International Journal of Recent Trends in Engineering & Research
ISSN (ONLINE) : 2455 – 1457
IMPACT FACTOR : 4.101

LIQUEFIED PETROLEUM GAS DIFFUSER

Home automation based fire security.

[1]Hiren Dilip Patel, Trinity College 0f Engineering & Research,
[2]Ameem Ahmed Khan, Saboo Siddik College of Engineering,

Abstract: Gas leakages cause major accidents at commercial premises, gas powered transportation & residential areas. Preventive measures to avoid these accidents due to liquefied petroleum gas has been proposed in the following research paper using automated electronic system. The designed prototype has been tested at residential level which is highly sensitive and gives accurate output of switching the exhaust fans in the kitchen at its highest speed and actuating the alarm system at high pitch level as soon as any liquefied petroleum gas is detected as secondary mode of automated fire security. Carbon-di-oxide gas cylinder valves get actuated if any rise is noted by the temperature sensors.

Keywords: - Home Automation, LPG diffuser, LPG safety system, LPG evacuation, LPG.

I. INTRODUCTION

Liquid petroleum gas (LPG) is commonly used at home for cooking and central heating and mobile heaters for caravans and barbecues. This LPG is primarily composed of propane and butane which are highly flammable chemical compounds. Leakage of these gases can be dangerous as there is a risk of an explosion. The LPG does not have any odour, hence gas refineries add an odorant such as ethanethiol or thiophene so that the leaks can be detected easily by us, but in absence of humans this can lead to a major accident. Bhopal gas tragedy is an example of accidents due to gas leakage. Gas leakage detection is not only important but controlling the same is essential as well. Before the development of electronic household gas detectors in the 1980s and 90s, gas presence was detected with a chemically infused paper that changed its colour when exposed to the gas. The proposed project has its automated action. This device has the capacity to detect minimal amount of LPG leakage, and as soon as it senses the gas, the sensors gives analog output voltage which is proportional to the LPG gas sensed. These analog signals are then processed in the microcontroller which actuates the exhaust fans drivers in the kitchen. And in parallel to the activation of fans a high pitch alarm also gets activated as an alert warning signal. This helps us to avoid explosions and reduce the accidents. The secondary fire safety is such that if any temperature rise is sensed by the thermal sensors, due to any fault fire occurrence, carbon-di-oxide gas cylinder (Fire Extinguisher) valves get actuated to extinguish the fire in the surrounding and alarms with different frequencies gives alert signals.

Weighing machines are also used to monitor the rate of gas used and the rate of gas reduction, Gas leakage sounds generated from the cracks in the pipelines are analyzed in to locate the leakage. All these methods mentioned above are conventional which do not have any reliability. Thus, to increase the sensitivity we thereby, have used more than one sensors away from each other in parallel to sense the presence of gas by any of them. MQ-6 sensor is the sensor which is used for sensing chemical composition of LPG (propane and butane) in air. [1][2][3]

II. PROBLEM FORMULATION

1. Working

The MQ-6 sensors used for sensing the LPG gas, are highly sensitive and gives an output voltage which is proportional to the concentration of the LPG. This sensor detects 200-10000ppm of LPG. Sensitive material of MQ-6 gas sensors is tin-di-oxide which has lower conductivity in clean air. The

conductivity increases with increase in the concentration of the LPG and this analog output is converted to digital form which is then fed to the processor. Three of these sensors are connected to the microcontroller in parallel to increase the sensitivity. Hence, if any of the sensors come in contact of gas, the microcontroller gives a high output signal to the exhaust fan drivers. These fans help in evacuation of leaked LPG from the kitchen. But using ac or simple dc motors for exhaust fans has a limitation. As these motors have brushes, sparks may occur on the slip-ring/carbon brushes which may lead to an explosion in the exhaust fans. Hence brushless dc motors are used for the exhaust fans. These motors work at a high RPM and has less power consumption as compared to the ac and simple dc motors.

