Xavier Institute of Engineering

A SISTER INSTITUTE OF ST XAVIER'S COLLEGE, MUMBAI

MONTHLY INSIGHTS

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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 systes, Data mining, IOT, Cloud and Analytics,Computer and Network Security etc. for innovative solution to real time problems.

INDEX

ARTICLES

The Future of Semiconductor Manufacturing: Opportunities for Engineering Students

The semiconductor industry stands on the brink of transformation, and India is poised to play a pivotal role. With a surge in investment, India is set to become one of the leading semiconductor producers globally by 2028, as announced by IT Minister Ashwini Vaishnaw.

For engineering students, this development opens a multitude of opportunities. Here's why:

1.Expanding Horizons: The semiconductor industry offers diverse fields such as chip design, fabrication, testing, and packaging. Students can explore areas like integrated circuit design, embedded systems, and nanotechnology.

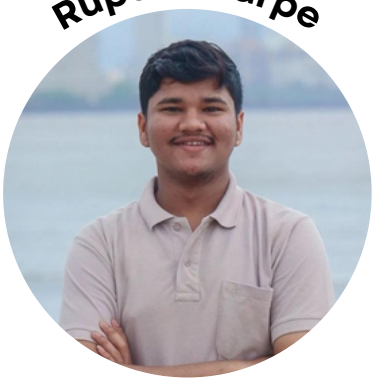
2.Technological Advancements: With the rapid advancement of technology, there's a constant demand for skilled engineers to innovate and drive progress in semiconductor manufacturing processes. Students can contribute to cutting-edge developments in materials science, device physics, and manufacturing techniques.

3.Career Growth: As India gears up to become a major player in semiconductor production, the demand for skilled professionals will soar. Engineering students equipped with the right skills and knowledge can expect rewarding career opportunities in both domestic and international markets.

4.Entrepreneurial Ventures: The semiconductor industry presents fertile ground for entrepreneurial ventures. Students with innovative ideas can explore start-up opportunities in areas like fabless chip design, IoT devices, and semiconductor equipment manufacturing.

5.Global Collaboration: The semiconductor industrythrives on collaboration and knowledge exchange.Engineering students can leverage globalpartnerships, research collaborations, and industry networksto stay abreast of the latest trends and developments.

In conclusion, the future of semiconductor manufacturing in India holds immense promisefor engineering students.By embracing this evolving landscape, students can charta rewarding career path while contributing to India's emergenceas a global semiconductor powerhouse.



MASTERING MERN: A FULL-STACK JAVASCRIPT MARVEL

MERN stack is a collection of technologies that enables faster application development. It is used by developers worldwide. The main purpose of using MERN stack is to develop apps using JavaScript only. This is because the four technologies that make up the technology stack are all JS-based. Thus, if one knows JavaScript (and JSON), the backend, frontend, and database can be operated easily.

The average salary for a MERN Stack Developer is ₹4,29,200 per year in India. The average additional cash compensation for a MERN Stack Developer in India is ₹24,200, with a range from ₹5,000 - ₹88,000. Salaries estimates are based on 246 salaries submitted anonymously to Glassdoor by MERN Stack Developer employees in India.

MERN stack stands out for its versatility, efficiency, and end-to-end JavaScript implementation when building web applications. It allows developers to leverage a single language, JavaScript, across the entire stack, enabling code reuse and streamlining the development process.

Here is a brief explanation of the stack's four components:

- MongoDB provides a flexible and scalable data management solution.
- Express.js simplifies writing code and building back-end components for application development.
- React, known for its component-based architecture and efficient rendering, empowers developers to build dynamic and interactive user interfaces.
- Node.js enables fast and event-driven back-end development, facilitating seamless communication between the front-end and back-end components.

MERN stack offers a comprehensive and cohesive framework for building full-stack JavaScript applications. It empowers developers to create modern, responsive, and efficient web experiences. The components work harmoniously, combining their strengths to deliver high-performance applications that can handle complex functionalities.

In a MERN stack application, the front end uses React, which handles the UI and user interactions. It's in charge of developing user-facing web and mobile applications. You manage failures effectively at this stage and have the ability to reuse code with React. It assists in creating and managing lists, forms, events, and functions effectively. The server layer is the second tier of the MERN stack, below the React layer, and comprises Express.js and Node.js. This is where URL redirecting and HTTP requests take place. The client tier and database tier are connected by this layer, creating a seamless transition from the top to the bottom. The final tier of the MERN stack, the database layer, stores your app's data with MongoDB. This layer efficiently stores information until it's retrieved. Like any technology stack, MERN stack has its limitations.

Here are a couple of key limitations to consider:

- Performance considerations: While React's efficient rendering contributes to high-performance user interfaces, improper handling of data or lack of optimization in the back end can impact overall application performance. Careful design and implementation are crucial to achieving optimal performance in MERN applications.
- Scalability challenges: Although MERN stack is scalable, as the application grows and user traffic increases, additional considerations and architectural decisions may arise to ensure efficient scaling of both front-end and back-end components.

Overall, MERN stack enables the development of full-stack JavaScript applications, where the front end and back end seamlessly work together to provide a complete user experience. The stack leverages the strengths of each component, allowing developers to build efficient, scalable, and responsive web applications.

Salil Gujar

TE IT

Exploring the Frontier of Edge Computing

In an era defined by the proliferation of connected devices and the exponential growth of data, traditional cloud computing paradigms are facing unprecedented challenges in meeting the demands for real-time processing, low latency, and scalability. Enter edge computing – a transformative paradigm that promises to revolutionize the way we process, analyze, and act upon data at the network edge. Let's embark on a journey to explore the frontier of edge computing and understand its implications for the digital landscape.

Understanding Edge Computing:
At its essence, edge computing refers to the decentralized processing of data at or near the source of generation, rather than relying on centralized cloud infrastructure. By bringing computation and data storage closer to the devices and sensors that generate data, edge computing minimizes latency, conserves bandwidth, and enables real-time decision-making in distributed environments

Key Components and Architecture:
Edge computing architectures typically comprise a diverse array of components, including edge nodes, gateways, edge servers, and edge devices. These components collaborate to facilitate the seamless transmission, processing, and analysis of data at the network edge.

Key characteristics of edge computing architectures include:

- Proximity to Data Sources: Edge computing systems are strategically positioned in close proximity to data sources, such as IoT devices, sensors, and mobile endpoints, to minimize latency and optimize data transmission.

- Distributed Processing: Unlike traditional centralized architectures, edge computing leverages distributed processing capabilities to offload computational tasks from remote data centers and perform them locally at the network edge.

- Dynamic Scalability: Edge computing architectures are designed to scale dynamically in response to fluctuating workloads and resource demands. This inherent scalability ensures optimal performance and resource utilization across diverse deployment scenarios

The Future of Edge Computing:

As the digital landscape continues to evolve, the future of edge computing appears increasingly promising and transformative. By embracing principles of decentralization, agility, and real-time responsiveness, edge computing is poised to catalyze innovation across diverse industries, drive the proliferation of connected devices, and redefine the boundaries of data processing and connectivity.

