

CHAPTER 1

INTRODUCTION

1.1 Motivation

The main reason why we opt this design is: ' Detection and prevention of any sort of gas leakage ' No environmental effect and no effect of physical conditions. ' In the long run the maintenance cost is very less when compared to the present designs. LPG is an essential need of every household; its leakage leads to disaster. To alert on LPG leakage and prevent any mishappening there are various products to detect the leakage. Leakage leads to various accidents resulting in both material loss and human injuries. The risk of explosion, firing, suffocating is bases on their physical properties such as toxicity, flammability etc. The number of deaths of due to the explosion of gas cylinders has been increasing in recent years. The reason for such explosions is due to substandard cylinders, old valves, worn out regulators and lack of awareness in handling gas cylinders. To avoid this problem there is a need for LPG leakage detection system this system is to detect the leakage of LPG gas. Gas leakage detection is the process of identifying potentially hazardous gas leaks using various sensors. Here we have developed an arduino based LPG gas detector alarm. If gas leakage occurs, this system detects it and makes an alert by the buzzer attached with the circuit and it delivers a message. This system is easy to build.

WHAT YOU NEED TO KNOW

LOW FLAME DOESN'T MEAN LESS GAS

Experts say ignorance rules when it comes to safety measures and gas stoves. Most people don't know that even if the flame is regulated to low or medium, the pressure of gas released from the regulator is the same. The neck of the regulator does not release the amount of gas as per calibration of the flame regulator on the stove. A typical 14.2kg LPG cylinder is designed to release 300gm of LPG per hour (combining the output of two gas burners).



HOW A BLAST TAKES PLACE

Kumar Nayak, a technical expert in LPG regulator designs, explains, "When the heat at the neck [of the cylinder increases, the metal slowly becomes brittle and weakens. It is only a matter of time, when the liquefied petroleum turns into gas inside the cylinder fully and creates an outbound pressure on all directions within the cylinder. When this happens, it only takes split seconds for the fire to return through the regulator and cause the cylinder to blast."



FIRE ARRESTOR YET TO GET NOD

- A fire arrestor, patented by BG Raghavendra Rao, a retired serviceman and petroleum engineer, is a device to prevent gas blast accidents. However, Petroleum and Explosives Safety Organisation (PESO) has not approved the technology. Hence oil companies too are not using it as a safety feature.
- The device can be fitted to the regulator through a small hose pipe. It works on non-return valve technology, preventing the fire from returning to the cylinder, the reason for all gas blast accidents. The belly acts as a reservoir of gas. One end is connected to the regulator of the cylinder and the other to the hose pipe leading to the stove.
- The end that connects to the stove has a valve that allows only calibrated amount of gas that is automatically sensed by the piston. This device needs no repair or maintenance and save 29% of LPG from being wasted. Nayak, who has tested the instrument, says it will help a household using 12 cylinders annually save four cylinders.



● Kishore Kaikini, founder of Bio-Activated Energy Mission, says, "I have been running pillar to post with this patented instrument that will not only save gas wastage but prevent accidents. IISc has tested it too and proved it to be safe even if 500gm of gas is passed through this."

Scope

Due to the increase in fuel costs, we use LPG gas in most petrol/diesel vehicles. The use of LPG gas in car and home is very risky. The LPG gas cylinders used at home and elsewhere are the same condition, which is mainly due to LPG gas leakage accidents. For the protection and security of LPG gas explosion problem, we design this project to prevent home and vehicle accidents.

