CIVIL INSIGHTS



2026

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INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

Department Of Civil Engineering

presents

CIVIL INSIGHTS 2026



MESSAGE FROM THE EDITORIAL TEAM

We are delighted to present the seventh edition of Civil Insights, the annual magazine of the Civil Engineering Department at IIT Bombay. As one of the institute's founding departments, Civil Engineering holds a proud legacy built on a global reputation for academic and research excellence. This issue offers a curated glimpse into the department's highlights from the 2025–2026 academic year, featuring key milestones, major events, and vibrant campus activities crafted to give our readers a concise yet engaging overview.

A publication of this scale reflects the collective effort of our community. We extend our heartfelt appreciation to the faculty, staff, and students who generously contributed their time and energy to make this edition possible. We express our sincere gratitude to our Head of Department, Prof. Tom V. Mathew, and our faculty advisors: Prof. Eswar Rajasekaran, Prof. Solomon Debbarma, and Prof. Ashish Pal. for their constant encouragement, guidance, and support throughout the process.

While we have taken utmost care to ensure accuracy throughout the magazine, we humbly ask for your understanding regarding any unintentional oversights. We hope these pages resonate with readers across all backgrounds and foster a deeper connection with our department's journey.

To the graduating Class of 2026: this edition stands as a celebration of your dedication, growth, and memorable experiences at IIT Bombay. As you step forward into the next chapter following the Institute's 64th Convocation, we wish you boundless success and fulfillment in all your future endeavors.



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STUTI AGRAWAL



VEDANT PATEL



SARTHAK KASTIYA



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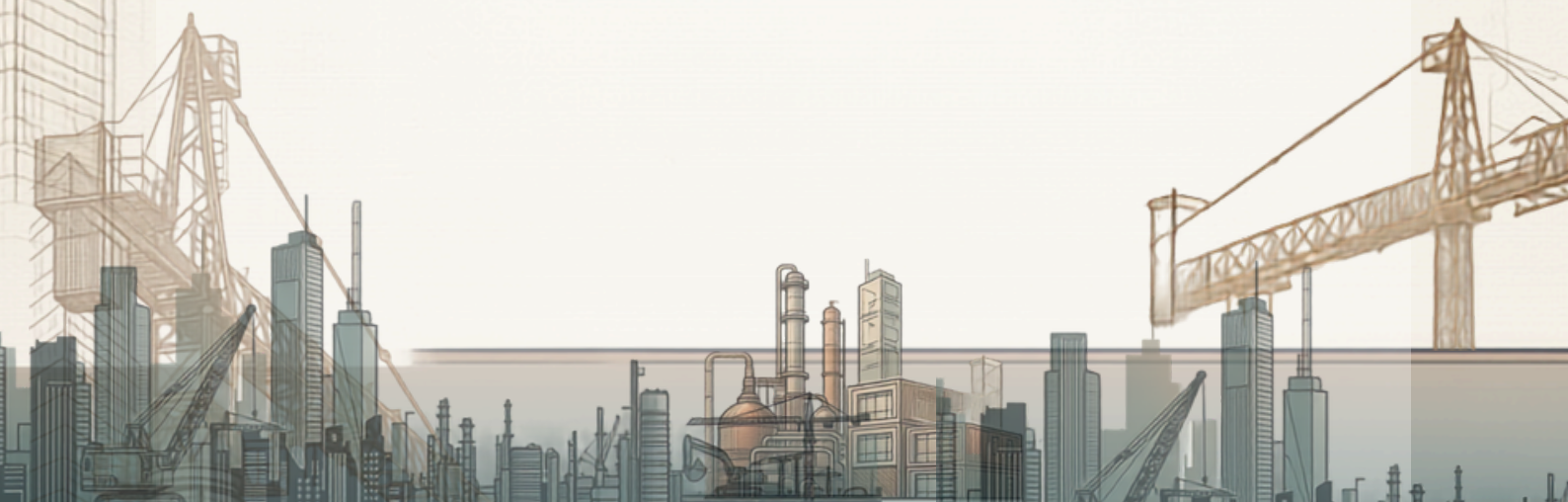
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MESSAGE FROM HOD



A very warm welcome to the Department of Civil Engineering at IIT Bombay! The Department of Civil Engineering has been one of the founding departments of IIT Bombay since 1958. Over the years, it has grown tremendously and is now recognized as one of the country's leading engineering departments, achieving high global rankings in the field of civil engineering. With its multifaceted faculty (60 regular faculty members and 6 adjunct, visiting, or guest faculty members), the department provides high-quality teaching and research.

We offer attractive facilities and a supportive environment for all who join the department as faculty or students. Currently, about 350 doctoral students, 250 master's students, and 650 B.Tech. students are enrolled in the department. We are supported by approximately 30 permanent staff members, including both technical and administrative personnel. We also have a large number of project staff working in the department, assisting with various sponsored research projects.

Among JEE (Advanced) qualified candidates opting for an undergraduate (UG) program, our department is one of the top destinations in the country for civil engineering. Similarly, for GATE-qualified candidates, this department is a highly preferred choice for postgraduate (PG) programs. Out of the large number of applications received for the Ph.D. program, less than 10% of applicants are admitted. Recently, IIT Bombay signed a Memorandum of Understanding (MoU) with SVNIT Surat, NIT Nagpur, and NIT Hamirpur under the Early Induction Program. Under this scheme, 10 final-year UG civil engineering students have joined the UG civil engineering program at IIT Bombay. The recent QS World University Rankings 2026 places our department at 42nd globally, ranking it first in India in the domain of civil engineering. According to the National Institutional Ranking Framework (NIRF) by the Ministry of Education, IIT Bombay ranks 3rd in the country and tops the list in the area of innovation. Our expert faculty members are involved in fundamental and applied research, much of which translates into solutions for various challenging issues facing the country and society at large.

MESSAGE FROM HOD

Eight of our faculty members are listed in the world's top 2% of scientists and researchers in their domain, according to a recent Stanford University database. These achievements are made possible, in part, by the various contributions of our former students. As the problems society faces are multi-dimensional, our efforts to combat them must be equally comprehensive. With this in mind, since the department's inception, our goal has been to research challenging engineering problems and provide efficient solutions across various sub-disciplines of civil engineering. The department has a strong focus on research areas including Transportation Systems Engineering, Geotechnical Engineering, Water Resources Engineering, Structural Engineering, Ocean Engineering, Remote Sensing, and Construction Technology and Management. Recently, the IIT Bombay Senate approved an eighth Master's program in Urban Science and Engineering, which will commence next academic year. The department offers M. Tech. and Ph.D. programs in all these research areas, alongside its traditional B.Tech. program in civil engineering. The department houses 17 high-end teaching and research laboratories in these areas, which are constantly upgraded.

The department also hosts postdoctoral fellowship programs in various specializations, sponsored by the Institute (IPDF), the DST, and other agencies. Currently, there are about 40 postdoctoral fellows working in the department. The department is actively involved in basic and applied research and provides high-quality technical advisory support through various R&D and consultancy projects for numerous organizations. Industry projects undertaken by the department account for more than half of the institute's entire consultancy revenue. This is a major contribution by the department toward making the academic institute financially self-sustaining. Through academic and sponsored research, our faculty members and students have published a large number of research papers in reputed, peer-reviewed journals with high impact factors in their domains. In the recent past, the department has attracted significant sponsored research funding from government and private organizations, delivering excellent output through implementable solutions that benefit the country and society at large. The department is well known for its multi-talented alumni. Several former UG and PG students hold prestigious positions globally across diverse sectors, including academia, research organizations, industry, and government bureaucracy.

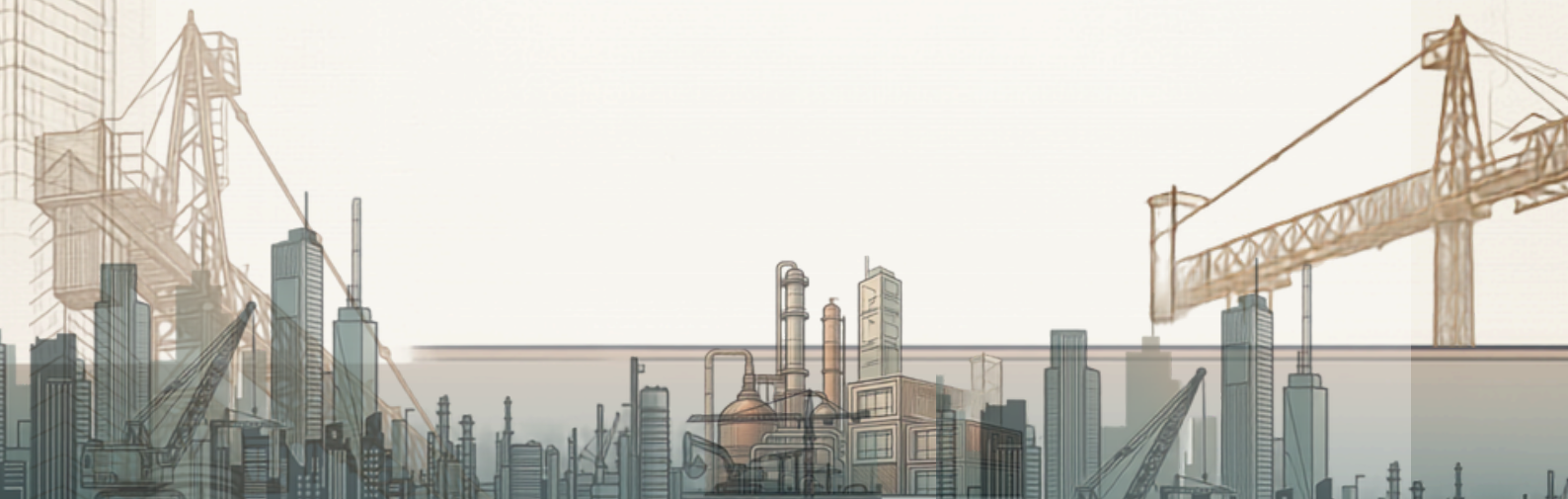
MESSAGE FROM HOD

Many of our civil engineering alumni have given back to their alma mater by instituting merit awards, Chair Professor positions, and making various other contributions. Recently, Mr. Jayant Kanitkar (B.Tech., Civil Engineering, 1977) generously donated to institute the “Kanitkar Merit Awards” for the top students in the 3rd and 4th years of the B.Tech. Civil Engineering program, with an award amount of INR 2,50,000 each. Another alumnus, Mr. Pankaj Jagtap (B.Tech., Civil Engineering, 1995), has established the “Anantrao Jagtap Chair” position for an outstanding faculty member working in the domain of Construction Management.

The family of the late Prof. R. S. Ayyar (whose elder daughter, Ms. Ranjini, is an alumna of the B.Tech. Civil Engineering program) donated two flats in Mumbai to the institute. From this donation, a Chair Professor position will be created in the department, and the 1st-floor conference room has been named in memory of the late Prof. Ayyar. Very recently, a memorial award was instituted by the family and well-wishers of Mr. Manu Akula (B.Tech., Civil Engineering, 2008), a beloved former UG student who recently passed away. This award is dedicated to the top-performing students in UG Construction Technology and Management courses.

The department disseminates the knowledge gained from its high-quality research through training programs, and it interacts with world-renowned experts through workshops and conferences. Our students and faculty members have won prestigious national and international awards and recognitions, continuing to bring laurels to the department and the institute. A significant number of our faculty members continue to serve as editors, associate editors, or editorial board members for various reputed international and national journals. In alignment with our vision and mission, our aim is to deliver the best to our students, society, and the nation.

Best wishes
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Head, Department of Civil Engineering, IIT Bombay



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SIGNIFICANT AWARDS/ RECOGNITIONS

1. Department of Civil Engineering, IIT Bombay won the Cleanliness Competition under Phase 3 of the "Clean Campus Drive" for the third Consecutive Year received 1st Prize for the Department Swacchta Awards (Clean & Green Campus Initiative).

2. Department of Civil Engg. at IIT Bombay is delighted to inform that three of our faculty colleagues have received IIT Bombay Research Awards 2024, which were given on 11th November 2025 during the National Education Day celebration program at IIT Bombay. Our faculty colleagues who received the awards this year are:

- **Prof. Swagata Basu** received "IIT Bombay Research Publication Award-2024".
- **Prof. Manish Kumar** received "IIT Bombay Impactful Research Award-2024".
- **Prof. Swathy Manohar** received "IIT Bombay Early Research Achiever Award-2024".

3. Department of Civil Engineering, IIT Bombay is very happy to note that on 19 September 2025, Elsevier has published the list of World's Top researchers, where 70 total faculty members from IIT Bombay are listed for their Entire Career out of which 7 (5 regular and 2 former) faculty members are from Civil Engineering department:

i. **Prof. Deepankar Choudhury**
ii. **Prof. Subimal Ghosh**
iii. **Prof. R. S. Jangid**
iv. **Prof. D. N. Singh**
v. **Prof. Bellie Sivakumar**
vi**. Prof. M. C. Deo**
vii**. Prof. Tarun Kant**

In another list, where a total of 76 total faculty members from IIT Bombay who are listed for Single Year 2024 as World's Top researchers, 7 (6 regular and 1 former) faculty members are from Civil Engineering department of IIT Bombay.

i. **Prof. Deepankar Choudhury**
ii. **Prof. Jayadipta Ghosh**
iii. **Prof. Subimal Ghosh**
iv. **Prof. R. S. Jangid**
v. **Prof. Bellie Sivakumar**
vi. **Prof. Nagendra Rao Velaga**
vii**. Prof. Tarun Kant**



SIGNIFICANT AWARDS/ RECOGNITIONS

4. On 5th September 2025, IIT Bombay celebrated the Teachers' Day, where three of our department colleagues were honored with the following awards:

- Prof. S. P. Sukhatme Excellence in Teaching Awards - 2025 of Institute received by **Prof. Arghadeep Laskar**.
- **Prof. Arpita Mondal** received C1973 Faculty Award for Research Excellence – 2025 under the domain of "Engineering Sciences and Design".
- **Prof. Muhammad Salman** and **Prof. Santiram Chatterjee** were selected as the recipient of Departmental Best Teacher Award-2025.

5. **Prof. Deepankar Choudhury** with his former PhD scholars, **Dr. Chaidul Chaudhuri** and **Dr. V. Dilli Rao** of our department, had significantly contributed for the foundation design of first Metro Railway of Madhya Pradesh state of India in the city of Indore, which was inaugurated by the Prime Minister of India on 31st May 2025.

6. **Prof. Deepankar Choudhury** has received the "Springer Nature Editor of Distinction Awards 2025" for his significant contributions as the Editor-in-Chief (EiC) of Indian Geotechnical Journal, published by Springer Nature, in association with Indian Geotechnical Society (IGS), New Delhi.

7. **Prof. Deepankar Choudhury** has been conferred with the prestigious "Eminent Engineer Award - 2025" from The Institution of Engineers (India) - IEI, in recognition of his eminence and contribution to the profession of Civil Engineering, given during the 40th National Convention of Civil Engineers on 1st September, 2025 at Statue of Unity (Ekta Nagar), Rajpipla, Gujarat, India.

8. **Prof. Deepankar Choudhury** and **Prof. Subimal Ghosh** were honored and delivered invited talks as Distinguished Alumni of Civil Engg, IISc, Bangalore during the 75th year of celebration of Civil Engineering department of IISc Bangalore during 23-24 July, 2025.

9. **Prof. Deepankar Choudhury** served as an expert member of the Search-cum-Selection Committee for selection of Vice Chancellors of various Universities of West Bengal

10. **Prof. Deepankar Choudhury** was the Guest of Honour in the Department of Civil Engineering, Indian Institute of Technology Kanpur for distributing the degrees to the Class of 2025 during the 58th Convocation of IIT Kanpur held on 23rd June 2025.

SIGNIFICANT AWARDS/ RECOGNITIONS

11. **Prof. Subimal Ghosh** societal impact work on Mumbai Extreme Rainfall and Flood Monitoring and Forecasting has been highlighted in in the news section.

12. **Prof. Subimal Ghosh** and his team's Societal Impact Work about Smart irrigation model which may help farmers cut water use by 30% published in the media report.

13. **Prof. Dharamveer Singh** conducted a 3-day training program for the UP PWD Engineers on Quality and Construction of Roads and New Technology. Prof. Singh met the Hon'ble Chief Minister of Uttar Pradesh Shri Yogi Adityanath Ji, in presence of Shri V. K. Singh, Technical Advisor, on 1st August 2025. Hon'ble CM of UP encouraged him to contribute further on national building through imparting training to highway practitioners and engineers of the country as a technical expert in the domain of Pavement Engineering.

14. **Prof. RAAJ Ramasankaran** been selected by Indian Society of Remote Sensing (ISRS) for the 'Indian National Geospatial Award' for the year 2025 for his significant contributions in the field of geospatial science, technology and its applications in the field of hydrology and cryosphere studies

15. **Prof. Basudev Biswal** has been nominated as a Member of Working Group (WG–08) on Data, Technology & Innovation under the National Task Force for Integrated Water Resources Development and Management (NTFIWRDM), constituted by the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD & GR) under the Chairmanship of the Hon'ble Member, NITI Aayog, Government of India.

16. **Prof. Arpita Mondal**'s research findings on Concretization/ urbanization, while in-line with India's rapid growth targets, can influence hydrology and microclimate in ways that may not be desirable and sustainable.

17. **Prof. Siddhartha Ghosh** and his PhD scholars of IIT Bombay has received the Best Paper Award at the 14th Asian Pacific Conference on Shell and Spatial Structures (APCS 2025) in Kanazawa, Japan, for their research work titled "Effect of Wrinkling Allowance in Tensile Membrane Structures".

SIGNIFICANT AWARDS/ RECOGNITIONS

18. **Prof. Manish Kumar**'s Societal contribution of the research work about the development of Lightweight modular bunkers to withstand missiles, drones and artillery fire, in collaboration with College of Military Engineering (CME), Pune published in the media report.

19. As per QS ranking 2026 for Civil Engg., our department is 1st in India with world rank of 42nd.

20. **Prof. R. S. Jangid** awarded with the Dr. P. K. Patwardhan Technology Development Award for the year 2025.

21. **Prof. Deepankar Choudhury** reappointed as an Expert Member of High-Rise Committee (HRC) of Brihan Mumbai Municipal Corporation (BMC).

22. **Prof. Deepankar Choudhury** joined the Expert Review Committee on Seismic Hazard Mapping and India-Specific Ground Motion Prediction Equations (GMPEs) of Ministry of Jal Shakti, Government of India.

