



IOT BASED GAS LEAKAGE DETECTOR FOR HOME

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Abstract— IOT Based Gas Leak Detector for Home The system includes a gas leak detector. Using the MQ-5 gas sensor, we build a detector that can detect gas from the outer and inner pipes and then send the information to the ESP controller (WIFI module) as soon as gas is detected. When the bell rings, the ESP controller (WIFI module) responds quickly and sends an alert message to the user's mobile phone and LCD screen. For persistent data storage, we use an Android application that also provides creation, modification and monitoring functions so that users can view or access data at any time. Also another use of our Android app is to store petrol and fuel reservation history. Another purpose of our system is to provide automatic fuel separation with the help of the mobile phone, which is the main weight of the fuel, and to send a message to the agency and the person responsible for the information received from the sent call for fuel reservation. To the user's mobile phone. phone number. If the user wishes to unsubscribe, the administrator can do so.

Keywords: Mobile Application, MQ5 gas sensor, LCD 16X2 Display, ESP 8266-01, Buzzer, Load cell

I. INTRODUCTION

Nowadays internet of things is used for safety purpose also. Gas Pipes fulfill vital roles in home automation and industries and thus in growing economics LPG gas is commonly used for cooking food and other stuff in both. In today's world, cities supply LPG through LPG pipelines. For this reason, gas leaks pose a threat and create a dangerous situation because they also cause fire. The solution to these problems is to create a new detector that can detect the gas from the outside of the pipe with the help of the MQ-5 gas sensor and can detect the leaking place of LPG gas in the house from the outside of the pipe if it sees the gas coming out. the sensor is fast to send a message. It responds quickly to ESP controller (WIFI module), bell and sounds, and quickly sends information to user's mobile phone, Gmail and LCD via Wi-Fi module. For persistent data storage, we use an Android application that also provides data updates and reviews so that users can view or access the data at any time. Also another use of our Android app is to store petrol and fuel reservation history. Another purpose of our system is to assist in manual loading of fuel, which is the weight of fuel, to enable automatic fuel reservation and send a message to the fuel reservation agent and viewer Telephone control will send a message to the user's mobile phone telephone.

II. LITERATURE REVIEW

1. A Comparative Study on Gas Alarm Detection System “, Muhammad Ahmad Baballe¹, Mehta Ibrahim Bello (2022). This paper comes in response to the increasing rate of fire outbreaks and explosions in the world today as a result of gas leakage. The main aim of this paper is to review literature related to gas alarm systems, their challenges faced, and the impact of deploying them in people's homes or organizations for security purposes. The gas detection systems can help in controlling and monitoring our homes from fire outbreaks and explosions.
2. “Leak detection and corrosion identification in water tubes gas pipes by mobile robot”, Asan Banu Jinnah Sheik Mohamed; Kanagaraj Venusamy; S.V.Tresa Sangeetha; Abdullah Salim Abdullah Al Rawahi; Ahmed, Said Mahmood Al Balushi 2021 2nd International Conference on Smart Electronics and Communication (2021). A result, humans created and IOT Based Gas Leakage detector for Home created numerous devices that aid in the detection of such flaws and errors and one of these devices is the robot. This robot could detect water tubes leakage, gas pipes leakage and corrosion in the pipes with its camera, and the robot can move in all directions by using omni-directional wheels and can also enter the pipe.
3. “Autonomous low-cost Wireless Sensor platform for leakage Detection in Oil and Gas Pipes”, Spandonidis C. Christos; Giannopoulos Fotis; Galiatsatos Nektarios; Reppas Dimitris; Petsa Areti; Spyropoulos Dimitrios 10th International Conference on Modern Circuits and Systems Technologies (MOCASST)(2021), Pipelines are one of the most common systems for storing and transporting petroleum products, both liquid and gaseous. Despite the durable structures, leakages can occur for many reasons, causing environmental disasters, energy waste, and, in some cases, human losses. The object of the ESTHISIS project is the development of a low-cost and low-energy wireless sensor system for the immediate detection of leaks in metallic piping systems for the transport of liquid and gaseous petroleum products in a noisy industrial environment. The

method to be followed will be based on processing the changes monitored in the spectrum of vibration signals appearing in the pipeline walls due to a leakage effect and will aim at minimal interference in the piping system

