SCIENCE EXHIBITION

EUREKA 2016

MODEL: GAS DETECTOR
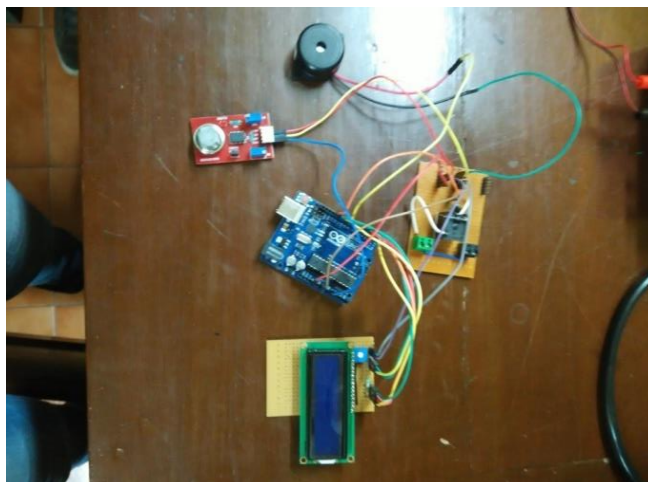
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Gas Detector using Arduino:-

Introduction:-

The gas detector is a device made using hardware as well as software. Its main purpose is to detect the gas leakage around the area, for example; many times it happens in the kitchen that we tend to forget to close the gas value. This is a device that successfully detects such gas's that can result in accidents; and switches off all the electric appliances and disconnects all connections from the main electric source. Apart from that it also shows the percentage of gas leakage in the LCD; making the person aware. The device also gives an alarm as soon as it detects the gas nearby.

Components required for making:-

1. Arduino Uno
2. Gas sensor
3. LED
4. Buzzer
5. Relay
6. Code(To function)
7. Transistor

Working principle of the device:-

Before starting with the working principle of the gas detector, let us first have a brief idea of the components used in the device.

Vero board – It is brand of strip broad. It is an insulating board made up of copper strips; which works as a pre- formed circuit board.

Transistor – A transistor is a device that controls the current flow or voltage flow in the circuit and acts as a gate for electronic signals. It consists of three layers of a semiconductor material, each of them are capable of carrying a current.

Arduino – It is a microprocessor which is used in communications and in controlling and operating multiple devices. Founded be Massimo Banzi and David Cuartilelles of Italy. The processor uses Harvard architecture where the program code and program data have separate memory locations. The code is stored in the flash memory, whereas the data is stored in the data memory. Since the microprocessor has two memory locations, one is the program memory and the other is the data memory. The Atmega 328 has 32 KB of flash memory for storing code (0.5 is used for the boot loader), 2 KB of SRAM (Static RAM) and 1 KB of EEPROM and operates with a clock speed of 16MHz.

A diagram or the algorithm of the microprocessor will give us a vivid view of the working of the microprocessor.
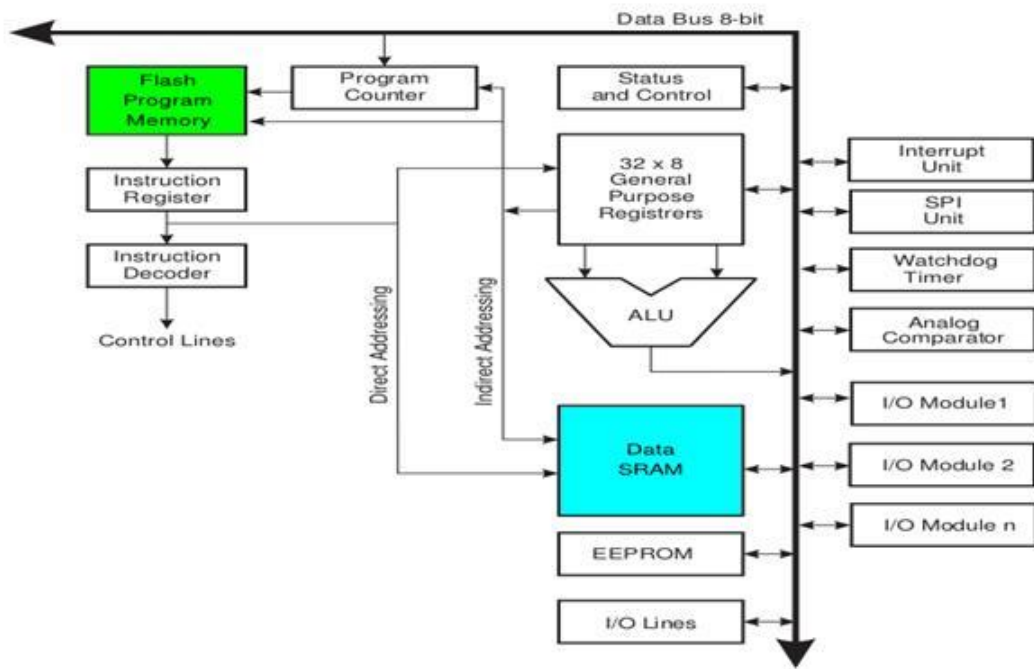
FIG:- <u>ARCHITECTURE OF ARDUINO</u>

