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Message from the Director



Dear readers,

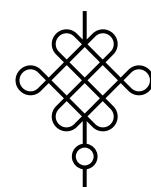
As we steer into the heart of this academic year, it is my proud privilege to thank our stakeholders for their continued support in making this a year of academic progress and achievements. We started this year reminiscing the memoirs of the founders of the Institute as we celebrated the Institute's foundation day on 11th January 2026. Together we witnessed how the Institute has come a long way embracing the change with time.

This quarter of the year, we have made significant strides across education, community engagement, and holistic development. The institute has further expanded its horizons by setting up a new 'Indian Geotechnical student chapter', organizing a highly impactful academic endeavour, National Education and Leadership Conclave 2026'. In its efforts to bridge the gap between theory and practice through robust industry-academia collaboration, the Institute conducted the National Level Academia-Industry Conclave (NLAIC-2026), judiciously blending traditional wisdom with modern education.

To mark the achievements by women in Science and Engineering, an International seminar on Women in engineering was hosted at NITTTR, Salt Lake campus. Keeping our commitment to nurturing mindful, resilient future leaders, a programme on well-being for youth was successfully organized for the aspiring students. Further, the blood donation camp showcased our team's deep empathy and commitment to social responsibility. Over the past few years, NITTTR Kolkata has taken special initiatives to uphold the rich traditional and cultural heritage of the nation by organizing series of lectures on the Indian Knowledge System.

I am sure that in the days to come, NITTTR Kolkata will continue evolving its role in guiding other academic institutions. In line with NEP 2020, it will open up new vistas developing thoughtful, well-rounded, and creative individuals possessing a strong sense of civic responsibility. I congratulate all of you for your resilience, brilliance, and unwavering commitment to our shared mission. I am incredibly proud to lead this institution alongside you.

Prof. V. M. S. R. Murthy
Director (Additional Charge)
NITTTR Kolkata



Vision-Based Digital Twins and Artificial Intelligence for Intelligent Manufacturing: A Review

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Abstract

Fast development of Industry 4.0 has changed traditional manufacturing into an intelligent, data-driven manufacturing system that can monitor, decision-making, and optimization of manufacturing processes. As key enablers of smart manufacturing, computer vision, artificial intelligence (AI), digital twins (DTs), the internet of things (IoT), and cyber-physical systems (CPS) are indispensable technologies. Vision-based monitoring systems continuously monitor manufacturing processes, and AI algorithms process information from different sensors to predict quality and anomalies of products and optimize the operation of manufacturing processes. Digital twins create a virtual copy of physical manufacturing systems to achieve synchronization, predictive analysis, and adaptive control of manufacturing processes. This paper will review recent developments in vision-based monitoring, deep learning, DT technologies, and intelligent supervisory control of manufacturing.

Keywords: Smart Manufacturing, Digital Twin, Artificial Intelligence, Computer Vision, Industry 4.0, Cyber-Physical Systems

1. Introduction

A revolution is occurring in manufacturing industries due to the emergence of Industry 4.0. Advanced sensing technologies, advanced communication, automation, and artificial intelligence are combined to increase the productivity, flexibility, and quality of the products manufactured. Modern manufacturing processes produce a lot of information that is collected using different types of sensors, industrial cameras, machine controllers, and other Internet-of-Things devices (Dinovitzer et al., 2019). Intelligent computational models are needed to transform such heterogeneous information into the knowledge by learning complicated relations between process parameters and product properties. Traditional manufacturing systems mostly use offline inspection and operator's experience in monitoring processes and assuring quality (Abranovic et al., 2024). Such approach can detect problems only after the production, which leads to increased number of wasted materials, production costs, and inefficiency. That is why

intelligent manufacturing can be considered an efficient way to solve the problems, which integrates sensing technologies, artificial intelligence, digital twins, and autonomous decision making into the production process. The combination of computer vision, machine learning, digital twin technologies, and cyber physical systems makes it possible to perform continuous monitoring of manufacturing processes, predictive quality control, equipment monitoring, and production optimization.

2. Computer Vision in Intelligent Manufacturing

Computer vision is arguably one of the most significant sensing technologies in current manufacturing due to its non-contact measurement capabilities. Industrial cameras acquire images and video data which are then processed through machine learning and image processing techniques to detect any variations in process and quality defects (Cho et al., 2022).

Some of the common applications of vision systems include surface defect detection, dimensional inspection, tool wear measurement, weld inspection, assembly verification, product classification, crack detection, robot guidance, and quality inspection. Recently, deep learning has brought a paradigm shift in the ability of computer vision systems by making object detection, segmentation, and feature extraction much more accurate through methods such as Convolutional Neural Networks (CNNs), Vision Transformer (ViTs), YOLO, Mask R-CNN, U-Net, and the Segment Anything Model (SAM) (Ali et al., 2024).

The foundation model like SAM has lowered the reliance on manually developed image processing algorithms and shown great success in industrial image segmentation.

3. Artificial Intelligence for Manufacturing

The application of AI technology has revolutionized the world of intelligent manufacturing processes. The role of AI models is to define nonlinear connections between manufacturing factors and reactions of the product. Among commonly used AI algorithms are artificial neural networks (ANN), convolutional neural networks (CNN), long short-term memory (LSTM), recurrent neural networks (RNN), support vector machines (SVM), random forests, gradient boosting, transformer network and reinforcement learning. Some of the common applications of the above algorithms are process modeling, predictive maintenance, fault detection, tool state monitoring, surface roughness prediction, remaining useful life, energy consumption prediction, process optimization and production scheduling. Hybrid AI models combining spatial,

temporal and numerical data have proven to outperform classical machine learning approaches in terms of prediction quality (Allah et al., 2025).

4. Digital Twin Technology

One of the key technologies that is used in Industry 4.0 is the Digital Twin because it provides constant synchronization of physical objects with virtual ones. The Digital Twin uses sensor data, simulation models, databases, and artificial intelligence methods to create an exact model of the system throughout its lifetime.

The Digital Twin is used for real-time monitoring, simulation processes, assessing performance, diagnostics, predictive maintenance, planning of production, optimization of resources, and predicting the quality of the products. In contrast to traditional simulation models, the Digital Twin constantly develops based on the new manufacturing data.

5. Integration of Computer Vision, AI, and Digital Twins

Computer Vision, AI, and Digital Twins have led to the development of intelligent manufacturing systems that are able to self-monitor and self-control. Intelligent manufacturing systems usually consist of the following stages: data collection through sensors and industrial cameras, data pre-processing and feature extraction, AI-based predictions and diagnoses, digital twins simulations and visualization, process optimization, decision-making, feedback control to manufacturing equipment (Rao et al., 2026).

