

# MONTHLY INSIGHTS

**JULY 2023**

VOLUME 05 | ISSUE 01  
**DEPARTMENT OF INFORMATION TECHNOLOGY**



### **Departmental Vision statement of Information Technology**

To nurture the joy of excellence in the world of Information Technology

### **Departmental Mission statements of Information Technology**

M1: To develop the critical thinking ability of students by promoting interactive learning.

M2: To bridge the gap between industry and institute and give students the kind of exposure to the industrial requirements in current trends of developing technology.

M3: To promote learning and research methods and make them excel in the field of their study by becoming responsible while dealing with social concerns.

M4: To encourage students to pursue higher studies and provide them awareness on various career opportunities that are available.



### **Program Educational Objectives (PEOs)**

PEO1: Information Technology Engineering Graduates shall be employed as IT Professionals, and shall engage themselves in learning, understanding and applying newly developed ideas and technologies as their field of study evolves.

PEO2: information Technology Engineering graduates shall be competent to use the learnt knowledge successfully in the diversified sectors of Industry, academia, research and work effectively in a multi-disciplinary environment.

PEO3: Information Technology Engineering Graduates shall be aware of professional ethics and create a social responsibility in the building the nation/society.

### **Program Specific Outcomes (PSOs)**

Student will be able to :

PSO1 : Demonstrate the ability to analyze and visualize the business domain and formulate appropriate information technology solutions.

PSO2: Apply various technologies like intelligent systems, Data mining, IOT, Cloud and Analytics, Computer and Network Security etc. for innovative solution to real time problems.



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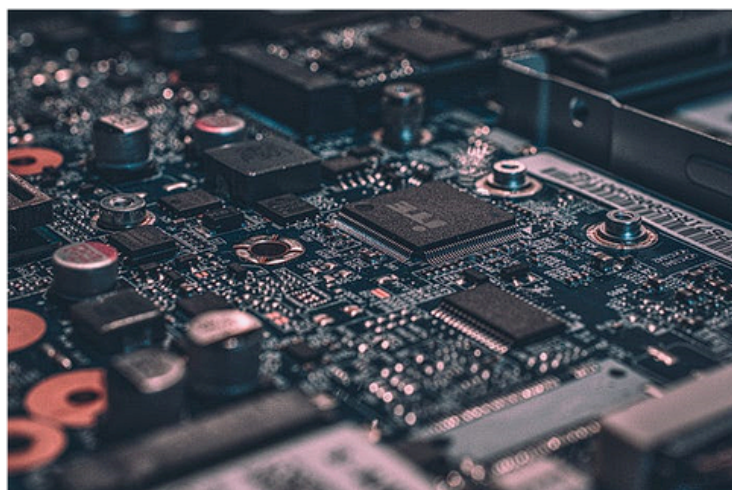


# ARTICLES

## TinyML: Power in Miniature

We are currently living in a world surrounded by Machine Learning models. Over the course of your day, you are utilizing these models more than you realize. Day to day tasks like scrolling through social media, taking a picture, checking the weather, all depend on machine learning models. You might even see this blog because a machine learning model suggested this to you

We all know that training these models are computationally expensive. But most of the times, running inference on these models are computationally expensive as well. The rate at which we are using machine learning services, we need computing systems that are fast enough to handle it. Thus most of these models run on huge data centers with clusters of CPUs and GPUs (even TPUs in some cases). When you take a picture, you want the machine learning magic to happen instantly. You don't want to wait for the image to be sent to a data center where it is being processed and sent back again. In this case, you want the machine learning model to run locally. When you say "Alexa" or "Ok, Google", you want your devices to respond to you instantly. Waiting for the device to send your voice to the servers where it is processed, and the information is retrieved.





## What is TinyML?

TinyML is a field of study in Machine Learning and Embedded Systems that explores the types of models you can run on small, low-powered devices like microcontrollers. It enables low-latency, low power and low bandwidth model inference at edge devices. While a standard consumer CPUs consume between 65 watts and 85 watts and standard consumer GPU consumes anywhere between 200 watts to 500 watts, a typical microcontroller consumes power in the order of mill watts or microwatts. That is around a thousand times less power consumption. This low power consumption enables the TinyML devices to run unplugged on batteries for weeks, months, and in some cases, even years, while running ML applications on edge.

### Advantages of TinyML:

- 1.Low Latency:** Since the model runs on the edge, the data doesn't have to be sent to a server to run inference. This reduces the latency of the output.
- 2.Low Power Consumption:** As we discussed before, microcontrollers consume very little power. This enables them to run without being charged for a really long time.
- 3.Low Bandwidth:** As the data doesn't have to be sent to the server constantly, less internet bandwidth is used.
- 4.Privacy:** Since the model is running on the edge, your data is not stored in any servers.