4. "Detection of leak position in household LPG distribution pipes using gas pressure sensor and continuity equation." Anang Suryana; Mukhlis Ali; Samsul Pahmi; Muhammad Mahmud; Duddy Suherman; Ali Dera; Ilham Fazrul Iman; Teja Nuralam 2020 6th International Conference on Computing Engineering and Design (ICCED)(2020), Factors causing pollution both water and air and fires can be caused by the pollution of liquefied petroleum gas that comes from gas network leaks from National gas Company to households. For National gas Company due to LPG gas pipeline leaks can cause quantitative losses. To prevent losses caused by LPG network leaks that are distributed to households, a gas pipeline leak detection system can be applied using the concept of fluid mechanics. To detect leaks quickly, the pressure monitoring data will be monitored in a database that is displayed in front end point of the location of leakage of household gas pipes to officers who monitor the performance of the household gas pipeline.

5. "Gas level detection and automatic booking notification using IOT", K. Muthamil Sudar; D. Lakshmi Lokesh; V. Samara sihareddy; Y. Chanakya Chowdar, International Conference on Computer Communication and Informatics(2021). IOT based gas level detection and automatic booking notification. Now a day's LPG is a major cooking fuel as it is cost effective also. So, it is the most preferred fuel source. LPG cylinder has to be pre-booked everytime. This booking process is not much efficient nowadays, because users of LPG have increasing day by day. This reading is passed to LCD module to show the gas content in the cylinder. If the gas level is less than the fixed value then GSM module sends the notification to the mobile and also informs the gas agency to record the booking on confirmation with customer. This project also ensures safety near the cylinder by detecting if any gas leakage and if any fire occurs. If any of these detected a buzzer will ring and also an exhaust fan will be turned on. The user will also be notified regarding this. .

III. PROBLEM STATEMENT

IOT Gas leakage detector and automatic gas booking for home as we know the drawback of existing system sending alert messages are stored in temporary basis but we use Android application to store permanent data like Location, Date, Time, percentage of gas and its risks. Also, we include online automatic gas booking system.

IV. PROPOSED SYSTEM

Step 1: The MQ5 gas sensor detects gas leakage the if the gas gets leak.

Step 2: When the gas gets leak.

2.1 : It sends to the ESP and displays the data on the LCD like risk i.e., high or low with percentage.

2.2 : The buzzer will on.

If the gas is not leaking the LCD is blank.

Step 3: ESP sends the leakage information through API.

3.1 : API sends the leakage information to the MYSQL database.

3.2: Then it sends the information to the gas agency and user through gas leakage detection application.

Step 4: The load cell detects the level of the gas. If the gas is empty it sends to the ESP.

4.1 : Gas leakage detector receives the gas information through API and MySQL database.

4.2 : Gas agency login with the credentials and view the dashboard. If user requested for the gas booking gas agency approves the request and gas gets book successfully.

4.3 : User login with the credentials and view the gas information, booking history, leakage history and will book the gas if gas remains low.