In such a closed system, a manufacturing system can detect any deviation from the optimal working state and change machine parameters in order to ensure the optimal product quality. This interaction between physical and digital manufacturing systems greatly increases the flexibility and reliability of the manufacturing process.

6. Applications in Manufacturing

Vision-based Digital Twin systems are increasingly adopted across numerous manufacturing sectors, including CNC machining, additive manufacturing, welding and joining, metal forming, casting and foundry operations, semiconductor fabrication, pharmaceutical manufacturing, textile production, electronics assembly, automotive manufacturing, aerospace manufacturing, food processing.

Their applications include process monitoring, dimensional inspection, autonomous robotics, predictive maintenance, inventory management, production scheduling, and intelligent quality control.

7. Challenges and Future Research Directions

Though great strides have been made, there are still several issues that must be addressed before full autonomy in manufacturing can be accomplished. The key research issues include lack of big datasets for industries, heterogeneous sensor data fusion, high-dimensional data processing in real time, explainability and transparency of AI models, security issues and data privacy, scalability of digital twin architectures, computationally intensive tasks.

Future research will center around Physics-driven digital twins, Explainable Artificial Intelligence (XAI), Large Foundation Models for manufacturing, vision language models, edge AI and edge computing, reinforcement learning for autonomous control, multi-agent digital twins, human-AI collaborative manufacturing, quantum machine learning, Industry 5.0 and sustainable manufacturing.

8. Conclusion

Combining computer vision, artificial intelligence, and Digital Twins is revolutionizing manufacturing into intelligent, autonomous, and data-driven manufacturing systems. Computer vision helps in monitoring the manufacturing process continuously, while artificial intelligence assists in predicting, optimizing, and diagnosing faults in the process. Digital Twins help to connect the real world and digital world by providing real-time synchronization, predictive analysis, and adaptive process control. These technologies together provide closed-loop manufacturing systems that monitor themselves, learn from the environment, and optimize manufacturing processes. The advancements in sensing techniques, artificial intelligence, edge computing, and cyber-physical systems will further lead to the development of autonomous smart factories in the future. Intelligent manufacturing will form a vital component of Industry 4.0 and Industry 5.0.

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Blood Donation Camp

Prof. Naveen BP organized the “*Seva Paramo Dharma in Action*” Blood Donation Camp at the National Institute of Technical Teachers’ Training & Research (NITTTR), Kolkata, on 9 January 2026, as part of the celebrations marking the institute’s 62nd Foundation Day. The camp beautifully embodied the timeless value of “*Seva Paramo Dharma*”, reaffirming that service to humanity is the highest duty. Each donor and volunteer emerged as an instrument of compassion and hope, extending the gift of life and potentially saving countless precious lives.



62nd Foundation Day of the Institute

(NITTTR Kolkata Celebrates 62nd Foundation Day with Grand Academic, Cultural and Alumni Engagement Programmes)

The National Institute of Technical Teachers’ Training and Research, Kolkata (NITTTR Kolkata) commenced its year-long celebration of the 62nd Foundation Day on 11 January 2026, marking over six decades of dedicated service towards quality assurance and capacity building in the technical education system of India.

A fully centrally funded institute under the Ministry of Education, Government of India, NITTTR Kolkata has been playing a pivotal role in strengthening both polytechnic and degree-level technical education across the country. The Institute began its journey on **11 January 1965** as the *Technical Teachers’ Training Institute (Eastern Region)* and, in recognition of its exemplary national-level contributions, was subsequently elevated to its present status. In **2024**, the Institute was conferred **Deemed to be University status under the Distinct Category** by the Ministry of Education, Government of India.



The Foundation Day celebrations on 11 January 2026 began with the hoisting of the National Flag and the Institute Flag, followed by the National Anthem,

symbolizing the Institute's commitment to national service and academic excellence. The inaugural session was held at the **Netaji Subhas Chandra Bose Auditorium**, where the ceremonial lighting of the lamp and Saraswati Vandana marked the formal commencement of the event.



The programme was graced by the presence of eminent dignitaries, including the **Hon'ble Chief Guest, Prof. Rajeev Srivastava, Director, IIIT Ranchi**, **Shri Sajjan Bhajanka, Chairman, Board of Governors, NITTTR Kolkata** and **Guest of Honour, Shri Om Prakash Mishra, Executive Director (Community Development) Coal India Limited** along with other distinguished guests, senior officials, faculty members, staff, trainees, students, alumni, retired employees, and research scholars.

During the inaugural session, **Professor V.M.S.R Murthy, Director, Additional Charge, NITTTR Kolkata**, delivered the welcome address, presenting a comprehensive overview of the Institute's history, achievements, academic growth, and future roadmap. He highlighted NITTTR Kolkata's expanding role in faculty development, research, innovation, and implementation of the National Education Policy (NEP) 2020.

In his address, **Shri Sajjan Bhajanka**, Hon'ble Chairman, Board of Governors, emphasized the need for the Institute to respond proactively to emerging challenges in technical and higher education, particularly in the areas of digital learning, industry collaboration, and outcome-based education. He reiterated his vision for NITTTR Kolkata to emerge as a nationally and globally recognized institution of excellence.

Addressing the gathering, the **Guest of Honour, Shri Om Prakash Mishra, Executive Director (Community Development), Coal India Limited**, highlighted the importance of technical education in driving inclusive and sustainable national development. He emphasized the need for strong industry-academia collaboration to

ensure that technical knowledge translates into societal impact. Appreciating NITTTR Kolkata's contribution to capacity building and nation-building, he expressed confidence that the Institute would continue to play a vital role in shaping a skilled and socially responsible workforce.

The **Hon'ble Chief Guest, Prof. Rajeev Srivastava, Director, IIIT Ranchi**, in his keynote address, underscored the importance of technology-enabled learning, systemic educational reforms, and capacity building of technical teachers to meet the aspirations of a Viksit Bharat. He highlighted the strategic role NITTTR Kolkata must play in aligning technical education with national priorities and global standards.

The programme also featured felicitations of dignitaries, presentations on institutional activities, and addresses by Deans on academic initiatives and research & development activities. The Institute also recognized outstanding employees for their dedicated service.

Post-inaugural sessions included the inauguration of the Alumni Association Office, followed by interactive sessions with retired employees and alumni, reinforcing the Institute's strong intergenerational connection. The celebrations continued with sports activities, prize and certificate distribution, and concluded with a vibrant cultural programme presented by students, staff, and an invited cultural band.

The **62nd Foundation Day celebration** concluded with a collective reaffirmation of NITTTR Kolkata's commitment to nation-building through quality technical teacher education, research, innovation, and institutional leadership, setting the tone for a year-long series of academic and outreach activities.

