Wireless Auto Power Trip system for Liquefied Petroleum Gas Leakage to Improve Safety in Domestic usage

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Abstract: *Due to todays advanced life no one is having time to look about certain problems occurring in day to day life. In this 21st century technology and science has became advanced in which it protect us from certain hazards . In most of the cases, the accident is caused by the electrical spark produced during gas leakage while switching which results in huge loud explosion It's a known fact that LPG leakage during domestic usage is a disaster, especially when we switch on any electric switch or appliances because it may produce a spark which causes sudden loud explosion of the gas filled room. In our country there are certain accidents recently been seen now a days and most probable is gas leakage in houses and industries our idea is to implement a gas leakage system in which auto power cutoff will occur when it will sense gas leakage and when the concentration decreases power will automatically back up . Once the gas leak is detected depending on the level of gas immediately the systems will trip of the power supply to avoid explosion and its hazardous result .*

Key Words: LPG leakage, Gas sensors, Wireless systems, Buzzer , LCD
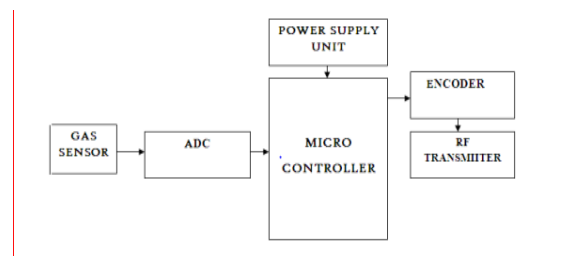
1. INTRODUCTION:

LPG is most important in our life as it is an source of fuel for automobile as an alternative source of petrol and diesel and mostly it is use for cooking although the gas in supplied either in cylinder or in pipelines there is a chance of leakage it is a clean fuel but it is highly explosive in nature .so when gas leakage will be there a high chance of explosion is there. As more than half of our nation population is using LPG today so there is threat of accident .the no of accidents occurred in recent years are due to gas leakage some examples of such disasters are like Bhopal gas tragedy. So our aim is to reduce incidents related to gas leak in industries as well as in household   . Wireless technology been adapted gives the module more mobility and reliability.

2. IMPLEMENTATION:

The project wireless auto power trip during gas leakage consists of two module i.e. transmitter module and receiver module .in transmitter module is consists of gas sensor , microcontroller or ARDUINO, encoder(HT12E), and transmitter module and the receiver module consists of RF

receiver ,decoder, microcontroller or ARDUINO, buzzer and relay module. composed of concentration of LPG and natural gas and activates an audiovisual alarm the gas leakage detected by the sensor its sends a signal and at threshold frequency its sends another signal to the receiver .The receiver module is a mobile unit that could be placed anywhere within the premises of the house so that the alarm can be detected and heard at a distance from the place of gas leakage. block diagram for the system is shown in Figure 1.

Transmitter Module:
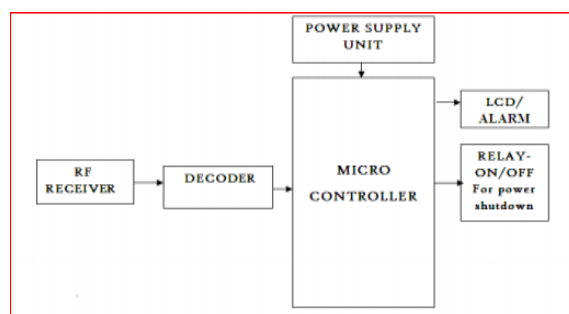

Receiver Module:

Fig.1: Block diagram for the gas leak detection and power trip system.   .
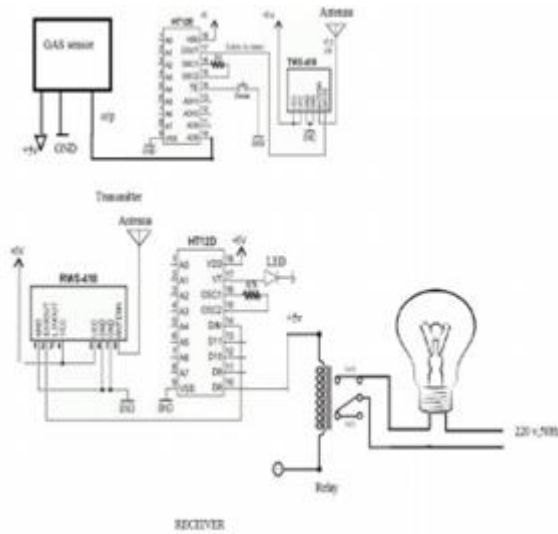
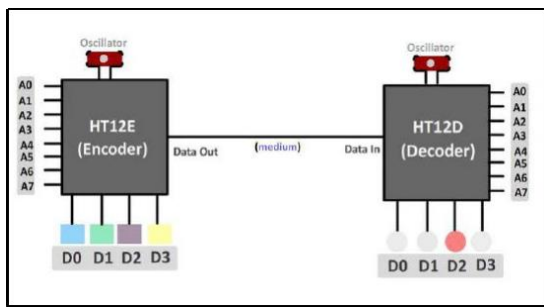Fig.2. Circuit Diagram of transmitter and receiver module

