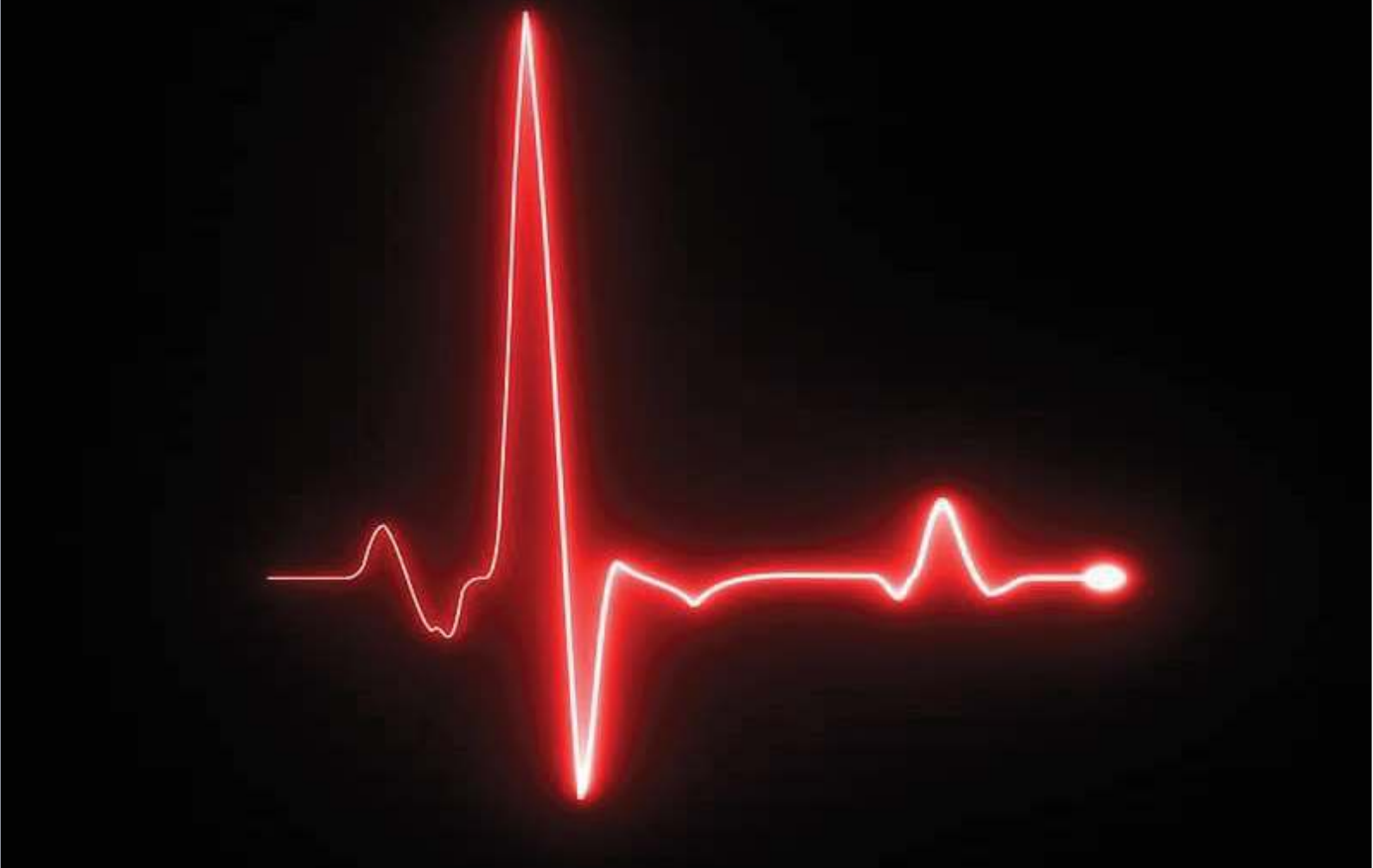
DECEMBER 2022 | VOL 2 | ISSUE 12

CHRIST
(DEEMED TO BE UNIVERSITY)
BANGALORE · INDIA

THE PULSE

NEWSLETTER
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Vision

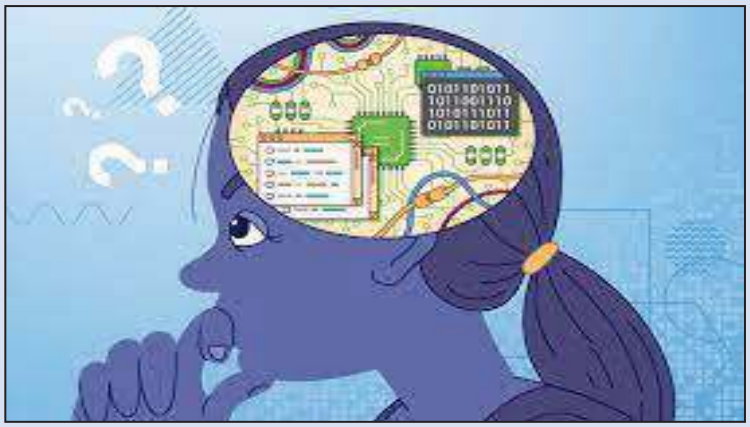
To emerge as a centre of academic excellence in the field of Electronics & Communication Engineering to address the dynamic needs of the industry upholding moral values.

Mission

- Impart in-depth knowledge in Electronics & Communication Engineering to achieve academic excellence.
- Develop an environment of research to meet the demands of evolving technology.
- Inculcate ethical values to promote team work and leadership qualities befitting societal requirements
- Provide adaptability skills for sustaining in the dynamic environment

FACULTY CONNECT

STUDENTS SHOULD DEVELOP COMPUTATIONAL THINKING



Every year lakhs of students apply for Computer Engineering as their first choice, duly supported by parents in this endeavor. Many students feel unhappy on not getting Computer Engineering. Surprisingly, after joining Computer Engineering, many students realize they do not like coding and erroneously attribute, Coding to Computer Engineering. They look at other alternatives, ending up further disheartened! Add to this, the fact that there aren't so many jobs for Computer Engineers. While many companies do prefer Computer Engineering graduates, an equal number of companies are actually looking at candidates with Computational skills. The journey to Computational skills does pass through programming, but it does not mean it is Computer Engineering. Students in our department and other disciplines, should not loose heart and wander around making half-hearted attempts at coding (frontend, Backend, full stack etc.) while losing focus from their core competence. Yes, today, in all domains one does need to know programming. But it suffices to know the