DESIGN AND CONSTRUSTION OF ELECTRONIC GUIDE OF A BLIND PERSON

BY

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(EE/08/1732)

A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING, SCHOOL OF ENGINEERING AND ENGINEERING TECHNOLOGY, MODIBBO ADAMA UNIVERSITY OF TECHNOLOGY YOLA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF ENGINEERING.

DECEMBER, 2012

DECLARATION

I hereby declare that this project report was written by me and it is a record of my own research work. It has not been presented before any previous application for a bachelor's degree. References made to be published literature have been duly acknowledged.

………………………………… Date…………………………………

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The above declaration is confirmed

………………………… Date…………………………….

Mal. Rilwan Usman

(Supervisor)

CERTIFICATION

This project entitle "Design and construction of Electronic Guide for a Blind Person" by Ahmed M.B Yaro (EE/08/1732) meet the regulation of governing the award of the bachelor's degree of Modibbo Adama University of Technology, Yola and is approved for its contribution to knowledge and literary presentation.

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Mal. Rilwan Usman

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………………………………… Date………………………………….

Prof. E.E Omizegba

(External examiner)

DEDICATION

This project is dedicated to my parent, for their support during my project.

ACKNOWLEDGMENTS

I must begin by expressing my appreciation to Almighty Allah for his mercies, kindness and protection. To Alhaji Mohammed Buba and Aminatu Mohammed Buba for their parental support and advice.

Appreciation goes to the H.O.D, lecturers and staffs of electrical and electronics engineering department, for the knowledge imparted and advice in one way or the other.

My gratitude also goes to my able supervisor; Malam Rilwan Usman who inspite of his numerous engagements, was able to provide good training and valuable suggestions. His guidance and encouragement has contributed immensely.

Appreciation also goes to my colleague and all of my friends.

ABSTRACT

Mobility for the blind is always a great problem. Just like a sighted, blind also needs to travel around inside a closed premises like house, factory, office, school etc. The conventional walking stick employed by the visually challenged people is actually not efficient to detect the object in front of the user. They can only detect the object that is being hit by the walking stick. A walking stick for the visually challenged people using the infrared distance sensor will become a great help to them because this kind of walking stick is able to detect the object in the specific range. In this project the distance range used is 1cm to 25cm. When an object is detected, sound alarm from a buzzer will alert the user about the object and the person can avoid the object safely without hitting the object. As the distance of the object and the user is closer, the loudness of the buzzer is increasing. The user is able avoid the obstacles better using the newly designed walking stick.

TABLE OF CONTENTS

Chapter two : Literature Review

Chapter three: Design and Construction Procedure

Chapter four: Performance and Cost Evaluation

Chapter five: Conclusions

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION

1.0 BACKGROUND

The lacking of visual perception due to the physiological or neurological factors is known as blindness. According to the world health report, about 314 million people are visually impaired; among them, 45 million are blind. This means approximately 45 million people are depended on other humans for movement, information processing and environmental interpretation due to the blindness [1,2].

Mobility aids like walking stick and guide dogs are still used by the blind even today .With the advancement of technology, some different types of electronic travel aid have been developed to support the mobility of the blind. Most of the commonly used electronic travel aids use ultrasound. All such devices use the principle of reflection of the high frequency ultrasonic beam, and are available in different models. The most widely used primary mobility aid today is the long cane or a walking stick. Various types of canes have already been developed to aid the blind solve many problems for a safe navigation like white cane [3],

1.1 STATEMENT OF PROBLEM

The disabled in our society encounter a lot of difficulties in the running of their day life because of obstructacles along their ways.

1.2 OBJECTIVE OF THE PROJECT

This project looks at the difficulties encountered while walking by the blind while moving about in a word full of obstructions. Traditionally, the blind have the option of using a human guide or an animal as a guide. Due to the development of modern technologies, many different types of devices are available to assist the blind [4].

The two options are not economical. This makes the electronic obstruction detector a better and cheaper for a blind person.

1.3 SIGNIFICANCE

The goal of Blind Aid project is to develop navigational assistance technology for the blind or visually impaired. The infrared obstacle detector has been extensively helpful, in particular for crossing intersections. This system uses directional infrared transmitters mounted on the the stick.

1.4 SCOPE OF THE STUDY

This project write up is based on the design and construction of obstacle detector which can be used by the blind while moving about. The device range can be set from a couple of cm to about 25cm.

CHAPTER TWO: LITERATURE REVIEW

2.0 BRIEF HISTORY OF INFRARED RADIATION

The discovery of infrared radiation is ascribed to William Herschel, the astronomer, in the early 19th century. Herschel published his results in 1800 before the Royal Society of London. Herschel used a prism to refract light from the sun and detected the infrared, beyond the red part of the spectrum, through an increase in the temperature recorded on a thermometer. He was surprised at the result and called them "Calorific Rays". The term 'Infrared' did not appear until late in the 19th century. [5]

