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Gas Seepage Locator via Arduino

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Abstract: Gas leakage is one among the main problem in Residential areas, Industrial sectors and gas driven vehicles like CNG. Though the security measures considered by the company, leakage of gas has become quite common accident which ends up in loss of life and properties. There are many reasons for fire accidents such as poor rubber quality used while manufacturing, not turning off gas valve while not in use. One among the preventive methods to prevent accidents associated with gas leakage was by developing and installing the gas leakage detector with SMS alert is extremely important and essential to provide some safety to the people. When there is a gas leakage due to above mentioned reasons then MQ135 gas sensor sense the gas in the air by checking air quality and therefore output of sensor goes slow, by which the Arduino detects the change and sends a signal audio buzzer and display board simultaneously to turn on and provides some alert if present within the home or nearby and also the system sends an SMS to the pre-registered mobile number. Hence, this paper presents a gas leakage system with SMS alert via GSM module (Global System for Mobile) and buzzer to alert people, in order that they can take the required precautions and save many lives from this sort of Accidents.

Index Terms **- GSM module, LPG accidents, Gas sensor, Arduino IDE.**

I. INTRODUCTION

About 61% of the entire population uses LPG in India as a fuel for in many applications like in home kitchens, in hotels, in hostel mess, in vehicles and industries. LPG (liquefied petroleum gas) may be a basically a mix of propane and butane which are highly flammable chemicals [1]. It's odorless gas in its wild to which ethyl Mercaptan is added as a strong smelling agent, in order that leakage of gas are often easily detected. Being heavier than air, these gases don't disperse easily. It's going to cause Suffocation when inhaled and should also cause explosion. Therefore, to avoid these sorts of gas leakage accidents it's vital and necessary to develop a gas leakage detector with SMS alert which consists of components include- Arduino board is a microcontroller which equipped with sets of digital /analog (I/O)pins and controls the method of the system , GSM module may be a circuit which is employed to determine communication between a mobile device, MQ 135-air Quality control gas sensor used for detecting LPG, 16×2 LCD display, Arduino buzzer is an audio signaling device as beeper, i2c module, Connecting wires and a SIM card [2]. When there's a gas leakage ,MQ 135 gas sensors senses the air quality and sensor output changes accordingly, i.e greater gas percent---greater output voltage which is detected by Arduino board and activates and send data to LCD and buzzer simultaneously, then LCD displays the quantity of LPG gas percentage present within the air and "DANGER" notification and therefore the buzzer beeps and produces loud audio signal to alert the users nearby then GSM module sends an SMS to the 2 specified phone numbers provided by the user and alerts them by a fast notification regarding "Danger - Gas leakage in home- Percentage –X%". So, the people nearby and much away can take the required precautions and safety measures from the gas leakage accidents.

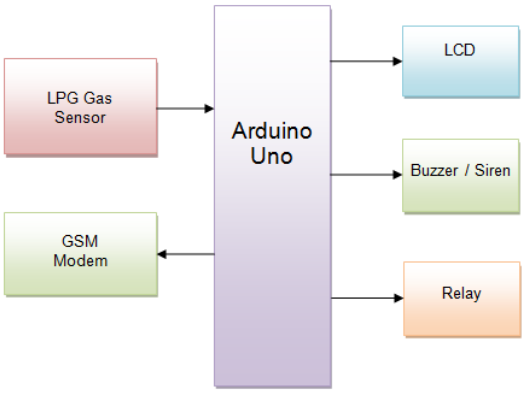
II. PROBLEM STATEMENT

Generally all households in India are using LPG gas cylinders still they are dangerous when it get leak. Many of families lost their lives because of this gas leakage. There are many possibilities for leakage like forgot to turn off the burner after using, any tiny hole on the pipe which we are connecting gas stove to cylinder or even sometimes damaged cylinder too. We approach a solution for this problem by to make a gas leakage detector using Arduino board with GSM module.

III. PROPOSED WORK

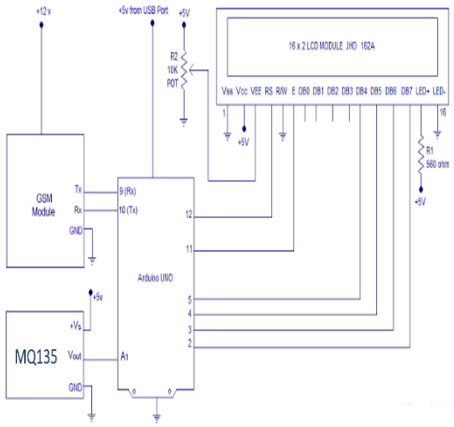
3.1 Block diagram

From Fig 1, In this block diagram all the LPG gas sensor that is MQ 135, GSM module, LCD 16x2 I2C display, buzzer all are coupled to the Arduino UNO board which is already programmed with Arduino software in the computer.