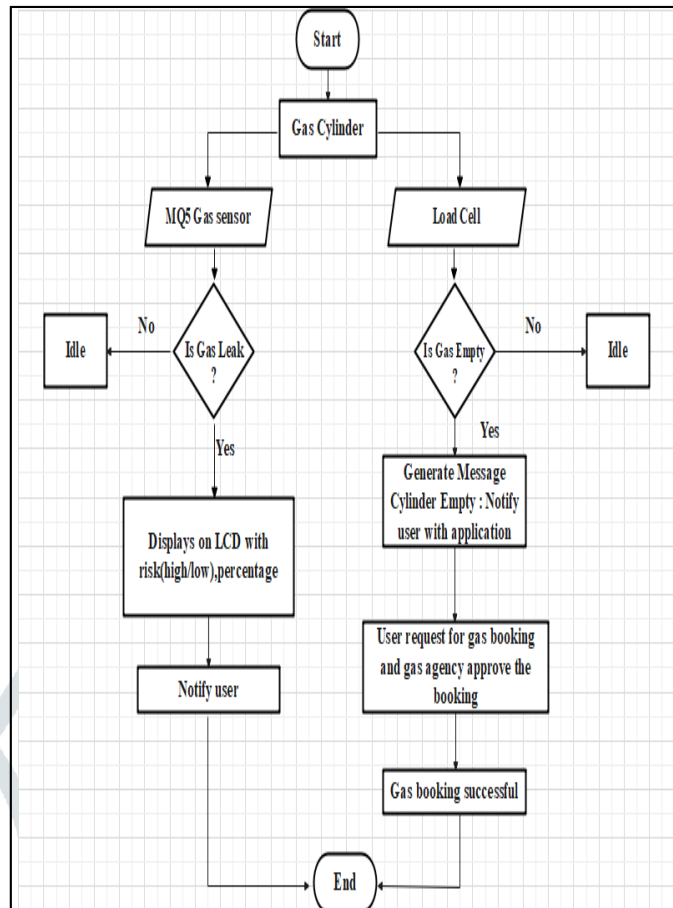


Fig 1. Proposed System

V. COMPONENTS

1. ESP 8266-01

The ESP8266-01 is a popular and widely used Wi-Fi module based on the ESP8266 chip. It is one of the earlier versions of the ESP8266 module series, offering a compact form factor and basic functionality.

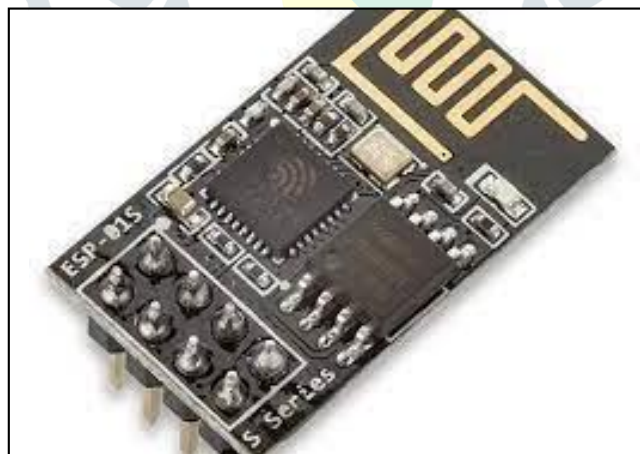


Figure 1: ESP 8266-01

2. Load Cell:

A load cell is a type of transducer used to measure force or weight by converting mechanical force into an electrical signal. It is commonly used in various industrial and commercial applications for weighing, force measurement, and process control. Load cells are widely used in scales, weighing systems, material testing machines, industrial automation, and other force measurement applications.

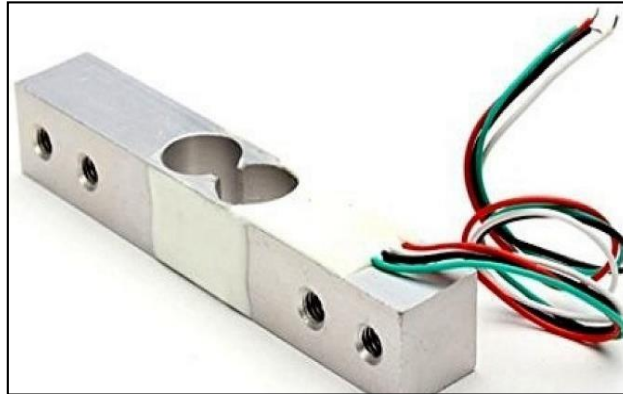


Figure 2: load cell

3. LCD:

LCD (Liquid Crystal Display) is used to give users visual feedback and information. It can show data like whether the door is locked or unlocked. The LCD can also show user input prompts like asking for a PIN number or fingerprint scan. By offering clear and concise information and feedback, an LCD in a smart door lock system can improve the user experience.



Figure 3: lcd

4. MQ-5 gas sensor

The MQ-5 gas sensor is a commonly used sensor for detecting and measuring the concentration of various gases, particularly methane (CH₄) and liquefied petroleum gas (LPG). It is part of the MQ series gas sensors developed by the company Winsen.