Conclusion:

In a world characterized by ubiquitous connectivity and exponential data growth, edge computing emerges as a beacon of innovation, reshaping the fabric of digital infrastructure and unlocking new frontiers of possibility. As organizations and enterprises embrace the transformative potential of edge computing, they embark on a journey towards a future where data is not just processed, but harnessed to drive meaningful insights, empower intelligent decision-making, and shape the course of human progress.

CRISPR-Cas9: The Revolutionary Genome Editing Tool

In the annals of modern biology, few discoveries have captured the imagination of scientists and the public alike as profoundly as CRISPR-Cas9. This revolutionary genome editing tool, inspired by the microbial immune system, has ushered in a new era of precision medicine, agricultural innovation, and basic research. From correcting genetic defects to unraveling the mysteries of the genome, CRISPR-Cas9 holds the promise of transforming our understanding of life itself. Let's delve into the intricacies of CRISPR-Cas9 and explore its transformative potential.

The CRISPR-Cas9 System:
CRISPR-Cas9, an acronym for Clustered Regularly Interspaced Short Palindromic Repeats and CRISPR-associated protein 9, represents a remarkable example of nature's ingenuity in microbial defense mechanisms. Originally discovered as part of the bacterial immune system, CRISPR-Cas9 serves as a molecular toolkit for identifying and cleaving foreign DNA sequences, such as those derived from viral invaders.

How CRISPR-Cas9 Works:
At its core, the CRISPR-Cas9 system comprises two main components:

- Guide RNA (gRNA): The gRNA is a short RNA molecule that is engineered to complement a specific DNA sequence within the target genome. It serves as a molecular "GPS" to guide the Cas9 enzyme to the desired location for DNA cleavage.

- Cas9 Endonuclease: The Cas9 protein, derived from bacterial sources such as *Streptococcus pyogenes*, functions as a molecular scissors that can precisely cut the double-stranded DNA at the target site specified by the gRNA.

Applications in Biomedicine:
The versatility and precision of CRISPR-Cas9 have revolutionized the field of biomedicine, offering unprecedented opportunities for genome editing, gene therapy, and disease modeling. Key applications include:

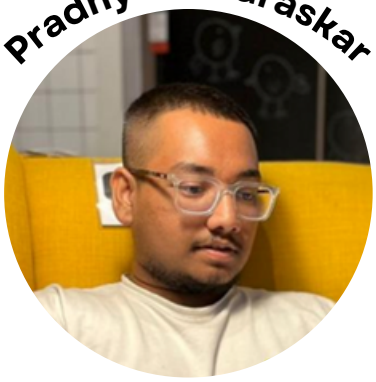
- Gene Therapy: CRISPR-Cas9 holds the potential to treat a wide range of genetic disorders by correcting disease-causing mutations at the DNA level. Clinical trials are underway to explore the use of CRISPR-Cas9 in treating conditions such as sickle cell anemia, muscular dystrophy, and certain types of cancer.

The Future of CRISPR-Cas9:
As CRISPR-Cas9 continues to evolve and mature, the future holds both promise and uncertainty. While the technology has already catalyzed groundbreaking advances in biomedicine, agriculture, and beyond, its responsible and ethical stewardship remains paramount. By fostering collaboration, transparency, and dialogue among scientists, policymakers, and the public, we can harness the transformative power of CRISPR-Cas9 to address pressing global challenges, advance scientific knowledge, and improve the human condition.

Conclusion:

CRISPR-Cas9 stands as a testament to the power of human ingenuity and the wonders of nature's evolutionary tapestry. From deciphering the intricacies of the genome to unlocking new frontiers in biomedicine and beyond, CRISPR-Cas9 embodies the spirit of exploration, discovery, and innovation. As we navigate the ethical, societal, and regulatory complexities inherent in genome editing technologies, we must remain steadfast in our commitment to uphold principles of scientific integrity, human dignity, and responsible innovation. In doing so, we can chart a course towards a future where the promise of CRISPR-Cas9 is realized for the betterment of humanity and the world we inhabit.

Pradnyesh Baraskar



SE IT

Leveraging Quantum Computing: A Glimpse into the Future of Engineering

Introduction:
As engineering students delve deeper into the realms of technology, the evolution of computing stands as a pivotal force shaping their academic and professional landscape. Quantum computing, a revolutionary paradigm in computational science, promises to redefine the boundaries of what's possible in the digital realm. In this article, we explore recent breakthroughs in quantum computing and their implications for the future of engineering disciplines.

Unveiling Quantum Supremacy:
In a groundbreaking achievement, scientists have recently achieved quantum supremacy, a milestone that heralds a new era in computational capabilities. Leveraging the inherent properties of quantum mechanics, quantum computers demonstrate unprecedented processing power, solving complex problems that traditional computers struggle to address efficiently. This monumental leap opens avenues for engineering students to explore novel solutions and tackle challenges across diverse domains.

The Power of Quantum Parallelism:
Unlike classical computers that rely on binary bits, which can exist in a state of either 0 or 1, quantum computers employ quantum bits or qubits. Qubits leverage the principles of superposition and entanglement, enabling them to exist in multiple states simultaneously. This inherent parallelism empowers quantum computers to explore vast solution spaces exponentially faster than their classical counterparts, offering transformative opportunities for engineering students to optimize algorithms, simulations, and data analysis techniques.

Applications Across Engineering Disciplines:
The potential applications of quantum computing span a myriad of engineering domains, ranging from materials science and aerospace engineering to cryptography and optimization. For instance, in materials science, quantum simulations can elucidate the behavior of complex molecules and accelerate the discovery of new materials with tailored properties. Similarly, in aerospace engineering, quantum optimization algorithms can streamline mission planning, trajectory optimization, and resource allocation, revolutionizing space exploration endeavors.

Challenges and Opportunities:
While the prospects of quantum computing are undeniably promising, engineering students must grapple with inherent challenges. Quantum systems are highly susceptible to noise, decoherence, and errors, necessitating robust error correction techniques and fault-tolerant designs.

Moreover, harnessing the full potential of quantum algorithms requires proficiency in quantum programming languages and quantum circuit design, skills that are poised to become indispensable in the future engineering landscape.

Conclusion:

As engineering students embark on their academic journey, the advent of quantum computing beckons a paradigm shift in computational methodologies and problem-solving approaches. By embracing the principles of quantum mechanics and mastering the intricacies of quantum computing, students stand at the forefront of innovation, poised to revolutionize diverse engineering disciplines and propel humanity towards a future defined by unprecedented technological prowess and discovery.

Kunal Jain

FE IT

MIT Breakthrough: Terahertz Tags Revolutionize Security for Engineers

In a groundbreaking development, MIT scientists have pioneered a new era of security with terahertz cryptographic ID tags. These tags, designed to safeguard sensitive information and assets, promise to redefine the landscape of engineering security protocols.

