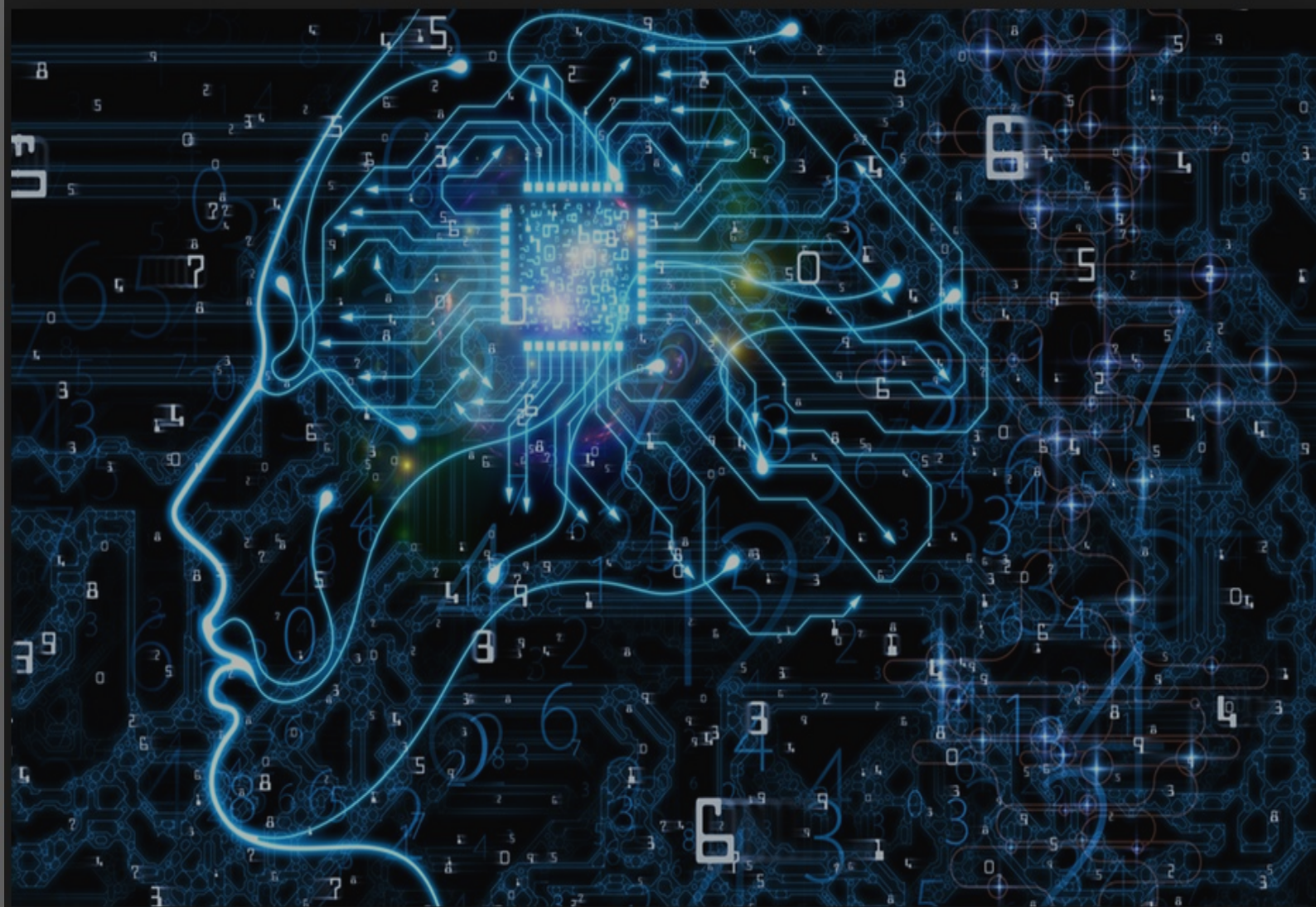


# **Computational Intelligence**

---



## **Message From Dean, FCAIT-UG**



The current issue of our magazine DKOSMOS explores the theme of Computational Intelligence. We find it fit to reflect on the transformative potential of this field and its profound implications for the future of technology and society. Computational Intelligence represents a convergence of computer science, artificial intelligence, machine learning, and data analytics empowering us to solve complex problems, make informed decisions, and unlock new opportunities across diverse domains.

In an era characterized by exponential data growth and rapid technological advancements, Computational Intelligence serves as a cornerstone of innovation, driving progress in fields ranging from healthcare and finance to manufacturing and entertainment. Through joint research initiatives, collaborative projects, and interdisciplinary courses, students gain holistic insights into the multifaceted nature of Intelligence and its intersection with various disciplines. Moreover, our commitment to excellence in education ensures that our students are equipped with the knowledge, skills, and mindset to thrive in an increasingly data-driven and AI-powered world. Through a multifaceted approach encompassing National Technical Festivals, Tech Talks and Seminars we aim to cultivate a dynamic learning environment conducive to innovation and growth. Through hands-on projects, experiential learning opportunities, and interdisciplinary collaboration, we empower our students to become future leaders and innovators in Computational Intelligence and related fields.

In this edition of DKOSMOS, we not only delve into the exciting realm of Computational Intelligence but also provide glimpses of the diverse array of seminars, workshops, educational endeavors, and industrial tours that have enriched our academic landscape at the Faculty of Computer Applications and Information Technology (FCAIT).

## **From Editorial Desk**

Welcome to the latest edition of DKOSMOS, In this issue, we embark on an exciting journey into the world of Computational Intelligence, exploring its transformative potential, innovative applications, and profound implications for the future. From self-driving cars and personalized medicine to smart cities and predictive analytics, Computational Intelligence is revolutionizing industries, shaping economies, and redefining the way we live, work, and interact with technology. As we navigate the complexities of an ever-evolving technological landscape, our commitment to excellence remains unwavering, propelling us towards a future where Computational Intelligence serves as a catalyst for transformative change.

