LPG Gas Leakage Monitoring System Detection and Alert System Using IOT

K. Muni Sankar[1], Dr. B.Booba[2]
[1]Research Scholar, Vel's University, Chennai
[2]Professor, Dept. of CSE., VISTAS, Vel's University, Chennai

Abstract - **At present fuels, gases, and other substances are widely used in our daily lives, such as in households, industries, and so on. However, if not used properly, it can cause serious problems. In the past, it was the sole cause of many accidents. The goal of this project is to detect a gas leak, prevent an accident, and block gas leaks in high-risk areas. This includes the MQ6 gas sensor, which is used to detect gas leaks in the home and industry and is also suitable for detecting LPG, i-butane, Hydrogen, Methane, Smoke, and Alcohol, among other things. However, it does not specify the precise gas concentration. It only depicts the trend of gas concentration within a reasonable error range. This device takes precautions on its own. And even turns off the main power supply for a short period of time to avoid accidents. Include the WiFi module as well, which will take immediate action by sending an alert SMS.**

Index Terms - **Arduino UNO, MQ6 gas sensor, Buzzer, Exhaust Fan, ESP8266 WiFI Module.**

I.INTRODUCTION

There are numerous devices available to prevent gas leakage accidents. As an example, smoke detectors, fire extinguishers, and so on. These devices can only prevent fire exposure; they cannot protect people from injury. In the past, accidents such as the Bhopal gas tragedy, which occurred in December 1984, killed over 3,000 people when methyl isocyanate leaked out. Andhra Pradesh's Nagaram The pipe became rusted in June 2014, resulting in a gas leak, a blast at the Gas Authority of India Limited's plant, the death of 29 people, and other incidents. So, in order to protect people from this potentially lethal disaster, technologies must be upgraded. If the gas outflow is not detected early, it can cause significant damage. MQ6 sensor is a device that not only detects but also prevents accidents by turning off the main power supply. It has a high sensitivity as well as a quick response time. A sensitive SnO2 filament is used in this detector. In the presence of clean air, this filament reduces electrical conductivity. When a combustible gas, such as LPG, is ignited, the conductivity of the filament increases. This sensor can easily communicate with Arduino. So it's an Arduino-based gas leak detection system, in which the device can be connected to WIFI via the ESP8266 WiFi module, and the maximum and minimum variables are set as a result. Following detection, an alert SMS will be sent to the owner.

II. LITERATURE REVIEW

Many authors have come up with ideas to prevent and detect gas leakage in the past, such as, [1] The authors Somashekhar Malipatil, Shilpa, and Jayasudha proposed GPS-based LPG Gas Measurement Detection. They used Arduino, LPG, GPS, a MQ6 sensor, a load cell, and a signal amplifier. The level of the gas cylinder is monitored by this system. If the threshold level falls below 2kgs, an alert SMS is sent to the user, and the leakage level is detected. [2] Siddharth, Rameswari, Keerthana Gayathri, and Kavin Sanjaya proposed Smart gas assistant for an ideal kitchen. They used Arudino, Wi-Fi, GSM Module, Internet of Things, Online Tool, and Mobile Application in this paper. This system determines the amount of LPG in the cylinder. It automatically books the cylinder based on the registration number. In addition, a message alerting the customer to the volume of gas available in the cylinder is sent. [3] Anusha, Nagesh, Venkata Sai, Srikanth, and Rupalin Nanda created an IoT-based LPG leak detection and booking system with SMS alerts for customers. They used a GSM modem, a MQ2 gas sensor, a load cell, and an AWS server in this paper. This system detects fuel leaks automatically and sends an SMS alert to the

user. If the user is busy somewhere and does not respond on time, the system automatically reserves the characteristics of LPG gasoline and robotically replaces the reservation data on the server using AWS server.

