ISSN No:-2456-2165

Auto Gaz: An Automatic Gas Level, Gas Leakage, and Booking System

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Abstract:- Almost every household and restaurants use Liquified Petroleum Gas (LPG) in their kitchens as it is an essential part of cooking. As important as it becomes it is often difficult to maintain it as there are a lot of difficulties for the users and the igneous gas can cause hazards at any time. The main issue arises when we cannot detect gas leakage in our LPG and there is no automated booking yet. These leakages can cause the life of the user. We can only understand that the gas cylinder is over when it is empty and stops working which is very inefficient for the users. To rectify these issues we developed Auto-Gaz, a hardware and software combination product that helps us to identify the current filling of the cylinder, the correct time for slot booking, and gives information about gas leakage if any occurs. In this product load cell senses the weight of the cylinder and sends the data to node MCU which helps us identify the current status of the gas. MQ6 sensor detects the gas leakage and the analog data is sent to the node MCU WIFI module. Node MCU is connected to the software application via firebase and the data is stored in the application. Notifications of current updates are shown in the application. If leakage occurs the system detects it and sends a warning alert to the mobile application. When the gas reaches a minimum level, the user is notified of a new booking. In addition, this device promises automatic working with no need for human interference and assures reliability, efficiency along with cost-effectiveness. Auto-Gaz is easily installable and low maintenance. This project aims to aid in home automation with the help of IoT.

Keywords:- *Leakage; LPG; MQ6; WIFI; NodeMCU.*

I. INTRODUCTION

In the olden days, men worked in harmful and dangerous environments knowing and unknowingly. Even when the environment was known to be harmful, risky, dangerous, and causing injuries, people felt that the risk was a part of their job. The coal mine environment was the first working environment that raised human concerns due to the many fatalities recorded. The coal mine was identified as an area housing many combustible and toxic gases which caused dangerous explosions, and even death in the mines. This then created the need for developing how to detect the harmful atmosphere that was responsible for the explosion in the coal mines, and hence, the invention of gas detectors. The application of intelligent systems in gas detection is expanding in both domestic and industrial spheres of human endeavors. During these years, a lot of investigations have taken place in the gas detection field, and these have led to many innovations and expanded the scope of gas detection applications. Ever since the discovery of LPG by Dr.Watter in 1910, these have had a significant progression by scientists and researchers alike attempting to proper solutions to the problem of dangerous gas detection with the view to curb the incidents of gas -explosion. A breakthrough was recorded in 1925 by Dr. Jiro Tsuji, with his development of light wave interference. In 1929, Dr.Oliver Johnson developed a platinum catalyst in a Wheatstone bridge electronic circuit for detecting combustible gases. Global Economy reports that the average daily consumption of LPG has risen to about a thousand barrels per day. This increase in LPG consumption has brought on with it an increased rate of accidents often leading to death due to gas leakage and the explosion of gas cylinders. Investigations have shown the major causes of these accidents to include: faulty cylinders, faulty valves, worn-out regulators, illegal or overfilling of gas cylinders, and lack of technical know-how on the part of the users of gas cylinders.

ISSN No:-2456-2165

II. LITERATURE SURVEY

SL NO	AUTHOR & YEAR	ARTICLE TITLE	ALGORITHM/TECHNIQUE	FEATURES	LIMITATIONS
1	S.Madhivathana, J.Malathy, N.Vasudevan 2020	Gas level detection Automatic booking using IoT	Taking the load cell and gas sensor values through Arduino and displayed on an LED screen	LPG Leakage alert and Automatic booking of gas.	If there is any spark when the exhaust fan works, it may lead to an explosion
2	Anag Suryana 2019	Rice Controller Using Half Bridge Load Cell and NodeMCU ESP8266 In Rice Dispenser	A specific weight of the rice is detected using loadcell and the value is sent to the software using nodemcu.	A proper diet can be maintained by taking the correct amount of rice from the dispenser.	If there are extra unwanted particles other than rice the weight taken will be the same but the calorie count won't be as expected which leads to a lack of nutrient intake.
3	Okonkwo PA, Obi AI, Idoko SO 2021	Design and Construction of Cooking gas (LPG) Leakage Detector	MQ6 sensor senses the gas leakage in the presence of gas which alerts the user's device using the GSM module	By detecting the gas leakage the user is alerted quickly and it can reduce the chance of fatal accidents	It is supposed to be stored in a dry and cold place. If not, it becomes inefficient.
4	Kurnia Paranita Kartika Riyanti, Ismail Kakaravada, Abdussalam Ali Ahmed 2022	Automated Load Detector Design to Determine the strength of pedestrian bridges using load cell sensor Based on Arduino	The load cell detects the weight of the pedestrian bridge and if it exceeds 25 kg, the buzzer alerts and displays it.	The possibility of accidents reduce to a high extent when alerted correctly	When a massive crowd emerges in an unusual situation the buzzer causes panic in the very inconvenient mass of people.
5	Hashem Alnabhi, Yahya Al-Naaman, Mohammed Al-madhehagi, Mohammed Alhamzi 2020	Enhanced Security Methods of Door Locking-Based Fingerprint	When a user presses their finger on the sensor, it checks the dataset and if it is an authorized user, the sliding lock is unlocked and it is reported to the GSM module. If it's an unauthorized user, the buzzer hits and it is alerted by the GSM module.	Enhancement of security can make users store or maintain important documents or things which cannot be easily accessed.	Using silica gel one can manipulate the fingerprint of another which can affect the security
6	Mubarak K. Kankara, Al Imtiaz, Imran Chowdhury, d. Khalid Mahbub Khan, Taslim Ahmed	Arduino and NodeMCU-based Smart Soil Moisture Balancer with IoT Integration	Soil moisture sensor senses the moisture content of the soil so that irrigation can be done accordingly and water level sensor detects the water level of the soil to maintain the water level for crop growth. Users can manually control the water supply using the NodeMCU module.	The regular sensing and monitoring of soil result in better crop growth and improve quality of the soil.	Different crops require different soil moisture and different water level for ideal growth. This is hard to maintain as we have to set up a different system for every single crop we grow.
7	A. I. Edeoghon, J. Chibuzor Okocha, J. S. Ebu, R. E. Ohiocheoya, O. V. Chukwunweike, G.	Design and Implementation of an IoT-Based Solar-Powered	The electrical energy generated by the solar cell is used for household purposes and the excess energy is stored in a load barrier. The current power,	Battery refilling need not be regular so its cost can be reduced and	Requires a lot of time for the battery to recharge and this system won't be

