



Gas Leakage Detection Using GSM Module & Arduino with SMS Alert

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ABSTRACT :The gas usage brings great problems in the domestic and industries. The inflammable gas such as Liquidized petroleum gas (LPG), which is commonly used in the houses and factories. The leakage of the gas causes the property damage and affects catastrophically on people. So, by observance it in the concept of the project we have determined to develop an examining system which finds the leak of LPG gas and protects the property by taken correct precaution at correct time. The project consists of Alarm unit which is Buzzer gives an audible sign of the presence of LPG volume. The gas sensors are widely used to detect essence of harmful gases, LPG and even smoke. If the MQ-2 Sensor senses gas leak from industries or homes and it sends information to Arduino UNO. The Arduino UNO turns on the LCD, exhaust fan and buzzer. It turns on the GSM modem after that, it continues to send messages SMS to mobile number specifically mentioned in the program of the source code for alerting danger to the people. Hence, by using this system we can reduce gas leakage accidents and save the lives and properties.

KEY WORDS: Arduino UNO, MQ-2 Sensor, Buzzer, LCD, Exhaust Fan, GSM Modem.

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I. INTRODUCTION

LPG Gas leaks have been increased drastically in the recent years of all the kitchen accidents. The Gas leakage is one of the big problems with industrial sector, residential milieu and gas functioning vehicles like CNG (Compressed Natural Gas) buses, cars etc. One of the contraceptive methods to stop accidents associated with the gas leakage is to install a gas leakage detection device at vulnerable places. This system provides the information such as when a gas leakage is noticed, sensors of in the project are used to notice the gas leakage and immediately turns ON the buzzer for the danger indication. Buzzer is a clear indication of gas leakage. By the detection of the hazardous gas the alerting message reached the person who has control over it from the GSM. Exhaust fan is used to send the gas from room. LCD display is used to display the status of the gas leak.

II. OBJECTIVES OF THE PROJECT

Detection of Gas Leakage (like LPG) in homes, hotels and other domestic areas by using gas sensor and Arduino. Setup an SMS based alert mechanism using GSM module. Send SMS (alert message) to specified mobile number. Sound alarm-produce sound alert on gas leak. Display status in an LCD using a 16*2 LCD module. To suck the gas out of the room using an exhausting fan. Hence, by using this system we can reduce gas leakage accidents and save the lives and properties.

III. LITERATURE SURVEY

In 2020 a paper was published by Ronnell, S. Paulina, Israel Carino about LPG Leakage Detector using Arduino with Sound Alarm in this paper to detect the presence of LPG leakage as a part of a safety system. Apart from sound alarm prevent any harmful effects due to gas leakage. Descriptively, we use a gas sensor to monitor the LPG if the gas leak reaches beyond the normal level. This proposed project will trigger the sound alarm. In addition, the gas supply will be automatically shut down. The people can be saved from a potential explosion caused by gas leakage

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In 2019 a paper was published by Juhi Chaudhary, Anurag Mishra about Detection of Gas Leakage and Automatic Alert System using Arduino in this paper. The current model gives an alert framework which is basically required to distinguish a Gas leakage in the house and commercial premises. Proportional message is passed on by the methods for an LCD screen and send SMS through GSM module quickly kill fundamental supply of LPG. With the utilization of MQ Sensor we can likewise recognize liquor, which is an extra component. The Gas Leak identifier gadget can discover application at private homes as well as it is relevant to inns, eateries and even in businesses where LPG gas is utilized for a few or alternate purpose.

In 2019 a paper was published by Ayesha Siddika, Imam Hossain about LPG Gas Leakage Monitoring and Alert System using Arduino in this paper consists of the Microcontroller Circuit, Power Supply, GAS Sensor Module and Buzzer. The output of the MQ Gas Sensor senses any gas leakage from the storage. This is detected by the microcontroller and the LED & buzzer are turned ON. The microcontroller continues sending message on the LCD display and by using GSM module it sends SMS alert.

IV. EXISTING METHODOLOGY

There are generally over 80% LPG customers in the country in which 35% has the gas related accidents occur because of gas leakage. So, the real concern is spillage of LPG. Whenever the spillage of LPG has occurred, the gas sensor is used to detect the leakage of gas. The Arduino will alert the buzzer, triggering the sound alarm and the LCD display is turned on. It sends SMS alert through GSM module. The above guidelines are also executed for the gas spillage identification system.

V. PROPOSED METHODOLOGY

In this proposed by using the “Gas Leakage Detector with SMS Alert using ARDUNIO and GSM module”, will be a great help in terms of preventing any danger caused by gas leakage. The purpose of this project is to detect the presence of LPG leakage in the homes and working places. Apart from sound alarm and SMS alert it will also turn on exhaust fan. The exhaust fan is used to remove the gas leaked in room. which is used in case of the nobody is present when the leakage occurs and to prevent accidents and property damage. It is cost efficient and reduce damage caused by the gas leakage.