23. **Sounak Kabasi** and **Allan Marbaniang** won the 2026 George Stephenson Medal from the Institution of Civil Engineers (ICE), UK, students of **Prof. Siddhartha Ghosh**.

24. **Dr. Omprakash**, student of **Prof. Albert Thomas**, who has now accepted a faculty position abroad, and started working as an Assistant Lecturer in Construction Management at the School of Surveying & Construction Innovation, Technological University Dublin, Ireland.

25. **Dr. Nivedita Dubey**, a former doctoral student, has been selected for the prestigious Humboldt Postdoctoral Fellowship. She will work with **Prof. Ana Bastos** at Leipzig University. Dr. Dubey completed her PhD under the supervision of **Prof. Subimal Ghosh**.

26. **Dr. Pranoy Debnath**, an ANRF-National Postdoctoral Fellow (NPDF) at the Department of Civil Engineering, Indian Institute of Technology Bombay, has been awarded the prestigious Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellowship (2025) under the Horizon Europe Programme of the European Commission. **Dr. Debnath** was mentored by **Prof. Deepankar Choudhury**.

SIGNIFICANT AWARDS/ RECOGNITIONS

27. **Mr. Rishav Baishya**, a PMRF-PhD Scholar at the Department of Civil Engineering, Indian Institute of Technology Bombay, has been awarded the "Student Excellence Award - Doctoral (PhD) Level" in recognition of outstanding doctoral research contributing to the advancement of tunneling and underground construction, during Tunnel Tech 2026 Awards given on 13th March 2026 at Gurgaon. **Mr. Baishya** is carrying out his Ph.D. under the supervision of **Prof. Deepankar Choudhury**.

28. **Mr. Saeed Soleimani**, a PhD student, has received the 2025 Outstanding Reviewer Award from Journal of Hydrology (Elsevier). Journal of Hydrology is among the top journals in the water resources field, with an Impact Factor of 6.3. **Prof. Bellie Sivakumar** is the Supervisor.

29. **Prof. Deepankar Choudhury** will Chair the Subject Expert Committee (SEC) of Civil Engg. for ANRF Prime Minister Early Career Research Grant (PMECRG) during 17-18 February 2026 at IISER Pune.

30. **Prof. Deepankar Choudhury** has been nominated as the Chairperson for the Building and Works Committee for the Indian Institute of Management Mumbai.

31. **Prof. Nagendra Rao Velaga** has been nominated as the Member of Infrastructure Advisory Committee for the Indian Institute of Management Mumbai.

32. GDI Best Paper Award (Academic) was presented to **Aaliya Azeem** & **Prof. Albert Thomas** at the International conference of Green + Digital + Intelligent Built Environments at Auckland, New Zealand from 1st December to 3rd December 2025.

33. IGS-AIMIL-HCV YGE Award was presented to **Dinesh Bishnoi**, **Vikas Patil**, and **Prof. S. Dasaka Murty** by IGS-Jalandhar Chapter held on Saturday, the 20th December 2025.

34. **Prof. Basudev Biswal** has been nominated as a Member of Working Group 08 (Data, Technology and Innovation) under the NTFIWRDM constituted by the Department of Water Resources, River Development & Ganga Rejuvenation (DoWR, RD & GR) under the Chairmanship of the Hon'ble Member, NITI Aayog, Government of India.



SIGNIFICANT AWARDS/ RECOGNITIONS

35. IACMAG Awards 2025 was awarded to three of **Prof. Deepankar Choudhury**'s former PhD scholars of IITB. These International Awards are given by the "International Association for Computer Methods and Advances in Geomechanics (IACMAG), USA" for various outstanding contributions in the domain of Geomechanics:

- **Dr. Kaustav Chatterjee**, Associate Professor of Civil Engg. at IIT Roorkee (PhD from Civil Engg. IITB in 2016 under guidance of supervisor **Prof. Deepankar Choudhury**) has been selected to receive "Excellent Contributions (Regional) Award - 2025" of IACMAG, USA.
- **Dr. Ashutosh Kumar**, Assistant Professor of Civil Engg. at IIT Mandi (PhD from Civil Engg. IITB in 2018 under guidance of supervisor **Prof. Deepankar Choudhury**) has been selected to receive "Excellent Paper Award - 2025" of IACMAG, USA.
- **Dr. Chaidul Chaudhuri**, Assistant Professor of Civil Engg. at IIT Bhubaneswar (PhD from Civil Engg. IITB in 2023 under guidance of supervisor **Prof. Deepankar Choudhury**) has been selected to receive "John Carter Award - 2025" of IACMAG, USA. This is equivalent to Best PhD Thesis work award in the domain of Geomechanics.

36. **Mr. Mohan Kumar Somavarapu** received the Best Student Paper award in the recently concluded 8th Conference of Transportation Research Group of India. He is a PhD scholar under guidance of supervisor **Prof. Avijit Maji** in IITB-Monash program.

37. The following students got selected for long term academic exchange under LOTUS (India-Japan Circulation of Talented Youths in Science) Programme commissioned by Japan Science and Technology (JST) Agency. Both are PhD scholars under guidance of supervisor **Prof. RAAJ Ramsankaran**.

- **Mr. Sanjay Saifi** will be visiting Kyoto University from March 2026- Feb 2027 (1 yr)
- **Mr. Luvkesh Attri** will be visiting Hokkaido University from March 2026 to Dec 2026 (8 months)



SIGNIFICANT AWARDS/ RECOGNITIONS

38. **Prof. Eswar Rajasekaran** has been included as a member of the Science and Cal/Val team of the upcoming Indo-French Satellite Mission TRISHNA.

39. **Prof. RAAJ Ramsankaran** inducted as Associate Editor in one of the reputed remote sensing journal named Remote Sensing Applications: Society and Environment (RSASE) published Elsevier. It is Q1 Journal in our field.

40. **Prof. Swathy Manohar** and **Prof. Solomon Debbarma** has been selected as Associates of the Indian Academy of Sciences (IASc), Bengaluru, with effect from January 2026.

41. **Prof. Subimal Ghosh** has been elected as a Fellow (FASc) of Indian Academy of Sciences (IASc), Bengaluru, from 2026.

INTEGRATED DESIGN PROJECT

Integrated Design Project (IDP) to bridge civil engineering education with real-world practice

In a significant step towards strengthening experiential and industry-oriented learning, the Department of Civil Engineering, IIT Bombay has introduced the Integrated Design Project (IDP), a 12-credit project-based course being offered from January 2026 to undergraduate students in the 6th, 7th and 8th semesters. The initiative is designed to take students beyond conventional classroom learning and expose them to the complexities of planning and delivering large-scale, real-world civil engineering projects.

Each IDP team comprises 4–5 students, working under the guidance of an IIT Bombay faculty supervisor and an industry mentor. The project problems are developed collaboratively with industry partners and are based on sanctioned, ongoing, completed, or proposed projects in India or abroad. Importantly, the projects are multidisciplinary, bringing together different facets of civil engineering within the context of a single project. Students may engage with aspects of structural and systems design, feasibility and pre-feasibility studies, site assessment, preliminary and technical design, cost considerations, sustainability objectives, project constraints, and strategies for project execution.

A key strength of the IDP is its close interaction with industry. Students will have periodic reviews with both their faculty supervisor and industry mentor and, where relevant, undertake site and industry visits to understand first-hand how large engineering projects are planned, coordinated and executed. This provides an opportunity to appreciate not only the technical dimensions of civil engineering, but also the practical aspects of project logistics, coordination between different stakeholders, design responsibilities and execution challenges.

The IDP thus seeks to create a bridge between academic knowledge and professional practice, while encouraging teamwork, interdisciplinary thinking, problem-solving and engineering judgement. Through sustained engagement with real projects and industry professionals, students will gain a deeper understanding of the role of a civil engineer in the complete project lifecycle. The initiative represents the Department's commitment to preparing its graduates not merely to solve well-defined engineering problems, but to conceive, integrate and deliver solutions to complex civil engineering challenges in the real world. The department also gives awards to be the best teams at the end of each semester.

RESEARCH ARTICLES

Understanding Directionality in Thermal Infrared Remote Sensing

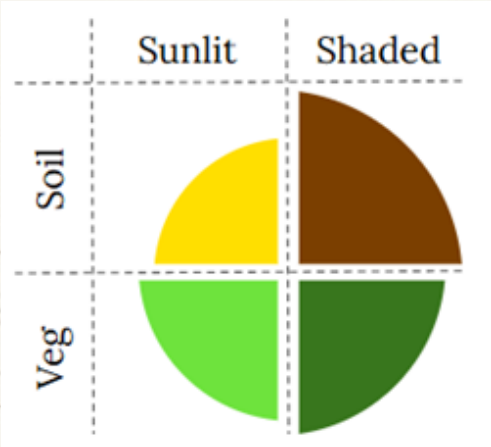
Thejaswini S P, Eswar Rajasekaran

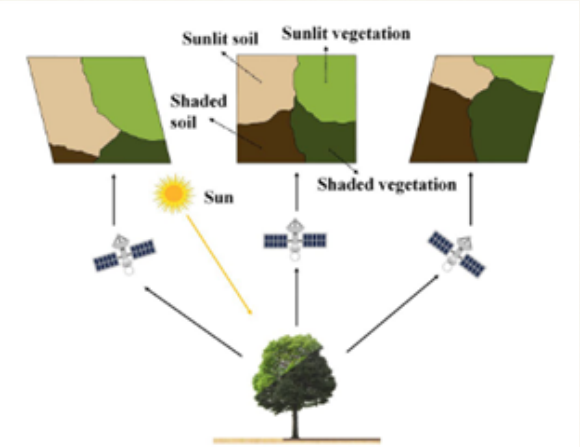
In satellite remote sensing, Earth's physical properties are observed and measured remotely through the radiation reflected or emitted from the surface. One important phenomenon affecting these measurements is directionality, where properties such as reflectance and temperature vary with the viewing angle of the sensor relative to the target. As a result, the same target observed at the same time can produce different reflectance or temperature values when viewed from different directions.

Directional effects have been extensively studied in the optical domain, but they are less explored in the Thermal Infrared (TIR) region. This is because surface temperature is influenced by several environmental factors, including solar heating, vegetation cover, soil moisture, atmospheric conditions, and seasonal variations, and it changes rapidly in both space and time.
Thermal Radiation Directionality (TRD) refers to the variation in brightness temperature between nadir and off-nadir observations. TRD is controlled by the combined effects of sun–surface–sensor geometry (Figure 1), vegetation structure, and seasonal radiation conditions. Studies have shown that angular anisotropy in Land Surface Temperature (LST) can cause temperature differences of up to 15 K, and even larger variations over dense vegetation canopies and urban areas. If these directional effects are ignored in conventional LST retrieval algorithms, errors of 12–15 K may occur, affecting applications such as climate modelling, evapotranspiration estimation, and agricultural monitoring.

The observed temperature of a scene can be approximated as the weighted average of the temperatures of all components within the sensor's field of view, such as vegetation, soil, water, and built surfaces. As the sensor viewing angle changes, the visible fraction of each component also changes, leading to variations in the measured LST.

RESEARCH ARTICLES





An additional directional effect is the hotspot phenomenon, which occurs when the Sun and the sensor are nearly collinear. In this geometry, shadows are minimized, a larger proportion of illuminated surfaces becomes visible, and the observed brightness temperature can increase significantly.
Because satellites provide only limited viewing geometries, simulations are essential for systematically analysing illumination–target–sensor configurations and for improving our understanding of directional anisotropy in Land Surface Temperature under varying environmental conditions.

Thermal directionality is an important source of variability in TIR remote sensing. Variations in sensor viewing angle, surface composition, vegetation structure, and Sun–sensor geometry can significantly affect the observed brightness temperature. Understanding Thermal Radiation Directionality, the hotspot effect, and the Cosine Scattering Angle is essential for improving Land Surface Temperature retrievals and for ensuring reliable applications in climate studies, agriculture, hydrology, and urban environmental monitoring. Combining satellite observations with simulations and angular analysis provides a more complete understanding of directional thermal behaviour and supports the development of more accurate thermal remote sensing methodologies.

RESEARCH ARTICLES

Artificial Intelligence powered Earth Observation for agricultural applications across Maharashtra

Nagendra S R, Dharanya T, Kukku Sara, Masan A, Harshita Tiwari, Eswar Rajasekaran

The word civil engineering will most likely trigger the images of skyscrapers, long bridges and other major infrastructural projects in our mind. The Department of Civil Engineering, IIT Bombay, is different from the traditional civil engineering departments where we diversify our research to cover multiple aspects that a civilization needs to survive. One such basic need is food, and agricultural industry is the backbone of our nation's economy even today. We are working closely with the Department of Agriculture, Government of Maharashtra and the Maharashtra Project on Climate Resilient Agriculture (PoCRA) to develop practical and actionable earth observation based inputs towards crop monitoring with a fine spatial granularity across the state. A major focus of the work is the use of satellite and Unmanned Aerial Vehicle (UAV, more commonly drones), field information, weather data, and data-driven models to generate reliable information on crop health and crop stress, particularly in regions where crop productivity is highly sensitive to the external factors.

The team has developed a model for soil-moisture estimation using Earth observation and associated environmental information. Soil moisture is a critical indicator of agricultural water availability and crop water stress. Spatially distributed soil-moisture information can therefore help in understanding variations in water availability across agricultural areas and identifying locations that may be more vulnerable to moisture stress.

RESEARCH ARTICLES

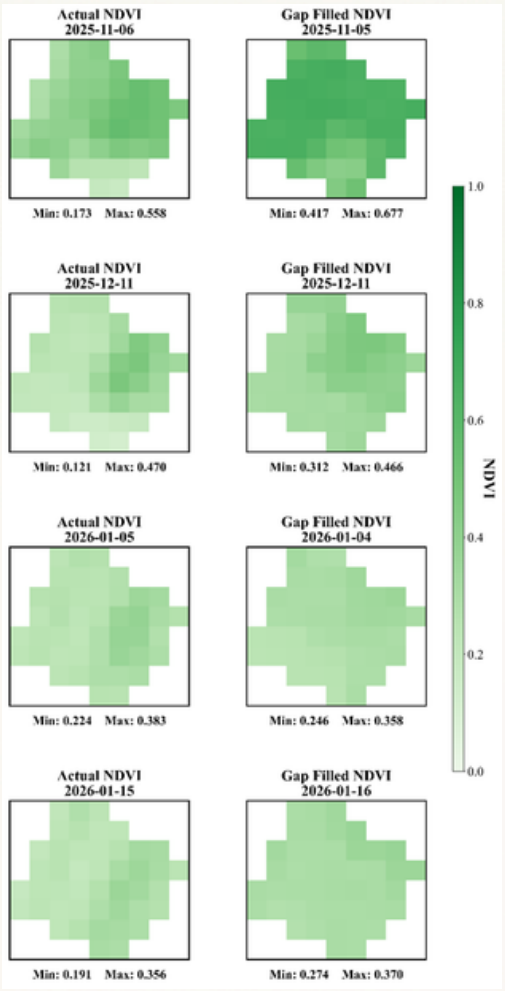


Figure 1 Comparison between Actual and Predicted NDVI Spatial Patterns for a cotton Plot in Parbhani

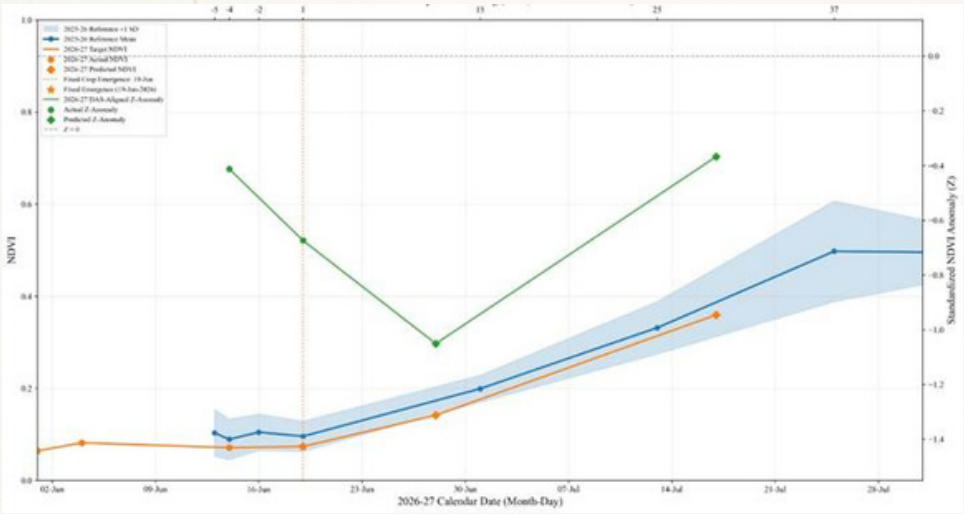


Figure 2 NDVI based crop health assessment

RESEARCH ARTICLES

One important component is the development of an all-weather NDVI estimation framework (Figure 1). Optical satellite observations such as Sentinel-2 provide valuable information on crop greenness and growth, but their availability is often limited during cloudy and monsoon periods. To overcome these gaps, information from Sentinel-1 Synthetic Aperture Radar (SAR), weather variables, field observations, and machine-learning techniques is used to estimate NDVI when usable optical observations are unavailable. This provides a more continuous representation of crop growth and enables improved monitoring of crop condition and seasonal vegetation dynamics. This all-weather NDVI will be directly useful in monitoring crop health (Figure 2).

The team is also working towards the development of remote-sensing and data-driven models for the early identification of crop pests, diseases and other abiotic stresses. Pest and disease symptoms are often clearly visible only after considerable damage has occurred. By integrating satellite and observations with field and environmental information, the work aims to identify subtle changes in crop conditions that may indicate the onset of pest or disease stress. Such early-warning approaches can potentially support timely field scouting and targeted crop-protection measures before the problem becomes severe.

We are also working towards addressing key challenges in conserving irrigation water and improving agricultural water-use efficiency under increasing water scarcity. To meet the growing global food demand irrigated agriculture is essential due to its higher productivity compared to rainfed agriculture. However, it accounts for nearly 70% of global freshwater withdrawals and approximately 85–90% of India's freshwater use. Despite advances in irrigation technology, farmers often schedule irrigation based on heuristics rather than soil moisture or crop water status, leading to inefficient water application.