In 1847, Armand Fizeau and Jean Foucault of France showed that infrared radiation, although invisible, behave similarly to light in its ability to produce the interference effect. 1959-1961: Harold Johnson builds the first near-infrared photometers covering the R, I, J, K and L bands. This extends infrared research out to a wavelength of 4 microns. Johnson and his team measure thousands of stars in these new near infrared bands, providing useful information on the radiation from cool stars. Johnson defines the first infrared magnitude system. 1983: IRAS (Infrared Astronomical Satellite) is launched. For ten months IRAS scans more than 96 percent of the sky four times, providing the first high sensitivity all-sky map at wavelengths of 12, 25, 60 and 100 microns. IRAS doubles the number of cataloged astronomical sources by detecting about 500,000 infrared sources. IRAS discoveries included a disk of dust grains around the star Vega, six new comets, and very strong infrared emission from interacting galaxies, as well as wisps of warm dust called infrared cirrus which could be found in almost every direction of space. IRAS also reveals for the first time the central core of our galaxy, the Milky Way. 1989: NASA launches the Cosmic Background Explorer (COBE) in November 1989, to study both infrared and microwave characteristics of the cosmic background radiation (the remains of the extreme heat that was created by the Big Bang). Over the next four years, COBE maps the brightness of the entire sky at several infrared wavelengths and discovers that the cosmic background radiation is not entirely smooth, showing extremely small variations in temperature. These variations may have led to the formation of galaxies. 1995: The Infrared Telescope in Space (IRTS), launched in March 1995, is Japan's first infrared satellite mission. During its 28 day mission, IRTS surveys about 7% of the sky with four instruments. This data adds to our knowledge of cosmology, interstellar matter, late type stars and interplanetary dust. 2001: The Keck Interferometer began operations in 2001. The Keck Interferometer is part of NASA's overall effort to find planets and ultimately life beyond our solar system. It will combine the light from the twin Keck telescopes to measure the emission from dust orbiting nearby stars, directly detect the hottest gas giant planets, image disks around young stars and other objects of astrophysical interest, and survey hundreds of stars for the presence of planets the size of Uranus or larger. 2010: The James Webb Space Telescope, planned for launch in about 2009, is a visible/infrared space mission which will have extremely good sensitivity and resolution, giving us the best views yet of the sky in the near-mid infrared. NGST will be used to study the early universe and the formation of galaxies, stars and planets. TPF (Terrestrial Planet Finder), scheduled for launch in about 2011, is envisioned as a long baseline interferometer space mission. 2012: TPF will concentrate on detecting terrestrial planets (small and rocky planets - like Mercury, Venus, Earth and Mars) orbiting nearby stars. By studying near infrared spectral lines, astronomers will also detect several molecules which may provide indications of whether the planets can sustain life. Infra-red radiation is generally associated with heat because heat is its most easily detected effect. Most material, in fact readily absorb infra-red radiation in a wide range of wavelengths, which causes a increase in the temperature of the materials. Objects with a temperature greater than about zero emit infrared energy and even incandescent object usually emit far more infra-red energy than visible radiation, about 60% of the sun’s rays are infra-red.

Infrared (IR) light is electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 0.74 micrometres (μm) to 300 μm. This range of wavelengths corresponds to a frequency range of approximately 1 to 400 THz, and includes most of the thermal radiation emitted by objects near room temperature[6,7].

Much of the energy from the Sun arrives on Earth in the form of infrared radiation. Sunlight at zenith provides an irradiance of just over 1 kilowatt per square meter at sea level. Of this energy, 527 watts is infrared radiation, 445 watts is visible light, and 32 watts is ultraviolet radiation.[8]

2.1 APPLICATIONS OF INFRARED RADIATION

Infrared imaging is used extensively for military and civilian purposes. Military applications include target acquisition, surveillance, night vision, homing and tracking. Non-military uses include thermal efficiency analysis, environmental monitoring, industrial facility inspections, remote temperature sensing, short-ranged wireless communication, spectroscopy, and weather forecasting. Infrared astronomy uses sensor-equipped telescopes to penetrate dusty regions of space, such as molecular clouds; detect objects such as planets, and to view highly red-shifted objects from the early days of the universe. [9]

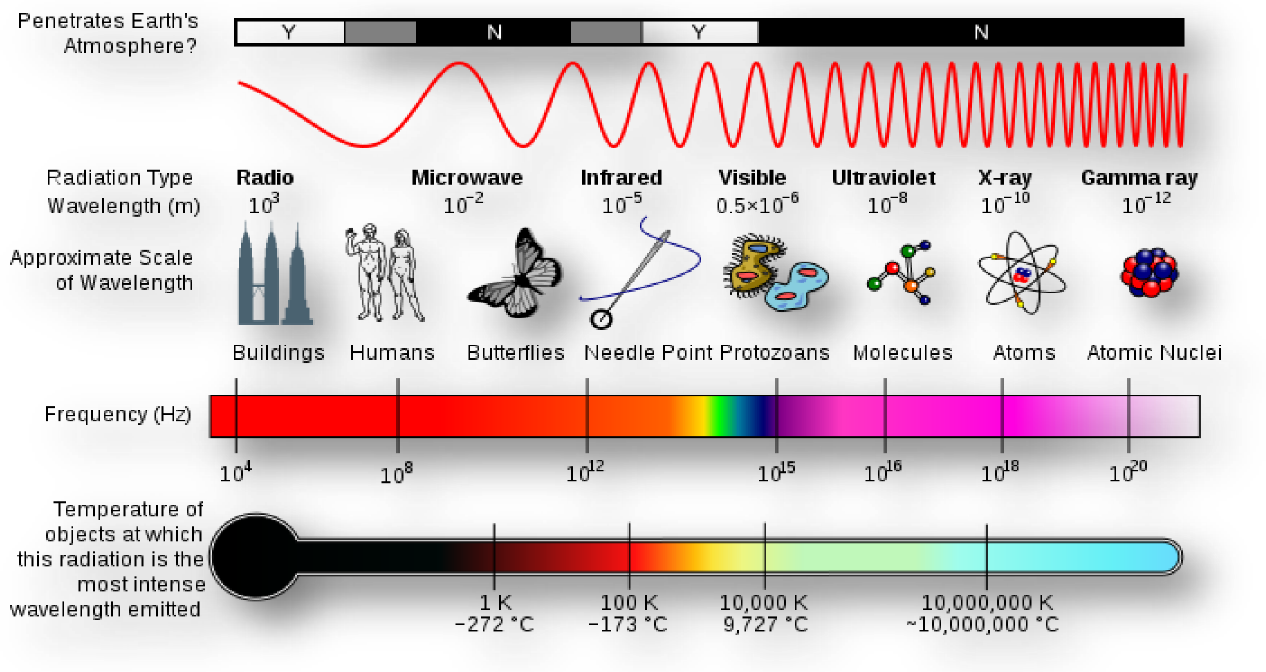

Fig 2.1 Electromagnetic spectrum.