Fig.3. Block Diagram of Encoder and Decoder

2.1 Gas Leak Detection-

Transmission Module the main function of transmitter module is to detect the gas concentration present in the kitchen and transmit to receiver . the module consist of gas sensor ,microcontroller ,transmitter, and encoder .

The gas detection is done using a solid state gas sensor that is sensitive to LPG, natural gas and other gases such as CO and H2 but not sensitive to air; therefore the reading is not affected by the presence of air. The sensing part is made up of Tin Dioxide (SnO2) layer, which is a resistive element with a resistance (Rs) which the concentration of gases changes with change in gas like CH4,CO ,LPG and ALCOHOL. MQ-6 gas sensor and the sensitivity characteristics. The sensor detects the gas concentration as mentioned in as small as 0.1 to 0.5 mg/L. which is suitable for gas detection . it is not mentioned but sensor is also sensible to humidity and room temperature . the gas sensor driving circuit requires a 5v dc power supply and a load resistance. The sensor is needed to be heated properly before performing experiment the heating is made by a fixed resistance (RH).this means sensor is to be switched on before a specific period of time . before measurements are made . the power supply for heating is done from same supply of sensing circuit.

The output voltage Vo from the sensing circuit is given by:

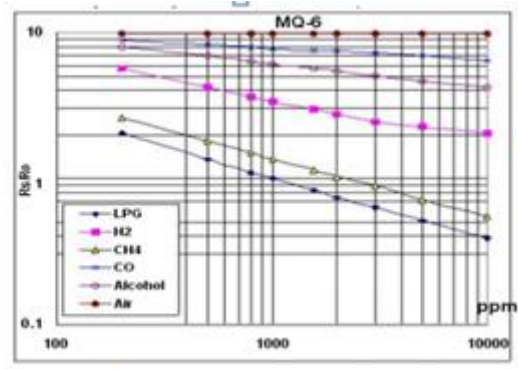$$V_o(Rs) = \frac{\bar{R_L}}{R_s + R_L} Vc$$

Fig.4. MQ-6 Gas Sensor and its Sensitivity Characteristics

Fig.5.gas sensor

and is fed into a microcontroller where it is digitized .The microcontroller reads the voltage from the sensor and uses it to calculate change in concentration. under condition the microcontroller stars with a calibrated stage where it reads the sensor voltage at normal condition .the microcontroller reads voltage and compares with the calibrated value if the reading exceeds the predetermined sensor voltage, the microcontroller sends a message .this is done by microcontroller . this is done by the microcontroller which sends out a USART encoded packet through the input/output port into the RF transmitter module .the RF transmitter is having a low power modulation which can send a signal upto 200 m outdoor and approx.. 30m indoor.

2.2 Gas Leak Detection- Receiving module:

The gas detection and transmitting module state event is received by the receiver module . It consists of an RF receiver and a microcontroller (INTEL 8051).or arduino uno R3 After receiving the data from the transmitter, the RF receiver sends it to the microcontroller. The microcontroller data is readed and , is decoded , and displayed onto the output devices (LCD display ,LED and buzzer). apart from that relay is used to trip the power supply which will prevent the household electrical appliances and also prevents from spark
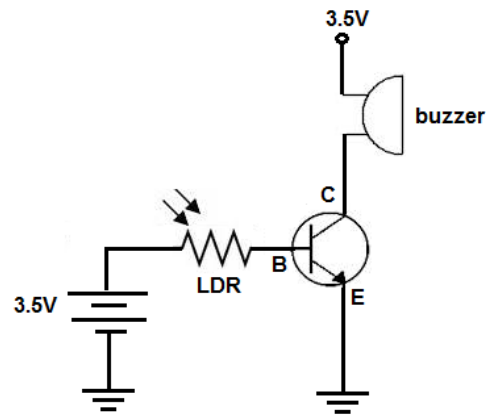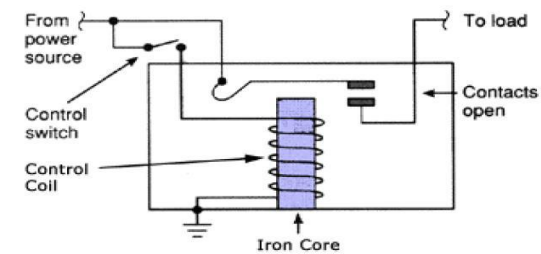