III. PROPOSED SYSTEMS

This proposed system detects leaks by utilizing a gas sensor MQ6 the detection system, Arduino, ESP8266, and an alert system. Figure 1 depicts the architecture of gas leakage detection, in which Arduino is used to receive input from a gas sensor and then send a signal to a stepper motor to turn off the cylinder valve. Also, notify your neighbour by activating the buzzer and exhaust fan. Also, use Esp8266 to send an SMS with images to the owner.
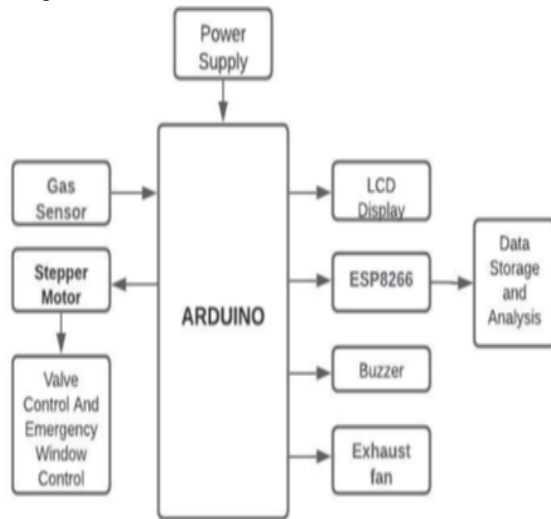
Fig. 1. Architecture of Gas Leakage Detection

IV. IMPLEMENTATION

An ESP8266 chip is used in the development of an IoT-based intelligent (LPG) leakage detector project. The circuit diagram is shown in fig:2. The MQ6 gas sensor has given input to Arduino, which will take action if a leak is detected. The output will be displayed on the IOT-based display about the gas level shown in fig.4, which will show the percentage of gas level as per set value. If a leak is detected, the stepper motor is notified to open the valve, and the buzzer is activated until the user turns it off after receiving a sms about the leak.
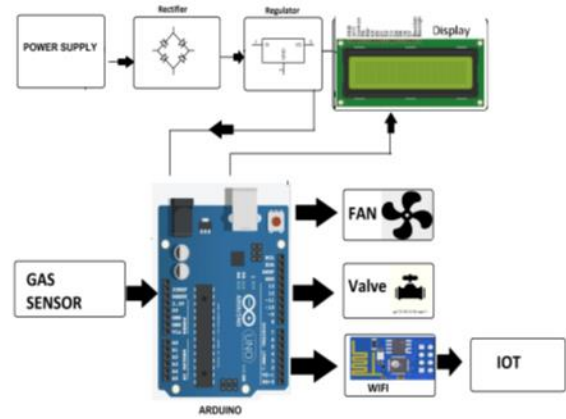
Fig. 2. Circuit Diagram

A. Arduino

An Arduino is a circuit board that contains microcontroller chips and other components. It is simple to use even for inexperienced users. It can be used to control motors, lighting, cameras, and even to construct a simple robot. It is designed in such a way that its software can run on Windows, Linux, and Mac, making code uploading as simple as plugging in a USB cable and pressing a button. A programming language that allows users to configure all Arduino hardware products in the same manner. It is an open-source platform with an integrated development environment (IDE) and a simple c programming language. The programme can be easily implemented by connecting the arduino board to the laptop via a connector cable. It is widely used in this system to turn off the gas supply when it receives information from the sensing device and alerts the neighbour by turning on the buzzer and exhaust fan. It even sends sms to the owner including images of the activities.

B. LCD

LCD is an abbreviation for 16*2 liquid crystal display. It was used in this system to interface with the Arduino and display the leakage output. It can be controlled by an Arduino and will display if there is a leak. Otherwise, gas is leaking. There is no leaking.

C. MQ6 Sensor

This detector can detect gases (Iso gas, butane) at concentrations ranging from 200 to 1000 ppm. To avoid the noise of alcohol, smoke, and other substances, once gas is detected by the detector, it compares with the comparator present within the

detector to provide digital logic information output to the Arduino. The enclosed MQ-6 has five pins, four of which are square measure accustomed fetch signals and the other two square measure used for providing heating current.

