NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

HEIGHT BASED ENTRY SYSTEM

A MINI PROJECT REPORT

Submitted by

VYSHAK SATHISH SHETTY (1NH18EC123)

VINAY KUMAR K (1NH18EC121)

NIDHISHREE KAWRI (1NH18EC078)

VARUN GOWDA K V(1NH18EC119)

In partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled "**Height based entry system**" carried out by **Vyshak Sathish Shetty(1NH18EC123), Vinay kumar K (1NH18EC121), Nidhishree Kawri (1NH18EC078),Varun Gowda K V(1NH18EC119),** bonafide students of Electronics and Communication Department , New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

Ms. Monika Gupta
Project Guide

Dr. Sanjeev Sharma
HOD ECE

External Viva

Name of Examiner Signature with Date

1.

2.

ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

We thank **Dr. Mohan Manghnani**, Chairman of **New Horizon Educational Institution**, for providing necessary infrastructure and creating good environment.

We also record here the constant encouragement and facilities extended to us by **Dr. Manjunatha**, Principal, NHCE and **Dr. Sanjeev Sharma**, head of the department of Electronics and Communication Engineering. We extend sincere gratitude to them.

We sincerely acknowledge the encouragement, timely help and guidance to us by our beloved guide **Ms. Monika Gupta** to complete the project within stipulated time successfully.

Finally, a note of thanks to the teaching and non-teaching staff of electronics and communication department for their cooperation extended to us, who helped us directly or indirectly in this successful completion of mini project.

Vyshak Sathish Shetty (1NH18EC123)

Vinay Kumar K (1NH18EC121)

Nidhishree Kawri (1NH18EC078)

Varun Gowda K V (1NH18EC119)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

It is a common practice in amusement parks to check each person's height before letting them in on certain rides as it can be dangerous to people with short height. This requires a large number of safety personnel to be present at each ride and also results in delay in movement of people in queues.

Also, in certain roads in cities, there are a large number of overhead passes in highways. This makes it difficult for tall vehicles to pass through and it also results in traffic as the vehicle should now change the route.

Our project aims at providing solutions for these problems by using sensors before the entrance to check for height requirements and alert if the person/vehicle does not meet the required height.

This reduces the man power needed to check people's heights at rides in amusement parks and also saves time of a lot a people.

This sensor can be used in roads before overhead passes to check vehicles and to alert the driver to change routes if the vehicle exceeds the limit height.

Keywords: Height based, LDR,BJT.

Chapter 1

INTRODUCTION

The topic we have chosen for our mini project is 'height based entry system'.

At present scenario, the world is becoming more advanced and automated in terms of technology.

Humans are replaced by robots in almost all jobs in order to bring accuracy and reduce delay in demand and supply.

Height based entry system is also an example among them. And it can meet benchmark in entry system by considering height of human.

Since the 90’s and till date, In most of amusement parks, checking of height before entering swimming pools is done manually in many countries including India. And also the trucks are above the maximum height to pass under an over bridge face difficulties when they come near an over bridge and can’t get through it because of height restrictions.

Our project aims at reducing inaccuracy in these fields.

Our Project is constructed by using basic electronics materials such as resistors, capacitors, LDR and BJT.

The theme of our project is built based on OVDS (Over height vehicle detection system). Since OVDS is complicated and should be in large scale. Hence our project will be a mini version of height based entry system that can be installed in big doors as for domestic use and amusement parks.

The goal of our project is to reduce the man force needed to check individuals heights at amusement parks and also to reduce the traffic created in highways because of tall vehicles being unable to pass through an over bridge.

Chapter 2

LITERATURE SURVEY

1. OVERHEIGHT VEHICLE WARNING SYSTEMS IN MISSISSIPPI

By,

C M Hanchey, S Exley

Published in 1990

The detection and warning of over height trucks prior to their striking and damaging the overhead members of through truss bridges is discussed.

Three basic bridge protection schemes were investigated:rigid passive overhead device; no rigid passive overhead device; and active detection and warning system.

A system to detect and warn over height vehicles was designed that incorporated the following parts: advance warning signs of the height restriction.

Device to detect over height vehicles; audible alarm bells that are activated when an over height vehicle is detected; overhead warning signs with flashing yellow beacons that are activated when an over height vehicle is detected; and regulatory signs with instructions for drivers of over height vehicles. The details are described of the detection device, the system layout, and effectiveness.

