NEWSLETTER

2020-2021

Message from Head of the Department

Prof. Subhasree Sengupta
MCA, B.Tech, M.Tech

I take the privilege to welcome you to the Department of Computer Science & Engineering, Future Institute of Technology, Kokata, India..

Technology changes rapidly, especially in the field of computing, whereas the science, if it changes at all, does so much more gradually.

Our understanding is that persons who are clear and thorough about the fundamentals can adapt to rapid changes in technology relatively easily.

We want the education imparted to our students to be the basis of a life time of learning.

Ever since we started our journey way back in 2014, our department has produced hundreds of professionals and has established a name for itself in the country and abroad. They have consistently excelled in the highly competitive industrial environment, in top-ranking companies.

I attribute this success to the winning combination of a dedicated faculty team that works hard at imparting quality education to our students.

Learning is a continuous process and does not end with the acquisition of a degree, especially because steady and rapid advances in computing technologies shorten the life of tools and techniques prevalent today.

Therefore we do not aim to make our students walking manuals of any language or package. Instead, they are given a strong foundation in computer science and problem-solving techniques, and are made adaptable to changes.

We believe that this approach to teaching-learning, coupled with practical experience gained during Industrial Training in reputed organizations, equips our students to handle the challenges posed by the software industry.

Human Computer Interaction

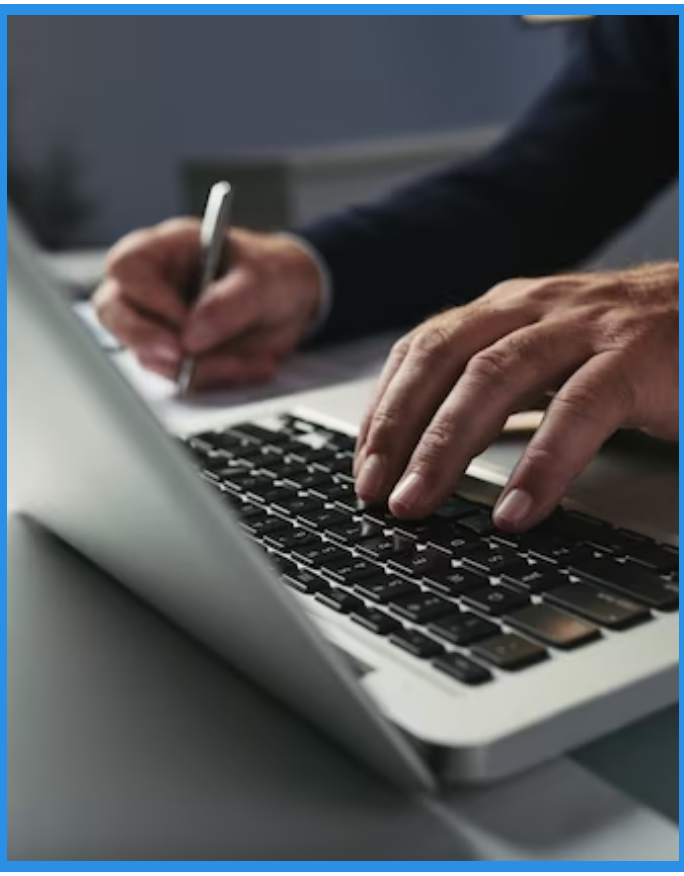
A interdisciplinary discipline called human-computer interaction (HCI) studies, develops, and evaluates interactions between people and computers. It focuses on developing effective computer systems that are easy to use and improve usability.

HCI has a wide range of applications in fields like healthcare, education, entertainment, and productivity tools. These applications span from developing websites and mobile apps to building sophisticated interactive systems. HCI is still a crucial area for ensuring that human-computer interactions are successful as technology develops.

User-Centered Design

HCI centers the design process around the user. To create interfaces that cater to users' mental models and cognitive capacities, designers and researchers seek to understand user demands, goals, and preferences.

