MOTION LIGHT SENSOR

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DECLARATION

We hereby declare that this is the result of our own investigations, except where otherwise stated. We also declare that is has not been previously or concurrently submitted as a whole for any other projects at Seberang Perai Polytechnic.

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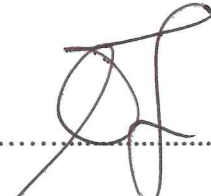
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Date: 7 OKTOBER, 2016

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as Final Year Project report as partial fulfillment for a diploma of Electronic Engineering (Communication).

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[*PUAN ERNIZA BT ZAILAN*]

Supervisor

ABSTRACT

There is case where people tend to get injury while searching the switch in the dark, where people always forget about their own safety, due to the lack of necessary equipment in our country that provides them with ease to avoid the risk, so came the idea of this research in the design and manufacturing PIR sensor handheld combines the properties of automatic light and that benefit the user in the dark places, which benefit from the experience of unseen. Sensor can detect motion within the designed range (150 cm) to avoid the user through the issuance of distinctive vision in the dark or light bulb will be switch on automatically. From the very beginning of human history, peoples are suffering from many darkness. Among those, injury while searching switch in the dark has been a case. Science and technology always try to make human life easier. So the main purpose of this paper is based on abating the disabilities of user in the dark by constructing a Relay based automated switch light that can corroborate a user to get vision in front of him/her instantly. It consists of a Relay incorporated with PIR sensor, Transistor, battery and additional equipment.

ABSTRAK

Terdapat kes dimana banyak kecedaraan dan kemalangan berlaku diakibatkan mencari suis dalam gelap, ramai yang sentiasa lupa tentang keselamatan diri sendiri, Ini kerana kekurangannya alat untuk memberi kesengan dalam mengelak risiko tersebut, Jadi datanglah idea penggunaan PIR sensor dan digabungkan dengan lampu automatic yang memberi manfaat kepada pengguna semasa dari keadaan gelap, Manfaat dari pengalaman yang tidak terlihat. Sensor boleh mengenal pasti dari jarak (150cm) untuk mengelakkan pengguna dalam memerlukan penglihatan dari gelap atau lampu automatik akan menyala. Dari mulanya kehidupan manusia terdahulu, manusia terjebak didalam kegelapan. Antaranya, Pelbagai kes telah direkodkan tentang mencari switch didalam gelap. Sains dan teknologi telah memudahkan kehidupan manusia seharian. Jadi punca utama kertas ini diwujudkan berdasarkan kelemahan penglihatan manusia didalam gelap, Dengan menggunakan Relay berdasarkan dari automatik cahaya membantu pengguna mendapat penglihatan didepan mereka sekelip. Ia merangkumi alat Relay bersama PIR sensor, transistor, bateri dan alat tambahan yang lain.

ACKNOWLEDGEMENTS

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

'In the name of Allah, Most Gracious, Most Merciful'

First of all, all praises be to Allah SWT for giving us the opportunity to learn new things in completing this project entitled 'Motion Light Sensor'

The completion and success of this project are not possible without the assistance, guidance and encouragement from many individuals. On the very outset of this project report, we would like to extend our sincere and heartfelt obligation towards all the personages who have helped us in this endeavor. We would like to express our heartiest gratitude and extremely thankful to our supervisor, Puan Erniza Bt Zailan for her conscientious guidance, supervision, and encouragement which has helps us in completing this project. Next, to Seberang Perai Polytechnic especially to the Electrical Engineering Department, we would like to extend our gratitude for giving us the opportunity to make this project.

Last but not least, we would like to acknowledge with a deep sense of reverence, our gratitude towards our parent and friends, for their constant supports morally and financially. Any omission from this acknowledgment does not mean lack of gratitude from us. May Allah bless everyone that contributed to our project, *In Sya Allah.*

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CHAPTER 1

INTRODUCTION

1.1 Background

The first light switch employing "quick-break technology" was invented by John Henry Holmes in 1884 in the Shieldfield district of Newcastle upon Tyne. The "quick-break" switch overcame the problem of a switch's contacts developing electric arcing whenever the circuit was opened or closed. Arcing would cause pitting on one contact and the build-up of residue on the other, and the switch's useful life would be diminished. Holmes' invention ensured that the contacts would separate or come together very quickly, however much or little pressure was exerted by the user on the switch actuator. The action of this "quick break" mechanism meant that there was insufficient time for an arc to form, and the switch would thus have a long working life. This "quick break" technology is still in use in almost every ordinary light switch in the world today, numbering in the billions, as well as in many other forms of electric switch.

