of the Deans and the Principal, lead the execution of these plans.
The primary focus of the Strategic Plan is to enhance B.Tech admissions as a key driver of institutional growth**.**
The present strategic plan is principally based on:

- The NAAC guidelines for ensuring quality aspects in higher education.
- The Vision and Mission of the EEE Department.
- Feedback from stakeholders.
- Societal expectations from the Faculty.
- SWOC Analysis performed by the IQAC.
- The EEE Department's aspiration to break into the league of the **top 500 institutions in the world** within the next 5 years.

Ranked by National Institutional Ranking Framework

Ranked by National Board of Accreditation

2. Vision of the Department

To be a nationally recognized centre of excellence in Electrical and Electronic Engineering, advancing education, research, and innovation for the benefit of society.

3. Mission of the Department

- To create an academic environment that encourages innovation, research, and intellectual growth among students and faculty.
- To address national and global technological challenges through quality education and research in electrical and electronic engineering.
- To provide industry-relevant education through academic programs, practical training, and exposure to emerging technologies.
- To collaborate with national and international academic institutions, research organizations, and industries **t**o strengthen teaching, learning, and research activities.

4. Goals of the Department

RAMA University, Kanpur, as a research-focused institution, promotes excellence in education, research, and innovation. The Department of Electrical and Electronic Engineering supports these objectives while prioritizing the growth of B.Tech admissions.

The department will focus on developing skilled professionals through education and research in areas such as power systems, renewable energy, Internet of Things (IoT), chip designing, Artificial Intelligence (AI), and Machine Learning (ML).

The department will also strengthen industry collaboration, innovation, and entrepreneurship while enhancing student learning, research activities, and societal engagement.

Priority areas of the department include:

- Strengthening industry and societal engagement.
- Expanding education and research in IoT, chip designing, AI, and ML.
- Improving academic infrastructure and support systems.
- Enhancing student learning and skill development.
- Promoting research funding and innovation activities.

STRATEGIC PLAN: 2026 - 2031

5. Factors Considered for Formulating the Strategic Five-Year Plan

5.1 Opportunities in India in Electrical domain

- The demand for electrical engineers in India is expected to grow steadily during 2026–2031 due to increasing dependence on electricity across residential, industrial, and commercial sectors.
- Expanding power generation and energy sectors, including atomic, hydro, and thermal power plants, will continue to offer significant career opportunities.
- These emerging opportunities are likely to encourage more students to pursue B.Tech programs in Electrical Engineering, thereby supporting increased admissions.

5.2 Opportunities in India in Electronics Domain

- The Government of India is expected to further strengthen policies aimed at reducing dependence on imported electronic products by promoting domestic manufacturing.
- High-growth areas such as automotive electronics, industrial electronics, and advanced manufacturing are anticipated to expand significantly during 2026–2031.

- Ongoing and upcoming initiatives such as smart cities, railway modernization, and industrial automation, along with increased investments by electronics manufacturing companies, particularly in mobile and semiconductor sectors, will drive growth in the electronics domain.
- These developments will create strong career prospects, which can be effectively utilized to attract students and enhance B.Tech admissions in Electronics and related disciplines.