Infrared light is used in industrial, scientific, and medical applications. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected. In astronomy, imaging at infrared wavelengths allows observation of objects obscured by interstellar dust. Infrared imaging cameras are used to detect heat loss in insulated systems, observe changing blood flow in the skin, and overheating of electrical apparatus. Humans at normal body temperature radiate chiefly at wavelengths around 12 μm (micrometers), as shown by Wien's displacement law. At the atomic level, infrared energy elicits vibrational modes in a molecule through a change in the dipole moment, making it a useful frequency range for study of these energy states for molecules of the proper symmetry. Infrared spectroscopy examines absorption and transmission of photons in the infrared energy range, based on their frequency and intensity. [10]

2.2 STAGES OF OBSTRUCTION DETECTOR

Ifrared signal sender the active infrared sensors use invisible light to scan a defined area. In active infrared systems, there are two-piece elements which are consisting of an infrared transmitter and an infrared receiver. There is a 3/8 inch infrared beam between the transmitter which is placed on one side of the trail and the receiver which is placed on the other side of the trail. The transmitter emits a beam of light into the scan zone. The light, which is reflected by the background returns to the receiver, which constantly monitors the scan zone. When a person or object enters the zone the infrared light is interrupted. It then sends a signal to the controller system. One variation of this operating mode is called ‘background suppression;[11]

For the infrared transmitter which is also known as emitter circuit, it is on a basic design of timer 555 astable operation. The output of timer is connected to the infrared transmitter is used to produce pulse using an astable timer circuit. In astable circuit operation, pulse will continually generated until the power supplied through the circuit is removed. The astable circuit produces a continuous train of pulses at any frequency required. This means that the 555 timer can operate repeatedly; it will switch ‘on’ and ‘off’ continually to generate data for the infrared transmission.[11]

Infrared receiver chips are available at 36 kHz, 38 kHz, and 40 kHz. The receivers are sensitive to oscillations several kilohertz to either side, although reception distance improves with a better signal to start with. If used for object detection, the signal needs to travel the distance to the object, bounce off the object, and then travel the distance back to the receiver. So, distance becomes a factor. Because infrared receivers amplify the signal to improve detection, electrical noise generated from the oscillator can leak into the receiver and trigger a false detection. This isn't a problem for VCRs or most consumer devices as they tend to contain either a transmitter (remote control) or a receiver (CD player), but not both. Therefore, robot transmitter and receiver circuits must be carefully designed and positioned apart to be useful. Robots that chase electrical ghosts, spin in place, or jerk sporadically are initially amusing but eventually frustrating. The lower the power of the circuit, the more likely it will be lower in noise. Also, liberal use of decoupling capacitors and metal shielding helps a lot. Greater distance between the circuits makes an enormous difference. [11]

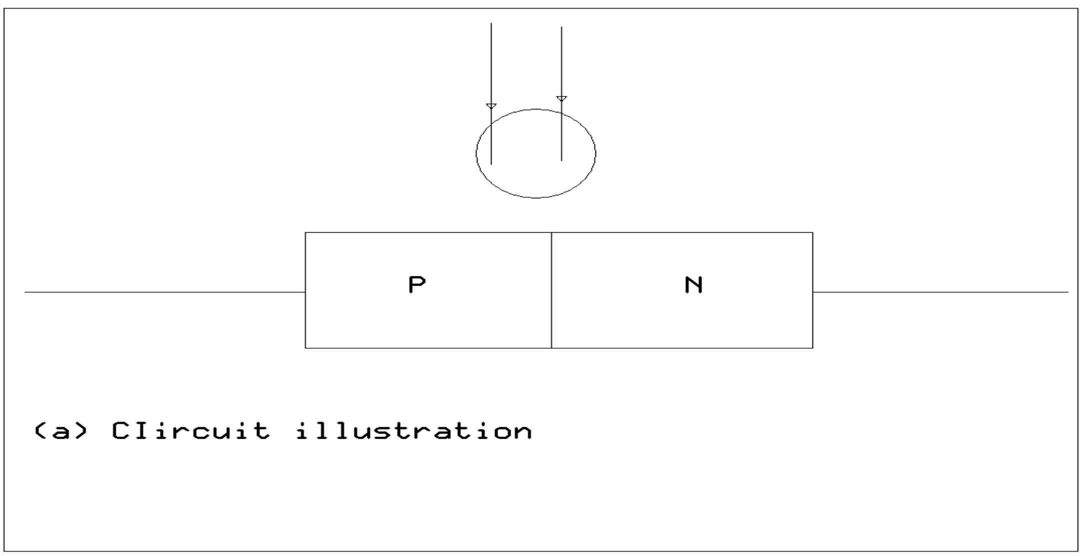

Fig 2.2

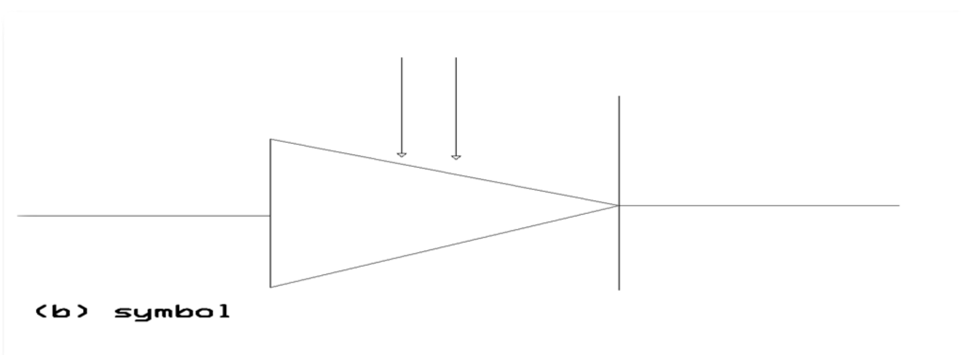

Fig 2.3 Photo diode

The signal amplifier used in this project is an operational amplifier. Its vary high gain direct couple negative feedback amplifier which can amplifier signal having frequency ranging from 0HZ to a little beyond 1MZ. The are made with different internal configuration in linear IC’s. Operational amplifier was first found in U.S. Patent 2,401,779 "Summing Amplifier" filed by Karl D. Swartzel Jr. of Bell Labs in 1941. This design used three vacuum tubes to achieve a gain of 90 dB and operated on voltage rails of ±350 V. It had a single inverting input rather than differential inverting and non-inverting inputs, as are common in today's op-amps. Throughout World War II, Swartzel's design proved its value by being liberally used in the M9 artillery director designed at Bell Labs. This artillery director worked with the SCR584 radar system to achieve extraordinary hit rates (near 90%) that would not have been possible otherwise. [13] Operational amplifiers have very high gain dc-coupled differential amplifiers wih single ended outputs, with two inputs and a single output. Real operational amplifier have much higher gain (typically I 0 to 106) and lower output impedance and allow the output to swing through most of the supply range. Operational amplifiers are now available in literally hundreds of types. An operational is amplifier shown below