Terahertz technology operates within the electromagnetic spectrum, enabling it to penetrate materials such as clothing, plastic, and cardboard. Unlike traditional security measures, which rely on visible or infrared light, terahertz waves possess the unique ability to identify and authenticate objects without physical contact. This innovation heralds a paradigm shift in how engineers approach security challenges.

By harnessing the power of terahertz waves, MIT's cryptographic ID tags offer unparalleled levels of protection against unauthorized access and counterfeit replication. Through sophisticated encryption algorithms, these tags encode information securely, thwarting potential breaches and ensuring the integrity of critical data.

The implications of this breakthrough extend far beyond conventional security applications. Engineering students, in particular, stand to benefit significantly from this technology. As they navigate complex projects and research endeavors, the need for robust security measures becomes increasingly paramount

With terahertz cryptographic ID tags, engineering students can safeguard their intellectual property, research findings, and prototypes with confidence. Whether working on cutting-edge innovations or collaborating on collaborative ventures, the assurance of secure data transmission empowers students to explore new frontiers in their respective fields.

Moreover, the accessibility of terahertz technology opens doors to interdisciplinary collaboration and innovation. By integrating security seamlessly into the engineering process, students can focus their energies on pushing boundaries and driving progress, free from the constraints of conventional security concerns.

As the world continues to embrace the digital age, the importance of robust security measures cannot be overstated. MIT's pioneering efforts in terahertz cryptography pave the way for a future where security is not just a barrier but an enabler of innovation. For engineering students, this represents a transformative leap forward, unlocking endless possibilities and propelling them towards a brighter, more secure tomorrow.

Jay Kshirsagar

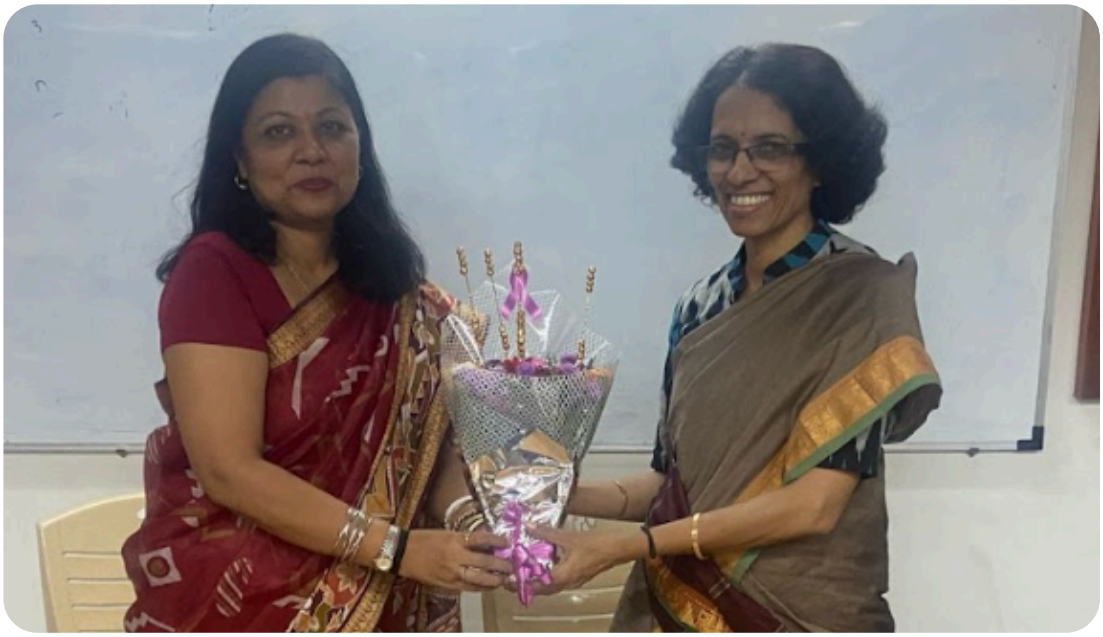
FE IT

FACULTY ACHIEVEMENTS

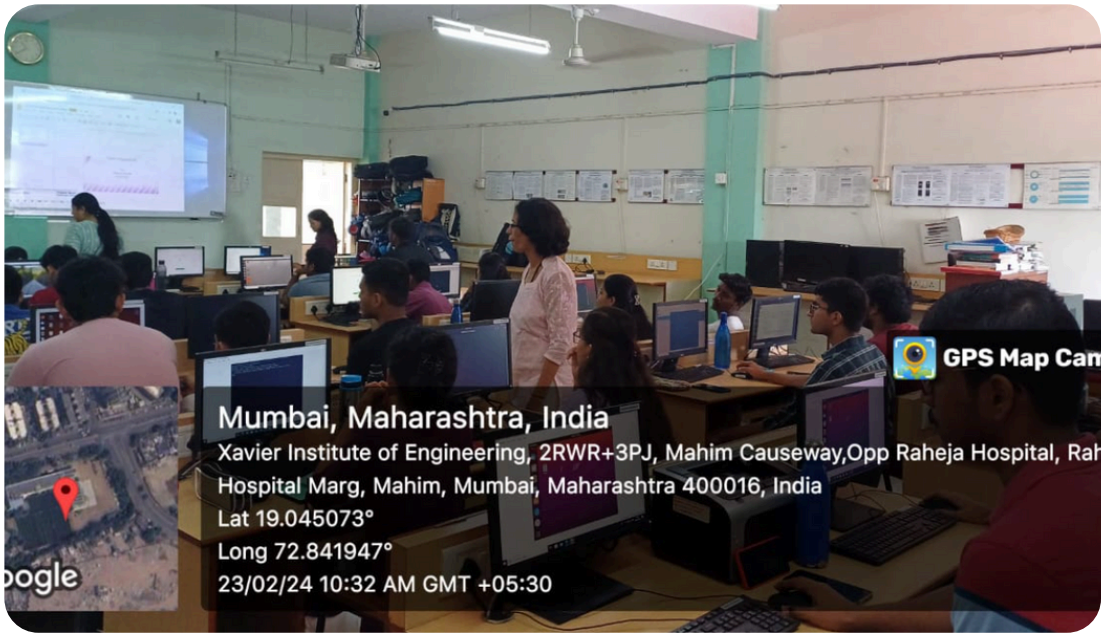
Prof. Chhaya Narvekar, Assistant Professor of IT Department presented a paper in IEEE conference on 9th February, 2024.

