



CETSD Newsletter

Oct - Dec 2024



**CENTER FOR
EMERGING TECHNOLOGIES
FOR SUSTAINABLE DEVELOPMENT
(CETSD)**

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About CETSD

The Center for Emerging Technologies for Sustainable Development (CETSD) was established on 14 January 2020. CETSD aims for sustainable development towards a carbon-neutral, bio-based, self-sufficient economy through safer, green technologies. Research focuses on United Nations Sustainable Development Goals (UNSDGs), covering areas such as soil, air, and water decontamination, pollution control, environmental monitoring through sensors and IoT, resource recovery, carbon capture, waste management, climate-water-energy-food nexus, sustainable building design, green energy, climate change adaptation, public health, biodiversity, rural development, and smart agriculture.

Vision To be a partner in tapping the potential of emerging technologies for creating a sustainable and prosperous future India.

Mission

- To provide a platform for non-governmental and governmental collaborators to work together to apply emerging technologies for finding and implementing solutions towards achieving SDGs.
- To help develop scientific temper societies to understand technologies that are sustainable or technologies that are using sustainability aspects.
- To innovate solutions towards challenges in location specific problems related to energy use, education, water management, infrastructure, traditional livelihood skills, and health.
- To perform applied research in areas such agriculture, environment, healthcare, waste management, pollution, livelihood, and rural development.

Message from the Head

Welcome to the Center for Emerging Technologies on Sustainable Development at IIT Jodhpur. The center began in 2019 with a dedicated faculty team undertaking research and development in different thematic areas of Sustainability. We undertake research and development on cutting- edge/emerging technologies that address pressing sustainability challenges. We aim to integrate technological advancements with sustainable practices that balance economic growth, social equity, and environmental protection. We are exploring exciting projects in water treatment & management, renewable energy, sustainable agriculture, smart cities, climate resilience, indigenous skills, and resource-efficient systems. Our center aims to contribute meaningfully to the United Nations' Sustainable Development Goals (SDGs) through interdisciplinary research, collaborations, and stakeholder connections. CETSD is open to collaborative projects, thoughtful insights, and potential partnerships toward sustainable development.

Scientific Achievements

PROJECTS

- **STI (Science and Technology Innovation) Hub**, 265 Lakhs: 2023-2026; Funding agency: DST
 - Team: Prof. Anand Plappally (PI), Dr. Prasenjeet Tribhuvan (Co-PI), Prof. P. K. Tewari (Co-PI)
- **Livelihood Business Incubator. Upajivanam**, 166 Lakhs: 2024-2029; Funding agency: MSME
 - Team: Prof. Anand Plappally (PI), Dr. Venkatesha Murty
- **NMR diffusometry and relaxometry approaches to evaluate molecular interaction and dynamics in nanosponges**, 64,02,264 INR: Feb. 2024-Feb. 2027; Funding Agency: SERB CRG
 - PI: Prof. Samanwita Pal
- **Hybrid organic-inorganic membranes with tunable pore sizes and physio-chemical properties for energy-efficient separation technologies**, 35 Lakhs: Jan 2023- Jan 2028
 - PI: Dr. Kirti Sankhala
- **Redesigning Urban Infrastructure for Sustainable Cities: A system of systems approach through Digital Twins**, 100 Lakhs: 2024-2026; Funding agency: IIT Jodhpur (Institute Project with School of AI and DS)
 - Team: Dr. Shreya Banerjee (Co-PI), Dr. Chandana N (Co-PI), Dr. Saran Adhar (Co-PI), Dr. Debasis Das (Co-PI), Dr. Trishikhi Roychoudhary (Co-PI), Dr. Vinod Vijay Kumar (Co-PI) Dr. Kirti Sankhala (Co-PI), Dr. Anugya Shukla (member)
- **Generative Causal AI Powered Digital Twin with Reinforcement Learning for Sustainable Urban Transformation-Phase 1**, 200 Lakhs: 2024-2025; Funding agency: MoE
 - Team: Dr. Shreya Banerjee (Co-PI), Dr. Chandana N (Co-PI), Dr. Saran Adhar (Co-PI), Dr. Debasis Das (Co-PI), Dr. Anugya Shukla (member)
- **Are we ready for the adverse effects of climate migration? A study on climate change-induced internal migration in India for 2040**, 5 Lakhs: 2023-2025; Funding agency: JP Narayan National Center of Excellence in Humanities, IIT Indore
 - PI: Dr. Anugya Shukla
- **Self-Healing Bacterial Concrete for Resilient Wastewater Infrastructure**, 25 Lakhs: 2023-2026; Funding agency: IIT Jodhpur
 - PI: Dr. Chandana N
- **Nanofiltration membranes for energy- efficient water treatment**, 25 Lakhs: Dec 2023 - Dec 2026; Funding agency: IIT Jodhpur
 - PI: Dr. Kirti Sankhala

