



## MESSAGE FROM DEPARTMENT CHAIR



I hope this message finds you all in good health and high spirits. Over the past few months, our department has achieved significant milestones, thanks to the unwavering dedication and hard work of our faculty members, staff, and students. Our research initiatives continue to make valuable contributions to our field, and I'm proud to see our faculty members publishing groundbreaking papers. In conclusion, I am proud of the progress we have made as a department. Together, we have achieved so much, and I have no doubt that we will continue to reach new heights. Let's maintain our focus on excellence, collaboration, and innovation as we move forward.

Thank you once again for your dedication and hard work. I am excited about our future endeavors and look forward to celebrating even more successes together.

- Dr. Krishnamoorthi Makkithaya

## Faculty Mentor

Dr. Srikanth Prabhu

## Editor-in-Chief

Dr. Radhakrishna Bhat.

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## DEPARTMENT EVENTS

### INTERACTION WITH PROFESSOR FROM DEAKIN UNIVERSITY

Prof. Gang Li from Deakin University visited the department on 6<sup>th</sup> November 2023 and interacted with department faculties and research scholars. Dr. Gang Li's guest talk on "Machine Unlearning" presented a unique perspective on artificial intelligence. He discussed the traditional way machines learn and introduced the idea of "Machine Unlearning," where machines intentionally forget or discard information.



### AICOM-2023

The department inaugurated its yearly event called "AiCom" (Advances in Computing). This year AiCom-2023 featured a two-day workshop titled "Unlocking the Power of Blockchain Technology" in Hybrid Mode on 10th-11th November 2023. The resource person Mr Lohit J J, Assistant Professor, Department of Computer Science & Engineering, BMS College of Engineering, Bengaluru, highlighted on bitcoin, cryptocurrency and smart contracts. A hands-on workshop was demonstrated for the same. More than 90 participants across India attended the workshop.



### COLLABORATION MEETING

Collaboration meeting between Virginia commonwealth university and CSE/ISE department was held on October 25, 2023 at CSE seminar Hall. The meeting was related to establishing research collaborations and exploring Ph.D Co-supervision opportunities as well as exploring faculty and student exchange possibilities. The research area included are Software engineering, Cyber Security, Artificial Intelligence, Machine Learning, Data Science and NLP. Dr. M Vijaya Kini, Dr. Vinod Kamath, and Dr. Mamatha Balachandra inquired about the feasibility of faculty and student exchange programs. Final year undergraduate students working on their projects have the option for supervision, especially if they are considering pursuing a Master's degree. This program spans five years, with four years at MIT Manipal and one year at VCU. The speakers, Dr. Bridget McInnes and Mr. Shivprakash are introduced by Dr. Mamatha Balachandra, Professor, Dept. of CSE. Dr. Muralikrishna introduced some of the NLP projects to Dr. Bridget McInnes and Mr Shivprakash that are of common interest.



### IAC - LSIE (LECTURE SERIES BY INDUSTRY EXPERTS)

On November 4, 2023, the department, as part of the IAC - LSIE series, conducted a lecture session titled "Developing Models for HPC - Basics" The session was facilitated by Prof. Dr. G K Patra, Chief Scientist at the CSIR Fourth Paradigm Institute, NAL Belur Campus, Bangalore, India. The event was specifically organized for students enrolled in B.Tech. CSE (AI&ML) and those in the 5th and 3rd semesters of B.Tech. CSE programs.



# DEPARTMENT EVENTS

## WORKSHOP ON DRUG DESIGN

The Department, in collaboration with the Manipal College of Pharmaceutical Sciences (MCOPS), MAHE, and Department of Chemical Engineering, MIT Manipal, co-hosted a three-day online workshop from August 16<sup>th</sup> to 18<sup>th</sup>, 2023. The workshop's primary focus was delving into the latest strides in atomic-scale bio-macromolecular modelling and the practical application of Schrödinger modules in drug design. This event drew the participation of distinguished industry professionals recognised as Schrödinger experts, with 110 participants.



## ADJUNCT FACULTY LECTURE SESSION AND PANEL DISCUSSION

CSE department organized Adjunct faculty Lecture Session and Panel Discussion on topic “ Intelligent O-RAN for 5G, B5G Networks and AI in Mobile wireless Networks” on 9<sup>th</sup> September 2023 addressing nearly 160 students.