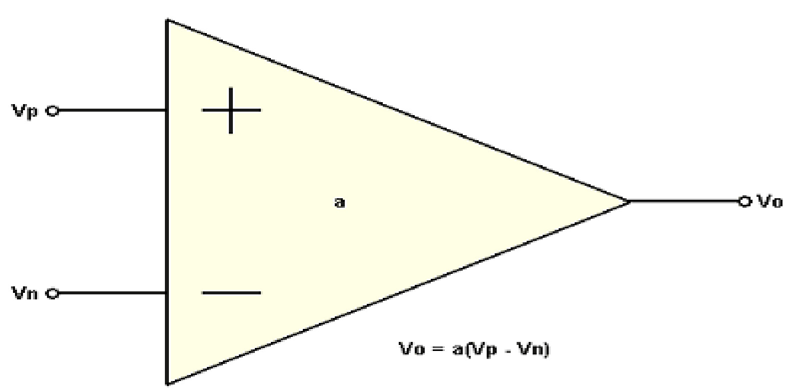

Fig. 2.4 (a) Operational Amplifier

With the universal symbol shown in the figure above, where the (+) and (-) inputs do expected: the output goes positive when the noninverting input (+) goes more positive then the inverting input (-), and vice versa. Examples of operational amplifier are the LM 741/Lf 411 which has a pin connection as shown below. [13,14]

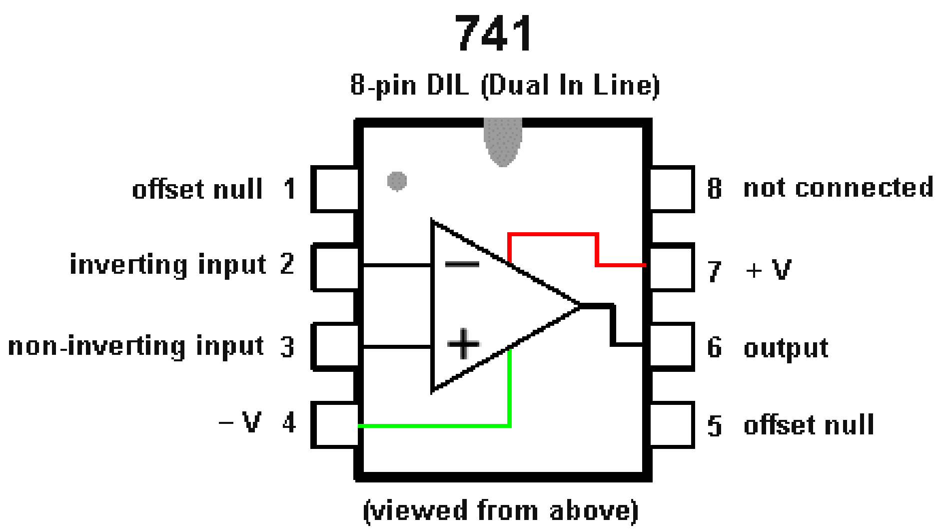

Fig. 2.5 LM 741

Inside the LM741/ LF411 is a piece of silicaon containing 24 transistors (21 BJTs, 3 FETs), 1 1 resistors and one capacitor. The dot in the corner, or notch at the end of the package, identifies the end form which to begin counting the pin number. The “Offset Null” terminals (also known as “balance” or “trim”) have do with connecting (externally) the small asymmetries that are unavoidable when making the operational amplifier. The basic operational amplifier circuit is inverting amplifier and non inverting amplifier. The operational amplifier used in the circuit is inverting amplifier shown in the figure below.[13,14]

Comparator it is a circuit which compares two signals or voltage levels, When a given signal exceeds a predetermined value. So comparators compares signal in the circuit. The simplest form of comparator is a high gain differential amplifier, either transistor or with an operational amplifier. The operational amplifier can be used as comparator (and frequently is,) are special integrated circuits intended for use as comparator, some examples are LM 306, LM 311, LM 393, NE 527 and TLC 372, separate IC comparator unit are suitable. Some of the improvements built in the comparator IC are faster switched between the two output levels, but in noise immunity to prevent the output oscillating when the input passes by the reference level, and the output capacitor directly driving a variety of loads. While in general comparators are "fast," their circuits are not immune to the classic speed-power tradeoff. High speed comparators use transistors with larger aspect ratios and hence also consume more power. Comparators generally have mode flexible output circuit than operational amplifier. Whereas an ordinaiy operational amplifier uses a push-pull output state swing between the supply voltages, a comparator chip usually has an “open-common” output with grounded emitter. Some point to remember on comparator:

(a) Because there is no negative feedback, the inputs are not at the same voltage.

(b) The absence of negative feedback means that the (differential) impedance is not bootstrapped to the high value characteristics operational amplifier circuit. As a result, the input signal sees a changed load and changing (small) input current as the comparator switches, if the driving impedance is too high, strange things may happen.

(c) Some comparator permit only limited differential input swings, as little as ±5 Volt in some cases.[13,14]

CHAPTER THREE: DESIGN AND CONSTRUCTION PROCEDURE

3.0 INTRODUCTION

This section gives the design and calculation of component values. It also deals with analysis of static and dynamic signals conditions. Chapter 3 focuses on the methodologies for the development of the electrical structure and the implementations. It gives a brief review on the concept of active infrared detector, the electrical structure for hardware development system.