The motion light sensor is a automatic light that consists of a circuit board that contains a PIR sensor. Positioning of the sensors is predefined by real life application. The entire project is designed using PIR sensor based upon its reliability. The PIR sensor is set in the board as the main thing to function the motion light.

1.2 Objective

This project has objectives which it's be a guide line in process to develop this project. The objectives are:

1. To save electric bill.
2. To avoid any possibility hazard during night.
3. To avoid any unmoral doing in dark places.
4. To ease student in switching on the light.

1.3 Problem statement

The current available solution to overcome difficulties in movement in dark places for the student is the use of the basic motion light sensor which actually helps them to see in the dark without searching for switch and prevents them from danger. The motion light sensor is designed to be auto switch on when detect any movement in 100cm.

The material used for motion light sensor is usually made of aluminum or plastic. Despite that it is able to help the student to pass through dark places without any worry to search for switch, the current motion light sensor can only detect movement which are within its length and no delay is set up for now.

1.4 Problem Solution

All previous problems we're trying to solve them. To help the user pass through the dark places without needs to search for the switch and the PIR sensor will detect the motion of the user to automatically switch the light on.

1.5 Project Description

This project is to help the user especially for those who scare of dark, to help them walk safely. When there are obstacle or hole in front of. This alert and automatically open the light.

1.6 Project scope

This project is suitable for anyone to use in any place. The place is:

- Outdoor
- side walk
- street vendor
- Indoor

LITERATURE REVIEW

2.1 Introduction

In this section, we will discuss about and share about all the information that we obtain from the study and research which is vital for us to get the project done. From the research, we also obtain some knowledge theory base AND practically base which can be used for us to successfully complete this project and attaint's our objective. Majority materials are article, books, journals and previous work related to the project. The materials will be compiled and used as guidance for us to complete our projects. We're expecting that this project could be useful to the blind people to help them walking safely at an outdoor. The research is carried out on the components of devices which is PIR sensor, Relays, transistor, bulb and else on. From the research, it help us to determine the suitable components to be used as a parts of our projects. Since the components has a wide range of selection, the study will help us choose the best to make a good auto motion light sensor devices.

2.2 PIR Sensor

PIR Sensor is motion detection sensor which imitate light that which human can't detect/see with human eyes, when any object pass through the light, automatically the PIR sensor will send the voltage signal to transistor.

2.3 Transistor

Transistor get the voltage signal from the PIR sensor by using NPN. Then the voltage gain from the base of transistor , will send the voltage to the Relays.

2.4 Relays

The voltage gain at the coil section of relays, turn it into magnetic coil which pull the switch toward NO (Normally Open) from the NC (Normally Close), makes the AC 220V follow straight to the bulb.

2.5 Understanding PIR Sensor

PIR sensors are more complicated than many of the other sensors (like photocells, FSRs and tilt switches) because there are multiple variables that affect the sensors input and output. To begin explaining how a basic sensor works, we'll use this rather nice diagram
The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a *positive differential* change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.
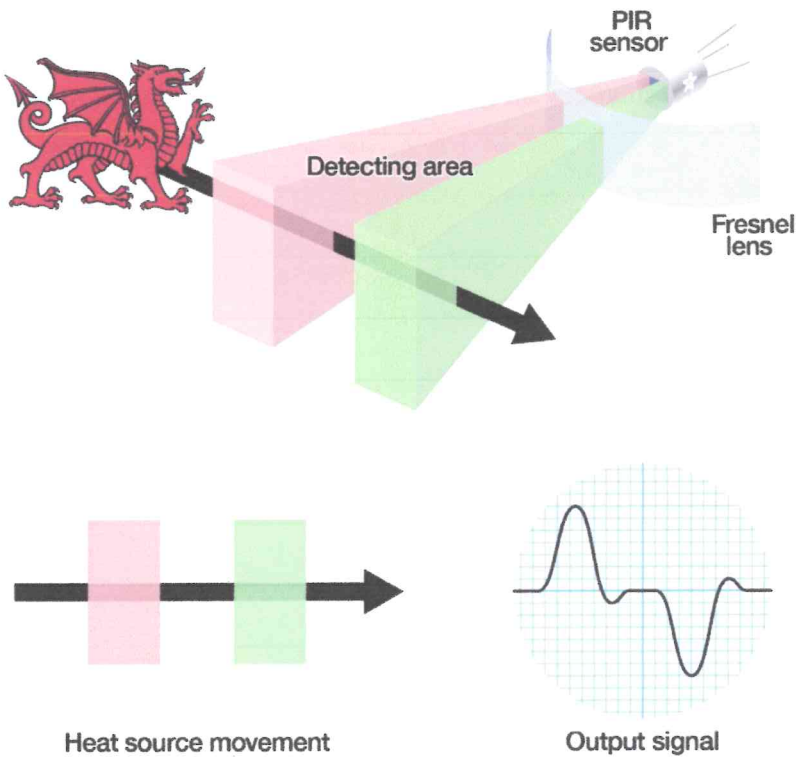

