POLITEKNIK SULTAN SALAHUDDIN
ABDUL AZIZ SHAH
POLITEKNIK KEMENTERIAN
PENGAJIAN TINGGI MALAYSIA

LAPORAN AKHIR PROJEK

FA-G@OBSTACLE AIDED

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8/20

FA-G @ OBSTACLE AIDED

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This report is submitted in Partial fulfilment of the requirement for
Diploma Electronic Engineering (Medical)

Jabatan Kejuruteraan Elektrik
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Dis 2016

APPENDIX D

ENDORSEMENT

" I hereby acknowledge that I have read this report and I find that its contents meet the requirements in term of scope and quality for the award of the Diploma in Electronic Engineering (Medical) "

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DECLARATION

" We hereby declare that the work in this report is our own except for quotation and summaries which have been duly acknowledge'

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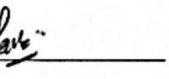
Signature : 

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ABSTRACT

The glove with integration of system was developed to assist blind people to detect obstacle . The project consist the Ultrasonic sensor (HC-SR04), Arduino NANO, Buzzer and Vibrator will be integrated into glove for detection. Since the ultrasonic sensor used is able to detect obstacles between 2cm until 300cm, the system has been set to detect obstacles 50cm, 100cm, 150cm and 200cm. For instance, if obstacles detected at a distance 150cm and above, the buzzer will beep slowly but when the obstacles at distance 100cm and below, the buzzer will beep very faster.

ABSTRAK

Sarung tangan ini dengan integrasi system telah dibentuk untuk membantu orang buta mengesan halangan. Projek ini terdiri daripada sensor ultrasonic(HC SR04), Arduino Nano, Buzzer, dan Vibrator Motor yang diintegrasikan bersama sarung tangan untuk mengesan halangan. Ultrasonik sensor dapat mengesan dalam jarak 2cm hingga 3m. produk ini telah diprogramkan untuk mengesan dalam 3 jarak iaitu bawah 25cm, 26cm hingga 45cm dan 46cm hingga 70cm. Terdapat tiga keadaan yang berbeza yang mempengaruhi bunyi buzzer yang tertentu. Jarak 25cm ke bawah buzzer akan sentiasa berbunyi semasa berdekatan objek. Jarak diantara 26cm hingga 45cm buzzer akan berbunyi selang seli dengan laju. Jarak diantara 46cm hingga 70cm buzzer akan berbunyi selang seli dengan perlahan. Selain itu, kelebihan projek ini ialah penciptaan buku manual dalam versi braille.

CHAPTER 1

INTRODUCTION

1.0 Introduction

Humans are blessed with perfect body creation. Despite that, some people are not as fortunate, since they are limited by natural disabilities caused by accidents. Blindness is categorized as one of the common disabilities. People with visual impairments, of all ages, are severely limited in their mobility and other activities of daily living that rely upon vision[1] . The primary aid is the long cane; however some individual prefer a guide dog. It is estimate that of the 1.1 million individual who are blind 109, 000 (10%) use along cane and 10,000 (1%) use a guide dog[2].

Thus, it appears that most (89%) individual who are blind may not use any mobility aid. The cane has been very helpful for the blinds in assisting their movements throughout their daily activities. Although the walking stick is able to guide the blinds, there are still several weaknesses that can be enhanced to make the design better. One of the weaknesses of the walking stick is that, it is only designed

to detect obstructions that are within the range of the stick length, when being direct contact with the walking stick. FA-G@Obstacle aided have been developed to increase capability beyond the white cane and guide dog. It provide non-visual signal (sound and vibration) to alert the user to nearby object (obstacle) in a range 2cm to 3m . And lastly, this project helps student to develop a new system and giving some knowledge on both hardware and software skill.

Live life as a visually impaired is very different compared to someone who has perfect vision, all 24 hours of their lives is a severe test of the parable is not according to this word. Blind movement very limited and so is the opportunity to earn a living to support their families are often extremely painful. In fact, as we do, every blind person wants to live independently. What do these people expect is a little understanding, awareness and compassion. Something that we are able to provide such create a tool that provide facilitates the movement and actions.