3.1 BLOCK DIAGRAM

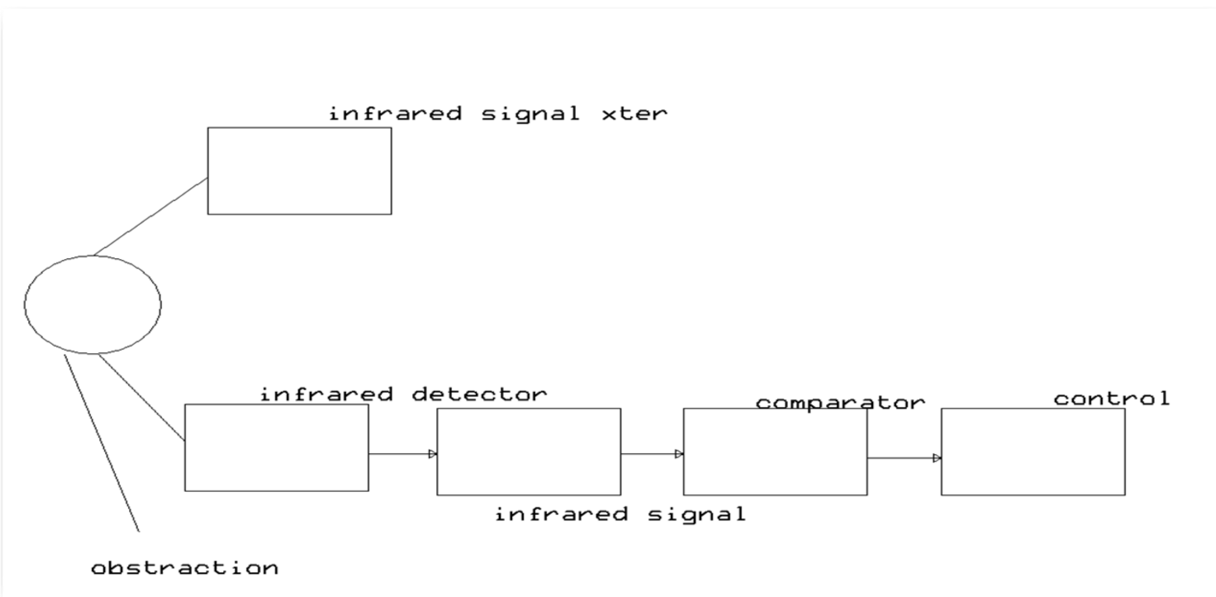

Fig. 3.1

3.2 THE SENDER

When the circuit is first turned on, the discharge pin is disconnected from ground and output pin is set high because the trigger pin is below 33% Vcc Voltage. The capacitor, C, starts to charge through resistors R1 and R2. The threshold pin is used to detect when the voltage across the capacitor reaches 66.6% Vcc voltage. When the voltage across the capacitor reaches 66.6% Vcc voltage, the output pin is set low and the discharge pin is connected back to ground. When the discharge pin is connected back to ground, the capacitor starts discharging though resistor R2. When the voltage across the capacitor reaches 33.3% Vcc voltage, the cycle repeats and creates a series of output pulses. An astable circuit triggers from previous output pulse whereas a monostable circuit requires an externally applied trigger. The output pin oscillates from high to low creating a series of output pulses. The duration the output pin stays high , t_{high}.

t_{high} = .693C (R1+ R2)

The duration the output pin stays low, t_{low}, is given below:

t_{low} .693CR2

The frequency, f, of the series of pulses is:

$f = {}^{1}/_{t1 + t2}$

$T = t_{low} + t_{high}$

$F = 1/T \quad = \quad 1.44/ (R_1 + 2 R_2) C_1$

Assuming frequency = 120Hz

$= \quad 1/T = 1.44/ (R_1 + 2 R_2) C_1$

If we use a typical value of capacitor $C_1 \quad = \quad 1\mu F$; then

$R_1 + 2R_2 = 1.44/ C_1F$

We assue a typical value for $R_1 = 10k\Omega$

Therefore, 2 R_2 = 1.44/1x10^{-6} 120 – 10 x 10^3

$2R_2$ = 1.44/0.00012-10000

$2R_2$ = 2000

$2R_2$ = 2000/2

Therefore, R_2 = 1kΩ

3.3 THE SIGNAL AMPLIFIER

The IC LM 741 operational amplifier is used as an amplifier of gain 1 x 10^{-6}

Where gain, G=R_4, thus R_4 = 1

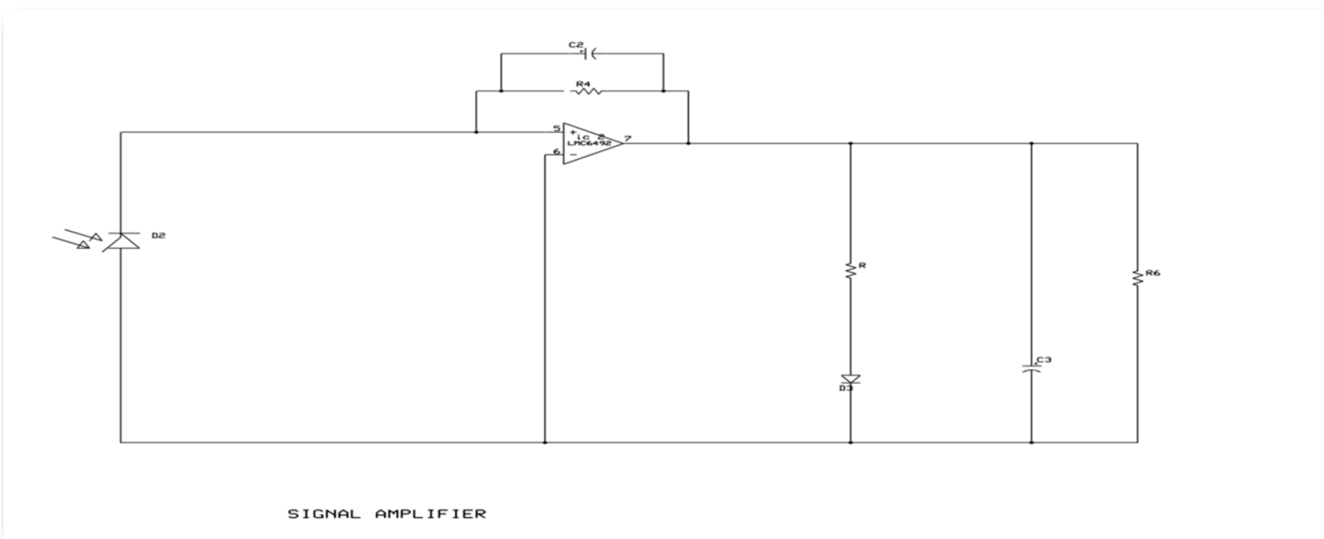

Fig. 3.2

At a frequency of 120Hz, Xc = $1/_{2\pi} \times 120Xc$

Since $X_c = {}^{1}/_{2\pi fc}$

At F, Xc <<R

$C_3 \quad = {}^{1}/_{2\pi fXc}$

For D.C blocking an Xc of about zero is needed.