As you navigate through the pages of DKOSMOS, we invite you to explore the latest trends, innovations, and challenges in Computational Intelligence, and to engage in critical discussions about its ethical, social, and economic impact. The magazine also brings out glimpses of events organized. Throughout the year, FCAIT has been a hub of intellectual discourse, hosting a series of seminars and workshops featuring renowned scholars and industry experts. We believe in the transformative power of interdisciplinary collaboration. By fostering partnerships with other faculties and academic institutions, we encourage cross-pollination of ideas and integration of diverse perspectives. Tech Talks and Seminars play a pivotal role in augmenting academic discourse and promoting industry-academia collaboration. Renowned experts and thought leaders are invited to share insights, discuss best practices, and decipher emerging trends in areas such as machine learning, data science, natural language processing, and robotics. These interactions not only broaden students perspectives but also provide valuable networking opportunities and foster mentorship relationships with industry professionals. Our TechTalk series continues to be a cornerstone of knowledge sharing and professional development within the FCAIT community.

We welcome your suggestions and remarks via email, so please get in touch with for reviews at [dkosmos@glsica.org](mailto:dkosmos@glsica.org). Thank you for joining us on this journey of exploration and discovery. We hope you enjoy reading DKOSMOS as much as we have enjoyed bringing it to you.

### **Chief Editor**

Dr. Tripti Dodiya

### **Members**

Dr. Disha Shah, Dr. Poonam Dang, Dr. Bharti Shah,  
Prof. Monica Gupta, Prof. Garima Mishra, Dr. Kruti Vyas,  
Prof. Ruchika Rami

### **Designer**

Dr. Bharti Shah

## Introduction

Computers, once mere tools for computation and data processing, have evolved into intelligent entities capable of mimicking human-like cognitive functions. This field is aptly named "Computational Intelligence," and it sits at the crossroads of computer science and artificial intelligence (AI). For beginners, understanding computational intelligence involves exploring how computers can be programmed to perform tasks that typically require human intelligence. At its core, computational intelligence refers to the ability of a machine to simulate human-like intelligence. This goes beyond the traditional capabilities of computers, which excel at executing predefined tasks with speed and precision. Computational intelligence aims to imbue machines with the capacity to learn, reason, and make decisions autonomously. This article delves into the historical journey and contemporary state of computational intelligence, examining its impact on various aspects of society. It explores the evolution from early symbolic reasoning to the current era of machine learning and artificial intelligence, highlighting applications in everyday life and the ethical considerations that accompany these advancements.

## What is Computational Intelligence?

Computational intelligence refers to the ability of computers and computer systems to perform tasks that traditionally require human intelligence. This includes tasks such as problem-solving, decision-making, learning, understanding natural language, recognizing patterns, and more.

Computational intelligence is typically achieved through the use of algorithms, data processing, and machine learning techniques. These techniques enable computers to analyze large amounts of data, recognize patterns, and make decisions or predictions based on the data they have processed. Some common examples of computational intelligence include:

**Machine Learning:** Algorithms and statistical models that allow computers to improve their performance on a task through experience(data).

**Natural Language Processing (NLP):** The ability of computers to understand, interpret, and generate human language.

**Computer Vision:** The capability of computers to interpret and understand visual information from the real world, such as images/videos.

**Robotics:** Combining hardware and software to create intelligent machines that can perform tasks autonomously or semi-autonomously.

**Expert Systems:** Computer systems that emulate the decision-making ability of a human expert in a specific domain.

**Artificial Intelligence (AI):** The broader field of study that encompasses all aspects of creating intelligent machines, including computational intelligence.

Computational intelligence has numerous applications across various industries, including healthcare, finance, manufacturing, transportation, and entertainment. As technology continues to advance, the capabilities of computational intelligence are likely to expand, enabling computers to perform increasingly complex tasks and solve more sophisticated problems.

## COMPUTATIONAL INTELLIGENCE



## What are the main goals of computational intelligence?

There are many different goals of computational intelligence, but some of the most common ones are:

1. To create systems that can learn and improve over-time.
2. To create systems that can reason and make decisions.
3. To create systems that can interact with humans.
4. To create systems that can solve problems in novel-ways.
5. To create systems that can adapt to changing environments.

## Evolution of Computational Intelligence: Unveiling the Journey

Computing devices, which once were simple tools for mathematical calculations, have undergone a profound transformation over the decades, evolving into intelligent entities capable of sophisticated tasks. The evolution of computational intelligence is a captivating journey that spans the mid-20th century to the present, marked by milestones in artificial intelligence (AI) and machine learning. This narrative aims to elucidate this evolution for beginners, tracing the trajectory from early computers to the current landscape of intelligent systems.

### 1. Early Computers and Symbolic Reasoning:

The dawn of computational intelligence can be traced back to the mid-20<sup>th</sup> century, where early computers were primarily designed for numerical calculations. However, the visionaries of that time began contemplating the idea of creating machines that could emulate human intelligence. Symbolic reasoning, a rule-based approach, dominated early AI research. Notable pioneers such as Alan Turing and John McCarthy laid the groundwork for what would become the field of artificial intelligence. The birth of artificial intelligence (AI) is intricately tied to the development of the Lisp programming language. Short for "List Processing," Lisp is not only a language but a fundamental concept that has significantly influenced the landscape of AI. In this article, we delve into the origins and characteristics of Lisp, the first programming language designed explicitly for AI.

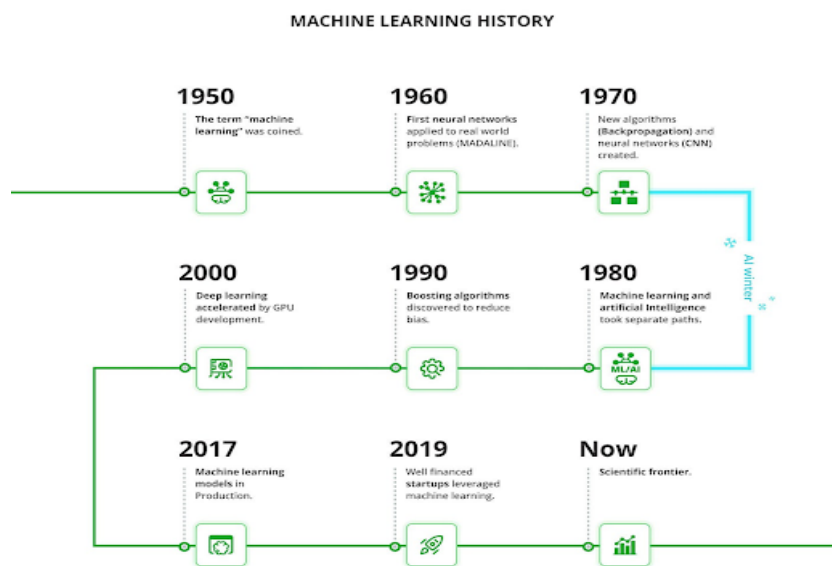


The birth of artificial intelligence (AI) is intricately tied to the development of the Lisp programming language. Short for "List Processing," Lisp is not only a language but a fundamental concept that has significantly influenced the landscape of AI. In this article, we delve into the origins and characteristics of Lisp, the first programming language designed explicitly for AI.

