

PROJECT ABSTRACT

IoT Swimming Pool Water Quality Monitor

An IoT pool water quality monitor measuring pH, ORP and temperature with lab-grade probe modules, local OLED display and cloud dashboard with safe-range alerts. Delivered built-to-order with working prototype, firmware, calibration kit, report, PPT and viva kit.

Project type: Hardware

Availability: Built to order

Suitable branches: IoT & Embedded

Technologies: ESP32, pH probe module, ORP probe module, DS18B20 temperature, OLED display, Wi-Fi telemetry, calibration buffers

Price: Request a quotation

Prepared by Projectech · projectech.in — for academic project reference.

01. Title

IoT Swimming Pool Water Quality Monitor

02. Introduction / Background

Pool water goes wrong invisibly: pH drifts out of the safe band, chlorine (measured as ORP) drops, and swimmers get eye irritation or worse — usually discovered by infrequent manual test strips. Continuous monitoring is the professional answer, but commercial pool controllers are expensive black boxes. The student-buildable version uses real lab-grade probes: a pH electrode, an ORP electrode and a DS18B20 temperature sensor, read through proper signal-conditioning modules by an ESP32, with local OLED readings and cloud telemetry that alerts when any parameter leaves its safe range.

03. Problem Statement

Pool operators test water manually and infrequently, so unsafe pH and sanitizer levels persist unnoticed. The project addresses this with a student-built continuous monitor: pH, ORP and temperature probes sampled by an ESP32, safe-range alert rules, a local display and a cloud dashboard — demonstrating proper probe interfacing, two-point calibration and IoT alerting in one build.

04. Objectives

- Measure pool pH with a lab-grade pH probe and conditioning module.
- Measure sanitizer activity with an ORP probe and conditioning module.
- Measure water temperature with a DS18B20 sensor.
- Perform two-point pH calibration with buffer solutions using the included kit.
- Display live readings with safe-range indication on an OLED.
- Publish telemetry to a cloud dashboard with safe-range alert rules.
- Deliver the complete student kit: prototype, firmware, calibration kit and guide, report, PPT and viva Q&A.;

05. Proposed Methodology

The system is built in three stages. (1) Probe interfacing: pH and ORP electrodes connect through high-impedance conditioning modules to the ESP32 ADC, with the DS18B20 on a digital pin; the student performs two-point pH calibration with the buffer solutions and records the calibration in the report. (2) Local readout: the OLED shows pH, ORP in mV and temperature with safe/unsafe band indication. (3) IoT telemetry: readings are published over Wi-Fi to a cloud dashboard that plots trends and raises alerts when pH or ORP leave the configured safe ranges.

06. System Architecture / Working

The ESP32 samples the pH, ORP and temperature probes on a schedule, applying the student's calibration to convert raw ADC values to pH units and millivolts. The OLED updates with the live values and a safe-range status. Each dataset is published over Wi-Fi to the cloud dashboard, which maintains the history, renders trend charts and fires an alert whenever pH or ORP crosses outside its configured safe band — the signal a pool operator needs to dose or retest.

07. Hardware / Software Requirements

- ESP32 development board (Wi-Fi)
- pH probe with conditioning module
- ORP probe with conditioning module
- DS18B20 waterproof temperature sensor
- 0.96-inch OLED display
- pH buffer calibration solutions (kit)
- Probe storage solution and beaker test rig
- Cloud dashboard (Blynk/ThingSpeak class)
- Arduino IDE (C/C++ firmware)

08. Expected Outcomes

- A working monitor reporting pH, ORP and temperature continuously.
- A documented two-point pH calibration performed on the student's own build.
- Safe-range alerts on the dashboard when water chemistry drifts.
- Trend history supporting dosing-decision discussion.
- A complete report, PPT and viva Q&A; on water-chemistry sensing and probe calibration.

09. Applications

- Demonstrating continuous water-quality monitoring for pools and spas.
- Teaching high-impedance probe interfacing and calibration discipline.
- Classroom demos of IoT alerting on environmental parameters.

10. Future Scope

- Automated dosing pumps driven by the pH/ORP readings.
- Turbidity and free-chlorine amperometric sensing as added channels.
- Solar-powered floating enclosure for in-pool deployment.
- Multi-pool facility dashboards.