Figure 2.1

The PIR Sensor

The IR sensor itself is housed in a hermetically sealed metal can to improve noise/temperature/humidity immunity. There is a window made of IR-transmissive material (typically coated silicon since that is very easy to come by) that protects the sensing element. Behind the window are the two balanced sensors.
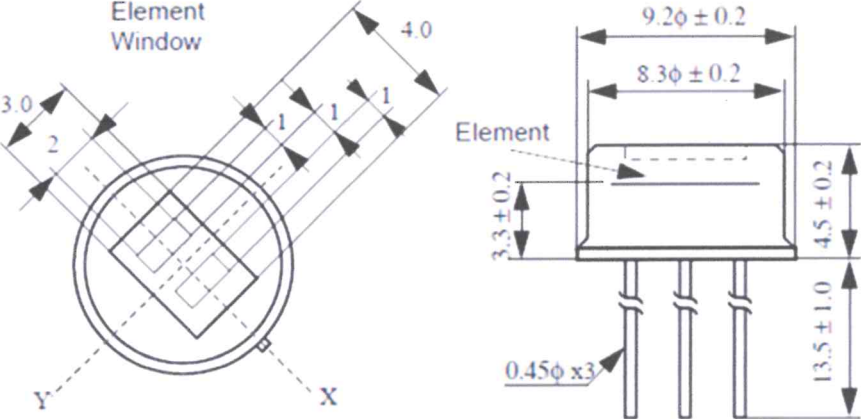

Figure 2.2

You can see above the diagram showing the element window, the two pieces of sensing material.

CHAPTER 3

3.1 Methodology

As it has been noted earlier the implanted motion light sensor scheme corresponds of several subsystems. These subsystems fundamentally sensor based. The integral scheme is designed with a circuitry fundament on a PIR sensor. This PIR sensor operates the whole scheme by functioning and linking the subsystems in good order. Figure 1 shows Physical Structure of motion light sensor.

Figure 3.1

3.2 Method Used

This chapter will briefly discuss several method used in order to do the project. The methods used to gather the useful information of the project. Those methods are :
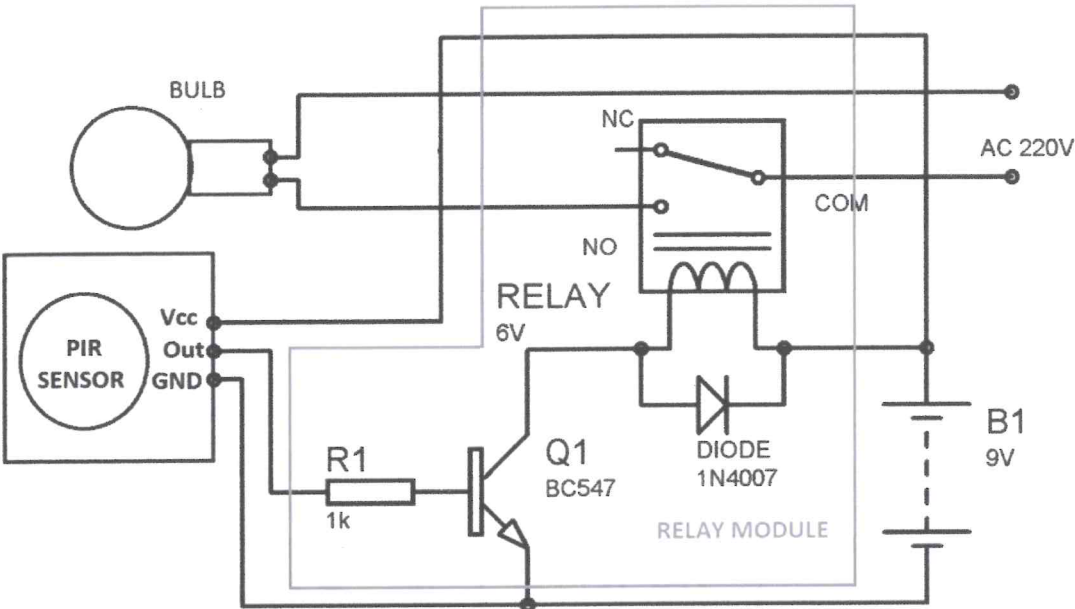
- Hardware

