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# Gas Leakage Monitoring and Alerting System using IoT

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***Abstract*— Safety has become a crucial issue all over and it's necessary that smart safety systems are to be enforced in places of education, work, business and family purpose thus the planned gas leakage detection and observance system is developed to forestall disasters. The advantage of this machine-driven detection and alerting system over the manual technique is that it offers fast reaction time and correct detection of an emergency and successively leading quicker diffusion of the vital scenario. The main objective of the work is coming up with microcontroller primarily based venomous gas detecting and alerting system. The dangerous gases like LPG are detected and showed and inform each second within the liquid crystal display. If these gases exceed the conventional level then associate alarm is generated instantly and sends alert message each SMS to the approved person through the ARM development board. The system style consists of 3 main modules: detection, transmission and also the receiving module. The detection and sending module detects the modification of gas concentration employing a special sensing circuit designed. This module checks if a amendment in concentration of gases has exceeded a particular pre-determined threshold. If the sensing element detects a amendment in gas concentration, it activates audiovisual alarm and sends a sign to the receiver module. This proposed model detects the gas leakage and alerts the alerting devices. The MQ5 Gas sensor senses the leakage of Liquid Petroleum Gas and gives the amount of concentration to the microcontroller Arduino Uno which triggers the alerting devices. It triggers the Buzzer to ON, LED to ON, Exhaust Fan to ON, Gas NOB to shut and finally sends a message to the user like "Attention! 10 % Gas leakage is detected". The user gets notified and particular action can be taken by him.**

***Index Terms*—** Arduino Uno microcontroller

## I. INTRODUCTION

The fire accidents are the major cause for the deaths occurring across the globe. The major cause for these fire accidents is due to Liquid petroleum gas leakage in the households, hotels and major restaurants. There are many indicators in the market to sense the danger and alert the individual to prevent the accident. But all those are not producing the accurate results; hence many lives have been lost by using appropriate device. Hence to overcome the accidents we are proposing a device which takes the advantage in this and produced exceptional results. The proposed and developed device is Arduino Uno microcontroller based Gas leakage detection system which senses the leakage and alerts the user through various alerting devices. The various alerting devices include Buzzer which alerts the user with banging sound. The LED indicator which is used to notifies the user with colourful danger patterns. The exhaust fan employed in this model ventilates the Gas leakage into outdoors and prevents the accident. The Gas Knob incorporated in this device automatically shuts the passage of leakage and prevents further leakage. It finally sends the SMS to registered user to take a further action.

This device can be incorporated in all households, hotels, restaurants and industries. "An ideal gas sensing element could also be accustomed feel the outpouring of an LPG from cars, industries, homes and completely different residential regions. If there's a outpouring of LPG, we are going to effortlessly understand by exploitation its concentration through the gasoline sensing element and by exploitation rise in temperature. The LPG is loosely used for home functions like boiling, heating and preparation". The Arduino Uno program is written in embedded c programming language to code the alerting system. After crossing the particular threshold value the microcontroller automatically trigger the alerting devices like buzzer, led, exhaust fan, gas knob and finally send a SMS to the registered user in the Arduino Uno script/program. It switches on the Buzzer, LED and Exhaust fan. It shuts the Gas Knob. And finally sends an SMS through GSM module to the registered user.

## II. PROPOSED SYSTEM

The proposed model for Gas Leakage Detection and alerting system provides high standard security measures for the consumers and households who use the Liquid Petroleum Gas for their edible and drinking purposes. In this model we the main sensing component we have employed is MQ5 sensor. It detects the leakage of LPG concentration in a definite amount of percentage whenever a leakage or outpouring occurs in the LPG cylinder. After crossing the specified threshold value MQ5 sensor alerts the alerting components by using the Arduino Uno Microcontroller.

The Arduino Uno program is written in embedded c programming language to code the alerting system. After crossing the particular threshold value the microcontroller automatically trigger the alerting devices like buzzer, led, exhaust fan, gas knob and finally send a SMS to the registered user in the Arduino Uno script/program. It switches on the Buzzer, LED and Exhaust fan. It shuts the Gas Knob. And finally sends an SMS through GSM module to the registered user.

