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# IITBBS Express

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# Nature is Speaking



Picture Credit: Manoj Kumar Sahoo



# Training Programme on 'Survey, Investigation and Preparation of DPR for Bridges in Rural Roads'

School of Infrastructure has inaugurated a 5-day training programme on 'Survey, Investigation and Preparation of DPR for Bridges in Rural Roads' on 9th September 2024, highlighting the Importance of Data-centric thorough research, Geotechnical Investigation and Safe & Resilient Design in bridge construction. The training programme will end on 13th September 2024.

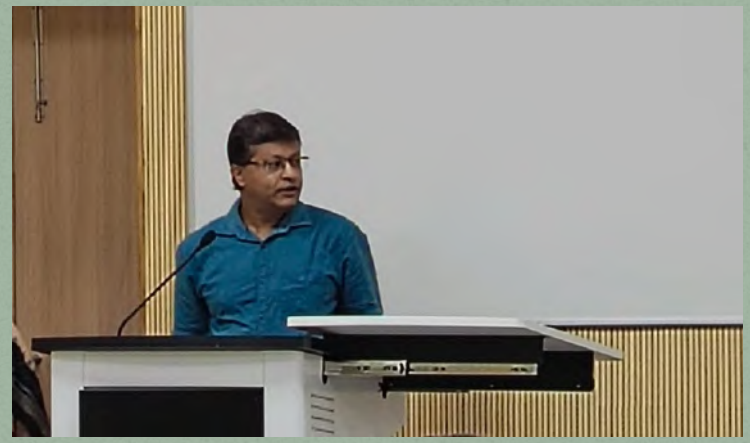
The event was inaugurated by Er. Ashok Kumar Basa, a renowned bridge engineer from Odisha, former President, Institute of Engineers India (IEI), and currently serving as the Executive Vice President of the World Federation of Engineering Organizations (WFEO). The inauguration ceremony was also attended by Shri Aswani Kumar Padhi, Senior Bridge Engineer from SMEC India; Prof. V. Panduranga, Dean of Continuing Education at IIT Bhubaneswar; and Prof. Sumanta Halder, Head of the School of Infrastructure. The course was coordinated by Dr. Suresh R. Dash and Dr. Umesh Chandra Sahoo of the School of Infrastructure, IIT Bhubaneswar. More than 40 delegates from across India, involved in bridge analysis, design, or construction, participated in the workshop. The course received financial support from NRIDA, Government of India.



Speaking on this occasion, Dr. Dash emphasized that, despite the critical role of bridges in our infrastructure, bridge design is frequently overlooked in regular academic curricula in India. Past bridge failures have highlighted the need for serious attention to bridge design, construction, and maintenance. The frequent news of bridge failures is concerning. Although bridges are designed to last 100 years, their premature deterioration raises concerns for all involved in their planning, design, construction, and maintenance.

Motivating delegates on the importance of studying bridge failures constructively to prevent future mistakes, Shri Basa highlighted the profession's pride in constructing numerous monumental bridges. He stressed the importance of thorough and accurate geotechnical and hydrological site data collection, likening it to prescribing medicine based on accurate pathological reports. Without adequate site data, no amount of sophistication in design can prevent structural failure. He also discussed several bridge failure cases, illustrating how minor mistakes in design or construction can lead to catastrophic consequences.





This 5-day training programme includes several crucial aspects of bridge design, including Bridge Planning, DPR Preparation for Bridges, Soil Investigation, Hydraulic Design, Load Assessment on Bridges, and the Design of Superstructures, Substructures, and Foundations, including Seismic Considerations. Advanced topics such as Lightweight Bridges and Bridge Health Monitoring are also part of the programme. The course also featured hands-on exercises and a field visit to an under-construction bridge site on 11th September 2024.





## Mushaira at IIT Bhubaneswar An Evening of Cultural Resonance & Romantic Verse

On 30th August, the Community Centre at IIT Bhubaneswar came alive with the soulful echoes of poetry as Abhivyakti, the Hindi Literary Society of the institute hosted a *Mushaira* that brought together poets from AIIMS, NISER, KIIT, and IIT Bhubaneswar. The evening was a celebration of culture and creativity, with a special focus on *shayaris* and poems that explored the theme of love.



The *Mushaira* was graced by a series of original compositions, with students from each participating institution sharing their unique interpretations of love through beautifully crafted verses. The shayaris, rich in emotion and elegance, captivated the audience, evoking both smiles and contemplative silence. These poetic expressions ranged from the tender joys of first love to the deeper reflections on longing and loss, resonating with listeners on a profound level.







