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GAS LEAKAGE AND VOLUME (WEIGHT) MONITORING USING IOT

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Abstract

The goal of this project is to raise awareness about the gas level in the container and to place a gas order when the level drops. It's also capable of detecting gas leaks. When a cylinder becomes empty, we must notify the gas cylinder provider and request a new cylinder. There may be a delay in providing the gas cylinder due to the rush or hectic schedule, or due to a lack of the cylinder. This could be due to a delay in notifying the gas provider, or because we notify the gas provider at the last minute when the gas tank is empty. In our daily lives, we frequently confront the problem of gas leakage from the cylinder and fire.A fire sensor can be used to solve the problem of flame or fire in the kitchen. Furthermore, the use of a load sensor allows him to reserve a gas cylinder due to his hectic schedule. The goal of this project is to create a smart gas cylinder that is connected to the internet of things.

LPG is a gas that is commonly utilised in everyday life. We'll be focusing on continuous monitoring and leak detection in residential LPG cylinders in this research. If we haven't observed that the petrol tank is empty, we must book it in black for more money. The level of gas in the cylinder will be checked at all times by this project, and we will be notified when the gas is ready to run out.It serves as a reminder to the user to schedule a new cylinder. Another requirement of this project is to detect gas leaks and provide a warning message to the user when one happens. The goal of this project is to create a smart gas cylinder that is connected to the internet of things.

Keywords: Internet Of Things,MQ6 gas sensor,Loadcell,LPG gas bottle,NodeMCU,SNSservice,Arduino,Leakagedetection,Monitoring gas level.

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I. INTRODUCTION

In everyday life, LPG gas is used. We will focus on continuous monitoring and leak detection in domestic LPG cylinders during this project. We'd like to book it in black for extra money if we haven't detected the completion of the gas. This project will ensure that the amount of gas in the cylinder is checked in the shortest amount of time possible, and that we are notified when the gas is nearing completion. It reminds the user to make a new cylinder reservation. Another requirement of this project is to detect gas leaks and provide a warning message to the user when one happens.The goal of this project is to design a smart gas cylinder that is connected to the internet of things. Today, in an era when technical advancements are at their pinnacle, there isn't a single industry that is unaffected by technology. Not only has technology made our lives simpler and easier, but it has also provided a higher level of protection and security wherever it is needed. One of the most important technologies is the IoT (Internet of Things), which allows two hardware devices to communicate via the internet. It's widely used in a variety of industries, including medical and manufacturing, and its application is also expanding in home markets. We will all be cooking our regular meals on LPG fuel in our daily lives.It is used in a variety of industries because to its versatility. A load cell sensor is used to determine the cylinder's load. It continuously monitors the load and delivers an electrical pulse to the microcontroller as a result. When the system detects a cylinder's burden falling below a certain threshold, it prompts the user to book a cylinder. It also has extra functionality, such as alerting you to the presence of gasoline in the container.

II. LITERATURE REVIEW

[1]LPG gas is the most often used home fuel in every household, and LPG gas leakage is one of the leading causes of domestic mishaps. It is extremely toxic if inhaled, and if the concentration rises too high, it may explode. As a result, because safety is so vital, this IoT project is also built to detect LPG gas leaks. When the concentration exceeds a certain threshold, the user is warned and asked to take the appropriate actions. Many domestic accidents occur because people are unaware that there is a gas leak. LPG gas is a highly combustible

mixture of propane, butane, and propylene.The weight of the gas cylinder is used to determine the amount of gas. A load cell and a weight sensor are employed to determine the cylinder's weight. It continuously monitors the weight of the LPG gas cylinder and presents the data on the ubidotsIoT platform. Before the gas is totally consumed, a threshold level or value is set. If the weight of the gas cylinder is less than the threshold value, an indication in ubidots is used to alert the user, and an email is issued. The MQ2 sensor module can detect gases such as LPG, CH4, CO, Alcohol, and Hydrogen. The ESP8266Wi-fi chip is used in the NodeMcu microcontroller. As a result, it is compatible with any network infrastructure.Analog pin A0 and Digital pins D0-D8 are available on the NodeMcu development board. A load cell is a type of weight sensor that is used to determine how much something weighs.