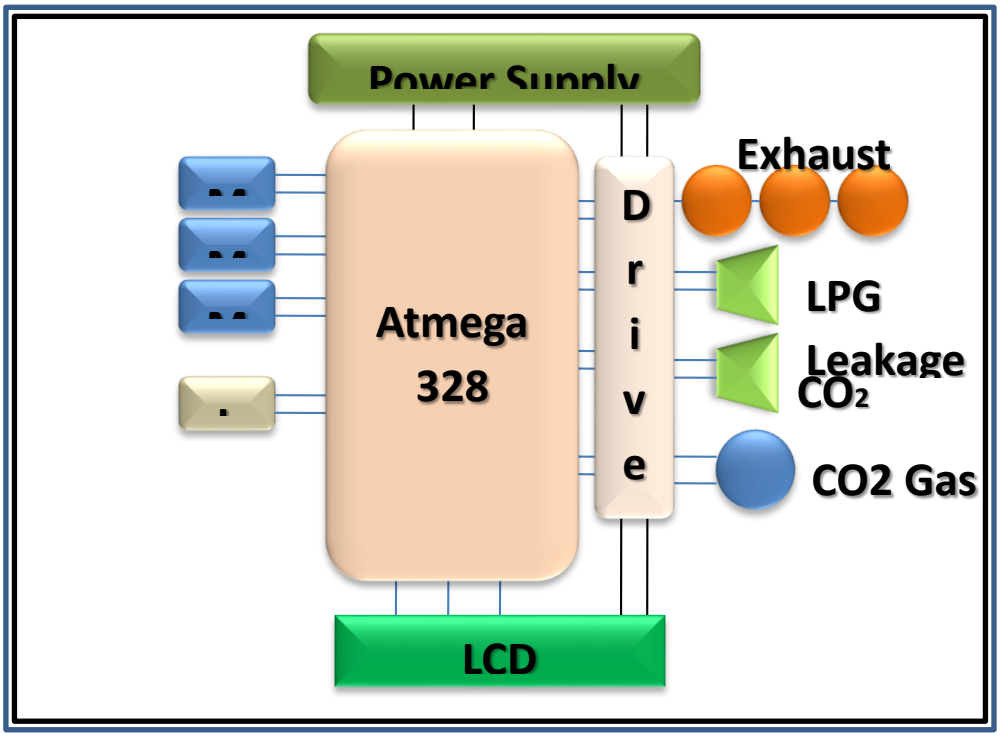


Figure.1: Block Diagram of Proposed Method.

2. Block diagram components.

2. 1: MQ-6 GAS Sensor (Input to Microcontroller)

MQ-6 LPG gas sensor is used in the project implementation to sense the leakage of gas in the kitchen. This is a semiconductor sensor device and has a sensitive material SnO_2 which has a lower conductivity in clean air, and conductivity increases with increases in concentration of the target gases - Butane and Propane. It gives an analog output which is proportional to the concentration of leaked gas. This sensor can be used to detect different combustible gases and is suitable for our application.

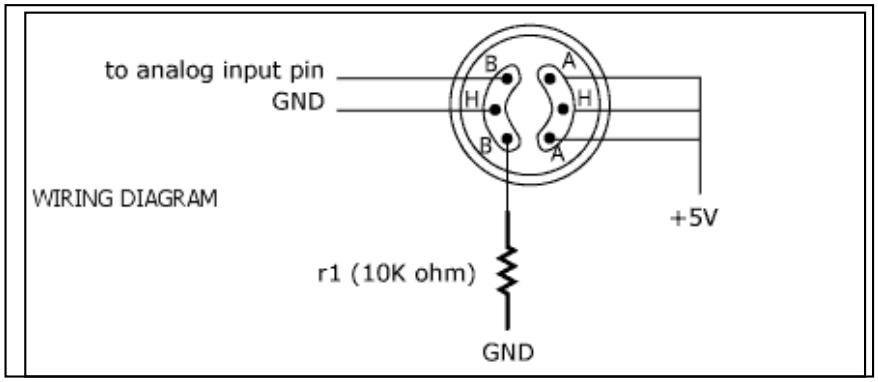


Figure.2: circuit diagram of MQ-6

2. 2: ATmega 328 (Microcontroller)

The ATmega328 is a low power CMOS 8-bit microcontroller based on AVR enhanced RISC architecture. This can execute powerful instruction in a single clock cycle. It has inbuilt 8-bit timer/counter with separate presale and compare mode, also has six PWM channels. The proposed method has four analog inputs and four analog outputs.

2. 3: LM35 (Input to Microcontroller)

The LM35 series are precision integrated-circuit temperature sensor. It's output voltage is linearly proportional to the centigrade temperature. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°Cat room temperature. The LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The Rated sensing temperature is from −55° to +150°C range. It has Low cost due to wafer-level trimming and operating voltage is from 4 to 30 volts.

