

PRINCIPAL'S DESK

Dear Readers,

I am very proud of presenting Bits and Bytes, the Electronics Department newsletter at CCET. This edition mirrors the creativity, innovation, and dedication of our students and faculty. Embracing advancements in electronics, I am convinced that tomorrow's challenges will be met by our community.

Regards,

Dr. M.S. Gujral



HOD'S MESSAGE

Hello Readers,

It's a pleasure to introduce Bits and Bytes, the Electronics Department's newsletter at CCET. Here, this issue comes featuring the sweat and toil of our students and faculty members. I appreciate the editorial team for their efforts in bringing this issue to life.

Best regards

Dr. D. S. Saini



EDITORIAL DESK

Hello Readers,

It is with great pleasure that we bring to you the latest edition of our e-Newsletter, "Bits and Bytes," from the ECE Department at Chandigarh College of Engineering and Technology. This newsletter connects and inspires young engineers towards supporting India's self-reliance vision. We welcome your feedback and suggestions.

Thanks for your support.

Dr. Shilpa Jindal



OUR TEAM



Palak Prasher (CO21551)



Dhruv (CO22518)



Yashika Vashisht (CO23562)



Arjun (CO21518)



Santosh Shukla (CO22541)



Tanishq Bansal (CO23557)

ACHIEVEMENTS

Faculty achievements :

1. Dr. Parvinder Kaur, Dr. Shilpa Jindal and Dr. Dinesh Sharma completed the “NEP 2020 Orientation and Sensitization Programme” from August 5, 2024, to August 16, 2024, under the Malaviya Mission Teacher Training Programme (MM-TTP) of the University Grants Commission (UGC), organized by the UGC-Malaviya Mission Teacher Training Centre (MMTTC), Panjab University, Chandigarh.

Students achievements :

1. Palak Prasher (co21551), Daulat Singh (co21530), and Akshita Agarwal (co21509) of ECE 3rd year have a design patent for an “Antenna design for vehicular communication” on 17th May 2024.
2. Sneha (co22546), Shriya (co22553), Avleen Kaur (co22512) and Shruti Raj (co22544) of ECE 3rd year has successfully completed “Generative AI” course on 18th September 2024.
3. Tejpartap Singh of ECE 2nd year (CO23559) has completed his foundation level in “Programming and Data Science” from IIT Madras (centre of outreach and digital education) on 15th May 2024.
4. Tanishq Sharma (CO23558) of ECE 2nd year bagged the first position in CCET idol held on 24th June 2024.
5. Piyush (co22534), Shreshth (co22543) of ECE 3rd year and Tanishq Sharma (CO23558) of ECE 2nd year bagged the third position in Space Day quiz and first place in ECI quiz held on 26th September 2024 at CCET.

IN THE NEWS

1. Tata's Assam plant to make 48.3 mn chips per day with native tech: Vaishnaw

MIT researchers developed a novel CMOS image sensor that improves neural voltage imaging by allowing pixelwise programmability. This innovation enhances visualization of fast neural spikes and subtle voltage fluctuations, overcoming the trade-offs between speed and light sensitivity. The technology advances brain-wide real-time imaging of genetically tagged neurons in freely moving animals. (The Economic Times)

2. How Amazon's New CPU Fights Cybersecurity Threats

Amazon's Graviton4 CPU, the latest in its line of Arm-based server processors, promises the usual performance gains; the cloud-computing giant claims it provides up to 30 percent better compute performance, and 75 percent more memory bandwidth, than the chip's predecessor. (The CDO Times)

3. NVIDIA Innovations : NVIDIA is enhancing AI computing performance with their Blackwell architecture while focusing on energy-efficient data centers using hybrid liquid-cooling. (NVIDIA Blog)

4. Sustainable Semiconductor Materials: The CHIPS for America initiative is working on AI-powered autonomous experimentation for sustainable semiconductor manufacturing. (NIST.govt)

5. AI in Semiconductor Design : AI is increasingly automating tasks in chip design, improving productivity and efficiency in semiconductor manufacturing. (www.logic-fruit.com)

6. Data Center Cooling: Hybrid cooling systems are being developed to boost data center energy efficiency, with NVIDIA contributing to the COOLERCHIPS project(NVIDIA Blog)

