PROJECT ABSTRACT

IoT Water Cooler Health Monitor with Dashboard

An IoT health monitor for water coolers: a split-core CT clamp watches compressor current and temperature sensors track outlet water on an ESP32 node, with a live cloud dashboard showing performance trends, fault alerts and maintenance tracking. Delivered built-to-order with the sensor node, working dashboard demo, firmware, report, PPT and viva kit.

Project type: Hardware + dashboard

Availability: Built to order

Suitable branches: IoT & Embedded, Electronics / E&TC, Electrical

Technologies: ESP32, SCT-013 CT clamp, DS18B20 sensors, MQTT telemetry, web dashboard, Arduino IDE

Price: Request a quotation

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

1. Title

IoT Water Cooler Health Monitor with Dashboard

2. Introduction / Background

A water cooler is a small refrigeration machine everyone depends on and nobody monitors. When performance degrades — low refrigerant, a dusty condenser, a tired compressor — the first symptom is lukewarm water and the second is a compressor running far longer than it should, wasting energy. Staff learn about it only through complaints. This project instruments the cooler non-invasively: a split-core current transformer clamped around the compressor supply measures current without touching mains wiring, DS18B20 sensors track outlet and ambient temperature, and an ESP32 publishes readings to a cloud dashboard every minute — turning maintenance from complaint-driven to data-driven.

3. Problem Statement

Facility teams have no visibility into cooler health: cooling degradation is noticed by users, energy waste is invisible, and service happens on breakdown or on vague schedules. Commercial monitoring retrofits are expensive and closed. This project delivers an open, student-buildable alternative: non-invasive electrical and thermal sensing, on-device analytics (short-cycling detection, abnormal current bands, run-hour counting), and a genuinely working dashboard that a facility manager could actually read — with the installation safe enough to fit on a real cooler.

4. Objectives

- Monitor compressor current non-invasively with a split-core CT clamp and outlet/ambient temperature with DS18B20 sensors.
- Publish telemetry every minute over Wi-Fi (MQTT/HTTP) from an ESP32 node.
- Detect short-cycling, abnormal current draw and warm-water conditions with on-device analytics.
- Accumulate compressor run-hours toward a configurable service interval.
- Render a live dashboard: gauges, 24-hour charts, cycle-event log and maintenance counter.
- Deliver the full kit: node, dashboard demo, firmware, install guide, report, PPT and viva Q&A.;

5. Proposed Methodology

The system is built in three layers. (1) Sensing: the CT clamp and temperature probes are fitted without disturbing mains wiring; the ESP32 samples RMS current and temperatures and derives compressor state from the current signature. (2) Analytics: firmware counts starts-per-hour for short-cycling detection, bands the current draw against the commissioned baseline, and accumulates run-hours. (3) Presentation: telemetry flows to the cloud backend and the dashboard renders live gauges, temperature/current charts, the event log and the service counter. Commissioning baselines a healthy cooler for a day before thresholds are set.

6. System Architecture / Working

The CT clamp and DS18B20 probes feed the ESP32, which computes RMS current, reads both temperatures, and determines compressor state from the current signature. Every minute the node publishes temperature, current, state and cumulative run-hours; short-cycling and abnormal-current events are raised immediately. The dashboard shows live gauges, the 24-hour temperature and current trends, the cycle-event log and run-hour progress toward the service interval. The included single-file demo dashboard runs the same interface on simulated telemetry for presentation; the real node swaps the simulator for live data.

7. Hardware / Software Requirements

- ESP32 development board
- SCT-013 split-core current transformer

- DS18B20 waterproof temperature sensors (outlet + ambient)
- MQTT/HTTP cloud telemetry backend
- Web dashboard (single-file HTML/CSS/JS demo included)
- 5 V USB power for the node
- Arduino IDE (C/C++ firmware)

8. Expected Outcomes

- A working monitor that tracks a cooler's temperature, current, cycles and run-hours continuously.
- Dashboard alerts for short-cycling, abnormal current and warm-water conditions.
- A run-hour service counter replacing guesswork scheduling.
- A documented commissioning procedure with baseline-learning steps.
- A complete report, PPT and viva Q&A; covering sensing, analytics and the dashboard.

9. Applications

- Facility management for offices, campuses and hostels with many coolers.
- Teaching non-invasive sensing and applied IoT analytics.
- Energy-waste studies on refrigeration appliances.

10. Future Scope

- Multi-cooler fleet view on one dashboard.
- Refrigerant-loss signature analysis from pull-down curves.
- Automatic service-ticket generation on maintenance flags.
- Solar-assisted power for the sensor node.