PROJECT ABSTRACT

IoT Elevator Health Monitor with Predictive Maintenance Alerts

An IoT elevator health monitor on a 3-floor model lift: vibration, current and door-cycle sensing with ESP32 telemetry and predictive maintenance alerts. Delivered built-to-order with working model, firmware, dashboard guide, report, PPT and viva kit.

Project type: Hardware

Availability: Built to order

Suitable branches: IoT & Embedded

Technologies: ESP32, MPU6050 vibration sensor, current sensor, reed-switch door sensing, MQTT telemetry, cloud dashboard, alert rules

Price: Request a quotation

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

01. Title

IoT Elevator Health Monitor with Predictive Maintenance Alerts

02. Introduction / Background

Elevators fail the way most machines fail — gradually, then suddenly. Worn guide shoes raise vibration, a straining motor draws more current, and door mechanisms wear with every cycle, yet maintenance is still mostly scheduled by calendar rather than by condition. The result is surprise breakdowns and trapped passengers. Continuous health monitoring changes the model: vibration, motor current and door-cycle counts reveal degradation trends before failure. This project demonstrates that loop on a 3-floor tabletop elevator — an ESP32 reads an MPU6050 vibration sensor, a current sensor and door-cycle reed switches, publishes the telemetry to a cloud dashboard, and fires predictive maintenance alerts on threshold crossings and trend rules.

03. Problem Statement

Elevator maintenance reacts to breakdowns instead of predicting them, because condition data is never collected. The project addresses this at classroom scale: a sensor-instrumented model elevator streams vibration, current and door-cycle data to a cloud dashboard, and alert rules flag the signatures of developing faults — demonstrating predictive-maintenance IoT from sensing to alert.

04. Objectives

- Instrument a 3-floor model elevator with vibration, motor-current and door-cycle sensors.
- Stream health telemetry from an ESP32 to a cloud dashboard.
- Implement threshold and trend-based predictive maintenance alert rules.
- Log door cycles and motor run-hours as wear indicators.
- Render live health status and alert history on the dashboard.
- Deliver the complete student kit: model, firmware, threshold-tuning guide, report, PPT and viva Q&A.;

05. Proposed Methodology

The system is built in three stages. (1) Instrumentation: an MPU6050 on the cabin measures vibration, a current sensor watches the drive motor, and reed switches count door open/close cycles — all read by an ESP32. (2) Telemetry: readings are published over Wi-Fi (MQTT/HTTP) to a cloud dashboard that stores history and plots vibration, current and cycle trends. (3) Alerting: firmware and dashboard rules compare live values against baselines recorded on the student's own model — rising vibration, over-current draw and cycle-count milestones each raise a predictive maintenance alert with a suggested inspection note.

06. System Architecture / Working

During every elevator run the ESP32 samples cabin vibration, motor current and door state. Door cycles and run-hours accumulate as wear counters, while vibration and current are compared against the student's recorded baseline. All of it is published to the cloud dashboard in real time; when a threshold or trend rule fires — high vibration, sustained over-current, or a door-cycle service milestone — the dashboard raises a predictive maintenance alert naming the suspect subsystem.

07. Hardware / Software Requirements

- 3-floor tabletop elevator model (cabin, counterweight, DC gear motor, pulley)
- ESP32 development board (Wi-Fi)
- MPU6050 vibration/IMU sensor
- Motor current sensor (ACS712 class)
- Reed switches for door-cycle counting
- Cloud dashboard (Blynk/ThingSpeak class)

- Arduino IDE (C/C++ firmware)

08. Expected Outcomes

- A working model elevator with live health telemetry on a cloud dashboard.
- Predictive alerts for vibration, over-current and door-cycle wear milestones.
- A student-recorded baseline and threshold-tuning procedure in the report.
- A complete report, PPT and viva Q&A; on condition monitoring and maintenance IoT.

09. Applications

- Teaching predictive-maintenance concepts with a tangible demo.
- Demonstrating multi-sensor IoT telemetry pipelines.
- Classroom discussion of condition-based vs calendar-based maintenance.

10. Future Scope

- Machine-learning anomaly detection on the vibration stream.
- Acoustic sensing for bearing-fault signatures.
- Fleet dashboards aggregating multiple elevator models.
- SMS/push escalation for critical alerts.