essentials, in a simple language like Python in an environment like Jupyter Notebook. There are enough jobs in various sectors and all it takes is to prove one's capabilities. One of these is computational skill. If you couple it with your core competence and soft skills, a good job is assured. Thus, the first step is to understand what exactly Computational Thinking is and not confuse it with Computer Engineering.

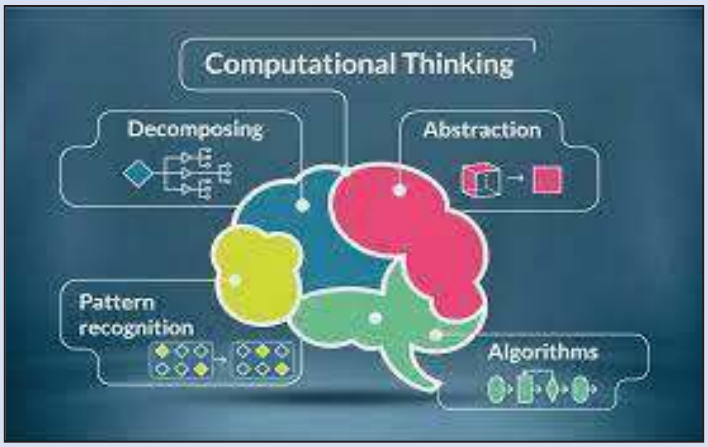
Essentially, Computer Engineering is not only programming. It deals with the theoretical foundations of information and computation, taking a scientific and practical approach to computation and its applications. Generally speaking, computer Engineering is the study of computer technology, both hardware and software. The topics covered in Computer Engineering can be seen by the syllabus of any B. Tech. program. As per Wikipedia: - "Computer engineering is a branch of electrical engineering and computer science that integrates several fields of computer science and electronic engineering required to develop computer hardware and software. [1] Computer engineers not only require training in electronic engineering, software design, and hardware-software integration, but also in software engineering. It uses the techniques and principles of electrical engineering and computer science, but also covers areas such as artificial intelligence (AI), robotics, computer networks, computer architecture and operating systems. Computer engineers are involved in many hardware and software aspects of computing, from the design of individual microcontrollers, microprocessors, personal computers, and supercomputers, to circuit design. This field of

FACULTY CONNECT

engineering not only focuses on how
computer systems themselves work, yet it also demands them to integrate into the larger picture. [2] Robots are one of the applications of computer engineering".