Usability is the ability of a system to be used and learned with ease. In order to allow easy contact between users and computers, HCI professionals strive to develop interfaces that are simple, effective, and error-free.



User Experience (UX)

It is a term that refers to a user's total emotional, psychological, and perceptual response to engaging with a system. HCI aims to produce satisfying user experiences that increase customer happiness and adherence.

Designing interfaces for human-computer interaction (HCI) includes creating graphical user interfaces (GUIs), voice-based interfaces, touch-based interactions, augmented reality (AR) and virtual reality (VR) experiences, among other means of user engagement.

Accessibility

A key component of HCI is making sure that computer systems are usable by individuals with disabilities. This entails creating user interfaces that people with visual, auditory, motor, or cognitive disabilities can utilize.

User Testing and Assessment

To develop a variety of organic ways for users to connect with computers, HCI researchers and designers investigate a variety of interaction methods, including touch, gestures, voice commands, haptics, and eye tracking.

Cognitive psychology

It is crucial for HCI to comprehend how the human mind processes information. Interfaces that are in line with human cognitive capabilities and limits are designed using cognitive principles.

Human Factors

The physical and ergonomic components of interface design fall under the category of human factors in HCI. It requires taking into account aspects of display readability, color perception, and ergonomic design as well as human abilities, limitations, and preferences.

Information Architecture

HCI specialists arrange data and create navigational frameworks that make it simple for users to locate and comprehend data inside a system.

Interaction Methods

User feedback is gathered during usability testing and assessment in order to pinpoint usability problems, confirm design decisions, and enhance the system.

-Subhasree Sengupta,asst prof.