**Key Features of Lips:** Lisp is distinctive for its unique features that distinguish it from traditional programming languages of its time. One of its defining characteristics is its focus on symbolic computing, enabling the representation of knowledge and reasoning in a form closely aligned with human thought processes. Lisp's syntax is based on expressions within parentheses, known as S-expressions, allowing for flexible and dynamic coding. Lisp's power lies in its representation of code as data, a concept known as homoiconicity. In Lisp, programs and data share the same structure, fostering a level of expressiveness that is unparalleled. This inherent flexibility facilitates the creation of meta-programs, enabling developers to write code that modifies or generates other code, a crucial capability in AI research.[1]

### 2. Birth of Machine Learning:

The evolution gained momentum with the realization that machines could learn from data rather than relying solely on explicit programming. The advent of machine learning, a subfield of AI, introduced algorithms capable of improving their performance through experience. This shift from rule-based systems to learning algorithms represented a paradigmatic leap in computational intelligence. The birth of machine learning can be traced back to the mid-20th century, with roots in the fields of mathematics, computer science, and artificial intelligence[2]. Here are key milestones and developments that played a significant role in the early days of machine learning:



# Computational Intelligence

**Alan Turing and the Turing Test (1950):** Alan Turing, a British mathematician and computer scientist, proposed the idea of a test to determine a machine's ability to exhibit intelligent behavior indistinguishable from that of a human. While not explicitly a machine learning concept, the Turing Test influenced thinking about artificial intelligence and the potential for machines to mimic human intelligence.

**Rosenblatt's Perceptron (1957):** Frank Rosenblatt introduced the perceptron, a simple neural network model inspired by the structure and function of the human brain. The perceptron could learn to recognize patterns and make decisions based on input data. However, its limitations in handling complex problems led to a decline in interest in neural networks during the following years.

**Widrow and Hoff's Adaptive Linear Neuron (ADALINE, 1960):** Bernard Widrow and Marcian Hoff developed ADALINE, an early form of a neural network that could adapt and learn from input data. This marked an advancement in the development of learning algorithms, laying the groundwork for more sophisticated approaches.

**Development of Decision Trees (1960s):** Research in decision tree algorithms, such as the ID3 (Iterative Dichotomiser 3) algorithm by Ross Quinlan in the 1960s, contributed to the concept of machine learning by enabling automated decision-making based on a series of hierarchical questions.

**Samuel's Checkers Player (1959):** Arthur Samuel, an American computer scientist and pioneer in AI, developed a program that could play checkers and improve its performance through self-play. Samuel coined the term "machine learning" to describe the ability of a computer program to learn from experience.

**Early AI and Expert Systems (1960s-1970s):** During this period, AI researchers explored rule-based expert systems, which encoded human expertise in a set of rules. These systems could make decisions based on explicit knowledge, representing an early form of symbolic AI. While not purely machine learning, they laid the groundwork for more data-driven approaches.

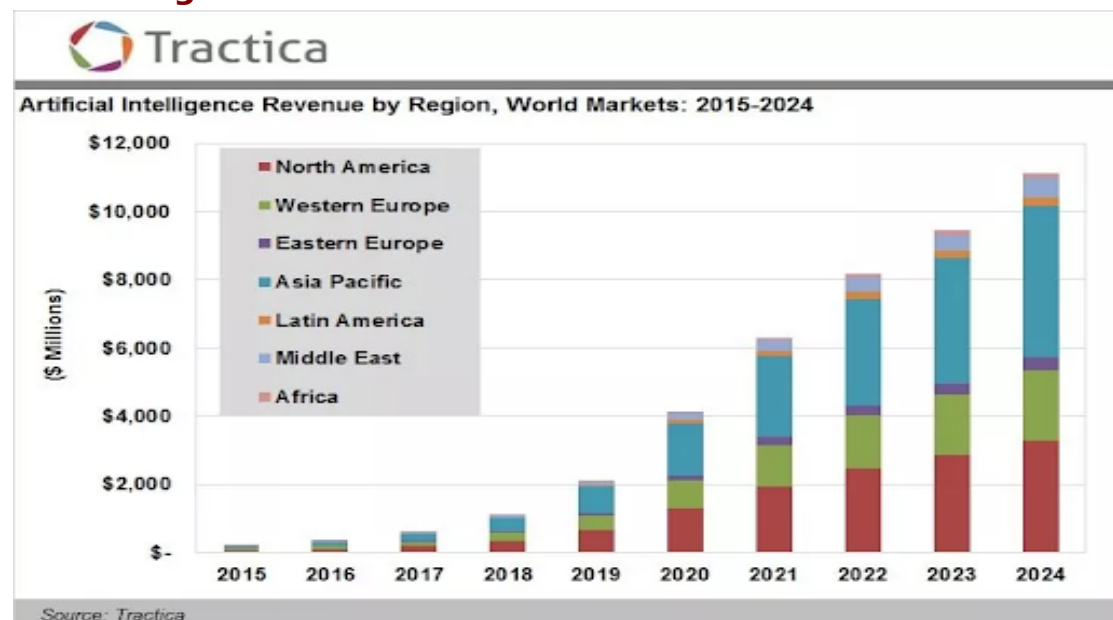
**Introduction of Backpropagation (1970s-1980s):** The backpropagation algorithm, a method for training artificial neural networks, was independently rediscovered multiple times and gained attention in the 1970s and 1980s. It allowed neural networks to learn and adjust weights through iterative training, overcoming some of the limitations of earlier models.

**Statistical Learning Theory (1980s):** Researchers in statistical learning theory, such as Vladimir Vapnik and Alexey Chervonenkis, made significant contributions to the theoretical foundations of machine learning. Vapnik later co-developed the Support Vector Machine (SVM), an influential machine learning algorithm.