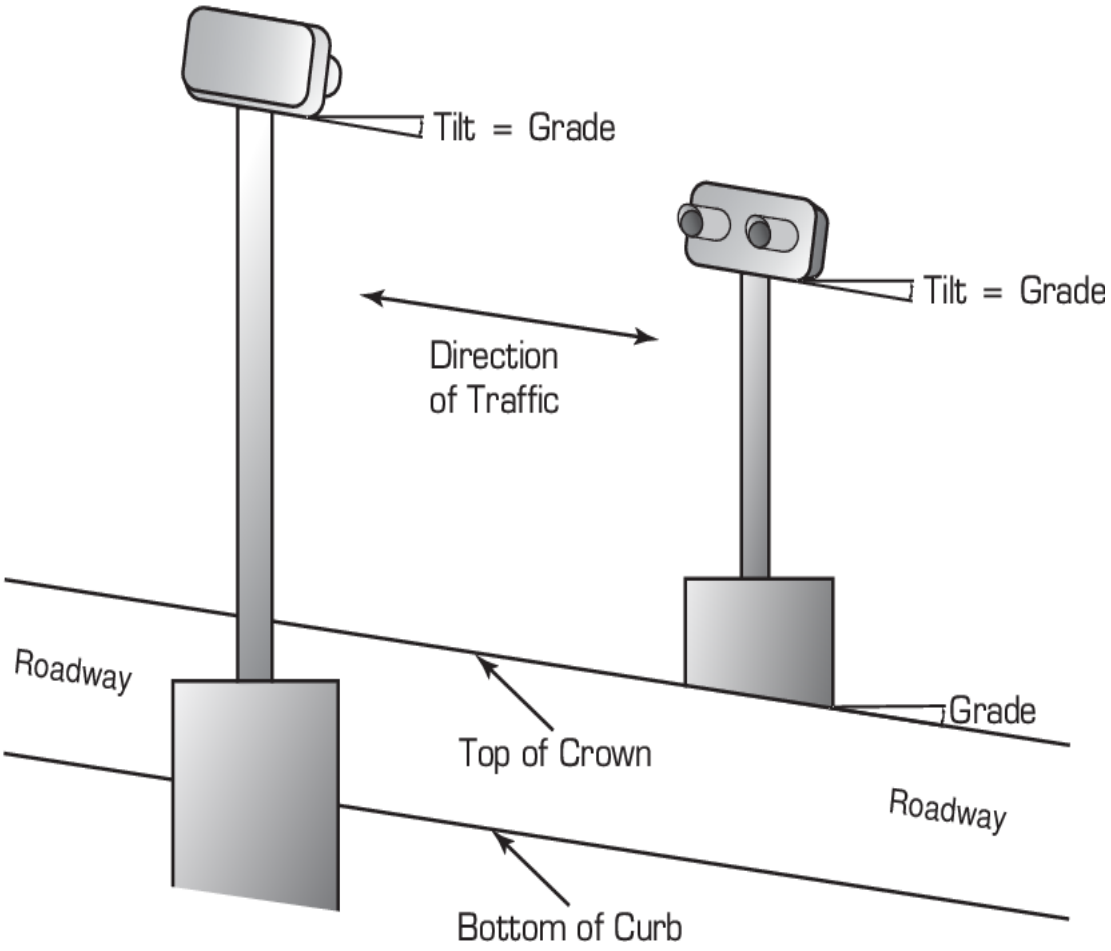

Fig 1.1 Over height system diagram

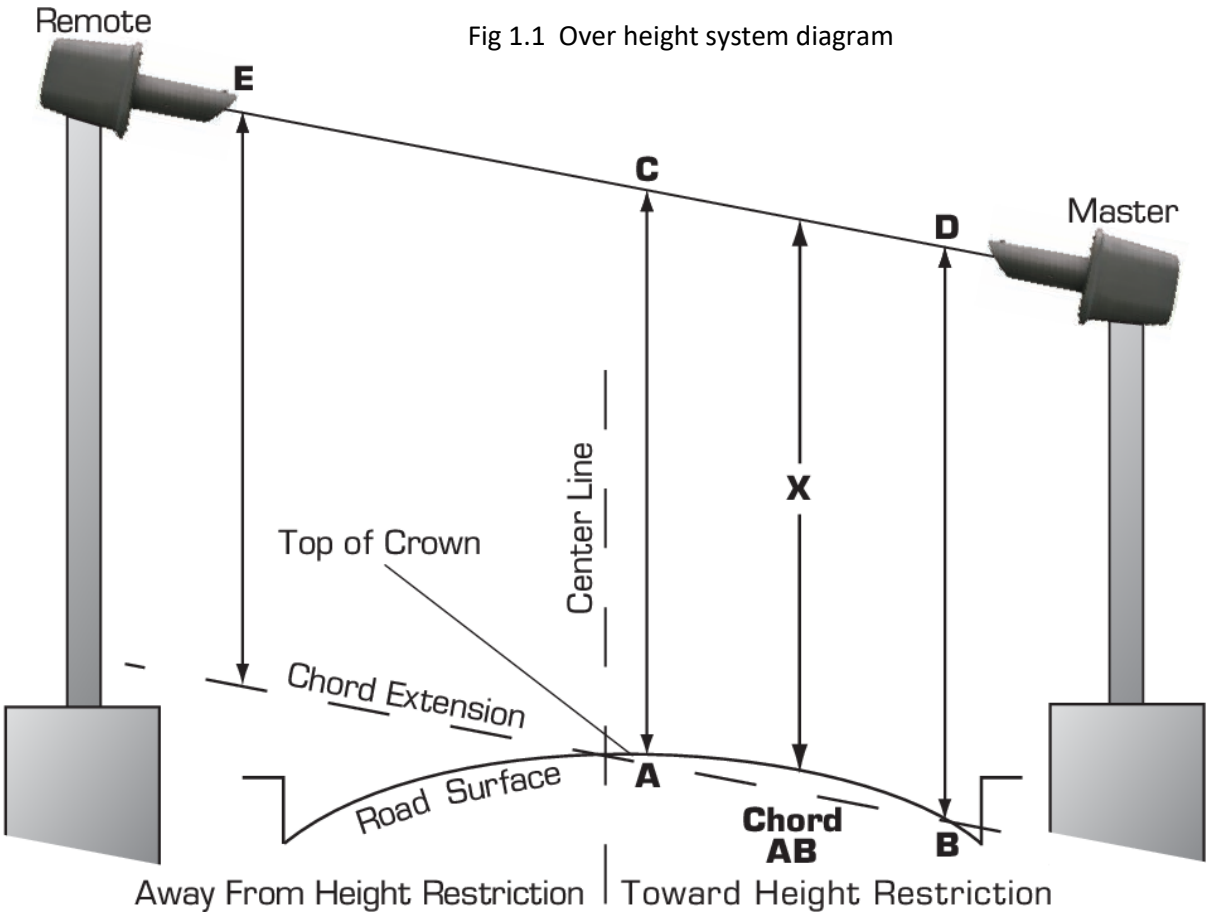

Fig 1.2 Overheight system calculations

2. OVERHEIGHT VEHICLE DETECTION SYSTEM IN EGYPT

By,

Magdy A.Massoud

Published in 2013

This paper presented a new technique of overheight vehicle detection.
This technique was advanced driver assistance system to reduce collisions between motorists and overhead structures.
The proposed technique was designed by three different methods; mechanical, optical, and image processing method. The technique achieved at a real-time operation. This technique consisted of three stages; overheight detection, driver alert, and traffic administration unit. License plate recognition (LPR) was used at traffic administration unit. The system was robust, and accurate performance.
The aim of this stage is to detect the over height vehicles. The proposed technique uses three methods to demonstrate which a suitable method to recommend applying in Egypt is. Overhight detection methods are depending on types of sensors which are used. Limit switch (LS), laser & light dependent resistor (LLDR), and camera are sensors which are used. LS and LLDR are mechanical and optical sensors for sensing and detecting vehicles at specific height, but camera (image processing method) can determine the height of a trunk that is higher than a bridge.
According to the proposed technique, when an overheight vehicle tries to pass from the bridge the accident will occur. To prevent the vehicle from accident, the system has the ability to announce drivers by sign and voice alerts. By using these alerts the drivers can take corrective action. There are two types of sign alert; traffic arrow sign, and LCD board. If the vehicle is overheighted, LCD will appear "Turn". If the vehicle can pass from the bridge, LCD board will appear "Welcome". Traffic arrow sign is a light arrow sign which guides the driver to turn.