In addition to the poets, students from KIIT, AIIMS, and NISER also attended as part of the audience, adding to the event's diversity and depth. The interaction between the poets and the audience was warm and engaging, with heartfelt applause and nods of understanding as each poet unveiled their thoughts on love. This created an intimate atmosphere, providing a great ambience for shared emotions and artistic exchange.



The poets were felicitated recognizing their contributions to the evening's success. The Mushaira was more than just an evening of poetry; it was a celebration of the human experience, captured through the lens of love. The event underscored the importance of cultural gatherings in fostering connections and inspiring creativity within the academic community.





# National Sports Day



IIT Bhubaneswar has celebrated National Sports Day. As part of the celebrations, the Institute organised various sports activities from 29th to 31st August 2024, as part of the Fit India Movement of Ministry of Youth Affairs & Sports, Government of India. Various friendly matches were conducted between the staff and students, that concluded with Fit India Pledge.





## Gastro & Oral Screening Camp

As part of its healthcare initiative, IIT Bhubaneswar organised a free Gastro & Oral Screening camp for its members. Bagchi Sri Shankara Cancer Centre & Research Institute, in association with the Sanjeevan Health Centre of IIT Bhubaneswar organized this health camp on 31st August 2024.



On this occasion, Dr. Debakanta Mishra, Department of Gastroenterology and Dr. Mahesh Sultania, Department of Head & Neck Oncology from Bagchi Sri Shankara Cancer Centre & Research Institute, along with their team conducted the screening for Gastro and Oral Cancer among the students, employees and residents of the Institute. As part of the camp, they also created awareness about the disease and suggested the participants about the preventive measures.



Around 40 members of the Institute attended the camp and benefitted. Dr. Mansoor Ahmed Khan, Senior Medical Officer of the Institute coordinated the programme. Dr. Abhimanyu Raju S.R., Medical Officer, Sanjeevan Health Centre was present during the camp and provided support to the team.



## NSS IIT Bhubaneswar celebrates International Literacy Day

The NSS Wing of IIT Bhubaneswar celebrated International Literacy Day on 8th September 2024 to commemorate the critical importance of literacy for creating a more just, peaceful, and sustainable society. A quiz programme titled 'Awareness Arena' was organised to mark the occasion, which witnessed participation of more than 100 students. Dr. Sivaiah Bathula, NSS Coordinator of the Institute coordinated the programme.





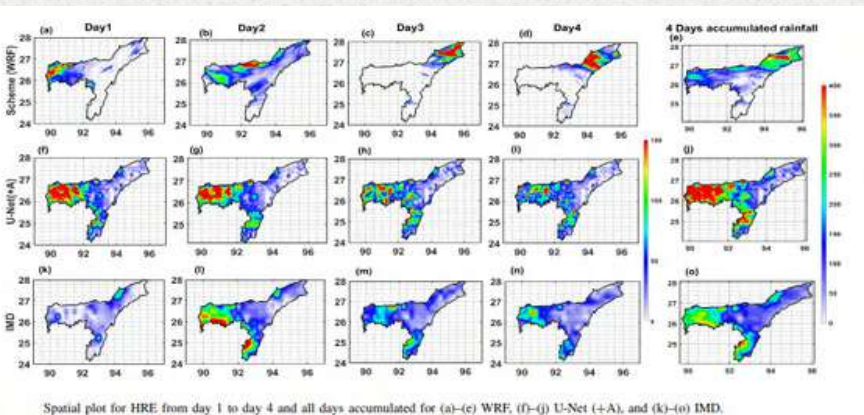
## Study on Advancing Rainfall Prediction Accuracy through Deep Learning

### *Special reference to complex terrains of Assam in Real Time*

In climate change scenarios, there is a rapid rise in the intensity and frequency of heavy rainfall events over the Indian region. These heavy rainfall events (HREs) have significant consequences and have a profound impact on our society. However, accurate rainfall prediction with adequate lead-time is an immense challenge for the current state of art dynamical models. Furthermore, this problem is exacerbated over complex mountainous terrains. State-of-the-art traditional numerical weather prediction (NWP) models and their ensembles, while useful, often struggle with accurately forecasting such events due to the intricate topography and varied climate patterns.

To overcome these limitations, for the first time, IIT Bhubaneswar has developed a hybrid technology integrating the output from the Weather Research and Forecasting (WRF) model into a deep learning (DL) model to enhance prediction accuracy particularly with an aim to improve prediction of heavy rainfall events with an adequate lead time. The studies were carried out over the complex terrain of Assam (highly vulnerable to severe flooding) during June 2023 and over the state of Odisha where heavy rainfall events are highly dynamic in nature due to the landfall of multiple intense rain bearing monsoon low-pressure systems. In Assam, the hybrid model displays prediction accuracy that is nearly double that of traditional ensemble models at a district level with a lead time up to 96 hours, showcasing its remarkable performance. These innovative studies have been carried out using retrospective cases.