### Applications of TinyML:

#### 1.Industrial Predictive Maintenance:

Machines are prone to fault. Using TinyML on low powered devices, it is possible to monitor the machine and predict faults ahead of time constantly. This predictive maintenance can lead to significant cost savings. Ping Services, an Australian startup, has introduced an IoT device that autonomously monitors wind turbines by magnetically attaching to the outside of the turbine and analyzing detailed data at the edge. This device can alert the authorities regarding potential issues even before it occurs.



## **2.Healthcare:**

The Solar Scare Mosquito project uses TinyML to curb the spread of mosquito-borne diseases like Dengue, Malaria, Zika Virus, Chikungunya, etc. It works by detecting the mosquito breeding conditions and agitates the water to prevent mosquito breeding. It runs on solar power and can thus run indefinitely.

## **3.Agriculture:**

The Nuru app helps farmers detect diseases in plants just by taking a picture of it by running Machine Learning models on the device using TensorFlow Lite. Since it works on the device, there is no need for an internet connection. This is a crucial requirement for remote farmers since they might not have proper internet connection in their place.

## **4.Ocean Life Conservation:**

Smart ML-powered devices are used to monitor whales in real-time in waterways around Seattle and Vancouver to avoid whale strikes in busy shipping lanes.

Sahil Chaurasia



TE IT

## Pinnacle of Artificial Intelligence in Biomedical Sciences



Artificial Intelligence (AI) has emerged as a transformative technology in the field of biomedical sciences, revolutionizing research, diagnostics, and treatment approaches. This report explores the latest applications of AI in biomedical sciences, showcasing its potential to enhance disease detection, drug discovery, medical imaging, personalized medicine, and more.

### **1. Introduction:**

Artificial Intelligence has gained prominence in the biomedical field due to its ability to analyze large datasets, recognize patterns, and generate insights that were previously difficult to attain. The integration of AI techniques with biomedical sciences has the potential to accelerate advancements in healthcare and improve patient outcomes.

### **2. Disease Detection and Diagnosis:**

AI algorithms are being used to identify disease markers and patterns in medical data, enabling early detection and accurate diagnosis. Machine learning models are employed to analyze genetic data, biomarkers, and clinical records, aiding in the identification of diseases like cancer, cardiovascular disorders, and neurodegenerative conditions at their incipient stages.





### **3. Drug Discovery and Development:**

AI-driven drug discovery is streamlining the identification of potential therapeutic compounds. Machine learning models predict molecular interactions, analyze compound libraries, and suggest drug candidates for specific diseases. This approach expedites the drug development process by reducing time and costs.

### **4. Medical Imaging and Diagnostics:**

AI is enhancing medical imaging interpretation by automating the analysis of X-rays, MRIs, CT scans, and other images. Deep learning algorithms can identify anomalies and highlight areas of concern, aiding radiologists in accurate diagnosis and treatment planning.

### **5. Personalized Medicine:**

AI facilitates the concept of personalized medicine by analyzing individual patient data to tailor treatment plans. By integrating patient history, genetic information, and lifestyle factors, AI algorithms can predict treatment responses and recommend personalized interventions.

### **6. Predictive Analytics and Prognosis:**

AI-powered predictive models utilize patient data to foresee disease progression and patient outcomes. These models assist clinicians in making informed decisions about treatment strategies, optimizing patient care pathways.

### **7. Biomarker Discovery:**

AI algorithms analyze complex biological datasets to identify novel biomarkers that signify disease presence or progression. These biomarkers aid in early detection and offer insights into disease mechanisms.

### **8. Virtual Health Assistants:**

AI-driven virtual assistants offer personalized health advice, medication reminders, and symptom tracking. These applications improve patient engagement, adherence, and overall healthcare management.

### **9. Ethical Considerations and Challenges:**

The implementation of AI in biomedical sciences raises ethical concerns surrounding patient data privacy, algorithm transparency, and bias mitigation. Ensuring the responsible use of AI in healthcare is imperative for maintaining patient trust and data security.

### **10. Future Directions:**

As AI technology continues to evolve, its integration with biomedical sciences is expected to become more seamless and impactful. Collaborations between AI experts and biomedical researchers will lead to innovations that transform healthcare delivery and patient outcomes.

### **11. Conclusion:**

The latest applications of AI in biomedical sciences represent a paradigm shift in healthcare. From disease detection to treatment personalization, AI-driven advancements hold immense potential for improving medical practices, accelerating research, and ultimately enhancing the quality of patient care.



