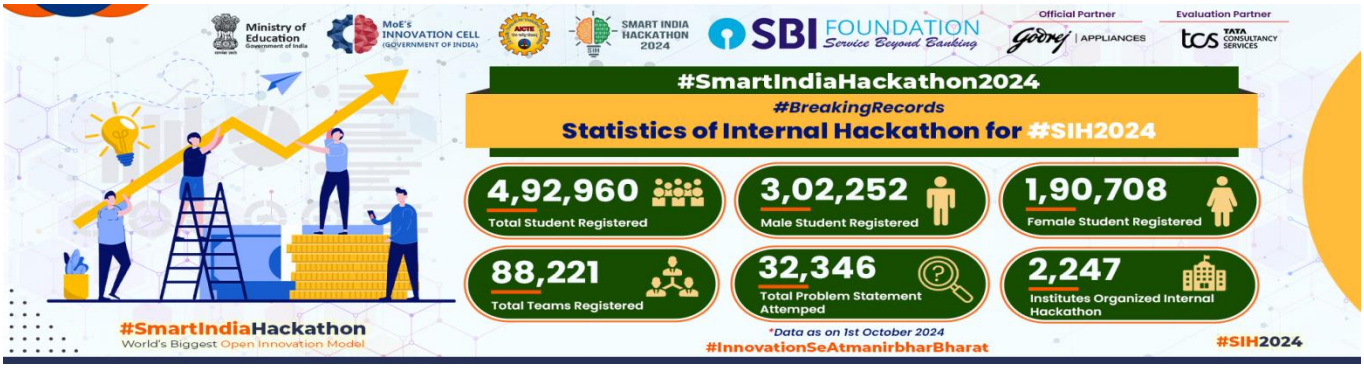
MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

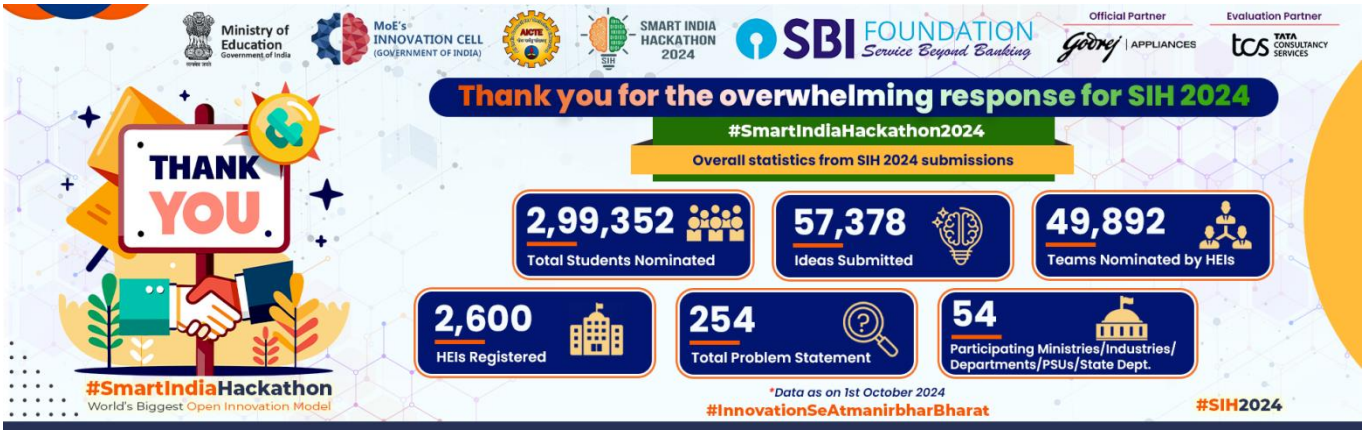
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Awards Received at different events

Smart India Hackathon (SIH) – 2024

(Software Edition)





Achievement	**:**	Selected for Grand Finale
Event	**:**	Smart India Hackathon (SIH) – 2024
Organized by	**:**	AICTE, MoE'S Innovacation Cell, I4C
Sponsored by	**:**	SBI, TCS, Godrej Enterprises
Event Place:	**:**	Indian Institute of Technology, Roorkee

Worked on:

PS Number	SIH1693
Category	Software
Theme	Smart Automation
Organization	Ministry of Jal Shakti
Problem Statement Title	Developing a Robust Hydraulic Transient Analysis Model for Hydro Power and Pumped Storage Schemes.