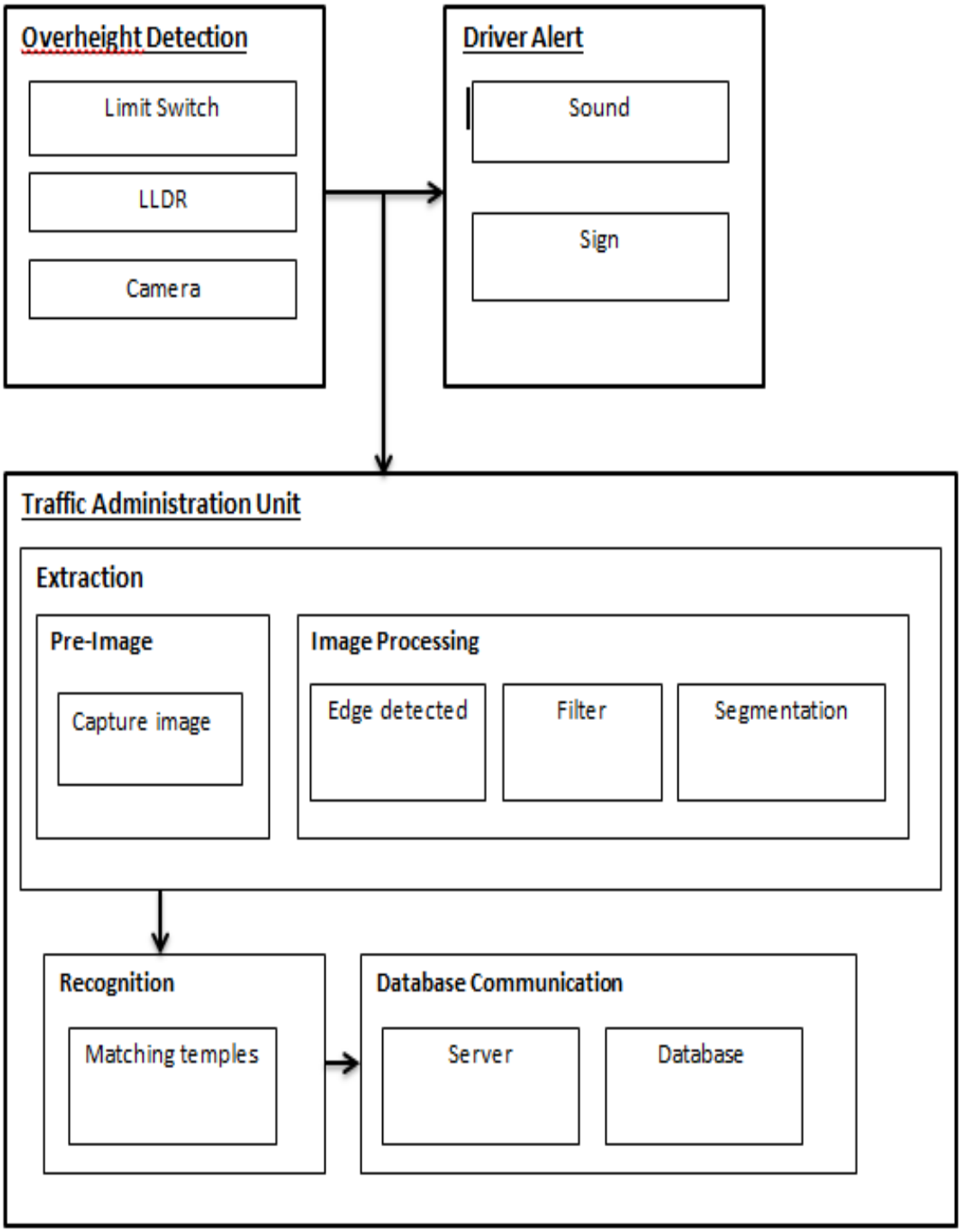

Fig 1.3 Block diagram of Egypt overhead system

Chapter 3

PROPOSED METHODOLOGY

The height based entry system can be devised for 2 main applications:

1) To prevent short person from entering certain rides in amusement parks where it is necessary to meet the required height.

2) To prevent tall vehicles from continuing on the road with overhead passes that can only allow a vehicle till certain height to pass through. Here, it is necessary that the vehicle does not exceed the maximum height.

This model will mainly focus on solving the first issue but can also be used to solve the second one with very slight modifications.

The **height based entry system** model uses 2 LDR sensors, paired with light sources to detect the presence of the person and also to check whether the person meets the required height or not. These LDRs are connected to respective BJT to act as a switch. Output from each BJT is given as input to different ICs to work as needed.

The output from the IC is given to a buzzer. The circuit is designed such that the buzzer rings when the person who does not meet the required height passes through the door.

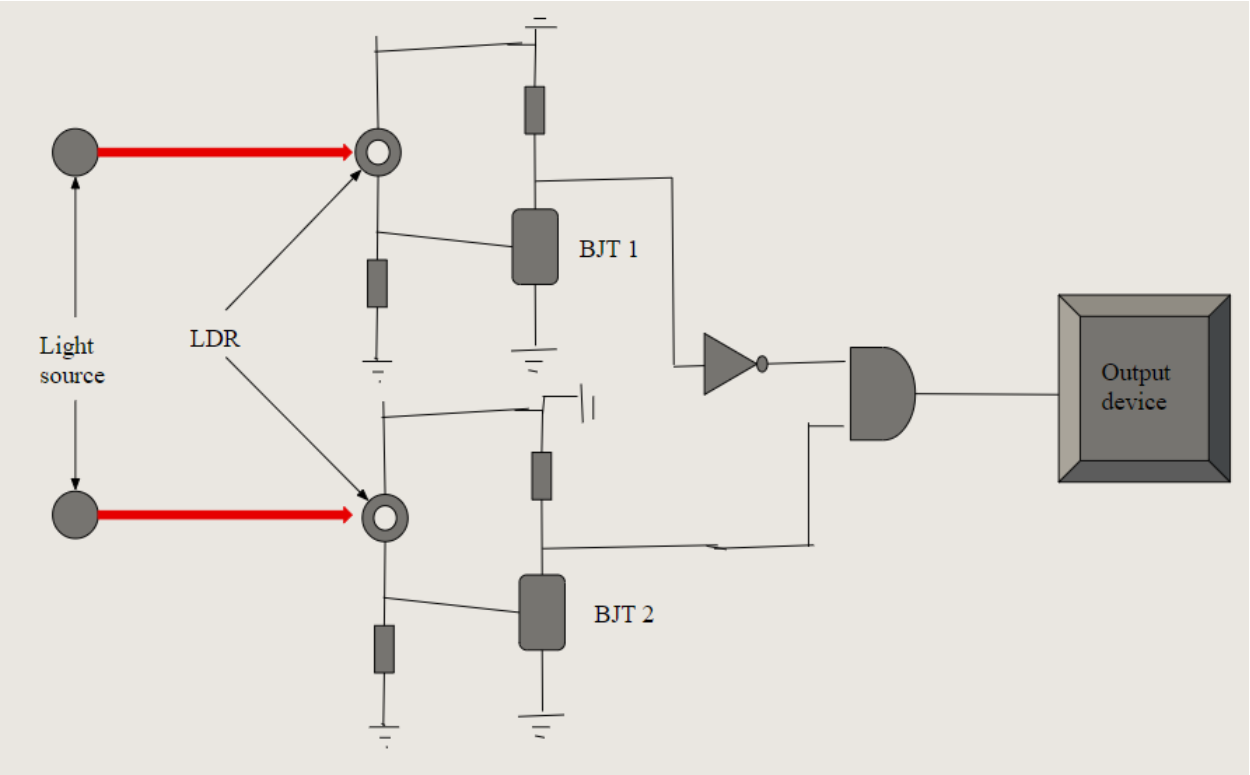

Fig 3.1 Block diagram of project

Truth table for output:

Table 3.1 Project logic truth table

BJT 1	BJT 2	output to buzzer
0	0	0
0	1	1
1	0	0
1	1	0

The first state (both BJT output=0) is when there is no person present at the door. The output will be 0 and the buzzer won't ring.