A team comprising Dr. Dhananjay Trivedi, Dr. Omveer Sharma, Dr. Vivekananda Hazra, Dr. Sandeep Pattnaik from the School of Earth Ocean and Climate Sciences and Dr. Niladri Bihari Puan, School of Electrical and Computer Sciences at IIT Bhubaneswar carried out these studies. The work has been supported by the Council of Scientific and Industrial Research (CSIR), and the New Venture Fund U.S., and IIT Bhubaneswar.



### References :

- <https://ieeexplore.ieee.org/document/10473751>
- 1. <https://ieeexplore.ieee.org/document/10274480>
- 1. <https://link.springer.com/article/10.1007/s00704-023-04734-4>
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- 1. <https://www.nature.com/articles/d44151-023-00180-3>

### Key Findings:

- **District-Level Precision:** First of its kind in real time to improving forecast skills on a district-scale.
- **Enhanced Prediction Accuracy:** The DL model demonstrated a notable improvement in forecast accuracy, capturing 54.4% of HREs compared to the WRF model's 22.8%. The DL model also achieved a mean absolute error (MAE) of under 30 mm, significantly lower than WRF's over 50 mm MAE for days 2–4 of the forecast period.
- **Technological Innovation:** The research introduces a U-Net model with a spatio-attention (SA) module that captures intricate spatial dependencies of rainfall features at district scale.



## Solar-Powered Microwave Pyrolysis Reactor for Sustainable Waste Management

A research team from the School of Infrastructure has developed an innovative solar-powered microwave pyrolysis reactor designed to recover valuable resources from both segregated and mixed waste materials, including biomass and plastics. The novel reactor uses microwave-assisted pyrolysis to rapidly convert waste into valuable products such as highly porous carbonaceous material (biochar) and bio-oil, depending on the characteristics of the feedstock and operating conditions. Dr. Remya Neelancherry, the lead researcher of the project, along with research scholars Rejeti Venkat Srinadh and Sohom Chatterjee has developed this innovative product.

Current solid waste management practices primarily involve incineration, biogas plants, or landfill disposal, offering limited opportunities for recycling. Incineration, while an alternative to landfilling, often leads to significant environmental pollution through the release of toxic gases and ashes. The microwave-assisted pyrolysis technology developed by IIT Bhubaneswar represents a promising solution to these challenges. Indian patent has been granted on the technology used in this project.



Dr. Remya explains the technology's working principles: "This emerging technology utilizes microwave radiation to generate homogeneous heat within the feedstock, enabling efficient conversion into valuable end products at a faster rate with precise control over reactions. Furthermore, the reactor operates entirely on solar power, ensuring sustainability and self-reliance without imposing any additional energy demands." This is a novel, mobile technology requiring minimal footprint area, capable of converting waste at a rate of 10 kg/h into high-value end-products. The ease of mobility promotes decentralized waste management. Moreover, the technology is carbon-neutral, offering investors a direct opportunity to generate carbon credits.

The end products of this process, biochar and bio-oil, have a wide range of applications, from healthcare to agriculture and industrial applications.

This environment-friendly technology can be implemented by municipalities and industries across various locations within cities, offering the potential to generate significant revenue with minimal pollution compared to incineration and other conventional waste management techniques.



## Distinguished Visitors



Dr. Kieran Hunt, Research Fellow, Department of Meteorology, University of Reading Visited School of Earth, Ocean and Climate Sciences (SEOCS), IIT Bhubaneswar during 26th to 27th August 2024 to carry out collaborative work. He has also accompanied by Dr. A. K. Mitra, Former Director, National Centre for Medium Range Weather Forecasting (NCMRWF), Ministry of Earth Sciences, Government of India. Dr. Hunt delivered a lecture entitled 'Using explainable AI to better understand Indian weather' to students and scholars. The talk discussed recent works related to paleo monsoon, monsoon low pressure systems and energy. Further, both the scientists interacted with faculty members, students and research scholars and also actively participated in the Janmastami Celebrations by Jijnasa Club.





# Open Schools Chess Championship Concludes at Aanand Kids Activity Centre

The Open Schools Chess Championship, a much-anticipated state-level event, successfully concluded on 1st September 2024, at the Aanand Kids Activity Centre. The championship saw the participation of more than fifty talented students from schools across Odisha, all of whom demonstrated exceptional strategic skills and a deep passion for chess. Jointly organized by the Aanand Kids Activity Center, Dream Chess Academy, and the Jatni Chess Association at the Community Centre, the championship provided a vibrant platform for young chess enthusiasts to display their skills, learn from one another, and foster a spirit of healthy competition.