Let Xc = 0.0001

$C_3 \quad = {}^{1}/_{2\pi \times 120 \times 0.0001}$

$C_3 \quad = 1\mu F$

D = IN 4148 for peak level detector

$C_4 \quad = C_3$ is for smoothing = $1\mu F$

3.4 INDICATOR

The light emitting diode (LED) indicator chosen has maximum voltage drop of 5V and allow a current of up to 10mA to flow through it successfully. The value of the resistor R can be calculated from the relation:

$R = {}^{Vo + Vdrop}/_{Iled}$

Where, Vo = 2V (assumed)

LED = 10mA

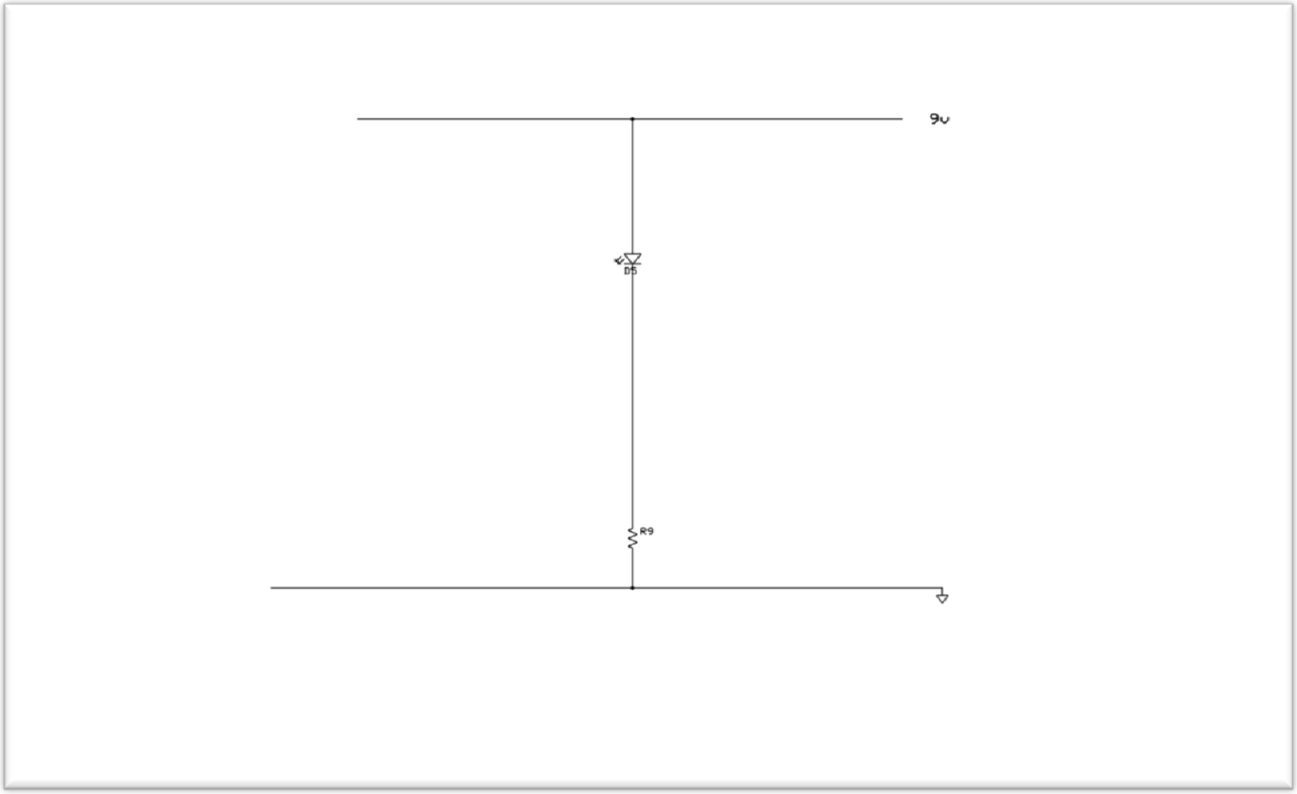

Fig. 3.3 Indicator

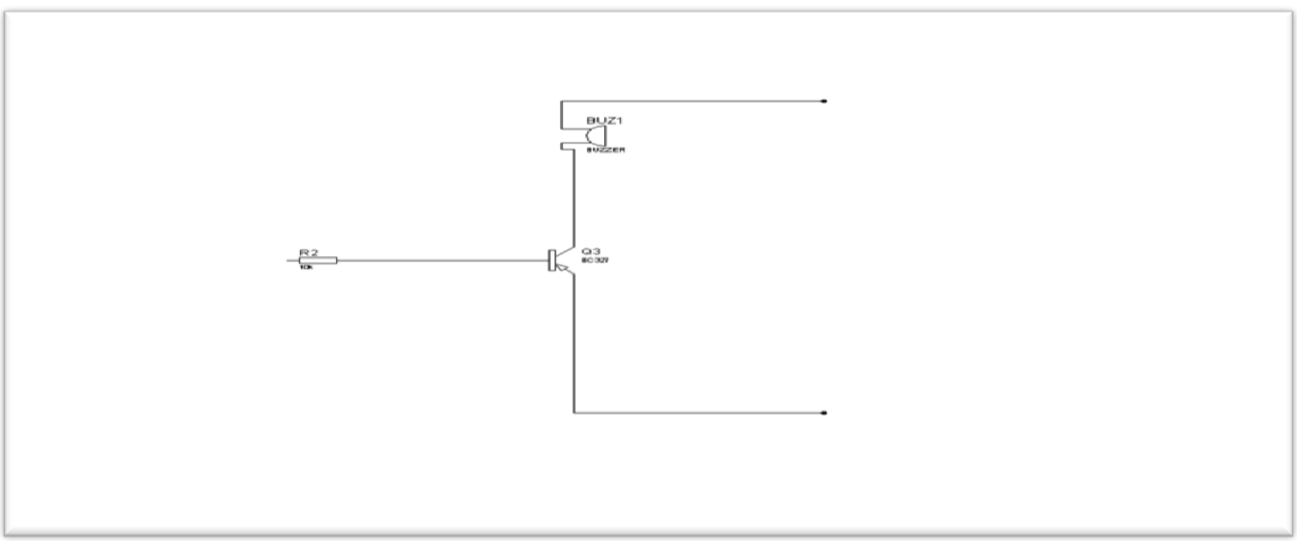

Fig 3.4 Switch circuit

A single state transistor amplifier is used as a switch to isolate or switch OFF the signal to the Loudspeaker when even the circuit detects an incoming GSM signal shown in fig 3.3.

