CLOSING THE REGULATOR USING MQ6 GAS SENSOR

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BONAFIDE CERTIFICATE

Certified that this project report entitled "**CLOSING THE REGULATOR USING MQ6 GAS SENSOR"** is a bonafide work of **S OMPIRAKASH – 19BEC1356, BALA MURUGAN P – 19BEC1426, MADHAVAN – 19BEC1423 and SHARATH SHANKAR -19BEC1020** who carried out the Project work under my supervision and guidance for**ECE1005-SENSOR AND INSTRUMENTATION PROJECT**

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ABSTRACT

Home fires have been taking place frequently and the threat to human lives and Properties is growing in recent years. Liquid petroleum gas(LPG) is highly inflammable and burn even at some distance from the source of leakage.

Most fire accidents are caused because of a poor-quality rubber tube or the regulator is not turned off when not in use. Therefore, developing the automatic closing the regulator by using mq6 gas sensor. In this project closing the regulator by magnetic field.

Keywords: Liquid petroleum gas, Gas sensor, leakage

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TABLE OF CONTENTS

SL. NO.		TITLE	PAGE NO.
		ABSTRACT	3
		ACKNOWLEDGEMENT	4
1		INTRODUCTION	6
	1.1	OBJECTIVES	6
	1.2	BENEFITS	6
	1.3	FEATURES	6
2		CLOSING THE REGULATOR USING MQ6 SENSOR - DESIGN	7-10
	2.1	BLOCK AND CIRCUIT DIAGRAM OF SYSTEM DESIGN	7-9
	2.2	HARDWARE SPECIFICATIONS	8-10
	2.3	SOFTWARE SPECIFICATIONS	10
3		CLOSING THE REGULATOR USING MQ6 SENSOR –IMPLEMENTATION AND ANALYSIS	11-14
	3.1	IMPLEMENTATION	11-14
	3.2	RESULTS AND INFERENCES	14
4		CONCLUSION AND FUTURE WORK	15
	4.1	CONCLUSION	15
	4.2	FUTURE WORK	15
		APPENDIX	16
5		REFERENCES	17-18
		BIO-DATA	19-20

CHAPTER 1
INTRODUCTION

1.1 OBJECTIVES

- sensing the Liquid petroleum gas(LPG) using mq6 gas sensor
- design the electric circuit for getting desired output
  i)amplifying the signal after detecting LPG gas by using the transistor(13003S)
  ii)the amplified signal are used for closing the valve.
- Design the valve using electromagnetic induction
- Making the automatic opening valve using mechanically.

1.2 BENEFIT

- Closing the regulator by using the valve after detecting the LPG gas.
- this gas can sense by the sensor such as MQ6 with low voltage supply
- it is more beneficial for domestic and for industries purpose
- this automatic closing regulator can be done without using arduino
- it is very less economy for buying this one.

1.3 FEATURES

- sensor mq6 are used for sensing the LPG gas
- Transistor(13003S) are used for amplifying the signal.
- LED(light emitting diode) are used for showing the sensor reading
- Design the valve for closing the regulator using electromagnetic field
- the automatic value opening are done by using spring mechanism

CHAPTER 2

CLOSING THE REGULATOR USING MQ6 SENSOR - DESIGN

BLOCK DIAGRAM:

In this diagram describe about the function of the closing the valve using gas sensor. This process are done by some technical issues.

This information can be understand by following the below diagram in figure 1.

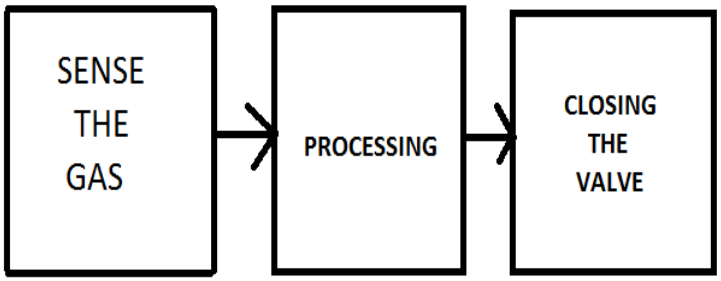


Figure 1: describe the function of closing the valve.

CIRCUIT DIAGRAM:

This diagram are more useful for understanding the logic processes of closing the regulator .