These early developments set the stage for the later explosion of interest and innovation in machine learning, especially with the availability of more powerful computers, larger datasets, and advances in algorithms. The field continued to evolve, embracing a variety of techniques, including regression, clustering, reinforcement learning, and ensemble methods, leading to the diverse landscape of machine learning we see today.

## 3. Market of Computational Intelligence

The market for computational intelligence, including artificial intelligence (AI) and related technologies, was experiencing robust growth and significant investment across various sectors globally. Here are some key details regarding the market of computational intelligence:



**Growth Trends:** The market for computational intelligence has been expanding rapidly due to advancements in machine learning, deep learning, natural language processing, computer vision, and other AI-related technologies. Businesses across industries are increasingly adopting AI to enhance efficiency, improve decision-making, and drive innovation.

**Industry Adoption:** Virtually every industry is exploring and implementing computational intelligence solutions. Some of the most prominent sectors include healthcare, finance, retail, manufacturing, automotive, cybersecurity, education, and entertainment. Each sector utilizes AI technologies to address specific challenges and opportunities unique to their domain.

**Investment and Funding:** The market has seen substantial investment from venture capital firms, private equity investors, and corporate entities. Startups specializing in AI technologies have attracted significant funding for research, development, and scaling their products and services. Established technology companies are also investing heavily in AI to stay competitive and drive growth.

**Applications:** Computational intelligence finds applications across a wide range of use cases, including:

**Healthcare:** AI is used for medical imaging analysis, drug discovery, personalized medicine, predictive analytics, and improving patient outcomes.

**Finance:** AI is employed for fraud detection, algorithmic trading, risk management, customer service automation, and personalized financial services.

**Retail:** AI powers recommendation engines, demand forecasting, supply chain optimization, customer segmentation, and personalized shopping experiences.

**Manufacturing:** AI enhances predictive maintenance, quality control, supply chain management, process optimization, and smart robotics.

**Automotive:** AI enables autonomous driving technology, vehicle diagnostics, predictive maintenance, and smart transportation systems.

**Cybersecurity:** AI helps detect and mitigate security threats, identify anomalous behavior, and enhance threat intelligence capabilities.

**Education:** AI is used for adaptive learning platforms, personalized tutoring, student performance analysis, and administrative automation.

**Challenges and Opportunities:** Despite its tremendous potential, the market for computational intelligence faces challenges related to data privacy, ethics, bias, explainability, and regulatory compliance. Addressing these challenges presents opportunities for innovation and collaboration within the industry.

**Global Landscape:** The market for computational intelligence is global, with leading companies and research institutions located in countries such as the United States, China, the European Union, and others. Collaboration and knowledge exchange among international stakeholders drive the advancement and diffusion of AI technologies.

Overall, the market for computational intelligence is dynamic and evolving, with continued growth expected as technology capabilities expand and adoption rates increase across industries worldwide. However, stakeholders must navigate regulatory, ethical, and technical considerations to realize the full potential of AI in a responsible and sustainable manner.[3]

**Hardik Parmar, Priya Thakkar, SYIMSc-IT SEM-IV**

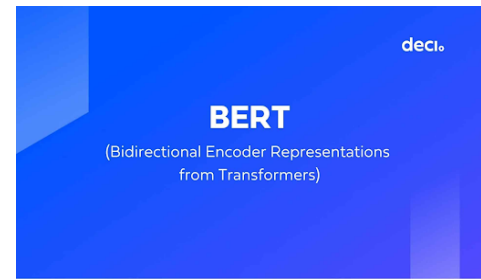
## 4. Top Companies using Computational Intelligence

AI has seamlessly integrated into our daily lives through virtual assistants, recommendation systems, and personalized advertising algorithms. Industries such as healthcare and finance leverage AI for tasks ranging from medical diagnostics to fraud detection.[3] These tools and platforms offer developers and researchers a wide range of options for building, fine-tuning, and deploying state-of-the-art language models and NLP applications. They enable a variety of use cases in natural language understanding, text generation, sentiment analysis, and other areas of NLP and AI research.[6]

**OpenAI GPT (Generative Pre-trained Transformer):** OpenAI's GPT models, including GPT-3, are among the most advanced language models available. They are capable of generating human-like text based on prompts provided by users. These models can be fine-tuned for various natural language processing tasks such as text completion, language translation, summarization, and question-answering.



**BERT (Bidirectional Encoder Representations from Transformers):** Developed by Google, BERT is another powerful language model designed to understand context and nuances in text. BERT can be fine-tuned for specific tasks, including sentiment analysis, named entity recognition, and text classification. It excels in understanding the relationship between words and phrases in a given context.



**XLNet:** XLNet is a language model developed by researchers at Google and Carnegie Mellon University. It overcomes limitations of previous models by leveraging permutation-based training, allowing it to capture bidirectional context while avoiding the limitations of traditional autoregressive and autoencoding models.

**Hugging Face Transformer:** Hugging Face provides an open-source library and platform for training, fine-tuning, and deploying transformer-based models, including GPT and BERT. It offers a wide range of pre-trained models and tools for natural language understanding and generation tasks, as well as interfaces for developers to integrate these models into their applications.



**AllenNLP (Allen Institute for AI):** AllenNLP is an open-source natural language processing library built on top of PyTorch. It provides pre-built models and tools for a variety of NLP tasks, including text classification, named entity recognition, and semantic role labeling. Developers can use AllenNLP to build custom NLP models and applications tailored to their specific needs.

**spaCy:** spaCy is an open-source NLP library written in Python. It offers tools and pre-trained models for various NLP tasks such as tokenization, part-of-speech tagging, named entity recognition, and dependency parsing. spaCy is designed for production use and is known for its speed, efficiency, and ease of integration into existing workflows.