## PROF. RAJARAM ORATION SERIES 2023

The Department of Computer Science and Engineering conducted Prof. Rajaram Oration Series 2023 on November 30<sup>th</sup> 2023. The chief guest of the event was Padma Shri Prof. Ajoy Kumar Ray , Director, JIS Institute Of Advanced Studies & Research, Former Director, IEST, Shibpur, Former Head, School of Medical Science and Technology, Retired Professor, Electronics and Electrical Communication Engg, IIT Kharagpur.



## WORKSHOP ON INNOVATIVE APPROACHES FOR AGRICULTURAL PRODUCT DEVELOPMENT

The department conducted a Workshop on Innovative Approaches for Agricultural Product Development on 17<sup>th</sup> November. Dr Sujithra from our department handled the session with 15 enthusiastic participants.

## WORKSHOP ON SCHRÖDINGER MATERIAL SCIENCE

Schrödinger Material Science Workshop was organized from 04-Sep-2023 to 06-Sep-2023 by the Department of Chemical Engineering in association with our Department at Manipal Institute of Technology, Manipal. The workshop introduced Molecular Modelling tools and demonstrated the capabilities of the Schrödinger Suite to participants with hands-on training sessions by Schrödinger Scientists. The audience comprises students, faculty members, and researchers from various institutes of MAHE participated enthusiastically.



## ENLIGHTENING SESSION ON EMERGING CAREERS

Dr. Kishore Bhamidipati, Associate Professor addressed talk on Exploring Careers of the Future at CHIREC international school for Grade 11 students to navigate their career paths.



## ALUMNI CONNECT PROGRAM

The Department organized two online lectures by Dr. Sevio Fernandes, Lead Data Scientist, PayPal, as part of the Alumni Connect program on 8<sup>th</sup> September 2023 and 6<sup>th</sup> October 2023 respectively. The lectures titled “Decision Trees” and “Data Clustering” provided insight into various types of decision trees, clustering techniques, and partitioning algorithms in data mining. A total of 82 participants attended the one-hour lectures.

## WORKSHOP ON CYBER SECURITY AND BLOCKCHAIN CONCEPTS

Dr. Narendra V G, Mr. Manoj T, and Ms.Namrata Marium Chacko were the resource persons for the one-day workshop titled “Cyber Security and Blockchain concepts”, organized by Mangalore Institute of Technology & Engineering, Mangaluru on 28<sup>th</sup> July 2023.

## FDP ON BLOCKCHAIN TECHNOLOGY AND ITS APPLICATIONS

The Department organized a two-day FDP on “Blockchain Technologies And Its Applications” from 6<sup>th</sup> to 7<sup>th</sup> October 2023. The FDP focused on providing hands-on training to develop a strong grasp of core Blockchain platforms, understand what Bitcoin is and how it works, learn key concepts commonly used in Blockchain, and create an app with Ethereum. The event was coordinated by Dr. Mamatha Balachandra and Dr. Narendra V.G.

# STUDENT ACHIEVEMENTS

# FACULTY ACHIEVEMENTS

◆ Manipal Institute of Technology's Team Cryptonite clinched the prestigious 1st prize at the Grand Finale of Smart India Hackathon 2023 - Software Edition for addressing the problem statement SIH1454. The team has been awarded a cash prize of Rs 1 lakh.



◆ Mr. Manoj T. has bagged the Best paper award in 2023 IEEE international conference on distributed computing, VLSI, Electrical circuits and Robotics (2023 IEEE DISCOVER) for his paper titled "A Blockchain based credentials for Food Traceability in agriculture supply chain" organized by IEEE Mangalore subsection. The other co-authors include Dr. Krishnamoorthy M. and Dr. Narendra V.G.

◆ Research scholar Ms. Vanajakshi presented a paper titled "Simulation of message injection attacks on control area networks" under the guidance of Dr. Renuka A and Dr. Adesh N.D, at Mysurucon 2023, a flagship Conference of IEEE Mysuru subsection hosted by MCE, Hassan and was awarded the best paper presenter award.

◆ Ms Vidya Kamath, Research scholar, Dept. of CSE received the Best Paper Award for her research article titled "Real-time Applicability of Lightweight Models on Jetson Nano using TensorFlow Lite" under the guidance of Dr. Renuka A, at the MAiTRI2023 conference, which took place at NIT Jalandhar, Punjab.

◆ Dr. Radhakrishna Bhat has delivered a Key-note offline lecture on "Application of Artificial Neural Network in strength Prediction of RCC Structural Component" in six day AICTE ATAL FDP on "Emerging Trends and its Applications in Civil Engineering" from 18th to 23rd December 2023 conducted by department of Civil Engineering, AT-MECE, Mysuru.