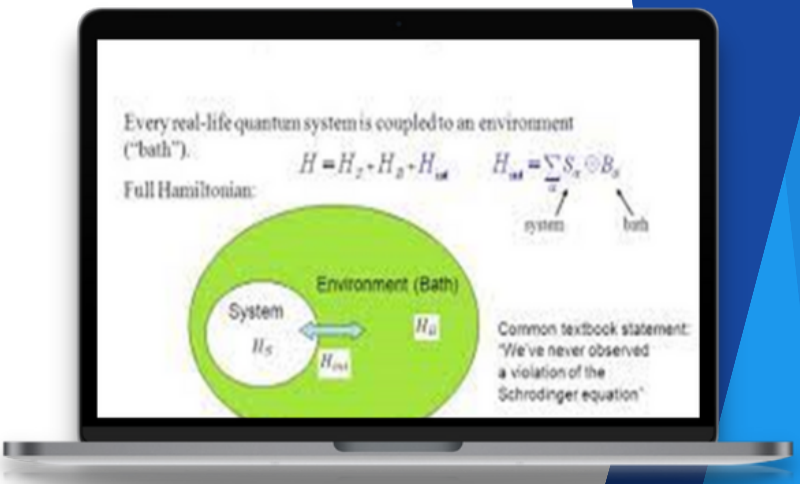
QUANTUM SYSTEM

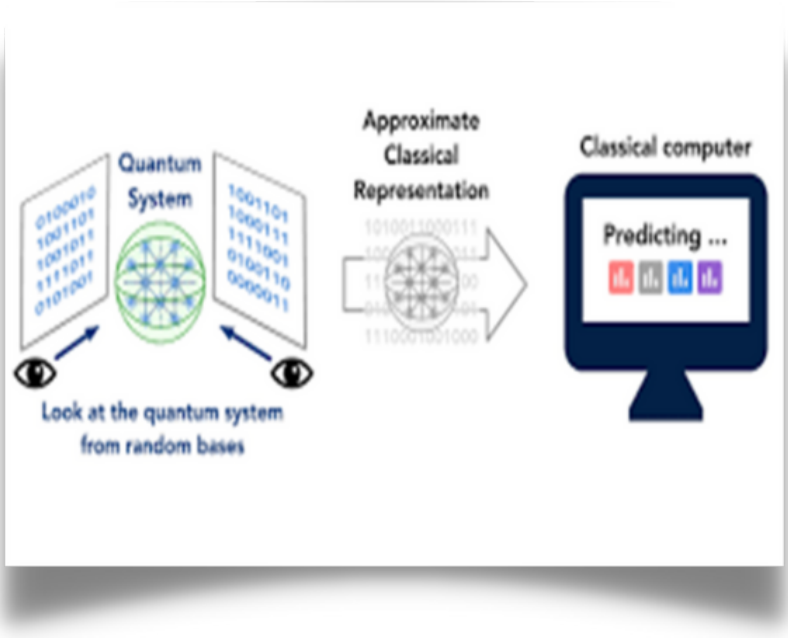
The behavior of matter and energy at the atomic and subatomic scales is described by the rules of quantum mechanics, which is a fundamental theory in physics. Quantum systems are physical systems that adhere to these principles. A number of novel and illogical notions that are different from those found in classical physics are introduced by quantum mechanics.

Important characteristics of quantum systems include:

Superposition: The simultaneous existence of several states in a quantum system. In contrast to classical systems, when an object is in a single, clearly defined state, this occurrence is referred to as superposition.

Quantization: In quantum systems, certain physical quantities, such energy levels and angular momentum, are quantized. They are therefore limited to taking discrete values only, not continuous ones.





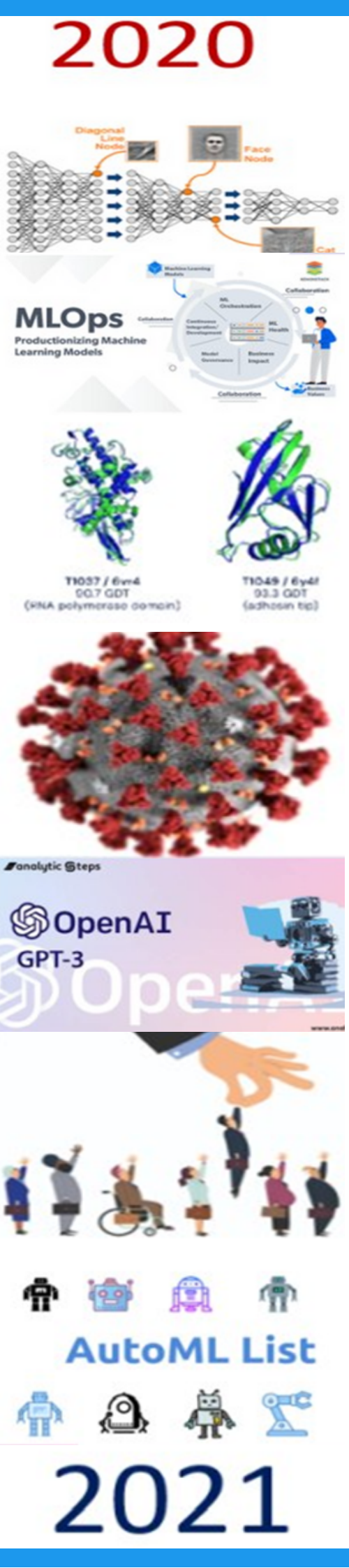
Wave-Particle Duality: At the quantum scale, certain particles, including electrons and photons, have both wave-like and particle-like characteristics. One of the fundamental theories of quantum mechanics is the wave-particle duality.

Heisenberg's uncertainty principle holds that some complementary pairs of attributes, such as location and momentum, cannot be simultaneously known with arbitrary accuracy. The accuracy with which we can measure these qualities has a basic limit.

Quantum entanglement is a phenomena in which, regardless of the distance between two or more particles, the states of the particles become so correlated that one particle's state cannot be described in isolation from the states of the others.

-Payel Pramanik,asst prof.

