ECWS-9 2025 Conference

The 9th International Electronic Conference on Water Sciences

11–14 November 2025 | Online

MDPI

Sensor Testing and Calibration Facility for Reliable Real-Time Water Quality Monitoring

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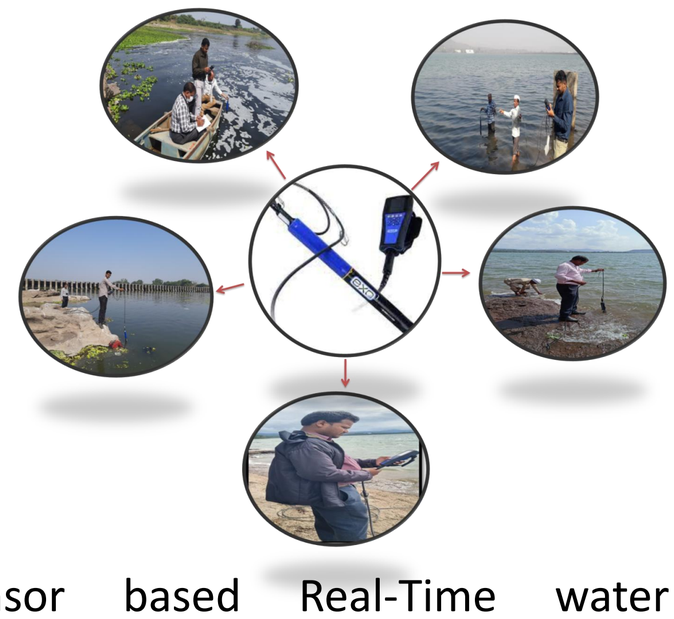
INTRODUCTION & AIM

- Accelerated urbanization and industrialization have intensified the discharge of pollutants into water bodies, raising concerns over water quality deterioration.



- Although sensor based Real-Time water quality measurements (RT-WQM) provide an affordable and scalable alternative to conventional analytical approaches, their wider deployment is often restricted by concerns about their calibration, precision, and dependability.
- However, to certify and validate their operational effectiveness, deploying sensors demand periodic testing and calibration under field conditions.
- To tackle this challenge, the River Rejuvenation Division at CWPRS, Pune, India, has established a one of its kind sensor testing and calibration (STC) facility ideated and developed indigenously to test and calibrate water quality sensors under field and controlled environmental conditions.

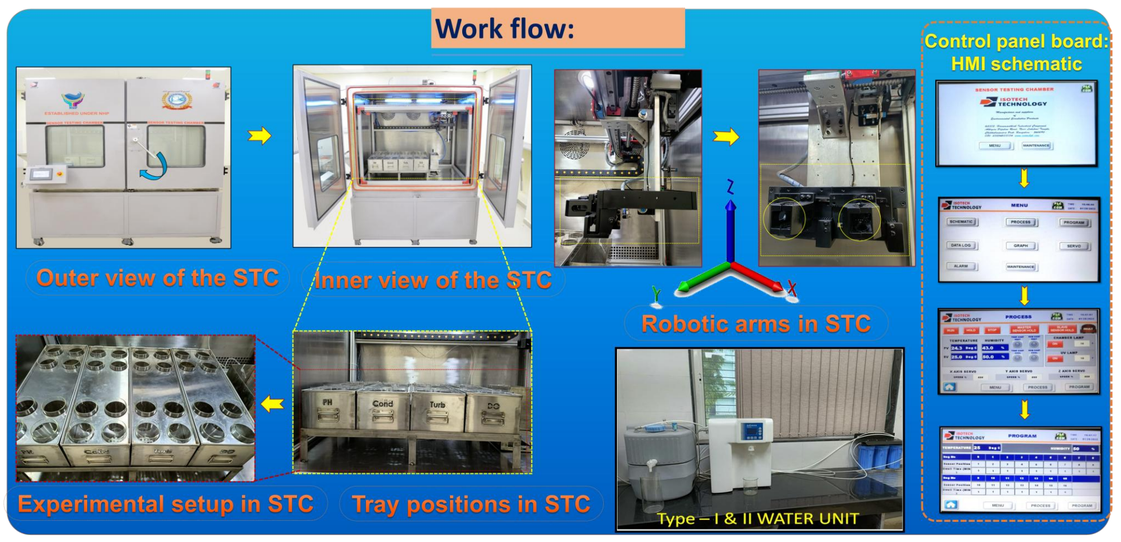
METHOD

Salient FEATURES:

1. The Testing and Calibration Facility (TCF) for Water Quality Sensors with automation at CWPRS is one of its kind in India, playing a significant role in the process of testing and calibration of water quality sensors.
2. The facility can simulate temperature (5˚C to 45˚C) and humidity (40% to 95% RH) conditions where water quality sensors can be tested and calibrated.
3. NIST-traceable standard certified reference materials are available and the same are used for testing and calibration of water quality sensors.
4. Water quality sensors deployed in field i.e. various rivers, streams and lakes can be tested and calibrated.
5. Periodic testing and calibration of water quality sensors ensures collection of accurate data for future use in water quality management.

RESULTS & DISCUSSION

- The engineered system is equipped with humidity (40–70%) and temperature (5–45 °C) control systems with robotic arms, facilitating the simulation of field-representative environmental conditions.



- The facility integrates with robotic arms to hold a movement of WQ sensors to continuously test and calibrate the key water quality parameters such as temperature, electrical conductivity (EC), pH, turbidity, and dissolved oxygen (DO).

Master Sonde Specifications:

Parameter	Range	Accuracy
pH	4 to 10	±0.1 pH units within ±10˚C of calibration temp; ±0.2 pH units for entire temp range
Electrical Conductivity (EC)	0 – 1000 µS/cm	±1% of reading or 2 µS/cm
Turbidity	0 to 12.7 NTU	±2% of reading or ±0.5 NTU, whichever is greater
Dissolved Oxygen (DO)	0 to 12 mg/l	±0.1 mg/L or 1% of reading
Depth	0 to 6 m	+/- 0.01 °C; +/- 0.05 °C
Temperature	+5 to 50 °C	±0.04% FS

CONCLUSION

- The novel, one of a kind facility delivers a dependable platform to assess the sensor working performance, sensitivity, accuracy, and reliability before field application.
- The developed STC facility represents a crucial advancement in enhancing the sensor-based WQM infrastructure and certifying the deployment of reliable WQM technologies for sustainable management of water resources.

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