RESEARCH ARTICLES

Satellite observations have increasingly been used to estimate crop water status and evapotranspiration (ET), providing valuable information for regional-scale irrigation assessment. However, the spatial resolution of satellite observations is insufficient to resolve the fine-scale variability that exists within agricultural fields. High-resolution Unmanned Aerial Vehicle (UAV) observations bridge this gap by providing detailed information at the field scale. The resulting UAV multispectral reflectance and thermal Land Surface Temperature (LST) (Figure 3) will then be used as an input for ET estimation (Figure 4), providing an estimate of spatially distributed crop water use. UAV-derived LAI, canopy height, and ET will then be integrated into a distributed ecohydrological model to represent crop–soil–atmosphere water dynamics. The overall framework will support adaptive, field-scale irrigation scheduling for vineyards in Nashik, India, with the goal of improving water-use efficiency.

Together, information on vegetation condition, soil moisture, and pest and disease stress can provide a more comprehensive understanding of crop health. While NDVI indicates changes in crop growth and canopy condition, soil moisture provides information on the available water environment, and pest- and disease-monitoring models can help identify possible biotic stresses affecting crop performance.

These developments have the potential to support the state government through continuous monitoring of crop conditions, early identification of vulnerable and stressed areas, assessment of moisture-related constraints, and improved understanding of pest and disease risks. Such information can assist in better planning of water resources, timely crop-management interventions, and more informed decision-making by farmers, researchers, and agricultural agencies.

RESEARCH ARTICLES

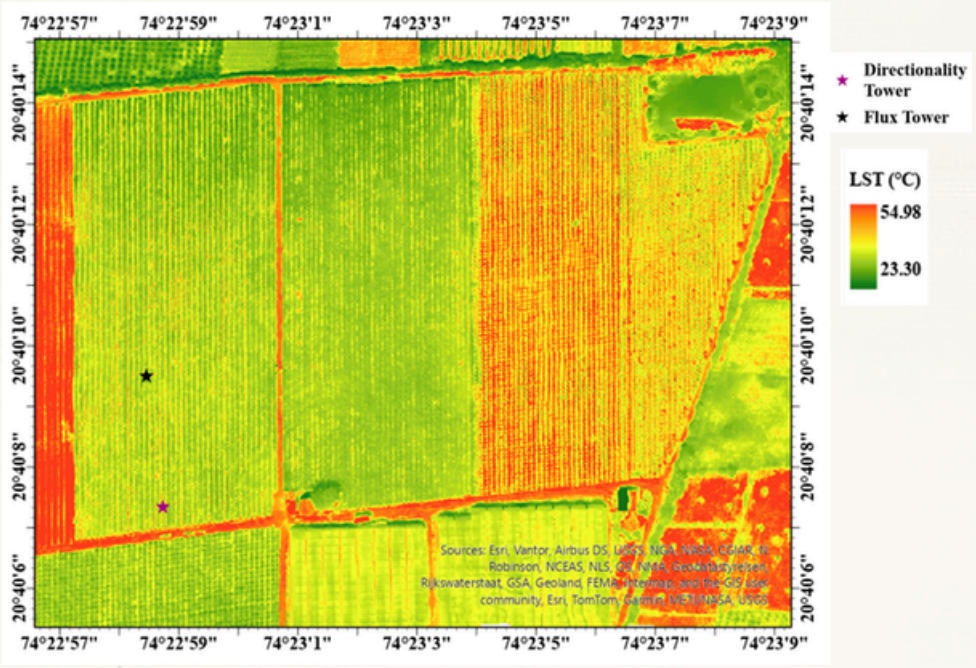


Figure 3 A UAV retrieved land surface temperature map over a vineyard at Malegaon, Maharashtra

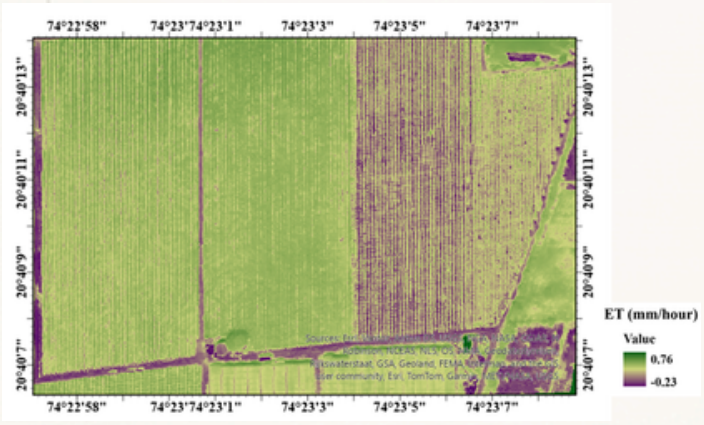


Figure 4 Evapotranspiration (ET) map over the Malegaon site

RESEARCH ARTICLES

Choosing the Right Reinforcement for Longer-Lasting Concrete Structures

Harshit Agrawal, Muhammad Salman

Reinforced concrete is one of the most widely used construction materials, but its long-term performance can be severely affected by corrosion of embedded steel reinforcement. This is particularly important in chloride-rich environments, where salts can penetrate concrete and initiate corrosion. Once corrosion begins, it can lead to cracking, loss of steel–concrete bond and progressive deterioration.

An important question is therefore: can the choice of reinforcement itself help improve the durability of concrete structures?

Is the most corrosion-resistant steel always the best choice?

Conventional TMT steel is widely used because of its strength, availability and relatively low cost. However, corrosion-resistant alloyed steels and coated reinforcements offer alternative solutions for aggressive environments. Our experimental study compared different reinforcement systems based on their corrosion resistance, bond behaviour and durability. Stainless steel showed the highest corrosion resistance, with approximately 104% higher critical chloride threshold than sandblasted TMT steel. Dual zinc-galvanized epoxy-coated reinforcement also showed a substantial improvement of around 84%. However, improved corrosion resistance can involve trade-offs. Some coatings reduced the bond between reinforcement and concrete; up to approximately 22% lower ultimate bond strength in epoxy-coated bars. Thus, selecting reinforcement cannot be based on corrosion resistance alone.

This highlights an important engineering trade-off: a reinforcement system that performs exceptionally well against corrosion may not necessarily be the most suitable choice when all practical requirements are considered together.

From “best material” to “best material for the project”

This challenge motivated the development of an Optimum Reinforcement Decision-Making (ORDM) framework. Rather than assigning a single ranking based only on corrosion resistance, the framework considers four key performance domains:

Bond strength + Corrosion resistance + Weathering/abrasion resistance + Cost

The relative importance of these parameters can be adjusted according to the requirements of a particular project and its exposure environment (as shown in Fig. 1). The framework then combines these factors to obtain an overall Total Performance Index (TPI) for each reinforcement alternative.

The strength of this approach lies in its flexibility. A project located in a severe chloride environment may place greater emphasis on corrosion resistance, while economic constraints or structural requirements may give greater importance to cost or bond performance.

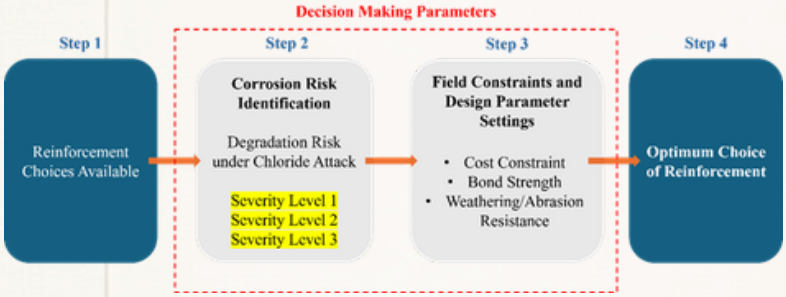


Fig. 1. Optimum Reinforcement Decision-Making (ORDM) framework.

Putting the framework into practice

The practical application of the framework was demonstrated for a high-rise building exposed to severe chloride conditions (Fig. 2). Under the assumed priorities, stainless steel, corrosion-resistant steel and cement-polymer composite-coated reinforcement emerged as the leading options. Stainless steel achieved the highest overall performance because of its superior corrosion resistance, while the other alternatives provided a more balanced combination of durability, bond and cost.

Interestingly, changing the emphasis placed on cost altered the preferred reinforcement options. This demonstrates the central idea of the framework: there is no single reinforcement that is best for every project. The optimum choice depends on the exposure environment, structural requirements and economic constraints.

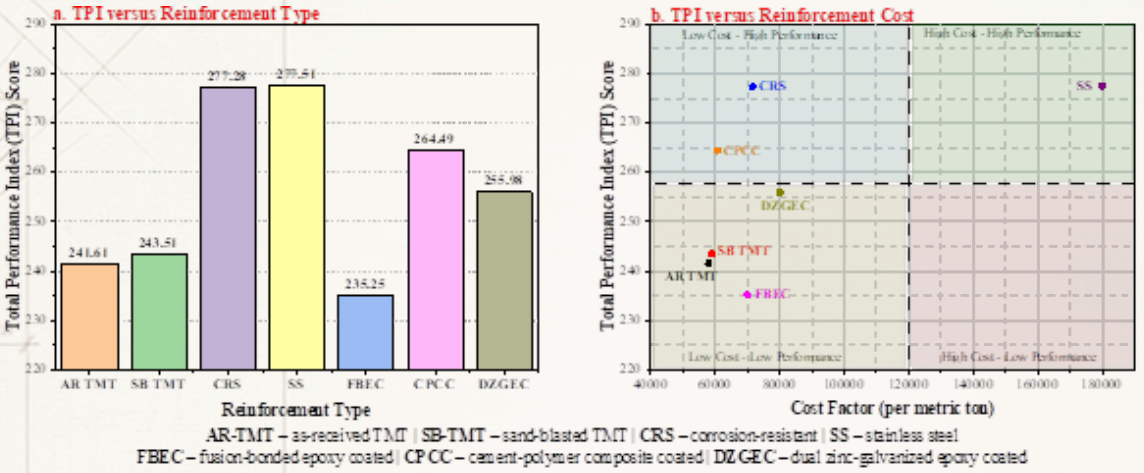


Fig. 2. Application of the ORDM framework for reinforcement selection in a high-rise building under severe chloride exposure.

Towards More Durable Infrastructure

The study highlights the importance of moving beyond material selection based on a single property. The ultimate objective is simple: make informed reinforcement choices at the design stage so that reinforced-concrete structures can remain durable for longer, with reduced maintenance and repair requirements.

RESEARCH ARTICLES

A Multiscale View of Pore Evolution in Fly Ash Blended Cement
Vivek V S and Muhammad Salman

Replacing Portland cement with fly ash not only changes the total pore volume but also reconfigures the pore network across different length scales. Analyses using N_2 adsorption–desorption (BJH/DFT), mercury intrusion porosimetry (MIP), and micro-CT (MCT) on OPC and fly ash blended cement pastes with 15%, 30%, 50%, and 70% fly ash (F15, F30, F50, F70) reveal a gradual transition from a relatively dense pore structure to a more varied and multimodal network as fly ash content rises.

The N_2 adsorption–desorption isotherms reveal clear hysteresis in all samples, particularly at higher relative pressures, indicating mesoporous structures and complex pore geometries. The isotherms broadly exhibit Type IV characteristics with H3/H4-like features, associated with slit-shaped and interconnected or ink-bottle pores. DFT/BJH distributions show strong pore restructuring. OPC peaks at 7–9 nm (~0.037 cc/g), decreasing to ~0.020 cc/g for F15 and ~0.005–0.007 cc/g for F30, before recovering to ~0.018–0.019 cc/g for F50. F70 shows a pronounced fine-pore peak near 7 nm (~0.09–0.095 cc/g). Similarly, pore-throat distributions shift from 3–4 nm (~0.052 cc/g) in OPC to 9–10 nm (~0.067 cc/g) in F70, indicating changes in pore-entry restrictions and connectivity with increasing fly ash replacement.

At the MIP scale, the pore structure becomes more complex. OPC shows major pore-body populations around 0.03–0.04 cc/g. F15 remains similar to OPC, while F30 and F50 have lower peak intensities. F70 features a multimodal distribution that extends toward larger pore sizes. Pore-throat distributions also become more irregular, highlighting why total porosity alone can't fully explain transport behaviour. Additionally, MIP-derived diameters indicate pressure-controlled pore-entry sizes and should not be mistaken for actual pore-body diameters, especially in ink-bottle geometries. The MCT results expand the analysis to the macropore scale, identifying pores from tens to thousands of micrometres. OPC exhibits specific large-pore populations, whereas fly ash blends spread pore volume over a wider size range. F70 is especially diverse, with notable populations across various pore sizes. Instead of merely filling existing pores, high-volume fly ash creates a hierarchical pore structure that includes fine mesopores, larger transport pores, and macropores.

RESEARCH ARTICLES

Overall, the combined analyses of N_2 adsorption–desorption, DFT/BJH, MIP, micro-CT, and transport regimes show that increasing fly ash replacement from OPC to F15, F30, F50, and F70 primarily reorganises the pore network rather than just altering total porosity. Low replacement levels affect the mesopore structure, while intermediate levels reduce accessible fine-pore volume across various size ranges. At higher replacements, especially F70, strong N_2 uptake, noticeable hysteresis, and multimodal pore-size distributions point to significant changes in pore shape and connectivity. Transport-regime analysis indicates that the transition regime dominates pore volume, with notable slip-regime contributions, whereas Knudsen and continuum regimes are less prominent. These shifts reveal that fly ash impacts pore size, connectivity, and the main mechanisms of gas and fluid transport. The results highlight the importance of considering both pore structure and transport physics when evaluating moisture movement, gas diffusion, permeability, carbonation, and the durability of fly ash blended cementitious materials.

RESEARCH ARTICLES

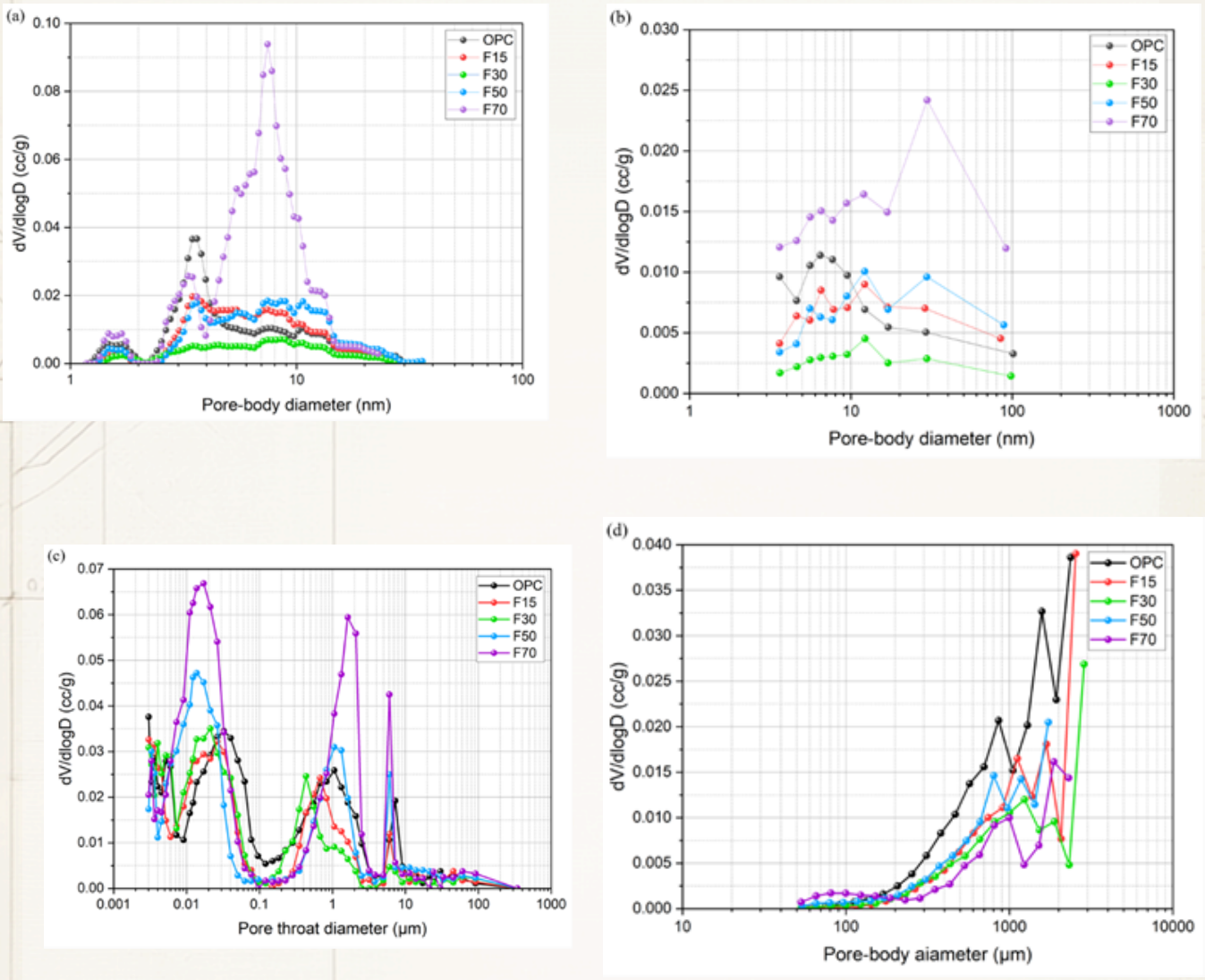


FIG. 1: MULTISCALE PORE-SIZE DISTRIBUTIONS OF OPC AND FLY ASH BLENDED CEMENT PASTES WITH INCREASING FLY ASH REPLACEMENT (F15–F70): (A) N_2-DFT PORE-SIZE DISTRIBUTION, (B) N_2-BJH PORE-SIZE DISTRIBUTION, (C) MIP PORE-SIZE DISTRIBUTION, AND (D) MCT PORE-SIZE DISTRIBUTION, ILLUSTRATING THE PROGRESSIVE REDISTRIBUTION OF PORE VOLUME FROM THE NANOMETRE TO MACROPORE SCALES.

RESEARCH ARTICLES

Understanding the Reactivity Potential of Coal Bottom Ash
Gayathri K S and Muhammad Salman

Supplementary cementitious materials (SCMs) provide an economically feasible approach for reducing the carbon footprint of cement production while promoting the effective utilization of industrial waste. Traditional SCMs, such as fly ash, silica fume, and ground granulated blast furnace slag, have been extensively used in concrete due to their proven performance. However, several abundantly available industrial by-products remain underexplored as potential SCMs.