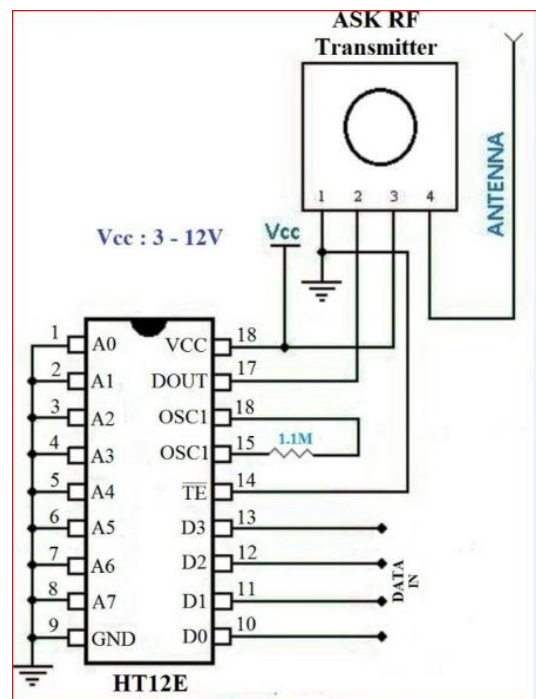Fig.6:Circuit Diagram of HT12E

fig.7 :Circuit diagram of HT12D

Fig.7:Circuit diagram of buzzer

Fig.8: Circuit diagram of relay
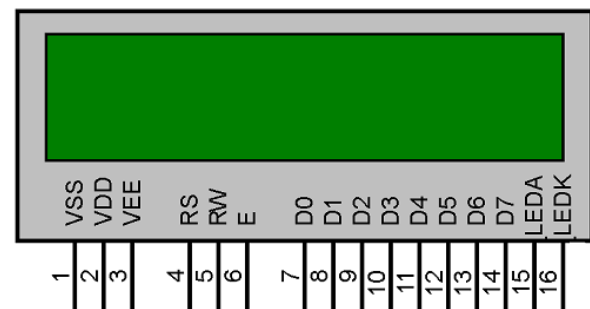

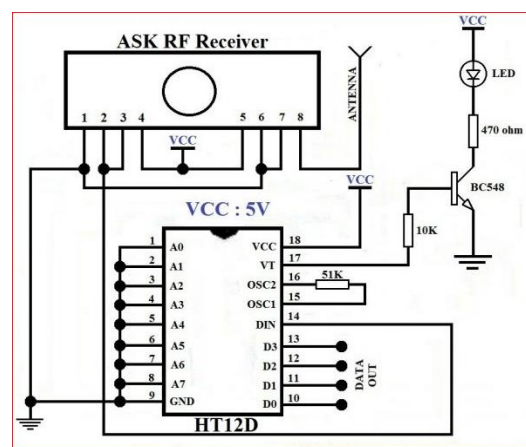Fig.9. liquid crystal display

The output of gas detector will be shown in tis lcd display . D0 to D7 pins are data input pins .the lcd is interfaced with the microcontroller or ARDUINO

3. Result

The gas sensor and the tripping system was implemented and its working depends on the concentration of gas and the distance of the receiver and it is designed for safety of home appliance from gas leakage the system has a calibrated value of gas concentration when the gas concentration drops automatically the power trip will be reversed

4. CONCLUSIONS

This paper represents a prototype for wireless gas leakage auto power trip systems that can be used mainly in house ,hotel, and many other applications in the industry and environment. The use of a sensor that is sensitive to small changes of concentration provides an excellent tool to detect a gas leak as it can detect small concentrations down to 100 ppm. The sensitivity can be changed by adjusting the load resistor. Which is flexible to calibrate externally .the actual concentration measurement of certain gas cannot be easily done with the help of this sensor since it can detect many gases at the same time and has a non-linear sensitivity curve. Further improvement can be introduced to the system by including a temperature measurement system to be used. The paper presents a low cost ,low power and simple system for device control while LPG gas leakage or fire situations. This system will have high application in industries and houses where it has been a bigger challenge for safety measures. Addition of ARDUINO and GSM module for concentration detection and SMS system may be used in future. In future more detection system like gas detection can be implemented.

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