PROJECT ABSTRACT

IoT Geyser Energy Monitor with App Dashboard

An IoT energy monitor for geysers: non-invasive current sensing on an ESP32 tracks every heating session, integrates kWh and converts it to rupees at a configurable tariff in a mobile-style app dashboard. Delivered built-to-order with the sensor node, working app demo, firmware, report, PPT and viva kit.

Project type: Hardware + app dashboard

Availability: Built to order

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

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

Price: Request a quotation

1. Title

IoT Geyser Energy Monitor with App Dashboard

2. Introduction / Background

An electric geyser is among the hungriest appliances in a home — a 2 kW element running forgetfully for hours — yet nobody knows how many units it burns or what each hot bath costs. The element cycles on a thermostat, and a geyser left on reheats the tank all day to cover standby losses: energy that buys nobody a hot bath. This project makes consumption visible without touching a wire: a split-core CT clamp measures current non-invasively, temperature sensors watch inlet and outlet water, and an ESP32 detects heating sessions, integrates energy, and converts it to rupees — shown in a mobile-style app dashboard.

3. Problem Statement

Families cannot answer the simplest questions about their geyser: today's units, the cost per bath, whether a timer would save money — because the consumption is invisible and plug-in meters need the appliance rewired. This project answers them with non-invasive sensing: session-aware energy accounting (not just instantaneous power), rupee conversion at a configurable tariff, standby-loss separation, and a phone-friendly app UI the family actually opens — all fitted without disturbing mains wiring.

4. Objectives

- Measure geyser current non-invasively with a split-core CT clamp and inlet/outlet temperature with DS18B20 sensors.
- Detect heating sessions from the current signature and integrate energy per session in kWh.
- Convert energy to cost at a user-configurable tariff and separate standby-loss reheats from real usage.
- Publish live power and session events over Wi-Fi every 30 seconds.
- Render a mobile-style app dashboard: live dial, today's units/cost, session log, weekly charts.
- Deliver the full kit: node, app 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 clips around the supply cable and temperature probes strap to inlet/outlet pipes; the ESP32 computes RMS power from current times the configured mains voltage. (2) Analytics: firmware marks session boundaries from the current signature, integrates power over time into kWh, tags short reheat cycles as standby loss, and applies the tariff. (3) Presentation: the app dashboard renders the live power dial, daily totals, the session log with per-session cost, weekly bars and the standby share. Commissioning verifies power against the geyser's rating plate.

6. System Architecture / Working

The ESP32 samples current continuously, computes RMS power, and watches the signature to mark session start and end. Energy per session is integrated into kWh and converted to rupees; standby reheat cycles are tagged separately. Every 30 seconds the node publishes live power, temperatures and session events over Wi-Fi. The app dashboard shows the live dial, today's units and cost, the session history, weekly consumption bars and the standby-loss share. The included single-file demo app runs the same interface on simulated telemetry; the real node replaces the simulator with live data.

7. Hardware / Software Requirements

- ESP32 development board
- SCT-013 split-core current transformer
- DS18B20 waterproof temperature sensors (inlet + outlet)
- MQTT/HTTP telemetry backend
- Mobile-style app 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 reporting live geyser power, per-session kWh and rupee cost.
- A quantified standby-loss share answering whether a timer would save money.
- A session log and weekly charts the family can act on.
- A documented commissioning procedure verified against the rating plate.
- A complete report, PPT and viva Q&A; covering metering, analytics and the app.

9. Applications

- Home energy awareness and electricity-bill diagnostics.
- Teaching non-invasive metering and energy accounting.
- Hostel/PG facility studies of hot-water energy use.

10. Future Scope

- Contactor-based timer control as a monitoring-plus-control extension.
- Multi-appliance energy disaggregation from a single mains CT.
- Push alerts for abnormally long heating sessions.
- Integration with rooftop-solar generation data.