Coal bottom ash (CBA) is one such underutilized coal combustion by-product with considerable potential for use as a sustainable cement replacement. Its application is currently limited by its porous structure, low intrinsic pozzolanic reactivity, and the need for additional processing to improve its performance. Nevertheless, its rich aluminosilicate composition suggests that CBA may possess cementitious potential. A better understanding of its reactivity is therefore essential for assessing its suitability as an SCM. The present study focused on evaluating the reactivity potential of CBA in comparison with commercially available fly ash.

The reactivity of ground coal bottom ash, GCBA (obtained after milling with a fineness of fly ash), was evaluated by monitoring its ability to consume calcium hydroxide (CH) in a controlled suspension system over a defined period. The extent of CH consumption is an important indicator of pozzolanic reactivity because CH is one of the major hydration products generated during the hydration of ordinary Portland cement (OPC). A reactive aluminosilicate material can dissolve in the alkaline environment and react with the available CH to form secondary hydration products such as calcium–silicate–hydrate (C-S-H) and calcium–aluminate–silicate–hydrate (C-A-S-H).

RESEARCH ARTICLES

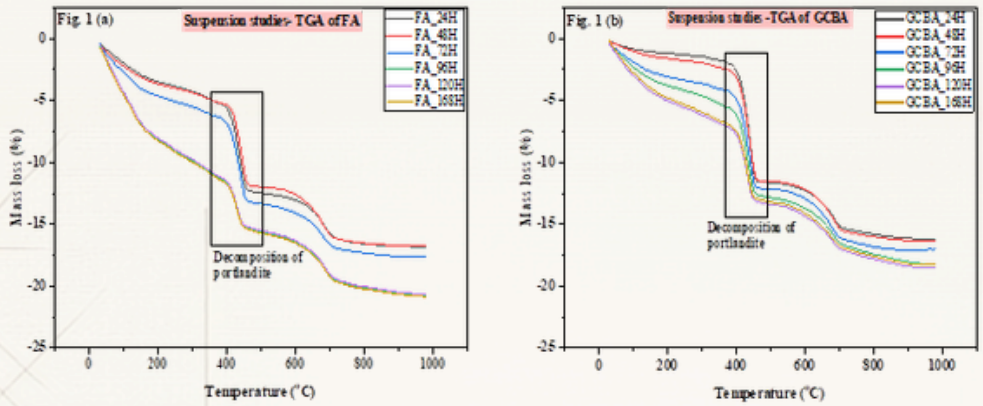


Fig.1 Mass loss due to calcium hydroxide decomposition in (a) Ground coal bottom ash (b) Fly Ash

The TGA results showed that hydration of 100% OPC produces about 14% calcium hydroxide (CH). This CH can react with SCMs and form new cementitious products. After 168 hours of reaction, GCBA consumed 14.88% CH, while commercial fly ash consumed 21.28% CH. This shows that both materials are capable of reacting with CH, but fly ash is more reactive and reacts faster than GCBA. Overall, the results confirm that GCBA has pozzolanic potential, but its reactivity is lower than that of commercial fly ash. Improving its reactivity through suitable processing or activation could increase its potential as a cement replacement.

RESEARCH ARTICLES

Urban Road Traffic Control and Safety Management Using Drones
Ajay Dobhal, Shruti Singh, Tom V. Mathew, Sangram K. Nirmale and Nagendra R. Velaga

For traffic police and urban transport agencies, managing a growing, increasingly congested city road network with fixed infrastructure is a challenging proposition. Static cameras cover only fixed locations, personnel can be deployed at only a few sites at a time, and by the time a violation or incident is reported, the vehicle involved has often already left the area, and the resulting congestion has propagated downstream. These agencies find it difficult to manage traffic in real time and proactively enforce safety, using tools built to record and report after the fact. The gap between the expectations placed on traffic management and enforcement agencies and the capabilities of existing monitoring infrastructure underscores the need for intelligent and dynamic traffic monitoring systems.

In this work, a UAV-based traffic monitoring framework is being developed to provide high-resolution information on urban traffic conditions. The acquired video data were processed frame-by-frame and used with computer vision-based object detection and tracking algorithms to identify and classify different road users, including two-wheelers, cars, and heavy vehicles, as shown in Figures 1 and 2. The movement of individual vehicles was tracked to extract their trajectories across road links, intersections, and other network locations.

Fig. 1 Vehicle Detection and Labelling



The extracted trajectory data will be subsequently used to derive both microscopic and macroscopic traffic characteristics, including vehicle speed, acceleration, and spacing relative to leading and adjacent vehicles. These observed and derived traffic parameters provide a detailed representation of traffic conditions and vehicle interactions within the road network.

The developed framework will be further used for traffic monitoring and congestion assessment. The Level of Service (LOS) of the road sections was determined based on the relationship between the observed vehicular travel speed and the corresponding free-flow speed estimated using the Greenshields model as per IRC 106:1990. thereby supporting more effective traffic management and rerouting strategies. Beyond congestion, the framework flags hazardous driving through a context-based conflict detection model: each vehicle's proximity, speed, and deceleration are evaluated against the surrounding traffic lane positions, adjacent spacing, and local flow, rather than against a single fixed threshold. This enables the identification of genuine risk patterns—such as close following, abrupt lane incursions, and erratic weaving—in dense, disordered urban traffic, where fixed-threshold measures tend to

flag either too many or too few events.

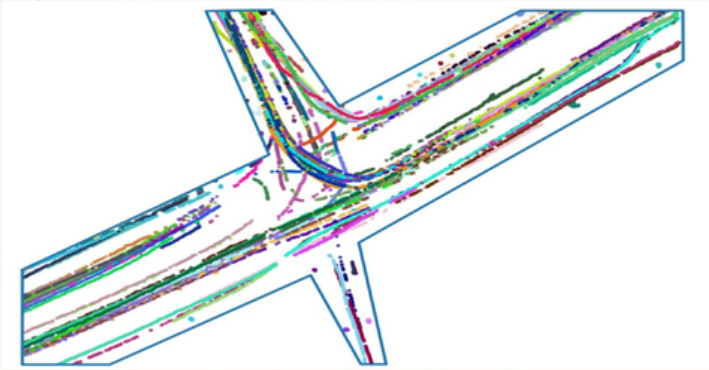


Fig.2 Tracking each vehicle based on Vehicle ID

Overall, the work demonstrates the potential of UAV-based computer vision and trajectory analysis as an integrated platform for urban traffic monitoring, congestion identification, hazardous driving behaviour detection, and proactive road safety management. The developed framework provides detailed traffic information to help traffic management and enforcement agencies make faster, data-driven decisions for safer, more efficient urban road transportation.

RESEARCH ARTICLES

Non-Destructive Testing as a Cornerstone for Heritage Conservation
Atharva Naik Supervisor, Swathy Manohar

Introduction: Heritage structures safeguard centuries of architectural ingenuity and cultural uniqueness. UNESCO reported there are 1248 World Sites across the globe, representing diverse civilizations, construction techniques, and historical narratives. The preservation of these structures poses unique challenges due to the distinct properties of traditional materials such as lime mortar, natural stone, timber, adobe, and handmade bricks when compared to modern construction materials. Furthermore, centuries of exposure to environmental and anthropogenic factors such as weathering, moisture ingress, temperature fluctuations, seismic activity, pollution, and biological deterioration often compromise their structural integrity. Conventional investigation techniques frequently involve intrusive testing methods that may cause irreparable damage to precious heritage fabric. Consequently, conservation engineering has increasingly adopted Non-Destructive Testing (NDT) techniques, which enable structural assessment without altering or damaging the original material.

NDT plays a vital role in heritage conservation by enabling:

Assessment of structures in their original condition without material extraction.

Detection of hidden defects such as cracks, voids, delamination, and moisture ingress.

Long-term monitoring of structural health and deterioration.

Scientific documentation to support restoration and conservation planning.

In line with the principles promoted by the International Council on Monuments and Sites (ICOMOS), minimally invasive investigations have become an important part of modern heritage conservation.

Challenges: Although NDT techniques offer significant advantages, their application to heritage structures is not always straightforward. One challenge is the lack of universal calibration standards, since heritage structures are made from a wide variety of materials and construction techniques. Surface irregularities, weathered finishes, and inaccessible areas can also affect the quality of measurements. In addition, no single NDT method can provide complete information about a structure. Each technique has its own strengths and limitations. For this reason, conservation engineers increasingly combine multiple NDT methods to gain a more comprehensive understanding of the structure's condition.

RESEARCH ARTICLES

Research Work: To address these challenges, our research focuses on developing and validating an integrated multi-NDT condition assessment framework for granite and sandstone-based heritage structures. The objective is to combine information from different NDT techniques to identify, quantify, and map deterioration mechanisms more accurately than would be possible using a single method.

Case Study: As part of this work, a field study was conducted on a heritage structure in Hampi, Karnataka. Data from multiple NDT techniques, including Ultrasonic Pulse Velocity (UPV), Ground Penetrating Radar (GPR), Infrared Thermography (IRT) were integrated with a detailed 3D photogrammetric model of the structure.

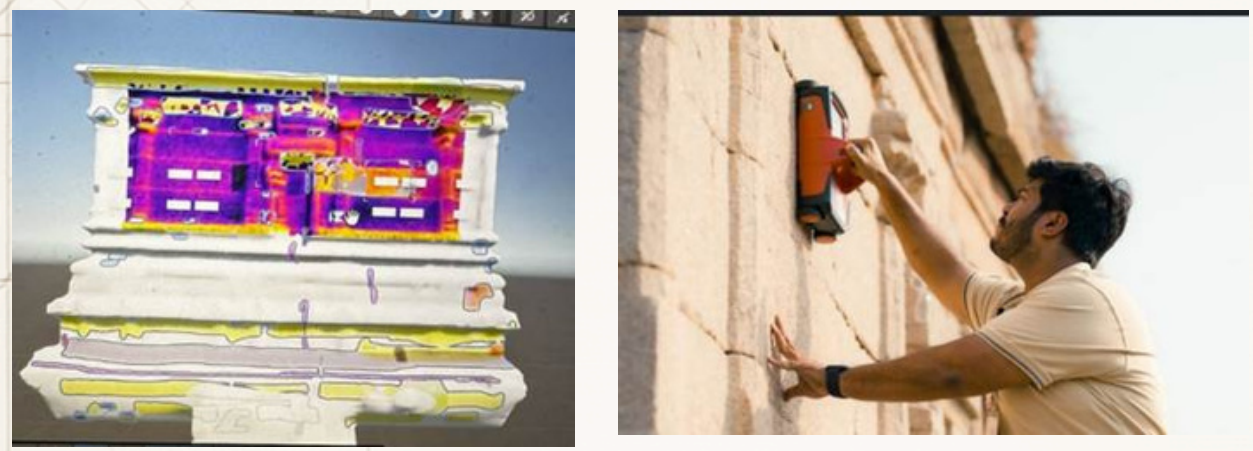
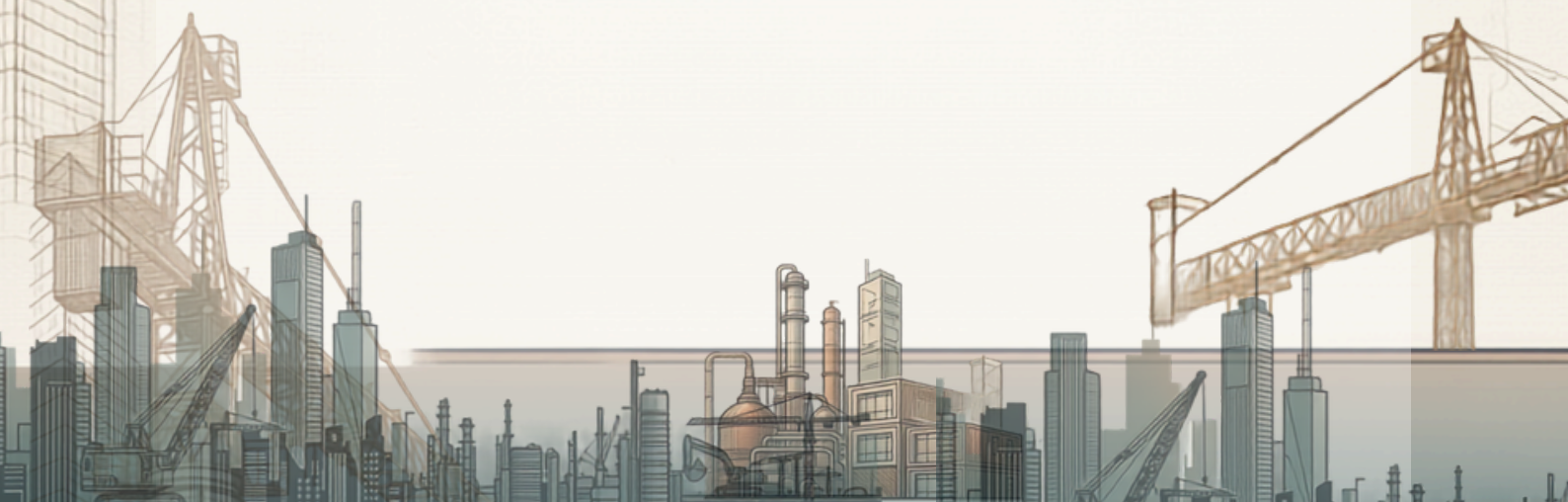


Figure 1. Integrated 3D visualization of NDT results for defect and deterioration assessment and Conducting GPR survey for subsurface condition assessment.

Figure 1 illustrates the combined visualization documented from the site at Hampi that allows potential defect zones and deterioration hotspots to be identified more effectively than through individual tests alone. By presenting the inspection results directly on the 3D model, areas requiring further investigation or conservation attention could be easily recognized. Such integrated assessments provide valuable information for engineers, archaeologists, and conservation professionals, helping them plan restoration interventions in a more targeted and scientific manner while minimizing disturbance to the original structure. Figure 1 also shows a snippet from the GPR (Ground Penetrating Radar) Survey being conducted at the site as part of data collection.

Conclusion: Heritage structures are irreplaceable assets that connect us with our past. Preserving them requires a careful balance between safeguarding historical authenticity and ensuring structural safety. Non-Destructive Testing provides a powerful solution by enabling engineers to understand the condition of a structure without causing damage. As conservation practices continue to evolve, integrated NDT approaches will play an increasingly important role in protecting monuments and historic structures, ensuring that these remarkable examples of human creativity and engineering excellence continue to inspire future generations to come.



RESEARCH ARTICLES

Silent Shields: Submerged Reefs for Climate-Resilient Coastal Defence

Nimma Rambabu and Srineash V K

As climate change continues to reshape our world, coastal communities find themselves on the front lines of an increasingly volatile ocean. Rising sea levels and intensified storm surges are no longer distant threats; they are current realities that challenge the integrity of our existing coastal defences. Many existing vertical seawalls were designed decades ago using historical environmental conditions and may not have been intended to withstand the range of conditions that could occur in the future. As a result, increased wave overtopping and loading can pose significant risks to coastal infrastructure, public safety and communities located close to the shoreline. This research investigates a promising climate-resilient approach: retrofitting existing vertical seawalls with submerged reef breakwaters. Rather than replacing an entire seawall, the concept aims to enhance its performance by introducing an additional protective barrier in front of the existing structure. Such an approach could provide a practical and potentially more economical strategy for upgrading existing coastal defences to meet future challenges. Unlike conventional breakwaters, these low-crested reef structures remain submerged, preserving the coastline's visual and recreational character. More importantly, they intercept incoming waves before they reach the seawall, causing them to steepen and break. This reef-induced breaking (RIB) dissipates wave energy and reduces the loading on the seawall.

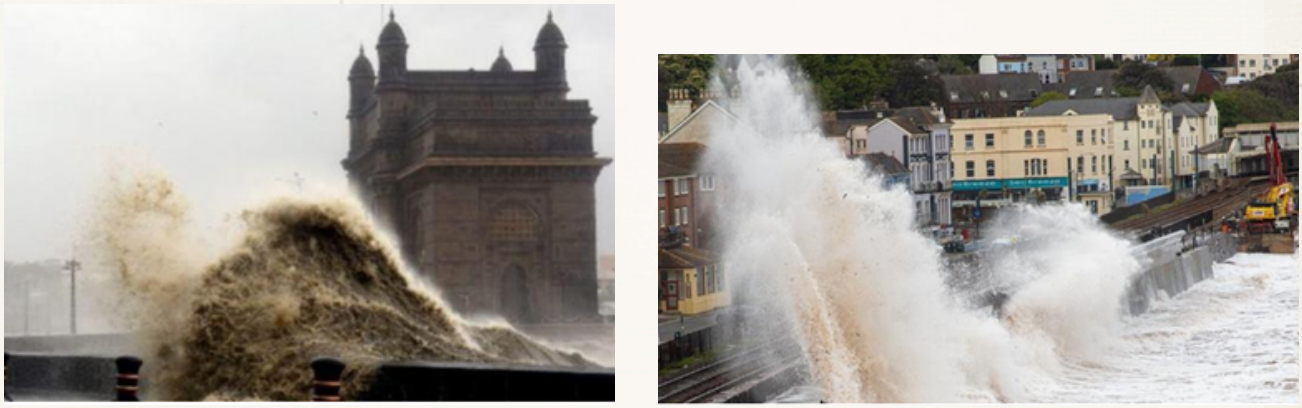


Figure 1 Wave overtopping over the existing seawall at (a) Mumbai, India and (b) at Dawlish, England

RESEARCH ARTICLES

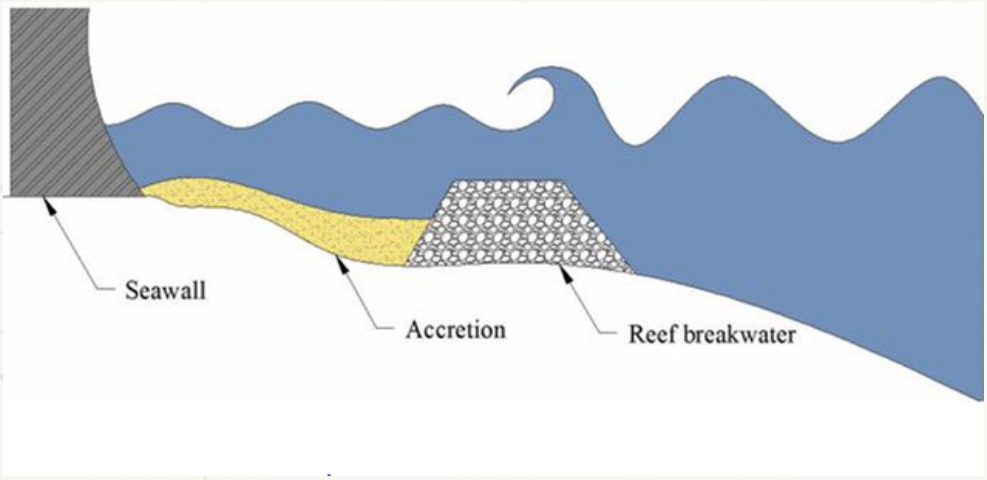


Figure 2 Seawall protected by a submerged reef breakwater

To understand how effective these reefs are, the research employed combined approach, including physical modelling experiments in a 2D wave flume and computer simulations. The wave run-up, the force acting on the structure, and the amount of water that splashed over the top (overtopping) were measured for seawall and seawall with submerged breakwater cases for different pool lengths (distance between seawall and submerged breakwater). The findings provide strong evidence for the potential of submerged reef breakwaters as an effective retrofit solution for existing seawalls. Under random wave conditions, the breakwaters reduced the horizontal forces acting on the seawall by approximately 40-52% and reduced wave overtopping by up to 89%. The research found that porous breakwaters (made of materials like stones or gabions with gaps between them) are even more effective than solid ones. The gaps within these structures promote friction and turbulence as water passes through them, enhancing wave-energy dissipation compared with solid breakwaters. In addition, the research established a methodology to identify the minimum safe pool length required to avoid resonance, providing engineers with a practical tool for designing effective and reliable retrofit solutions.