Abstract: Crop disease recognition is a crucial aspect of modern agriculture that can significantly impact crop yield, quality. and overall food security. This paper introduces an innovative approach to crop disease recognition and farmer support by combining Generative Al and Langchain Llama Model for chatbot development. In the proposed system, Generative Al, specifically deep learning models, are employed to analyze images of crop leaves for early signs of diseases. This approach enhances the accuracy and efficiency of disease diagnosis, enabling farmers to take timely corrective actions and reduce the use of pesticides. A Generative Adversarial Network (GAN) is employed for image augmentation due to the limited dataset size. A Convolutional Neural Network (CNN) is utilized for precise crop disease recognition based on image analysis. To bridge the gap between technology and farmers. the Langchain Llama Model, a state-of-the-art conversational Al model. is integrated to create an interactive and user-friendly

Prof. Chhaya Narvekar, Assistant Professor of IT Department spoke about AI in Bio-medical Engineering in a Session held in FDP Father Agnel Polytechnic, Vashi on 14th February, 2024.

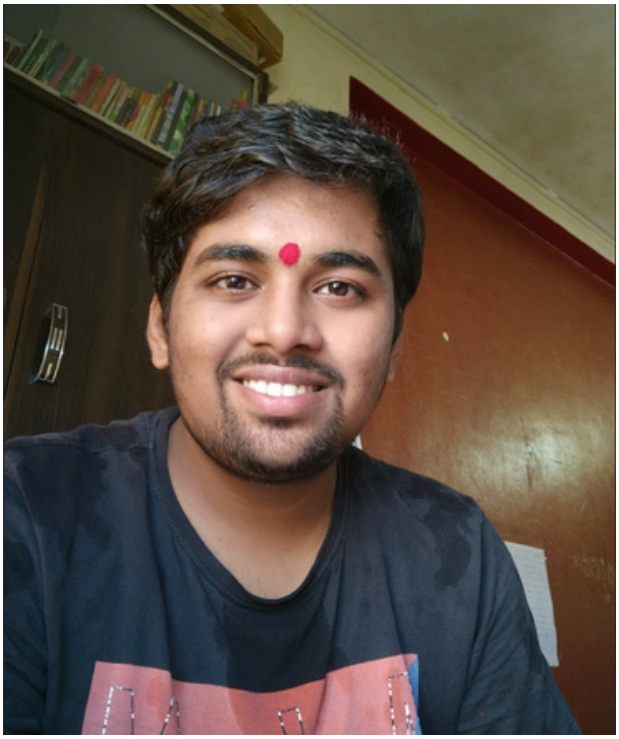


Prof. Chhaya Narvekar, Assistant Professor of IT Department conducted guest lecture on Linux programming for TE EXTC student on 23rd February, 2024.

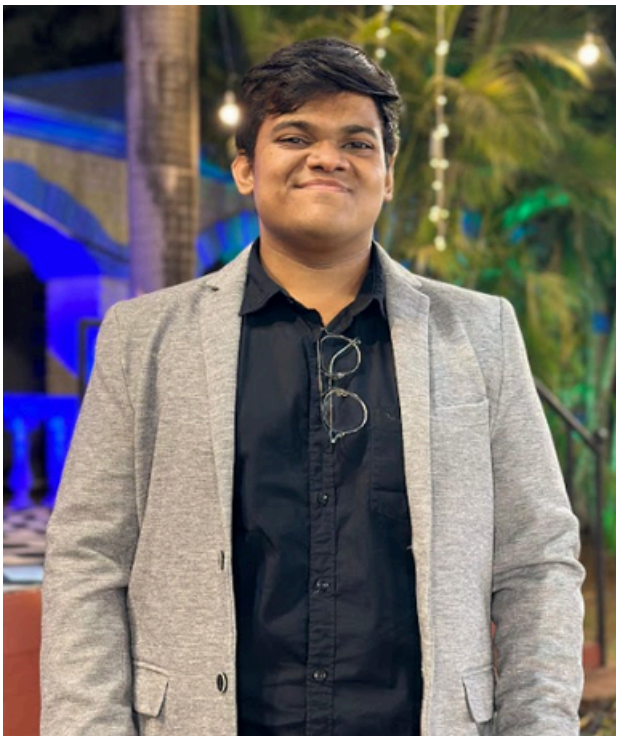


Prof. Meena Ugale, Assistant Professor of IT Department participated in two days workshop on the theme 'NEP 2020 Sensitization- Train the trainers' on 26th & 27th Feb, 2024 held at Kirti M. Doongursee College of Arts, Science & Commerce, Dadar.

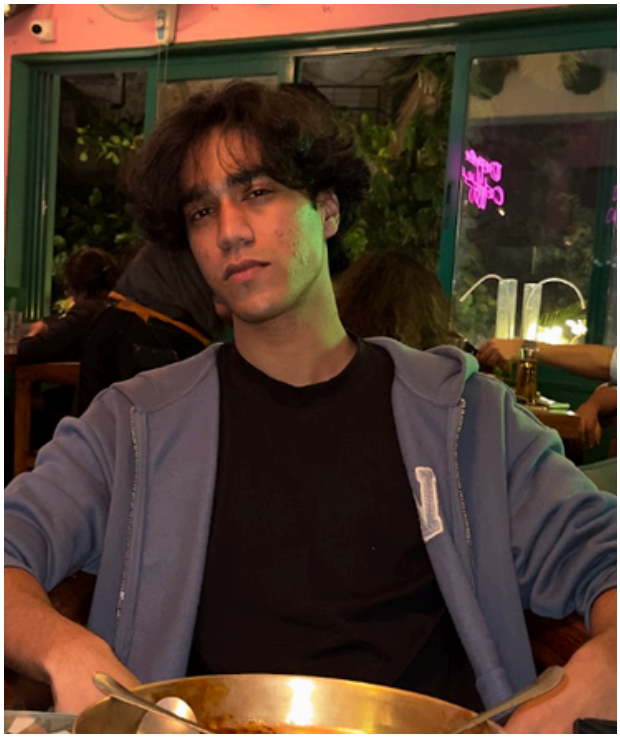
Mayuresh Bharat Balsaraf from TE IT won 2nd place in Spandan event “Nach Baliye (Solo)”.



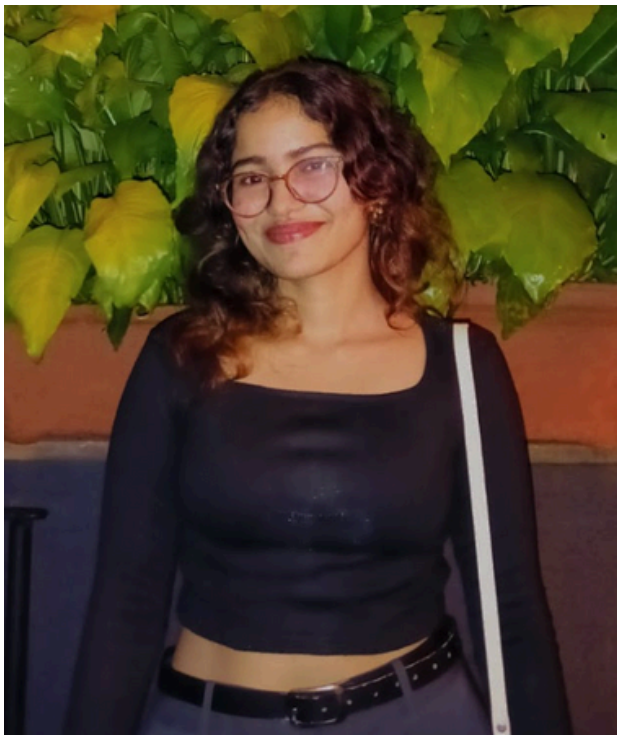
Om Deshmukh from SE IT won 1st place in Spandan event “Jugalbandi”.