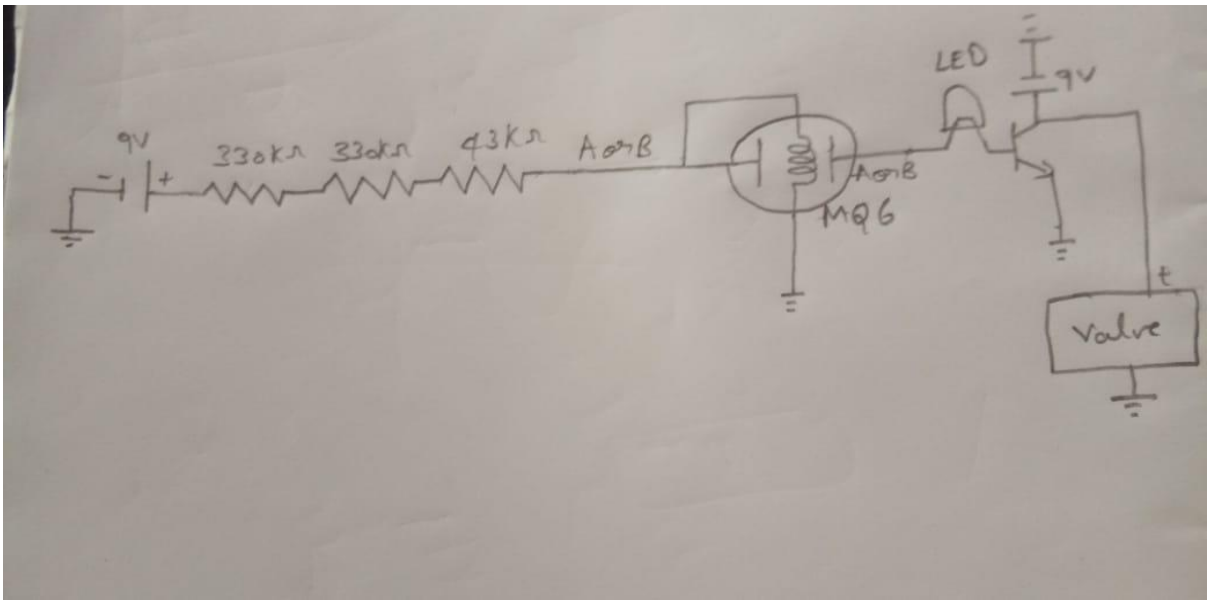


Figure 2:circuit diagram of this project.

2.2 HARDWARE SPECIFICATIONS

The PCB consists of the power supply, 3 resistance, MQ6 gas sensor, transistor (13003s) ,solenoid valve placed upon the PCB board. The power supply powers all the other units with the appropriate voltages. The transistor (13003s) will amplify the signal for processing the valve. The valve close the regulator from the surrounding.

2.2.1 POWER SUPPLY

The power supply will be 9V or 12v batteries and the voltage eliminator to supply power to different devices. A three resistance will step down the voltage to 4.3V to power the MQ6 gas sensors, LEDs. The another powersupply will connect to the other components such as transistor through the PCB board and wires.

2.2.2 PURPOSE OF USING TRANSISTOR

A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals controls the current through another pair of terminals. Because the controlled (output) power can be higher than the controlling (input) power, a transistor can amplify a signal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuits

But, in this concept we are using the transistor as a amplifier for functioning the valve.

Figure 3. the diagram of transistor(NPN)

2.2.3 manufacture of the valve:

As we all know about faraday law "induce the current by changing the magnetic field. Using that concept we are going to close the valve fitted backside of the regulator me . So fitting at the backside of the regulator is very difficult to control the pressure because in lpg gas regulator release 21 - 30 mba outlet pressure. So the valve has been designed mechanically to manage the pressure. The current flow in the solenoid will induce the current in the core .so this core will produce the magnetic field. So repulsion will be taken place which will move the core and stop the flow of gas. Spring are fitted with the core for mechanical purpose for opening the valve. So the design as shown in the figure 4.

Figure 4:picture of the valve

2.3 SOFTWARE SPECIFICATIONS

In this project there is no need of using any software concept.

CHAPTER 3

SYSTEM IMPLEMENTATION AND ANALYSIS

This section describes system implementation and results with inferences.