	Ebikade, E. O. Akinlade, , Ekwunife Onyeka, Odey Nicholas, Enofe. P	Inverter Control System	voltage, and amount of energy are sent to the mobile application of the user using the NodeMCU module.	since we are using solar it is a renewable source it won't be exhausted completely	efficient during humid or rainy days due to lack of sunlight
8	Tanzila Younas, Deepak Kumar Mukhi, Mufaddal, SM Faiz Hassan Zaidi, Hamzah Ahmad Khan, M Mahad Fayyaz. 2020	LPG Gas Detecting Robot Based on IoT	MQ6 detects gas leakage and the robot moves and points to the correct location of the leakage in the pipeline using the GPS module of the gas and alerts the connected devices.	By detecting the gas leakage the user is alerted quickly and it can reduce the chance of fatal accidents.	When an obstacle occurs in the place of movement, the robot may stop moving or move to the wrong location.
9	Zaky wahyu oktavianto, anton breva yunanda	Monitoring the air quality around users with IoT-based nodemcu ESP8266	MQ-135 a chemical sensor is used to detect the quality of air in the exhaust of vehicles and the data is sent to the mobile application using the NodeMCU module.	We can reduce and understand the amount of pollution emitted. By looking at the exhaust one can understand the condition of the vehicle.	When multiple vehicles run at the same time, it is difficult to understand the air quality of a single vehicle, the values may change.
10	Parag Narendra Achaliya, Nidhi Mohan Sharma, Arpita Ravindra Patil, Tanaya Dipak Chate, Pranali Chetan Kothari	Farm Fruit Safety Management System	Gas sensors sense the freshness of the fruits and send the data to a google sheet through the NodeMCU wifi module.	Sensors help to identify fresh fruits and we can avoid rotten fruits from them	Different fruits have different values for understanding freshness and it becomes

III. EXISTING SYSTEMS

Nowadays there are a few LPG leakage detection facilities that are available. But it is not widely available in our society, because of the high cost and maintenance. Some level detection mechanisms are available that are mainly attached or fit onto the LPG cylinder for monitoring the gas level using the temperature variants or pressure variants.

There is a magnetic gas level indicator that is widely used for household purposes. This device is mounted on the side of the cylinder with help of a magnet. The device can detect the temperature variation inside the cylinder. With this information, the device can indicate the level of the cylinder using different colors of light. Here Green light indicates that the LPG cylinder is sufficiently filled, the Yellow light indicates that the gas storage has going to end in a few days and finally the colour Red indicates that the cylinder is empty.

There is some sort of pressure gauge has also used to identify the level of the gas inside the LPG. It is also commonly used for household purposes. This device is fitted on the top of the cylinder such that it can measure the pressure variation of the cylinder and indicate the level of the gas in the cylinder.

The main limitations are although these devices can accurately detect the level of the cylinder, the user has to manually visit the place of the cylinder and check the reading. This problem can be solved with Auto-Gaz.

IV. PROPOSED SYTEMS

The application for gas level detection acts as an interface between users who are looking for knowing the status of the gas cylinder without having to lift the cylinder. The load cell will detect the weight of the cylinder and send the readings to the application. This information is displayed on the application interface. It enables us to notify the users of the details of the gas cylinder. If there is a leakage of gas, the user will receive alerts on their mobile application. The required users will be able to make use of the information provided and make bookings once the gas cylinder is about to be empty. The application is designed in such a way that the users have these options to select.

- First-time users should choose their gas provider and the type of gas cylinder.
- If the user wants to view the status, they can open and view the app.
- If the gas cylinder is about to be empty, the user is provided with the option to make a booking.
- If the gas cylinder is empty, the application will notify the user and directly make the booking
- If the user wants to view the history of bookings, they can view it.

ISSN No:-2456-2165

V. CONCLUSION

The main advantage of this simple gas leak detector is its simplicity and its ability to warn its users about the leakage of the LPG gas and the level detection helps them to warn if the cylinder is going to empty. The Automatic booking facility is very helpful for the customers to make their booking when the cylinder is going to empty and also a single click is needed to confirm their booking slot. The other advantage of this system includes its visual warning system. The gas detector is implemented successfully, is easy to use, and is a low-cost product. Another advantage of this device is that even though there is no one in the house when the gas leak occurs, the WIFI module is there to send immediate messages to the users regarding the gas leak and thus it lowers the intensity of accidents. The WIFI module in this device ensures better safety regarding gas leaks. This project can reduce wait time, improve efficiency and protect the safety of the users.

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