e-Magazine under Student Chapter "ELECTROVYOMIC"

ECE DEPARTMENT

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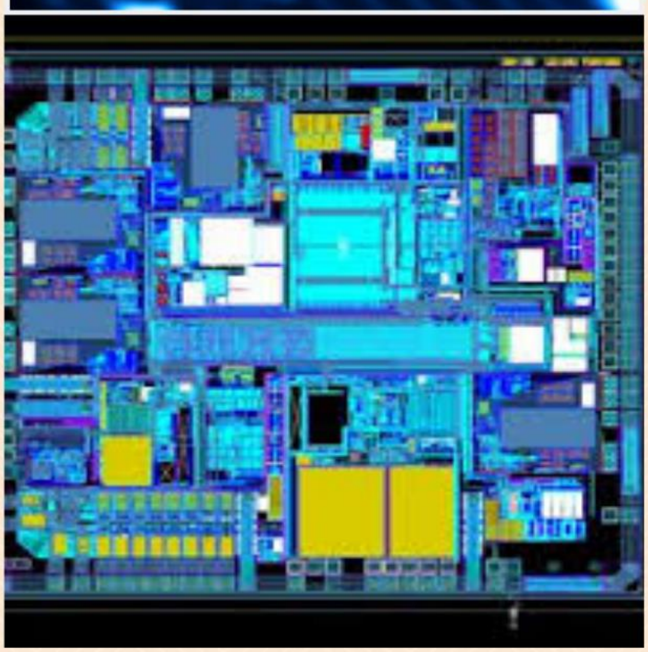
JAN'22 to MAY'22



Vision

To be a centre of excellence for promoting education, training and research in the field of Electronics and Communication Engineering.

Department Overview

The Department aims to provide quality education in the domain of Electronics and Communication Engineering through a periodically updated curriculum, effective teaching-learning process, state-of-the-art laboratory facilities, and collaborative ventures with the industries.

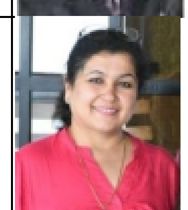
The laboratories of the department are well equipped with sophisticated equipment and professional EDA tools in the fields of Communication Engineering, Control and Embedded Systems, VLSI design, Digital Signal Processing, and Image Processing. The department emphasizes the development of hands-on skills of the students to complement their theoretical knowledge. As such, the department organizes periodically conferences, training programs, and workshops to train students with the latest technologies apart from the prescribed curriculum.

The department has a vibrant learning environment where all the students and faculty members nurture the spirit of innovation, and creativity and contribute effectively to the advancement of technologies.

The department offers need-based and customized Short Term Staff Development Programs of one- or two-week duration at the Regional and National Level for the faculty and technical staff of Polytechnics and Engineering Colleges in the newly emerging areas to fulfill the objectives and mission of the Institute. The areas offered for short term courses are –

- Wireless LANs & Computer Networks
- Advanced VLSI Design
- Digital Signal Processing
- Wireless & Mobile Communication
- Digital & Data Communication,
- Embedded & Digital System Design
- Artificial Neural Networks & Fuzzy Logic
- Optical Fibre Communication
- Image Processing

Faculty Profile

Sr. No.	Name of the Faculty	Designation/Qualifications	Specialization	Photograph
1.	Dr. Sandeep Singh Gill	Professor & Head Ph.D. (Eltx. & Comm. Engg.)	VLSI Design, Soft Computing Techniques Engineering	
2.	Dr. Amod Kumar	Professor Ph.D. (Electronics & Comm. Engg.)	Digital Signal Processing, Digital Image Processing, Soft Computing Biomedical Engineering	
3.	Dr. Balwinder Singh Dhaliwal	Associate Professor Ph.D. (Electronics & Comm. Engg.)	Antenna (Fractal, MIMO), ANN, Digital Signal Processing, Soft Computing.	
4.	Dr. Balwinder Raj	Associate Professor Ph.D. (VLSI)	Nanoelectronic Devices and Circuits, Nanotechnology and energy based devices, VLSI Design, VLSI & Embedded System Design, Modeling and Simulation, FPGA Based Design, Artificial Intelligence and Its Applications.	
5.	Dr. Kanika Sharma	Assistant Professor Ph.D. (Engg.)	Embedded System Design, Digital System Design, Wireless Sensor Network	
6.	Dr. Garima Saini	Assistant Professor Ph.D. (Engg.)	Advanced Digital Communication; Wireless & Mobile Communication, Antenna	
7.	Dr. Rajesh Mehra (Joint Faculty in ECE)	Professor & Head, CDC Ph.D. (Engg.)	VLSI Design; Advanced Digital Signal Processing, and Embedded Design	
8.	Dr. Meenakshi Sood (Joint Faculty in ECE)	Associate Professor, CDC Ph.D.(ECE)	Curriculum Development, Digital Signal Processing & Image Processing, Machine Learning, Nature Inspired Algorithms, Soft Computing Techniques, Women Empowerment, Energy harvesting and storage, Artificial Intelligence and Its Applications, Biomedical engineering, Antenna(Plana, Metamaterial, Fractal).	