3.1 SYSTEM IMPLEMENTATION

The 9 volt battery is supply to the circuit. In that circuit contain 3 resistance Such as 2-(330k ohms) and 1-(47k ohms) and transistor and led and the valve

Sensor reading and working principle:

This sensor detect propane, iso-butane, liquid petroleum gas(LPG) and working principle of this gas sensor is:

i. The sensor consist of a sensing material which ionize the gases which comes in its contact.
ii. As a result, the ionization process of the gases changes the resistance across the circuit

This sensor reading can be analyse by using LED light(light emitting diode)
So this sensor will raises the voltage as change resistance across the circuit

Figure 5:picture of mq6 gas sensor

The voltage from the sensor will be transmitted to NPN transistor for amplify the dc voltage .before that we have to know the basis of using the transistor

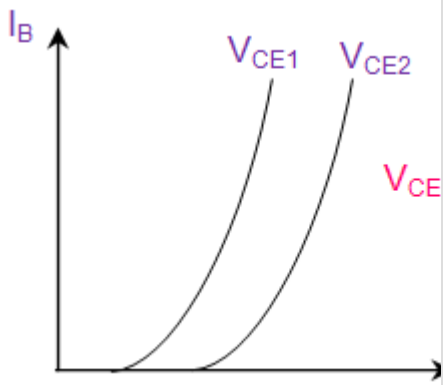
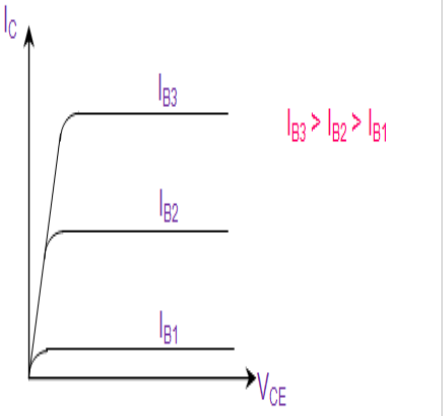
So we know two types of configuration for amplify the signal:
i)CE(common emitter) configuration
ii)CB(common base) configuration

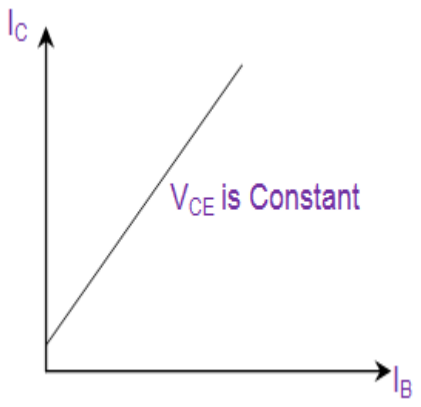
so in this concept we are going to use common emitter configuration

Characteristics of common emitter configuration:

In CE Configuration, the Emitter terminal of the transistor will be connected common between the output and the input terminals

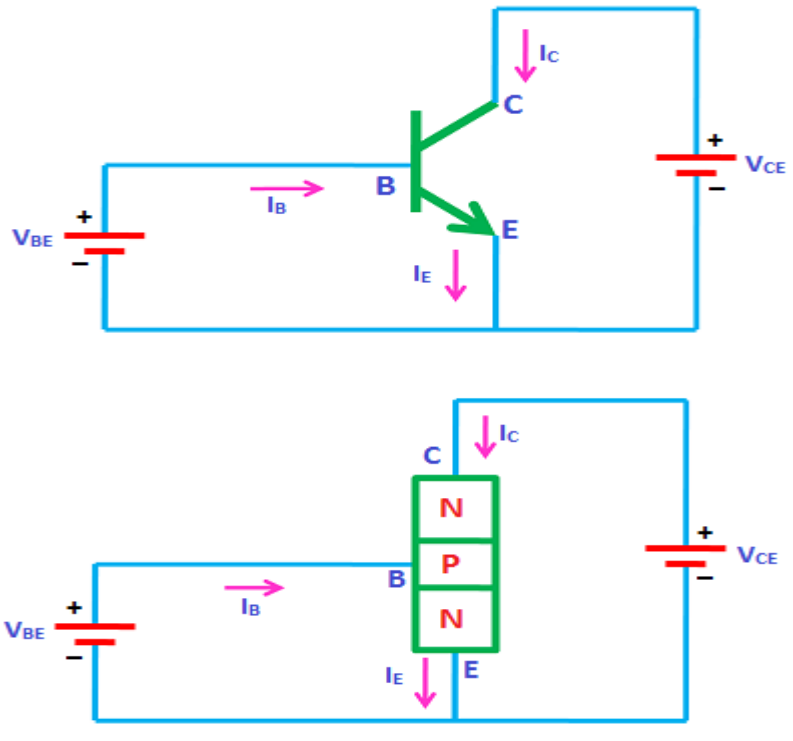
The transistor characteristic under Common Emitter configuration is as follows:

Transistor Characteristics	Definition	Formula/Expression	Characteristic Curve
Input Characteristics	The variation of emitter current(I_B) with Base-Emitter voltage(V_{BE}), keeping Collector Emitter voltage(V_{CE}) constant.	$R_{in}=\Delta V_{BE}\Delta I_B\|V_{CE}=$Constant	
Output Characteristics	The variation of collector current(I_C) with Collector-Emitter voltage(V_{CE}), keeping the base current(I_B) constant.	$R_{out}=\Delta V_{CE}\Delta I_C\|I_B=$Constant	

Current Transfer Characteristics	The variation of collector current(I_C) with the base current(I_B), keeping Collector-Emitter voltage(V_{CE}) constant. The resulting current gain has a value greater than 1.	$\alpha=\Delta I_C \Delta I_B \vert V_{CB}=$Constant	

Another 9 or 12 volt battery is connected to collector terminal of the transistor for amplification.

In initial stage voltage supply to the valve will be keep on reducing because most of the positive charge of the battery will flow to the collector terminal of the transistor. After sense by the sensor then their will be a huge voltage supply to the base terminal of the transistor .so the positive charge will be more in the collector side. So voltage supply from 9 volt will be more supply to valve which will make the process for closing the regulator.



Common emitter configuration

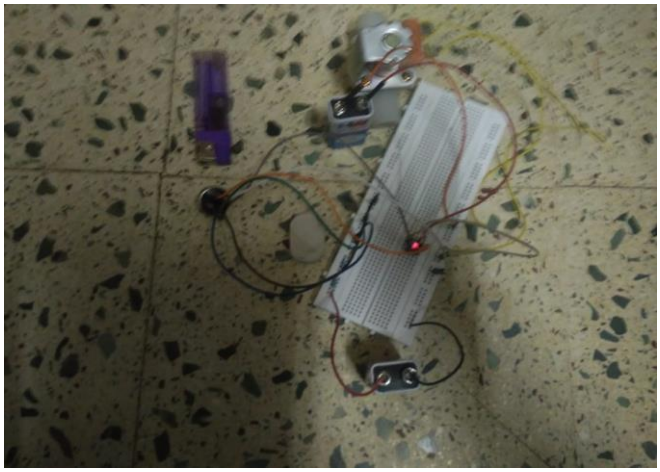
Figure 6: picture of the common emitter configuration

3.2 RESULTS AND INFERENCES

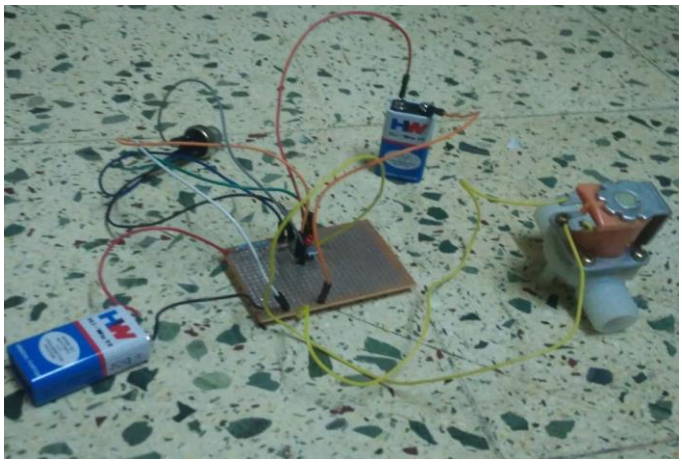
This project are successful in sensing the liquid petroleum gas(lpg) and also successful in amplify the signal and valve for closing regulator is also successful

The picture shown below will be informative for the observer.

Tested using breadboard



Tested using pcb board



CHAPTER 4

CONCLUSION AND FUTURE WORK

4.1 CONCLUSION

- The sensing by the sensor was successful
- Making the economy cost low for this project
- Amplify the signal using transistor is successful
- Closing the regulator by using the valve was implemented
- The preliminary test results are promising.

4.2 FUTURE WORK

- Implement the better valve closing with low voltage supply
- Implementing the circuit using alternate current
- Making this processing using relay concept
- Sensing concept can be using pressure concept
- Making this process using arduino

(OPTIONAL)

APPENDIX

DATASHEET OF MQ6 GAS SENSOR

DETAIL OF THE VALVE

CHAPTER 5

REFERENCES

1) datasheet of mq6 gas sensor (http://cdn.sparkfun.com)

2) detail of valve closing concept(https://theengineeringmindset)

3) Magnetic field about faraday concept(fundament science)

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L.C.Passarini and P.R.Nakajima

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