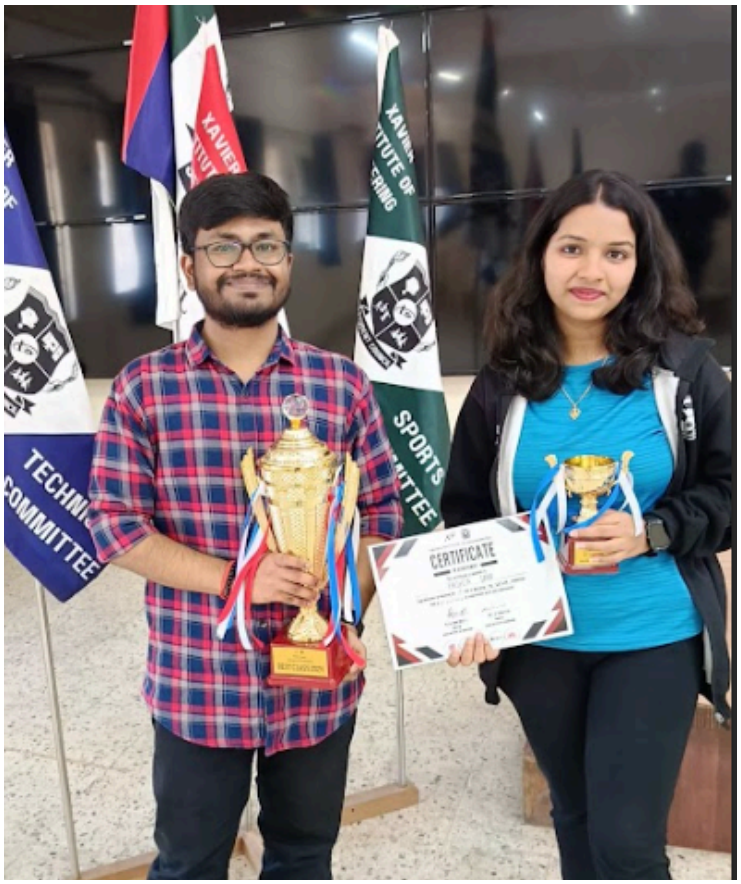


Chirayu Desle from SE-IT was declared as Mr. Xaviers 2024.

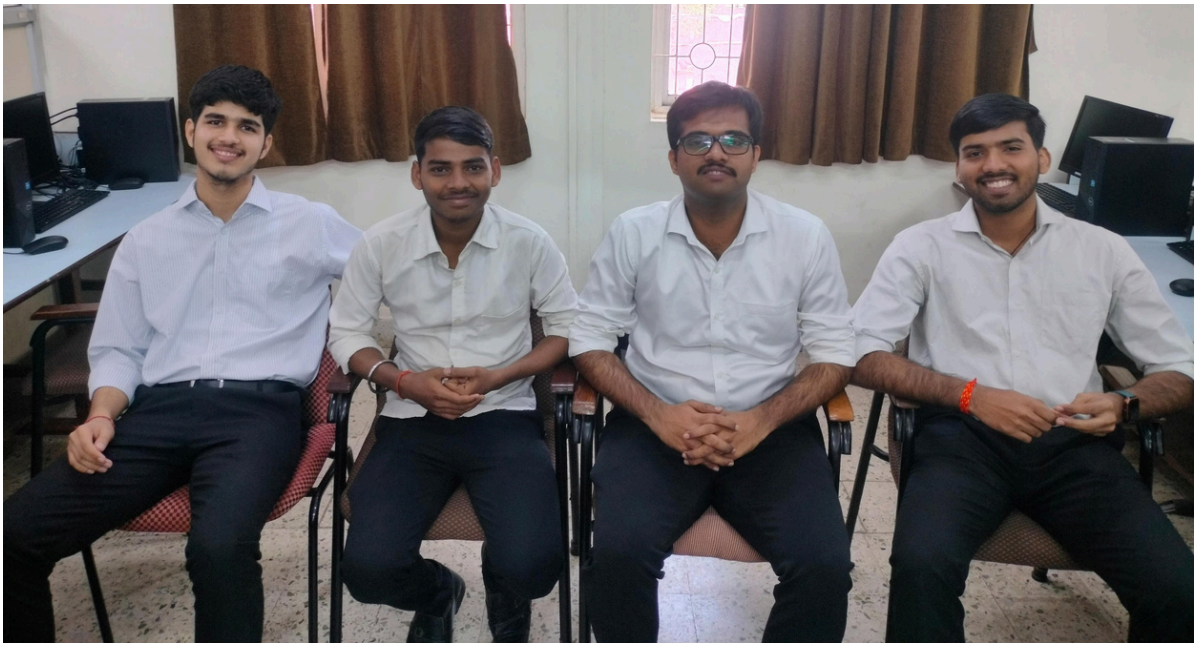


Unnati Helekar from SE-IT was declared as Ms. Xaviers 2024.



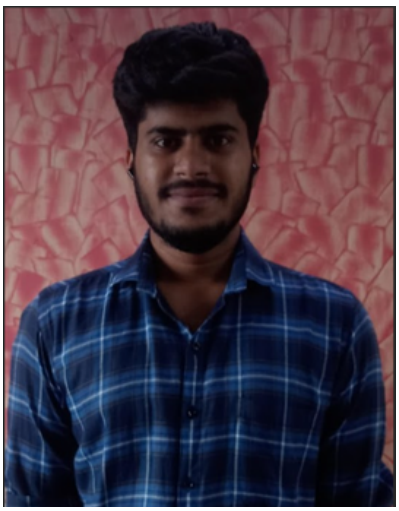
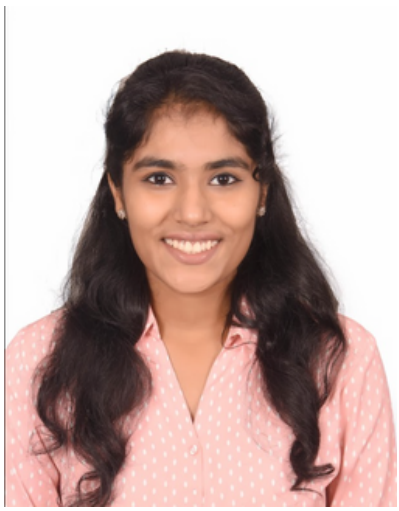
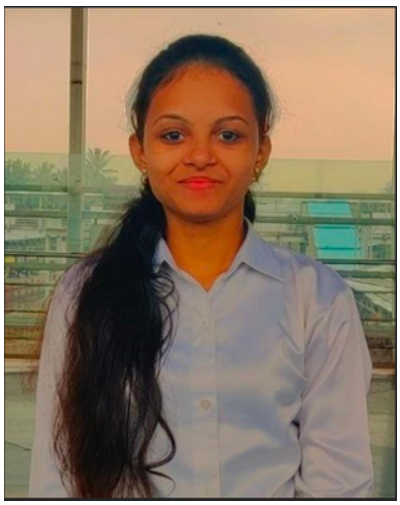


Mangesh Pangam, Rakshita Sarap & Riya Kamble from TE IT won 1st place in Transmission event named “Building The Gateway”.