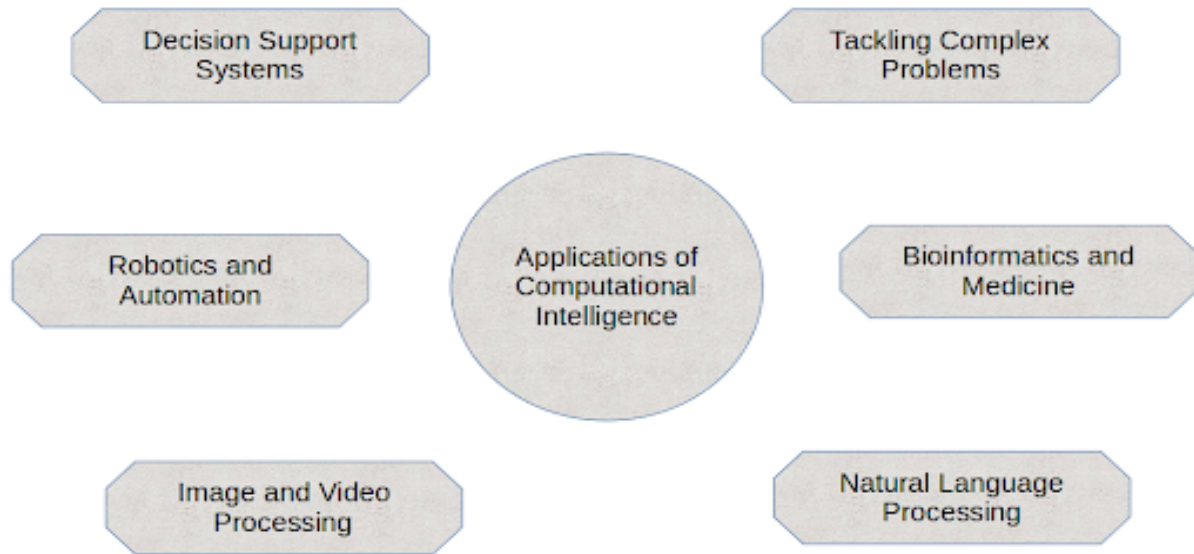
**BERT:** BERTaaS is a cloud-based service that provides pre-trained BERT models accessible via APIs. Users can leverage these models for a variety of NLP tasks without the need for extensive computational resources or model training. BERTaaS simplifies the deployment of BERT models in production environments and allows developers to focus on building applications.

**IBM:** IBM Watson is a well-known AI platform that offers a range of services, including natural language processing, machine learning, and computer vision, to help businesses leverage AI in their operations. A powerful artificial intelligence platform developed by IBM that leverages natural language processing, machine learning, and other advanced technologies to analyze large volumes of unstructured data, understand human language, and generate insights to support decision-making processes.



**DeepMind:** DeepMind, a subsidiary of Alphabet Inc. (Google's parent company), is a leading research organization focused on artificial intelligence and machine learning. DeepMind's projects span various domains, including healthcare, robotics, and gaming, with the goal of developing AI systems that can solve complex problems and improve human lives.

## 5. Applications of Computational Intelligence



**Tackling Complex Problems:** Computational intelligence offers solutions to complex problems that traditional algorithmic approaches may struggle to solve. Examples of its applications span various domains.

**Natural Language Processing:** With computational intelligence techniques, machines can understand, interpret, and generate human language in written or spoken forms. Applications include sentiment analysis, machine translation, and chatbots.

**Image and Video Processing:** Using techniques like neural networks, computational intelligence enables image and video processing for tasks such as object detection, face recognition, and video analytics.

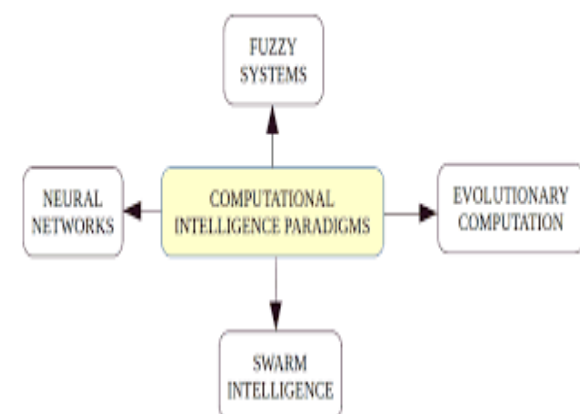
**Robotics and Automation:** In robotics, computational intelligence is used to develop robots with increased autonomy and adaptability. Applications range from self-driving cars and drones to robotic arms in manufacturing and medical robotics.

**Decision Support Systems:** Computational intelligence supports decision-making in complex environments. Examples include stock market prediction, risk assessment in finance, and recommendation systems for e-commerce or content platforms.

**Bioinformatics and Medicine:** In bioinformatics and medicine, computational intelligence techniques help analyze vast amounts of data, such as genomics data or medical images, to find patterns, perform diagnoses, and predict patient outcomes.

## 6. Types of Computational Intelligence

Computational intelligence frameworks are inspired by biological systems and evolutionary processes. Over the past decade, researchers have made great strides in using mathematical and programming principles to mimic natural problem-solving processes.



**Neural Networks:** Neural networks are inspired by the structure and function of the human brain. They consist of interconnected nodes (neurons) that are able to process and learn from data. Deep learning, a subset of neural networks, has been particularly influential in recent years, leading to significant advancements in new types of deep learning models for image recognition and natural language processing (NLP).

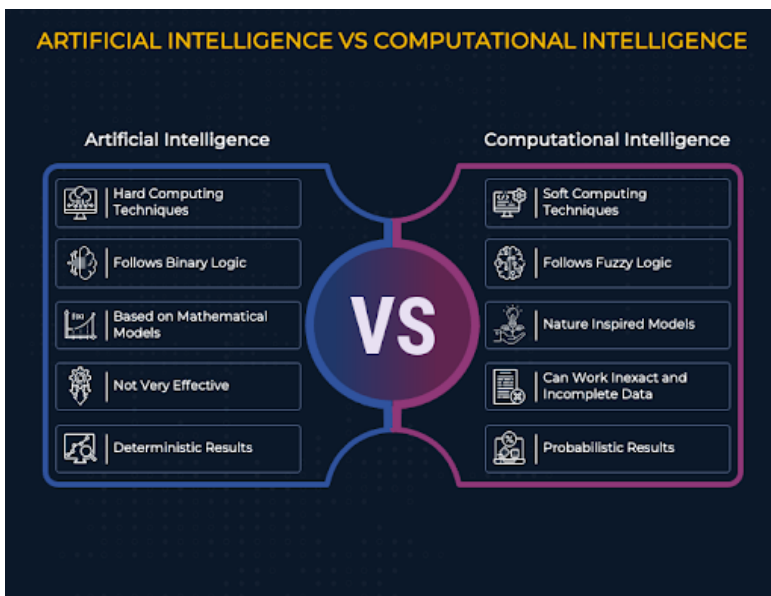
**Fuzzy Logic:** Fuzzy logic is a powerful tool for being able to still use algorithms when traditional binary logic may not capture the nuances and uncertainties of input data. In this context, the label “fuzzy” means “vague or imprecise.” Fuzzy logic handles uncertainty by allowing variables to have degrees of truth between 0 and 1. At the conclusion of mathematical operations, fuzzy algorithmic outputs are then “defuzzified” to obtain precise (crisp) numerical results.