3.5 CIRCUIT DIAGRAM

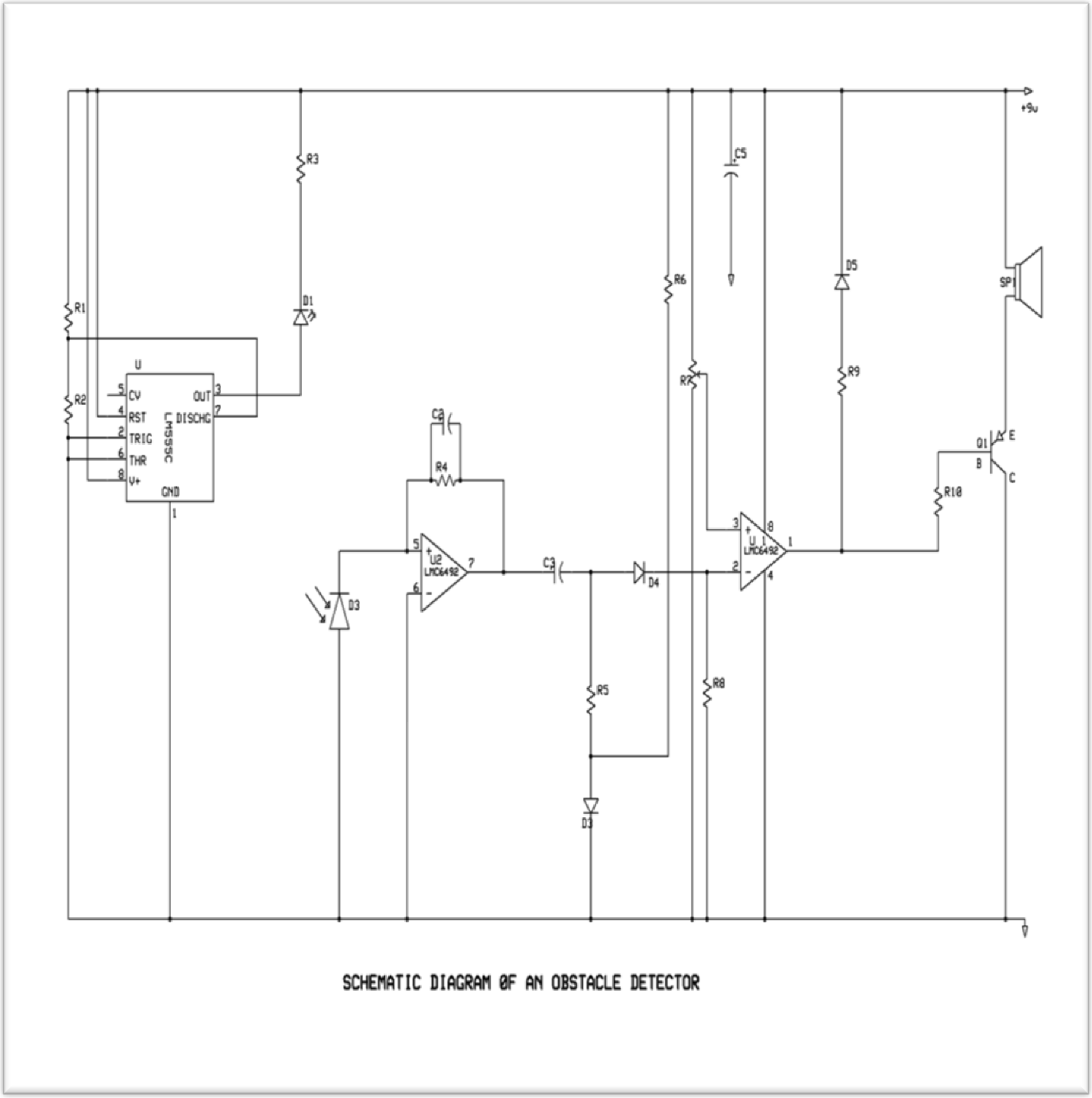

Fig 3.5 Circuit diagram

3.6 CIRCUIT OPERATION

From the fig 3.5 shown, IC_1 forms an oscillator driving the infrared LED by means of 0.8mS. Pulses at 120Hz frequency and about 300mA peak current. D_1 and D_2 are placed facing the target on the same line, a couple of centimeters apart on a short bread board strip. D_2 pick up infrared beam generated by D_I an reflected by the surface situated in front of it. The signal is amplified by IC_2A and peak detected by D_4 and C_4. Diode D_3, with R_s and R_6, components for the forward diode drop of D_4. A D.C voltage proportional to the distance of the reflecting object and D_1 and D_2 feeds the inverting input of the voltage comparator IC_2B. This comparator switches ON and OFF the LED and the buzzer via Q_1, comparing its input voltage to the reference voltage at its non - inverting input set by the trimmer R_7.

3.7 COMPONENT LIST

Table 3.1: Part List

S/NO	COMPONENT	DESCRIPTION	VALUE
1.	R_1	Resistor	10Ω
2.	R_2	Resistor	1KΩ
3.	R_3	Resistor	33Ω
4.	R_4	Resistor	1MΩ
5.	R_5	Resistor	1KΩ
6.	R_6	Resistor	1KΩ
7.	R_7	Resistor	10KΩ
8.	R_8	Resistor	1MΩ

9.	R_9	Resistor	1KΩ
10.	R_{10}	Resistor	22Ω
11.	C_1	Capacitor	1μF
12.	C_2	Capacitor	47PF
13.	C_3	Capacitor	100μF
14.	C_4	Capacitor	1μF
15.	C_5	Capacitor	100μF
16.	C_6	Capacitor	100μF
17.	D_1	Diode (Infrared)	Infra-red LED
18.	D_2	Photo Diode	Infra-red Photo Diode
19.	D_3	Diode	IN 4148
20.	D_4	Diode	IN 4148
21.	D_5	Diode	LED
22.	D_6	Diode	IN 4002
23.	D_7	Diode	IN 4002
24.	Q_1	Transistor	BC 327
25.	IC_1	Integrated Circuit	555 Timer
26.	IC_2	Integrated Circuit	LM 741
27.	BY	Battery	9V

3.8 CONSTRUCTION

The system was constructed based on the circuit diagram in Fig. 3.1. It was first set up on the bread board to ensure that it is functioning as required before to the next stage. This basically means the arrangement of component as connected on the Vero Board.