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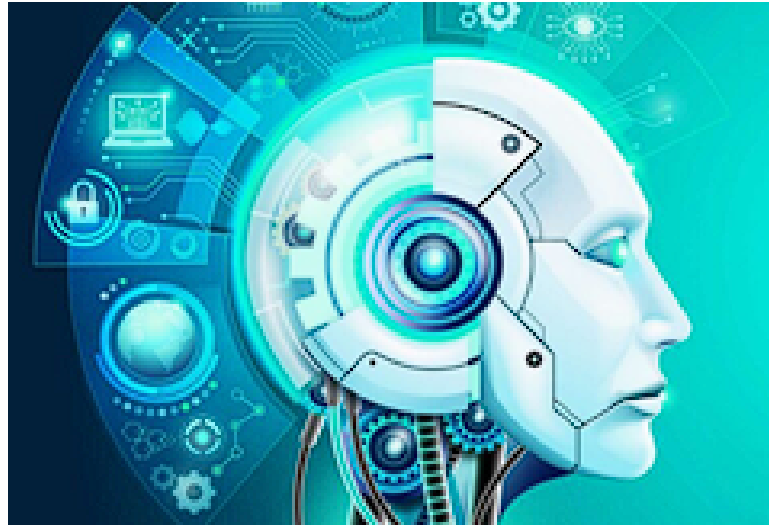
## IT Industry Developments



The IT industry has reached greater heights. The IT sector has increased its contribution to India's GDP from 1.2% in 1998 to almost 10% in 2019. According to NASSCOM, the sector aggregated revenues of 180 billion dollars in 2019 with export revenue standing at 99 billion dollars and domestic revenue 48 US billion dollars, growing by over 13%.

The major thrust areas include Emerging Areas of Information Technology (IT), Quantum Technologies, Blockchain, Data Analytics, IoT, Perception Engineering, Artificial Intelligence (AI) etc.

Talking about AI, it is the most emerging and best technologies in IT. In AI, new softwares has been made recently. One of them is ChatGPT. It is the majorly used AI tool among all other tools. But, it is in developing stages, so some solutions provided by it are inaccurate.



AI has many branches. One of them is Computer vision. It enables computers to analyze digital images and classify objects, individuals, and actions. Recent advancements in this domain have empowered robots to achieve human-level performance in tasks like object detection and emotion recognition. There are some features of computer vision. They are:-

- 1) Convolutional Neural Networks (CNNs) are a significant breakthrough in deep learning, specifically designed for visual data processing.
- 2) It finds potential applications in manufacturing, retail, and entertainment industries.
- 3) It also plays a crucial role in augmented and virtual reality, enabling the creation of immersive virtual worlds that respond to user gestures.
- 4) As computer vision continues to advance, robots will become even more proficient in interpreting visual data.



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# PLACEMENTS

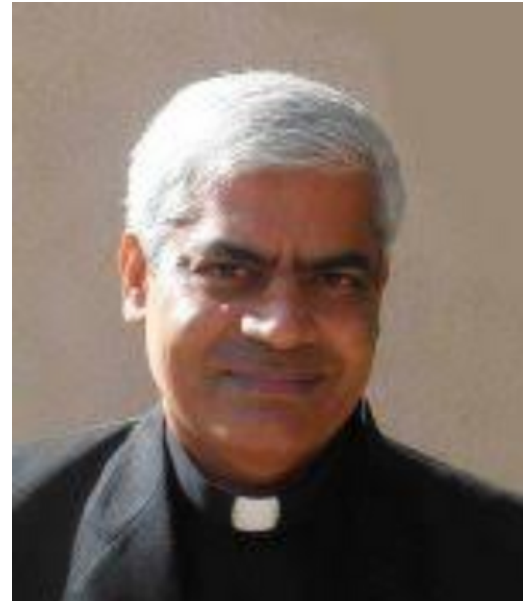
**In this month, different companies visited the campus of XIE to recruit students from various different branches for a variety of positions in the company. The student from IT department who got placed in this month was:**

**Name :** Shivam Goswami  
**Company :** Sciative Solutions  
**Package :** 6 lakhs/-

**Name :** Prajakta Dagade  
**Company :** Sciative Solutions  
**Package :** 4.5 lakhs/-

**Name :** Dhruv Agrawal  
**Company :** Sciative Solutions  
**Package :** 4.5 lakhs/-

Fr. Dr. John Rose SJ, Director of IT Department published an article on "Steganalysis on data embedded medical image" in the "Journal of Discrete Mathematical Sciences and Cryptography" on July 4, 2023



Prof. Chhaya Dhavale, Assistant Professor of IT Department conducted session on GAI language model on 6th July 2023 in ISTE approved six days STTP on generative AI and its application



## Empower Yourself with Ignatian Spirituality

Prof. Stella J participated in a day-long workshop organized by JHEASA- West Zone on the theme: “Empower Yourself with Ignatian Spirituality- a transformative workshop” that was held on 8th July 2023 at Bandra Retreat House, Mumbai.