FA-G@obstacles aided is a tool to track the movement of an objects or a person in the vicinity. FA-G@obstacles aided is facility created to help people visually impaired. FA-G@obstacles aided there is a distinctive characteristics of normal gloves modified by placing an electronic devices to detect obstacles in environment(indoor) and provide convenience and safety to users. The assistive glove for the blind is a device that can help visually impaired to facilitate movement and to perform daily activities without relying too each others. The glove with the integration of ultrasonic sensor HC-SR04, arduino NANO microcontroller, buzzer and vibrator will help blind to facilitate movement and give alert to user if there are obstacle in front of them in range 2cm to 300cm.

1.1 Background study

Visual impairment also known as vision loss, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses. Some also include those who have a decreased ability to see because they not have access to glasses or contact lenses. As of 2014, it has been reported that over 285 million people are visually impaired worldwide and of this population, 39 million are

blind[3]. Visual impairment include the subcategories of blindness(best vision of <20/200 in the better eye and <20/400 by the WHO) and low vision (<20/40) and are due to a myriad of causes. Visual impairment may cause people difficulties with normal daily activities such as driving, reading, socializing, and walking. The most causes of visual impairment globally are uncorrected refractive error which is problem with focusing of light on the retina due the shape of the eye (43%). Besides, it is causes of a cataract is clouding of the lens in the eye which leads to a decreases in vision and symptoms may include faded colors, blurry vision, halos around light, trouble with bright lights and trouble with bright lights, and trouble seeing at night(33%). Lastly, glaucoma which causes of visual impairment. Glaucoma is a group of eye diseases which result in damage to the optic nerve and vision loss.

1.1.1 Classification of visual impairment

Its can be classify in six term[4] :

- 20/30 to 20/60 – is considered mild vision loss, or near-normal vision.
- 20/70 to 20/160 – is considered moderate visual impairment, or moderate low vision
- 20/200 to 20/400 – is considered severe visual impairment, or severe low vision
- 20/500 to 20/1000 – is considered profound visual impairment , or profound low vision
- More than 20/1000 – is considered near-total visual impairment, or near total blindness
- No light perception – is considered total visual impairment or total blindness

1.2 PROBLEM STATEMENT

From our research that we had done, there are several problems that might happen to the daily activity of blind people where we are interested to solve their problem. First, the problem is the normal stick is not very helpful to blind person because it cannot detect obstacles around them. Second, as we know normal blind stick is easily fall from their hand and its hard for them to find it in open place. Third , even though they are blind , but as a human being they also have desire to be independent like normal people.

In addition is human error. Sometimes blind people may do some mistakes like hit something when their use blind stick. Some mistakes like hit something can cause them injury and painful. Its will add difficulties one has to perform their everyday life. Last but not least, they are still uncomfortable using assistive devices because the price is very expensive and inconvenient. A device which is more practical and low cost must be developed in order to reduce the difficulties of blind people.

1.2 Objective project

There were some objectives that come out from this main project 'FA-G@obstacles aided'. One of the main objective is

- to help OKU person to live independently without the help of others and help to avoid obstacles.
- To reduce the risk for the blind people.
- Aimed on developing a portable and low cost glove with integration of system that can be afforded and easily carried by blind person.
- Develop manual and info in braille version.