**Evolutionary Algorithms:** Evolutionary algorithms are a type of optimization algorithm inspired by the process of natural selection. The process begins by randomly or heuristically creating a population of potential solutions referred to as candidates. A selection process determines which candidates should be chosen to become parents for the next generation, and the algorithm continues to iterate through generations until a termination condition is met. Common termination conditions include reaching a maximum number of generations, achieving a satisfactory solution, or running for a specified amount of time.

**Swarm Intelligence:** Swarm intelligence is inspired by the collective behavior of some types of animals like ants, bees, and birds. This type of connective intelligence simulates the cooperation and interaction observed in natural swarms and adjusts outcomes based on the collective knowledge of the group. Swarm intelligence is particularly useful for optimizing tasks in dynamic environments when there are lots of interdependent variables.

## What is the difference between Artificial Intelligence and Computational Intelligence?



## Difference between Artificial Intelligence and Computer Science

Criteria	Artificial Intelligence (AI)	Computer Science (CS)
<b>Definition</b>	Building intelligent systems that can perform tasks that typically require human-level intelligence.	The study of computers and computational systems, including their design, development, and applications.
<b>Focus</b>	Developing intelligent algorithms and systems.	Building and maintaining computer systems.
<b>Key Technologies</b>	Machine Learning, Natural Language Processing, Robotics, Neural Networks.	Data Structures, Algorithms, Programming Languages, Operating Systems.

## Future Horizons and Ethical Considerations:

As we look to the future, quantum computing, explainable AI, and advancements in natural language processing stand on the horizon. However, the evolution of computational intelligence brings ethical considerations, including issues of bias, privacy, and accountability. Striking a balance between innovation and ethical use is crucial for shaping a positive and responsible future.[7]

**Manya Choradiya, Drashti Barot, SYBCA, SEM-IV**

## References:

- [1] McCarthy, J., Minsky, M. L., Rochester, N., & Shannon, C. E. (1955). A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence.
- [2] Samuel, A. L. (1959). Some studies in machine learning using the game of checkers. *IBM Journal of Research and Development*, 3(3), 210-229.
- [3] Buchanan, B. G., & Shortliffe, E. H. (1984). *Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project*.
- [4] Rumelhart, D. E., Hinton, G. E., & Williams, R. J. (1986). Learning representations by back-propagating errors. *Nature*, 323(6088), 533-536.
- [5] LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. *Nature*, 521(7553), 436-444.
- [6] Silver, D., et al. (2016). Mastering Chess and Shogi by Self-Play with a General Reinforcement Learning Algorithm. *Science*, 362(6419), 1140-1144.
- [7] Diakopoulos, N. (2016). Accountability in Algorithmic Decision Making. *Communications of the ACM*, 59(2), 56-62.
- [8] Arute, F., et al. (2019). Quantum supremacy using a programmable superconducting processor. *Nature*, 574(7779), 505-510.

# Academic Activities

## Industrial Visit

The Faculty of Computer Applications and Information Technology provides opportunities to students for learning and engaging with the real working environment, workstations, plants, machines, systems, and interacting with highly trained and experienced personnel by organizing various industrial visits. Currently, FCAIT organized an industrial tour for first year students of BCA, BCA(Hons.) and i.Msc.(IT) to AMUL's chocolate Plant at Mogar and butter manufacturing facilities in Anand on 2nd and 16th September 2023. This visit made them familiar with the manufacturing, packaging and distribution process of Amul products as well as its evolution and expansion as a co-operative industry. Students also got a chance to visit Amul's museum, which is a portrayal of the intersection of the freedom struggle and the milk revolution of Anand, and charts the trajectory of the milk co-operative ever since it was formed. A gallery full of images and an audiovisual show gives a walk through the years that Amul has been around. At the end of the visit students enjoyed hygienic and delicious food at Amul Canteen.



Faculty of Computer Applications and Information Technology (FCAIT) organized an educational tour for TYBCA and SYBCA students to Adani's Port, Mundra, was an enlightening experience spanning two days, offering invaluable insights into industrial operations and renewable energy sources. The visit commenced with a comprehensive tour of the thermal power plant, unveiling the intricate process of electricity generation from coal. Students observed firsthand the step-by-step mechanism involved, enhancing their understanding of power generation. The exploration of solar plates' generation from scratch was an eye-opener, showcasing the meticulous process of harnessing solar energy.

Witnessing the world's highest onshore windmill prototype left an indelible impression, highlighting the innovation and technology behind renewable energy sources. The day continued with a visit to Udaan Hostel, where students immersed themselves in the serene ambiance of a beautiful temple. Later, a delightful dinner was served, followed by captivating cultural performances by talented students, fostering a sense of unity and cultural exchange among participants. The second day commenced with invigorating yoga and laughter sessions, setting a positive and energetic tone for the day. After a wholesome breakfast, students embarked on a tour to Adani Port & SEZ, gaining profound insights into port operations and the significance of Special Economic Zones. A highlight of the day was the visit to Adani Wilmar Ltd. refinery, where students witnessed the generation of filtered oil from crude oil. This immersive experience provided a comprehensive understanding of the refining process, enriching their knowledge in the domain of oil production and refinement. The educational tour was a resounding success, combining technical knowledge with cultural experiences, broadening students' horizons and fostering a deeper appreciation for industrial processes and renewable energy sources. This endeavor wouldn't have been possible without the support and coordination of the faculty, organizers, and Adani's Port, Mundra. The experience garnered during these two days is certain to resonate positively in the academic and professional pursuits of the participating students.

