

Title: 1st International Workshop on “AI, Machine Learning, and Big Data Analytics in Water Resource Engineering and Management”.

Abstract: The 1st International Workshop on “AI, Machine Learning, and Big Data Analytics in Water Resource Engineering and Management” is aimed at providing the diverse community of researchers, practitioners and stakeholders, engaged in the water environmental field, a podium to explore applications and the transformative potential of Artificial Intelligence (AI) technologies in water resources management. In the modern world, AI, Machine Learning (ML) and big data analytics are collectively adopted to implement innovative solutions for the existing challenges associated in the water environment. The resourceful discussion in the workshop will be beneficial for policymakers to implement informed and enhanced decision making, optimized resource utilization, thus ensuring sustainability in water management strategies. The water sector, presently, encounters an array of challenges such as depletion, contamination and mismanagement. Data analytics tools can process extensive water environmental data to provide key insights of the water environment that can be utilized for the formulation of operational strategies. At the same time, anticipatory actions can be undertaken to avoid potential issues and crises. For example, data-driven predictive models can warn regulatory authorities about any future crisis scenarios. This workshop will provide an opportunity for a lively discussion between industry experts and academics to explore the future trajectory of AI applications in water management. Such discussions may result in delineating potential pathways for enhancement of ML algorithms to identify and combat future crisis scenarios and is expected to foster interdisciplinary collaboration to enhance sustainability and resource resilience. Collaborations and shared knowledge in this workshop will contribute towards shaping global water management strategies across the world.

Topics of Interest: This workshop will consider papers on the following topics of interest (but not limited to):

- Machine Learning, Big Data Analytics, and AI Approaches for Surface Water and Groundwater Quality Assessments
- Artificial Intelligence Applications in Coastal and Offshore Environments
- AI-Driven Decision Support Systems for Integrated Water Resources Management
- Real-Time Monitoring and Forecasting of Hydrological Extremes Using AI and ML
- Smart Water Infrastructure: Optimization and Automation Using AI Technologies

- Predictive Maintenance and Leak Detection in Water Distribution Networks Using Machine Learning
- Data-Driven Modelling of Water Demand and Consumption Patterns in Urban and Rural Settings
- AI Applications in Watershed and Catchment Management for Pollution Control
- Big Data Frameworks for Processing and Analysing Multisource Water Environmental Data
- Climate Change Impact Assessment on Water Resources Using AI and ML Techniques
- AI-Assisted Remote Sensing for Water Resource Monitoring and Assessment
- Case Studies and Best Practices in Implementing AI in the Water Sector

Co-Chairs 1: Dr. Md Salauddin, Head of Environmental Hydrodynamics and Coastal Resilience (EHCR) Lab, School of Civil Engineering, University College Dublin, Ireland. Email: md.salauddin@ucd.ie Web: <https://people.ucd.ie/md.salauddin>

Profile Brief Bio: Dr Md Salauddin is a Lecturer/Assistant Professor in Hydraulic Engineering within the School of Civil Engineering. His research interests include Protection of Critical Infrastructures (CIs), Extreme Events, Impacts of Extreme Events on CIs, and Climate Resilience of Coastal and Offshore Structures. Dr Salauddin is currently supervising 4 PhDs and 4 Research Masters working on resilience of hydraulic infrastructures under changing climatic conditions. He has published 70+ peer-reviewed research papers in reputed journals and national/international conferences.

Co-Chairs 2: Dr. Soroush Abolfathi, Associate Professor, School of Civil Engineering, University of Warwick, UK. Email: Soroush.Abolfathi@Warwick.ac.uk Web: https://warwick.ac.uk/fac/sci/eng/people/soroush_abolfathi

Profile Brief Bio: Dr. Soroush Abolfathi is an Associate Professor in Water and Environmental Engineering at the University of Warwick, UK. His research is focused on environmental fluid dynamics, climate resilience, and nature-based solutions. Dr. Abolfathi's research is at the forefront of integrating machine learning, numerical models, and remote sensing to address complex water resource management challenges and enhance environmental sustainability. He leads an internationally recognized research group with 10 PhDs and postdoctoral fellows. With over 100 peer-reviewed publications and a global reputation in water and hydroinformatic research, he is committed to fostering interdisciplinary innovation in sustainable water resource management.

Co-Chairs 3: Md Arman Habib. Post Doctoral Research Fellow I, School of Civil Engineering, University College Dublin, Ireland. Email: md.habib@ucdconnect.ie. ORCID: <https://orcid.org/0009-0003-0649-0493>

Md Arman Habib is an early-stage researcher currently working as a Postdoctoral Research Fellow at University College Dublin (UCD), after having completed his PhD at the same university in April 2025. Arman's research portfolio is related to the application of Artificial Intelligence (AI)-based Machine Learning (ML) methods for predictive modelling in the oceanic environment. Arman has also gained considerable expertise in experimental modelling of oceanic phenomena such as wave overtopping at the toe of sea defenses during his doctoral research. He has almost 3 years of work experience as a Research Assistant on projects related to water resources management. He has authored several peer-reviewed articles in the realms of coastal engineering and water resources management. Dr Arman also acquired mentoring, tutoring and demonstrating skills in the fields of hydraulics and water quality assessment during his doctoral studies. His current research involves the application of AI-based ML methods to detect cyberthreats in water distribution networks.