Two-Day National Workshop on "Wellbeing for Youth & Gen-Z: An Integrated Multidimensional Holistic Approach"

The National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata, under the Ministry of Education, Government of India, successfully commenced a Two-Day National Workshop on "Wellbeing for Youth & Gen-Z: An Integrated Multidimensional Holistic Approach" on 19–20 January 2026 at the Ramakrishna Paramahansa Auditorium, NITTTR Kolkata.

The workshop is designed to address the growing need for mental, emotional, physical, social, and digital wellbeing among youth and Gen-Z learners through expert interactions, student engagement, and wellness practices.

Inaugural Session

The inaugural session was graced by Mr. Kalyan Mukhopadhyay, IPS (Retd.) as the Chief Guest and Ms. Ila Sinha as the Guest of Honour. The dignitaries on the dais included Prof. Gayadhar Panda, Dean (Faculty & Academic Affairs), Dr. Habiba Hussain, Organising Chair of the workshop, and Dr. Deepak Mehra, Workshop Coordinator.



Inaugural Session

The Guest of Honour and Chief Guest highlighted challenges related to mental health, digital balance, and emotional resilience among today's youth.

The day also included student activity sessions, group announcements for presentations, and concluded with a Yoga Session conducted by Ms. Manjari Mandal, promoting physical and mental rejuvenation.

Students actively participated in group presentations, sharing reflections and learnings from the workshop. An Open House Interaction allowed participants to engage

directly with experts. The programme concluded with a Valedictory Session and Way Forward Address by Dr. Habiba Hussain, highlighting the need to integrate wellbeing practices into academic and personal life.

The workshop witnessed enthusiastic participation from students and faculty members and reaffirmed NITTTR Kolkata's commitment to nurturing holistic, healthy, and resilient youth.



Expert Session



Yoga Session



Outdoor Activities

Report on Celebration of 77th Republic Day on 26th January 2026 at NITTTR Kolkata

The 77th Republic Day was observed on 26th January 2026. It began with the unfurling of the Indian Tricolour, by the Dean, Research Planning and Development along with the Dean, Faculty and Academic Affairs and the Senior most outgoing Professor, Dr. Urmila Kar. This was followed by singing of National Anthem and offering flowers in memory of the brave soldiers who sacrificed their lives for the nation.



Thereafter, all the members of faculty and staff assembled in the Ramakrishna Paramhans Auditorium. Speeches were delivered by employees and students which mainly focused upon reiterating the contributions and sacrifice of the Shaheeds of our motherland. It was very inspiring to find the young students taking active participation in the entire event. After the celebrations in the auditorium, Cricket match among employees and students at NITTTR Kolkata playground was conducted.

The event was attended by the members of faculty, staff, students, trainees and research scholars.

The programme was coordinated by Dr. Habiba Hussain, Associate Professor, Deptt. of Technical Education & Management and Shri Kallol Modak, Sr. Technical Assistant.

Celebration of the Birth Anniversary of Netaji Subhas Chandra Bose

The National Institute of Technical Teachers' Training & Research (NITTTR), Kolkata, solemnly celebrated the Birth Anniversary of the legendary freedom fighter and patriot, Netaji Subhas Chandra Bose, on January 23, 2026.



Garlanding of the statue of Netaji

The programme commenced at **4:30 PM** with the ceremonial garlanding of the statue of **Netaji Subhas Chandra Bose** outside the NSCB Auditorium by the dignitaries, faculty members, and students. A one-minute silence was observed in his honour, followed by floral tributes. Thereafter, the gathering proceeded to the **Sri Ramakrishna Paramahansa Auditorium** for the cultural and academic session.



Inaugural Session

The formal session began with Dr. Deepak Mehra inviting the dignitaries to the dais, including Prof. Subrata Mondal (Professor & Head, Department of Mechanical Engineering), Prof. Anil Kumar, Dr. Habiba Hussain, and Dr. Arpan Kumar Mondal.

Prof. Subrata Mondal formally opened the proceedings with a warm Welcome Address, setting a reflective and celebratory tone for the evening. In alignment with institutional tradition, the entire auditorium stood in harmony for the singing of the National Anthem. The inspiring addresses were delivered by Prof. Anil Kumar, highlighting Netaji's vision, leadership, and unyielding dedication to the nation.

The stage was opened to the campus community. Short, evocative speeches were delivered by faculty member, staff member and student, who reflected deeply on the

life, values, and contemporary relevance of Netaji's ideals.

The formal Vote of Thanks was delivered by Dr. Deepak Mehra.

Indian Geotechnical Student Chapter

IGS Student Chapter Inaugurated at NITTTR Kolkata; First Technical Workshop Successfully Conducted with 200 Participants

The Department of Civil Engineering at National Institute of Technical Teachers' Training and Research, Kolkata (NITTTR Kolkata), in collaboration with MIDAS, successfully organized a hands-on technical workshop on "RCC Superstructures with Foundation Design." The programme was conducted under the aegis of the Indian Geotechnical Society (IGS) Student Chapter, NITTTR Kolkata.

The workshop was organized under the leadership of Prof. Naveen BP, Head, Department of Civil Engineering, NITTTR Kolkata, whose guidance and vision played a pivotal role in the successful execution of the event.

A total of 200 participants, including students, research scholars, and faculty members, actively took part in the workshop. The programme provided comprehensive hands-on exposure to RCC superstructure analysis and foundation design methodologies using advanced engineering tools, thereby enhancing practical knowledge and industry readiness.



The event holds special significance as it was the first-ever programme organized by the IGS Student Chapter at NITTTR Kolkata, marking a historic milestone after more than two years of dedicated efforts by students and faculty. Notably, NITTTR Kolkata has become the first among all NITTTRs in India to establish an IGS Student Chapter, setting a benchmark in professional

engagement and academic excellence in the field of geotechnical engineering.

The IGS Student Chapter was formally inaugurated on February 14, 2026, at the NITTTR Kolkata campus, ushering in a new era of student-led technical initiatives and strengthened industry-academia collaboration.

National Education and Leadership Conclave 2026

The National Education and Leadership Conclave 2026, organized by the National Institute of Technical Teachers' Training & Research (NITTTR), Kolkata, is scheduled to be held on 25th February 2026. The conclave aims to bring together academicians, education leaders, administrators, and professionals to deliberate on contemporary developments, leadership practices, and transformative initiatives in education, within the context of the evolving national and global educational landscape.

Aligned with the vision of the National Education Policy (NEP) 2020, the conclave will serve as a platform for thought leadership, knowledge sharing, and collaborative dialogue through expert talks and panel discussions on key issues impacting educational institutions and leadership.



