

# GAS LEAKAGE DETECTION USING INSECT ROBOT

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## ABSTRACT:

*The explosion due to gas leakage has become a serious problem in our country's daily activities. Now the world is evolving with technology, so it is necessary to use technology, if possible, in every case. Placing sensors at each section of pipe is very costly process. LPG gas to resolve the accident occurred we can prevent it through technology. The system is based on a microcontroller, which uses gas sensors and GSM along with GPS and a robot car moving in a forward and backward direction. It is designed for LPG Gas Leakage Detection and Alert System using Arduino Uno with an MQ5 sensor. This circuit contains an MQ5 gas sensor, microcontroller, L298N 2A Dual Motor Driver, GPS and GSM. The Robot Car moves forward and backward directions MQ5 sensor will detect the gas leakage and transmit the information to the microcontroller. Based on that information, the microcontroller makes a decision and then sends a warning message on the mobile, and the location will be sent to the user via GSM. The uses of the Arduino micro controller with Arduino provide a suitable platform for implementing an embedded control system, and it is possible to modify it to meet our future requirements easily and quickly.*

*Keywords: LPG, GSM, GPS, MQ5 sensor, Arduino Uno, Robot, Motor Driver.*

## 1. INTRODUCTION:

LPG Gas leaks have been increased from 0.72% of all kitchen accidents to 10.74% of all kitchen accidents. The small LPG cylinder of weight 5kg in which the burner is located immediately over the cylinder without using a rubber tube, is safer than the one which uses a rubber pipe as this subway has the hazards of getting cracked, which can make

way to leakage. A computer program to run online to detect the leakage locations has been originated. It functions as the automatic supervisor of the pipelines in remote areas Simple Gas leak detector is a simple device which is used to detect the leakage of gas. If the gas leak occurs, an equivalent message is conveyed by means of an LCD screen and a buzzer and with the help of the GSM module, it is capable of broadcasting messages to the stakeholders about the LPG leak.

This device is at its initial level of development and with modification. In future, this device will also trip off the mains supply to ensure better safety and surety. The gas leak detector device can find applications not only in residential homes but also it is applicable to hotels, restaurants and even in industries where LPG gas is used for some other purposes. Robots are indispensable in many manufacturing industries. The reason is that the cost per hour to operate a robot is a fraction of the cost of the human labour needed to perform the same function. More than this, once programmed, robots repeatedly perform functions with a high accuracy that surpasses that of the most experienced human operator.

Human operators are, however, far more versatile. Humans can switch job tasks easily. Robots are built and programmed to be job-specific. You wouldn't be able to program a welding robot to start counting parts in a bin. Today's most advanced industrial robots will soon become "dinosaurs". Robots are in the infancy stage of their evolution. Internal hardware such as accelerometers, gyroscopes and proximity sensors are used by some applications to respond to additional user actions, for example, adjusting the screen from portrait to landscape depending on how the device is oriented. Android allows users to customise their home screens with shortcuts to

applications and widgets, which allow users to display live content, such as emails and weather information, directly on the home screen. Applications can further send notifications to the user to inform them of relevant information, such as new emails and text messages.

## 2. EXISTING SYSTEM:

Existing methods are Carbon Monoxide, Explosive Gas Detector, Radon Detector, Check for a Sulfur or Rotten Egg smell, Combustible gas leak detector, and Underwater bubble test. It is difficult because most gases are colourless and odourless. Natural gas companies usually put an additive called mercaptan into natural gas to give it a distinct smell. The odour often smells like Sulphur or rotten eggs that can easily be detected in your home. If you smell this particular odour, it may be best to investigate the source of the leak or to contact a plumber. The best option to detect harmful gas leaks is a hybrid alarm detecting carbon monoxide and other explosive gases, such as methane, propane, and other natural gases. But in this case, we have to place the sensors at each step. To overcome all the difficulties faced in the previous methods, we have proposed a method.