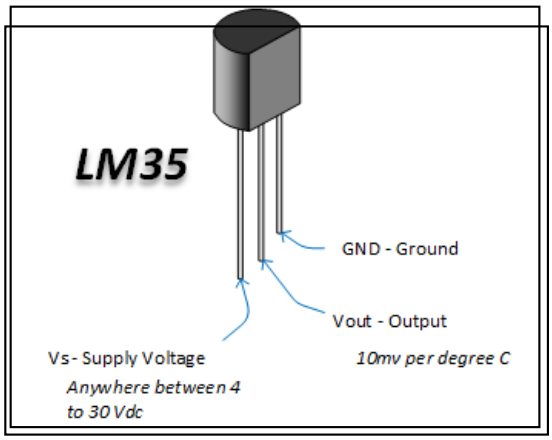


Figure.3: LM35

2. 4: Exhaust fans BLDC Motor (Output from Microcontroller)

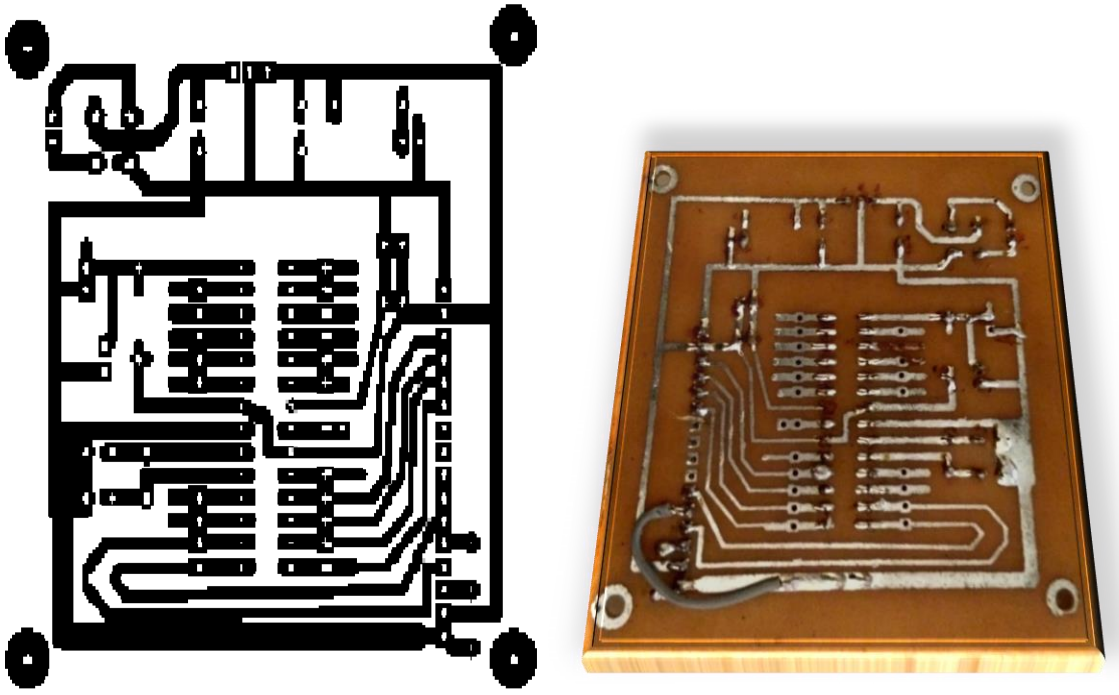
In this project, BLDC motors have been used for exhaust fans as these motors have high speed and low power consumption and low working noise. The main reason to use this motor is to avoid explosion in fans itself because usage of conventional ac motors or simple dc motors would lead to sparks on the brushes on the contact of rotor.

2. 5: CO2 gas valve and buzzer (output from the Microcontroller)

If the temperature in kitchen rises to a higher value, the CO_2 gas cylinder (Fire extinguisher) valve in the kitchen will be operated using a servo mechanism thus increasing the CO_2 gas concentration in the kitchen area which will control the growth of fire and eventually subside the same. The Fire extinguisher valve and buzzer alarm system are actuated at the same time to alert other people of the possible calamity. Two buzzers of different frequencies have been used - one for LPG gas leakage alert and second for the fire being started.