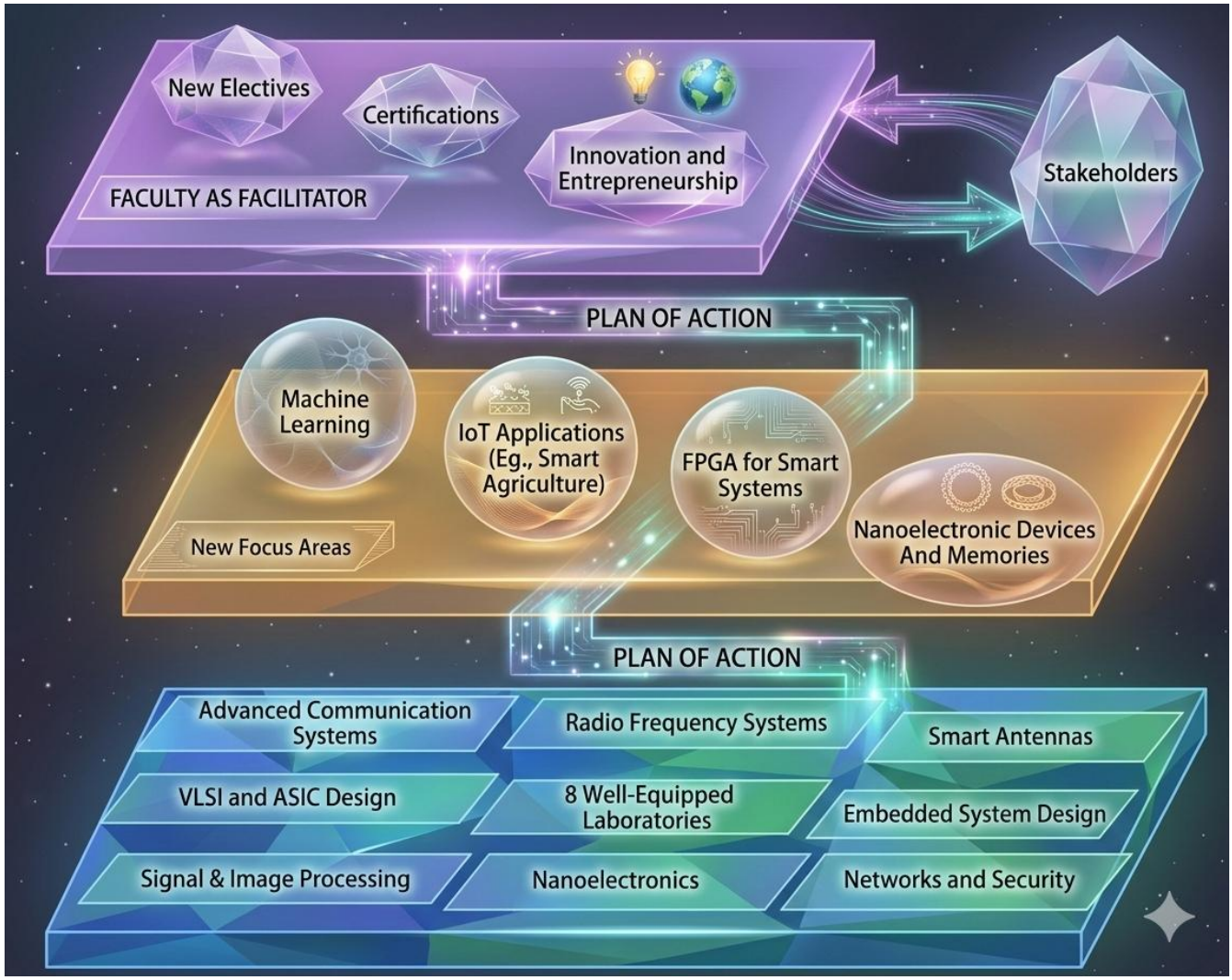
Specific Targets (2026–2031)

- To establish collaboration with IIT Kanpur for research, patent development, product innovation, and curriculum enhancement.
- To strengthen industry collaboration by introducing 2–5 one-credit courses or advanced, high-impact electives in each program annually, along with offering advanced one-year diploma/certificate programs for engineering graduates.
- To actively engage the alumni network in mentoring students and enhancing placement opportunities, with a target of increasing the average student salary by 25% within two years.
- To enhance research productivity by increasing faculty participation in patents, publications, and funded projects from 50% to 75%.
- To develop advanced infrastructure supported by corporate funding and government initiatives such as Smart City, Digital India, and Make in India, in collaboration with organizations like the Ministry of Electronics and Information Technology, Ministry of Power, DRDO, DST, and ISRO, to meet national technological and workforce demands.