The second state is when the person passes through the bottom sensor but is not tall enough to cover the upper sensor. It means the person does not meet the required height and hence 1 output is given to the buzzer and the buzzer rings.

The fourth state is when the person passes through both the sensors indicating that the required height is met. Therefore, the output is zero to buzzer and the buzzer does not ring.

Also, in order to simplify the working and handling of our project , we will be using a single light source to power both of the LDRs.

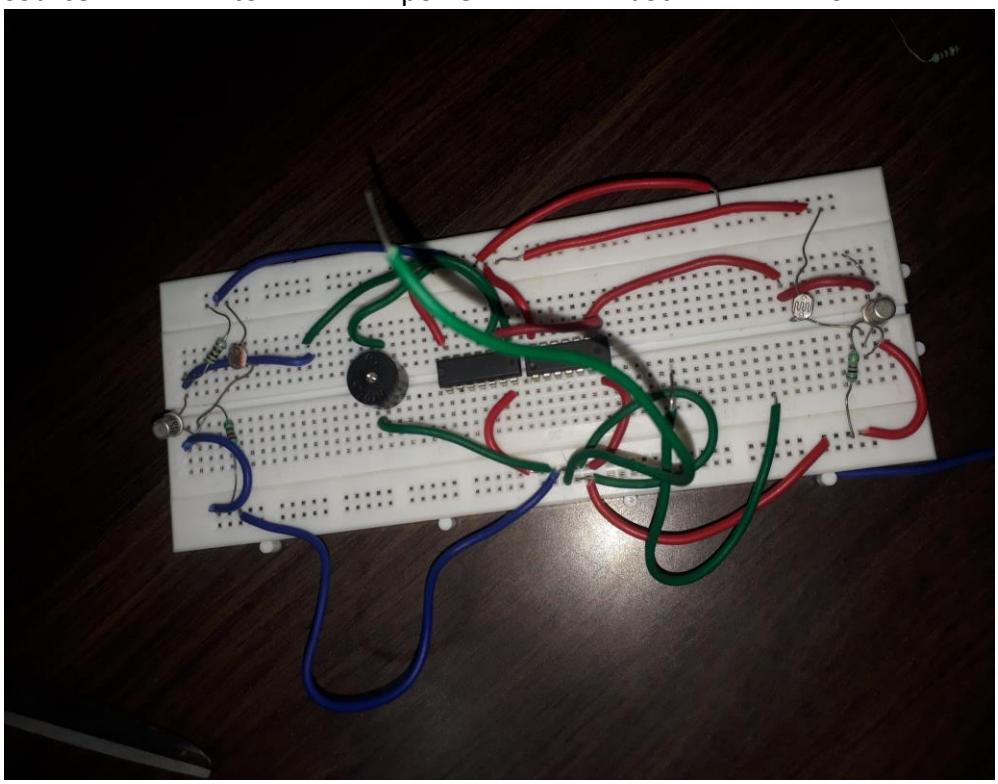

Fig 3.2 Project testing on breadboard

The circuit was first rigged onto a breadboard and checked for its working. After troubleshooting and verifying its working the circuit was transferred onto a PCB board and soldered.

Fig 3.3 Installing components on PCB

In the current model of the project, as we are using a buzzer to indicate a short person passing through, it makes it necessary for a person to be at the door to stop the short person from entering. This can be overcome by using a motor and a door at the output to stop the short person from passing through.Also,2 laser lights can be used instead of the singular light source to ensure highly accurate working of the sensor.

Chapter 4

PROJECT DESCRIPTION

The Height Based Entry System is a device that is mainly used for the purpose of safety. It decides the next step to be taken depending on the height of the object passing through it. It can be used for many different applications depending on the way it is configured. Let us look at the hardware used in this project.

HARDWARE DESCRIPTION:

Light Dependent Resistor:

The Light Dependent Resistor (or LDR) is a unique type of resistor that is able to change its value depending on the amount of light falling on it.

Fig 4.1 LDR

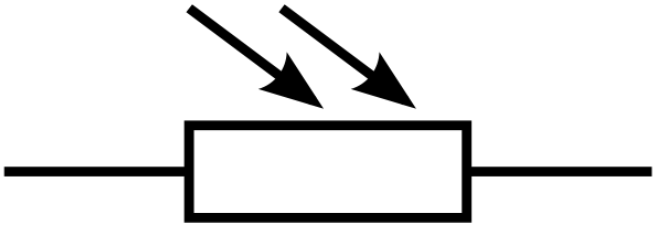

Fig 4.2 LDR Schematic

The working principle of an LDR is photoconductivity. The material that the LDR is comprised of is able to reduce its conductivity the more it absorbs light, hence it increases the resistivity and thus giving more resistance when more light falls on it.

The LDR that we use has a resistance of 1000 ohms when there is no light and the resistance increases to 15000 ohms when there is light falling on the LDR.

In our circuit, we use the LDR to detect a passing object. When an object comes in between the LDR and the light source, then the light is cut off from the LDR. Then we place the LDR in such a way that when the light is cut off, the change in voltage is able to control the voltage at the base of the bipolar junction transistor hence giving the desired signal to the integrated circuits for processing of the appropriate logic.

Resistors:

Resistors are devices that resist the flow of current in the circuit. They come from different values depending on how we want to control the flow of current in a circuit. Resistors also come of different types. The ones that we use in our circuit are the carbon resistors.

Fig 4.3 Carbon resistors

The resistance values of the resistors are given by color codes. Each color holds a value and we can find out the value of the resistor by reading these color codes using a chart.