# Academic Activities

## Educational Tour

The Faculty of Computer Applications and Information Technology organizes various educational visits for students to introduce learning beyond classroom. The first year students of BCA (Hons.) and iMCA went on an educational tour to 108 - Emergency Management and Research Institute and the Modhera Sun Temple on 2<sup>nd</sup> and 16<sup>th</sup> September, 2023. Visiting this organization students got an exposure to an Emergency Response System that coordinates every emergency through a single toll free number 108/112. From a transparent glass corridor students learnt about assessment of the emergency, dispatch of the ambulances, along with a well trained Emergency Medical Technician to render quality pre-hospital care and transport of the patient to the appropriate health care facility. They also got to know about many helpline services such as 104 (Health Helpline), 181 (Women Helpline and Rescue Vans), 100/112 (Police Command and Control Center), 1962 (Veterinary Mobile Clinics), Public Grievance Redressal Helpline. After having lunch at EMRI canteen students went to the modhera sun temple, Mehsana. The prime objective of students visiting the sun temple was to make them see the architecture and carvings of the magnificent kund known as the Ramakund, the 'Sabha Mandap' and the Garbhagriha. Students got to know about the glory of the temple and its inclusion on the tentative list of the UNESCO World Heritage Site last year.



## Collegiate Women's Development Activities



FCAIT organizes various seminars and awareness programmes on Self Defence Techniques, Health and Hygiene for Women under the women's development cell (CWDC). The institute conducted an expert session on Women Safety, Protection & Laws on 15<sup>th</sup> July, 2023 at Thakorbbhai Desai Hall. The keynote speaker, ACP Sir Himala Joshi, shared her valuable inputs on Women's Safety, Protection and Laws. Legal adviser & Self-Defence Expert, Mr. Jaldeep Mundhwa spread awareness about women's safety and laws. Self-Defence Teacher Mr. Shaileshbhai Ravat demonstrated various self defense techniques. The aim of this seminar was to build awareness about various laws that protect women and also to execute multiple techniques of self-defense through demonstration. More than 200 students attended the seminar. The seminar ended with a question-answer session and students were also made familiar with the availability of emergency helpline numbers for police protection.

# Academic Activities

## TechTalks

The institute provides a dynamic and collaborative learning environment by encouraging student-organized TechTalks. Such TechTalks empower students to take ownership of their learning journey, develop essential skills, and contribute to the growth of a vibrant tech community within the academic institution. Organizing TechTalks by students holds significant importance in an academic setting and can contribute to the overall growth and development of the student community.

By taking the initiative to organize and participate in TechTalks, students contribute to creating a culture of continuous learning. This can have a positive impact on the overall academic environment, promoting curiosity and a thirst for knowledge. Themes of Techtalks organized in the current academic year listed below:

Network Security organized on 26<sup>th</sup> August, 2023. It provided a platform for students to delve into the critical aspects of network security, aiming to enhance awareness, share insights, and discuss best practices in safeguarding digital infrastructure.

UI/UX, Web Development, Git/Github organized on 1<sup>st</sup> September, 2023. This TechTalk offered insights into the latest trends, tools, and best practices in these crucial domains of technology. Attendees gained valuable insights, practical knowledge, and hands-on experience, contributing to their growth as technology enthusiasts.

Cloud Computing organized on 15<sup>th</sup> February, 2023. The TechTalk on cloud computing provided valuable insights into the transformative power of this technology and its implications for businesses, society, and the broader technological landscape. As cloud computing continues to evolve, organizations must embrace innovation, prioritize security, and navigate ethical considerations to unlock its full potential and capitalize on the opportunities it offers. The TechTalk concluded with a forward-looking perspective on the future of cloud computing, highlighting opportunities for innovation, industry collaboration, and continued growth.



# Academic Activities

## Hackathon

Hackathons are crucial for FCAIT students as they provide a platform to apply theoretical knowledge in practical scenarios. Participation fosters collaboration, problem-solving, and innovative thinking, preparing students for real-world challenges in the rapidly evolving field of computer science. Engaging in hackathons enhances their skills, encourages teamwork, and nurtures a proactive approach to technology, contributing to their overall professional development.

Hackathon SSIP, Govt. of Gujarat, the institute exhibited commendable participation in the Azadi ka Amrit Mahotsav Hackathon 2023 organized by SSIP and Gujarat Knowledge Society (Education Department – Govt. of Gujarat). 7 teams from FCAIT's UG program enthusiastically participated in the hackathon. The diversity of ideas and skills showcased the department's commitment to encouraging students to address real-world challenges through innovative technological solutions. Out of the 7 participating teams, 3 teams from FCAIT got selected for the Final Round of the Azadi ka Amrit Mahotsav Hackathon 2023.

A team of FCAIT students, comprising Kumawat Harish, Anoushka Banerjee, Sarode Ajay, Jay Sharma, Purani Vashisht, and Aahana Patel developed a "QR Code based Citizen Feedback System for Gujarat Police" and won 3rd prize in Azadi ka Amrit Mahotsav Hackathon organized by SSIP and Gujarat Knowledge Society (Education Department – Govt. of Gujarat).

A team of students demonstrated their expertise and commitment in cybersecurity by participating in the prestigious KAVACH-2023 Cybersecurity Hackathon. The event provided an excellent platform for students to apply their knowledge, collaborate with peers, and contribute to addressing contemporary cybersecurity challenges.

e-Yantra Hackathon, A teams of FCAIT have participated in e-Yantra Hackathon 2023 organized by IIT Bombay, demonstrating their prowess in technology and problem-solving skills. One of the teams successfully advanced to the final round of the competition. The event welcomed the talented individuals and teams across the country to showcase their innovative solutions in robotics and automation.

EthIndia 2023, A team of FCAIT proudly participated in World's Biggest Ethereum Hackathon, an event that transcended the realms of mere lines of code and sleepless nights. Held in Bengaluru from 8<sup>th</sup> to 10<sup>th</sup> December 2023, EthIndia proved to be a crucible of collaboration, innovation, and global connections in the blockchain space. A teams from FCAIT seized the opportunity to showcase their talents and innovative ideas on the EthIndia platform. The teams were not just participants; they were representatives of the institution, contributing to the vibrant and dynamic atmosphere of the event.