The Chief Guest, Prof. T.G. Sitharam, Former Chairman of AICTE and Former Director of IIT Guwahati, delivered an inspiring keynote on "Empowering Young Minds for a Viksit Bharat." He emphasized visionary leadership, innovation-led education, strong industry-academia collaboration, and youth empowerment as essential

pillars for elevating India's global standing in technical education. His address set a powerful tone for transformative and accountable leadership.

With the divine blessings of Maa Mahakali, Prof. Naveen BP conceptualized and executed the conclave with exceptional foresight, clarity, and strategic depth. As the principal architect of the event, he transformed a visionary idea into a nationally significant academic platform.

Report on the First Annual Sports Meet 2026, NITTTR Kolkata

Prize Distribution Ceremony: The First Annual Sports Meet 2026 at NITTTR Kolkata was organized with great enthusiasm and competitive spirit. Prior to the main event days, league rounds for all sports were successfully conducted. The final rounds of all athletic events and games were played across 27th and 28th February 2026 according to the scheduled timeline.

The grand event officially commenced on the morning of 27th February 2026 with an Inaugural Session and the formal opening of the sports meet. The program was inaugurated by Prof. Gayadhar Panda, Dean (Faculty and Academic Affairs), and Prof. Chandan Chakraborty, Dean (Research, Planning and Development), alongside the sports event coordinators, **Dr. Deepak Mehra** and **Dr. M. S. Jagadeesh**.

During this ceremony, the Dean (FAA) and Dean (RPD) presented medals and trophies to the well-deserved winners and runners-up.

Summary of Winners and Runners-up

Sl. No.	Sports/Event Name	Winners	Runners-up
1	Men's-Doubles Badminton	Pritish Ali & Sumalya Majumdar	Sudip Sadhukhan & Avijit Kundu
2	Women's-Doubles Badminton	Debjani Biswas & Nashima Begum	Haniya Yeasmin & Priyasi Mallick
3	Chess	Sudip Sadhukhan	Rohan Saha
4	100m Race	Naveen Annepaka	Pritish Ali
5	Tug of War	M.Tech First Year	<i>Not Applicable</i>
6	Cricket	M.Tech Second Year	<i>Not Applicable</i>
7	Volleyball	M.Tech First Year	<i>Not Applicable</i>
8	Musical Chairs	Aniket Mukherjee & Sudip Sadhukhan (<i>Joint</i>)	<i>Not Applicable</i>
9	Carrom	Kaushik Barik	Sumalya Majumdar
10	Table Tennis	Sumalya Majumdar	Sandipan Ghosh



Volleyball



Table Tennis



Inaugural Session



Cricket



Chess

INTERNATIONAL SEMINAR ON WOMEN IN ENGINEERING

An **International Seminar on Women in Engineering** was organized to promote gender inclusivity, leadership, innovation, and greater participation of women in engineering and technology.

The inaugural session featured addresses by **Dr. Sagarika Pal**, **Prof. Shalini Sinha Chaudhary**, **Prof. Urmila Kar**, and **Prof. Anuradha De**, who highlighted the importance of diversity, mentorship, resilience, and equal opportunities for women in STEM. The session concluded with a vote of thanks by **Mrs. Sheela Yadav Rai**.



The keynote sessions, delivered by **Dr. Tapati Bandopadhyay**, **Prof. Tumpa Hazra**, **Prof. Nandini Mukhopadhyay**, and **Dr. Mahuya Hom Choudhury**, focused on bridging the gender gap in engineering, strengthening institutional support, promoting innovation and intellectual property, and empowering women to take leadership roles in research, technology, and nation-building.



Panel Discussion:

Theme Women in Engineering – Past, Present and Future Challenges

Introduction

The panel discussion brought together distinguished academicians and professionals to share their



Carrom



Badminton



100 Meter Race



Prize Distribution Ceremony

experiences and perspectives on the evolving role of women in engineering. The session aimed to:

- Highlight the journey of women in engineering
- Identify current challenges
- Emphasize the importance of education and societal support
- Inspire future generations of women engineers

Key Discussions

Importance of Women in Engineering

The panel emphasized that women have historically contributed to engineering and society, though often under recognized. Ensuring equal opportunities and fostering inclusivity were identified as essential steps forward.

Role of Education

Speakers stressed that education—especially at the primary level—plays a foundational role in shaping values and awareness. Equal access to education for boys and girls, particularly in rural areas, was strongly emphasized.

Challenges Faced by Women Engineers: Key challenges discussed included-

- Gender bias in education and workplaces
- Limited access to technical roles
- Underrepresentation in leadership positions
- Societal expectations and stereotypes

Panelists shared real-life examples of exclusion from fieldwork, limited practical exposure, and unequal recognition.

Personal Journeys: The speakers highlighted resilience, determination, and family support as crucial factors in overcoming barriers. Self-confidence and persistence were identified as essential qualities for professional success.

Progress Over Time: The panel acknowledged progress in women's enrollment in engineering education and improved workplace acceptance. However, leadership gaps and industry-specific barriers still remain.

Need for Societal Change: The discussion emphasized collective responsibility in achieving gender equality, including-

- Educating both boys and girls about equality
- Encouraging women's leadership
- Strengthening mentorship systems
- Implementing inclusive institutional policies

CONCLUSION: The panel discussion provided meaningful insights into the past, present and future of women in engineering. While progress has been made, continued efforts are required to eliminate systemic bias and ensure equal opportunities. Education,

institutional support, mentorship, and societal transformation remain key to achieving lasting gender equity.

RECOMMENDATIONS: Based on the discussion, the following recommendations are proposed-

1. Strengthen primary education with a focus on values and equality
2. Increase awareness about opportunities in engineering for women
3. Provide mentorship programs for young women engineers
4. Encourage participation of women in leadership and decision-making roles
5. Address gender bias through institutional policies and practices

National Level Academia–Industry Conclave (NLAIC–2026)

The National Level Academia–Industry Conclave (NLAIC–2026) was successfully organized jointly by the National Institute of Technical Teachers Training & Research Kolkata and Assam Engineering College under the theme “*Integrating Sustainability, Resilience, and Technological Innovation for Viksit Bharat@2047*” on 27th and 28th March 2026. The conclave aimed at strengthen collaboration between academia and industry while promoting innovation, sustainable development, and technological advancement with special focus on the North Eastern Region (NER) of India. More than 120 participants comprising faculty members, researchers, students, innovators, and industry professionals, actively participated in various technical and academic events conducted during the two-day programme.

The conclave commenced with an inaugural session at the auditorium of **Assam Engineering College, Guwahati**, attended by eminent dignitaries from academia, industry, and government. The speakers emphasized sustainable technologies, industry–academia collaboration, research-driven innovation, and resilient development for achieving the vision of **Viksit Bharat@2047**.