3.3 Block Diagram

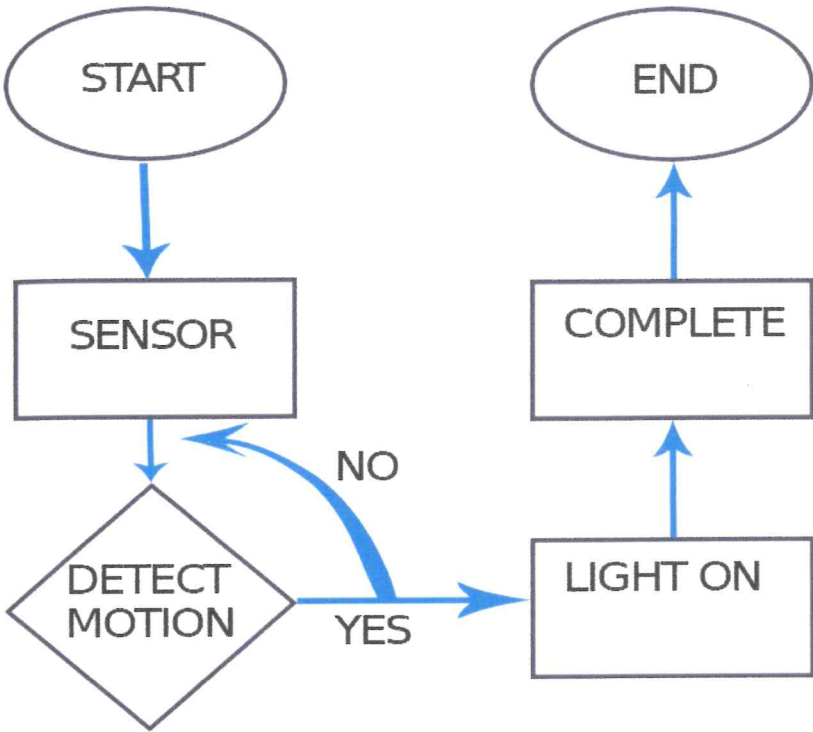Figure 3.2

3.4 Flow Chart

Figure 3.3

Every device has its own input and output. Like this project, the PIR is the main component of this project. The input (sensor) will detect some obstacle in front or bottom. When it detect some motion/heat, it will light up the bulb to the people. If don't have any motion/heat, the motion light sensor wont react.

3.5 Hardware and Development

Below is the list of component that we used for our project. All the components are chosen to according to their component are chosen to according to their compatibility so it can work with the PIR sensor:

- PIR Sensor
- Bulb
- Jumper (wire)
- Container Box
- Battery

3.6 Hardware Explanation

3.6.1 PIR sensor

Figure 3.4

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

3.6.2 Bulb

Figure 3.5

An incandescent light bulb is an electric light with a wire filament heated to a high temperature, by passing an electric current through it, until it glows with visible light.
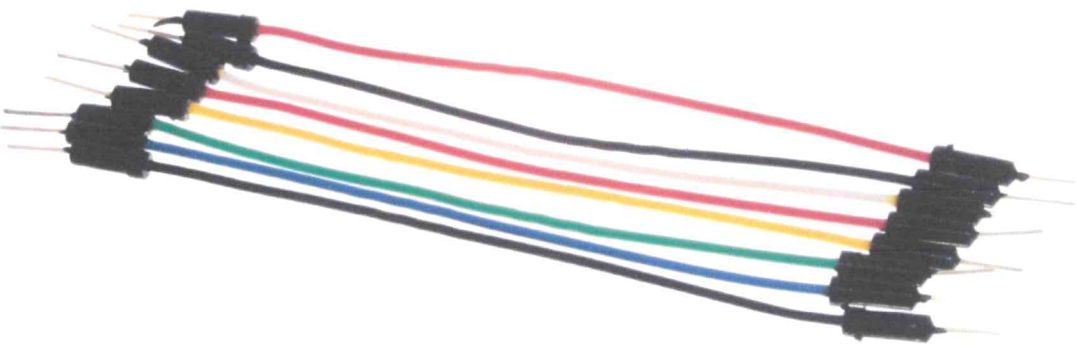
3.6.3 Jumper (wire)

Figure 3.6

A jump **wire** (also known as **jumper**, **jumper wire**,**jumper** cable, DuPont **wire**, or DuPont cable – named for one manufacturer of them) is an electrical **wire** or group of them in a cable with a connector or pin at each end (or sometimes without them – simply "tinned")

3.6.4 Container Box

Figure 3.7

This part is also important because this is where all the component will be kept. We chose a black box that could fit the device nicely. We also choose a big box and small box so that it would be light and portable and also can put at middle the stick.

3.6.5 Battery

Figure 3.8

The whole system is powered up by a battery which is able to supply 9V. It is essential for the current to be high enough to power up all the components. Otherwise, the sensors will not be able to operate well as the output signals of the sensors are not accurate.

3.7 Summary

In this chapter, we have briefly explained how we make the device. This chapter discussed about the methodology consists of main part/component, block diagram, hardware development and software development explained about the project methods by using hardware component. For each subtopic, a brief explanation had been made in order to make this project easily to understand. Proceed in assembled and test in hardware.

CHAPTER 4

RESULT AND ANALYSIS

4.1 Introduction

In this chapter, we were finished the entire configuration by PIR sensor. We will discuss the result that we got and do experimental in order to investigate the performance and ability of the motion light sensor.

4.2 Testing

In this phase, the prototype should be tested to make sure it functions as intended. Up to this point, this study has opportunities to test the motion light sensor in term of its functionality. The results of the testing are discussed in this capture.
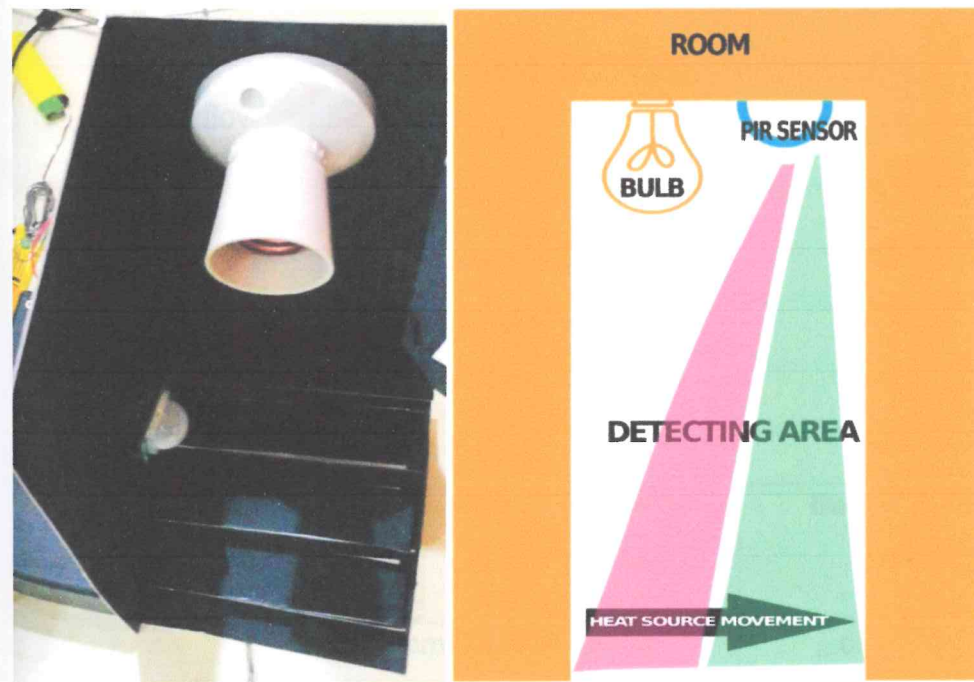