# Academic Activities

## Cyber Shadez- 2023

Techfests provide a platform for showcasing innovative ideas, projects, and products developed by employees. This fosters a culture of innovation within the organization, encouraging employees to think creatively and contribute to technological advancements. The annual techfest “Cybershadez” plays a pivotal role within FCAIT by fostering an environment of innovation, collaboration, and education focused specifically on cybersecurity-related topics. The 2023 National-Level Tech Fest “CYBERSHADEZ” was on the theme of cyber security. The two-day techfest was organized between the 24<sup>th</sup> and 25<sup>th</sup> of February 2023. More than 1100+ participants from 90+ institutes and 19 states across India participated in the event in hybrid mode. More than 28 technical events were organized over a period of two days.

The techfest was organized in order to imbibe knowledge of how Cyber Security is impacting and will impact the lives of people, industries and society. It was featured as Track 1, Track 2 and Track 3. Each track comprised various competitions organized for different UG and PG courses of FCAIT and FET. The spectrum of competitions such as Techathon, IT Extempore, IT Quiz, Squash the Bug, Idea presentation - IoT Models, IT Treasure Hunt, Python Charmer, Code Jigsaw, Brain Digger and Logo Designing, commenced during the two days. All the participants were evaluated by experts from the various IT and Computer fields. The winners were awarded cash prizes and bounties worth Rs. 2.5 lakhs.

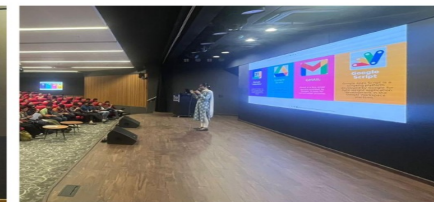
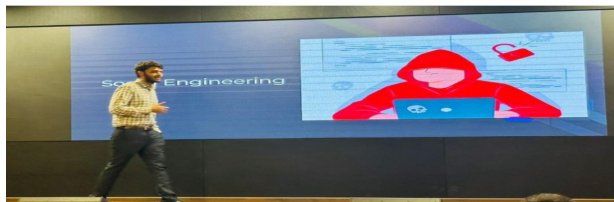


# Academic Activities

## Series of Seminar and Workshops

The institute is dedicated to fostering a holistic approach to education, blending technical expertise with interdisciplinary knowledge. To achieve this goal, FCAIT has established a dynamic committee tasked with organizing a series of seminars and workshops covering a diverse range of technical and interdisciplinary topics. Through these seminars and workshops, FCAIT boosts technical skills while promoting exploration of how technology intersects with other fields.

Name of Activity	Date	Resource Person
Seminar on Single Sign On	03-01-2023	Prof. Nirav Suthar, Asst. Prof. FCAIT , GLS University
Seminar on Block-Chain	19-01-2023	Mr. Bhawik Chawda, Mr. Akshay Singh, Yudz Solutions LTD.
Seminar on Chat GPT3 and NLP	07-02-2023	Mr. Prem Raval, Stan AI, Canada
Seminar on Beyond Graduation: Navigating Career Paths and Opportunities	21-02-2023	Dr. Arpit Jain, Prof. Kartik Joshi, Asst. Prof. FCAIT, GLS University
Seminar on Software Engineering	23-02-2023	Mr. Karan Chugh, IndiaNIC Infotech Ltd.
Seminar on AI & NLP	15-07-2023	Dr. Purna Tanna, Asst. Prof. FCAIT, GLS University
Seminar on Lets start Implementation How to develop your skills	22-07-2023	Mr. Yagnesh Modh, CEO, The Special Character
Seminar on Blockchain & Digital Transformation	22-07-2023 & 26-07-2023	Mr. Chintan Dave,& Mr. Rahul Trivedi,Block Chain Trainer, Algorand
Seminar on Mastering the Fullstack Developer Roadmap	5-08-2023	Mr. Ritesh Vatwani, Operation Head, Centous Solutions, Ahmedabad
Seminar on Google Scripts	12-08-2023	Prof. Nasrin Aasofwala, Asst. Prof. FCAIT, GLS University
Seminar on Cyber Security	11- 09-2023	Aman Verasia, Network Engineer, Centous Solutions, Ahmedabad
Seminar on Graphics and Animation	11- 09-2023	Ninad Shashtri, Founder of Explora Education, Ahmedabad
Seminar on Malware	13-09-2023	Prof. Hardika Menghani, Asst. Prof. FCAIT, GLS University
Seminar on Image Processing	18-12-2023	Prof. Rinkal Shah, Asst. Prof. FCAIT, GLS University



# Academic Activities

## Code Express

The institute has introduced an activity “CODE EXPRESS” to develop coding skills among the students. Under its mandate, students explore various innovative programs based on trending programming languages. This results in students’ participation which gives them an opportunity to showcase their expertise in a friendly yet spirited environment to develop their coding skills.

CodeExpress 15, an annual coding competition, was organized on 25-7-2023 on C++ for second year students of BCA, iMSc.(IT), and iMCA. The event aimed to provide a platform for students to showcase their coding skills, foster healthy competition, and promote collaboration among participants. Vani Pooja (BCA), Kshatriya Mehul (BCA), Moradiya Nilay (BCA), and Vakharia Heet (iMSc.(IT)) were the winners of the competition.

CodeExpress 16, a coding competition focused on the C programming language, was organized on 22-9-2023 to provide students with an opportunity to showcase their proficiency in C programming, enhance their coding skills, and foster a spirit of healthy competition. The event aimed to encourage students to explore the fundamental concepts of programming through C language and apply them in solving real-world coding challenges. The event was organized for first year students. Italiya Sarthak (BCA H.), Chavda Parth (BCA H.), Heet Kalal (BCA), Anjali Mehta (iMCA) and Trivedi Daksh (iMCA) were the winners of the competition.



## Seminar on Enhancing Communication Skills for IT

On September 13<sup>th</sup>, 2023, a seminar focused on enhancing communication skills for professionals in the IT sector was held for FY BCA Honors students, featuring Prof. Harmik Vaishnav from PDEU, Gandhinagar, as the resource person. The seminar aimed to address the critical need for effective communication within the rapidly evolving IT industry and provide insights and strategies to improve communication proficiency among IT professionals. Prof. Harmik Vaishnav underscored the significance of communication skills in the IT sector, emphasizing how effective communication is essential for collaboration, project management, client interactions, and career advancement. He highlighted that technical expertise alone is insufficient for success in the IT industry; effective communication skills are equally crucial.