Figure 4: mq5 gas sensor

5. Jumper Wires:

Jumper wires are used to establish connection between IOT components.



Figure 5: jumper wires

6. Buzzer:

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.



Figure 6: buzzer

7. Small size zero PCB:

A "small size zero PCB" is not a specific term or standard in the field of electronics or PCB design. However, I can provide some general information about small-sized PCBs. PCB stands for Printed Circuit Board, which is a flat board made of insulating material, such as fiberglass or phenolic resin, with conductive tracks etched onto its surface. PCBs are used to provide mechanical support and electrical connections for electronic components.

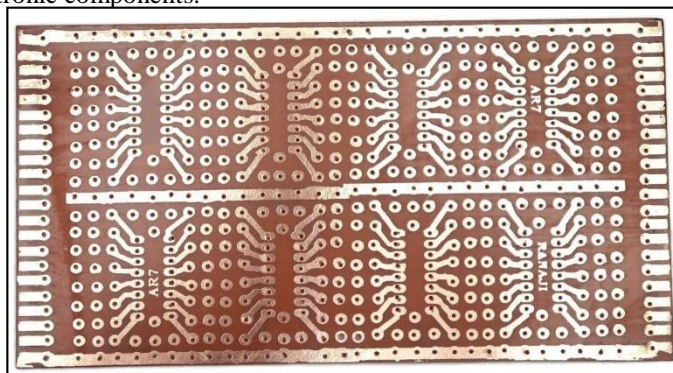


Figure 7: small size pcb

VI. EXPERIMENTAL WORK

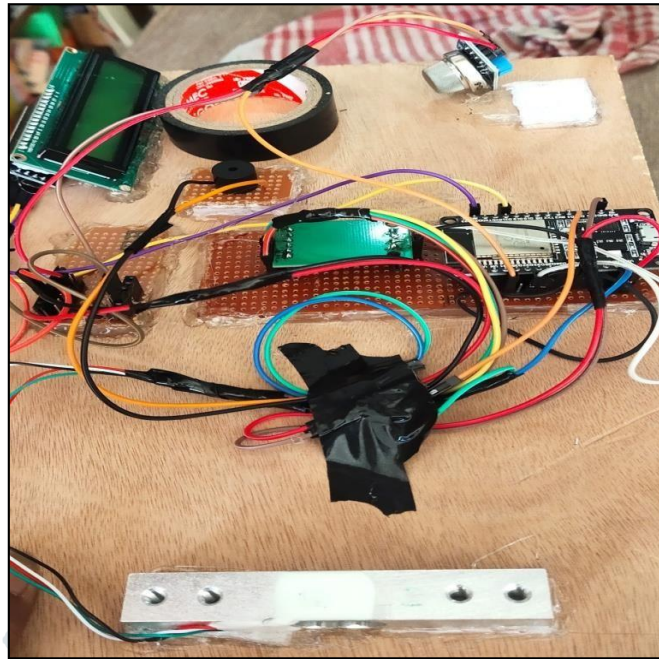
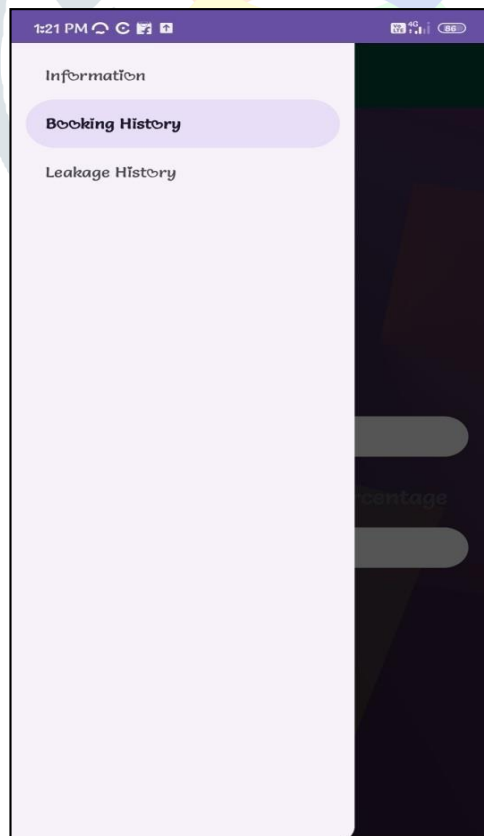