In contrast Computational thinking is a problem-solving technique. It is a 21st Century skill required in all fields. It is applicable in all fields including the field of Computer Engineering. As per Wikipedia: -

"Computational thinking (CT) is the mental skill to apply concepts, methods, problem solving techniques, and logic reasoning. In education, CT is a set of problem-solving methods that involve expressing problems and their solutions in ways that a computer could also execute.[2] It involves automation of processes, but also using computing to explore, analyze, and understand processes (natural and artificial)."



The various skills required for computational thinking are taught from school onwards. The steps involved are, firstly **Problem decomposition**, i.e., capability to break a problem into smaller problems. This is an essential technique used from solving complex mathematical problems to simple management challenges. Some of us might recollect project management. This technique of problem decomposition is one of the first things carried out. Even conduct of a small event requires us to break the event into smaller tasks for easy management. In OOP as well as functional programming you have been taught to break the problem into smaller modules.

The next component of computational thinking is **Pattern recognition**. Here we can think of recognizing patterns in the various decomposed parts. Normally, pattern recognition is associated with machine learning, but here we are talking of an individual's capability to see patterns in decomposed text, data, task or any other activity. Capability to recognize pattern in items, helps one to can carry out abstraction.

The next issue is **abstraction**. While you may have studied abstraction as a OOP concept, look at what Wikipedia says it is,

Abstraction in its main sense is a conceptual process wherein general rules and concepts are derived from the usage and classification of specific examples, literal ("real" or "concrete") signifiers, first principles, or other methods.

Does this activity of pattern recognition and abstraction remind you of mathematical induction taught to you in school? Well, the idea is similar, the capability to derive rules and concepts from multiple statements and data by understanding the pattern amongst them.

FACULTY CONNECT

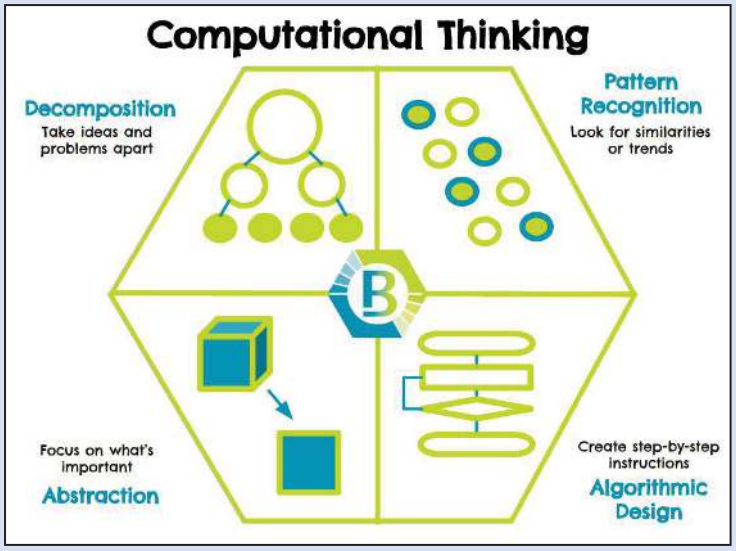
Yes. the last component has something to do with Computer Engineering. It is **Algorithm design**. However, it is the least required today due to the availability of various automated tools. In any case , you have been taught this subject.

In a nutshell, do not worry about your lack of coding capability. Focus on your core capability and develop your Computational thinking capability which comprises of, **Decomposition, pattern recognition,**

Abstraction and Algorithm design. Couple it with soft skills and the world is YOURS.

PS. I asked Chat GPT the difference between Computer Engineering and Computational Thinking. This is what is said:

Computer engineering is a field of engineering that deals with the design, development, and maintenance of computer systems and their components, such as hardware and software. It involves the application of principles from electrical engineering and computer science to create efficient and reliable computer systems. Computational thinking, on the other hand, is a problem-solving approach that involves breaking down complex problems into smaller, more manageable parts, and then using algorithms, logic, and abstraction to develop solutions. It is a way of thinking that emphasizes the use of computational tools and techniques to solve real-world problems in various fields, including science, engineering, business, and social sciences.



In summary, computer engineering is a specific field of engineering that deals with the design and development of computer systems, while computational thinking is a problem-solving approach that emphasizes the use of computational tools and techniques.

