# IoT-Based Oil Storage Tank Monitoring System

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## Introduction

Efficient management of oil storage is critical for industries to avoid wastage, ensure continuous operations, and maintain safety. This project proposes an IoT-based solution to monitor oil tank levels, consumption, and environmental parameters in real time. The system is designed to provide accurate data visualization, alerts for critical conditions, and scalability for future enhancements.

## Objectives

- To monitor oil levels, inflow, and outflow rates in real time.
- To track environmental conditions such as temperature inside the storage tank.
- To provide alerts for low oil levels or anomalies.
- To ensure scalability and energy efficiency for practical applications.

## Proposed Solution

The solution employs an ESP32 microcontroller, equipped with sensors to collect data from the oil tank. The data is transmitted to the cloud via Wi-Fi and visualized on a user-friendly dashboard. Notifications are sent for critical conditions, ensuring timely action and better inventory management.

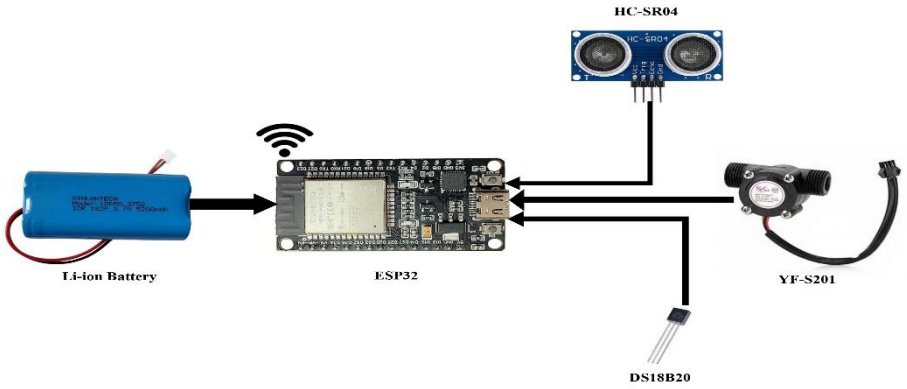
## Hardware Solution

1. **ESP32 Microcontroller**: Central unit for processing and communication.
2. **Ultrasonic Sensor (HC-SR04)**: Measures oil level.
3. **Flow Rate Sensor (YF-S201)**: Tracks inflow and outflow rates.
4. **Temperature Sensor (DS18B20)**: Monitors internal tank conditions.
5. **Power Supply**: Rechargeable Li-ion battery.
6. **Optional Actuator**: Solenoid valve for automating supply control.

## Digital Solution

1. **Cloud Storage**: Firebase Realtime Database for data storage.
2. **Communication Protocols**: MQTT or HTTP for data transmission.
3. **Web Dashboard**: Real-time visualization using Streamlit.
4. **Notifications**: Alerts via IFTTT or Twilio for critical conditions.

## Block Diagram




## Code : GitHub

## Results

The system successfully monitored oil levels, flow rates, and temperature in real time. Data was visualized on a cloud-based dashboard, with alerts generated for low oil levels and high temperatures. The prototype demonstrated scalability and energy efficiency, making it suitable for practical deployment.

## Future Scope

- Integration with machine learning for predictive analytics.
- Mobile application for remote monitoring.
- Enhanced connectivity using LoRa or NB-IoT for remote locations.
- Additional sensors for pressure or humidity monitoring.

## Conclusion

This project provides an efficient and cost-effective solution for oil storage tank monitoring using IoT. It ensures better inventory management, prevents wastage, and enhances decision-making through real-time data and alerts.