IOT BASED SMART GAS LEAKAGE DETECTION AND ALERT SYSTEM

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Abstract—There are much uses of fuels, gases, etc. in our dayto-day life such as in households, industries, etc. But it can cause vital issues if not used carefully. It was the only cause of many accidents in the past. The purpose of this project is to detect a gas leak and prevent the accident and blocking of gas leaks in vulnerable areas. This includes the MQ6 gas sensor which is used to detect gas leakage in home and industry and is also very much suitable for detecting LPG, i-butane, Hydrogen, Methane, Smoke and Alcohol, etc. But it does not indicate the exact gas concentration. It only illustrates the trend of gas concentration in a suitable error range. This device automatically takes precautions. And even turns off main supply in some time to avoid accidents. And also include the WiFi module to take necessary action immediately by sending an alert SMS to the owner.

Index Terms—Arduino UNO, MQ6 gas sensor, Buzzer, Exhaust Fan, ESP8266 WiFI Module

I. INTRODUCTION

There are lots of devices to avoid accidents of gas leakage. Like smoke detectors, fire extinguishers etc. These devices can prevent fire exposure only, they can't protect people from getting injured. In past, accidents like Bhopal gas tragedy, On December 1984, more than 3,000 people were killed when methyl isocyanate leaked out. Nagaram, Andhra Pradesh, On June 2014, the pipe was rusty which led to a gas leak, blast in Gas Authority of India Limited's plant, killed 29 people etc. So to protect people from this hazardous disaster need to upgrade the technologies. Major damage can cause, if gas outflow is not detected early.

MQ6 sensor is a device which will not only detect also it will prevent accident by turning the main supply off. It has a high sensitivity and fast response time. This detector contains a sensitive filament made from SnO2. This filament keeps electrical conductivity lower in the presence of clean Chanchal Rai

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air. The filament's conductivity increases when a combustible gas commenced like LPG. This sensor can simply interfaced with arduino. So its a Arduino based gas leakage detection, in which device can get connected to WIFI using ESP8266 WiFi module, the maximum and mininum variable will be set consequently. After detection the alert SMS will be sent to the owner.

II. LITERATURE REVIEW

In the past, There are lots of authors came up with ideas to prevent and detect gas leakage such as, [1] The authors Somashekhar Malipatil, Shilpa, Jayasudha proposed LPG Gas Measurement Detection using GPS. They used components like Arduino, LPG, GPS, MQ6 sensor, Load cell, Signal amplifier. This system monitors the level of gas cylinder. If threshold level comes below 2kgs the alert SMS will be sent to the user and also it detects the leakage level. [2] Siddharth, Rameswari, Keerthana Gayathri, Kavin Sanjaya proposed Smart gas assistant for a perfect kitchen. In this paper they used Arudino, Wi-Fi, GSM Module, Internet of Things, Online Tool, Mobile Application. This system measures the amount of LPG present in the cylinder. It automatically books the cylinder from registered number. And a alert message sent to the customer also about volume of gas available in cylinder. [3] Anusha, Nagesh, Venkata Sai, Srikanth, Rupalin Nanda designed IoT Based LPG Leakage Detection and Booking System with Customer SMS Alerts. In this paper they used GSM Modem, MQ2 Gas Sensor, Load Cell, AWS server. This system automatically detect the fuel leak and alert the user by sending the sms. If user is busy somewhere and fails to respond on time it automatically reserves the characteristics of LPG gasoline and replaces the data of reservation on the server robotically by using AWS server.

III. PROPOSED SYSTEMS

This proposed system provides a way to detect leaks using a gas sensor MQ6 the detection system, Arduino, ESP8266 and alert system. Fig:1 shows architecture of gas leakage detection in which Arduino has used to get input from gas sensor then give signal to stepper motor to turn off the valve of cylinder. And alert neighbour by turning buzzer and exhaust fan on. Also, sms the owner including images using Esp8266.



Fig. 1. Architecture of Gas Leakage Detection

IV. IMPLEMENTATION

IoT-based intelligent (LPG) leakage detector project is implemented using an ESP8266 chip. The circuit diagram shown below in fig:2. MQ6 gas sensor has given input to arduino which after detection of leakage action will be taken. The output will be displayed on IOT based display about the gas level shown in fig.4, which will show the percentage of gas level as per set value. If leakage is detected stepper motor will be informed to turn on the valve simultaneously buzzer will be turned on till user turns off after getting sms about the leakage.