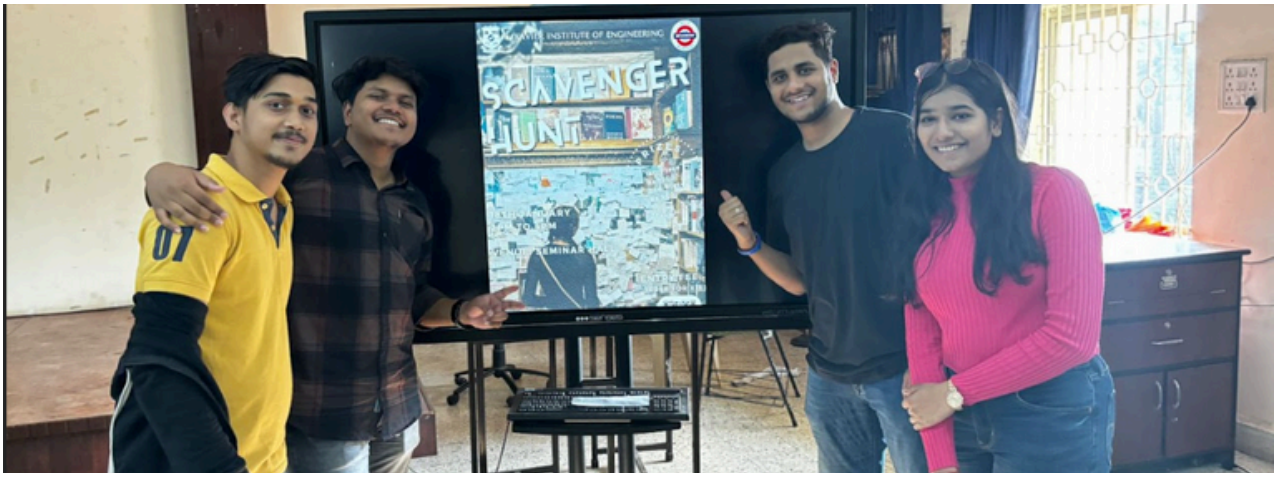


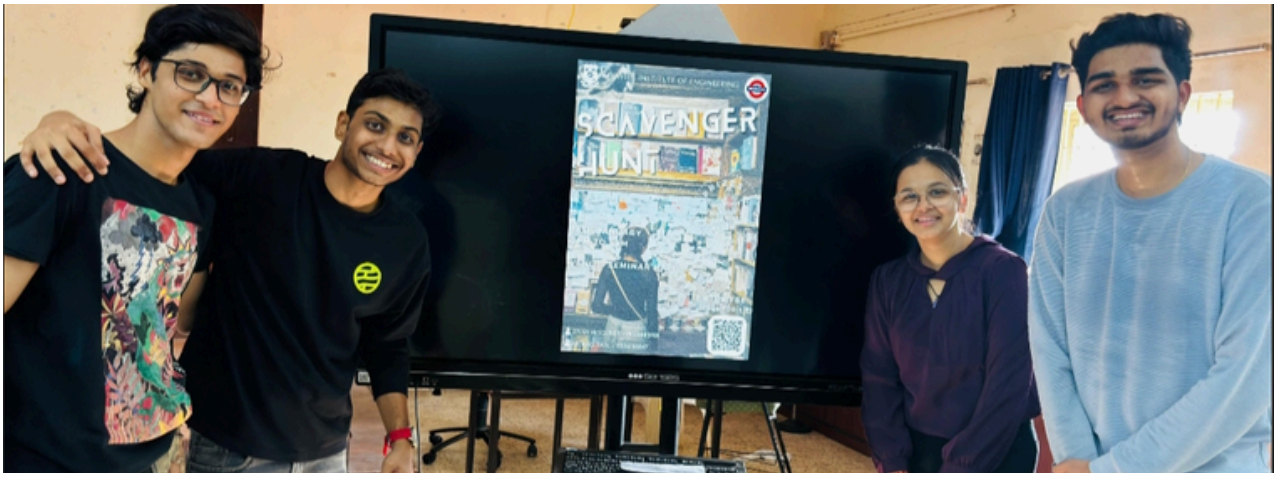
Nithin Nayak, Himanshu Tiwari, Sachin Vishwakarma, Chandan Singh Rajpurohit from SE IT won 1st place in Transmission event “Coders ka Tyohaar”.

SE IT Slayerz from SE IT won 1st place in Spandan event “Nach Bachliye (Group)”.

Arfaat Hashmi, Merin Reji, Harshita Gupta from BE IT won 2nd place in Spandan event “Collaborative Murals”.



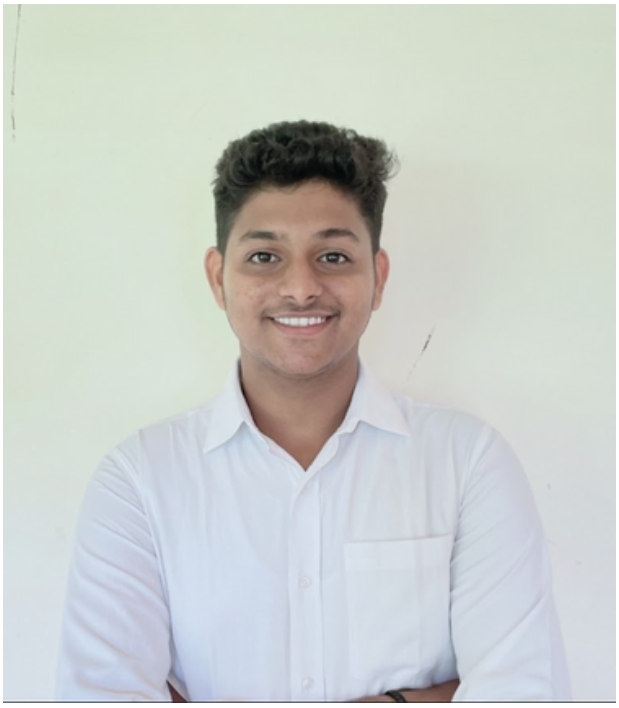


Both 1st and 2nd place was secured by BE-IT in the Spandan event named “Scavenger Hunt”.