RESEARCH ARTICLES

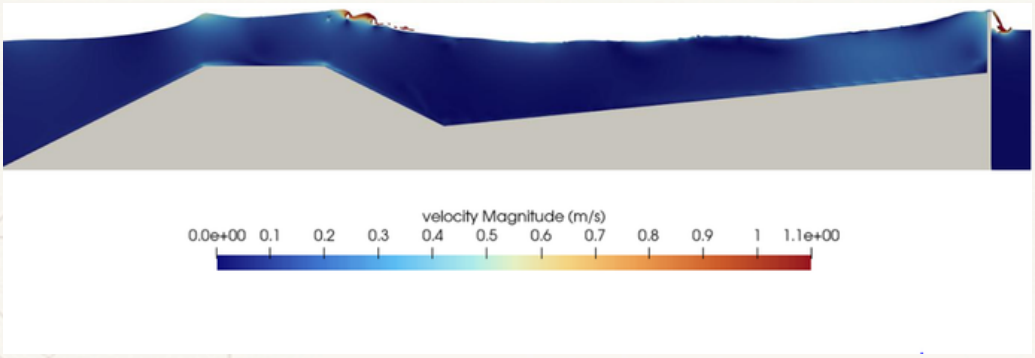


Figure 3 Velocity contours showing wave interaction with submerged breakwater and seawall.

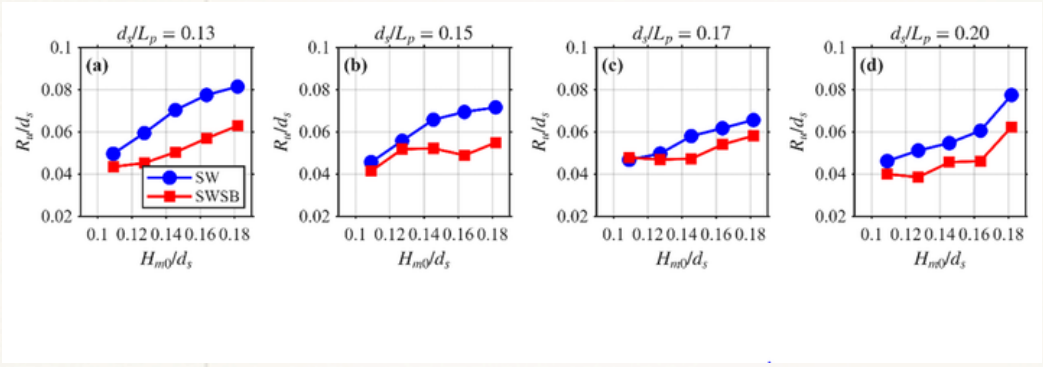


Figure 4 Variation of normalised run-up with relative wave height (Hm0/ds) for various relative water depths (ds/Lp) under random wave conditions.

This research demonstrates that submerged breakwaters can enhance the resilience of existing seawalls by reducing wave forces and overtopping, thereby helping to protect coastal infrastructure, roads and utilities. By limiting flooding and wave overtopping, they also improve public safety for pedestrians and vehicles. In addition, these submerged structures can provide opportunities for artificial habitats, supporting marine biodiversity and potentially benefiting local fisheries and coastal tourism.

RESEARCH ARTICLES

Integrated Driving Simulator for Driver Training and Assessment for Mixed Traffic Conditions in India

Purvang Chaudhari, Jibin Sebastian, P. Vedagiri, Tom V. Mathew, Nagendra R. Velaga

Road safety is strongly influenced by the way drivers perceive, interpret and respond to changing traffic and roadway conditions. Assessing these responses in real-world traffic, however, is difficult because potentially hazardous situations cannot be repeatedly created in a safe and controlled manner. Driving simulators provide an alternative by allowing drivers to experience different traffic, roadway, and environmental conditions without exposing them to the risk of a crash. However, most conventional driving simulators are designed for structured, lane-based traffic and do not adequately represent the heterogeneous and weak-lane-discipline traffic conditions commonly observed on Indian roads. In addition, conventional driver assessment generally focuses on vehicle-control measures, with limited consideration of the drivers' visual attention, cognitive state and physiological responses.

To address these limitations, an integrated driving and traffic simulator system was developed for driver training, behavioural assessment, and road-safety research. The system combines a three-dimensional driving simulation environment, such as Unity 3D, with a microscopic traffic simulator, such as SUMO. This integrated system reproduces realistic interactions between a user-controlled ego vehicle and surrounding heterogeneous traffic. A bidirectional communication framework enables continuous transfer of the position and movement of the driver-controlled vehicle to the traffic simulation environment. In contrast, information about surrounding vehicles is simultaneously transferred back to the three-dimensional visualisation environment. This enables surrounding vehicles to respond dynamically to the driver's actions, creating an interactive traffic environment rather than a predefined visual traffic sequence.

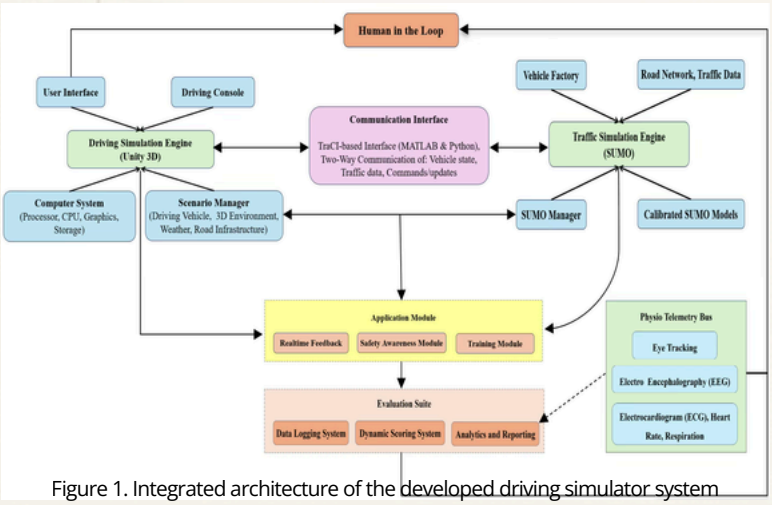
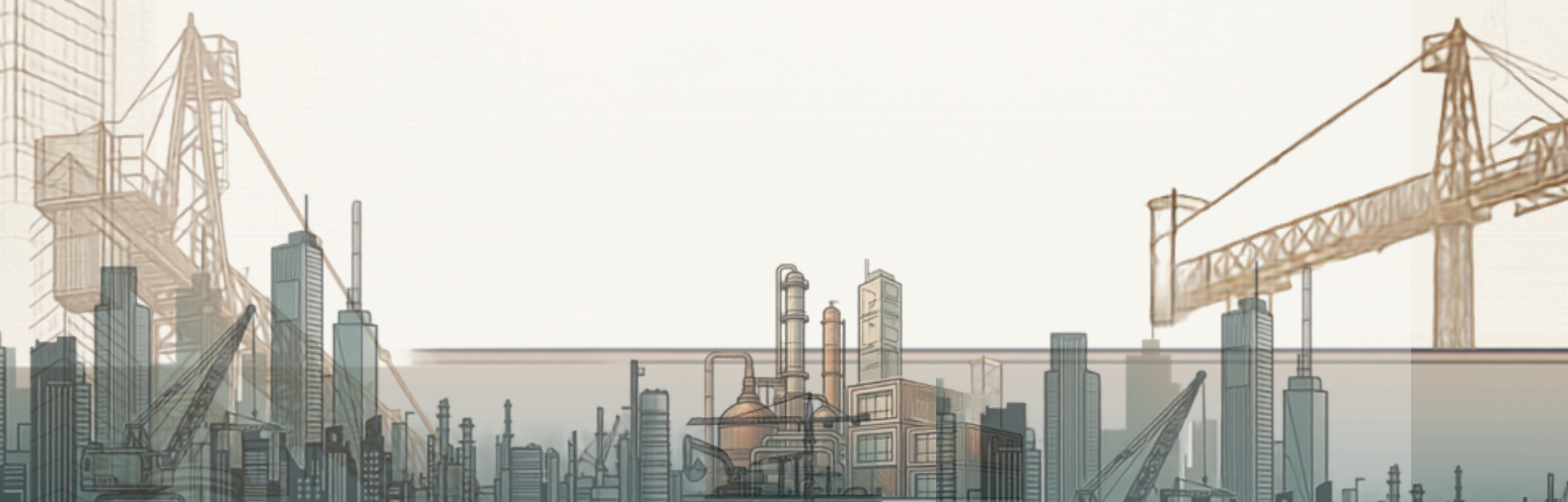


Figure 1. Integrated architecture of the developed driving simulator system

RESEARCH ARTICLES

The simulator is operated through a driving console comprising a steering wheel, gear shifter, accelerator, brake, and clutch pedals. Training and assessment modules include H, S, 8, and T driving-test tracks, as well as parallel, perpendicular, and angular parking exercises. Realistic urban and rural scenarios can be configured for different traffic levels and environmental conditions. The system can also introduce controlled hazard-perception events, including unexpected pedestrian or vehicle entry, sudden braking by a lead vehicle, and work-zone situations. Day, night, rain, and fog conditions can be generated to examine driver responses under varying visibility and driving complexity. During every simulation run, driving performance parameters such as vehicle speed, acceleration, braking, gear use, trajectory, kerb hits, crashes and other driving events are recorded. The system processes this data through an evaluation framework to generate an objective assessment of the driver's performance. Performance criteria and their associated weightages can be configured to meet the requirements of the relevant training or testing authority. At the end of a session, the platform generates a Driver Performance Score and a Driver Attention Score, along with a detailed report and a graphical representation of the driver's performance. The integrated framework, therefore, moves beyond a conventional driving simulator that merely recreates a road scene. It provides a common platform for driver training, hazard-perception assessment, behavioural monitoring, attention assessment and performance evaluation under realistic mixed-traffic conditions. Such a system can support driver training and licensing applications, assessment of novice and professional drivers, evaluation of driver responses to adverse weather and hazardous events, and controlled research on road-user behaviour and intelligent transportation safety applications.

Overall, the developed simulator demonstrates the potential of combining realistic traffic simulation, interactive vehicle control, multimodal driver monitoring and automated performance assessment within a single platform. By recreating challenging traffic and environmental situations safely and repeatedly, the system can contribute toward more objective driver assessment, improved hazard-awareness training and a better understanding of driver behaviour under complex Indian traffic conditions.



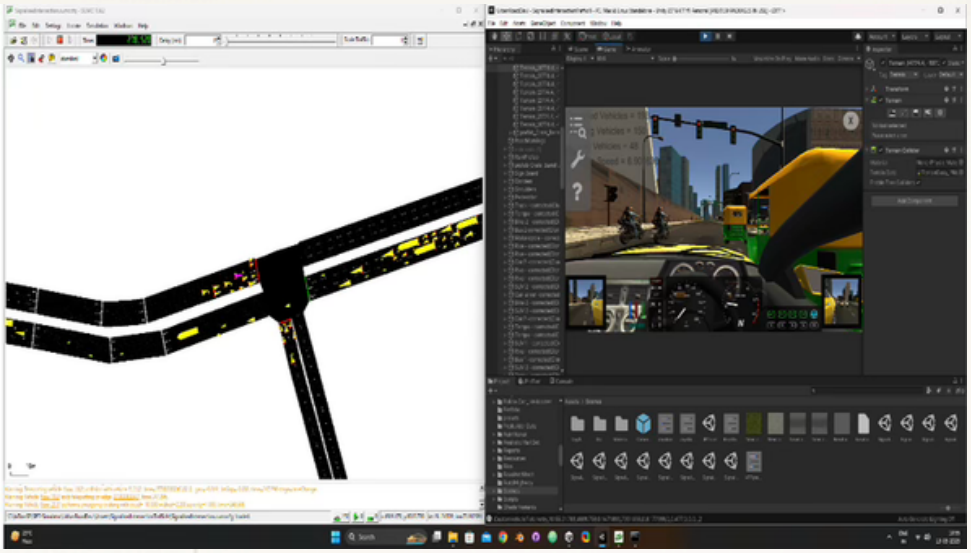


Figure 2. (a) Desktop-based driving simulator setup; (b) Co-simulated environment for assessing drivers' behaviour under mixed traffic conditions

Acknowledgments:

The authors are grateful to Mr Satheesh G, Mr Abey S A, and Mr Arun G from the Centre for Development of Advanced Computing (C-DAC), Thiruvananthapuram, for their valuable technical support and contributions to this research.

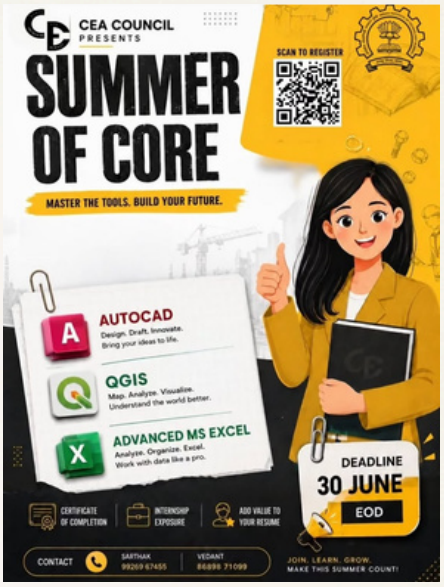
The authors sincerely thank and acknowledge the Ministry of Electronics and Information Technology (MeitY), Government of India, for providing financial support and valuable technical guidance for this research.

CEA EVENTS

SUMMER OF CORE

The Summer of Core is an immersive programme designed for students eager to strengthen their skills in essential software such as ETABS, AutoCAD, and Excel. The programme focuses on hands-on learning through real-world projects and process optimization, helping participants develop both technical and problem-solving skills.

Guided by expert mentors, students get the opportunity to apply their knowledge to practical scenarios and gain valuable industry-oriented experience. Participants receive a Summer of Core certificate upon completion, while the programme also provides internship opportunities, helping students take their first steps towards a professional career in core engineering.



ESPORTS WEEK

Esports Week was an exciting, week-long event that brought together students from different departments to bond over gaming. The event featured a variety of popular games like FreeFire, Smash Karts, Valorant and Clash Royale. It wasn't just about competition but also about fun and teamwork.

Students showcased their gaming skills, and the winners were rewarded with prizes for their outstanding performance in each game. Esports Week truly highlighted the spirit of camaraderie among students while giving them a chance to unwind and enjoy.



CEA EVENTS

CONVOCATION CEREMONY

The 63rd Convocation Ceremony was a proud moment celebrating the achievements of the graduating class of 2025. The event was graced by distinguished guests, including Chief Guest Dr. Sheel Kant Sharma, a renowned IFS officer, and Guest of Honour Dr. C.R. Parthasarathy.

Their speeches inspired the graduates to aim for excellence and make meaningful contributions to society. The ceremony ended on a high note with degrees and medals awarded to the graduates, marking the beginning of a new chapter in their lives.



UNDERGRADUATE ORIENTATION

The Civil Engineering Department extended a warm welcome to the incoming batch of 2026 through an engaging Undergraduate Orientation. The formal session featured an address by the Head of Department, highlighting the values of academic growth and community spirit, followed by faculty members familiarizing students with the curriculum, research opportunities, and extracurricular avenues.

Faculty advisors were also introduced, marking the beginning of their mentorship journey with the students. The mood turned lively during the informal session, where ice-breaker games sparked interaction and camaraderie. The day concluded with the Batch of 2030 showcasing their varied talents, adding a vibrant and personal touch to their first departmental event.

CEA EVENTS

POSTGRADUATE ORIENTATION

The Postgraduate Orientation marked the beginning of an exciting academic journey for the new PG entrants, offering them a platform to connect with fellow scholars, faculty members, and the department. Professors representing various specialisations within Civil Engineering shared insights into their respective fields, giving students a broader perspective of the department's diverse expertise and opportunities.



FRESHIE NIGHT

Freshie Night, held in October, brought together the newest members of the department for an evening of fun, interaction, and celebration. As a pre-event, a Treasure Hunt took participants across different corners of the IIT Bombay campus, with teams following a series of clues and hints to reach their destinations. The winning teams were rewarded with prizes, which were later distributed during Freshie Night. The evening also featured refreshments and provided the freshers with an opportunity to interact with their peers and seniors in a relaxed and lively atmosphere.



CEA EVENTS

TRADITIONAL DAY



Traditional Day was a vibrant celebration of culture, talent, and togetherness, held at LTPCSA, bringing students together under one roof. The event featured a series of enthusiastic performances by students, adding colour and energy to the evening. With everyone dressed in traditional attire, the celebration created a lively atmosphere while showcasing the diverse talents of the student community.

The evening continued with an energetic DJ session, giving students an opportunity to come together and celebrate beyond academics. Refreshments were also arranged for the participants, making the event a memorable evening filled with music, performances, food, and camaraderie.

VALEDICTORY FUNCTION



The Valedictory Function (VALFI) marked the end of the college journey with a graduation ceremony. It began at Jalvihar with final year students in formal attire and a photoshoot. The event continued at PC Saxena Auditorium with speeches from the HoD and Prof. Eswar Rajasekaran, along with awards recognizing the students' achievements.

Awards were given to the graduating batch to honour their college experiences, and the event concluded with a dinner at Civil Cafe.