Figure 4.1

4.3 Experimental result

The PIR sensor system in this paper is designed to combine two parts: signal alert part for the Relay which will send signal as in the automatic open door does. Figure-1 show the device diagram function used in this paper. Table-1 show specifications of motion devices.
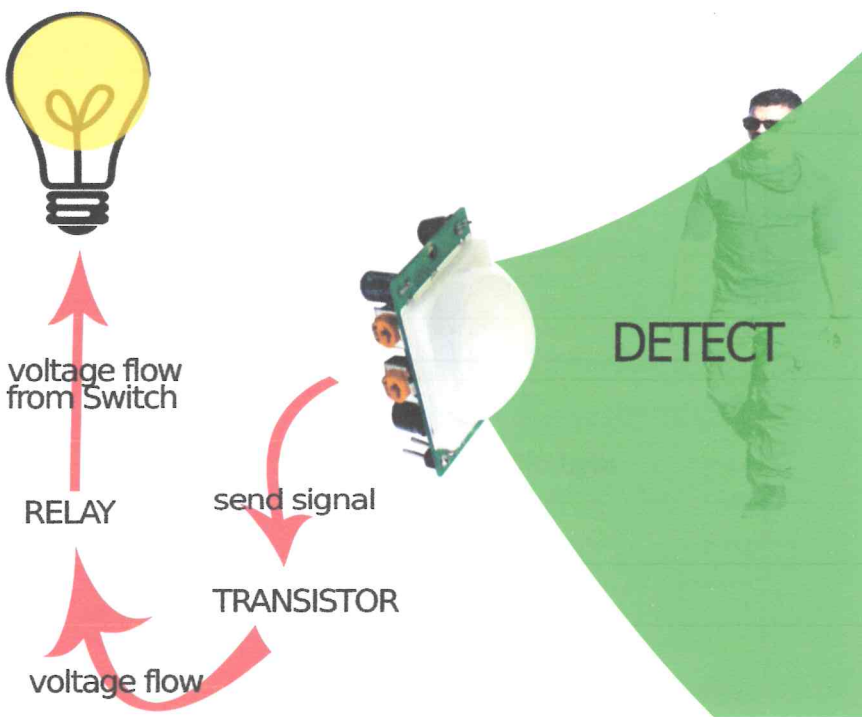

Figure 4.2

Table-1

Detection range	Detection angle	Battery
40-150 cm	5°	6V

The practice range of motion light sensor as we mentioned in table-1 is (10-30 cm) after we tested the device we get the experiment results show in table-2. From this table we see that with distances the PIR can reach to detect the motion, it will give a voltage flow to Relays and goes to the bulb as the automatic door does. While in as long the object have motion, even animal not non-living thing, as long it contain heat. Figure- 4 shows the result of respondent about this project.