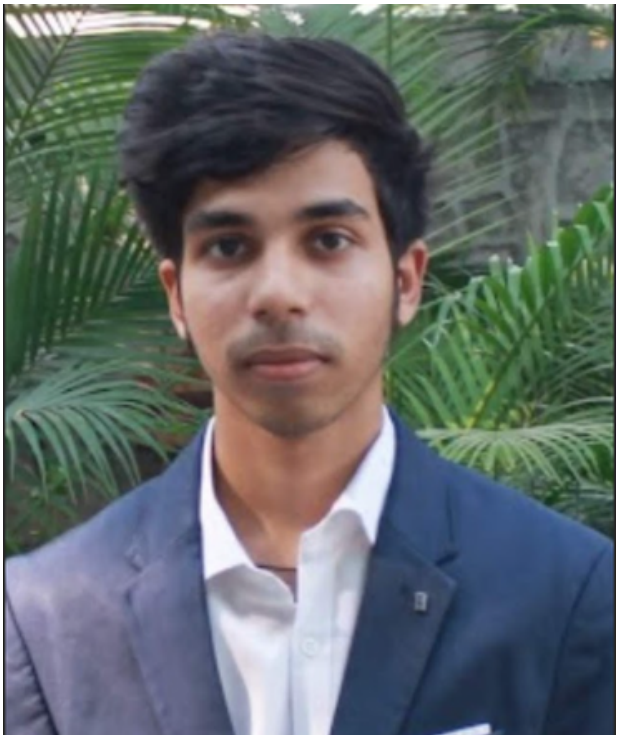
1st Place : Yashika Gupta, Hamza Shaikh, Osama Shaikh, Anshuman Sharma

2nd Place : Saquib Khan, Soham Desai, Falguni Joshi, Bhanu Sunka

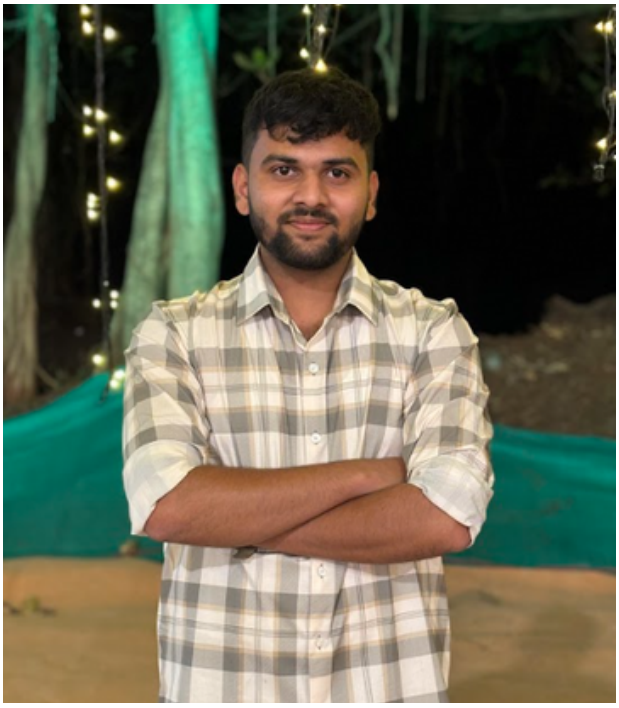
Aditya Ghadge from TE IT won 2nd place in Transmission event “Treasure of the Arabian Sea”.



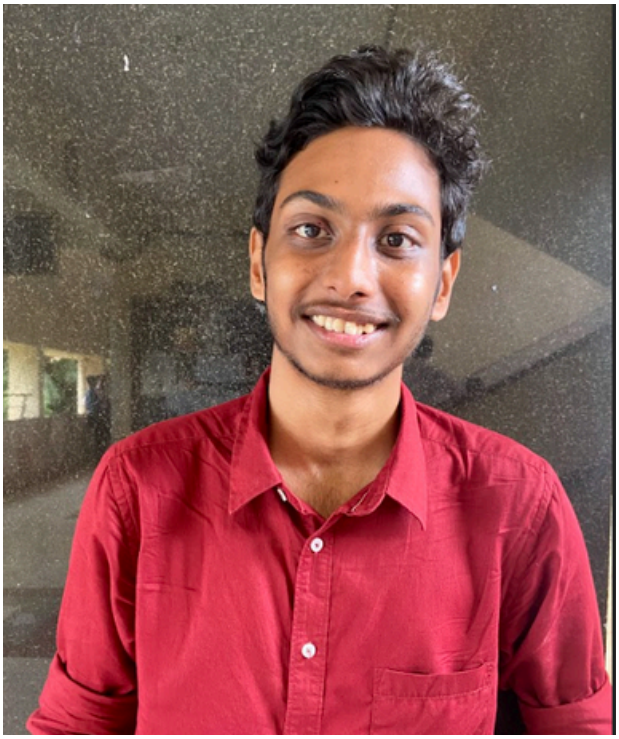
Saish Rane from TE IT won 1st place in Transmission event “Humshakals”, 1st place in TPO quiz and got the Best project (3rd Year) of IT department.