VI. BLOCK DIAGRAM

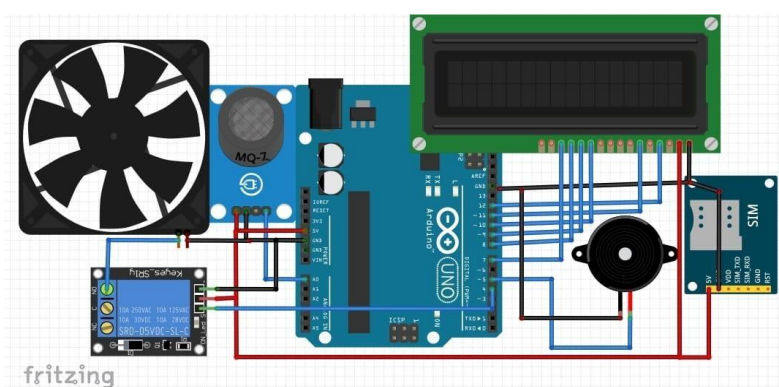


Figure 1: Gas Leakage Detection Using GSM Module & Arduino With SMS Alert

When the MQ-2 sensor senses gas leak from workplace or home, it sends information to the Arduino UNO. As it reaches the threshold value, The Arduino UNO turns on the devices which includes LCD display,

Exhaust fan, buzzer. the GSM modem sends SMS to mobile number specifically mentioned in the program of the source code to alert the people. The exhaust fan removes the gas in the room.

VII. HARDWARE AND ITS DETAILS

VII.1 MQ-2 SENSOR :

The MQ-2 sensor is capable of detecting a wide range of gases including carbon monoxide, alcohol, methane, hydrogen, isobutene, liquefied petroleum gas, propane, and smoke. For the easy interfacing, the MQ-2 sensor Module is provided with 4 male headers so that it can be easily interfaced with the Arduino Uno or Mega using male to female type jumper wires.

MQ-2 SENSOR PINOUT

- As you can see the 4 male header pins are labelled with
- A0
- D0
- GND
- And vcc



Figure 2: MQ2 Sensor

VII.2 SIM900A GSM MODULE :

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.



Figure 3 : SIM 900A GSM Module

VII.3 16x2 LCD MODULE :

LCD (Liquid Crystal Display) is the innovation utilized in scratch pad shows and other littler PCs. Like innovation for light-producing diode (LED) and gas-plasma, LCDs permit presentations to be a lot slendrer than innovation for cathode beam tube (CRT). LCDs expend considerably less power than LED shows and gas shows since they work as opposed to emanating it on the guideline of blocking light.

LCD is either made with an uninvolved lattice or a showcase network for dynamic framework show. Likewise alluded to as a meagre film transistor (TFT) show is the dynamic framework LCD. The uninvolved LCD lattice has a matrix of conductors at every crossing point of the network with pixels. Two conductors on

the lattice send a current to control the light for any pixel. A functioning framework has a transistor situated at every pixel crossing point, requiring less current to control the luminance of a pixel.

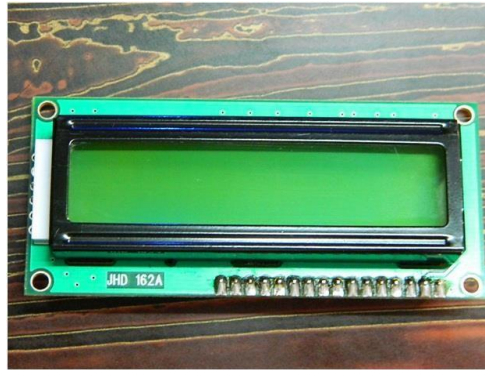


Figure 4: LCD Display

VII.4 BUZZER

The buzzer will be used to emit sounds to alert users during leakage. A buzzer or beeper is a signalling device usually electronics, that is most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a pre-set time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong.



Figure 5: Buzzer

VII.5 ARDUINO UNO:

The Uno with Cable is a micro-controller board base on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs); 6-analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything need to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. “Uno” means one in Italian and is the name to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards. Note: The Uno R3 reference design can use an Atmega8, 168, or 328, Current models use an Atmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors.