Lab

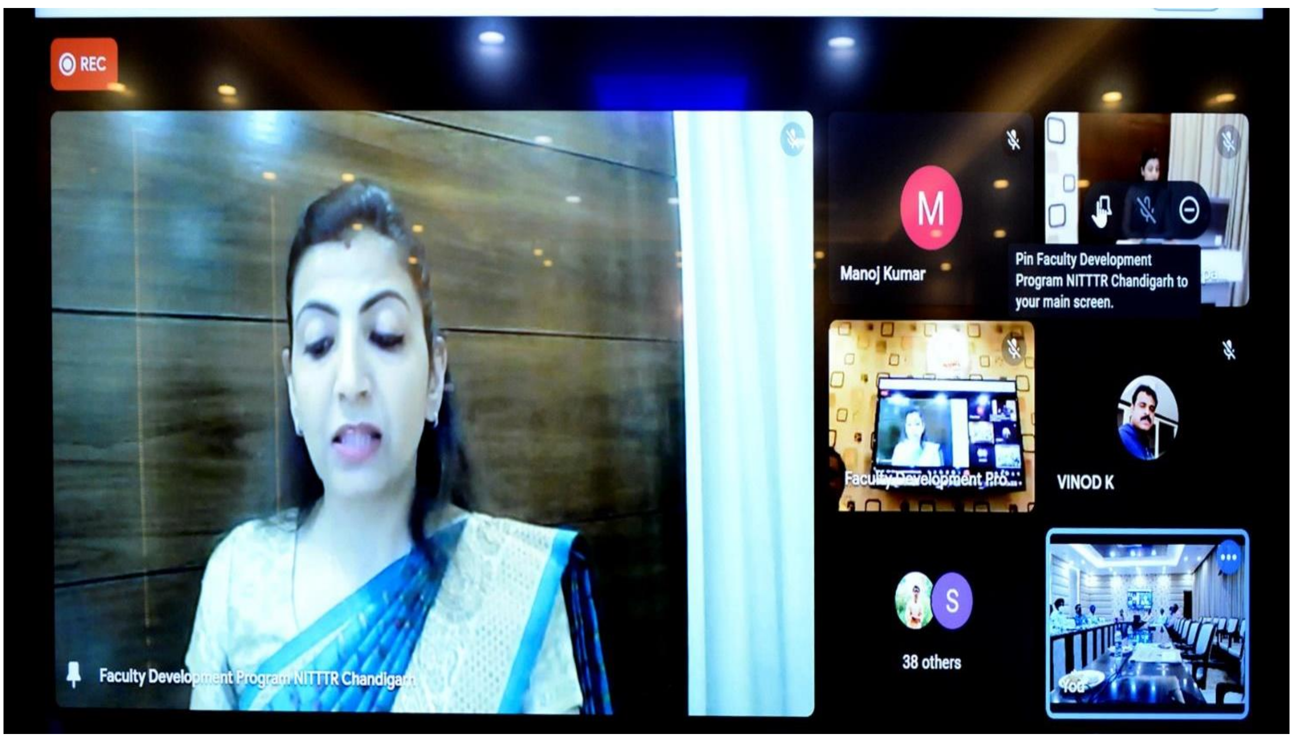
Activities

ME Student Shivam Bansal performing simulation in ANSYS HFSS software.

ME Student Rachit Lodhi performing simulation in MATLAB software.

Lectures/Seminars

Dr. Amod Kumar delivering the lecture on different types of transforms in the domain of digital signal processing.