The programme was successfully coordinated by **Dr. Deepak Mehra, Dr. Kunwar Raghvendra Singh, and Dr. Moushumi Patowary** under the guidance of the Organizing Chairs, **Prof. Anil Kumar and Prof. Gayadhar Panda**, ensuring the smooth execution of the conclave.

A major attraction of the conclave was the keynote session delivered by Mr. Jadu Pran Borgohain, General Manager, Assam Power Generation Corporation

Limited (APGCL), on the topic “*Academia–Industry Collaboration for Viksit Bharat 2047.*” In his address, he highlighted the importance of bridging the gap between academic research and industrial implementation to promote innovation, renewable energy systems, entrepreneurship, and technological self-reliance. Another keynote session was delivered by Prof. C. K. Chanda, Professor (HAG), IEST Shibpur, on “*Understanding Inertia: With Zero Spin Energy into AI–ML Assisted Synchronous Grid.*” The session focused on future power systems, renewable integration, and the role of AI and machine learning in maintaining grid stability.

Two panel discussions were held during the conclave, featuring eminent academicians and industry professionals. The first panel discussion on “*NER as the Frontier of Resilient and Sustainable Development for Viksit Bharat@2047*” included panel experts Prof. C. K. Chanda, Prof. Lingaraj Sahoo, Mrs. Ranjana Chakravorty, Dr. Plabon Kakoti, Dr. Purobi Patowary, and Mr. Bhaskar Jyoti Deka. The second panel discussion on “*Sustainable Innovation & Technology for NER*” included Prof. Gayadhar Panda, Prof. Ajay Kalamdhad, Prof. Chitralekha Mahanta, Dr. Pankaj Kalita, Dr. Bipul Talukdar, and Mr. Arvind Rai. These discussions emphasized sustainable development, renewable energy, smart infrastructure, innovation ecosystems, entrepreneurship, and digital transformation in the North-Eastern Region.

Several technical events including model presentations, poster presentations, industry-oriented research recognition, and student innovation pitch sessions, were organized during the conclave. Participants presented innovative projects and research works related to artificial intelligence, electric vehicles, smart agriculture, IoT-based monitoring systems, renewable energy technologies, sustainable materials, advanced manufacturing, and digital technologies. The technical sessions provided a valuable platform for interdisciplinary collaboration and encouraged practical problem-solving and industry-oriented innovation among students and researchers.

The valedictory session marked the successful conclusion of the conclave and included prize distribution ceremonies for various technical categories such as Best Model/Project Award, Best Poster Award, Best Industry-Relevant Research Award, and Best Innovation Idea Award. Certificates of excellence and recognitions were presented to outstanding participants for their innovative ideas and technical contributions. During the valedictory session, Prof. Gayadhar Panda expressed heartfelt gratitude to all dignitaries, keynote speakers, panel members, organizing committee members, volunteers, sponsors, faculty members, and participants for their active

support and contribution toward the grand success of NLAIC–2026. He appreciated the enthusiasm and innovative spirit demonstrated by the participants and emphasized the importance of continuing academia–industry collaboration for sustainable technological growth and national development.

Overall, NLAIC–2026 concluded successfully with active participation, meaningful technical discussions, innovative project demonstrations, and collaborative interaction among academia, industry, and policymakers. The conclave significantly contributed toward promoting sustainable innovation, technological excellence, and research collaboration aligned with the national vision of Viksit Bharat@2047.



Inaugural Session



Participants and dignitaries at the Inaugural Session



Welcome Speech by Prof. Gayadhar Panda, Dean
(Faculty and Academic Affairs, NITTR, Kolkata)



Participants Presentation



Panel Discussion day-1



Panel Discussion Day-2



Cultural Program



Valedictory Session and Prize Distribution

NITTTR Kolkata's First In-House FDP at Government Polytechnic Bramhapuri, Nagpur

A One-Week Faculty Development Program (FDP) jointly organized by NITTTR Kolkata and Government Polytechnic Bramhapuri, Nagpur

- Program Code: CU46C
- *Transforming Waste into Clean Energy: Building a Sustainable Future*
- Date: 6th – 10th April, 2026
- Venue: Government Polytechnic Bramhapuri

This FDP marked a special milestone as it was the first time NITTTR Kolkata conducted an in-house program at Government Polytechnic Bramhapuri, Nagpur, making it a noteworthy initiative in collaborative academic engagement.



The program, effectively led by Prof. Naveen B.P., stood out as a strong example of how theory and practical learning can be seamlessly integrated to address real-world environmental challenges. It was thoughtfully designed to go beyond conventional lectures by combining fundamental concepts with hands-on exposure in areas such as waste-to-energy technologies, sustainable engineering practices, and resource recovery.

Report A special expert lecture under the Indian Knowledge System (IKS) initiative was organized at the NITTTR, Kolkata

A special expert lecture under the Indian Knowledge System (IKS) initiative was organized at the National Institute of Technical Teachers' Training and Research (NITTTR), Kolkata, with great enthusiasm and academic spirit. The programme commenced with the formation

of the dais by the distinguished dignitaries including Mr. Dayanidhi Urmaliya Ji, Prof. Gayadhar Panda, Dean (Faculty and Academic Affairs), and Prof. Chandan Chakraborty, Dean (Research, Planning and Development). The event witnessed active participation from faculty members, research scholars, and students of the institute.



IKS Centre, NITTTR, Kolkata



Inaugural Session

As a mark of respect and traditional Indian hospitality, Mr. Dayanidhi Urmaliya Ji was felicitated during the inaugural session. Prof. Chandan Chakravorty, Dean (Research Planning and Development), presented a bouquet to the esteemed speaker, while Prof. Gayadhar Panda, Dean (Faculty and Academic Affairs), honoured him with an Uttariya symbolizing the rich cultural heritage and values of the Indian Knowledge System. The dignitaries appreciated the initiative of integrating Indian traditional wisdom with modern education and research.



Felicitations of Mr. Dayanidhi Urmaliya

During the programme, Prof. Gayadhar Panda, Dean (Faculty and Academic Affairs) and Prof. Chandan Chakraborty, Dean (Research, Planning and Development) addressed the gathering and highlighted the importance of Indian Knowledge Systems in the present educational and technological landscape. They emphasized the need to revive and integrate ancient Indian wisdom, ethics, sustainable practices, and

Invited Talk

By Dr. Kinsuk Giri: "Fundamentals of Machine Learning using Python" delivered by Dr. Kinsuk Giri, March 20, 2026 Visva-Bharati University, West Bengal, India

By Prof. K. Venkata Rao: An invited talk on "Digital Technologies in Engineering" at Prasad V. Potluri Siddhartha Institute Of Technology, on 22nd March 2026.