Fig. 2. Circuit Diagram

A. Arduino

An Arduinos are circuit boards that have micro controller chips on them and lots of stuff. It is easy to use for beginners. It can be used to control motors, lighting, cameras, or even build a simple robot. It is created in that manner so that its software can work on Windows, Linux and Mac, which makes uploading codes as simple as connecting a usb cable and clicking a button. A programming language that lets user configure all the arduino hardware products in the same way. It is a open-source platform provides integrated development enviroment(IDE) and simple c language is used. The program can be implemented easily by connecting arduino board to laptop using connector cable. It has wide use in this system to turn of the supply of gas when it gets information from the sensing device and alerts the neighbour by turning on buzzer and exhaust fan.It even sends sms to the owner including images of the activities.

B. LCD

LCD means 16*2 liquid crystal Display. In this system used it to interface with arduino and dispaly the output of the leakage. It can be controlled by arduino if there is a leakage it will display Gas is leaking or else No leakage.

C. MQ6 Sensor

This detector can sight gases (Iso gas, butane) at concentrations of 200–1000pppm. Avoid the noise of alcohol, smoke, etc. once gas is detected by the detector it compares with the comparator extant within the detector to provide the digital logic information output for the Arduino. The enclosed MQ-6 has vi pins, four of them square measure accustomed fetch signals, and therefore the different two square measure used for providing heating current.

D. ESP8266 WiFi module

ESP8266 is a low cost wifi module with full tcp/ip stack and MCU. It operates in soft access point mode. It has only two input output pins. The program gets uploaded in MCU to GPIO board. This wifi module used to send the data on websites and can even receive the data from website. It can be used directly connecting to computer using usb cable or can be used by connecting it to arduino board

E. Flowchart

Fig. 3 represents the flow of gas level. It shows how much gas present in the air. In starting if gas leaks it will be detected by the sensor and check the threshold value. As per result it turn on the motor and cylinder valve will be closed if still threshold is lower than gas value then alert message will be sent to the fire station and power will shut automatically. And even user will get the alert message immediately to act as per.



Fig. 3. Flowchart of the gas leakage detection

V. RESULT

Gas leakage level is shown in fig:4 if threshold is less than gas level it will detect leakage and display over IOT based display that how much gas level has in cylinder. And if gas is about to leak then sensor MQ6 will sense and signal will be sent to motor to switch of the power supply by turning valve on. And sms send to the owner about the leakage is shown in fig:5.



Fig. 4. Gas Leakage Detection

11:32		8.09	-491	(55)
← +91865736379	3			00
Gas Leaking!				
Gas Leaking!				

Fig. 5. Alert SMS received by User

11. Comaparison of Existing System with I toposed System	Α.	Comaparison	of	Existing	System	with	Proposed	System
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S.No.	Parameter	Proposed	Existing Sys-
		System	tem
1.	Sensor	Any MQ	Only MQ2
		sensor from	sensor is used
		MQ2 to	which has a
		MQ5/6 and	low range of
		MQ9 gas	threshold for
		sensors can	sensing gas
		be used and	values in ppm
		can apply	and further
		a variable	versions of
		threshold	MQ sensors
		range for gas	is not used
		sensing in	or can't be
		ppm	added[14]
2.	Additional	Can use	In the system
	compo-	exhaust and	they used
	nents	valve at	load cell
		the same	and LM35
		time while	temperature
		turning on the	sensor instead
		exhaust fan	of exhaust
		and closing	fan[1-15]
		the valve are	
		automatic	
		when gas	
		sensor senses	
		the gas leak	
		and exhaust	
		fan is on until	
		the gas is	
		present in the	
		room where	
		system is	
		applied	
3.	Data	It has a data	No additional
	Storage	storage for	data storage
		every gas	for gas leak
		leak per use	
		or when leak	
		is detected	
		in the cloud	
L	~	storage	
4.	Cost	low cost	cost bit costly
		around 7k to	around 10k to
		8k	12k

VI. CONCLUSION

This is a arduino based system designed and implemented to detect the gas leakage in home, hotels, and in industrial applications. This system has a sensing range is set via IOT platform site if it is low then set range system is not on or doesn't turn the valve and exhaust on, and it is in the 200-1000 ppm range or greater than that the system detects a gas leak and alerts user via buzzer sound and if user can't able to turn off the valve manually under 1 min. the system turns off the valve automatically and exhaust fan is on until the gas levels in ppm present in the room is decreased and fan is automatically off.

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