◆ Dr. Neelima B selected as general co-chair for 29th HiPC 2023.

◆ Dr. Manjunath K N, Associate Professor, Dept. of CSE has completed a 7 months long professional grants writing training conducted by University of Cologne and financially sponsored by federal ministry of Economic and cooperation and development, Germany at Lalith hotel, New Delhi.



## Ph.D. AWARDEES

◆ Ms. Shwetha Rai has been awarded a doctoral degree by MAHE, Manipal for her thesis titled "Development of Efficient Algorithms for Discovering Strong Association Rules for Rare and Frequent Itemsets Based on Abstractions" under the guidance of Dr. Geetha M. and Dr. Preetham Kumar.



◆ Ms. D. Cenitta has been awarded a doctoral degree by MAHE, Manipal for her thesis titled "Design And Implementation Of Substitution And Hybrid Classification Techniques For Identifying Cardiac Disease" under the guidance of Dr. R. Vijaya Arjunan. and Dr. Prema K. V.



◆ Ms. Tanuja Shailesh has been awarded a doctoral degree by MAHE, Manipal for her thesis titled "Design and Development of Transformations from UML/MARTE profile specifications to PNML and PROMELA models" under the guidance of Dr. Ashalatha Nayak and Dr. Devi Prasad.



◆ Mr. Prakash Kalingrao Aithal has been awarded a doctoral degree by MAHE, Manipal for his thesis titled "Development of an Optimal Portfolio Management System using Real-time Data Analytics Framework" under the guidance of Dr. U. Dinesh Acharya and Dr. Geetha M.



◆ Ms. Jashma Suresh P.P. has been awarded a doctoral degree by MAHE, Manipal for her thesis titled "Design and Development of a Hybrid Framework for Mining Non-Redundant Frequent Itemsets" under the guidance of Dr. U. Dinesh Acharya. and Dr. N.V. Subba Reddy.



◆ Ms. Archana Praveen Kumar has been awarded a doctoral degree by MAHE, Manipal for her thesis titled "Automatic Generation of Multiple Choice Questions to evaluate Factual and Conceptual Cognitive Skills in E-learning" under the guidance of Dr. Ashalatha Nayak and Dr. Manjula Shenoy.



## DEPARTMENT CLUB ACTIVITIES

### TECSE

Faculty Advisor - Mr. Giridhar N.S

#### Events Conducted

- 1) Sept 12 2023 Student EXPO
- 2) Sept 22 2023 Board Transfer
- 3) Sept 27 - 30 Management Committee Recruitment
- 4) Oct 16 2023 MIT\_GPT
- 5) Oct 25 2023 First Offline MC+B meeting
- 6) Oct 27-28 2023 Let's React (React Workshop)
- 7) Nov 10 2023 General Body Meeting
- 8) Nov 11 2023 Freshers CodeSprint'23
- 9) Nov 22 2023 PSUC Workshop
- 10) Nov 24 2023 Endsem Strategies
- 11) Dec 27 2023 C++ & STL Workshop
- 12) Dec 30 2023 Basic Math for DSA & Recursion Workshop

### ACM STUDENT CHAPTER

Faculty Advisor -Dr. Srikanth Prabhu

#### Events Conducted

- 1) Club Expo
- 2) Cambiar
- 3) Git It Together
- 4) Amazon FE Mentorship
- 5) Google STEP Mentorship
- 6) Google WE Mentorship
- 7) Core committee meeting

### LINUX USERS' GROUP

Faculty Advisor -Mr. Ashwath Rao

#### Events Conducted

- Oct 7 2023 AI in Healthcare



# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL  
(A constituent unit of MAHE, Manipal)

## VISION

**Excellence in Technical Education through Research, Innovation and Teamwork**

## MISSION

**Educate students professionally to face societal challenges by providing a healthy learning environment grounded well in the principles of engineering, research, creativity and teamwork.**

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### VISION

**Excellence in Computer Science & Engineering education through continuous learning, research and teamwork**

### MISSION

**To impart excellent Computer Science & Engineering education for professional roles in a changing and challenging technological world, to advance knowledge through quality research in important emerging areas in the discipline and to build a strong relationship with industry, academia and society.**

### B.Tech Computer Science and Engineering

#### PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- PEO1: Carry out engineering projects and develop new products in the area of Computer Science and Engineering and pursue higher studies.
- PEO2: Innovate and be creative in the profession; apply analytical skills and demonstrate research capabilities in the field of computer science and engineering.
- PEO3: Work in multidisciplinary environments and be responsive to the changing needs of the society.
- PEO4: Communicate effectively, display leadership skills, and demonstrate professionalism.
- PEO5: Engage in lifelong learning, apply the knowledge judiciously and remain continuously employable.