Gas sensor- The gas sensor is a gas detecting device, which is of the type MQ-6. It is highly sensitive to LPG, iso-butane and propane and less sensitive to alcohol and smoke. It is composed of gas sensing layer which is made up of Sno2, electrode of Au, electrode line of Pt. It is also composed of ceramic tubes which is made of Al2O3, clamp ring made up of copper plating Mi. The Rasin base is made up of Bakelite with tube pins of copper plating Ni. The heater (coil made up of Ni-Cr alloy) provides necessary work condition for working of sensitive components. The MQ-6 has 6 pins, 4 of them are used to fetch signals and the other two are used to provide heating current.

Relay - A relay is an electromechanical device that is spur be an electrical current. The current flowing in one circuit opens or close's another circuit. It contains a electric coil which detects the current. When the applied current exceeds a threshold value, the coil activates

the armature which either closes the open circuit or opens the closed magnetic force which causes the armature to open or close.

DESCRIPTION:-

The Arduino is connected to an external power supply of 12v. Veroboard is used instead of breadboard; since it provides compatibility and versatility over breadboard. 5V is supplied from the Arduino to all the components. All the component's ground and Vcc are respectively connected. The code is fetched into the micro processor and is stored in the flash memory. All the components are also connected to the micro processor as well. On detecting gas the gas sensor send an analog signal to the micro processor to A0 pin of the Arduino. On receiving the signal, the microprocessor sends a signal to the buzzer through pin number 10, which signals an alarm. On the other hand, on receiving the signal through pin number 13; the relay trips off all the electric appliances. The LCD which is also connected to the microprocessor also receives a signal and displays the percentage of gas leakage as well as displays "TRIP" indicating that all the electric appliances have been switched off.