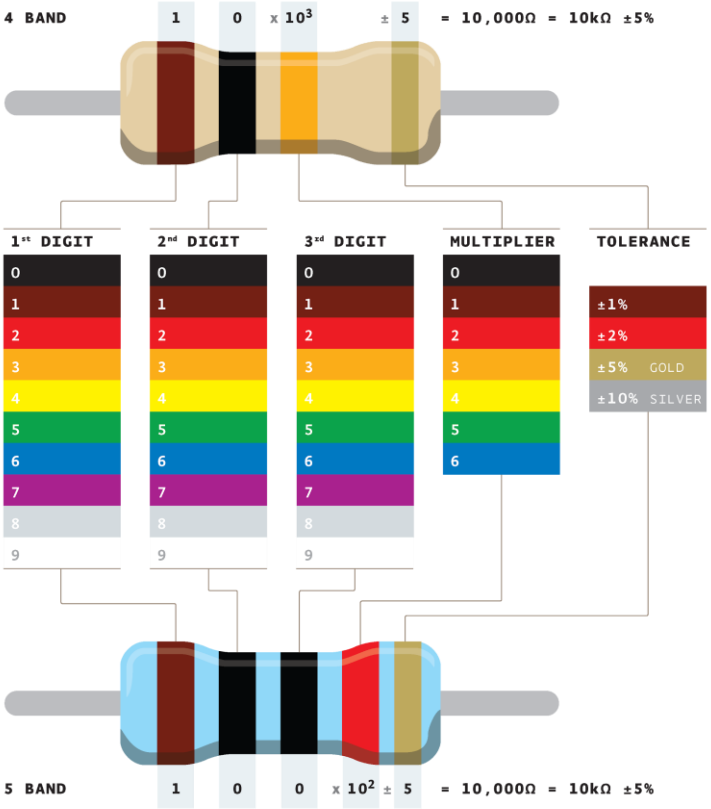

Fig 4.4 Resistor value chart

In our circuit, we use the resistors for dividing the voltage and biasing of the bipolar junction transistor. the resistor along with the LDR gives the appropriate voltage to the base of the transistor such that it can give the desired outputs to the ICs such that the purpose of the circuit is fulfilled.

Bipolar Junction Transistor:

The bipolar junction transistor(or BJT) is a sandwich of two different types of semiconductors, the n-type and p-type. They come in two configurations, the NPN transistor, and the PNP transistor.

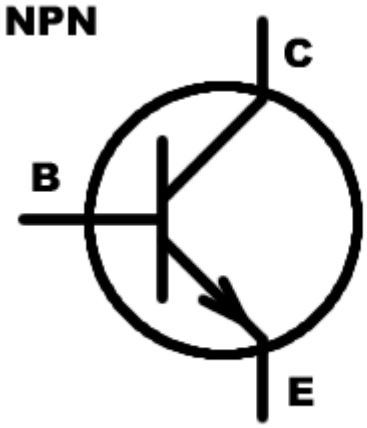

Fig 4.5 NPN transistor

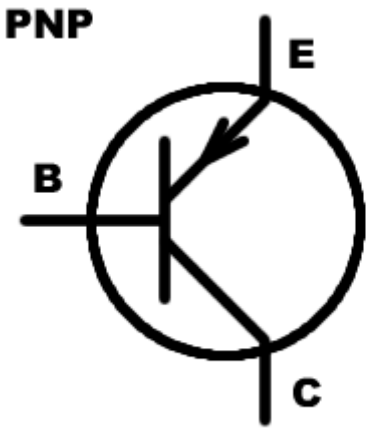

Fig 4.6 PNP transistor

These are some very revolutionary devices that have changed the world drastically and helped to make computers smaller and more compact so they fit in the palm of our hands. Transistors have a variety of applications. They are used as amplifiers, switches, etc. In our project, we use our amplifier as a switch as it turns ON or OFF depending on the voltage at the base of the transistor.

Fig 4.7 Bipolar Junction Transistor

We use two BJTs in our circuit and both are used as switches to let the ON or OFF state reach the integrated circuit. The BJT that we are using is BC107. It is a legacy transistor so it has been used for a very long time. We found this transistor sufficient for the demands of our circuit and it is able to do its job appropriately without any issues. The transistor, when ON gives a high signal to the IC and when OFF gives a low signal to the IC. So when the BJT gives appropriate signals to the IC then the logic behind the circuit is able to operate giving us the desired output.

Integrated Circuits:

When a circuit is integrated into a small chip it is known as an integrated circuit. They have input and output pins which then go to circuit and do the necessary computation. These are used in almost every modern circuits as there is a need for compact circuits and portable computers. So integrated circuits by integrating some commonly used circuits into a small chip are able to reduce the size of modern computers and make then more compact.

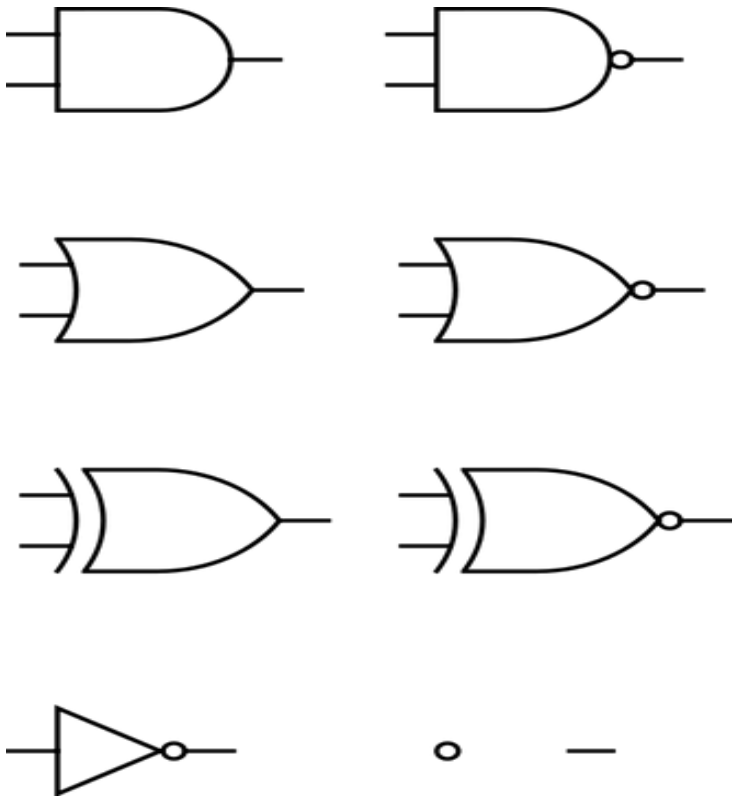

Fig 4.8 Logic gates

These circuits are mainly used for the computation of the logic. Every digital circuitworks on a logic and for this to work we use logic gates. There are many different logic gates and depending on the IC we use we are able to use different logic gates.

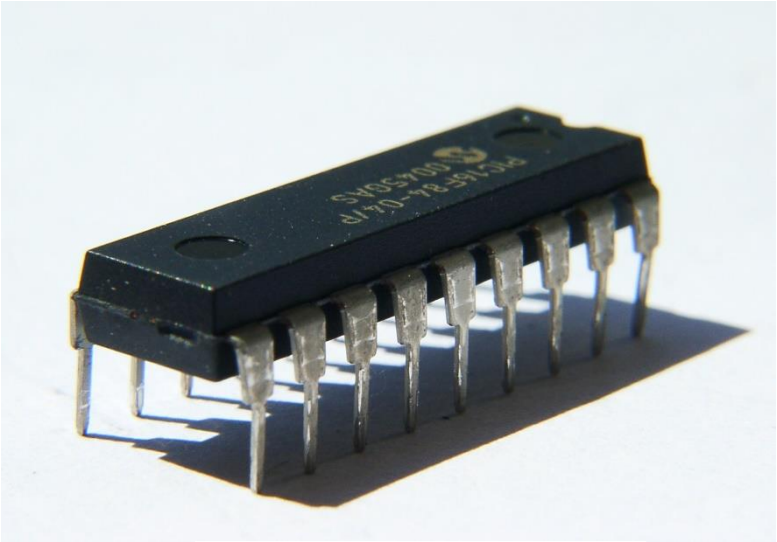

Fig 4.9 Integrated Circuits

The ICs that we are using are IC4069 and IC4081

IC4069 is completely comprised of NOT gates. There are six NOT gates in this IC and all of the gates are facing downwards. the pin 14 is given to the supply voltage and pin 7 is given to ground.