#### PROGRAM SPECIFIC OUTCOMES (PSO)

- PSO1: Analyse and solve real world problems by applying a combination of hardware and software.
- PSO2: Formulate & build optimised solutions for systems level software & computationally intensive applications.
- PSO3: Design & model applications for various domains using standard software engineering practices.
- PSO4: Design & develop solutions for distributed processing & communication.

### B.Tech Computer Science and Engineering (Artificial Intelligence and Machine Learning)

#### PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- PEO1: Carry out engineering projects, develop new products, and pursue higher studies in Computer Science with emphasis on Artificial Intelligence & Machine Learning.
- PEO2: Innovate and be creative in the profession; apply analytical skills and demonstrate research capabilities in the field of computer science and engineering.
- PEO3: Work in multidisciplinary environments and be responsive to the changing needs of the society.
- PEO4: Communicate effectively, display leadership skills, and demonstrate professionalism.
- PEO5: Engage in lifelong learning, apply the knowledge judiciously and remain continuously employable.

#### PROGRAM SPECIFIC OUTCOMES (PSO)

- PSO1: Analyse and solve real world problems by applying a combination of hardware and software.
- PSO2: Formulate & build optimised solutions for computationally intensive applications.
- PSO3: Use tools and techniques in Artificial Intelligence & Machine Learning for solving problems.
- PSO4: Apply intelligent models for multidisciplinary areas.

### B.Tech Computer Science and Engineering

### B.Tech Computer Science and Engineering (Artificial Intelligence and Machine Learning)

#### PROGRAM OUTCOMES (PO)

Engineering Graduates will be able to:

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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### MISSION

To impart excellent Computer Science & Engineering education for professional roles in a changing and challenging technological world, to advance knowledge through quality research in important emerging areas in the discipline and to build a strong relationship with industry, academia and society.

### M.Tech Computer Science and Engineering

#### PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- PEO1: To carry out projects and demonstrate design, analysis, and programming skills to solve computational problems in science and multidisciplinary engineering domain.
- PEO2: Be actively involved in research and development and engage in lifelong learning leading to new innovations to meet the societal challenges.
- PEO3: To take up a career in industry, academia or become successful entrepreneurs and excel as socially committed professionals by respecting ethical practices and maintaining integrity.
- PEO4: To apply the knowledge of mathematics, research methodology and computer science and engineering education to pursue higher studies.
- PEO5: To demonstrate leadership skills, teamwork and effective communication of the technical information and remain continuously employable.

#### PROGRAM OUTCOMES (PO)

- PO1: An ability to independently carry out research /investigation and development work to solve practical problems.
- PO2: An ability to write and present a substantial technical report/document.
- PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
- PO4: Apply problem solving skills and advanced concepts in Computer Science to breadth of topics in industrial applications.
- PO5: Use mathematical foundations and research based knowledge for facilitating novel contributions to contemporary areas of computer science.

### M.Tech Computer Science and Information Security

#### PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- PEO1: To carry out projects and demonstrate design, analysis, and programming skills to solve computational problems in security and multidisciplinary engineering domain.
- PEO2: Be actively involved in research and development and engage in lifelong learning leading to new innovations to meet the societal challenges.
- PEO3: To take up a career in industry, academia or become successful entrepreneurs and excel as socially committed professionals by respecting ethical practices and maintaining integrity.
- PEO4: To apply the knowledge of mathematics, research methodology and computer science and information security education to pursue higher studies.
- PEO5: To demonstrate leadership skills, teamwork and effective communication of the technical information and remain continuously employable.

#### PROGRAM OUTCOMES (PO)

- PO1: An ability to independently carry out research /investigation and development work to solve practical problems.
- PO2: An ability to write and present a substantial technical report/document.
- PO3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
- PO4: Apply problem solving skills and advanced concepts in Computer Science and Information Security to breadth of topics in industrial applications.
- PO5: Use mathematical foundations and research based knowledge for facilitating novel contributions to contemporary areas of cryptography and information security.