7. Advanced Chip Fabrication: TSMC is advancing its 2nm chip fabrication technology, aiming to stay competitive in the global semiconductor race by 2025. (www.tsmc.com)

Semiconductor Revolution: Key Innovations and Trends Shaping 2024

The semiconductor industry is experiencing a significant transformation as we move into 2024, driven by technological advancements and real-world developments. Leading manufacturers like TSMC and Samsung are making headlines with their transition to 3nm chip production, exemplified by Apple's latest iPhones powered by the A17 chip, which enhance performance and energy efficiency. This shift is complemented by the expansion of Extreme Ultraviolet (EUV) lithography, with ASML ramping up production to meet growing demand. Additionally, the automotive sector is increasingly adopting Gallium Nitride (GaN) and Silicon Carbide (SiC) semiconductors; Tesla's announcement to feature SiC chips in new models underscores the importance of efficiency in electric vehicles. Meanwhile, research into 2D materials like graphene is gaining momentum, with Stanford University reporting breakthroughs that could significantly enhance chip performance.

AI and machine learning are also reshaping the industry, as companies like Nvidia develop specialized GPUs optimized for AI workloads, exemplified by the recent launch of the A100 Tensor Core GPU. Intel's Loihi 2 chip, designed for neuromorphic computing, mimics brain-like processing and could redefine AI training and inference. However, geopolitical tensions, particularly between the U.S. and China, are prompting semiconductor companies to reassess their supply chains. The U.S. CHIPS Act aims to bolster domestic production, with Intel planning new facilities in Ohio and Arizona, while the European Chips Act seeks to increase the EU's semiconductor capacity to 20% by 2030. Finally, the field of quantum computing is advancing, with IBM announcing a roadmap to develop quantum processors with over 1,000 qubits by 2025, which could revolutionize cryptography and complex simulations. As these trends converge, they will undoubtedly shape the future of technology and the global economy.

The Rise of Smart Cities: ECE's Role in Urban Innovation

As urbanization continues to grow, cities have more demands on them in terms of service delivery management of resources as well as ensuring high quality living standards. These are some of the problems that smart cities address through utilization of data, sensors and connectivity. The skills of Electrical and Computer Engineers are needed for designing and implementing systems or technologies that will turn these ideas into reality.

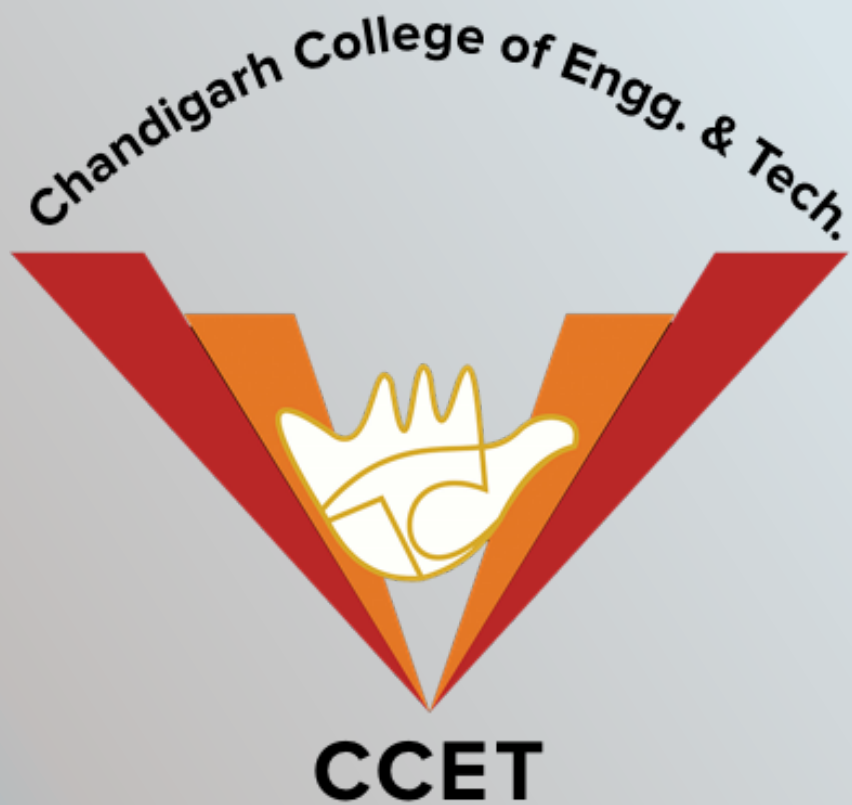
Real-time monitoring is made possible by electrical and communication engineering through developing intelligent infrastructure like networks, sensors or communication systems. Even with large amounts of city data at their disposal ECE professionals use machine learning and artificial intelligence to analyze it through big data analytics so as to come up with useful insights which help guide policies as well as improve city services. Smart grids are essential for the generation of efficient, sustainable and resilient energy systems through innovations in power systems and energy management. In transportation, the advancement of ECE is revolutionizing urban mobility with technology that helps to support autonomous vehicles, manage traffic better, and connect infrastructure. Furthermore, engineers work hard to protect urban systems from cyber threats and data breaches thus cybersecurity is an important dimension of ECE's contribution.