3.2 Circuit diagram of the work

From Fig 2, the circuit we have seen that how our project is working. I am going to elaborate our circuit. while gas is leaking the gas sensor MQ135 which is connected through jumper wires to the Arduino board it will detect the gas which was leaking and it sends feedback to the Arduino board then from Arduino board it goes to the GSM module and in that component we kept a 2G sim which will helps to send a message to our sim which is inserted in our mobile phone. In the Arduino program we set that mobile number which is used in our mobile. And also the Arduino board sends the signal to the LCD 16x2 I2C display it shows the how much gas is leaking in percentage, and also a buzzer will beep when Arduino sends the message to it.

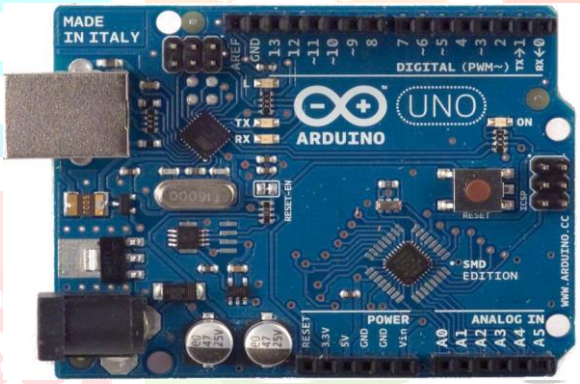


3.3 Overview of MQ135 Sensor

From Fig 3, a sensor is a component which converts the physical things into electronic signals and by the help of sensor it will detects the event with full accuracy and correct by the help of sensor it will progress the information to the next step of process. And the information passed by the sensor is easily understand by the people or machines easily. And sensors was reduce the people's work and a device which acts smartly in electronics field and helpful for the most of the devices [4]. This sensor is mainly useful for the finding of gas leakage at certain place and by the help of this sensor we can easily predicts the leakage of certain gases easily with the help of sensor and it requires the analog pin to connect with the system. It was a comparator. And it consumes less power. And it is having the output of digital format. It is very easily react to the certain gases and this sensor is mainly helpful for the so many applications and projects which is mainly working on the various gases.

3.4 Overview of Arduino Board

From Fig 4, Arduino UNO is the newest version of the normal Arduino USB board. We can connect this Arduino board with the computer using USB cable and then we need to program it and then we can use the board. It is a microcontroller having 14 pins based on ATmega328. In the 14 digital i/p and o/p pins in which 6 pins are act as PWM outputs, another 6 acts as analog inputs, then a USB connector, an ICSP header, a power jack and a reset button. It exists everything that needed to hold up the microcontroller. We can easily attach it to a computer using a USB cable or we can use AC-to-DC adapter to the power or we can use a battery to get going [5]. There are so many types of Arduino boards that can be maintained for different uses. For any type of Arduino board these components are common in them. Power: For every Arduino board supplying the power is needed. We should connect it to a power supply. The Arduino board can be easily connect with USB cable with the computer and also we can connect it with power supply. Using USB connection we can dump the code in the Arduino board which we programmed using Arduino software in our computer. The important thing is we should not employ power supply more than 20 volts it over power your Arduino and it can be destroyed. The usual voltage for all the types of Arduino boards it should be between 6 – 12 Volts. Pins: Pins are used on your Arduino board are to connect wires to make a circuit probably for adding of breadboard and some other wires. The Arduino board has various types of pins, each of them used for different purposes. GND: GND is shortcut for Ground. There are various GND pins are inbuilt on the Arduino board, all are used for ground. 5V & 3.3V: In the Arduino 5V pin is used for 5 volts of power supply and then 3.3V pin is used for 3.3 volts of power supply. Analog: The pins which are mentioned at the 'Analog In' (A0 – A5) are used as the Analog input pins. These pins are used to read the data from the analog sensor and then it can convert it into digital signal. Digital: Digital pins (D0 – D13) are utilized for both digital i/p and digital o/p. PWM: PWM pins are used as typical digital pins and also require for pulse width modulation (PWM). These pins are used to give analog output on an LED or on a buzzer. AREF: It stands for Analog Reference. These pins are used sometimes only as external reference voltage, anyway we can leave this pin most of the times. Reset button: Arduino is having a reset button which is used to restart the Arduino board when required. When we click this button it temporarily connect to the ground and it will restart the code that is dumped previously in the Arduino board. Main IC: IC is an Integrated circuit it is the brain of the Arduino board. The main IC is differs from one Arduino to another Arduino board types, but mainly they are from ATmega IC's designed by the ATMEL company. It is necessary to learn about the IC type before using it for programming the Arduino board. On top every IC they write the information about it. Voltage regulator: Actually we don't use voltage regulator or we don't need to interact with it. But it is useful to know something about that. It is used to control the voltage flow which will go into the Arduino board.