6. Academic Programme

6.1 B.Tech in Electrical & Electronics Engineering (EEE)

Strategy -



Specific Targets -

- To collaborate with key stakeholders—including industry, alumni, and government—to design curriculum and pedagogy that enhance students' technical and soft skills in line with emerging global and national trends.
- To increase student enrollment in industry-recognized online certification courses.
- To ensure that industry-driven projects constitute 100% of student projects, up from the current 75%.
- To promote active participation of students in innovation competitions and support idea-to-product development through pre-incubation initiatives involving both students and faculty.
- To ensure that every faculty member maintains active engagement with at least one industry at any given time.

6.2 M.Tech in Nanoelectronics & Nanoengineering

The Department of Electrical & Electronics Engineering at RAMA University, Kanpur offers an M.Tech program in Nanoelectronics & Nanoengineering focused on advanced teaching, research, and innovation. Students are actively involved in research, publications, and technology development.

Key Research Areas:

- Nanoelectronic devices and semiconductor modeling
- VLSI design and MEMS/NEMS
- Nanomaterials and nano-sensors
- Flexible electronics and quantum devices
- Energy harvesting and nano-enabled systems

Laboratory Facilities:

- Nanoelectronics and Device Simulation Lab
- VLSI and Embedded Systems Lab
- Nanomaterials and Characterization Lab
- MEMS/NEMS and Advanced Computing Labs

Industry & Research Activities:

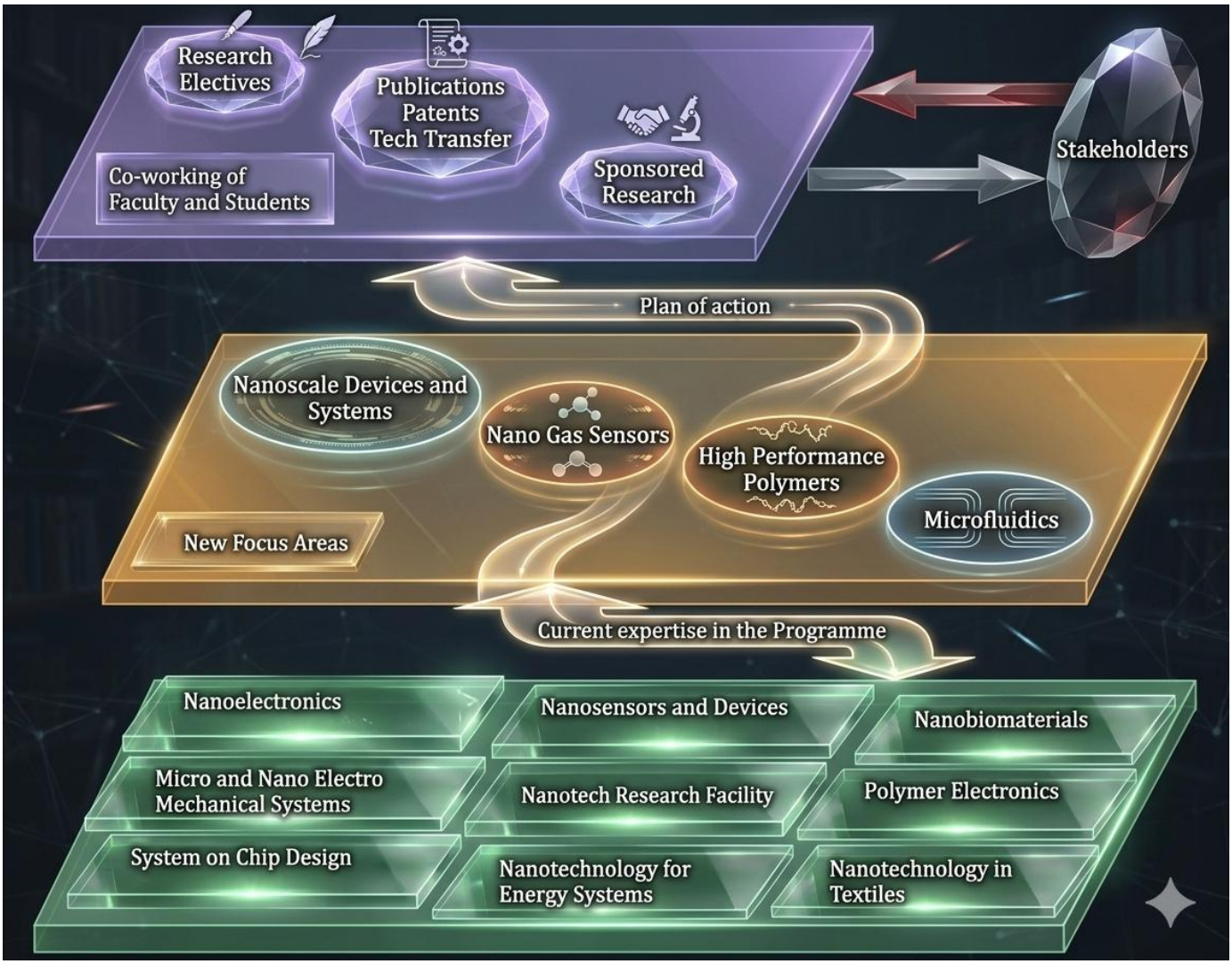
The department collaborates with industries and research organizations, promotes consultancy and funded projects, and encourages publications, patents, and participation in national initiatives.