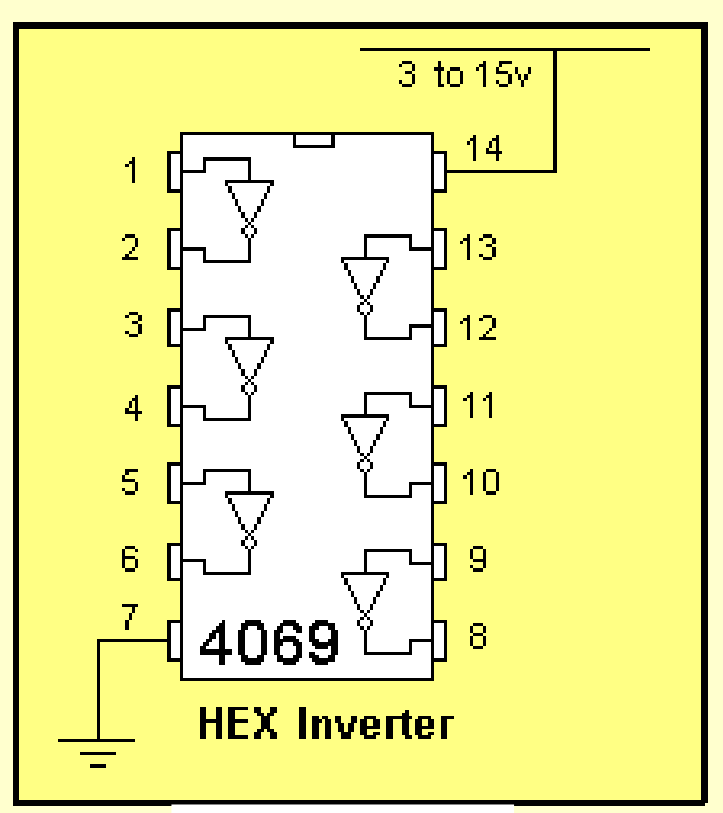

Fig 4.10 IC4069 Pinout

IC4081 is completely comprised of AND gates. This IC has four AND gates in which two of the gates are facing upwards and the other two of the gates are facing downwards. In this IC also the pin 14 is given to the power supply and pin 7 of the IC is given to the ground.

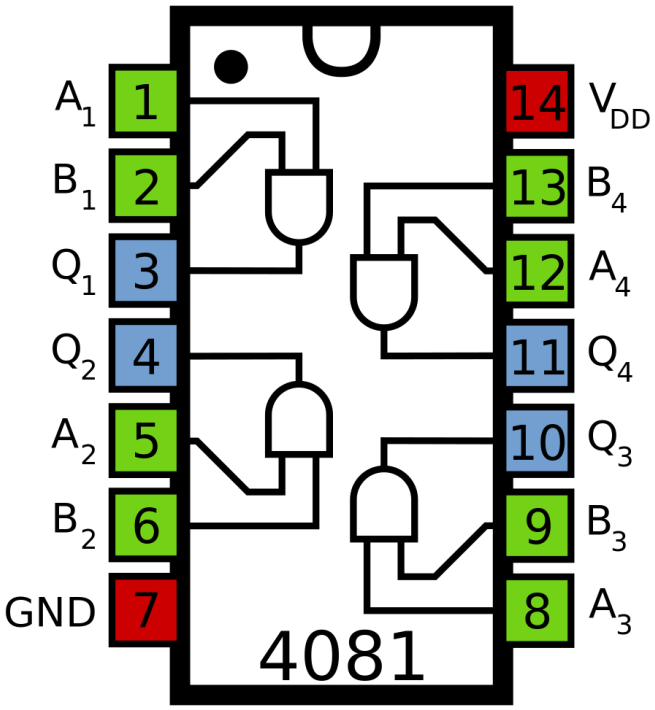

Fig 4.11 IC4081 Pinout

So according to our logic, we have one of the outputs of BJT given to the NOT gate so the output of one BJT is to be given to the pin 1 of the IC4069. The pin 2 of the IC4069 is the output of the NOT gate and this is to be given to the AND gate input ie. pin 1 of IC4081. The second BJT output must be given to the another AND gate input. So the second BJT input is given to the pin 2 of IC4081 This output from the pin 3 of IC4081 is then given to the buzzer and LED so that it will buzz and light up when the necessary logic is met.

Light Emitting Diode:

The light emitting diode (LED) is a p-n junction also called a diode that is able to emit the heat energy in terms of light. A diode is nothing but a combination of doped semiconductors. There are mainly two types of doped semiconductors, the N type and the P type. N type is formed when Silicon (Si) or Germanium (Ge) is doped with pentavalent elements like Phosphorous (P) , Arsenic (As) or Antimony (Sb). P type semiconductor is formed when Silicon (Si) or Germanium (Ge) is doped with trivalent elements like Boron (B), Gallium (Ga) or Aluminum (Al).