[2] While LPG gas is a need for every household, its leakage could be disastrous. There are a variety of products available to detect LPG leaks and prevent any mishaps. They built an Arduino-based LPG gas leakage detecting alarm in this survey. If there is a leak of LPG gas, this system detects it and sounds an alarm by buzzing the circuit's buzzer.The major goal of this research is to provide automatic protection against LPG (Liquefied Petroleum Gas) leakage or to reduce the hazards that can be created by the user's ignorance of the LPG gas leakage. The sound of the alarm, as well as messages sent to the user's mobile phone, will provide useful advice on how to avoid the dangerous effects of LPG gas leaking. The microcontroller, which controls the whole functioning of a device, is critical to the operation of any complex system. The Arduino Uno microcontroller serves as a conditional switch in this scenario. Depending on the situation, it conducts two sets of actions.

[3] LPG is the most widely used commercial fuel in several nations. In India, LPG is the most used cooking fuel because it is more convenient. Continuous monitoring and leak detection in domestic LPG cylinders are the subject of this paper. The ESP8266 is used for monitoring and detection. The gas leak is detected using the MQ-6 gas sensor. When a leak is detected, the device activates the buzzer and sends a notification to the user. The issue may emerge as a result of a leak or because the user is unaware of the amount of LPG left in the cylinder.The existing system employs a load cell, an Arduino UNO, and a gas sensor to monitor gasoline levels and predict gas leaks in order to alert the user.

Our system is designed to assist consumers in customising their safety standards, with the most important role being to prevent accidents and safeguard lives and property from a variety of hazards. As a result, the user is unable to reserve the cylinder in advance. Due of high demand, the user must reserve the cylinder in advance. The cylinder is elevated above the load cell, which measures the cylinder's pressure. The weight of the cylinder is measured using a load cell.The mobile application uses NodeMCU to display the cylinder's current level.

[4]In many countries, LPG is mostly utilised for cooking due to cost, convenience, or because it is the preferred fuel source. This study primarily focuses on the use of the Internet of Things to measure and show the gasoline content present in residential LPG cylinders, as well as to identify gas leakage. This is an application. A load sensor is used to assess LPG levels, while a gas sensor is used to detect gas leakage. The premise behind this technology is that when the LPG concentration changes, it is recognised and an auditory visual warning is activated when it surpasses a specific threshold value. It also transmits another warning message to the receiver module using a radiofrequency (RF) technology.The gas detector is sensitive to a wide range of gases, and it is impossible to distinguish which gas is present. Instead, it was assumed during this research that the gas sensing element has the same sensitivity for LPG and Methane(CH4), which is a reasonable assumption. It can detect both the volume of gas and the presence of a gas leak. Users will be able to see their gas level in cylinders thanks to this system.

[5]

Due to a shortage of LPG, it is not viable to provide LPG through pipelines in India. The customer finds it difficult to determine the gas level, and it is also extremely dangerous when LPG gas leaks in any household application, chemical industrial, or other application.

Everyone is busy in their everyday lives these days, thus this application provides a system that sends SMS to the user and also sends an alarm to the user when a gas leak happens. The major goal of our research is to use pervasive sensors to measure the gas contained in the cylinder when the weight of the cylinder falls below the predetermined load.

PROPOSED SYSTEM

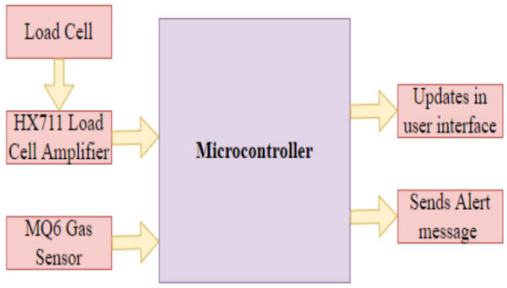
An ESp8266 microcontroller, a load sensor, a HX711 amplifier, and a MQ6 sensor are all part of the proposed system. The suggested system measures gas

concentrations with a MQ6 gas sensor. When there is a gas leak, the user gets notified through email. A load cell is a device that detects when the weight of a cylinder falls below a certain threshold, notifies the user that a new gas cylinder is needed, and continuously monitors the gas in the cylinder. The user interface will be updated with all of the records or data so that the user can readily monitor them.