Neelansh G. from Kendriya Vidyalaya, IIT Bhubaneswar, emerged as the champion of the tournament, displaying outstanding skill and strategy. Himansu Sekhar Sahoo from Railway School, Khurda Road, and Naman Singh, also from Kendriya Vidyalaya, IIT Bhubaneswar, secured the runners-up positions, contributing to the event's competitive spirit and excitement.



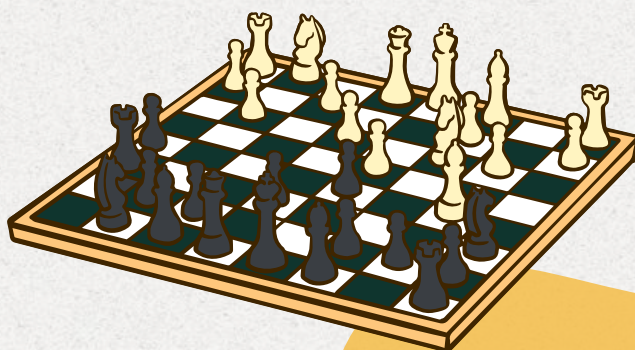




In addition to the top two winners, several other students were recognized for their outstanding performances and were awarded trophies. The awardees included Aditya Prasad Subudhi, Hridaya Srinivasa, Ayan Ankit Swain, Surendu Prakash Sahu, Ronit Agrawal, Satya Swarup Das, Aarav Agrawal, Jigyansha Mohanty, Thanvi Vinoj, Mohammed Fayaz, Arnesh Patra, Advait Shukla, and others. The event also featured commendable performances from the Aanand Kids from different Schools, namely Neelansh Gollapudi, Naman Singh, Hridaya Srinivasa, Jigyansha Mohanty, Thanvi Vinoj, Mohammed Fayaz, Arnesh Patra, Advait Shukla, Ahaan Khan, Manomay Bhumkar, Pradhyush Nandan Reddy, Bhakti, Vedant Prajapati, Sibanshu Sahoo, Mayukh Pandit, Ankan Haldar, Sidiksha Haldar, Ayushman Sridhar, Avyakt Shukla, and Abeer Khan, who all showcased impressive chess skills.



The tournament was skillfully conducted under the expert guidance of Shri Avinash Baliarsingh, Director of Dream Chess Academy and Shri Suresh Baliarsingh, President of the Jatni Chess Association. They were ably supported by members of Aanand, Dr. R. Venkat Raghavan, Smt. Subarna Pandit, Smt. S. Radhika Patro, Dr. Sapna Khan, Smt. Suhana Parween and others.





# Ganesh Puja Celebrations





## Vatsalya celebrates Janmashtami

Vatsalya (day care centre) of IIT Bhubaneswar has celebrated the Janmashtami Festival on 26th August 2024, with great enthusiasm.





মোৰ ক'লা ঢুলিত ৰাতিপুৱাৰ ৰঙা ৰ'দ পৰ  
চকুৰ আগৰ কুঁৱলিবোৰ ভয়ত উৰা মাৰে  
জাগি উঠা মানুহে হেজাৰ চিঞৰ মাৰে  
তাতে ঠেকা লাগি হেজাৰ পাহাৰ ভাগি পৰে  
মানৱ সাগৰত কোলাহল শুনো  
নতুন চিঞৰটিৰ প্ৰতিধ্বনি শুনো

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মোৰ গাঁৱৰে সীমাৰে পাহাৰৰ সিপাৰৰ  
প্ৰতিধ্বনি শুনো মই প্ৰতিধ্বনি শুনো।

Mur kola sulit ratipuwa ronga rod pore  
Sokur agor kuwoli bur bhoyot ura maare  
Jagi utha manuhe hezar siyor maare  
Tate theka lagi hezar pahar bhangir pore  
Manow hagarot kulahol hunu  
Notun siyortir protidhwoni hunu

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Mur gaore himare paharor hiparor  
Protidhwoni hunu moi, protidhwoni hunu

*Original Assamese Song :Pratidhwani Hunu*

The red morning sunlight falls on my black hair and leaves its colour  
The fog in front of my eyes disappears in fear  
The awakened people raise a thousand voices  
The voices strike against thousand hills and break away  
I hear the uproars in the ocean of humanity  
I hear the echoes of the new sounds

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The border guards at the edge of my village  
I hear an echo, I hear an echo