TEACHERS' DAY

The Teachers' Day celebration was a heartfelt event filled with gratitude. Teachers received personalized cups and diaries as tokens of respect, and students expressed their appreciation through personal notes, deeply touching the professors.

The celebration provided an opportunity for students to acknowledge the guidance and support of their teachers and celebrate the meaningful role they play throughout their academic journey.


akaar
18th Edition

AAKAAR

AAKAAR

Since 2009, Aakaar, the annual technical festival of the Department of Civil Engineering, IIT Bombay, has grown into a platform for innovation, learning, and industry engagement, bringing together students, researchers, and professionals. The 18th edition, held in March 2026, continued this legacy through competitions, research presentations, workshops, exhibitions, and industry interactions, offering participants exposure to emerging technologies and real-world applications while inspiring the next generation to build a smarter, more resilient future.

INAUGURATION

Aakaar 2026 commenced with the inauguration ceremony graced by Shri K. Mahapatra, Director, Directorate of Construction, Services & Estate Management (DCSEM), Department of Atomic Energy (DAE), as the Chief Guest.

With extensive experience in executing large-scale infrastructure and strategic projects, Shri K. Mahapatra brought valuable insights into engineering excellence, infrastructure development, and the role of young engineers in shaping India's future.



AUTHOR TALK SESSION

The Author Talk Session featured Mr. Pratap Padode, Managing Director, ASAPP Info Global Group, who shared perspectives from his book Tarmac to Towers - The India Infrastructure Story.

The session explored India's infrastructure journey over the past decades while highlighting the gap between classroom learning and real-world execution. Through his experiences and insights, Mr. Padode emphasized the importance of practical exposure, site experience, and industry-oriented learning in developing future-ready engineers.

AAKAAR

CENEX - Civil Engineering National Exhibition

CENEX 2026 served as a national-level platform for showcasing innovations, technologies, projects, and research in civil engineering. It brought together industry organizations, infrastructure leaders, construction technology firms, material solution providers, faculty, and students. The exhibition encouraged meaningful interaction between academia and industry while providing participants an opportunity to explore emerging technologies, flagship projects, and developments shaping the future of infrastructure.

KEYNOTE SESSION

The Keynote Session brought together prominent voices from the real estate, technology, and infrastructure ecosystem to discuss the changing landscape of the built environment.

The session featured:

Mr. Aniruddha Dilip Chopadekar - Application Engineer, Bentley Systems

Mr. Aayush Puri - Head - ANAROCK Channel Partners & ANACITY

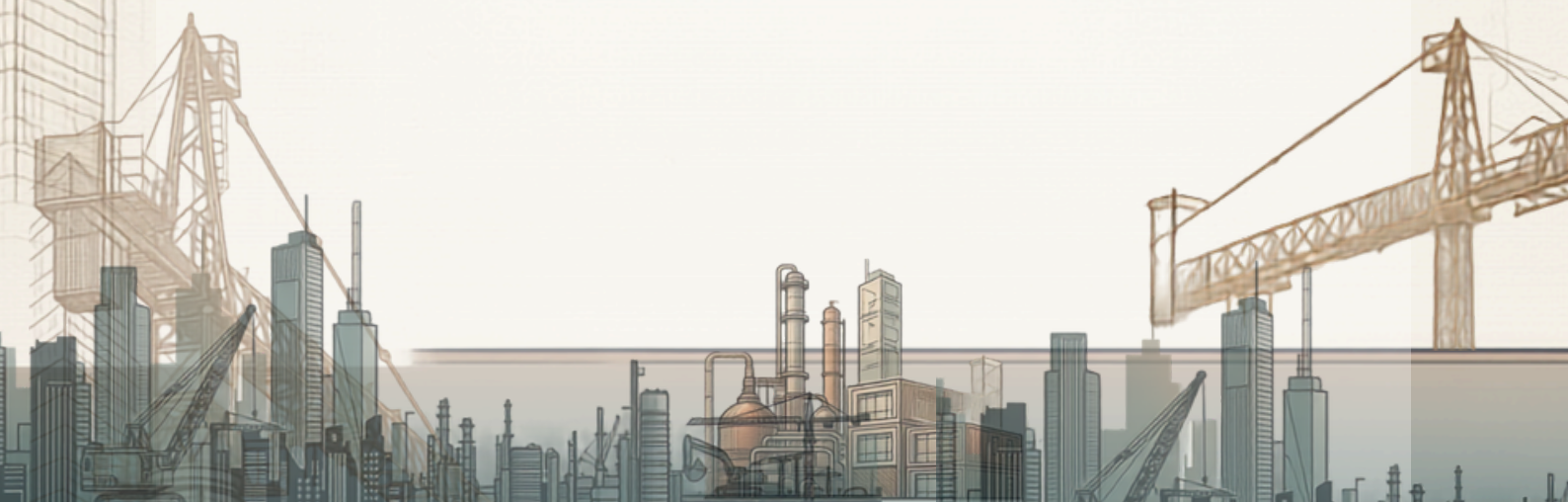
The speakers explored the intersection of technology, urban development, digital transformation, and the future of the built environment.

Mr. Aayush Puri shared insights into the evolving landscape of urban housing and PropTech, emphasizing how data-driven decision-making, artificial intelligence, sustainability, and digital platforms can contribute to smarter and more efficient buildings and cities.

Mr. Aniruddha Chopadekar brought an industry perspective on the role of digital engineering tools and technology in transforming the way infrastructure is designed, delivered, and managed.

THESIS 180

The competition cultivates PhD researchers from different IITs and NITs, who take part in presentation and research communication. It celebrates the exciting research taking place in India. Participants curate their thesis in such a way that they can express it in 3 minutes and deliver it to a jury that doesn't belong to the Civil Engineering specialization.



AAKAAR

PANEL DISCUSSION

The flagship Panel Discussion at Aakaar 2026 explored the transition from conventional, carbon-intensive infrastructure towards sustainable and climate-conscious development.

Under the theme “Terra Nova: From Grey Scapes to Green States,” the discussion focused on sustainable urban growth, low-carbon construction, digital technologies, and the need to integrate environmental responsibility into the future of infrastructure.

The distinguished panel comprised:

Dr. L. R. Manjunatha - Head, Business Development & Specifications, JSW Cement

Mahesh Gera - Chief Human Resources Officer, Rustomjee

Amol Patil - Target Market Manager, Sika

Aniruddha Dilip Chopadekar - Application Engineer, Bentley Systems

Shridhar Narayan - CEO, Real Estate & Infrastructure, Hiranandani

Girish Goenka - Chief Financial Officer, Piramal Realty

The discussion examined how industry leadership, policy, technology, and sustainable materials can work together to create resilient urban environments. Key conversations included low-carbon materials, digital transformation, sustainable construction, and pathways towards net-zero development.

The session brought diverse perspectives on the future of sustainable infrastructure, exploring how innovation, technology, and responsible construction practices can work together to address the challenges of urban development. The discussion emphasized the importance of adopting low-carbon materials, digital solutions, and sustainable practices to create infrastructure that is not only efficient, but also resilient and environmentally responsible. It encouraged students and professionals to look beyond conventional approaches and contribute towards a greener future for the built environment.



AAKAAR

AAKAAR SYMPOSIUM 2026

Aakaar's Symposium is one of the biggest of its kind in the nation and features different kinds of research presentations from students. It provides a stage where researchers can showcase their work in front of seasoned professors, civil engineering industry experts, and industrialists while competing against the top civil engineering students. The Symposium aims to elevate research and civil engineering to a whole new level.

INTERNATIONAL CIVIL ENGINEERING SYMPOSIUM (ICES)

Since its inception, Aakaar's International Civil Engineering Symposium (ICES) has provided a platform for young research enthusiasts to present their work and exchange scientific knowledge. In its 10th edition, ICES continued this tradition by bringing together aspiring researchers, experienced professors, and industry leaders to showcase and discuss research across diverse areas of civil engineering.

PAPER PRESENTATION

The ICES Paper Presentation offers students interested in research a platform to showcase their work to some of the nation's most accomplished professors, industry leaders, and experts in the field of civil engineering.

POSTER PRESENTATION

Aakaar introduced the Poster Presentation as a concise method for showcasing your study and understanding of a subject. This format involves analyzing, evaluating, and synthesizing the concept, as well as creatively presenting your research findings.



AAKAAR

COMPETITIONS

Aakaar 2026 featured a diverse range of national-level technical competitions designed to challenge students to apply engineering concepts to real-world problems. The 18th edition featured BridgeIT, ConquerIT, Industrial Design Project (IDP), and Crackathon, covering structural engineering, materials, design, artificial intelligence, and project management.

BRIDGE-IT

BridgeIT challenged participants to design and construct a lightweight double-decker, arch supported bridge using specified materials, with the final models evaluated through physical load testing for structural efficiency and stability.



CONQUER-IT

ConquerIT challenged participants to investigate high-strength pervious concrete and lightweight beam structures, with an emphasis on innovative concrete mix design and structural performance.

INDUSTRIAL DESIGN PROJECT (IDP)

The Industrial Design Project (IDP) challenged participants to develop innovative, sustainable, and practical solutions to real-world engineering challenges presented by industry leaders, bridging the gap between theoretical knowledge and professional practice.

CRACKATHON

Crackathon, introduced for the first time, bridged the fields of civil engineering and artificial intelligence, challenging participants to develop machine learning and computer vision solutions for road-defect detection. The event encouraged participants to identify and classify road defects using AI-driven approaches, highlighting the potential of technology to enable smarter road maintenance, efficient infrastructure management, and more resilient transportation systems.

AAKAAR

WORKSHOPS: BRIDGING THEORY AND PRACTICE

Aakaar 2026 featured engaging workshops and industry interactions designed to bridge theoretical knowledge with practical applications, giving participants exposure to modern tools, technologies, and professional practices.

AUTODESK REVIT ARCHITECTURE WORKSHOP

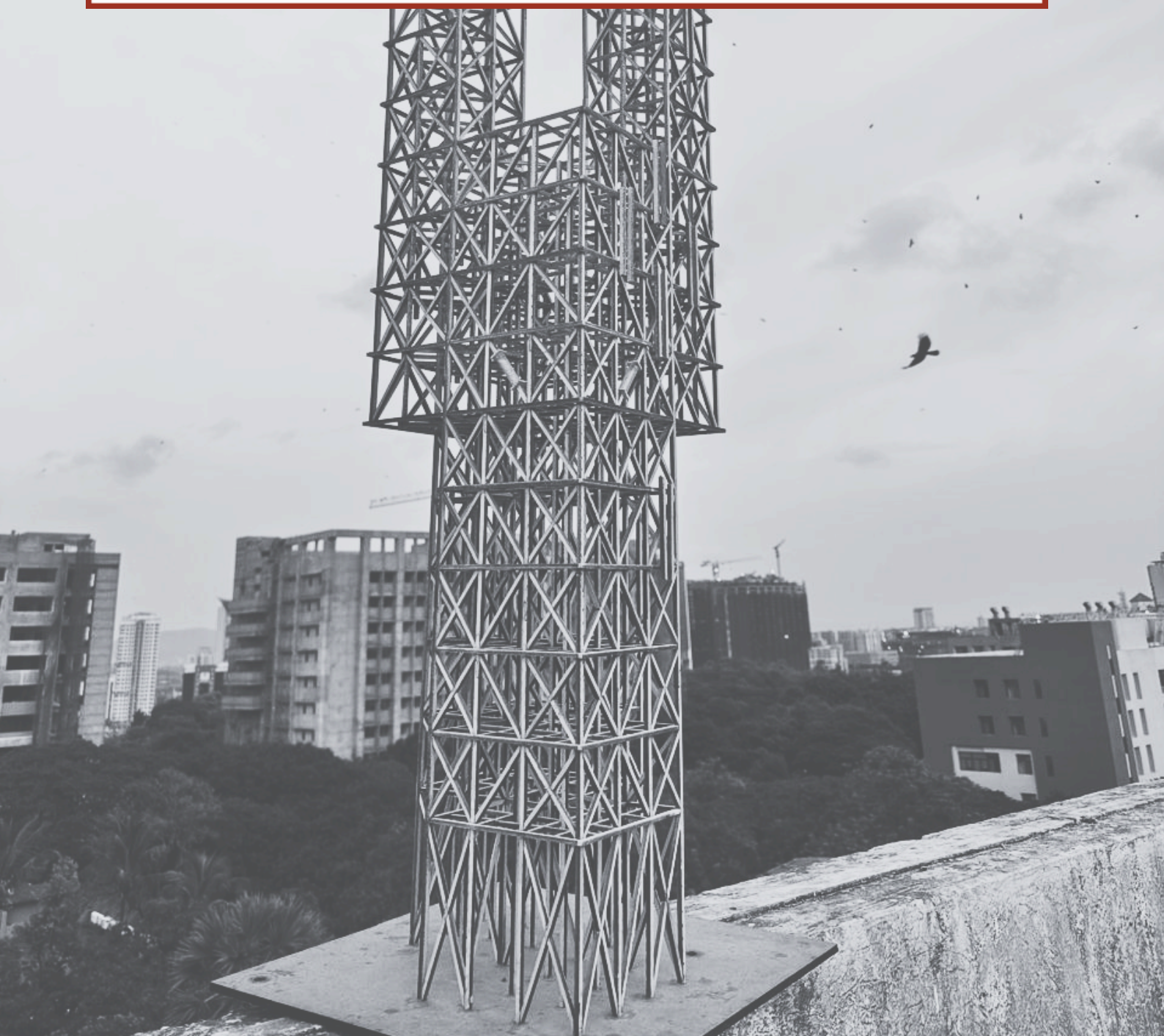
The Autodesk Revit Architecture Workshop, conducted in association with Autodesk, introduced participants to BIM-based digital design workflows. Through hands-on sessions, participants explored Revit's applications in architectural modelling, visualization, and design coordination.

CORPORATE PRESENTATION & CIVIL EXPO

The Corporate Presentation and Civil Expo connected students with industry professionals and organizations, offering insights into emerging technologies, industry practices, career opportunities, and innovations shaping the construction sector.



EERI IIT Bombay Student Chapter



EERI

MISSIONS AND GOALS

Established in March 2021, the EERI IIT Bombay Student Chapter aims to advance earthquake engineering and related fields through study, practical application, and research. The primary objective is to encourage students to pursue careers in these areas by building relationships with experienced professionals.

The chapter has outlined the following goals:

•Organize talks by industry experts and notable researchers in earthquake engineering.

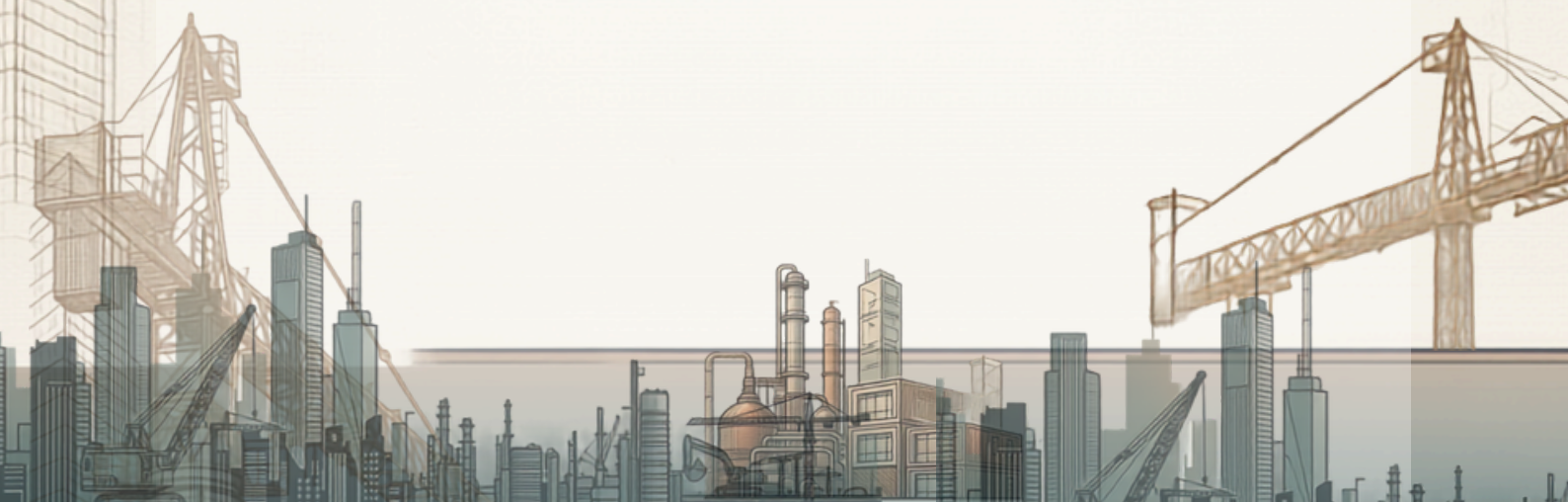
• Conduct workshops tailored to students' interests.

• Create a global platform for students to engage in various EERI competitions and activities.

• Organize outreach programs in local schools and organizations to enhance awareness of earthquake hazards.

CHAPTER ACTIVITIES

Introduction session for new postgraduates and undergraduates in the civil engineering department at EERI. Orientation for the Seismic Design Competition (SDC). A special lecture by Mr. Umesh Rajeshirke, Managing Director of Spectrum Consultants Pvt. Ltd, was held on "Design and Construction of Cable-Stayed and Extradosed Bridges" on March 2, 2023 QUAKEZONE "Quakezone" is the official newsletter of the EERI IIT Bombay Student Chapter, released periodically. Issue 5 came out in December 2022, with Issue 6 following in May 2023. This newsletter offers unique perspectives on the newest research, designs, structures and ideas in earthquake engineering. It also features essential information about upcoming events and conferences. "Quakezone" is distributed to all students, guests and professors in the Department of Civil Engineering. EARTHQUAKE ENIGMA The Earthquake Enigma event blends education with fun! In this online competition, students take on the role of "Googlers" and tackle questions and challenges that require them to use Google searches for solutions. These carefully designed questions aim to encourage critical thinking and immerse participants in the field of earthquake engineering. The Earthquake Enigma attracted over 225 participants from 30 colleges.