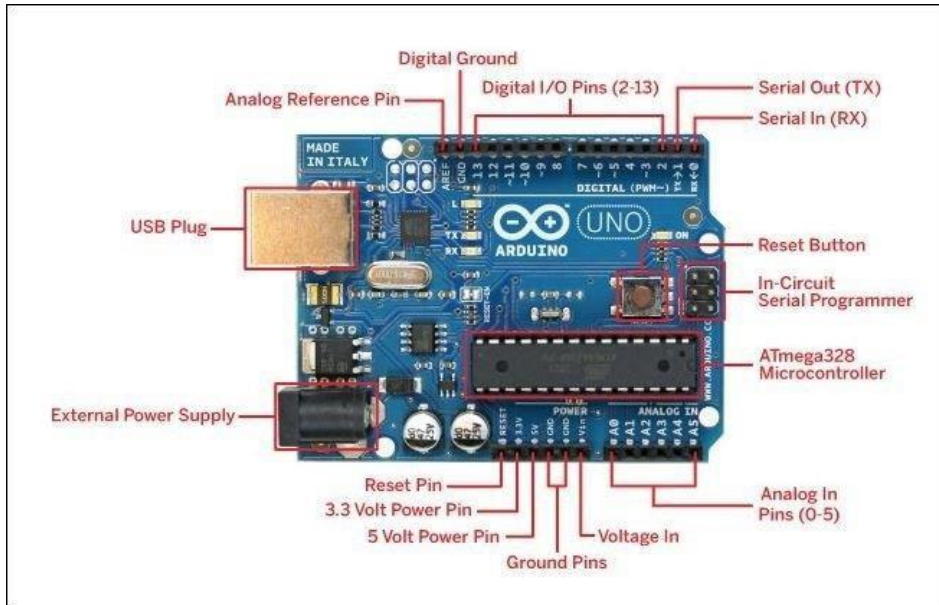


Figure 6: Arduino Uno

VII.6 EXHAUST FAN

If the leakage is detected system automatically starts the exhaust fans. the exhaust is used to suckthe gas out of the room. Exhaust fans are used to pull excess moisture and unwanted odours out of a particular room or area. They are commonly found in industries and kitchens, where moisture can build up due to activities such as showering, washing, or cooking.



Figure 7: Exhaust Fan

VIII. SOFTWARE AND ITS DETAILS

VIII.1 ARDUINO IDE 1.8.9 RC (1.8.9-RC3)

Arduino IDE where IDE stands for Integrated Development Environment – An official software introduced by Arduino.cc, that is mainly used for writing, compiling and uploading the code in the Arduino Device. Almost all Arduino modules are compatible with this software that is an open source and is readily available to install and start compiling the code on the go.

Arduino IDE is an open-source software that is mainly used for writing and compiling the code into the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and many more. Each of them contains a microcontroller on the board that is actually programmed and accepts the information in the form of code. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino Module. This environment supports both C and C++ languages. How to install Arduino IDE: You can download the Software from Arduino main website.

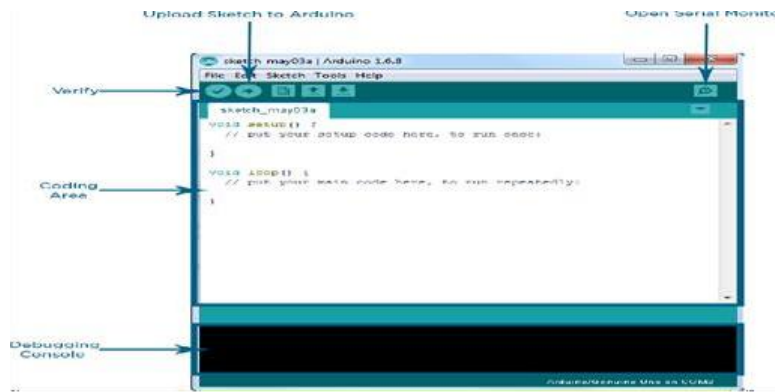


FIGURE 8: IDE Software Interface

IX. CONCLUSION AND FUTURE SCOPE

IX.1 CONCLUSION

Hence, the leakage of the gas causes destructible impact to the lives and as well as to the heritage of the people. So, the system consists of Alarm unit which is Buzzer gives an audible sign of the presence of LPG volume. The sensors are widely used to detect essence of propane, iso-butane, LPG and even smoke. If the LPG sensor senses gas leak from workplace or home, sensor output goes to active low (logic 0) condition. The Arduino UNO turns on the LCD and buzzer. It even turns on the GSM modem after that, it continues to send messages SMS to mobile number specifically mentioned in the program of the source code for alerting danger to the people and the LPG safety device is used to turn off the gas supply by using this system we can reduce gas leakage accidents. Indanger situations we are able to save the life by using this system.

IX.2 FUTURE SCOPE

The Future scope of the project is adding more software based intelligent functions with this system. This is an automatic gas detection, control and alert system. In future this system will have a feature where it can notify the emergency services if any accidents happen. A mobile app and webbased app for real time monitoring also will be added. In the user app for this system many smart features will be added. The overall features will make the system safer for the users. The system will be optimized for use in many places like the car, the home, industries and many other places. After designing the final prototype with smart multifunctional features, the system will be implemented in real life scenario.

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