Gas Cylinder Monitoring System using IoT

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Abstract - Gas detection and leakage are big issues in our daily lives nowadays. Gas leakage is the main problem we face today. It endangered a great number of lives. We used dependable methods for finding gas leaks to solve this issue. Certain leak detection techniques were created to enable the possibility of pinpointing the leak because simply knowing there is a leak does not always allow for the launch of a repair action. Using the Internet of Things, our goal is to lower the hazards in the kitchen. The primary objective is to suggest the layout and assembly of an SMS-based Gas Leakage Alert System. Gas leaks in a kitchen can be found with a gas sensor. The issue of gas wastage is also tracked with the use of an infrared sensor. When the sensor doesn't identify a vessel over the hob for a predetermined amount of time, an alarm sounds.

Keywords: Internet of Things(IoT), LPG, Gas Leakage, Gas detection, Smart Gas System, Booking System.

I. INTRODUCTION

LPG is widely used in India, but the rate of accidents caused due to it has increased. This paper discusses the solution to it, using IoT (Internet of Things). The number of deaths due to the explosion of gas cylinders has been increasing due to people forgetting or not getting enough time for booking the gas from the gas agency. This proposed topic aims to detect and alert consumers to gas leakage by providing a smart gas system that monitors the level of LPG in the cylinder and automatically sends a notification to the gas agency. If the user accidentally forgets to turn off the gas burner, the system will alert by activating an alarm, solving the problem of wastage of energy.

II. PROPOSED WORK

A human nose contains about 400 different kinds of scent receptors, allowing humans to detect over 1 trillion different kinds of scents. But, the majority of us are still unable to tell what kind of gas is in the environment. As a result, there are several sensors to precisely monitor atmospheric gas concentration. The most popular method for creating an IoT-powered system and determining the different dangerous gases present around an industrial plant is to employ gas detection sensors. By protecting them from unforeseen hazards like explosions, it helps the manufacturers and refineries.

We have created a "IoT-based Smart Gas Monitoring System" for the proposed system. This system's goal is to identify commercial fuels like alcohol, liquefied petroleum gas, and petroleum. The topic's next feature is to make sure that gas cylinders are reserved from a gas agency. In order for these systems to function, sensors must be able to detect gas leaks from the sensor and send that information to the internet via programming. The information is then sent to an Android app, where we may use it to send instructions for turning off the gas valve from a distance. As a result, it switches back to the internet and uses IoT to close the gas cylinder valve. Using this technology would also help to solve the issue of gas waste. The consumer might occasionally be informed if the hob was accidently left on. If a pot is not placed on top of a hob while it is on. Let's expand on the uses and advantages of a gas monitoring.

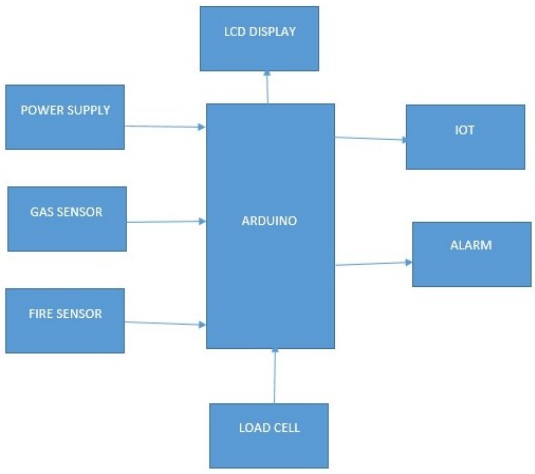

Fig 1. Block Diagram of Proposed System

III. SIMULATION RESULTS

Simulation works on the basis of the Arduino Uno board. It detects leakage of the gas. It also detects the fire. This simulation's results lead us to book our gas cylinder automatically with the gas agency. It also indicates the threshold level of the gas using the SMS service. The weight of the gas can be detected using this system. By using a web page and an Android application, we can track our gas report. On a web page, the user has their own log-in ID and password.

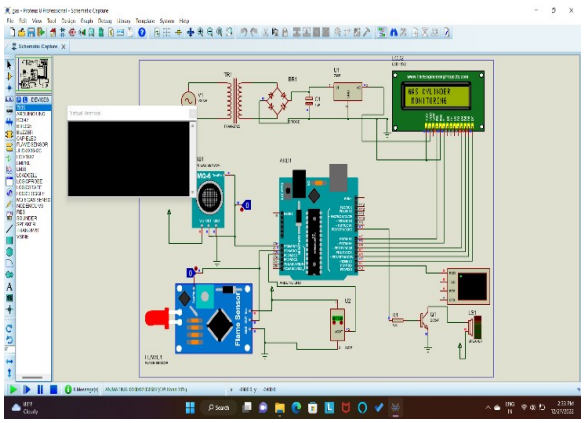

Fig 2. Proposed Simulation Diagram

In fig 2, it is the proposed simulation diagram of the gas cylinder monitoring system using IOT. Here, we used Arduino UNO, Gas Sensor, Fire sensor, LCD Display, Load cell, Power supply and Buzzer. This is the output of our project - Gas Cylinder monitoring System using IOT.

A. Fire Detection

In the event of an unwelcome incident, the gas might get sparked; in this case, a fire sensor detects the fire and gives us an alarm and message. So that we can able to protect ourselves from the harm.