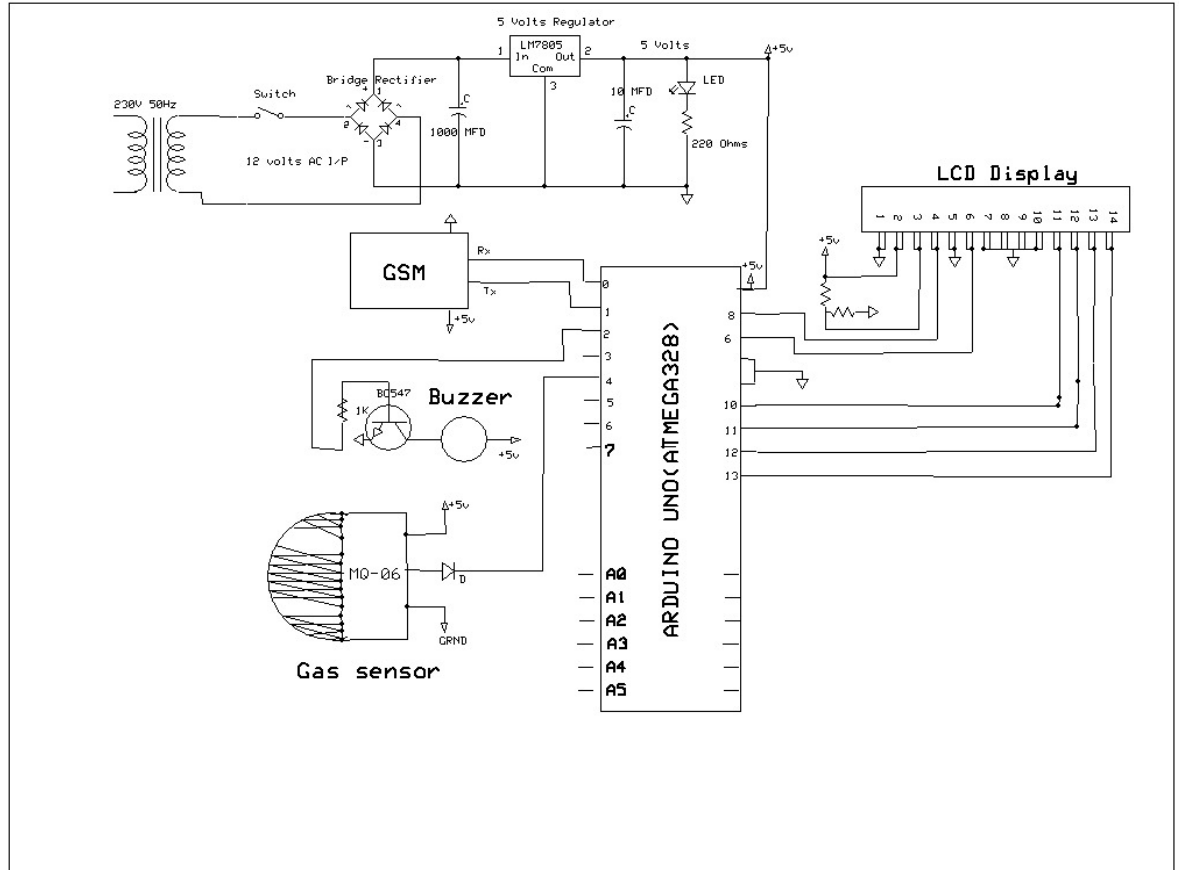
- This monitoring system can be further enhanced by using Bluetooth in place of GSM to send alert messages to the user, which supports another real-time application. '
- For industrial purpose, mobile robots can be developed for detecting multiple gas concentrations.
- In addition to gas sensor temperature sensor can also be used which detects the high-pressure gas in cylinder pipe, display the alert SMS when high temperature is reached.

Objectives

- Detect Gas Leakage (like LPG leak, Butane leak, Methane leak) or any such petroleum based gaseous substance that can be detected using MQ5 Sensor.
- Setup an SMS based Alert Mechanism and send 3 SMS (3 alert messages) to 2 specified mobile numbers (input inside the arduino program)
- Display status in an LCD using a 16×2 LCD module.

