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IOT BASED WIRELESS PETROLIUM MEASURING AND DISPLAYING UNIT

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Abstract

This project presents an IoT based wireless petroleum measuring and displaying unit used to monitor the fuel level in storage tanks. The system uses an ultrasonic sensor to measure the level of petroleum inside a tank. The measured data is processed using a microcontroller and transmitted wirelessly through an IoT communication module. The level information is displayed on a local display and can also be monitored remotely through an internet platform. This system reduces manual inspection, increases safety, and improves monitoring accuracy in petroleum storage facilities.

1. Introduction

Petroleum storage tanks are widely used in fuel stations, industries, and transportation systems. Monitoring the level of petroleum is important to avoid overflow, leakage, and fuel wastage. Traditional methods use manual measurement techniques such as dip sticks or mechanical gauges, which are time-consuming and may cause safety risks.

With the advancement of Internet of Things (IoT) technology, petroleum monitoring systems can be automated. Sensors can measure the fuel level and transmit the data wirelessly to a monitoring system. This project proposes an IoT-based wireless petroleum measuring and displaying unit that provides real-time monitoring.

2. Objectives

• To design a system for measuring petroleum level using sensors.

• To transmit the measured data wirelessly.

• To display the fuel level in real time.

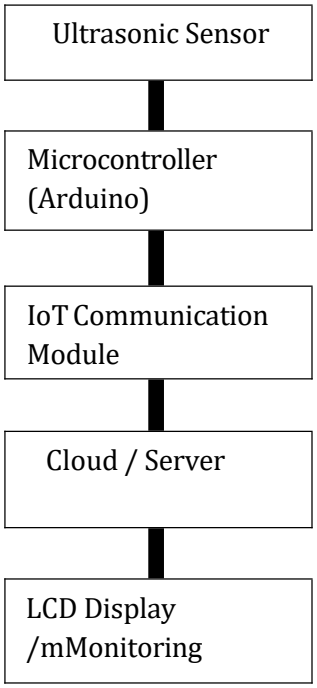
• To enable remote monitoring using IoT technology.

• To improve safety and reduce manual monitoring.

3. System Architecture

The IoT-based wireless petroleum monitoring and displaying unit system architecture is designed to continuously monitor fuel levels and parameters in storage tanks and transmit the data wirelessly for real-time analysis. The system consists of sensors such as ultrasonic or flow sensors to measure the level and quantity of petroleum. These sensors are connected to a microcontroller unit (such as Arduino or ESP8266), which processes the collected data. The processed information is then transmitted through a wireless communication module like Wi-Fi or GSM to a cloud server or local monitoring system. The data is displayed on a user interface such as an LCD screen or a web/mobile application, enabling remote monitoring. This architecture ensures accurate tracking, reduces manual intervention, improves safety, and helps prevent fuel theft or leakage by providing real-time alerts and data logging capabilities.

Block Diagram



4. Hardware Components

4.1 Ultrasonic Sensor

The ultrasonic sensor is used to measure the distance between the sensor and the surface of the petroleum inside the tank. The measured distance is converted into the level of fuel.

4.2 Microcontroller (Arduino)

The Arduino microcontroller processes the sensor data and performs calculations to determine the petroleum level. It also controls the communication with the wireless module.

4.3 Wireless Communication Module

A wireless communication module such as Wi-Fi, GSM, or LoRa is used to transmit the measured data to a remote monitoring system through the internet.

4.4 LCD Display

The LCD display is used to show the measured petroleum level locally so that operators can monitor the data directly at the tank location.

4.5 Power Supply

The system requires a stable power supply to operate the sensors, microcontroller, and communication module.

5. Working Principle

The ultrasonic sensor sends ultrasonic waves towards the petroleum surface. When the waves hit the surface, they are reflected back to the sensor. The sensor calculates the distance based on the time taken for the echo to return.

The microcontroller converts this distance value into a fuel level measurement. The data is then transmitted through the IoT communication module to a monitoring platform where it can be viewed remotely. The same data is also displayed on an LCD.

6. Software Implementation

The system software is developed using embedded programming on the Arduino platform. The program reads sensor data, calculates the fuel level, and sends the information through the communication module.

Algorithm

1. Start the system.

2. Initialize sensor and communication module.

3. Measure distance using ultrasonic sensor.

4. Convert distance into fuel level.

5. Display fuel level on LCD.

6. Send data to IoT platform.

7. Repeat the process continuously.

7. Advantages

- Real-time petroleum monitoring.
- Reduces manual inspection.
- Improves safety in storage tanks.
- Enables remote monitoring.
- Accurate fuel level measurement.

8. Applications

- Petrol bunks and fuel stations.
- Oil storage industries.
- Fuel transportation systems.
- Industrial petroleum tanks.
- Smart fuel monitoring systems.

9. Future Enhancements

The system can be improved by integrating mobile applications, advanced sensors, and automated alert systems. Alerts can be sent when the fuel level reaches critical limits or when leakage is detected.

10. Conclusion

The IoT based wireless petroleum measuring and displaying unit provides an efficient solution for monitoring petroleum levels in storage tanks. By combining sensors, microcontrollers, and wireless communication technologies, the system ensures accurate measurement and real-time monitoring. This technology can significantly improve safety and operational efficiency in fuel storage management.

References

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