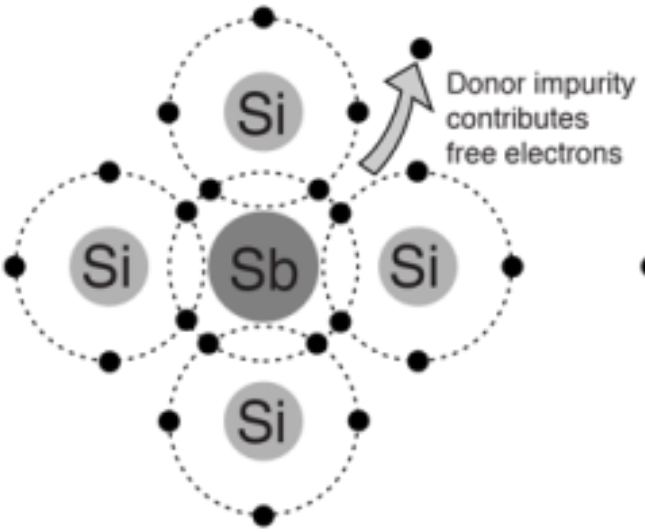

Fig 4.12 N-type semiconductor

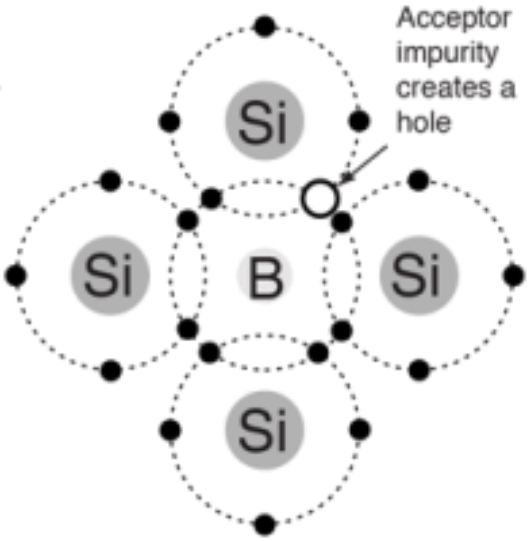

Fig 4.13 P-type semiconductor

When you put a N type semiconductor and a P type semiconductor end to end or back to back of each other then a P-N junction is formed. This is also called a diode. A diode allows the passage of current in only one direction. So it has a very low resistance in one direction and a very high resistance in the other direction. That implies that the LED does not glow in one direction and glows in the other.

Fig 4.14 Light Emitting Diode

In our project we use the LED as the confirmation for the logic if the condition is satisfied or not. That is if a tall person passes then the light does not glow. If a person of a height that is shorter than the required height then the logic is triggered and the LED turns ON.

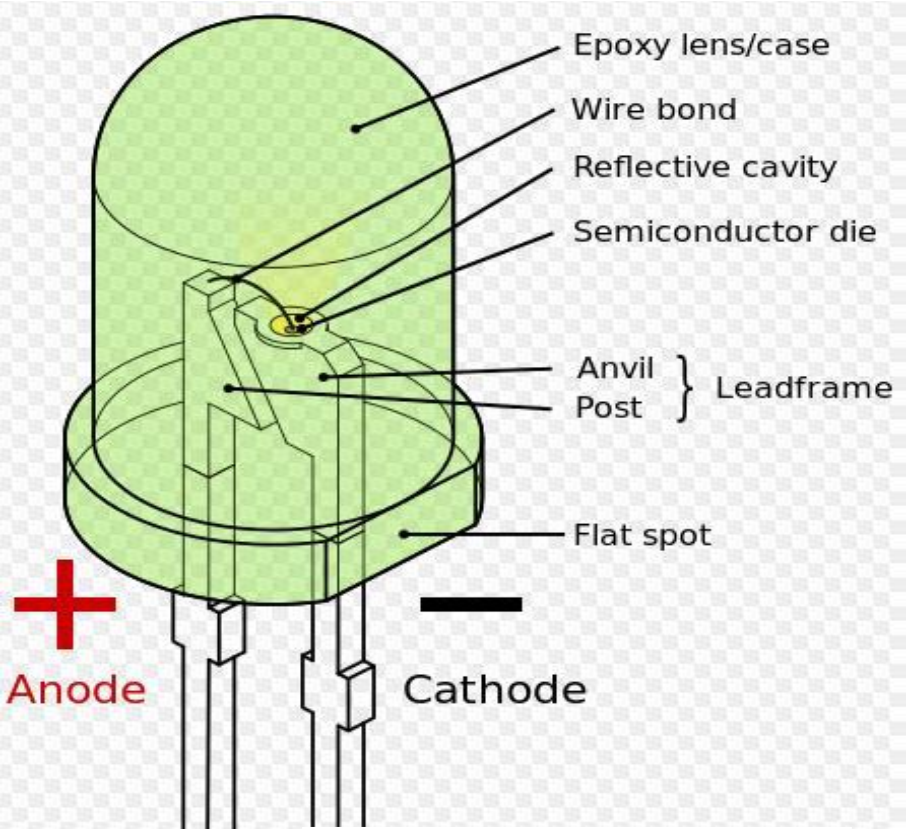

Fig 4.15 Internal labeling of LED

Buzzer:

A Buzzer is a device that gives a high frequency sound when some voltage is applied across its terminals. The minimum voltage required to turn this buzzer ON is 5 V. This buzzer has a fixed frequency i.e. around 2300Hz.

Fig 4.16 Active buzzer

In our project, we use the buzzer for the same purpose as our LED, to indicate the working logic of the project. That is, when a tall person goes by or the required height is met, nothing happens. But when a short person goes by then the buzzer starts ringing indicating the same.

Solid Wires:

Wires are strands of metal, usually made of copper. The job of the wires is to let the electrons pass through one point to another. That means, wires are responsible for the overall conduction of current in the circuit. Wires are of two types, stranded and solid. Stranded wires have a lot of smaller wires wound together covered by an insulation whereas the solid wire is one thicker strand of metal elongated and that is covered by an insulation. Different types of wires can be used for different applications of the project. In our project we will be using the solid wire, as it is more suitable for our project. Solid wires are used when the wires do not move around a lot as they have a higher chance of breaking easily when they are moved around a lot. As our project is a stationary one and a lot of moving around is not involved, we use the solid wire.

Fig 4.17 Types of wire

In our project model the wires are used for giving the power supply, turning the Bipolar Junction Transistor ON and OFF, sending the ON and OFF signals from the Bipolar Junction Transistor to the Integrated Circuits and also the logical output from the Integrated Circuits to the buzzer and Light Emitting Diode so that it can indicate the right output.

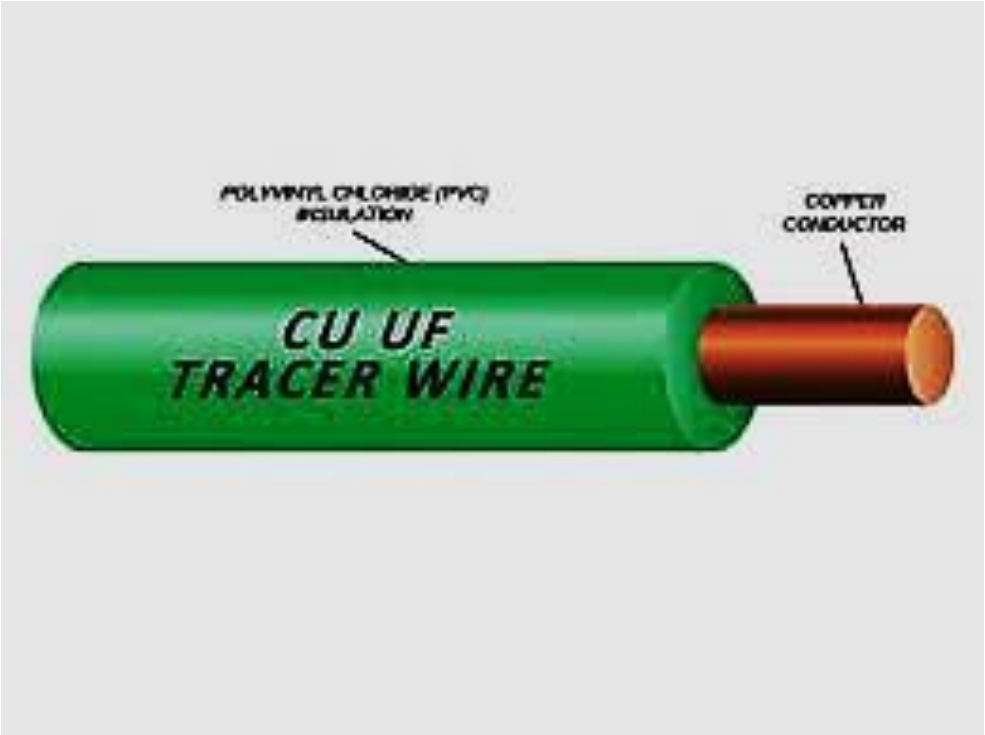

Fig 4.18 Internals of wire

Power Supply:

To power to our system, we give a 18V power supply connecting two 9V cells in series to each other. A cell is a device that is used to generate a potential difference or a voltage difference across the circuit. A chemical reaction happens inside the circuit to generate this potential difference. Hence a cell converts potential energy into electrical energy.

Fig 4.19 9V battery

When there are two metals and they are immersed in an electrolytic solution then the metal which is more reactive has the tendency to get dissolved in the solution give off positive ions which leaves the electrons on the metal plate. Hence the metal that is more reactive gets negatively charged. The less reactive metal plate has the tendency to attract the positive charges that are dissociated in the electrolytic solution. Hence the positive charges start to get accumulated on the less reactive plate. Therefore the less reactive plate gets an overall positive charge. When these positive and negatively charged plates are connected to the terminals of the circuit then they develop a potential difference across the circuit. In this way the cell is able to convert the chemical energy into electrical enegy.

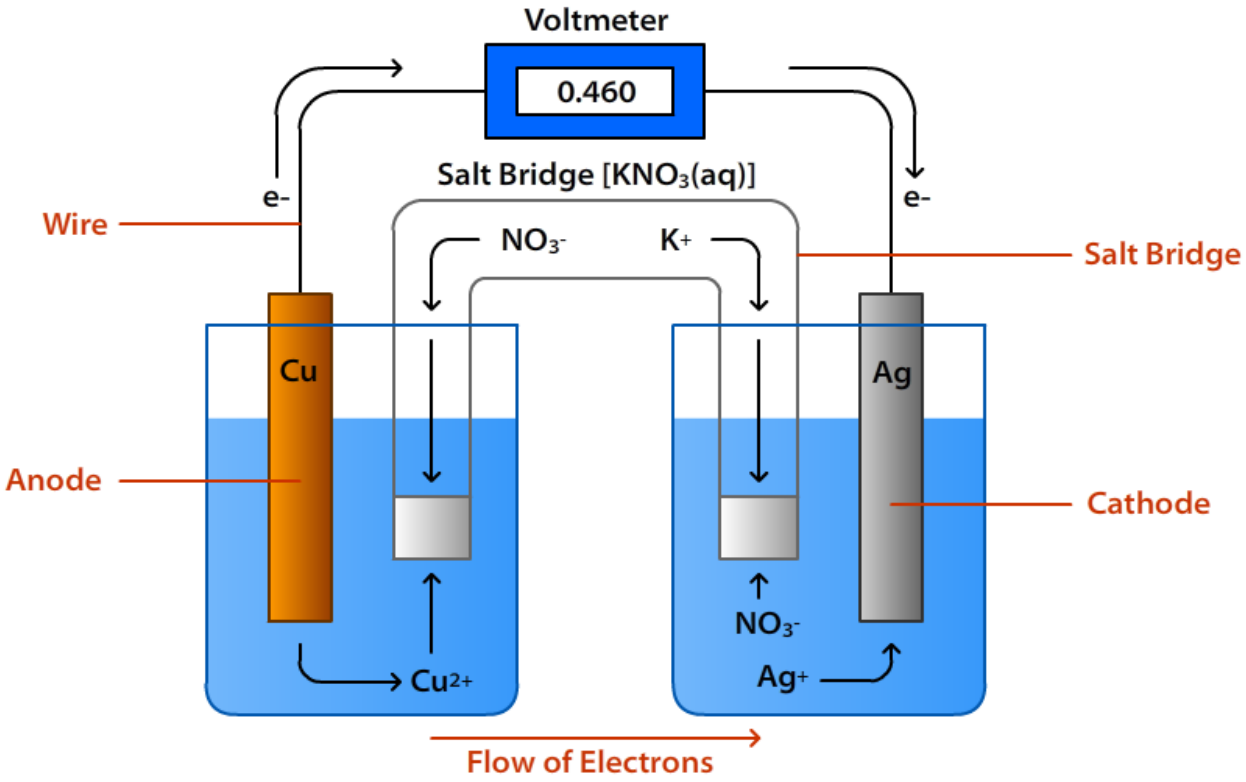

Fig 4.20 Voltaic cell working

Chapter 5

RESULTS AND DISCUSSION

The mini project model was completed within the due date and was submitted to the reviewer for approval. The model is now capable of sensing the presence of any object in the doorway and alerting if the person does not meet the required height.

This model can be used in large scale in amusement parks to stop people who does not meet the minimum height requirement from entering certain rides.

All teammates are now clear with the concept of working of BJT as a switch and also the working of certain gate ICs.

The model is now only done with a buzzer to indicate the person with short height but this can be replaced by a relay , timer and a motor to create a door mechanism that only opens when the person meets the required height .

Chapter 6

CONCLUSION AND FUTURE SCOPE

The Height Based Entry System can be used for a applications by configuring it in different ways. Thus it has a lot of scope for the future. It can be used in amusement parks to not let under height children riding on some risky rides. Also in swimming pools where there are deep pools so that people with a shorter height could not pass as it could be dangerous for them. If we tweak with the configuration of the setup a little bit it can be used to detect overheight trucks in highways to prevent them from crashing into a lowly setup bridge. Similar application can be found out also by adding a little more lasers and sensors and also changing the logic according to the required need.

References

[1] M. A. Massoud. “Over-height Vehicle Detection System in Egypt,” in Proceedings of the World Congress on Engineering 2013 Vol II, WCE 2013, July 3 - 5, 2013, London, U.K.

[2] Hanchey, C. M. and Exley, S. F. “Overheight Vehicle Warning Systems in Mississippi.” ITE Journal, 60(6), 24-29, 1990.

[3] Richard B. Hurley. “The Role of Transistors in Electronics,” in Journal of the SMPTE, Volume: 66 , Issue: 6 , June 1957, 0361-4573.

[4] Ali Habeb Aseeri, Fouzeyah Rajab Ali. ”Bipolar Junction Transistor as a Switch,” in IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) e-ISSN: 2278-1676,p-ISSN: 2320-3331, Volume 13, Issue 1 Ver. I (Jan. – Feb. 2018), PP 52-57.