Design and Development of Product

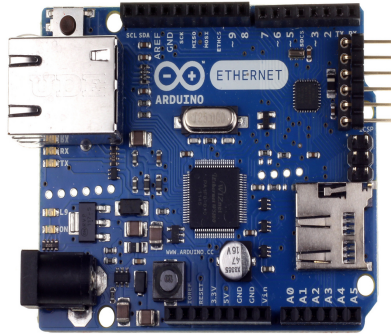
Design of Product



Purchasing information

We have purchased the components needed for building our project they are:

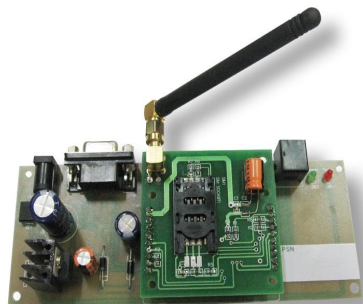
- Arduino board



- LCD Display



- Regulated power supply
- GSM module



- Gas Sensor



- Buzzer

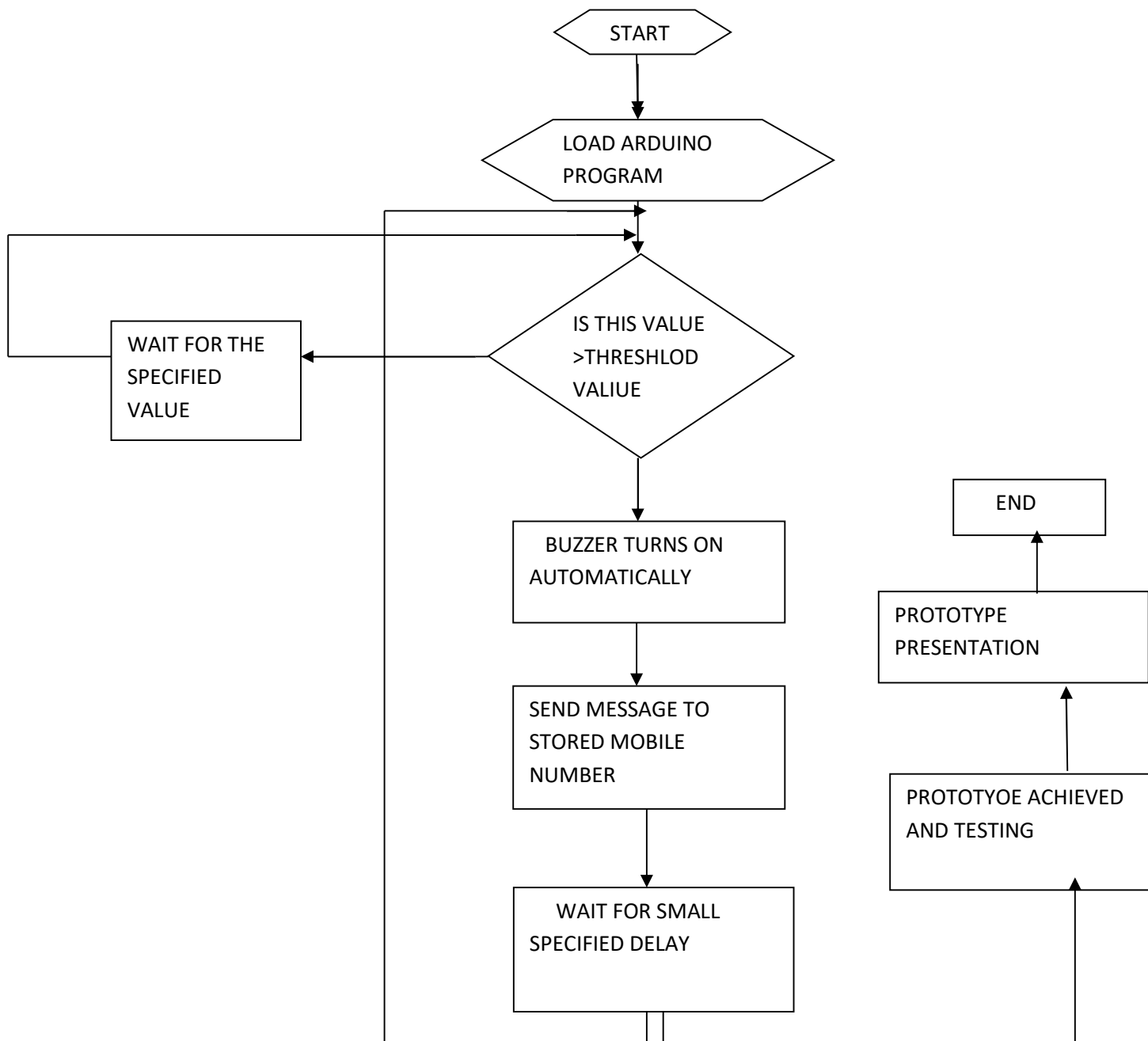


- Voltage regulator

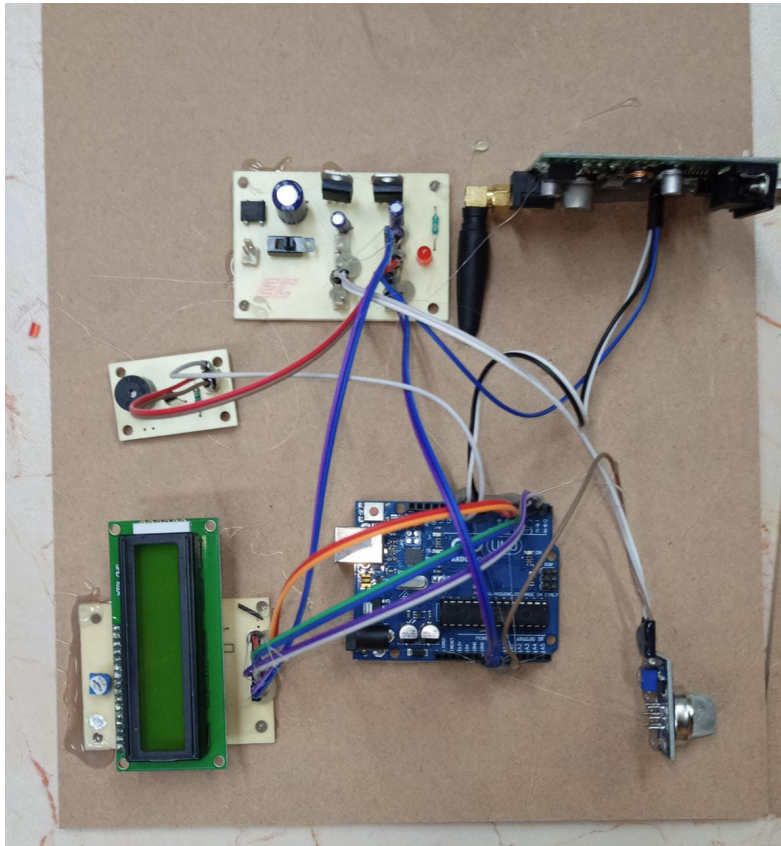
COMPONENT	COST
Arduino UNO	585
GSM –sim 800 modem	1599
16x2 LCD display	169
MQ-6 sensor	95
Buzzer	70
Voltage regulator	15

Development Process

After the purchase of all the components we started developing the product by assembling them according to the design we have, then by loading the program code into the aurdino board we have checked the functionality of the product.



4 Final Product



CONCLUSION

The design of a sensor-based automatic gas leakage detector with an alert and control system has been proposed and discussed in this paper. This is a low-cost, low power, lightweight, portable, safe, user friendly, efficient, multi featured and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department, but it will also lead to raise our economy, because when gas leaks it not only contaminates the atmosphere but also wastage of gases will hurt our economy. In the open literatures it is noticed that much work has not been done for a smart gas detection system. In future, more advanced features will be integrated with this system which will provide users with more safety and relaxation. The proliferation of handheld devices has led to developments in the field of smart gas sensors, which has considerably widened their scope of application. The need for ensuring safety in workplaces is expected to be the key driving force for the market over the coming years.

REFERENCES

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- Mahalingam, A., R. T. Naayagi, and N. E. Mastorakis. "Design and implementation of an economic gas leakage detector." Recent Research in Applications of Electrical and Computer Engineering, pp. 20-24, 2012.