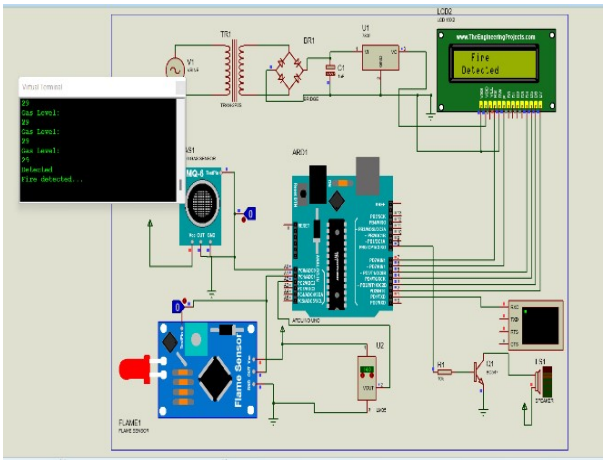

Fig 3. Fire Detection output

B. Gas Leakage Detection

Use this Gas Cylinder Monitoring System if your gas is leaking. The system recognizes it and uses IoT to deliver a message to the registered mobile number. It also sounds an alarm, allowing the consumer to quickly shut the gas valve and repair the problem.

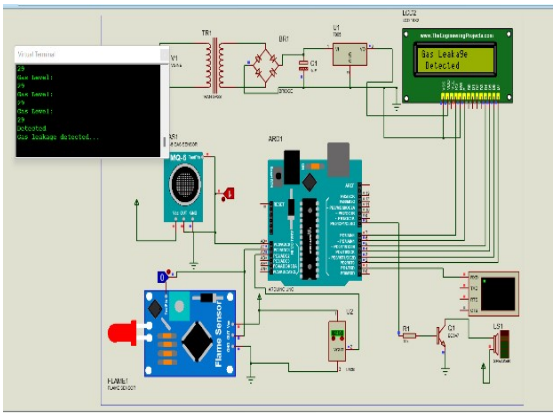

Fig 4. Gas leakage detection output

C. Automatic Booking of Gas using IOT

The main objective of our project is to determine the gas's threshold level, which is a very important goal. In fact, the system will mostly inform us if the gas level specifically hits 75%, and at 50%, we will essentially receive a warning via IoT to basically establish the amount of the threshold energy. Most of the time, the system will sort of alert us to plan a replacement cylinder when the gas level approaches 25%. The device will quickly book the cylinder at the gas agency when it reaches 25%. So there is no need for manual booking. In Fig. 5, we show the output of the automatic booking of gas using IoT. It only works when the gas level reaches 25% or below.

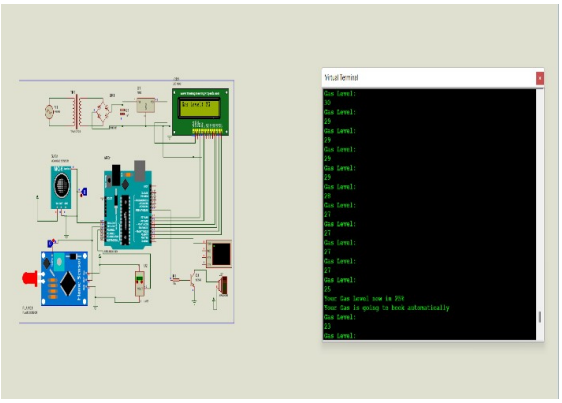

Fig 5. Automatic booking of gas output

IV. EXPERIMENTAL RESULTS

Testing of gas leakage monitoring system and weight of the load cell carried out successfully on node MCU. The gas sensor is tested in this case, and the expected results were seen. Sending data to the cloud. The buzzer and LED both turn on at the same time when a gas leak is discovered.

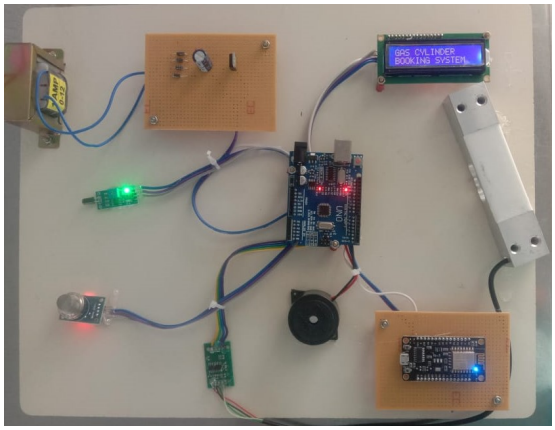

Fig 6. Hardware Result

This diagram displays the data that is kept in the cloud. The gas sensor uses the Node-MCU to transmit data. The figure next to the picture, which shows the date and time the gas leaked, will reveal how much gas leaked. Prototype was built and tested successfully. When there is a leak, the sensor detects it and simultaneously turns on the buzzer and sends the consumer an SMS. Additionally, this system uses the cloud to monitor the data.

V. CONCLUSION

The usage of LPG has increased significantly, leading to damages caused by the leakage of gas. To address this, the Internet of Things (IOT) is being used in a wide range of applications. The proposed system is cost-effective and real-time, and monitors gas leakage on continuous basis. It also allows customers to book gas from the gas agency when the weight of the gas cylinder reduces below a threshold value, and alerts consumers about the wastage of gas while removing utensils from the burner. To further inform users to the quantity of gas and LPG leakage, the system will also send them an alert message to their phone.

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