Circuit diagram of the gas detector :-
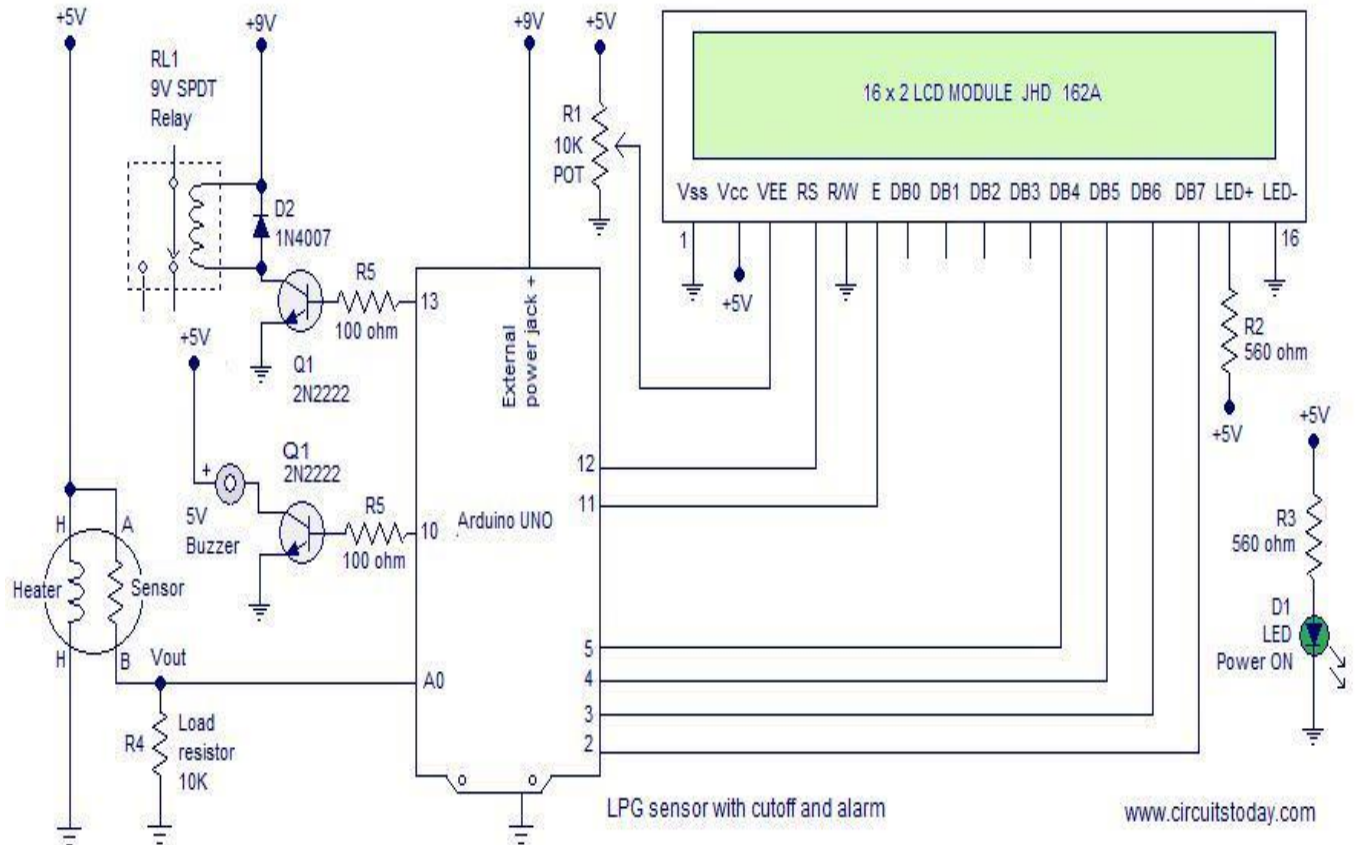

FIG :- CIRCUIT DIAGRAM OF GAS DETECTOR

CODE :-

```
#include<LiquidCrystal.h>

int mq2=A0;

int rel=13;

int buz=10;

int d;

float p;


LiquidCrystal lcd(12, 11, 5, 4, 3, 2);


void setup()
{
pinMode(rel,OUTPUT);

pinMode(buz,OUTPUT);

digitalWrite(rel,LOW);

digitalWrite(buz,LOW);

lcd.begin(16,2);

}
```

```
void loop()
{
d=analogRead(mq2);