- **UNDERSTAND COMPUTATIONAL THINKING WHATEVER BE YOUR DISCIPLINE.**
- **LEARN PYTHON BASED JUPYTER NOTEBOOK (THAT'S ANOTHER STORY FOR ANOTHER DAY!)**

- Col. P. Jai Govind,
Associate Professor
ECE department

EVENTS

Highlights of the Month

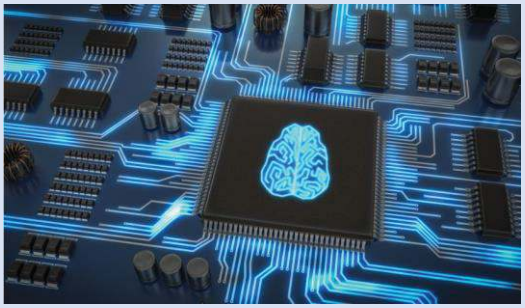
- Organized a department level FDP on Effective Curriculum Design based on Choice based Credit System.
- Organized a Training on the Data Centric Labs of Intel Unnati on 8-12-22 and 9-12-22.
- Organized a Training on Microcontroller board available in the lab on 13-12-22.
- Department level Board of Studies(BoS) presentation on syllabus revision as per PO/PSO relevance with opinion on relative grading and ESE duration reduction was held on 7-12-22, 8-12-22 and 13-12-22.
- Dr. Chidambaram S. attended a Hands-on Workshop on Accelerate End-to-End AI Pipelines with Intel AI Analytics Toolkit held on 09-12-22.
- Dr. Jesuwanth Sugesh R. G. attended a seminar on topic Technical Meeting on Optical Switching Networks and its Research Challenges on 30-12-22.
- Dr. Jesuwanth Sugesh R. G. attended a 5 day FDP on Recent Trends in 5G Communication Networks organized by Sai Ram Engineering College, Chennai, sponsored by IEEE Madras section.
- Prof. Shashikumar D. and Dr. Suganthi S. presented a conference paper entitled as "A Slotted Circular Patch Antenna with Defected Ground for Sub 6 GHz 5G Communications" in MAPCON 2022 organized by IEEE Bangalore section, Dec 2022.

STUDENT CONNECT

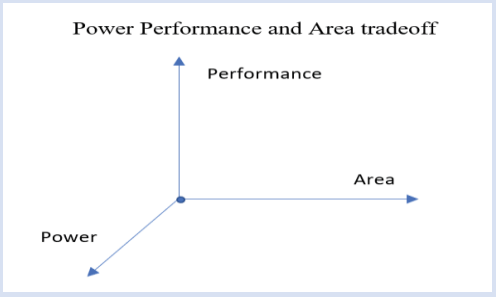
Artificial Intelligence (AI) in Chip Development

Artificial Intelligence, Machine Learning, Deep Learning, Big data analytics, Data Science and Cloud are some buzzwords that all of us hear very often nowadays. We are surrounded by electronic gadgets or systems that employ these technologies such as Google's Siri, Amazon's Alexa, self-driving cars such as Google's Waymo, image recognition systems and likewise. All these applications are on the software front and demand more processing power and speed from the tiny electronic chips that sit inside all these systems.

We have ushered into an era where all these Technologies are integrated and now being adopted at the hardware level as well. In other words, AI is now being used to design the very chips that implement AI applications. Yes, AI is now being leveraged in the electronic chip development process and promises to improve the design and verification domains of the Semiconductor industry. Just as AI applications offload time-consuming tasks in the software world, it projects to do the same in the complex and dynamic chip development process.



An example of such an integrated AI application is Synopsys' Design Space Optimization AI (DSO.ai), which uses Reinforcement Learning to solve the typical optimization challenge of chip design - Power, Performance and Area (PPA) for a given chip. Traditionally, experienced Engineers take weeks or months to achieve optimal PPA values by exploring various chip configuration parameters in keeping with the Customer's requirements. This task consumes significant time in the chip development process and is not very scalable. The task of finding the optimal chip configuration settings such as process nodes (5nm or 7nm), operating frequency and voltage and floor planning in addition to PPA form the design exploration space for a given chip under design. Such data driven (permutation) decisions are best suited and optimized by AI and DSOI.ai addresses this challenge effortlessly and produces optimal configurations much faster than the traditional method. This solution boasts to improve engineer's productivity and accelerates the development process, consequently achieving quicker time to market. Once DSOI.ai has been applied to a specific chip, it can be leveraged to design other similar chips. It improves its underlying model over time and data and adapts quickly to dynamic Customer needs and thus proves to be a scalable solution as well.



Credits: Synopsys' Website and DSO.ai Podcasts

- Angela Maria Peter
M. Tech. 2021-23 Batch
ECE department

Department Newsletter Team

Faculty in-charge
Dr. Syam Chandran K – syam.chandran@christuniversity.in

Design, content and editing

Segu Sai Nikhitha- segu.sai@btech.christuniversity.in
Kamalesh Kumar- kamalesh.kumar@btech.christuniversity.in

Kindly share your thoughts and research experiences via e-mail to our team, and be featured in next month's issue!