Figure 8: hardware circuit

VII. RESULTS & DISCUSSION:

- *User Module:*



- Leakage History:

Date: 2023-05-29	Time: 12:56:46	Gas Percentage: 11	Risk: high
Date: 2023-05-29	Time: 12:58:29	Gas Percentage: 11	Risk: high
Date: 2023-05-29	Time: 01:15:55	Gas Percentage: 11	Risk: high
Date: 2023-05-29	Time: 01:48:52	Gas Percentage: 11	Risk: high
Date: 2023-05-29	Time: 02:08:35	Gas Percentage: 9	Risk: high

- Booking History:

Date: 2023-05-25	Time: 04:53:59.000000	Status: Booked	BookingId: 123
Date: 2023-05-25	Time: 04:54:56.000000	Status: Booked	BookingId: 123
Date: 2023-05-25	Time: 04:56:17.000000	Status: Booked	BookingId: 123
Date: 2023-05-29	Time: 10:20:16.000000	Status: Booked	BookingId: 111
Date: 2023-05-29	Time: 12:00:18.000000	Status: Booked	BookingId: 111

VIII. SOFTWARE COMPONENTS:

Embedded C: Embedded C refers to the subset of the C programming language that is commonly used for developing software for embedded systems. Embedded systems are computer systems designed to perform specific functions within a larger system or device.

LCD library: To work with LCD (Liquid Crystal Display) modules in embedded systems, various libraries are available to simplify the interfacing and control of LCDs. These libraries provide functions and routines to initialize the LCD, write data to the display, and control cursor movements.

Android application: used Android application for permanently data storage also that application provide which creations updating and monitoring so user can view or accessing data anytime. And another purpose of our system we provide facility for automatic gas booking.

MySQL Database: MySQL is widely used in web applications, content management systems, e-commerce platforms, data warehousing, and many other domains. It has a large and active community that provides support, documentation and additional features through extensions.

IX. ADVANTAGE

- **Early Warning:** Gas leakage detectors provide an early warning system, detecting the presence of gas leaks before they become hazardous.
- **Safety and Protection:** Gas leaks can be dangerous, as they can lead to fire, explosions, or the buildup of toxic gases. Automatic Gas booking System.
- **Sent alert message to android application and SMS**
- **Property Protection:** Gas leaks can cause significant damage to properties, including structures, appliances, and belongings..

X. DISADVANTAGE

- **Limited Sensitivity** for limited gases.
- **High Cost.**
- **Payment option is not available.**
- **Only for home automation.**

XI. CONCLUSION

We implemented Gas Leakage detection system by using ESP module, MQ-5 gas sensor, LCD Display. While implementing the project we learn lot about Gas sensors, ESP module and many other IOT devices. LPG Gas Leakage leads a huge problem in many industries and households. We are going to design a Gas leakage detector that can detect Gas Leakages effectively by using a MQ-5 gas sensor and alert user by sending an alert message by using the ESP module to the respective mobile phones and Gas leakage detector application. Also we include Automatic gas booking system. Hence our Project will definitely prove to be an important for households.

XII. REFERENCES

1. A Comparative Study on Gas Alarm Detection System“, Muhammad Ahmad Baballe1, Mehta Ibrahim Bello (2022).
2. Gas level detection and automatic booking notification using IOT, K. Muthamil Sudar; D. Lakshmi Lokesh; V. Samara sihmareddy; Y.Chanakya Chowdar, International Conference on Computer Communication and Informatics (2021).
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4. “Autonomous low-cost Wireless Sensor platform for leakage Detection in Oil and Gas Pipes”, Spandonidis C. Christos; Giannopoulos Fotis; Galiatsatos Nektarios; Reppas Dimitris; Petsa Areti; Spyropoulos Dimitrios 10th International Conference on Modern Circuits and Systems Technologies(MOCAST)(2021),