Table-2

Distance (cm)	Light signal
10	On light
20	
30	
40	No light
50	
60	
70+	

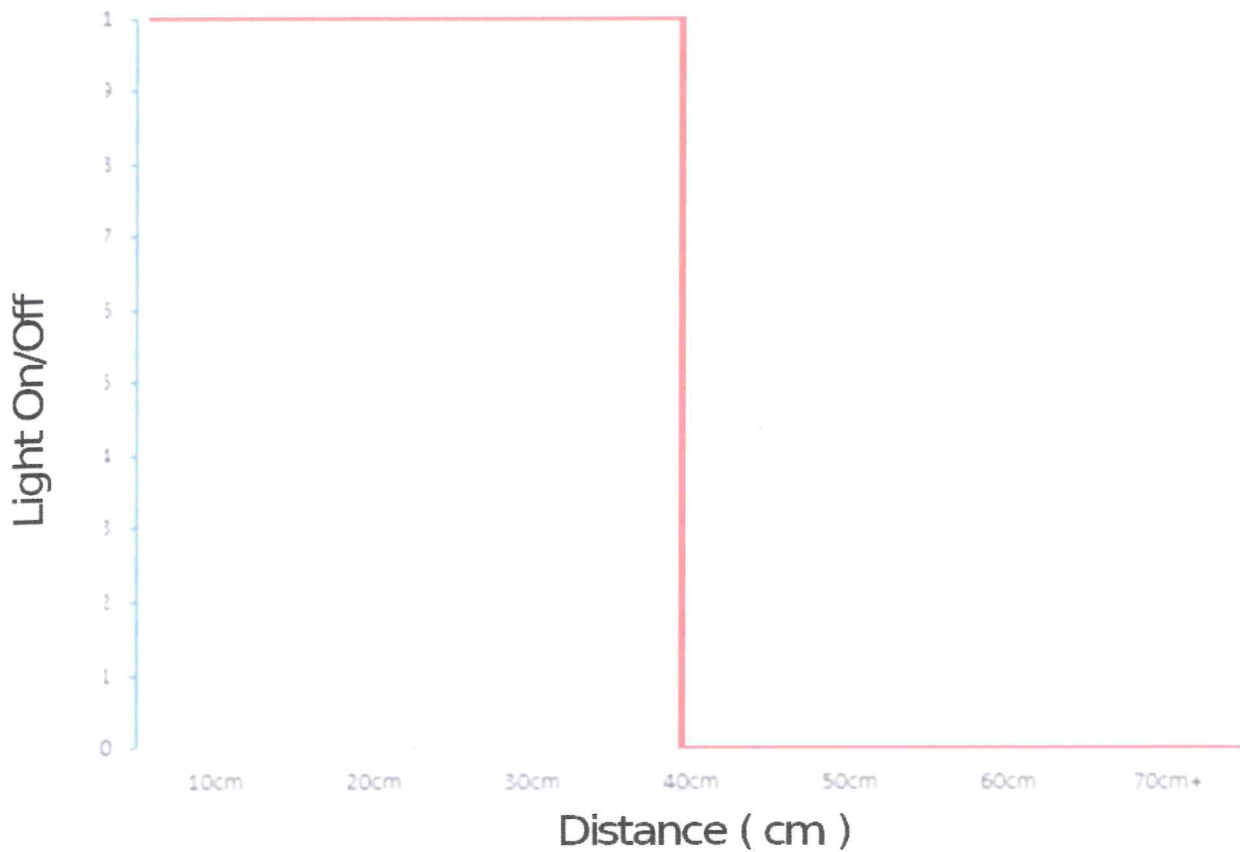MOTION LIGHT SENSOR REACTION

Light On/Off

Distance (cm)

Figure 4.3

4.4 Analysis

The main aim of this project is to assist the user without the need of hardness in searching for the switch. It is well known that motion light sensor will detect anything move. Sometimes even when they use this motion light sensor, there is no guarantee that user are safe and secured in reaching their destinations. There may be an obstacle in their path but is not encountered by the person with the help of the normal light bulb. Thus, the people may be injured if the obstacle is big enough or dangerous. Thus, a design has been developed to assist the blind and provide them a clear path automatically.

The system consists of PIR sensor fixed to the light bulb. While the user moves to the dark places in the forward direction, the PIR sensor fixed to the switch bulb tries to detect the motion if any present in the motion. If the sensor detects the movement, the output of the receiver triggers and this change will be detected by the Relays since the output of the receivers is given as inputs to the transistor. Thus, the transistor immediately let the voltage flow to the Relays as soon it receives the triggered output from any of the sensors. Thus, the user can walk through the dark places without any worries, in any other direction to avoid any kind of injury, as soon the bulb is activated. The entire controlling unit will be fixed to the motion light sensor.

Figure 4.4

4.5 Summary

This project is focused on detecting motion to help any user walk safely. From the test that we done, we can conclude that this device is working incompletely. The device should has a great suitable and easy used to dark places than normal switch. The sufficient range of this device (40-150 cm), and can be used in three dimensions.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, we will discuss about the conclusion and work of the whole project, and recommendations to improve that can be made to make the device better. Several recommendations for further work are given as well.

5.2 Recommendations

Some future works are suggested and recommended in order to improve the Motion Light Sensor. The accuracy of the motion detection can be increased. Therefore, the sensitivity of the motion sensor in PIR sensor should be improved. The PIR sensor can be adjusted to detect fast moving objects. Moreover, to make this project be more smooth, Arduino should be added to make a delay timer, so it wont off the light to fast.