III. HARDWARE IMPLEMENTATION

The complete system is designed using Proteus Suit 8.0 PCB design software packages. The PCB layout and the implemented PCB are shown in Figure: 4



(a) *(b)*

Figure.4: (a) PCB design layout and (b) constructed PCB

IV. THE FLOWCHART OF PROPOSED METHOD IS GIVEN BELOW

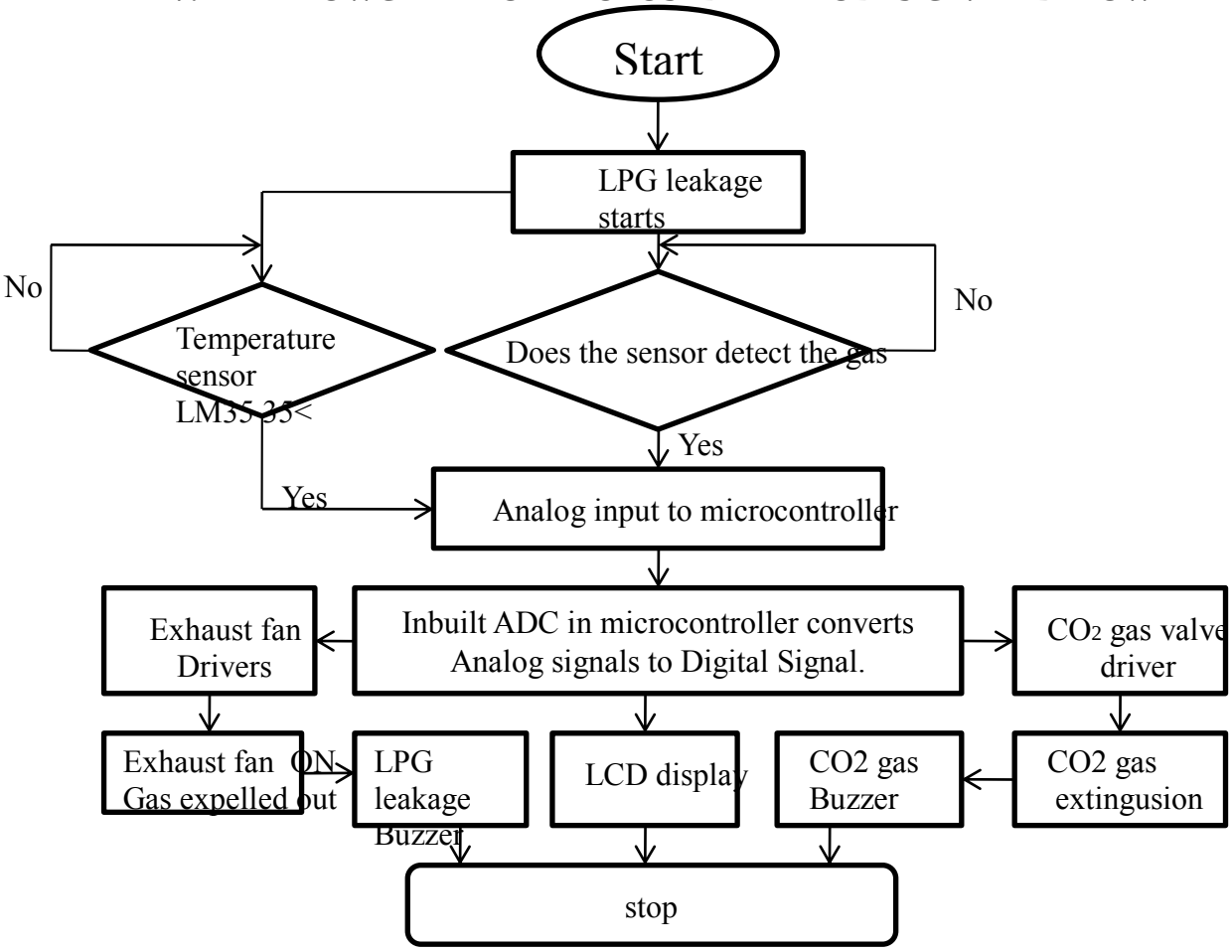


Figure.5: flowchart of proposed methodology.

V. CONCLUSION

This is an efficient method for automatically detecting and controlling the LPG gas leakage. Moreover, the fire accidents can also be prevented by switching the CO2 extinguisher.

REFERENCES

I. Prof.M.Amsaveni and A.Anurupa, Gsm based LPG leakage detection and controlling system, The International Journal of Engineering and Science (IJES) ISSN (e): 2319 – 1813 ISSN (p): 2319–1805, 112, March - 2015.
II. B. D. Jolhe, P. A. Potdukhe, Automatic LPG Booking, Leakage Detection And Real Time Gas Measurement Monitoring System, International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 4, ISSN: 2278-0181, 1192, April – 2013.
III. Digambar Surse, Swati Talekar, Smart Gas Booking System & Leakage Detection, International Journal of Innovative Research in Computer and Communication Engineering, ISSN (Online): 2320-9801, 3223, March 2016.
IV. D.Mohankumar, Gas Leakage Alarm using MQ-6 Sensor. Sensor circuit.14, electronic hobby, November 2012.