D. ESP8266 WiFi module

The ESP8266 is a low-cost wifi module that includes a full tcp/ip stack and an MCU. It works as a soft access point. It only has two input/output pins. The programme is uploaded from the MCU to the GPIO board. This wifi module is used to send data to websites and can also receive data from them. It can be used directly by connecting it to a computer via a USB cable or by connecting it to an Arduino board.

E. Flowchart

The flow of gas level is depicted in Fig. 3. It indicates the amount of gas in the air. If there is a gas leak, the sensor will detect it and compare it to the threshold value.
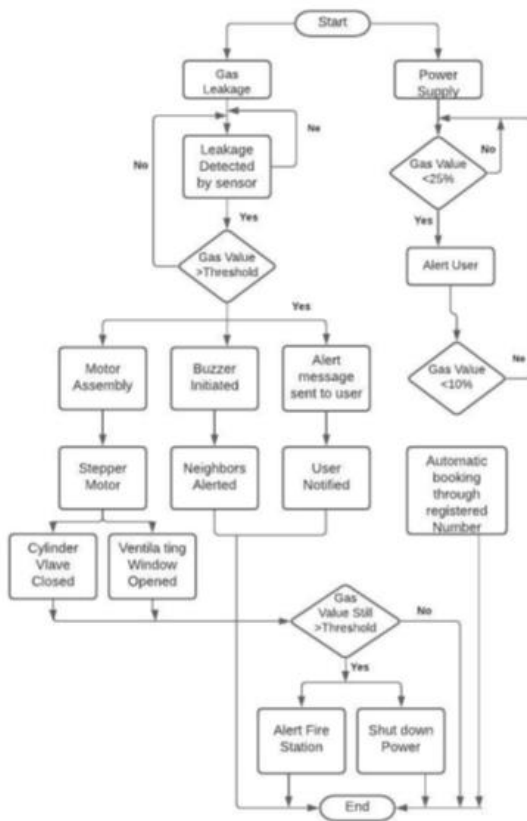

As a result, the motor is activated, and the cylinder valve is closed. If the threshold remains lower than the gas value, an alert message is sent to the fire station,

and the power is turned off automatically. Furthermore, the user will receive an alert message and will be required to act immediately.

V. RESULT

Figure 4 depicts the level of gas leakage. If the threshold is less than the gas level, it will detect leakage and display the amount of gas in the cylinder on an IOT-based display. And if gas is about to leak, sensor MQ6 will detect it and send a signal to the motor, causing the power supply to be cut off by turning the valve on. Figure 5 depicts an SMS sent to the owner informing him of the leak.

Comparison of Existing System with Proposed System:
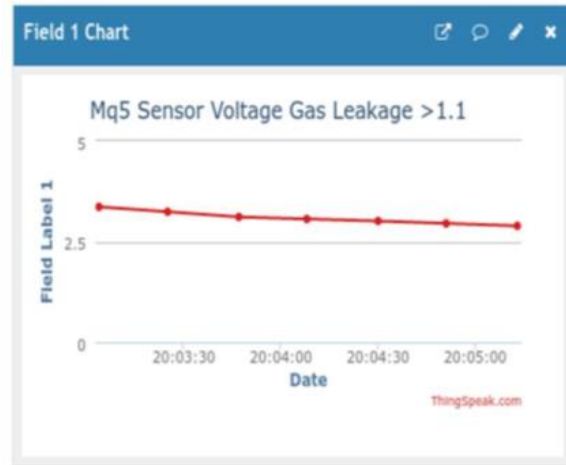
VI. CONCLUSION

This is an arduino-based system that was designed and implemented to detect gas leaks in homes, hotels, and industrial settings. This system has a sensing range that is set via the IOT platform site; if it is low, the system is not on or does not turn the valve and exhaust on; if it is in the 200-1000 ppm range or greater, the system detects a gas leak and alerts the user via buzzer sound; and if the user is unable to turn off the valve manually within one minute, the system turns off the valve automatically and the exhaust fan is on until the gas levels in ppm present.

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