Faculty Development Programs

Teachers' Training During the period of January – April, 2026: 4273 numbers of Technical Teachers have been trained, through various Short-Term Training Programmes, broadly in the areas of Content Updating, Management, Pedagogy and Professional Skill Development. A total of 62 training programs were conducted for the Teachers and Technicians of different Polytechnic colleges and Engineering colleges all over the Country during the 4th Quarter of the Year 2026.

Newsletter, National Institute of Technical Teachers' Training and Research, Kolkata, Block-FC, Sector-III, Salt Lake City, Kolkata-700106 India.

List of Training Programmes (January – April, 2026)

Sl. No.	Programme Code	Programme Title	Programme Coordinator	From	To
1	PS60B	Effective Teaching	Habiba Hussain	29/12/2025	02/01/2026
2	PS55A	Outcome Based curriculum design in line with NEP 2020 for autonomous higher educational institutes(HEIs).	Urmila Kar	29/12/2025	02/01/2026
3	PS58C	Assessment, Evaluation and Development of question bank	Sagarika Pal	05/01/2026	09/01/2026
4	CU228C	Waste to Energy	Kunwar R Singh	05/01/2026	09/01/2026
5	PS79C	NBA Accreditation and SAR preparation	Rayapati Subbarao	05/01/2026	09/01/2026
6	SPL(IHP-GIMT)	"Assessment and Evaluation under Outcome Based Education"	Urmila Kar and Sukanta Kumar Naskar	05/01/2026	09/01/2026
7	CU174C	Network Infrastructure Management	Rajeev Chatterjee	05/01/2026	16/01/2026
8	PS61A	Modern Pedagogical Tools and Techniques for Effective Technical Education	K Venkata Rao	05/01/2026	09/01/2026
9	CU208B	Finite Element Analysis with ANSYS	Nirmal Kumar Mandal	05/01/2026	09/01/2026
10	SPL33C	Application of Deep Learning, AI & ML in Modern Power Systems	Gayadhar Panda	12/01/2026	16/01/2026
11	CU178C	Mathematical Foundation of Computer Science	Kinsuk Giri	12/01/2026	16/01/2026
12	CU180C	Machine Learning with PYTHON	Kinsuk Giri & Chandan Chakraborty	19/01/2026	23/01/2026
13	PS62C	NBA Accreditation and SAR Preparation for Polytechnics and Engineering Colleges	Arpan Kumar Mondal	19/01/2026	23/01/2026
14	CU183B	Solar Photovoltaic System and Smart Grid	Soumitra Kumar Mandal	19/01/2026	23/01/2026
15	CU215C	Load & Renewable Energy Forecasting and power filters in Power Network	Papia Ray	19/01/2026	23/01/2026
16	SPL(IHP-GCEK)	NAAC and NBA Accreditation with SSR and SAR Preparation for Engineering Colleges	Rayapati Subbarao	19/01/2026	23/01/2026
17	SPL(IHP-IMIT-CUTTACK)	Cyber Security	Rajeev Chatterjee	20/01/2026	24/01/2026
18	SPL-IIIT-Bhagalpur	Induction Training	SKnaskar & Sagarika Pal	30/01/2026	01/02/2026
19	CU209C	Applied Machine Learning	Nirmal Kumar Mandal	02/02/2026	06/02/2026
20	SPL (IHP-KIST)	NBA Accreditation	Rayapati Subbarao	02/02/2026	06/02/2026
21	PS64C	Introduction to Problem Based Learning	Kinsuk Giri, Arpan Kumar Mondal, Indrajit Saha, Sagarika Pal	02/02/2026	13/02/2026
22	PS82A	Advanced Pedagogy	Sukanta Kumar Naskar	02/02/2026	13/02/2026
23	SPL40F	Effective Teaching	Habiba Hussain	02/02/2026	06/02/2026
24	SPL40F	Effective Teaching	Habiba Hussain	02/02/2026	06/02/2026
25	CU216B	Energy Audit and Management	Papia Ray	09/02/2026	13/02/2026
26	CU187C	Technical Paper and Thesis Writing by using MS word	Saurabh Kumar Yadav	09/02/2026	13/02/2026
27	SPL(IHP-Rajganj)	Developing Managerial Skills through Training and Development	Sukanta Kumar Naskar	09/02/2026	13/02/2026

Sl. No.	Programme Code	Programme Title	Programme Coordinator	From	To
28	CU188C	Introduction to LABVIEW Programming and its Applications	Sagarika Pal	09/02/2026	13/02/2026
29	SPL(IHP-AITAM)	AI Driven Approaches to Pedagogy and Research	K Venkata rao	09/02/2026	13/02/2026
30	SPL41F	Climate Risk Management	Anil Kumar and Kunwar R Singh	09/02/2026	13/02/2026
31	PS41C	Waste Water Treatment: Pollution Control and Reuse	Subrata Mondal	16/02/2026	20/02/2026
32	CU190C	Generative AI For Matlab Programming For Mechanical Engineers	Saurabh Kumar Yadav	23/02/2026	27/02/2026
33	PS65C	Assessment, Evaluation and Development of question bank	Sagarika Pal	23/02/2026	27/02/2026
34	SPL53F	How to Write Thesis and Research paper (SPL53F)	Rayapati Subbarao	23/02/2026	27/02/2026
35	SPL42F	Development of Laboratory Instruction and Manual (Prog. Code: SPL42F)	Subrata Mondal	23/02/2026	27/02/2026
36	SPL43F	Values and Ethics for Professionals (SPL43F)	Mithu Dey	23/02/2026	27/02/2026
37	SPL44F	Community Development through Technical Institutes (Prog. Code: SPL44F)	Sheela Yadav Rai	23/02/2026	27/02/2026
38	SPL-AP1	Advanced Pedagogy	Arpan Kumar Mondal and Sukanta Kumar Naskar	23/02/2026	06/03/2026
39	SPL42F	Development of Laboratory Instruction and Manual	Subrata Mondal	23/02/2026	27/02/2026
40	SPL43F	Values and Ethics for Professionals	Mithu Dey	23/02/2026	27/02/2026
41	SPL44F	Community Development through Technical Institutes	Sheela Yadav Rai	23/02/2026	27/02/2026
42	SPL46F	Machine Learning With Python	Jagadeesh MS	23/02/2026	27/02/2026
43	SPL53F	How to Write Thesis and Research paper	Rayapati Subbarao	23/02/2026	27/02/2026
44	PS65C	Assessment, Evaluation and Development of question bank	Sagarika Pal	23/02/2026	27/02/2026
45	SPL45F	Introduction to Artificial Intelligence	Indrajit Saha	09/03/2026	13/03/2026
46	SPL52F	Introduction to Quantum Computing and Its Applications in Engineering	K Venkata Rao	09/03/2026	13/03/2026
47	CU193C	Modern Teaching Practices with Technology in Education	Saurabh Kumar Yadav	09/03/2026	13/03/2026
48	PS66C	Introduction to Problem Based Learning	Kinsuk Giri, Arpan Kumar Mondal, Indrajit Saha, Sagarika Pal	09/03/2026	20/03/2026
49	PS67C	Assessment, Evaluation and Development of question bank	Sagarika Pal	09/03/2026	13/03/2026
50	PS77C	NBA Accreditation for polytechnic institutes	Rayapati Subbarao	16/03/2026	20/03/2026
51	CU230C	Environmental Chemistry	Kunwar R Singh	16/03/2026	27/03/2026
52	MGT14C	Project Management Techniques and Tools	Deepak Mehra	16/03/2026	20/03/2026
53	SPL-AP2	Advanced Pedagogy	Arpan Kumar Mondal and Sukanta Kumar Naskar	16/03/2026	27/03/2026
54	CU198C	Nature-Inspired Optimization: for real world application of Artificial intelligence	Saurabh Kumar Yadav	23/03/2026	27/03/2026
55	PS80C	NBA Accreditation and SAR preparation	Rayapati Subbarao	23/03/2026	27/03/2026
56	CU218C	Electric Vehicle: charging station and Drives Control	Papia Ray	23/03/2026	27/03/2026
57	CU201C	Integrated Circuit (IC) Design	Niladri Pratap Maity	06/04/2026	10/04/2026
58	CU46C	Transforming Waste into Clean Energy: Building a Sustainable Future	Naveen BP	06/04/2026	10/04/2026
59	PS02C	Digital Twin Frameworks for Advanced Engineering Systems	K Venkata Rao	13/04/2026	17/04/2026
60	PS03A	Advanced Pedagogy	Arpan Kumar Mondal and Sukanta Kumar Naskar	13/04/2026	24/04/2026
61	PS04C	ICT Tools for Teaching Learning and Assessment	Kinsuk Giri	20/04/2026	24/04/2026
62	PS07C	Accreditation for Polytechnic and Engineering Institutes	Rayapati Subbarao	20/04/2026	24/04/2026