IMPACT OF DEEP LEARNING IN 2020-2021



>>> DEEP LEARNING

Machine learning includes the subcategory of deep neural networks. It is a network model with layers between input and output and several parameters for the neurons. The neural network architecture method is used by DL. Consequently, they are known as deep neural networks. Automatic learning of features and their representation in a hierarchy at various levels is provided by DL. Contrary to conventional machine learning techniques, deep learning's robustness comes from its potent learning process.Deep Learning is still a rapidly developing field with important developments and applications across many industries.

The following significant advancements and trends in deep learning for the years 2020 and 2021 are listed:

>>> DUE TO THE EMERGENCE

Of the new typical COVID-19 blues, PSUs adopted DeepMind artificial intelligence for cybersecurity while Google Maps used it to forecast arrival times.

A simulator that offers a scalable environment for AI research was called DeepMind Lab2D.

Google and improbable company worked together to use augmented reality to recreate the real world (AR). For instance, a better navigation system used augmented reality to overlay the route on a real-time view of the road.

Ground staff at Singapore's airport used augmented reality (AR) glasses to see more details about cargo containers and accelerate loading times. In order to study the affected area of the body for cancer, bone issues, injuries, and lung diseases, deep learning was used for X-ray diagnosis. 2020 saw the use of CNN-based models ResNet-50, Inception-v3, and Inception-ResNet-v2 to predict COVID-19 patients from chest X-ray images.

>>> PROGRESSION IN NATURAL LANGUAGE PROCESSING (NLP)

Transformer-based models, including T5, GPT-3, and BERT (Bidirectional Encoder Representations from Transformers), revolutionized NLP tasks. These models showed cutting-edge performance in a variety of tasks, including sentiment analysis, question answering, machine translation, and others.

COMPUTER VISION PROGRESS

Deep learning furthered its impact on computer vision tasks. Models like EfficientNet, ViT (Vision Transformer), and DeiT (Data-efficient Image Transformers) achieved impressive results on image classification and object detection challenges.

Deep learning has strengthened its influence on computer vision tasks. On difficult image classification and object detection problems, models like EfficientNet, ViT (Vision Transformer), and DeiT (Data-efficient Image Transformers) produced impressive results.The 2020 release of OpenAI GPT-3 was heralded as a miraculous development in natural language processing.

Deep reinforcement learning gained popularity and produced outstanding outcomes in robotics, autonomous systems, and game-playing tasks. In complex environments, the efficiency of algorithms like DQN (Deep Q-Networks), A3C (Asynchronous Advantage Actor-Critic), and PPO (Proximal Policy Optimization) was demonstrated.

FEDERATED LEARNING

Federated learning has become a promising strategy for machine learning that protects privacy. It protected user privacy by allowing multiple devices or servers to work together while training a global model without transferring raw data.

HARDWARE INNOVATIONS

Deep learning research keeps expanding the complexity and model size bounds. This led to advancements in specialized hardware, like GPUs and TPUs, to speed up model inference and training.

INDUSTRY APPLICATIONS

Deep learning has been used in a number of different fields, including finance, healthcare, autonomous vehicles, and natural language interfaces. It was essential in hastening developments in these fields.

GENERATIVE MODELS

Generative models like Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs) have remained popular. Particularly GANs were used to produce lifelike pictures, videos, and even deep-fake content, raising questions about possible abuse.

SELF-SUPERVISED LEARNING

Self-supervised learning techniques have gained popularity because they can be used to train deep neural networks using unlabeled data. They assisted in enhancing model functionality and lowering reliance on sizable labeled datasets.

ETHICAL AND SOCIAL IMPLICATIONS

As deep learning models become more potent, such as GPT-3, there are growing worries about moral dilemmas, bias, openness, and misuse of AI technology. To ensure responsible AI deployment, researchers and policymakers are concentrating on addressing these issues.

PRE-TRAINED MODELS AND TRANSFER LEARNING

These techniques are now used more frequently. To save time and resources, researchers and developers bootstrapped their own tasks using models that had already been trained on massive datasets.

-Arnab Hazra,asst prof.