EERI

SEISMIC DESIGN COMPETITION (SDC)

IIT Bombay has proudly represented India at the Earthquake Engineering Research Institute's (EERI) prestigious Seismic Design Competition (SDC) for the past six years. This global event challenges university teams to design and build cost-effective, earthquake-resilient building models, attracting participation from top institutions worldwide. The journey began in 2021, when IIT Bombay made a remarkable debut as the first Indian team to win an award at SDC, the Charles Richter Award for the Spirit of the Competition during the online edition. In 2022, 21 undergraduate students from the Civil Engineering Department competed in-person at Salt Lake City, Utah. Their model withstood two major seismic tests, earning them 16th place overall. The team carried this momentum into 2023, travelling to San Francisco, California, where they delivered their best-ever performance yet, securing an impressive 8th position overall. In 2024, the team continued competing at Seattle, Washington. Although the model collapsed during the tests, IIT Bombay secured 3rd place among all collapsed structures, demonstrating resilience and steady progress. In 2025, IIT Bombay made a strong comeback at UC Berkeley, California, securing an impressive 15th place overall, with top-15 ranks in Communication, Financial Modelling and Architecture. Seven students represented the IITB Student Chapter at the event, bringing renewed drive for excellence. This year, the chapter travelled to Portland, Oregon, marking another milestone in its journey. IIT Bombay secured its second-best position yet, finishing 11th overall and was honoured with the Egor Popov Award for Structural Innovation. Every aspect of the process saw improvement, from material quality and structural detailing to teamwork, preparation, and the enthusiasm to excel. It was a defining year for IIT Bombay at SDC, showcasing the team's growth, grit and increasing global competitiveness.



EERI

MOVING AHEAD

Being a newly established chapter in the institute, we are expanding our range of activities. Our future endeavours are designed to not only benefit the institute's students but also the broader community, focusing on increasing awareness about seismic hazards and their prevention. These plans involve hosting regular lecture series by experts across different domains, providing software training and conducting outreach programs within the institute and neighbouring schools. This year, we are also planning to conduct the National Seismic Design Competition (NSDC), our first such competition within India, aimed at bringing together student teams from across the country to engage with earthquake-resilient design. EERI IIT BOMBAY WELCOMES ALL The EERI chapter at IIT Bombay is open to all. Embracing a wide range of disciplines within earthquake engineering, our chapter includes both postgraduate and undergraduate students from our institute. Our diverse community provides a unique opportunity to share knowledge, conduct research and fieldwork, develop managerial skills and promote teamwork. Join us now and contribute to "Reinforcing Resilience."



TEAM SHUNYA

Building a sustainable future



TEAM SHUNYA

INTRODUCTION

Team SHUNYA (Sustainable Habitat for an Urbanizing Nation by its Young Aspirants) is a multidisciplinary student-led initiative at IIT Bombay dedicated to developing sustainable, energy-efficient, and climate-responsive habitat solutions for India. The team integrates engineering, architecture, automation, and data-driven innovation to create affordable, net-zero, and technology-driven living environments. Its work spans sustainable building design, renewable energy, thermal comfort, smart automation, and digital infrastructure for future-ready habitats.

Through research, prototyping, competitions, and real-world implementation, Team SHUNYA aims to bridge the gap between sustainability research and practical impact. Its vision is to create intelligent, energy-efficient, and human-centric habitats that balance technology, affordability, and environmental responsibility.

PROJECT VIVAAN

Team SHUNYA's journey has been marked by several achievements in sustainable housing. At the Solar Decathlon Build Challenge 2023 in the USA, Project VIVAAN secured 2nd position globally with a net-positive energy residential prototype. The project integrated sustainable materials, thermal comfort systems, smart automation, renewable energy systems, and advanced HVAC technologies to demonstrate the possibilities of sustainable residential design.



TEAM SHUNYA

SDI 2025–26 — PROJECT SHEETANSH



Team SHUNYA participated in the Solar Decathlon India 2025–26 Residential Cooling Retrofit Challenge with Project Sheetansh, a personalized cooling solution designed for compact living spaces such as hostels and PGs. The project uses a Vapor Compression Refrigeration System (VCRS) for hybrid radiative and convective cooling, creating a comfortable microclimate around the occupant.

A working prototype, tested in real Mumbai conditions, achieved a 2–3°C reduction in Mean Radiant Temperature (MRT) and demonstrated 62.5% energy savings compared to a conventional 1-ton split AC. The project secured 2nd position in the Residential Cooling Retrofit Division at SDI 2025–26, showcasing an energy-efficient approach to cooling in dense urban habitats.

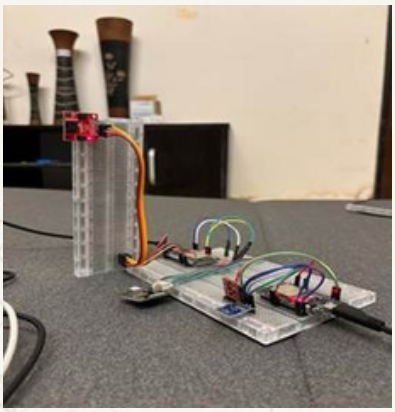
TECHNOLOGY FOR SUSTAINABLE HABITATS

DIGITAL TWIN

Traditional building control systems often rely on fixed settings without accounting for changing occupancy, airflow, ventilation, and outdoor climatic conditions. This can result in inefficient energy use and compromised indoor comfort. To address this challenge, Team SHUNYA is developing an adaptive Digital Twin framework for intelligent indoorenvironment management.

The system combines virtual sensing, physics-informed modelling, and intelligent control to understand environmental conditions and make informed decisions while balancing thermal comfort, indoor air quality, and energy efficiency. Controlled experiments generated approximately 5,000 environmental scenarios to develop predictive models using techniques including virtual sensing, XGBoost and LSTM-based forecasting.

TEAM SHUNYA





NIVAS ECOTECH

A large proportion of residential construction in India's tier-2 and tier-3 cities takes place without professional architectural guidance, often resulting in poor ventilation, excessive heat gain and greater dependence on mechanical cooling. Nivas EcoTech is Team SHUNYA's AI-assisted platform developed to make sustainable building design more accessible to Indian homeowners and local builders.

Users provide simple inputs such as location, plot geometry, orientation, surroundings, room requirements, and budget. The platform uses multiple domain-specific AI agents to generate climate-responsive recommendations for spatial planning, ventilation, passive design, and sustainable materials.



The platform is being refined across different climatic regions, with future development focusing on 3D design visualization, reinforcement-learning-based optimization, and multilingual accessibility.

TEAM SHUNYA

INNOVATION & OUTREACH

SUSTAIN 6.0

Team SHUNYA successfully hosted SUSTAIN 6.0, its annual Net Zero and Sustainability Conclave, in collaboration with GESH IITB and the Institution's Innovation Council. The event brought together academia, industry professionals, startups, policymakers, and sustainability practitioners to discuss sustainable development, climate-conscious infrastructure, clean energy, and implementation-oriented climate solutions.

A major highlight was the panel discussion “Beyond Net Zero: Designing a Sustainable Future”, which explored climate resilience, sustainable infrastructure, energy optimization, sustainability governance, and green entrepreneurship. The event also featured a sustainability consulting competition, a Python workshop on energy data analytics, and the official launch of the Nivas EcoTech MVP.

TECHCONNECT

Team SHUNYA participated in TechConnect, showcasing its sustainability and net-zero housing initiatives to students, faculty members, industry professionals, and institute dignitaries. The team presented projects and research related to sustainable infrastructure, energy systems, climate-responsive housing, and smart environmental technologies.

The exhibition provided an opportunity for Team SHUNYA to showcase its work to a wider audience, receive valuable feedback, and highlight the role of interdisciplinary engineering and technology in advancing sustainable development.





WORDS FRM GRADUATING STUDENTS



SHASWAT PRASAD

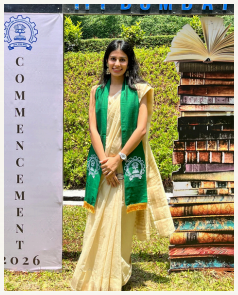
"More than any single event, the relationships I built, the leadership lessons I learned, and the feeling of contributing something meaningful to the department are what I will remember most."

My most memorable experience in the department was my journey as the Department General Secretary. What made it truly special was not just the responsibilities, but the opportunity to work closely with a dedicated team of students and faculty, turning our ideas into initiatives that directly benefited the department.
From coordinating academic activities and events to addressing student concerns, there were many challenging moments. However, seeing the team come together and successfully execute our vision made every challenge extremely rewarding.
My journey was challenging and transformative, filled with unforgettable experiences, lifelong friendships, and countless lessons that I will cherish forever.

Advice for juniors

Make the absolute most of your time in the department , not just academically, but by taking up responsibilities and building meaningful relationships. Don't be afraid to step out of your comfort zone or take on something you feel you may not be ready for; some of the best learning happens through those experiences. Don't get so caught up in chasing achievements that you forget to enjoy the journey. Four years go by much faster than you think, so make sure you create memories along the way.

WORDS FRM GRADUATING STUDENTS



AYAKSHMA SHARMA

"Looking back on my time in the Civil Department, it isn't a single event I'll remember most, but all the shared late nights, department trips, and daily laughs with the people around me."

A Roller Coaster of Growth

My journey through the department has been a true roller coaster, filled with dynamic ups and downs, but rich in personal and academic evolution. Every individual I crossed paths with, whether a batchmate, a friend, or a professor, left me with a valuable lesson. Looking back, I realize how much I've grown ,not just intellectually, but as a person. That growth, paired with the relationships built along the way, is what I will cherish most .

It is impossible to single out just one core memory when the entire experience was so rich. Serving as a CEA Council Member and hosting movie nights in the Civil Department was a great departmental experience The unforgettable pre-exam nightouts in LHC, turning intense study sessions into lifelong memories and unwinding on department trips and spending endless hours in casual chitchat sessions with friends are my core memories.

If there is one common thread that made every simple moment extraordinary, it was the people. I was fortunate to be surrounded by friends who turned every phase into a joyful milestone.

Advice for juniors

Do things at the right time. Whether it's academics, placement prep, or everyday tasks, being proactive spares you unnecessary stress and gives you a distinct advantage.

It's easy to tell yourself that you'll start enjoying college after exams, presentations, or submissions are over but there is always another deadline around the corner. Learn to find joy in every phase, even the chaotic ones. The late-night cram sessions and group prep are often the very moments you will look back on with fondness .Value your friends above all else. They were the heartbeat of my college experience, and the memories created together are what endure long after graduation.

WORDS FRM GRADUATING STUDENTS



ARNAV MISHRA

"Getting into IIT was the best thing that ever happened to me, and becoming a part of the Civil Engineering Department was the icing on the cake."

Serving as the **Associate Secretary** of the Civil Engineering Association was easily one of the highlights of my second year. Beyond organizing and conducting events I genuinely loved, it gave me the chance to build deep, meaningful bonds with both my seniors and juniors. Working side-by-side with my teammates and spending quality time with fellow council members created memories that I will cherish for a lifetime.

Advice for juniors

Never, ever underestimate your potential. Your path is uniquely yours, so take the time to discover your true interests rather than comparing yourself to others or blindly following the crowd. Make the absolute most of every single day in college, live like there's no tomorrow. Moments pass quickly, and you don't want to look back with regrets about what you missed. Invest time in the people around you and nurture beautiful bonds that will stay with you long after graduation. Build a career that directly reflects your own dreams, passions, and the life you genuinely want for yourself.

WORDS FRM GRADUATING STUDENTS



ROHITASHAV KUMAR

"From surviving FRs and hostel naps to random sidequests with my best friends, I lived every single moment at IIT Bombay to the fullest with zero regrets."

Living IIT Bombay to the Fullest

My time here has been a wild, unforgettable ride. If my life ever flashed before my eyes, my college years and the friends I made here would dominate every single second. Apart from a few academic bumps ,like dodging class to sleep in the hostel, getting the occasional FR grade, or stressing over CPI,I have no regrets. I jumped into everything possible: sports, extracurriculars, impromptu adventures, and endless random sidequests. I truly got the complete IIT Bombay experience.

While I served as a CEA Council Member, hosted movie nights in the Civil Department, and went on department trips, my favorite memories are the unfiltered, everyday ones like skipping morning lectures to catch up on sleep in the hostel, and pulling off intense pre-exam nightouts in LHC. Unwinding with my closest crew , Ank, Isha, Pratik, Bhavesh, and others, sharing endless banter, making fun of each other, and diving into spontaneous fun will be one of the best memories .

It was never just one big event that made this journey special. It was the daily chaos, the shared laughter, and the incredible people who made even the simplest moments unforgettable.

Advice for juniors

My advice is to shoot your shot & live without regret. Propose to your crush and get rejected? No problem. Just don't leave room for "what ifs." Do something random, sign up for extracurriculars, and make bold moves. Pay a little attention to academics early on so you don't stress over your CPI, later being proactive gives you a huge advantage.Enjoy every phase, including the stressful ones. The late-night LHC cramming, presentation prep, and department laughs are what you'll miss the most.Treasure your friends. The memories created with them are what stay with you long after you leave campus.

INTERNSHIP EXPERIENCE

VANSH ARORA



I was a Software Developer Intern at Mercedes-Benz for 11 weeks .

"Build a strong DSA foundation early, work on real-life applicable projects, and never underestimate the impact of your CPI and resume."

Selection Process & Preparation

A strong foundation in Data Structures and Algorithms (DSA) which was built using core learning resources like Apna College and Striver as early as possible lays the essential groundwork for technical preparation. Beyond mastering DSA, standing out on paper requires pairing problem-solving proficiency with practical application, whether through real-world, high impact projects or prior internship experience. This dual focus directly aligns with a two round interview process comprising one Technical and one HR round, where a wide variety of hands-on projects coupled with sharp problem solving capabilities serve as the key differentiators to stand out and succeed.

Internship Experience & Key Takeaways

The core of the internship focused on developing a complete architecture and Proof of Concept (PoC) for real-time automobile data transfer. While the technical work was engaging, the stand out highlight of the entire experience was easily the exceptional team and supportive work culture. For those looking at similar roles, it is helpful to keep in mind that Mercedes Benz is not a pure core software company, so managing your technical expectations accordingly ensures a much better fit and overall experience.

Words of wisdom for juniors

Pay close attention to your CPI and resume design early on , they carry significant weight during screening.Don't delay your DSA preparation or rely solely on theoretical knowledge; hand -on, practical execution is what sets you apart.

I would rate my internship 4 out of 5 . It was a great experience and I did learn a lot .

INTERNSHIP EXPERIENCE

DIBYANSHU DASH



I was a Software & Cloud Engineering Intern at Mercedes-Benz Research and Development India (MBRDI) for 3 weeks .

"The intern season can put you in a tailspin, it's a test of patience and resilience. Like the bamboo plant that stays dormant for years before rising 80 feet, consistent effort always finds its reward."

Selection Process & Preparation

The selection process involved an Aptitude and DSA test followed by two blended Technical and HR interview rounds. Live, structured problem-solving served as the key differentiator. Successful preparation relied on mastering core DSA concepts like Dynamic Programming and Graphs using Striver's A2Z sheet, grounding in CS fundamentals and ML, understanding project trade-offs, and consulting seniors to learn company interview patterns.

Internship Experience & Key Takeaways

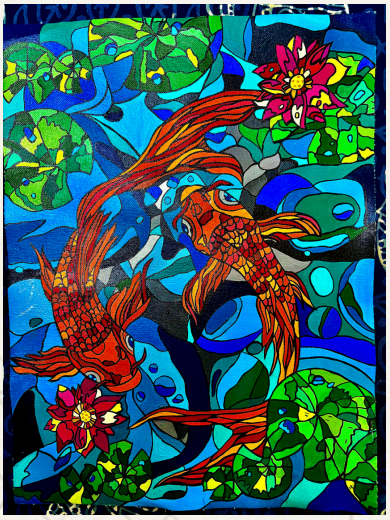
The core project centered on engineering an architectural auto-healing solution for workflow execution without interrupting runtime which is a complex, purely software architectural problem statement. Built on a tech stack of Microsoft Azure, AWS, Java Spring Boot, and enterprise grade software architecture, the initiative demanded robust system design. Complementing the technical work was an exceptional work-life balance typical of European firms, featuring flexible hours, remote options, supportive managers, and a strong emphasis on employee well-being. However, navigating the corporate reality requires recognizing that learning curves can be steep initially and team paces vary widely, making adaptability the single most valuable skill.

Words of wisdom for juniors

Commit to DSA regardless of your target domain, it always pays off. Continuously refine your resume to reflect depth rather than surface level listings. The intern season has an element of unpredictability. Avoid comparing your timeline to others or falling into imposter syndrome.: Keep your head down and put in the work, trust that your efforts will compound when the right opportunity arrives.

I would rate my internship 4 out of 5 . It was a great experience and I did learn a lot .