Student Details:

Roll No	Name of the Student	Year of Studying	Dept.
217Y1A05J3	M Yeshwanth Reddy	IV	CSE
217Y1A05I7	G Venkatesh	IV	CSE
217Y1A05I9	V Vinay Kumar	IV	CSE
217Y1A0534	G Nikhil Yadav	IV	CSE
227Y1A05D0	Azeem	III	CSE
227Y1A0593	Manashwini	IV	CSE

The **Smart India Hackathon (SIH) 2024** is a nationwide initiative by the Ministry of Education's Innovation Cell (MIC) and AICTE, aiming to provide students with a platform to solve pressing problems faced by society, industries, and government bodies. It encourages innovative thinking and problem-solving skills among students across India.

What is SIH 2024?

SIH 2024 is the 7th edition of this annual hackathon, featuring both **Software and Hardware editions**. Participants work in teams to develop innovative solutions for real-world problem statements provided by various ministries, departments, and industries.

Problem Statements

SIH 2024 presented **254 problem statements**, categorized into:

- **186 Software-related challenges**
- **68 Hardware-related challenges**

These problem statements span various themes, including:

- Robotics and Drones
- Transportation & Logistics
- Smart Automation
- Healthcare & Biomedical Devices
- Agriculture & Rural Development
- Clean & Green Technology
- Smart Education
- Security & Surveillance
- Space Technology

Team Formation & Eligibility:

- **Team Composition**: Each team must consist of **6 members**, including a **Team Leader** and **at least one female member**.
- **Institution Criteria**: All team members must be from the **same institution**; inter-college teams are not allowed.
- **Academic Level**: Participants can be from any year of study (E1 to E4).
- **Mentorship**: Teams may select mentors to guide them through the process.
- **Restrictions**: A student cannot be part of multiple teams, and team members cannot be changed after registration.

Registration Process:

1. **SPOC Registration**: Each institution must appoint a **Single Point of Contact (SPOC)**, typically a faculty member, who will handle all communications and registrations.
2. **Internal Hackathon**: Institutions conduct an internal hackathon to shortlist teams.
3. **Team Nomination**: The SPOC nominates up to **50 teams** (45 shortlisted + 5 waitlisted) based on the internal hackathon results.
4. **Idea Submission**: Nominated teams submit their ideas through the SIH portal.

Key Dates for SIH 2024:

- **Internal Hackathon**: Conducted by institutions in early September 2024.
- **Idea Submission Deadline**: September 12, 2024.
- **Final Submission Deadline**: Extended to September 30, 2024.

Grand Finale:

The **Grand Finale** of SIH 2024 was held concurrently at **51 nodal centers** across India.

- **Software Edition**: A 36-hour nonstop coding event.
- **Hardware Edition**: Extended over several days to accommodate prototyping and testing.

Figure: Certificates Received at SIH -24 for Software Edition

Figure: Smart India Hackathon 2024 (Hardware Edition) at IITR

Nodal Center List for SIH-2023 Grand Finale:

https://sih.gov.in/sih2024/nodalcenter

SMART INDIA HACKATHON 2024 | HOME | ABOUT SIH | GUIDELINES | PROBLEM STATEMENTS | KNOW YOUR SPOC | PROJECT IMPLEMENTATION | FAQS | CONTACT US | SIH Finale Login