lcd.setCursor(0,0);
lcd.print("LPG SENSOR");

if(d<60)
{
p=0;
}
else
{
p=(d-60)/9.64;
}
lcd.setCursor(0,1);
lcd.print(p);
lcd.setCursor(5,1);
lcd.print("%");
```
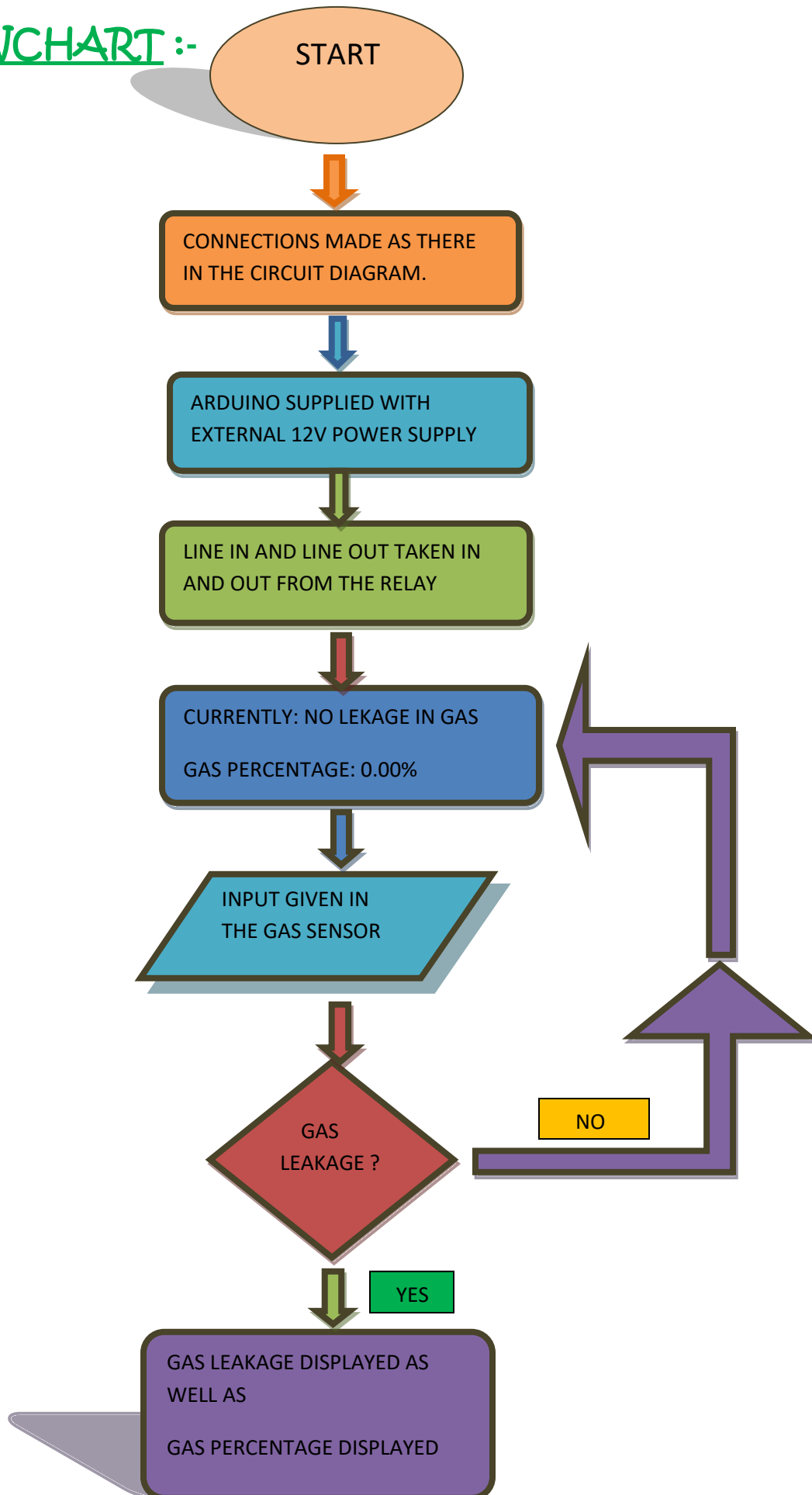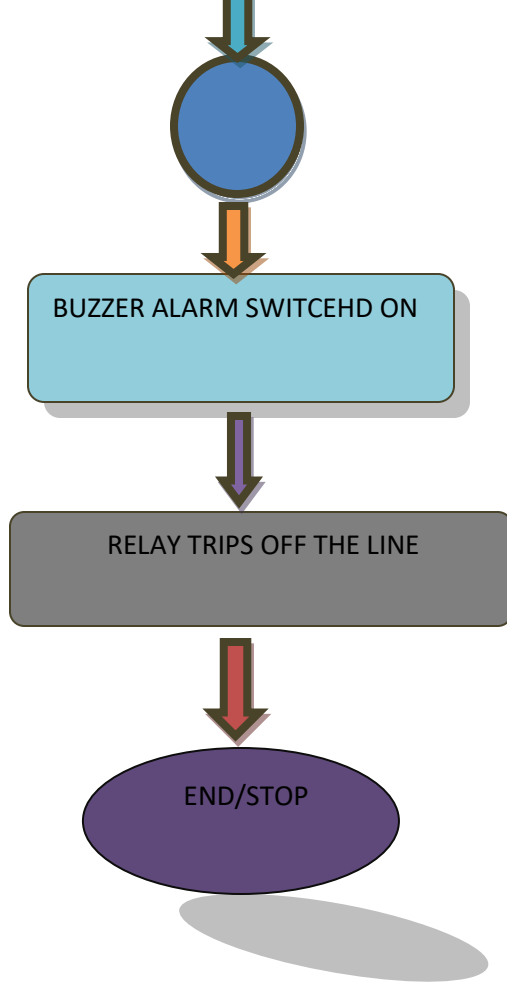
```
if(p>=30)

{

digitalWrite(rel,LOW);

digitalWrite(buz,HIGH);

lcd.setCursor(9,1);

lcd.print("TRIP");

}

else

{

digitalWrite(rel,HIGH);

digitalWrite(buz,LOW);

}

delay(500);

lcd.clear();

}
```