Publications

JOURNAL

- 1) Sumant Kumar Dalai, Kaibalya Prasad Panda, Sze Sing Lee, **Gayadhar Panda**, Jibitesh Kumar Panda, Performance evaluation of novel common grounding boost inverter under standalone and grid-connected modes, Energy Reports, Volume 15, 2026, 109318, ISSN 2352-4847, <https://doi.org/10.1016/j.egyr.2026.109318>.
- 2) K. Prasad Panda, S.Kumar Dalai, A. Prasad Panda, R.T Naayagi, and **G. Panda**, "Self-Regulated Capacitors-Based Extendable Reduced Switch Y-Type Multilevel Inverter," International Journal of Circuit Theory and Applications 54, no. 1 (2026): 409–420, <https://doi.org/10.1002/cta.4584>.
- 3) Vaibhav Sharma, Garima Nagpal, **B. P. Naveen** and Piyush Gupta (2026) "An updated review on landfill leachate treatment methods "Discover Chemistry, Springer, Vol.3 1-58.<https://doi.org/10.1007/s44371-026-00473-3>.
- 4) Mahavir Singh Rawat; Smita Kaloni and **Naveen B.P** (2026) " Influence of alkali molarity and recycled aggregates on sustainable geopolymer concrete" Proceedings of the Institution of Civil Engineers - Structures and Buildings, emerald insight Publisher, ICE, 1-24. <https://doi.org/10.1680/jstbu.25.00136>
- 5) Soharu A, **Naveen BP** and Vaid K (2026) Modelling material flow of construction and demolition waste from an infrastructure project for the construction phase, Proceedings of the Institution of Civil Engineers – Waste and Resource Management, emerald insight publisher, ICE, 1-10.<https://doi.org/10.1680/jwarm.25.00016>
- 6) Abdollahi, M.S., Soltaninejad, S. & **Naveen, B.P.** Comprehensive numerical analysis of landslide risk management: a case study of the Jiroft Dam. Innov. Infrastruct. Solut. 11, 214 (2026). <https://doi.org/10.1007/s41062-026-02622-0>
- 7) Sayon Dey and **Rayapati Subbarao**, 'Scenario of Joining Various Aluminium and Its Alloys for Automobile Applications by Using FSW Method', Lecture Notes in Mechanical Engineering, pp. 25-34, 2026.
- 8) N.Mahato and **R. Subbarao**, "Stress Distribution and Heat Transfer of Steel Alloys Insights Into Gas Turbine Compressor Stator Blade Performance and Failure Mechanisms." ChemistrySelect 11, no. 13 (2026): e06438. <https://doi.org/10.1002/slct.202506438>

BOOK CHAPTERS

- 9) Dalai, S.K., Panda, K.P., **Panda, G.** (2025). Evolution of Reduced-Component Switched-Capacitor Boost Inverters for Photovoltaic System. In: Gopal, Y., Dhaked, D.K., Panda, K.P., Rosas-Caro, J.C. (eds) Multilevel Inverter Technology for Renewable Energy Systems. Green Energy and Technology. Springer, Cham. https://doi.org/10.1007/978-3-032-03589-9_3
- 10) Panda, K.P., Dalai, S.K., Gopal, Y., **Panda, G.** (2025). Common-Ground Boosting Multilevel Inverter Topology with Optimal Components Count. In: Gopal, Y., Dhaked, D.K., Panda, K.P., Rosas-Caro, J.C. (eds) Multilevel Inverter Technology for Renewable Energy Systems. Green Energy and Technology. Springer, Cham. https://doi.org/10.1007/978-3-032-03589-9_7

PATENT PUBLICATION:

- Prof. Naveen BP was granted the patent titled "**A Zeolite Material and Its Method for Remediation by Immobilization to Treat Contaminated Soil**" (Patent No. 585388) on 27 March 2026.

PAPERS PRESENTED IN CONFERENCES & CONFERENCE PROCEEDINGS:

- M. Kumar, K. P. Panda, R. Thakur and **G. Panda**, "Design and Implementation of a High Gain DC-DC Converter for Solar Photovoltaic Systems", 2025 IEEE 4th International Conference on Smart Technologies for Power, Energy and Control (STPEC), Goa, India, 2025, pp. 1-6, doi: 10.1109/STPEC66316.2025.11490338.
- **Rayapati Subbarao**, Trisha Biswaghri, Sukanta Kumar Naskar, Ascertainment of appropriate sample size for the ranking of technical institutes in a region to ensure more sustainability Paper ID – 163, 1st International Conference on Advances in Mechanical and Aerospace Sciences, (ICAMAS-2026), NIT Arunachal Pradesh, 10th –12th March, 2026
- **Rayapati Subbarao**, "Feasibility of alternate fuels in transportation for environmental friendly and sustainable future", Paper ID – 162, 1st International Conference on Advances in Mechanical and Aerospace Sciences, (ICAMAS-2026), NIT Arunachal Pradesh, 10th –12th March, 2026.