6.3 Ph.D. in Flexible & Wearable Electronic Engineering

Specific Targets –

- To utilize available facilities and national programs to promote student projects focused on flexible and wearable electronic systems for healthcare, energy, and smart applications.
- To develop at least two new elective courses in collaboration with industries working in flexible electronics, wearable devices, and advanced materials, using relevant design and simulation tools.
- To establish research collaborations with leading institutes and laboratories for joint research, publications, and technology development in flexible and wearable electronics.
- To set up a dedicated Innovation/Incubation Centre focused on wearable technologies and smart electronic products.
- To ensure 100% student involvement in industry-sponsored or application-oriented research and live projects in wearable and flexible electronics.
- To increase high-quality research publications in reputed international journals in the domain of flexible and wearable electronics.
- To achieve a steady Ph.D. graduation rate of at least 0.25% per faculty member per year in this emerging area.

6.4 Ph.D in Nanomaterials for Energy & Environment



Specific Targets –

- To effectively utilize advanced nanotechnology research facilities for developing sustainable and environment-friendly solutions with societal impact.
- To introduce specialized elective courses aligned with faculty research areas such as energy nanomaterials, environmental nanotechnology, nanocomposites, and advanced characterization techniques.
- To focus on product and technology development in areas such as renewable energy systems, energy storage devices, water purification, and environmental remediation.
- To establish a Centre of Excellence in Energy and Environmental Nanotechnology.
- To achieve 100% involvement of research scholars in industry-sponsored or application-oriented research and live projects.
- To significantly enhance high-quality publications in reputed international journals comparable to top global institutions.

- To increase research funding through sponsored projects from agencies such as DST, DST Nano Mission, MNRE, and other national/international bodies.
- To achieve a Ph.D. graduation rate of at least 0.25 per faculty member per year.

7. STRATEGY PLAN – Brief Report

7.1 Curricular Aspects

New Initiatives:

- **Academic Matters -**

Introduce *Professors of Practice* from industry to handle up to 25% of skill-based elective courses across UG, PG and doctoral programs.

- **Administrative matters –**

❖ Classify students into two groups: high-performing and those requiring additional academic support.
❖ Assign two tutors per class to mentor students, improve academic performance, attendance, and pass percentage.