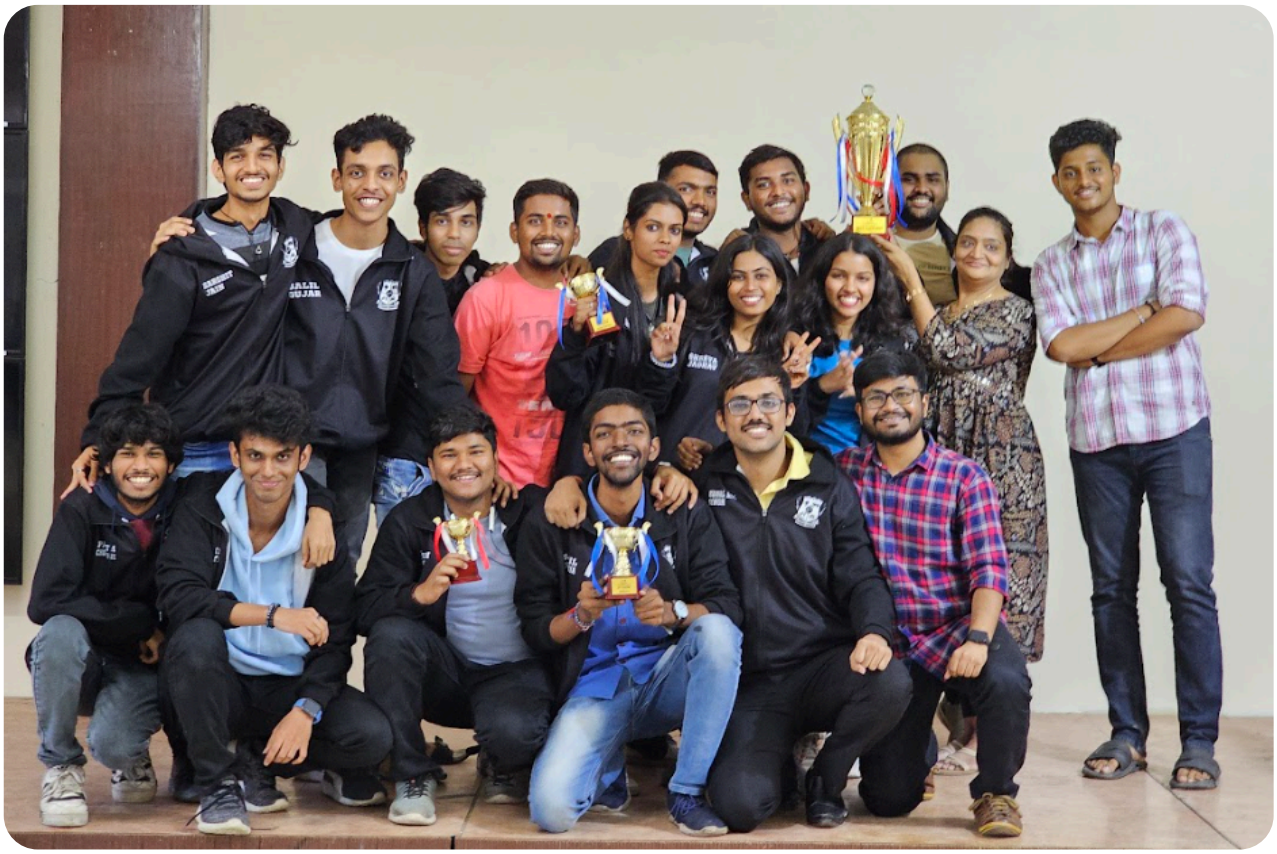
Vedant Gharat from TE IT won 1st place in Transmission event “Coders ka Tyohaar” and 3rd place in Transmission event “Treasure of the Arabian Sea”.



Soham Desai from BE IT won 1st place in Transmission event “Coders ka Tyohaar”.



On the 21st February 2024, Prize Distribution was held by Student Council for Spandan and Transmission 2024 where class TE IT won Best Class award. Hardwork of all the students paid off where they competed in different competitions of cultural and technical events. Also more than half of the organizing committee was from from TE IT. This was a really proud moment for all the students of TE IT to have such a great honour.



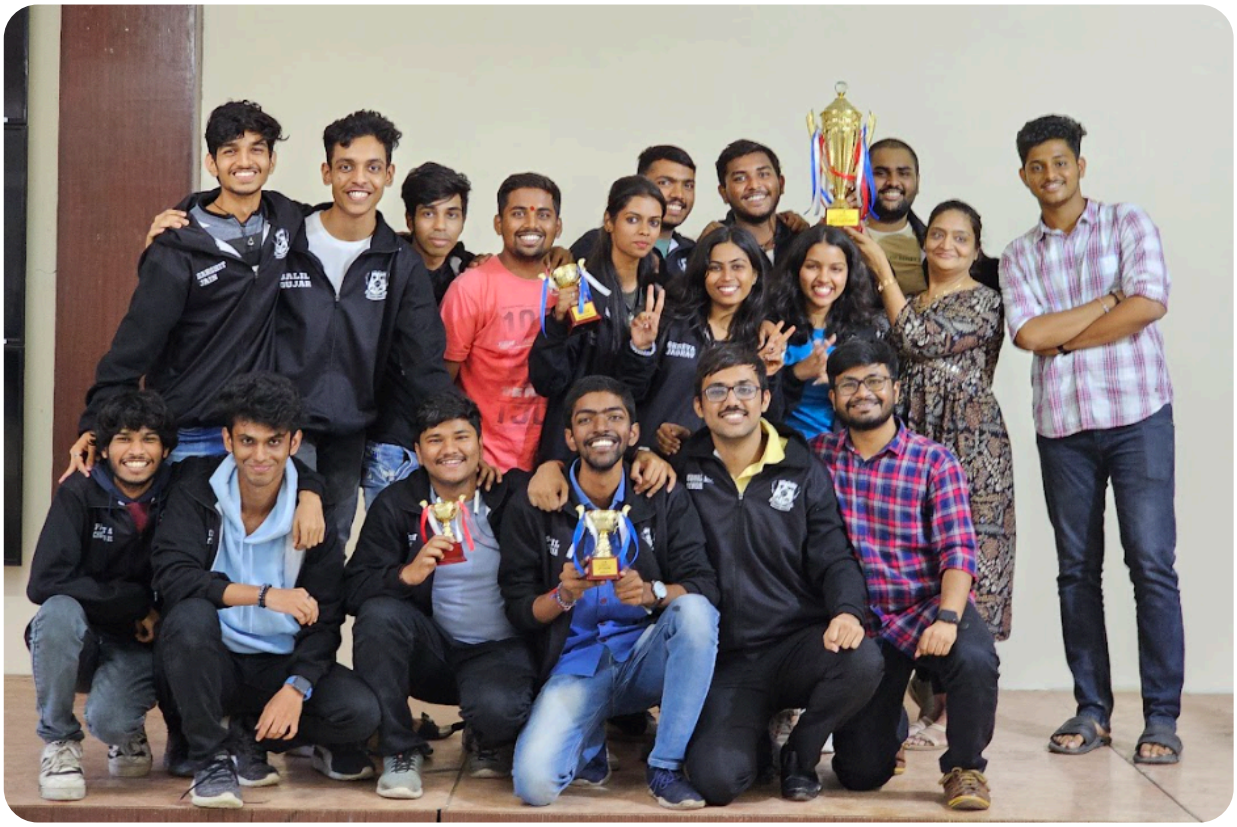
ACTIVITIES

Prize Distribution

Prize Distribution of Spandan & Transmission was held on 21st February 2024. It was held in the presence of Student & Staff Welfare Dean Prof. Kavita Jain. It was one of the successful event where students were felicitated with trophies and certificates for their achievement in Spandan and Transmission 2024. Prizes such as Best College, Best Contingent Leader & Best Class was given.

Prizes:

- **Best Class:** TE-IT



Event Photos :

SE IT Slayerz collecting their prize

Mr. & Ms. Xavier

Prize Distribution Ceremony

OUR AMAZING CREW

- Prof. Stella J (Staff Co-ordinator)
- Harshvardhan Gupta (Editor-in-Chief)
- Shreya Jadhav (Student Co-ordinator)
- Siddhi Awlegaonkar (Reporter-in-Charge)
- Bibhor Mishra (SE Student Editor)
- Parth Choudhary (Graphic Designer)
- Gayatri Dyavanapalli (Asst. Graphic Designer)
- Sachin Vishwakarma (Documentation Head)
- Shirley Methri (Student Reporter)
- Chandan Singh Rajpurohit (Student Reporter)
- Himanshu Tiwari (Student Reporter)