An informative session on wireless sensor networks is presented by Dr. Kanika Sharma.

Extra – Curricular Activities

ME students performing skit on the inauguration ceremony of NITTTR Cultural Club- Arohan.

ME (ECE) team won the NITTTR Premier League (NPL) cricket tournament.

Articles

1. Cryptography vs. Cryptology vs. Encryption

The syllable crypt may make you think of tombs, but it comes from a Greek word that means hidden or secret. Cryptography literally means secret writing. Cryptology, meanwhile, means something like knowledge of secrecy, if cryptography is the practice of writing secret messages, then cryptology is the theory, although the two words are often used interchangeably. Encryption is what we call the process of turning plaintext into ciphertext Encryption is an important part of cryptography, but doesn't encompass the entire science. Its opposite is decryption. One important aspect of the encryption process is that it almost always involves both an algorithm and a key. A key is just another piece of information, almost always a number, that specifies how the algorithm is applied to the plaintext in order to encrypt it. In a secure cryptographic system, even if you know the method by which some message is encrypted, it should be difficult or impossible to decrypt without that key.
There are numerous cryptographic algorithms in use, but in general they can be broken into three categories: symmetric cryptography, asymmetric cryptography and hash functions.

- *Symmetric Cryptography*

Symmetric cryptography is widely used to keep data confidential. It can be very useful for keeping a local hard drive private, for instance, since the same user is generally encrypting and decrypting the protected data, sharing the secret key is not an issue. Symmetric cryptography can also be used to keep messages transmitted across the internet confidential. However, to successfully make this happen, you need to deploy next form of cryptography in tandem with it.

- *Asymmetric Cryptography*

In asymmetric cryptography, each participant has two keys. One is public and is sent to anyone the party wishes to communicate with. That's the key used to encrypt messages. But the other key is private, shared with nobody, and it's necessary to decrypt those messages. To use a metaphor, think of the public key as opening a slot on a mailbox just wide enough to drop a letter in. You give that key to anyone who you think might send you a letter so they can open the slot and deliver the envelope. The private key is what you use to open the mailbox so you can get the letters out.

The mathematics of how you can use one key to encrypt a message and another to decrypt it are where the idea of one-way functions that we discussed above come into play where the two keys should be related to each other mathematically such that it's easy to derive the public key from the private key but not vice versa. For instance, the private key might be those two very large prime numbers, which you'd multiply together to get the public key.

Rachit Lodhi

2. Embedded System

Embedded systems differ from general purpose computers in many aspects. An embedded system is a microprocessor-based system that is incorporated into a device to monitor and control the functions of the components of the device. They are used in many devices ranging from a microwave oven to a nuclear reactor. Unlike personal computers that run a variety of applications, embedded systems are designed for performing specific tasks. An embedded system used in a device (for instance the embedded system in washing machine that is used to cycle through the various states of the washing machine) is programmed by the designers of the system and generally cannot be programmed by the end user. Embedded systems possess the following distinguishing qualities.

Reliability
Embedded systems should be very reliable since they perform critical functions. For instance, consider the embedded system used for flight control. Failure of the embedded system could have disastrous consequences. Hence embedded system programmers should take into consideration all possibilities and write programs that do not fail.

Responsiveness
Embedded systems should respond to events as soon as possible. For example, a patient monitoring system should process the patient's heart signals quickly and immediately notify if any abnormality in the signals is detected.

Specialized Hardware
Since embedded systems are used for performing specific functions, specialized hardware is used. For example, embedded systems that monitor and analyze audio signals use signal processors.

Low cost
As embedded systems are extensively used in consumer electronic systems, they are cost-sensitive. Thus, their cost must be low.

Robustness
Embedded systems should be robust since they operate in a harsh environment. They should endure vibrations, power supply fluctuations, and excessive heat. Due to the limited power supply in an embedded system, the power consumed by the components of the embedded system should be kept to a minimum.
Embedded systems are often confused with real-time systems. A real-time system is one in which the correctness of the computations not only depends on the accuracy of the result but also on the time when the result is produced. A hard real-time system should always respond to an event within the deadline or else the system fails. Soft real-time systems have less severe time constraints. All embedded systems are not real-time systems and vice-versa.

Saurabh

Editor’s Team: -