## 3. PROPOSED SYSTEM:

An innovative robot is proposed to detect gas leakages in various industries, hospitals, and households to reduce gas leakages in the Gas Pipes, as shown in Fig 1. In this work, Arduino UNO (Atmega-328) is the system's main unit that performs the following tasks. Signal conditioning of the Arduino UNO is done by the output signal of the gas sensor, provided input to Arduino. The gas sensor detects the leakages and sends alerts to people of danger in the workplace, factory, and home and also sends alert SMS to the in charge of the plant whose number is saved in the SIM card using a GSM modem. The SMS received contains the level of gas leakage, time information and location of the gas leakage area. So, from that information, we will get alerted and move to the safe zone.

In Fig 1, the power is supplied to various components like Arduino Uno, GPS, GSM, Motor Driver and Gas Sensor. GSM module requires 5V, GPS module

requires 5V, Arduino Uno requires 5-12V, Motor Driver and Gas Sensor requires 5V. Arduino Uno is used to controlling all the operations of the components used. L298N Motor Driver is used in this project. It takes a low current signal and gives out a high current signal to drive a motor. It can also control the direction of the motor. NEO 6M GPS Module is used in the project, it is used to detect the time information and location of the gas leakage. MQ5 Gas Sensor is used in the project to detect H<sub>2</sub>, LPG, CH<sub>4</sub>, CO, and Alcohol. After detection of the gas leakage using the SIM 900 GSM Module, we can accomplish almost anything a normal cell phone can; SMS, text messages, and making phone calls.

### BLOCK DIAGRAM



**Fig 1: Block diagram of Gas Leakage Detector**

#### a) SIM900 GSM modem:



**Fig 2: GSM Module**

GSM/GPRS Modem-RS232 is built with Quad-Band GSM/GPRS engine- SIM900, works on frequencies 850/ 900/ 1800/ 1900 MHz The Modem is coming with RS232 interface, which allows you connect PC as well as a microcontroller with RS232 Chip (MAX232).

The baud rate is configurable from 9600-115200 (the default baud rate is 9600) through AT command. The GSM/GPRS Modem shown in Fig 2, is having internal TCP/IP stack to enable you to connect with the internet via GPRS. It is suitable for SMS, Voice, and DATA transfer applications in the M2M interface.

**b) MQ-5 Gas Sensor:**

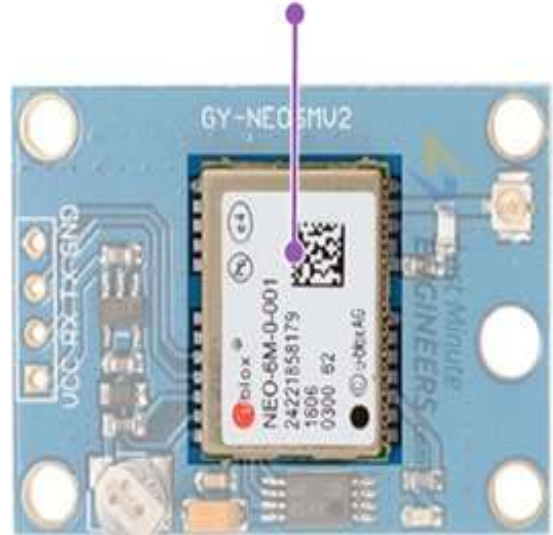
The MQ5 Gas Sensor module shown in Fig 3 is helpful for gas leakage detection. It is suitable for detecting H<sub>2</sub>, LPG, CH<sub>4</sub>, CO, and Alcohol. Due to its high sensitivity and response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer.