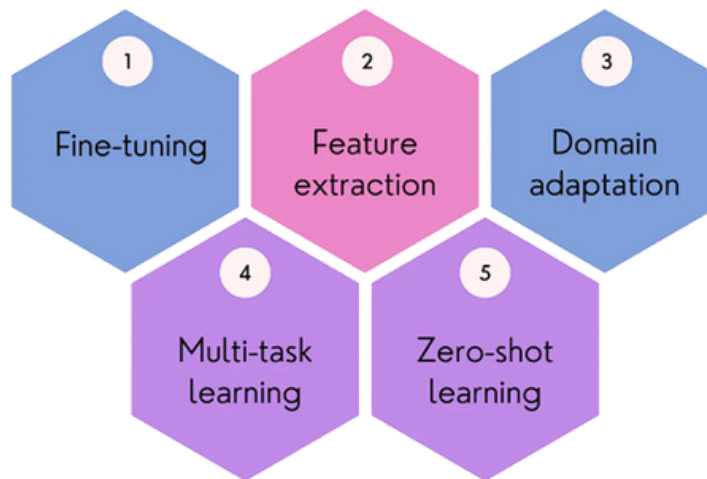
**Jesuit**  
Higher Education  
Association South Asia



## Transfer Learning and its applications

Prof. Stella J participated in a FDP program on "Transfer Learning and its applications" from 3rd July to 12th July 2023 conducted by NIT Warangal and organized by Computer Engineering, XIE.

### TYPES OF TRANSFER LEARNING



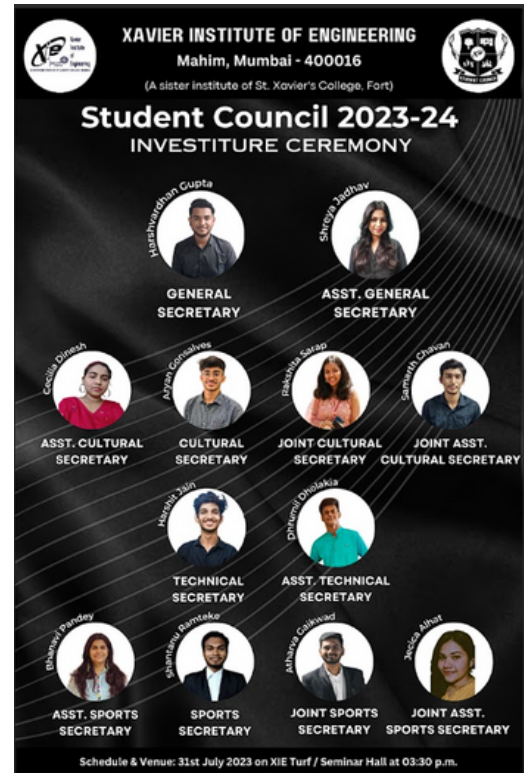


## Student Council Investiture Ceremony

The Investiture Ceremony of the Student Council at Xavier Institute of Engineering was a event marking the transition of leadership at institution, held at 3:30 pm on 31st July, 2023. The ceremony commenced with a warm welcome extended to dignitaries, followed by a prayer to invoke blessings for the new council's journey. A speech was delivered by the Director Fr. Dr. John Rose emphasizing the importance of leadership in education. The Principal's address this sentiment, highlighting the role of students in shaping the institution's future. The past council was then applauded by the students and faculty and the GS for 2022-23 gave an heartfelt speech towards the achievements of the team and wishing the new council.



The much-anticipated moment arrived as the new student council members were introduced one by one and received their sashes from the management. The flags were handover to the new council symbolizing the transfer of responsibility. The oath-taking ceremony was then held by the Dean of Student Council Mrs. Kavita Jain, a pledge of commitment to their roles. Finally, the General Secretary concluded the event with an encouraging speech, setting the tone for the council's term. The Investiture Ceremony was a meaningful and motivating start to the council's tenure, inspiring leadership and service among XIE students.



# OUR AMAZING CREW

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- **Shreya Jadhav (Student Co-ordinator)**
- **Siddhi Awlegaonkar (Reporter-in-Charge)**
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- **Gayatri Dyavanapalli (Asst. Graphic Designer)**
- **Sachin Vishwakarma (Documentation Head)**
- **Shirley Methri (Student Reporter)**
- **Chandan Singh Rajpurohit (Student Reporter)**
- **Himanshu Tiwari (Student Reporter)**