- ***Curriculum Structure and Revision of Regulation***

❖ Introduce new electives and one-credit courses aligned with Industry 4.0 for B.Tech programs.
❖ Offer PG electives through Centres of Excellence (CoE) to enhance practical exposure and research quality.
❖ Implement a flexible credit system allowing students to choose up to 20% of courses from a common

7.2 Teaching – Learning & Evaluation

- ***Faculty training and Development Initiatives***

  Make Faculty Development Programs (FDPs) and training mandatory. Adopt a *Hub and Spoke Model* by collaborating with leading institutions such as IIT Kanpur, IIIT Allahabad, and industry partners for faculty training and knowledge exchange.

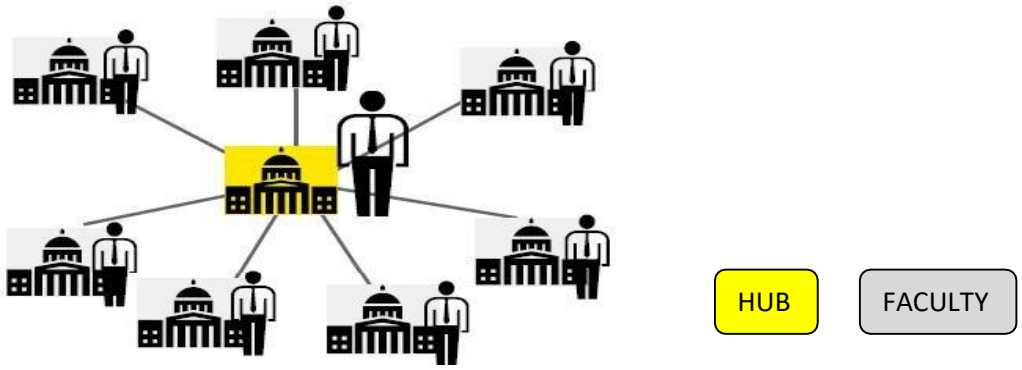


Figure: Hub and Spoke Model

7.3 **Research, Innovations and Extension**

Specific and realizable targets are planned for each research component as follows:

- Increase faculty involvement in research, patents, and funded projects from 50% to 75%.
- Enhance publications in high-impact journals.
- Achieve a Ph.D. graduation rate of 0.25 per faculty per year.
- Introduce 2–5 industry-driven one-credit courses annually and offer one-year diploma/certificate programs.
- Promote industry-recognized online certifications among students.
- Strengthen alumni engagement for mentoring and aim to increase average student salary by 25% within two years.

Funding Opportunities

- Leverage national initiatives such as Digital India, smart cities, railway modernization, and industrial automation.
- Promote research in high-growth sectors like power systems, electronics, and Industry.

7.4 Infrastructure and Learning Resources

- ***Planned Infrastructure facilities in the department –***

1. ***Centre of Excellence in Power Processing*** in collaboration with KESCO Kanpur and Power Grid New Delhi., funded by AICTE, UPCST, DRDO and TEQIP III. The following are the primary objectives:
   - Training for B.Tech students (part of curriculum).
   - Training for PG students using advanced digital signal processors.
   - Training for Faculty (Internal & External) on research activities through workshops, training programs and FDP's.
   - Establishing a Design and Testing Consultancy Centre for Industry projects.
   - Providing a research platform for the faculty and research scholars from various departments.

   The following activities are also planned as part of the Centre's outcomes:
   - UPCST Funded Project Titled 'Advanced Power Transmission & Monitoring system'
   - DRDO Funded project titled 'VLSI Design & Nanotechnology'
   - Executive Development program for Industry Professionals

2. ***VLSI Design Centr***e sponsored by Ministry of Electronics and Information Technology , RAMA Management, INTEL, Enixs and TEQIP. The broad objectives of the centre include:
    - ❖ To develop ASIC catered to societal applications similar to ASIC used in Light Combat Aircarft.
    - ❖ To develop projects catering to industry and societal requirements.
    - ❖ To develop new electives and assign student projects leading to chip development.