There are two aspects to this project. It can detect both the volume of gas and the presence of a gas leak.

We can assist individuals in providing safety and security in a simple manner by designing this project. In today's hectic world, people must book a new cylinder by sending a message to the user. When compared to other components, the ones used here are the best and cheapest. By creating this project, we will be able to save both time and money. As a result, this approach can be used to other businesses, depending on their needs.

Block Diagram



IMPLEMENTATION SETUP

Components

- **Nodemcu**

NodeMCU is an open-source firmware that includes open-source prototype board designs. The term "NodeMCU" combines the words "node" and "microcontroller" (micro-controller unit). The moniker "NodeMCU" refers to the firmware rather than the development kits that go with it. The firmware as well as the prototyping board designs are free to use. The Nodemcu ESP8266 and Nodemcu ESP32 are growing increasingly popular, and they are now used in nearly half of all IoT applications

somewhat bent under load, but returns to its starting position, responding elastically to each load, as the word "spring element" suggests. Strain gauges are commonly used to measure these incredibly minor changes.

- **Load cell**

A load cell, specifically a force transducer, is a type of transducer. It turns a force such as tension, compression, pressure, or torque into a measurable and standardised electrical signal. The electrical signal changes accordingly as the force applied to the load cell rises. Load cells are commonly used to determine weight. Load cells commonly have a spring element on which strain gauges are mounted. Steel or aluminium are sometimes used for the spring element. This suggests it's quite strong, but only slightly elastomeric. The steel is

- **HX711 Module**

The HX711 Dual-Channel 24 Bit Precision A/D weight Pressure Sensor Load Cell Amplifier and ADC Module is a compact breakout board for the HX711 IC that allows you to read load cells to live weight quickly and easily. When you connect the module to your microcontroller, you'll be able to read changes in the load cell's resistance as well as perform some calibration. You'll be able to obtain extremely precise weight measurements. This is useful for making your own industrial scale, controlling processes, or simply

detecting presence. The HX711 Sensor communicates using a two-wire interface (Clock and Data). The GPIO pins on the microcontroller should operate, making it simple to read data from the HX711.

Each colour corresponds to the load cell's standard colour coding:

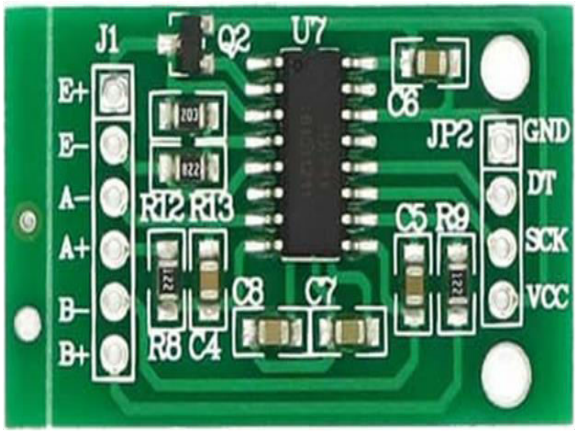
1. Red (VCC or Excitation+).

2. The colour black (Excitation- or GND).

White (Amplifier+, Signal+, or Output+) is the third option. 4. The colour green (A-, S-, or O-).

5. The colour yellow (Shield).

The YLW pin is an optional input that does not connect to the gauge but is used to ground and shield against EMI from the outside (electromagnetic interference)