FLOWCHART :-

START

CONNECTIONS MADE AS THERE IN THE CIRCUIT DIAGRAM.

ARDUINO SUPPLIED WITH EXTERNAL 12V POWER SUPPLY

LINE IN AND LINE OUT TAKEN IN AND OUT FROM THE RELAY

CURRENTLY: NO LEKAGE IN GAS

GAS PERCENTAGE: 0.00%

INPUT GIVEN IN THE GAS SENSOR

GAS LEAKAGE ?

NO

YES

GAS LEAKAGE DISPLAYED AS WELL AS

GAS PERCENTAGE DISPLAYED

BUZZER ALARM SWITCEHD ON

RELAY TRIPS OFF THE LINE

END/STOP

BLOCK DIAGRAM :-

GAS SENOSR TYPE MQ-6

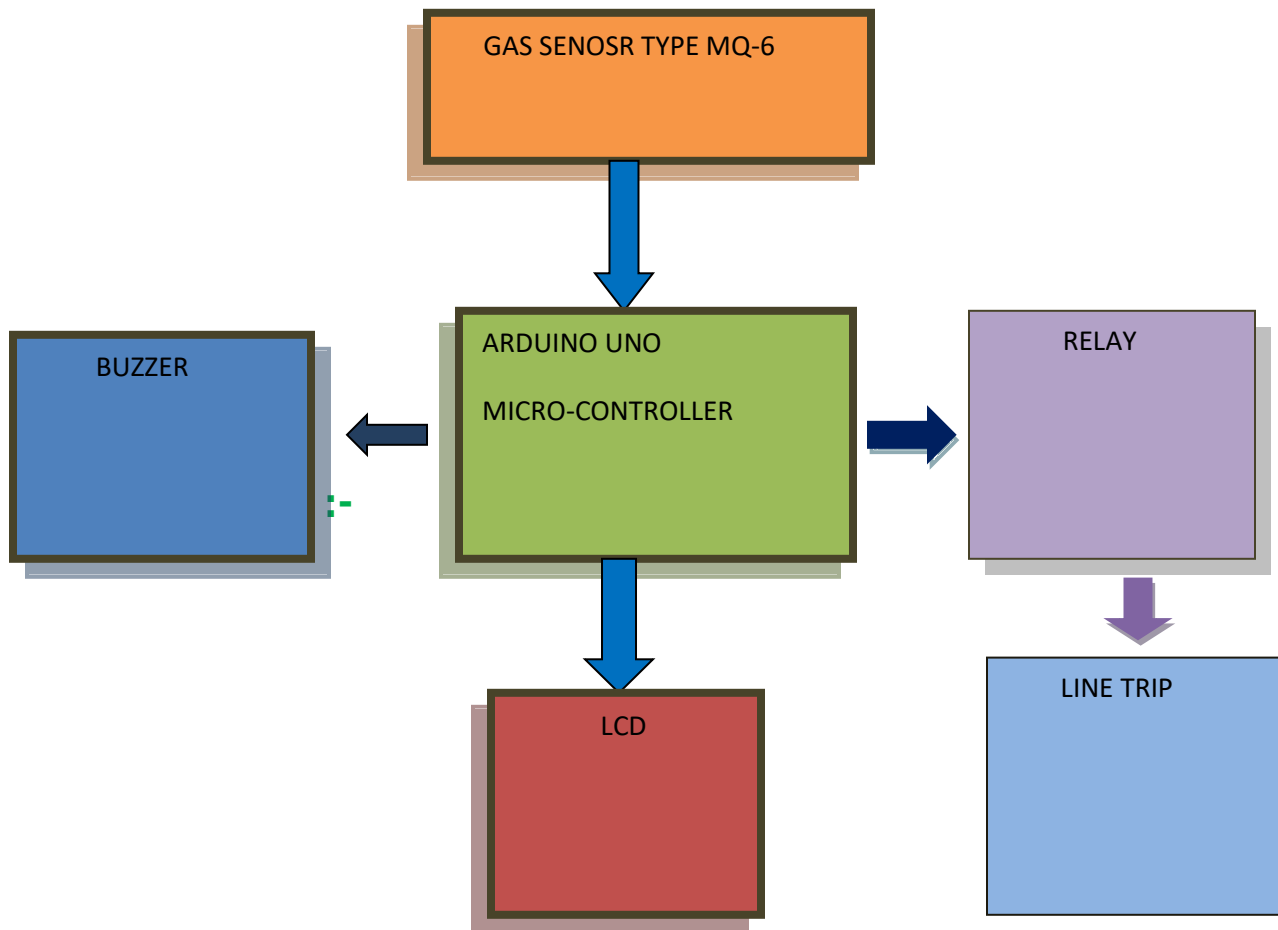ARDUINO UNO

MICRO-CONTROLLER

BUZZER

RELAY

LCD

LINE TRIP

FIG:-BLOCK DIAGRAM

ALGORITHM :-

1. Connections are made from the microprocessor to different components by assigning the pin number to different components.
2. Outputs are taken from relay and buzzer, initially they are set to low. And the data rate of LCD is set.
3. The value received by the gas sensor is stored in an integer, the LCD is set to zero displaying an.
4. Checks for the leakage, if there is no leakage, the buzzer and the relay remains low.
5. On detecting a leakage, the gas sensor sends an analog signal and the buzzer as well relay is set to high.
6. The percentage of gas leakage is printed and "TRIP" is also printed in the LED.
7. The program is set to pause for an interval of 500 miliseconds.

FUTURE PROSPECT:-

Nowadays safety is a major issue and probably the most important issue in today's highly technical world. This is where the demand comes from. Nearly every home uses LPG gas cylinders for the house hold purpose. There are high chances of accidents taking place when people are not meticulous. This device can provide safety in such places. Not only it can provide in homes but it can provide in industries as well as in residential places. It can be used by the police department to detect alcohol, since it is also sensitive to alcohol; helping in liquor test.

By the help of socket programming, the device can be made more effective. In addition to the working, the device would send an "SMS" to the people who number has been used in the code. This implementation broadens the security and cuts down the chances of accidents.

Advantages:-

1. Gas detector detects the gas leakage around the place where it is kept and automatically turns off all the electric appliance's present.
2. Apart from the turning off the electric appliances, it displays the percentage of gas leaked.
3. As soon as it detects any gas it blows an alarm through buzzer.
4. One time installation, provides long life stability and quick response to the gas.

Disadvantages:

1. The MQ-6 takes some time to heat in order to function.
2. Since the LPG gas is heavier than air, it cannot be installed anywhere.

ABSTRACT :-

One of the problems addressed was the size of the device. To overcome the problem a Vero board was used instead of a breadboard, which provided the same features as that of a breadboard. The need of multiple Vcc and ground connections was also problem in making the device. To overcome this problem   was shouldered in the Vero board, and 5V Vcc and ground connections were given from the micro processor. Brightness of LCD was also a problem, for this an   was used.

After meticulously making all the intricate technicalities this device serves as a great gas sensing device .

CONCLUSION:-

The device works well under normal condition. It can be installed in residential. Since everything carries a pros and cons; so does this device.