**Fig 3: MQ-5 Gas Sensor**

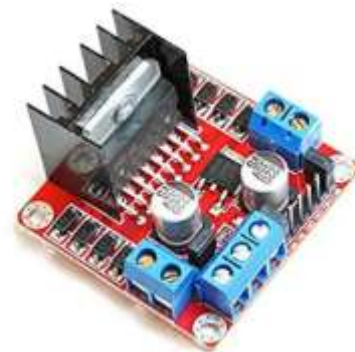
**c) NEO-6M GPS:**

The module's heart is a NEO-6M GPS chip shown in Fig 4 from u-box. The chip measures less than the size of a postage stamp but packs a surprising number of features into its little frame. It can track up to 22 satellites on 50 channels and achieves the industry's highest level of sensitivity i.e. -161 dB tracking, while consuming only 45mA supply current.



**Fig 4: NEO-6M GPS Chip**

**d) MOTOR DRIVER:**



**Fig 5: Motor Driver**

The Motor Driver(L298N) shown in Fig 5 is a module for motors that allows you to control the operating speed and direction of two motors simultaneously. The function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor. Motor drives are of many kinds depending upon the maximum supply voltage, maximum output current, rated power dissipation, load voltage, number outputs, etc.

**e) DC Motor**

D.C. Motor shown in Fig 6 uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors. The reverse process, producing electrical energy from mechanical energy, is accomplished by an alternator,

generator or dynamo. Many electric motors can be run as generators, and vice versa. The input of a DC motor is current/voltage, and its output is torque (speed). The DC motor has two essential parts: the rotating part called the armature and the stationary part that includes coils of wire called the field coils.



**Fig 6: DC Motor**

#### 4. HARDWARE SETUP:

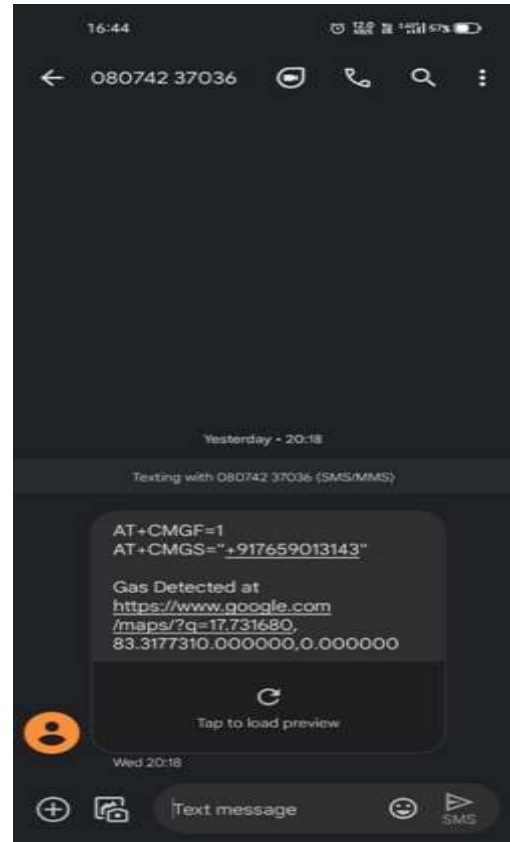


**Fig 7: Hardware Setup of Gas Leakage Detector**

The hardware model is developed with all the above components as per the block diagram working principle, shown in Fig 7.

#### 5. OUTPUT AND RESULTS:

When the gas is leaked into the pipeline, it detects the location and sends a message, as shown in Fig 8. It sends the google map link of the exact gas detection location with the sender and receiver's numbers.



**Fig 8: Gas Leakage Information**

The receiving person can open that link and identify the location, as shown in Fig 9, the necessary precautions can be taken.



**Fig 9: Gas Leakage Location**

## **6. CONCLUSION AND FUTURE SCOPE**

Its ability to warn its stakeholders about the leakage of the LPG gas. The future aspects of this detector include the GSM module and a tripper circuit which increases the efficiency of the system and provides more safety to the users. This detector is implemented successfully and is easy to use and also a low-cost product. Another advantage of this device is that even though if no one is there in the house and then gas leaks occur, GSM module is there to send immediate messages to the stakeholders regarding the gas leak and thus it lowers the intensity of accidents. GSM module used in this work ensures better safety regarding the gas leakages.

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