- **MQ6 gas sensor**

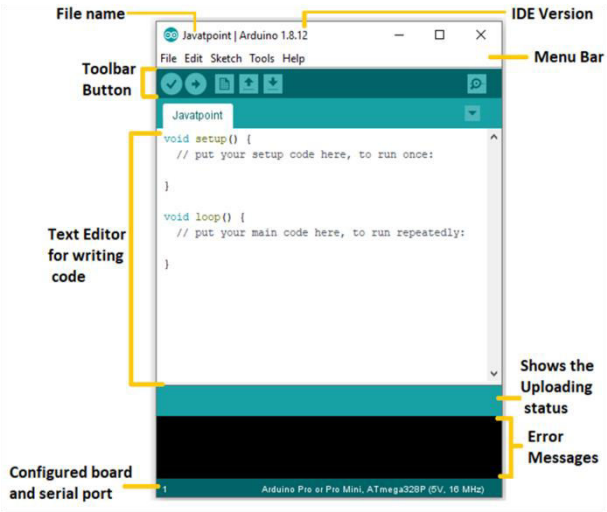
The MQ6 gas sensor is a device that responds quickly to liquid petroleum gas and is commonly used in equipment to detect gas leaks in industrial and other environments. This is a simple sensor for detecting LPG in the air, which is mostly made up of butane and propane. We may use the sensor to detect gas concentrations anywhere and thus employ it in a variety of industrial and commercial projects. This sensor's Digital Pin allows it to work without a microcontroller, which is useful once you've tried to catch one specific gas. Various flammable gases may be detected by the sensor. The MQ-6 gas sensor is highly sensitive to Propane, Butane, and LPG, as well as fossil fuels.The sensor can be used to detect many combustible gases,

particularly Methane, and is modest in cost and suited for a wide range of applications.

- **Arduino IDE**

The Arduino IDE is a free and open-source programme for writing and uploading code to Arduino boards. The IDE programme is compatible with a variety of operating systems, including Windows, Mac OS X, and Linux. C and C++ are supported programming languages. IDE stands for Integrated Development Environment in this case. Sketching refers to the process of writing a programme or code within the Arduino IDE. We'd want to use the IDE to connect the Genuino and Arduino boards and upload the sketch created in the Arduino IDE software. The '.ino' extension is used to save the sketch.

The Arduino IDE will look like this:



ALGORITHM RELATED TO PROJECT.

Step 1: Begin

Step 2: Calculate the gas weight.

Step 3: If the gas weight falls below a certain threshold, the user gets notified through email. Step 4: If not, the weight of gas is regularly updated on the user website.

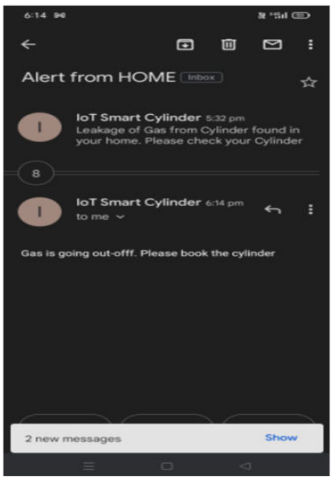
Step 5: Using the MQ6 sensor, check for gas leaks.

Step 6: If there is a gas leak, the user will be notified through email.

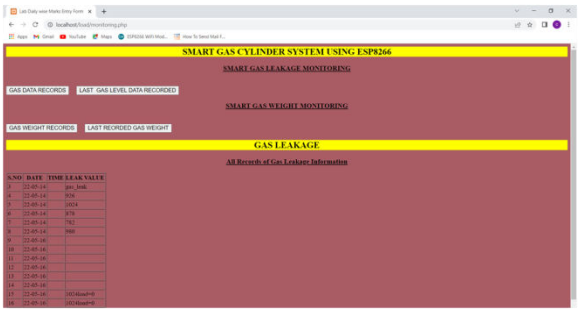
Step 7: Come to a close.

Results

Alert Message To Users:



User Interface:



This is the webpage where users may check gas level and value updates. This website houses all records of gas leaks and gas levels. All gas leakage data records, Last gas leakage data records, All gas weight monitoring data records, and Last gas weight monitoring data record are all available to the user.

Conclusion

There are two aspects to this project. It can detect both the volume of gas and the presence of a gas leak. We can assist individuals in providing safety and security in a simple manner by designing this project. In this fast-paced world, people must still book a new cylinder by sending messages to the user. When compared to other components, the ones used here are the best and cheapest. By creating this project, we will be able to save both time and money. As a result, this approach can be used to other businesses, depending on their needs. LPG is a gas that is commonly utilised in everyday life. We'll be focusing on continuous monitoring and leak detection in residential LPG cylinders in this research.If we haven't observed that the petrol tank is empty, we must book it in black for more money. The level of gas in the cylinder will be checked at all times by this project, and we will be notified when the gas is ready to run out. It serves as a reminder to the user to

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