- ***Computerization of administration in department***

The following computerization is planned in the department:

- ❖ Development of **Infrastructure Database** to ensure the utilization of infrastructure in teaching as well as research laboratories. The upgradation plan will be based on the database.
- ❖ **Faculty and Student Database for internal record maintenance and reference**. This would be highly useful for activities like Accreditation, Harbinger/Tech day report preparation, etc

7.5 Student Support and Progression

India is poised to be the major supplier of manpower to the rest of the world by 2030. Hence we plan to identify the megatrends that drive innovation and technology at a global level through our Alumni who are spread out in several parts of the world. The Department plans to identify alumni and give them title of '**Career Coach'** and arrange for regular interactive sessions with students as well as faculty on new subjects and skills requirements; also on existing job requirements in market.

- ❖ The EEE Association would be conducting GATE coaching classes with our GATE qualified department faculty as resource persons.
- ❖ It is decided that **PCD** in I year, **Innovation Lab** in Third year and Project Work would be innovation driven and max. Need to be based on real life challenges.
- ❖ The skills based courses in curriculum would be identified and at least **one CO in the subject be related to Innovation**. The pedagogy used to impart this outcome can be of experiential learning model.
- ❖ The innovation pipeline would identify student ideas at early stage through appropriate means (eg., competition), validated, supported and mentored to develop PoC followed by prototype validation. Encourage **Student Start-ups.**

7.6 Institutional Values and Best Practices

Best Practices

- ❖ Conduct of Project Exhibition in department
- ❖ Every faculty member associated with Industry and Interaction sustained through on-site reviews
- ❖ Toppers in Examinations are honored through EEE Association
- ❖ Recognition of teachers in Research
- ❖ Good research ambiance through excellent infrastructure
- ❖ Encouragement of senior as well as young alumni to visit their alma mater and involve in department activities.

SWOT Analysis

Strengths:

- ✓ Faculty
- ✓ Best students in the region are admitted to the programmes
- ✓ High Quality Research and maximum number of research guides and PhDs ongoing/completed

- ✓ Infrastructure

Weakness:

- ✓ Consultancy and Testing

Opportunities:

- ✓ Several Govt. initiatives have Telecommunication infrastructure as the backbone which is an opportunity to work with Government as a stakeholder in research.
- ✓ Industry 4.0 requires Smart Factories which depend on Machine to Machine Communication thus improving placement prospects for EEE students.

Threats:

- ✓ Declining student motivation to take up challenging tasks in academia.
- ✓ To sustain the quality of admissions to post graduate programmes.