- **Comprehensive Framework for Integrated Health Risk Assessment**, 25 Lakhs: 2024-27; Funding agency: IIT Jodhpur
 - PI: Dr. Rajyalakshmi Garaga
- **Inspection of Industrial units at Bhilwara through Rajasthan Pollution Control Board**, 0.48 Lakhs: 2024; Funding agency: Rajasthan State Pollution Control board
 - PI: Dr. Rajyalakshmi Garaga
- **UF Membrane Assisted Sorption Based Water Purification Systems in Rural 13 Village Schools of Jodhpur District, Rajasthan**, 40 Lakhs: 2021-2024; Funding agency: HEFA-CSR
 - PI: Prof. Anand Plappally
- **Unnat Bharat Abhiyan -Regional Coordinating Institute (UBA-RCI) IIT Jodhpur**, 10 Lakhs/year: 2019-2026; Funding agency: UBA
 - Team: Dr. Vivek Vijay (Regional Coordinator), Dr. Rajyalakshmi Garaga (PI)
- **GIS Survey Of Waqf Properties & Updation In An Online Waqf Assets Management System Of India (WAMSI)— For State of Rajasthan**, 110.62 Lakh: 2022-till date; Funding agency: Central WAQF board, Ministry of minorities
 - Team: Dr. Farhat Naz (PI) and Dr. Anand Plappally (Co-PI)
- **Micro and Meso-Scale Urban Climate Modelling and research for improved weather prediction and disaster risk reduction over urban area**, 26 Lakhs: 2024-2027; Funding agency: ISRO.
 - PI: Dr. Anugya Shukla
- **2D-3D heterostructure based Green Catalyst for the Efficient Capture and Conversion of CO₂ into Green Fuels via Artificial Photosynthesis**, 1,25,81,452/- INR: 2023-2025; Funding agency: Oil India Limited.
 - PI: Dr. Kumud Malika Tripathi
- **Sand dune study and erosion modelling for a proposed solar park**
 - PI: Dr. Pradeep Kumar Dammala
- **Designing water sustainability in urban contexts from socio hydrological systems approach: a study of Bangalore, India, and Kaohsiung, Taiwan**; Funding Agency: Indian council of social science research - national science and technology council; 2024-26,
 - Co-PI: Dr. Chandana N.

RESEARCH PUBLICATIONS

1. Chalka, V. K., Mishra, A., Chhabra, M., Rangra, K., & Dhanekar, S., A Lab Prototype for Rapid Electrochemical Detection of Escherichia coli in Water Using Modified Screen-Printed Electrodes. ACS Applied Bio Materials, 2024, 7(11), 7269-7279.

2. Jangir, N., Marik, D., Verma, D. et al. Nano Urea Outperforms Equimolar Bulk Urea in the Hydroponic Growth of *Arabidopsis thaliana* by Inducing Higher Levels of Nitrogen Assimilation and Chlorophyll Biosynthesis Genes. *J Plant Growth Regul* (2024).
3. Gouri Sankar Das, Lokesh K Jangir, K. Sandeep Raju, Yogesh Chandra Sharma, Kumud Malika Tripathi. Waste biomass-based 3D graphene aerogels for high performance zinc-ion hybrid supercapacitors. *Chem. Commun.*, 2024, 60, 10568–10571.
4. Dhiman V, Marik D, Amrita, Shekhawat RS, Swain AK, Dey A, Yadav P, Pal A, Dey S, Sadhukhan A (2024) AP2/ERF Transcription Factor Orthologs of the Desert Tree *Prosopis cineraria* Show Higher Copy Number and DNA-Binding Affinity than Drought-Sensitive Species. *Journal of Plant Growth Regulation*
5. Book Chapter
Rajkumar Satankar, Anand Krishnan Plappally, Deepak Saxena, Timothy Savage, and P. J. Wall, 2024, A Socio-cultural Perspective on Technology for Environmental Sustainability: The Case of Filtering Water Pots (G-filters) in Rajasthan, India IFIP AICT 709, Wallace Chigona, Salah Kabanda, Lisa F. Seymour Editors, 18th IFIP WG 9.4, ICT4D.
6. Book
Anjana Nair, Prasenjeet Tribhuvan, S. Mukhopadhyay, A. Plappally, Rural Technology Development and Delivery: Mapping Rural Technology Space in India, Imperial Publishers, Mumbai, India, pp. 628.

CONFERENCES

1. Dr. Chandana N., Invited talk: "Bioenzyme: Benefits of On-site Sanitation Technologies" in National Webinar on Bioenzymes-2024, Mithila Council of Science and Technology, Darbhanga, Dec 2024
2. Dr. Kirti Sankhala. Invited talk, "Sustainability of membranes: a key concern in membrane-based separations", International Conference on Soft Materials (ICSM) 2024, Universitat Rovira i Virgili, Tarragona, Spain

OUTREACH ACTIVITIES

Dr. Anugya Shukla

Working as a Mentor at the Master Mentor Geo-Enabling Indian Scholars (MMGEIS) Program launched by the Centre for Knowledge Sovereignty (CKS) and Esri India.