SIH1688	Software	Ministry of Jal Shakti	Department of Drinking Water and Sanitation (Coordination Section)	M. S. Ramaiah University of Applied Sciences	State Private University	Karnataka	Bangalore	560054
SIH1689			Bureau of Water Use Efficiency, National Water Mission					
SIH1690								
SIH1691	Software	Ministry of Jal Shakti	Department of Water Resources & Ganga Rejuvenation/Central Water commission	Don Bosco Institute of Technology Bangalore	Private Institute/ College	Karnataka	Bangalore	560074
SIH1692								
SIH1693								
SIH1694	Software	Ministry of Jal Shakti	National Mission for Clean Ganga, DoWR, RD & GR	New Horizon College of Engineering, Bangalore	Autonomous Institute (Private)	Karnataka	Bangalore	560103
SIH1695								
SIH1696			Central Ground Water Board					
SIH1697								
SIH1698								

Shortlisted List for SIH-2023 Grand Finale:

https://sih.gov.in/sih2024/screeningresult

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SIH1693	Ministry of Jal Shakti	1	12613	12346	Techno Genesis	Om Ramesh Sonawane	C-34528	BGP'S Hitech Institute of Technology, MIDC, Waluj, Aurangabad.	Aurangabad	Maharashtra	SELECTED
SIH1693	Ministry of Jal Shakti	2	10287	8191	Neebula	Manashwini Amberi	C-19922	Marri Educational Society's Marri Laxman Reddy Institute of Technology and Management	Rangareddi	Telangana	SELECTED
SIH1693	Ministry of Jal Shakti	3	30110	36652	Airavata	Aniket Sanjay Rane	C-34012	Sterling Institute of Management Studies Plot No.93 93A Sector 19 Nerul E Navi Mumbai 400 706	Thane	Maharashtra	SELECTED

Developing a Robust Hydraulic Transient Analysis Model for Hydro Power and Pumped Storage Schemes

Abstract:

Hydraulic transients—commonly known as water hammer—pose significant operational and structural risks in hydro power and pumped storage systems. These transients result from rapid changes in flow conditions due to turbine load changes, sudden valve closures, or pump trips. The proposed project aims to develop a robust, scalable, and accurate hydraulic transient analysis model to predict, mitigate, and optimize such phenomena in hydroelectric systems. By leveraging advanced numerical methods like the Method of Characteristics (MOC) and incorporating real-world operational parameters, the model will support enhanced decision-making in the design and operation of hydropower infrastructure. This solution will be modular, allowing integration with SCADA or digital twin systems for real-time applications and preventive maintenance.

Key Components:

Mathematical & Numerical Modeling

- Implementation of the **Method of Characteristics (MOC)** to solve unsteady flow equations.
- Simulation of wave propagation, pressure surges, and damping.

System Components Modeling

- **Penstocks**, **valves**, **surge tanks**, **turbines**, and **reservoirs** modeled with realistic physical parameters.
- Elastic behavior of conduits and compressibility of water incorporated.

Optimization Module

- Parameter tuning using **Particle Swarm Optimization (PSO)** or **Genetic Algorithms (GA)** for surge tank design, valve timings, etc.

Visualization Interface

- Real-time plotting of pressure heads, flow rates, and transient events across system components.
- User-friendly dashboard for configuration, simulation, and analysis.

Software Integration

- Export options for integration with **Bentley HAMMER**, **EPANET**, or **custom SCADA** systems.
- Optional 3D visualization of flow paths and pressure waves.

Validation Engine

- Comparison with benchmark case studies and real-time data from hydro plants (if available).
- Verification using standard experimental results (e.g., valve closure problems, pump trip scenarios).

Expected Outcome

- **An accurate and stable simulation model** to predict hydraulic transients under different operational scenarios.
- **An optimization module** to design components (e.g., surge tanks, valve closing time) that minimize pressure fluctuations.
- **A desktop/web-based prototype** with real-time simulation visualization for operators and engineers.
- **Reduction of infrastructure damage risks**, increased system lifespan, and improved operational efficiency.
- **A scalable model** applicable to both large-scale hydro plants and compact pumped storage schemes.
- **Potential for integration** with digital twin and SCADA systems for proactive transient control.