MAGAZINE

- Prof. Naveen B.P. (2026). *Strategic Leadership in Higher Education*. Published in Ignited Minds Today (IMT) Magazine, March 21, 2026; <https://tinyurl.com/246ajeb2>

Miscellaneous

ACTIVITIES OF LEARNING RESOURCE CENTRE

- i. List of educational resources developed/video coverage during the period
 - a) MOOC video recording – 23nos
 - b) Educational Video Film -- 9nos
 - c) Video recording of other institutional program- 07nos
 - ii. Photo coverage of the events during 1st January – 30th April, 2026
- During the above-mentioned period following Thirteen (13) events were covered:
- a) Sports & cultural competition for M.Tech and PhD students
 - b) Blood donation camp Jan09 2026
 - c) Observation of the 62nd Foundation Day Jan11 2026
 - d) Curriculum Development workshop for Odisha state on 16.01.2026
 - e) National workshop on wellbeing for Youth & Gen-Z on 19.01.2026
 - f) Observation of 77th Independence Day 26th January 2026
 - g) 1st Annual Sports Meet February 25 2026
 - h) A hands-on- Workshop between NITTTR, Kolkata and MIDASS
 - i) National Education & Leadership conclave 2026 organised by CE Department on 26.02.2026
 - j) Seva Sankalp Resolution oath taking program newly adopted by the Union Cabinet on March 04 2026
 - k) International Seminar on Women in Engineering organized by TE&M Dept. on 24 & 25 March 2026
 - l) Student Interactive program with Industry expert on 10.04.2026
 - m) A special lecture on 'Traditional Indian Engineering Knowledge and its application in Modern Education System' on 27.04.2026

iii) Any other news item worth publishing.

Beside this, during this period, hybrid mode M Tech classes (each of 1Hr duration) conducted from two Smart –Classrooms of LRC on regular basis.

Ph.D Supervision

Mr. Suman Kumar Bhattacharyya, AICTE-QIP scholar, Electrical Engineering Dept. has completed his Ph.D. successfully on 20th February 2026 from Maulana Abul Kalam Azad University of Technology, West Bengal, under the supervision of **Dr. Sagarika Pal**, Associate Professor, Electrical Engineering Dept.

Conference attendance and presentation

1. **Dr. Rayapati Subbarao** attended the 1st International Conference on Advances in Mechanical and Aerospace Sciences, (ICAMAS-2026), held at NIT Arunachal Pradesh from 10th – 12th March, 2026. He also presented two of his papers on sample size for ranking and alternative fuels. He also acted as a reviewer for the papers presented at the conference.
2. **Dr. Rayapati Subbarao** attended the 2-day International Seminar on Women in Engineering, held at NITTTR Kolkata from 24th to 25th March 2026.

National Education Leadership Conclave 2026

Glimpse

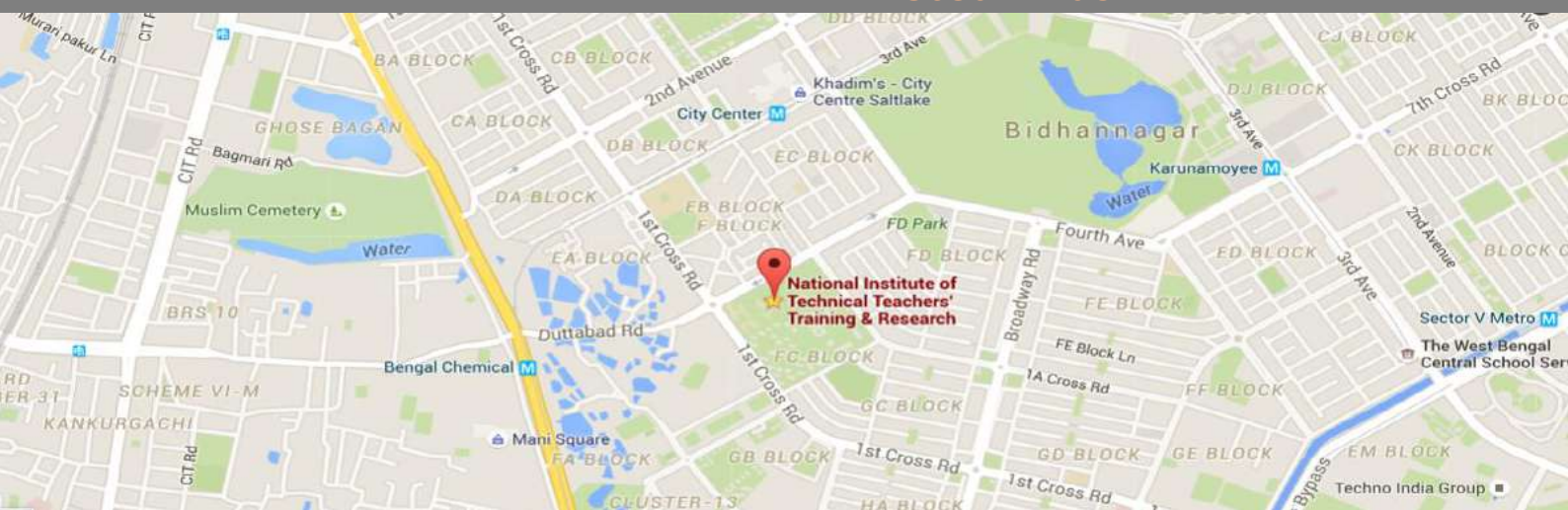




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**“To live is the rarest thing in the world.
 Most people exist, that is all”**

- Oscar Wilde



Distance:

- From Howrah Railway Station: **42 min** (8.1 km) via Maniktala Main Road
- From Sealdah Station: **26 min** (7.4 km) via Beliaghata Main Road and Broadway Road
- From Kolkata Railway Station: **16 min** (4.8 km) via Canal Circular Road
- From Shalimar Station: **38 min** (18.8 km) via Parama Island Flyover
- From Netaji Subhas Chandra Bose International Airport: **27 min** (11.5 km) via Kazi Nazrul Islam Sarani/VIP Road

Google map link: <https://goo.gl/maps/F7gssJoeqxSvffqf9>



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