These innovations can already be witnessed around the world. For instance, the introduction of smart traffic management systems has reduced congestion by 10% in Singapore. In Barcelona, having adopted energy-efficient lighting systems has led to 30% reduction in energy costs. Additionally, intelligent waste management technologies have resulted into 25% improvements in recycling rates for Copenhagen.

The development of intelligent urban centers reflects how much power have technology and creativity of men. Electrical & computer engineering is instrumental in posing the latter as well as doubling up on innovation, building environments that are sustainable, interconnected and prosperous. As world moves more towards urbanization as trend would indicate it usefully follows that the rocketing demand for ECE knowledge will contribute to smarter cities with lesser crises in terms of their management.

The Role of AI and Machine Learning in Smart Agriculture: An Electronics Perspective

The agricultural sector, a cornerstone of the global economy, is being transformed by the integration of Artificial Intelligence (AI) and Machine Learning (ML). These technologies, driven by advancements in Electronics, are enabling smart agriculture—an approach that optimizes farming practices through data-driven decision-making. AI and ML technologies are revolutionizing agriculture by facilitating precision farming, which uses electronic sensors, drones, and IoT devices to collect vast amounts of data. This data is analyzed to provide actionable insights, leading to enhanced crop management, optimized resource use, and increased productivity. For example, AI-driven algorithms can process data from multispectral cameras on drones to monitor crop health in real-time. AI systems can detect diseases early, predict weather patterns, and estimate crop yields, providing farmers with the tools to make informed decisions and reduce losses. The Internet of Things (IoT) plays a critical role in the deployment of AI and ML in agriculture. IoT devices, including soil moisture sensors, weather stations, and automated irrigation systems, collect continuous data across vast agricultural landscapes. These IoT devices are interconnected through wireless sensor networks (WSNs), enabling real-time data transmission and remote monitoring. Additionally, AI-powered drones equipped with advanced imaging systems can assess crop conditions, allowing for targeted application of fertilizers and pesticides, which minimizes environmental impact and reduces costs. Despite the significant potential, the widespread adoption of AI and ML in agriculture faces several challenges. The initial investment required for AI-driven systems can be substantial, particularly for small-scale farmers. Moreover, the effectiveness of AI solutions is highly dependent on the availability of quality data, which can be limited in regions with poor digital infrastructure. However, as the cost of sensors and IoT devices continues to decrease, and as 5G networks expand, the barriers to adoption are expected to diminish. The development of more robust and affordable electronic systems will enable broader access to these technologies, fostering more sustainable and efficient agricultural practices.



Chandigarh College of Engineering and Technology (Degree Wing) Sector-26, Chandigarh, India

Principal: Dr. M.S.Gujral
Published By: ECE Department

OUR TEAM:

InCharge: Dr. Shilpa Jindal
Designers: Arjun (CO21518)
Santosh Shukla (CO22541)
Tanishq Bansal (CO23557)

Editors: Palak Prasher (CO21551)
Dhruv (CO22518)
Yashika Vashisht (CO23562)



0172-2750947



principal@ccet.ac.in



www.ccet.ac.in