## III. SCOPE AND LIMITATION

**Scope:**

- The Gas Leakage Detection model notices/detects the Liquefied Petroleum Gas leakage as well as Compressed Natural Gas.
- LCD Displays the current status and amount of percentage leaked/detected.
- The Model triggers the alerting devices like Buzzer, LED.
- It Switches on the Exhaust Fan.
- It shuts the Gas Knob to further Leakage.
- Finally sends SMS to the registered user

**Limitation:**

- The Model is suitable for portable usage.

## IV. OBJECTIVES

The main objective of the work is coming up with microcontroller primarily based venomous gas detecting and alerting system. The dangerous gases like LPG are detected and showed and inform each second within the liquid crystal display. If these gases exceed the conventional level then associate alarm is generated instantly and sends alert message each SMS to the approved person through the ARM development board.

## V. BLOCK DIAGRAM

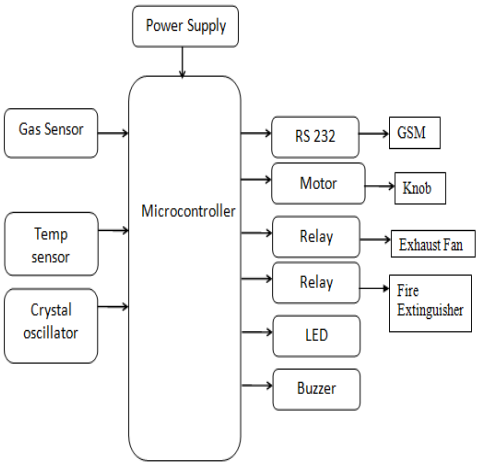



Fig.1. Block Diagram

### A. MODULES DESCRIPTION

*1) MQ5 Sensor:*

- The sensor detects/notices the amount/concentration of Liquid Petroleum gas leakage and can be read by microcontroller.

*2) GSM Module:*

- This device is an alerting device which notifies the registered user through an SMS. I sends the SMS through a service provider of the registered user.

*3) Gas Knob:*

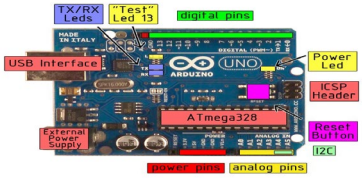
- The Gas knob used to shut to avoid further leakage of Gas in the surroundings.

*4) LED:*

- This device ia an alerting device which notifies the user with the colour pattern like blinking etc.,

*5) Arduino Uno Microcontroller:*

- The Microcontroller used in the model is Arduino Uno based Microcontroller.The microcontrooler supports a variety of sensors and alerting devices. It integrates all the components. We can program the controller using embedded c language.




*6) Exhaust Fan:*

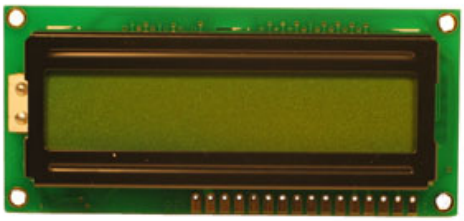
- This device is used to ventilate the leaked gas out of the doors in order to prevent the fire accidents.

*7) Buzzer:*

- This device is an alerting device which alerts the user by the banging sound.

*8) LCD:*

- Liquid Crystal Display is especiallyused for show the data. Here we are using 2x16 Digital Display.



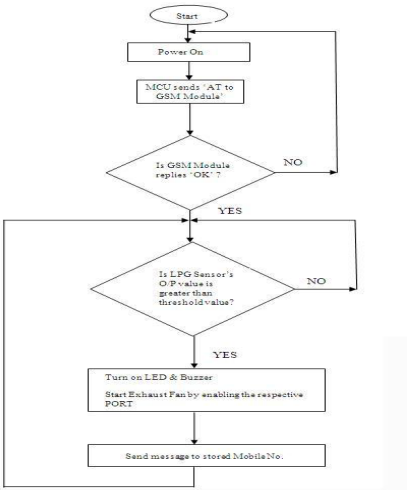
## VI. EXPERIMENT SETUP

### *A. WORKING PRINCIPLE*

The working principle for the model for Gas Leakage Detection and alerting system provides high standard security measures for the consumers and households who use the Liquid Petroleum Gas for their edible and drinking purposes. The Arduino Uno program is written in embedded c programming language to code the alerting system. After crossing the particular threshold value the microcontroller automatically trigger the alerting devices like buzzer, led, exhaust fan, gas knob and finally send a SMS to the registered user in the Arduino Uno script/program.