3.9 SOLDERING

The components were laid down on the Vero board with a closer follow up circuit diagram. Short circuits across the different sections of the system were avoided by using blade to demarcate the line connections of the circuit which perform different functions. Flexible wire were used as jumpers for obtaining the expected point - to point connection in the system's circuit for more reliability and maintainability. The integrated circuit (IC) used was mounted on IC socket which was soldered directly on the vero board. The purpose of using the IC base is to protect the IC from sudden damage that may occur as a result of heat that would be transferred directly to the leads if it were to be soldered directly on the board and there by destroying it. While use of IC base also result in a lower maintenance time since the change of damaged IC would not require desoldering the damaged one but only pulling out the damaged one from the IC socket an pushing (inserting) a new one into the socket.

3.10 CASING

Casing is a method of housing the design circuit for easy transfer of the circuit from a place to the other, and to guide against damage.

CHAPTER FOUR : PERFORMANCE AND COST EVALUATION

4.0 INTRODUCTION

In this chapter, results obtained from test procedure in chapter four are tabulated and their result discussed.

4.1 TESTING

The project was subjected to test at the end of the design during the test, the circuit was properly checked to ensure there is no fault soldering or solder bridge between the vero board rail having complete the construction and the following checks were also observed: Its performance characteristics with respect to specification. To ascertain whether the board has fault either short or open circuit.

The sensitivity of the circuit depends on the reflectivity of the surface because different substances have different reflectivity and penetration at infra-red levels. Below is relative reflectivity of common obstruction detected.

i. Paper - highest reflectivity

ii. Metal- medium reflectivity

iii. Organic compound lowest reflectivity

iv. Black colour substance no reflectivity.

4.2 RESULTS

Table.4.1

S/NO	OBSTRUCTION DISTANCE (CM)	PIN 7 K2 (V)	LED STATUS	BUZZER STATUS
1.	50cm	0.01	OFF	OFF
2.	25cm	3.0	ON	ON
3.	12cm	5.6	ON	ON
4.	7cn	7.2	ON	ON

The result in the table shows above that the strength of voltage delivered at the output of IC_2B depends on the distance of the obstruction to the sensors. The LED status shows that within the preset distance of 1 cm 2cm obstruction can be detected. The buzzer status also reflects the status of detection. Overall, the results allow that the circuit is performing the basic function of detecting obstruction.

4.3 COST EVALUATION

Table 4.2

S/N0.	COMPONENT	DESCRIBTION	UNIT	RATE (per unit) naira	AMOUNT (naira)
1	Resistors	10 ohm	2	10	20
2	Resistor	1k ohm	4	10	40
3	Resistor	33 ohm	1	10	10
4	Resistor	1M ohm	2	10	20
5	Resistor	22 ohm	1	10	10
6	Capacitor	100µf	3	30	90
7	Capacitor	1µf	2	30	60
8	Capacitor	47pf	1	30	30
9	Diode	(2)IN4002,	5	150	750
10	Diode	Photo diode (infrared photo)	1	250	250
11	Diode	Led	1	10	10
12	Transistor	BC 327	1	100	100
13	Integrated circuit	555 Timer. ,LM 741,(one each)	2	200	400
14	Battery	9V	1	70	70

15	Vero board		1	150	150
16	Break board		1	400	400
17	TOTAL AMOUNT				2560

CHAPTER FIVE: CONCLUSIONS

5.0 SUMMARY

There are five chapters discussed in this project which are the concept of obstacle detector for a blind person, the hardware development, and the designed system. Each part of these elements is related to each other. The understanding of the concepts and methods on developing the project is very important to achieve the main objective for the whole project.

This project aims at the development of an electronic device to aid in the independent mobility of blind persons. In this project an electronically guided walking stick that can be used conveniently inside a closed premises.

5.1 CONCLUSIONS

This device is very simple, low cost and easy to use. It can be conveniently used inside a closed premises specially organized with the transmitters. In a closed premises like school building blind students can move simultaneously and independently. If require the receiver may also be fitted inside the shoe and thus eliminating the requirement o f the external stick The transmitter that is used in this device will not interfere with the local radio communication system due to its low power output. More over the carrier frequencies may be properly chosen to avoid any interference with the local radio communication system. To conclude, we would like to say that engineering does not just stop at gaining knowledge and innovating, it ends when you are able to use that knowledge for the benefit of your fellow human beings.

As the saying goes, “If engineering is the application of science for human benefit, then the engineer must be a student of not only the application of science but of human benefit as well.”

5.2 RECOMMENDATION

But all systems are focused on one particular problem and require the blind to carry a device along, difficulty in using, training the blind first to understand the outputs and give inputs. This sensor that helps the blind person in obstacle detection only. But it does not help them face all their navigation problems. But there is no system so far that integrates the solution to all their problems, wherever they go, considering their ease to handle it. Further improvement should not be ruled out, as this may give more and latest review of this work.

Further studies can lead to development of a universal obstruction detector before modifying the detector to measure the levels of infra-red ray detector. With modification in the circuit to include a metering unit in place of the comparator unit, it can be used as a infra-red reflectivity meter, which can be used to study different reflectivity of different substance as applied in spectroscopy, night view and photography. The main parameter m the development of universal obstruction detector will be the infra-red level meter to enable measurement of the different reflectivity of substance as such the meter must be designed, constructed calibrated to give degree of accuracy and reliability. The obstruction detector can be developed as detecting obstruction probability using ultra sonic waves such that comparative detected will give more accurate identification of size and or nature of the obstruction.

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PACKING PROCESS