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Device to Measure Gas Cylinder Level Using Internet of Things (IoT)

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Abstract- This system is designed to solve a common problem: running out of gas without knowing when it's about to happen. The system keeps track of how much gas is left in the container by continuously checking its weight. If the gas is running low, it can automatically place a new gas order using the Internet of Things (IoT) technology. A device called a load cell is used to measure the weight of the gas container, and this data is sent to an Arduino Uno (a small computer) to compare with a standard weight. If the gas is low, the system sends a message to the user via SMS, using a GSM modem. For safety, the system also has sensors to detect gas leaks (MQ-2 sensor) and monitor the surrounding temperature (LM35 sensor). If any unusual changes are detected by these sensors, such as a gas leak or a sudden change in temperature, a siren will sound to alert the user.

Index Terms-– IoT, Arduino Uno, load cell, LM 35 sensor, MQ-2 sensor, GSM modem.

I. INTRODUCTION

Liquefied Petroleum Gas (LPG) has been used for decades, both for industrial and household purposes, like cooking and heating. One of the main issues people face with LPG is that it often runs out unexpectedly, causing inconvenience. Sometimes, there's a delay in ordering a new gas cylinder because we notify the supplier too late, or we forget until it's already empty. In today's fast-paced world, it's important to monitor the gas level in the cylinder to avoid this issue.
To solve this problem, the system uses a load cell to continuously measure the gas cylinder's weight. When the cylinder is placed on the load cell, it measures the weight and sends this information to an Arduino Uno (a small computer). The Arduino compares the current weight with the ideal.

If the weight is lower than the ideal full weight. level, the system sends a text message (SMS) to the user, turns on a buzzer, and updates the information in a monitoring app called Thing Speak.

Safety is crucial, especially when dealing with gases in the home. Gas leaks are a common and dangerous issue, often caused by negligence or technical errors. To prevent accidents, the system is also equipped to detect gas leaks using an MQ-2 gas sensor and a temperature sensor (LM35). If the system detects a gas leak or a sudden change in temperature, a siren will be triggered to alert the user. Accidents in recent years. Because leaked gas stays close to the ground, the sensors monitor the surrounding environment to catch potential The system also aims to be an affordable solution for detecting LPG leaks, which have caused an increasing number of danger early. The system uses the Internet of Things (IoT), which connects various devices and sensors to collect data and communicate with each other. IoT makes it possible to monitor the system remotely and in real-time. IoT is used in many areas, from smart homes and cities to connected vehicles and devices. It not only improves convenience and safety but also has the potential to boost the economy by providing better, more efficient solutions.

In summary, this system offers a reliable, affordable way to monitor gas levels and detect leaks, making everyday life safer and more convenient.

II. RELATED WORK

1. Juvanna
This paper provides gas level monitoring using RFID tag, microcontroller, pressure sensor, and buzzer. This paper uses the pressure as important parameter to detect level of gas present in container .The aim of this project is to intimate the user when the gas container goes empty.

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2. Zeinab Kamal
This paper presents a technology called Internet of things (IoT). There is connectivity between computers and other

physical devices such as vehicles and buildings, embedded with the sensors and network connectivity which enables the reading the data from sensors and actuators that is to be monitored by using the internet.

3. Hans-Petter Halvorsen
This paper presents an Arduino its hardware and software based on open source prototyping. It is very easy for the learners to understand the language and easy to debug. Originally Arduino was created as tool for fast prototyping, basically for students without any knowledge in electronics and programming.

4. A Mahalingam
This paper provides gas leaks detection which uses a microcontroller, gas sensor and buzzer. When gas leaks are detected by the gas sensor, microcontroller will turn on the buzzer in critical situations.

III. PROPOSED MODELING

This system uses various sensors (load cell, gas sensor, temperature sensor), a GSM modem, and an Arduino Uno microcontroller, which all work together to monitor the gas level, detect leaks, and ensure safety

Power Supply: The Arduino Uno load cell, gas sensor, temperature sensor, LCD display, and buzzer run on 5V, while the GSM modem uses 12V. Two separate power adapters are used to supply the system. The Arduino program is pre-set with normal data values, acting as thresholds to detect changes in gas levels, temperature, and leaks.

How It Works
- A gas container is placed on the load cell, which has a strain gauge that senses pressure.
- The load cell constantly sends signals to the Arduino, which compares the weight with an ideal value.
- If the gas level drops below the ideal, a message is sent to the user via GSM modem, a buzzer sounds, and the information is updated in the Thing Speak App.
- The system also uses a gas sensor (MQ-2) to detect leaks. If a leak is detected, the system sends an alert via SMS, triggers the buzzer, and updates the app.
- The temperature sensor (LM35) monitors heat levels. If the temperature rises above normal, the system sends a warning SMS, sounds a siren, and updates the app.
- Display and Updates: Data is displayed on a 16x2 LCD screen and updated in the Thing Speak IoT application. The Node microcontroller (Node MCU) connects to Wi-Fi to send updates to the IoT platform.

Key Components
- **Arduino Uno:** Controls the sensors, processes data, and sends signals. It operates on 5V and communicates through serial ports (Rx/Tx).
- **Load Cell:** Measures the gas cylinder's weight using a strain gauge. A module called HX711 amplifies the signal so the Arduino can process it.
- **MQ-2 Gas Sensor:** Detects gas leaks. When a leak occurs, the sensor sends a signal to the Arduino, triggering an alert.
- **LM35 Temperature Sensor:** Measures temperature changes and converts them into a readable voltage for the Arduino.
- **LCD Display:** Shows the gas level, leak alerts, and temperature readings in real time.
- **GSM Modem:** Sends SMS alerts to the user about gas levels, leaks, and temperature changes.
- **Buzzer:** Sounds an alarm when the gas level is low, a leak is detected, or the temperature is too high.
- **Node MCU:** Connects the system to the IoT platform (Thing Speak) for real-time monitoring and updates via Wi-Fi.
- **Thing Speak:** A platform used to visualize data from the sensors and monitor the system in real-time. It allows users to track gas levels, detect leaks, and receive alerts through the internet.

This system provides a reliable, low-cost solution to monitor gas levels, detect leaks, and ensure safety using IoT technology.

IV. RESULTS AND DISCUSSION

The system monitors the gas level in real-time and updates the information online. There are two possible readings:
- **0 (Low):** Indicates that the gas level is low.
- **1 (High):** Indicates that the gas level is still sufficient.

Additionally, the system continuously checks for gas leaks around the container. If a leak is detected, the system updates this status online. If the reading is 1, it means that there is a gas leak.

The temperature sensor also measures the temperature near the gas container to prevent fire hazards. If the reading is 1, it signals that there is a fire risk near the container. If the reading is not 1, the environment is safe.

Users receive SMS alerts about gas leaks, low gas levels, or a significant rise in temperature. This ensures they are immediately informed of any dangerous conditions.

V. CONCLUSION

In this project, we developed an IoT-based gas level monitoring system that is portable, easy to use, and affordable. It effectively addresses the challenges of monitoring gas levels and detecting leaks. The system provides immediate responses, enhancing safety and preventing accidents at home or in industrial settings. It not only saves users time but also helps them live more

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