3.4.1 Advantages

1. Arduino boards are low of cost when compared to other microcontroller hardware devices.
2. These Arduino boards are cross platform that means this programming software runs on both Windows and Macs and also in some other operating systems like Linux and OSX.
3. Programming of an Arduino board is very easy to use. It is flexible and easy for beginners.
4. Arduino software is a open source and easy to get.

3.5 LCD 16X2 I2C Display

Liquid crystal display is shortly known as LCD it is mainly used for to display the useful information and also it determines the state of position of the particular elements like weight and temperature in digital format and displaying the position of the elements in numerical model as well as simple English. Fig 5, and it is consisting of crystals which was helpful for displaying the information of the particular state or position. And in this project we connected the LCD display with the I2C module [8]. And by the help of this we can be displaying of image and certain color. To display the information it requires the current for displaying purpose. And by the help of this helpful for so many electronics like mobile phones and T.V's and certain watches and some monitors. And it consumes less power and occupies less space and it is mainly consisting of polarizer setting involved in it. In background it is mainly consisting of black in color [6]. And while in terms of brightness it is having the moderate lighting of the display.

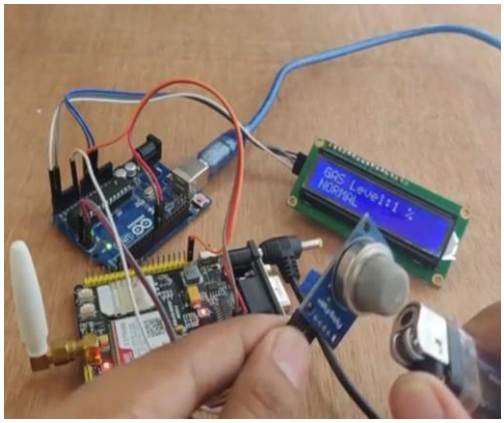
3.6 Overview of GSM Module

From Fig 6, Global system for mobile communication module shortly known as GSM Module. The GSM is mainly used for the communication purpose and by the help of it transferring the message or information to the mobile number [7]. And is mainly useful for the 2G communication purpose. It is a combination of digital, circuited switched network optimized into the telephonic purpose and GSM is digitizes the data and compressing the sending data and based on the time transferring of information takes place through mobile.

IV. RESULTS AND DISCUSSION

In households purposes we use LPG and in some industries as well and in some cases the gas get leaked from the cylinder by the help of our project whenever the gas get leaked from the cylinder it will intimate the information regarding gas leakage at certain place and intimate the information through the particular mobile number and also the buzzer get alarmed during the time of leakage. And in LCD display it displays the temperature and level of the gas present in the cylinder, Fig 7.

- ❖ The project should helped the people whenever no one was present in the home and helpful for sending the message and alarm get buzzing.
- ❖ And by the help of our project we can detect the weight of the gas present in the cylinder and the temperature of the released gas.
- ❖ By the help of this project is helpful for the customers to upgrade the safety norms and precautions during gas leakage



4.1 Advantages

In generally when the gas leakage is happened the people who are in outside they don't know certain things which was happened at the time of gas leakage and this project has an advantage during the time of leakage of gas by alerting the people by alarm and transferring the message to mobile through the GSM module.

V. CONCLUSION

It is the self-responsibility of each person to form some safety measures and precautions from the accidents. The gas leakage detector with SMS alert is one among the efficient way to save our family and innocent labors in industries from the gas leakage accidents by placing the equipment nearby LPG gas cylinders or gas valves within the houses also in industries to provide an alert SMS and an high volume Audio signal to take quick safety measures to guard ourself and properties from gas leakage accidents..

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