ARTWORKS



IDHIKA [1st Year]



DIVIT [2nd Year]



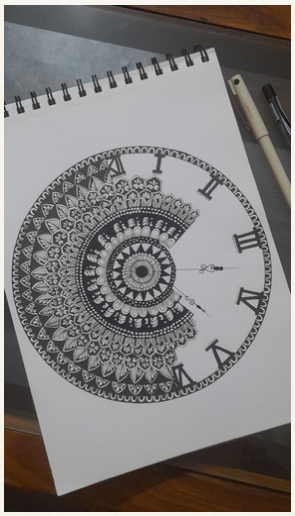
SAMRIDDHI [2nd Year]



ADITYA ARYAN CHOUBEY [2nd Year]



ADITYA [1st Year]



PRASHANSA [2nd Year]



LAKSHITA [1st Year]

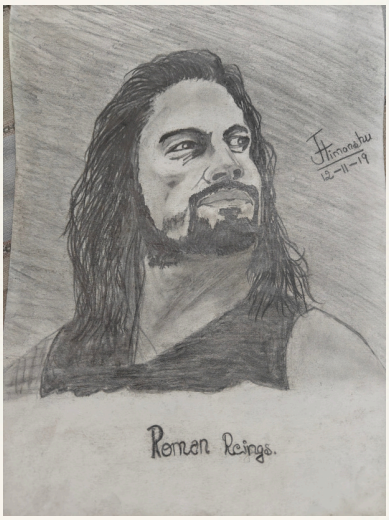
ARTWORKS



ADITYA [1st Year]



AVIRAL [2nd Year]



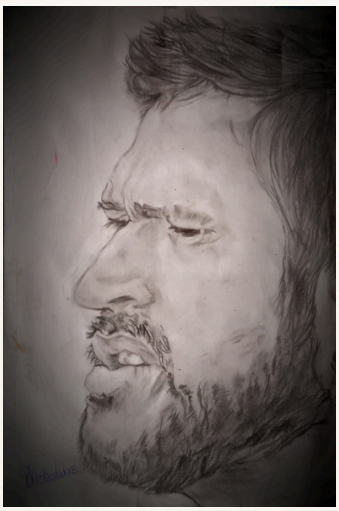
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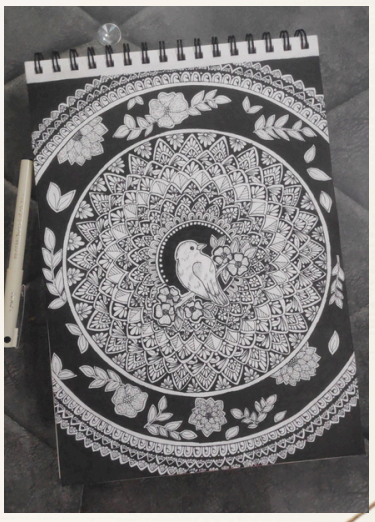
SAMRIDDHI [2nd Year]



ANTARA [1st Year]



PRATIK [5th Year]

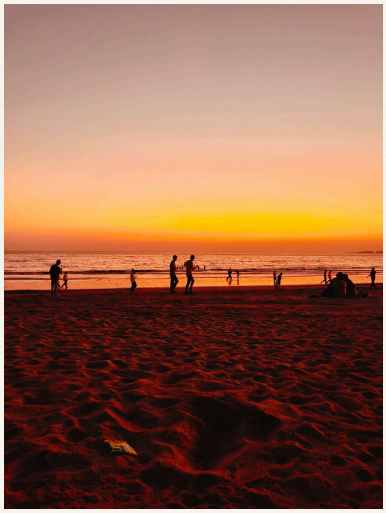


PRASHANSA [2nd Year]

ARTWORKS



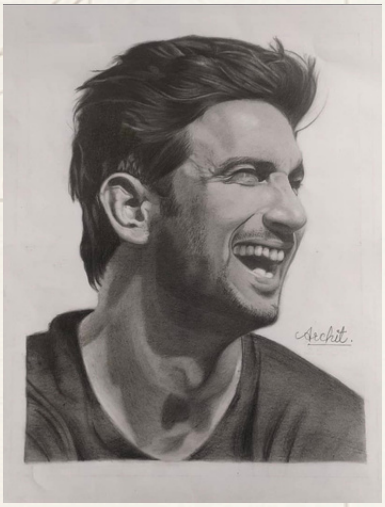
SURABHI [1st Year]



SHAIVI [2nd Year]



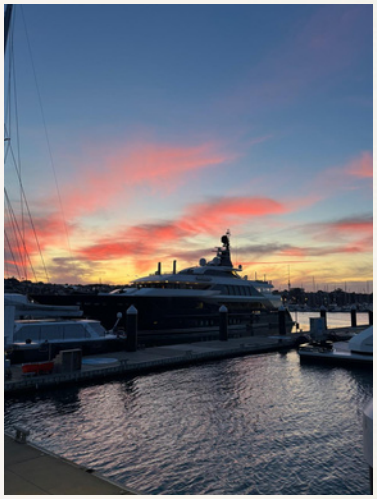
AARNAVI [1st Year]



ARCHIT [3rd Year]



SUMEDHA [1st Year]



DIVIT [2nd Year]



SHAIVI [2nd Year]

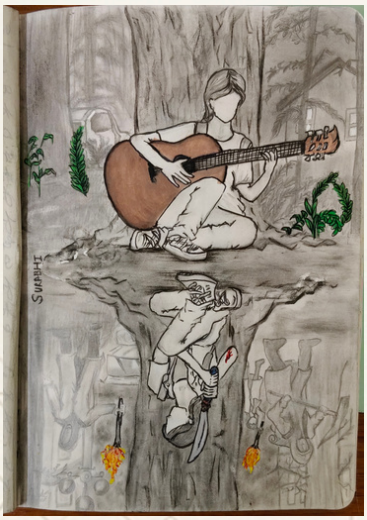


SAMRIDDHI [2nd Year]



JASMEEN [2nd Year]

ARTWORKS



SURABHI [1st Year]



SUMEDHA [1ST Year]



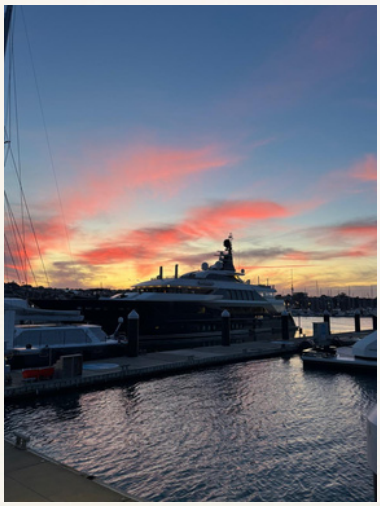
IDHIKA [1ST Year]



ADITYA ARYAN CHOUBEY [2nd Year]



IDHIKA [1st Year]



DIVIT [2nd Year]



PRASHANSA [2nd Year]

GRADUATING STUDENTS OF 2026

DEGREE OF BACHELOR OF TECHNOLOGY

Aakanksha Atul Chavan 210040001	Ayushi Warwade 210040028	Rohit Kumar 210040126
Hardik Agrawal 22B0601	Ankit Raj 22B0602	Rohit Kumar 22B0604
Gajendra Singh Dhaked 22B0606	Pritesh Dhakate 22B0609	Dev Raj Singh Chandel 22B0610
Rahul Dara 22B0611	Lakshit Agarwal 22B0612	Bhavesh Rohilla 22B0614
Sumit Adikari 22B0615	Shashank Rawat 22B0616	Anurag Singh Yadav 22B0617
Sanjoli Pataria 22B0618	Vishnu Kumar 22B0620	Tanishka Yadav 22B0621
Lalit Meena 22B0622	Bhumisha Jaiswal 22B0624	Jansi Bhati 22B0626
Rinku Meena 22B0627	Ayakshma Sharma 22B0629	Gaurav Sahu 22B0630
Rachna 22B0631	Motwani Sanjay Raju 22B0632	Isha Rani 22B0633
Satvik Jain 22B0635	Sunil Kumar Gurjar 22B0638	Surya Umesh Mahajan 22B0639

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DEGREE OF BACHELOR OF TECHNOLOGY

Kulkarni Pranav Pradeeprao 22B0642	Vikrant Kumar 22B0643	Gaurav Jaiswal 22B0644
Nikhil Kedia 22B0645	Prem Parag Naik 22B0647	Biplab Singha 22B0648
Divyansh Jain 22B0649	Aditya Aryan 22B0650	Rishav Chatterjee 22B0653
Putha Pranavsai Reddy 22B0654	Shubham 22B0655	Abhinav P T 22B0656
Srishti Makkar 22B0657	Hiya Rajesh Agrawal 22B0658	Sujay Anand Somani 22B0659
Deepak Silaych 22B0660	Pranav Gupta 22B0661	Kottam Asmith Reddy 22B0663
Arnav Dhamankar 22B0664	Harshil Singh Juneja 22B0666	Shubham Garg 22B0667
Gaurav Singh 22B0668	Rishi Deepak Naik 22B0669	Drashti Kamlesh Mehta 22B0676
Vedant Waghade 22B0677	Krish Malviya 22B0679	Salonee Ravindra Sisekar 22B0680
Bhumika Kalra 22B0681	Raghavi Rajesh Marathe 22B0682	Prabhu Sagar Chaudhary 22B0683

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DEGREE OF BACHELOR OF TECHNOLOGY

Ankit 22B0684	Bhavin Hareesh Jain 22B0685	Divakar Kumar 22B0686
Vishal Kumar 22B0687	Ayush Kumar 22B0689	Shaswat Prasad 22B0691
Parul Khicha 22B0693	Rohitashav Kumar 22B0694	Farhan Khan 22B0695
Jainam Dosi 22B0696	Sohan Raghuvanshi 22B0697	Sarode Deepak Gajanan 22B0698
Anshul Singh 22B0699	Tek Singh 22B0700	Het Modi 22B0701
Akshita Choudhary 22B0702	Rachit Raj Kartik 22B0703	Veenus 22B0704
Mohammad Usaid 22B0706	Banoth Naveen 22B0707	Pranav Heggere 22B0708
Ramasamy Pramod Sai 22B0709	Urvashi Godhane 22B0710	Harshwardhan Mishra 22B0711
Satyendra Vishwakarma 22B0713	Anushka Singh 22B0714	Ayush Kumar Singh 22B0715
Khwaish 22B0716	Yash Dhawal Shah 22B0717	Chirag Bansal 22B0718

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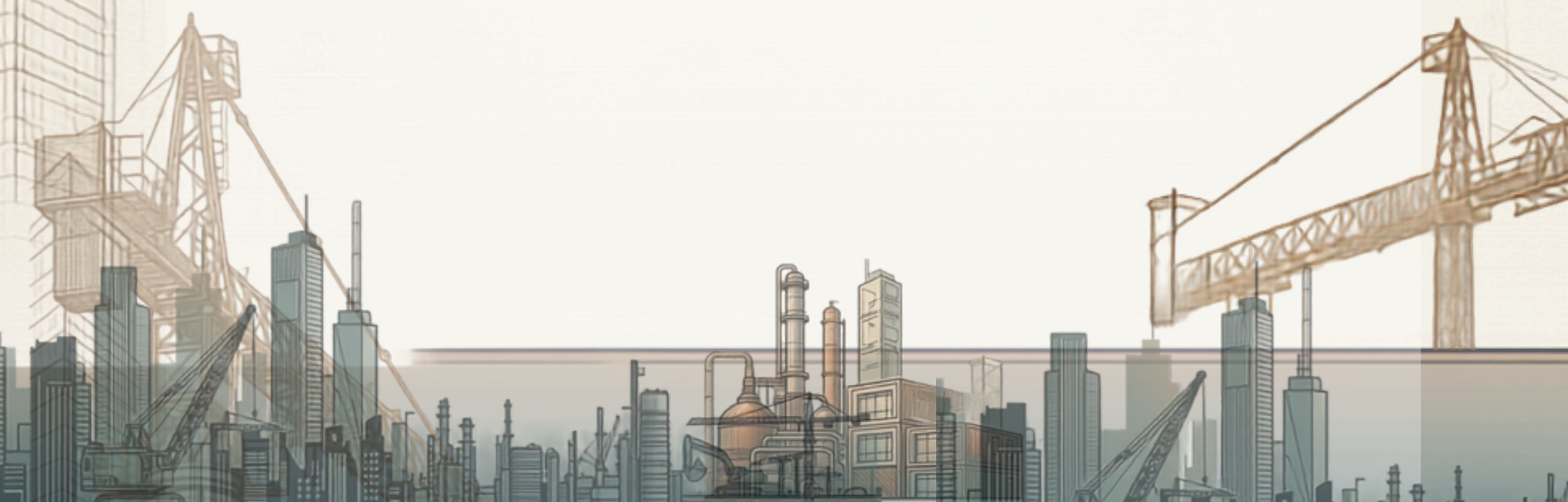
DEGREE OF BACHELOR OF TECHNOLOGY

Kesav Ram.S 22B0719	Rohit Kourav 22B0720	Priyanshu Chaturvedi 22B0722
Mahak Kalra 22B0723	Sambhram Satish Shetty 22B0724	Yuvraj Khandelwal 22B0725
Korade Sharayu Sachin 22B0726	Garvit Kumawat 22B0729	Bikram Ravidas 22B0730
Gulshan Kumar 22B0731	Hritik Mohan 22B0732	Ravi Kishan Ray 22B0733
Raj Prasad 22B0734	Vishwam Hemang Patel 22B0735	Sarvesh Kumar 22B0736
Harshul Jain 22B0737	Shreyas Sinha 22B0739	Harshit Nimbawat 22B0740
Yogya Prakash 22B0741	Nirsitha S 22B0742	Arnav Mishra 22B0743
Aditya Vyas 22B0744	Shivamkumar 22B0745	Aiswarya Susheel 22B0746
Annu Kumari 22B0748	Aanchal Kumari 22B0749	Ritu Raj 22B0750
Battu Srujana Sri Chandrika 22B0751	Kundan Singh 22B0752	Gaurav Koli 22B0754

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DEGREE OF BACHELOR OF TECHNOLOGY

Nakul Agarwal 22B0755	Nirav Prabin Mohanty 22B0756	Saksham Garg 22B0757
Sarvesh Kumar 22B0758	Pratham Singh 22B0759	Sourav 22B0760
Neev Mehta 22B0761	Aadishree Srivastava 22B0763	Shivanshu Mishra 22B0764
Anand Kumar Meena 22B0765	Rohit Kumar 22B0766	Chandan Bairwa 22B0767
Prakhar Gautam 22B0768	Pragya Meshram 22B0770	Kavita Meena 22B0771
Paarth Sonone 22B2545	Aryan Amit Bagdia 22B2730	Nikhil Agrawal 22B4212



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DEGREE OF MASTER OF TECHNOLOGY

Pindiproli Vinaya Sai Saketh 24M0625	Amrutanshu Prusty 24M0608	Unadkat Yashvi Rajendrakumar 24M0633
More Pankaj Khasherao Surekha 23M0617	Shuvodip Datta 23M0618	Mayank Soni 24M0610
Vikash Kumawat 24M0613	Abhishek Kumar 24M0614	Divyansh Gupta 24M0615
Nikhil Kumar Shukla 24M0616	D Bharath Kumar 24M0618	Kuruva Lokesh 24M0619
Ritin Penha 24M0621	Dharavath Priyanka 24M0623	Sawant Vinit Vijay Ujwala 24M0626
Prakhar Agrahari 24M0631	A Sreevalli 24M0636	Salifyanji Sichilindi 24M0640
Hokins Emanuel Moshi 24M0641	Ravi Kumar 24M0609	Kuhikar Aniket Shrawan 23M0614
Turaga Hema Phani Harshita 24M0565	Jumna T P 24M0562	Aman Sahay 24M1425
Aditya Gaurav 24M0560	Rohit Shah 24M0599	G Aparna Nair 24M0601
Pawar Jayraj Sanjay 24M0600	Raaga Tarunya A 24M0602	Siddu Leela Supraja 24M0605

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DEGREE OF MASTER OF TECHNOLOGY

Jeevitha B 24M0603	Pooja F 24M0639	Avinash Kumar Singh 24M0606
Owais Ahmad Sheikh 24M0630	Aniket Kumar 24M0579	Ganesh 24M0632
Mule Venkatesh Umesh 24M0637	Sriharipriya Tankala 24M0595	Chikhalikar Saurabh Ramesh Ratanamala 24M0596
Desai Om Vijaybhai 24M0556	Sachin K Joseph 24M0580	Bhalerao Pratik Prakash 24M0593
Praveen Kumar 24M0638	Yedukrishna K R 24M0545	Ankit Raj 24M0548
Rajasri S 24M0549	Aditya Anand 24M0550	Kunal Singh 24M0551
Abhijeet Kumar Gaurav 24M0553	Lekshmi Muraleedharan 24M0544	Senaiyar Subramanian Piraman Mariammal 24M0554
Aiswarya Binu 24M0566	Gawali Prashant Ravindra 24M0570	Haritha M B 24M0571
Shreya K S 24M0572	Ashish Yadav 24M0574	Digvijay Singh 24M0576
Kaushal Dogra 24M0568	Bhagya D Dev 24M0569	K Pavan 24M0594

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Hulawale Sakshi Shankar
24M0573

Biswaranjan Dalnayak
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K. Suhas
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Aniket Raj
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Surve Vinay Ganpat
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Faakirah Rashid
214046002

Ankan Karmakar
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Smitha Jayakumar Sudha
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P J Navinkumar
194040010

Nimma Rambabu
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Arya Thomas
214040008

Charity Marbaniang
214040017

Salvi Ruchita Shashikant
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Manu K. Soman
183040066

Vasaw Tripathi
183040063

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Parikshit Mahala
24M0588

Mukul Bhardwaj
24M0591

Dhirendra Kumar
24M0622

Kota Madhusudhana Rao
25M0583

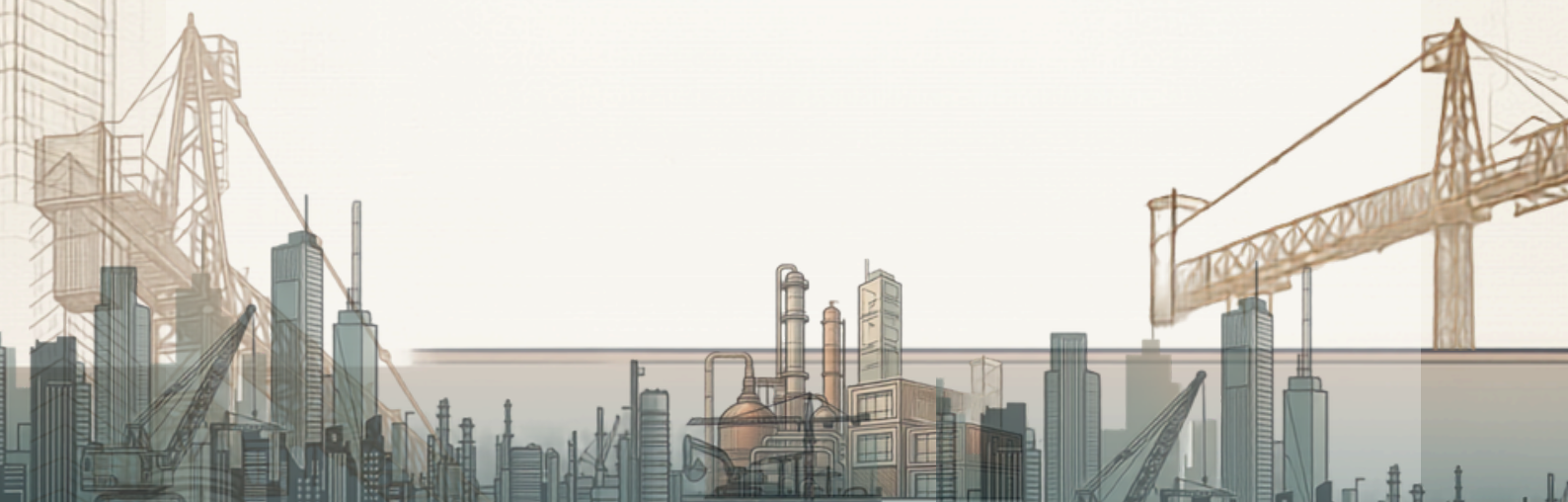
Manideepa Kumari
24M0577

Ashmita Kumari
24M0561

BACHELOR OF SCIENCE

Rele Ishwari Manohar
210040123

Vinayak Meena
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