7.7 Focused Work

a. High Density Automatic Fogging Machine

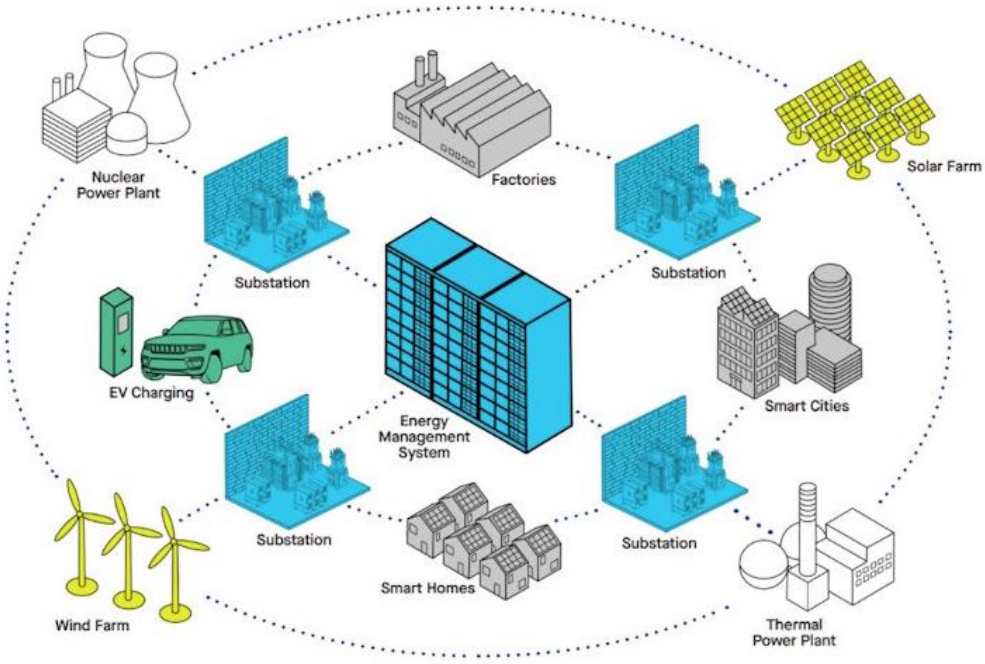
- ❖ A fog machine, also known as a fog or smoke generator, is a device that produces a dense vapor resembling fog or smoke. It is widely used in entertainment applications, while compact and affordable versions are also available for personal use.
- ❖ These machines are also utilized in industrial operations, training exercises, and certain military applications.
- ❖ The fog is typically generated by heating and vaporizing special fluids made from water mixed with glycol or glycerin, or by atomizing mineral oil. This fluid, commonly called "fog juice," turns into vapor inside the machine.
- ❖ When the vapor is released and comes into contact with cooler surrounding air, it condenses to form a thick, visible fog.

b. Organic Light Emitting Diode(OLED)

- Organic light-emitting diodes (OLEDs) are LEDs that use organic materials such as polymers or small molecules as the active light-emitting layer, making them suitable for flexible and wearable electronic applications**.**
- Unlike conventional inorganic LEDs, OLEDs can be fabricated on **flexible and bendable substrates**, enabling their integration into **wearable devices** and smart textiles.
- In recent years, OLEDs have become a key technology for flat-panel displays, replacing cathode ray tubes (CRTs) and traditional LED displays, while also enabling the development of flexible and wearable display systems**.**

c. **Smart grid & micro grid**

- Smart grids enable the collection of significantly more data compared to traditional manual energy metering systems, allowing advanced data analytics and accurate forecasting of energy consumption.
- They also facilitate better prediction and management of load demand and supply, thereby helping to prevent large-scale grid failures



d. **Renewable energy &Clean energy**

- ❖ Due to the limited availability of coal and other fossil fuels, there is a growing emphasis on promoting renewable energy sources. However, the energy generated from these sources is still insufficient, leading to ongoing research aimed at improving the efficiency of solar cells.
- ❖ At the same time, significant focus is being placed on reducing manufacturing costs to make renewable energy technologies more affordable and widely accessible.

e. The Energy Management and Optimized Operation of Electric Vehicles Based on Microgrid

- This work proposes a regional energy management and optimized operating strategy for Electric Vehicles (EVs) and Battery Swapping Stations (BSS) within a smart microgrid, addressing the impact of uncoordinated charging on the utility grid.
- In grid-connected mode, a price-based incentive model is used to coordinate EV and BSS charging, aiming to minimize EV charging costs while maximizing BSS profit.
- In islanded mode, a fuzzy control approach determines EV service pricing based on the state of charge, ensuring power balance between renewable energy sources and load demand.
- The model also incorporates interruptible load scheduling to optimize energy dispatch, reduce operational costs, and improve overall system efficiency.
- The optimization framework is formulated as cost minimization and profit maximization problems and implemented using mathematical programming tools.
- The proposed strategies are validated through case studies, demonstrating their effectiveness in improving the operation of EVs and BSS in smart microgrid systems.