It switches on the Buzzer, LED and Exhaust fan. It shuts the Gas Knob. And finally sends an SMS through GSM module to the registered user. In this model we the main sensing component we have employed is MQ5 sensor. It detects the leakage of LPG concentration in a definite amount of percentage whenever a leakage or outpouring occurs in the LPG cylinder.

## VII. FLOW CHART




## VIII. RESULT

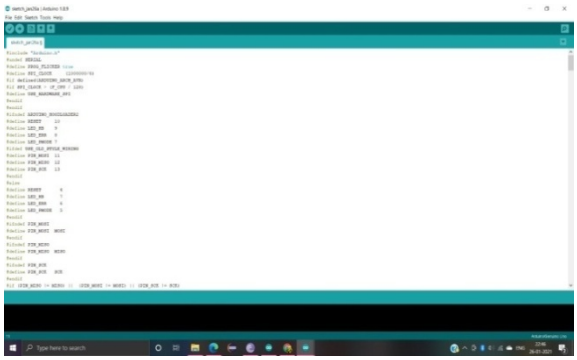


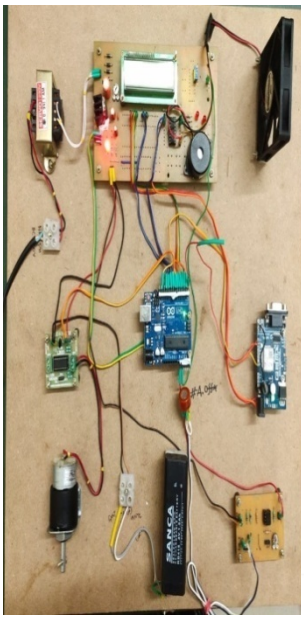
Fig.2. Result

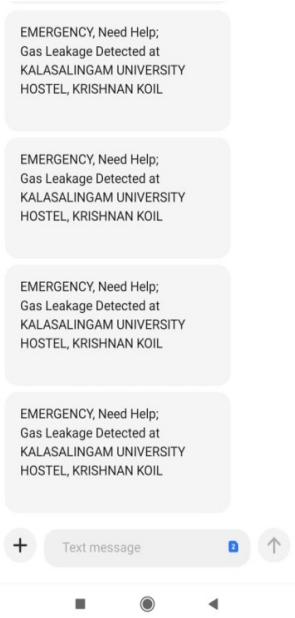
### *A. ADVANTAGES*

1. Tiny size compared with other types of load cells.
2. Very little influence because of temperature changes.
3. Extremely precise and linear measurements.

### *B. LIMITATIONS*

1. The major disadvantage is it is not fire assistant.
2. The Voltage required for the device is 5 Volts only.
3. The accuracy depends on the surroundings temperature and humidity.





### C. *COST ANALYSIS*

| Sl. No. | Description | Qty. | Price |
|---|---|---|---|
| 01 | Arduino UNO Board | 01 | 1120.00 |
| 02 | GSM Module | 01 | 850.00 |
| 03 | MQ-5 Sensor | 01 | 150.00 |
| 04 | Resistor | 02 | 20.00 |
| 05 | Capacitor | 02 | 18.00 |
| 06 | Diode | 02 | 20.00 |
| 07 | LED | 03 | 160.00 |
| 08 | Step Down Transformer | 01 | 90.00 |
| 09 | Temperature Sensor | 01 | 145.00 |
| 10 | Vero Board | 01 | 150.00 |
| 11 | Wires | | 30.00 |
| Total: | | | 2753.00 |

## IX. CONCLUSION

The project ARDUINO UNOMICROCONTROLLER BASED LPG GAS LEAKAGE DETECTION AND ALERTING SYSTEM USING SMS, BUZZER etc., is functioning fine, and the results projected by the alerts given by the developed device prevents major accidents in all the LPG gas usage places like households, hotels and Restaurants.

By the accurate detection of the leakage by the device many lives of the people can be saved from the hearth accidents, prevent huge damage and financial loss. The components used to develop the model are of high standard certified by ISI. The designing and development of the device at the low and affordable cost gives privilege that everyone can buy and use it.

Hence the results obtained by the usage of the model give ultimate satisfaction and great accomplishment for us.

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