1.4 Scope

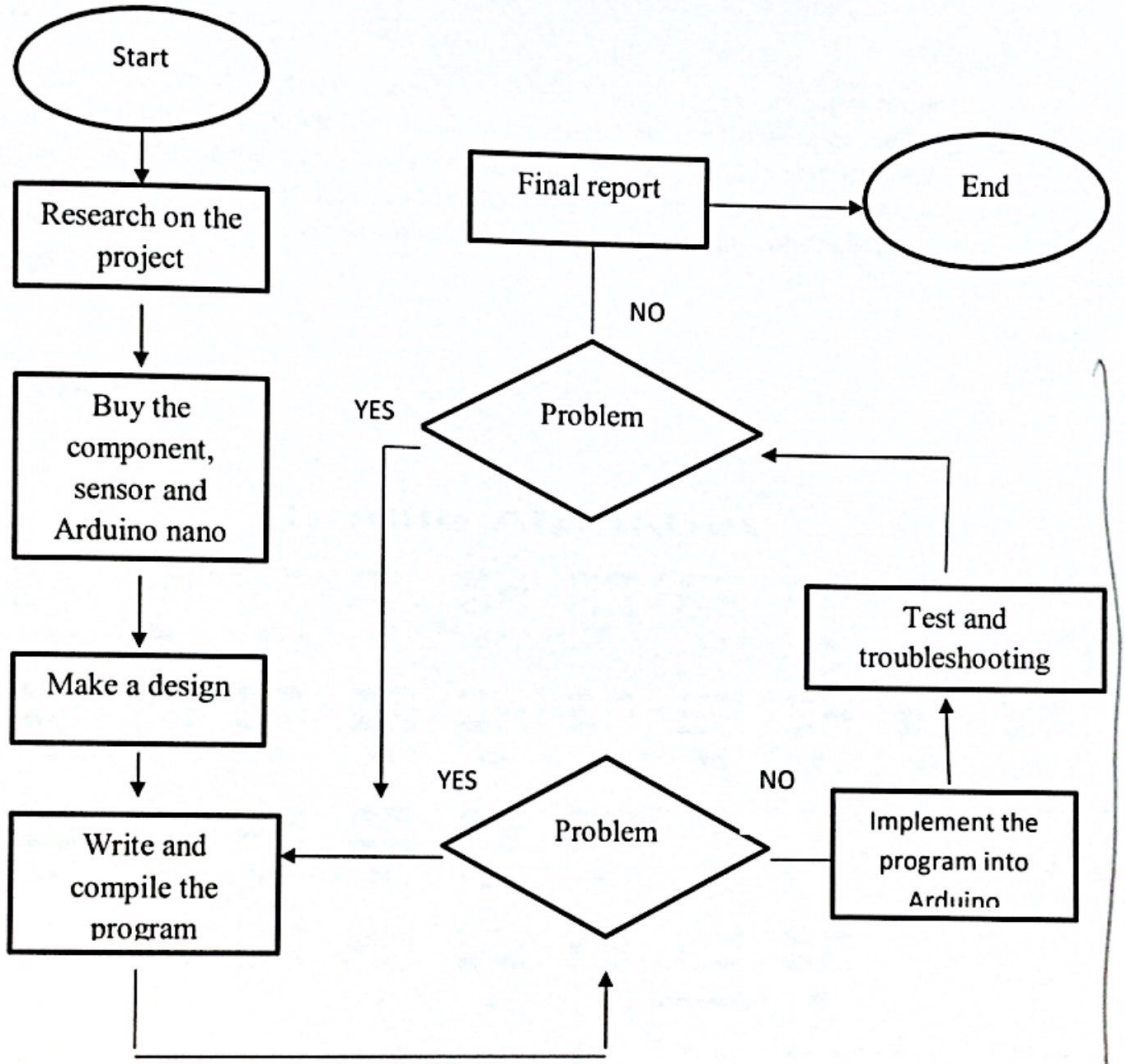
Our team scope are focusing on develop a ' FA-G@obstacles aided'. Our 'FA-G@obstacles aided' is specifically for the blind people for indoor use. It means it is use for in house, office and room. The limitation of our product is only can detect distance about 2.5cm to 3m.

For the hardware, ultrasonic sensor HC-SR04 will be used as a sensor to detect obstacles at the front and it will send signal to Arduino NANO which act as microcontroller. The microcontroller will then process data and send the signal to Buzzer and Vibrator which is buzzer can hear sound and vibrator can vibrate to their finger.

1.5 Study population

- ✓ Normal people
- ✓ Blind people (sejak lahir)
- ✓ Blind people effect by disease

1.6 Significant of study



1.7 Theoritical of study

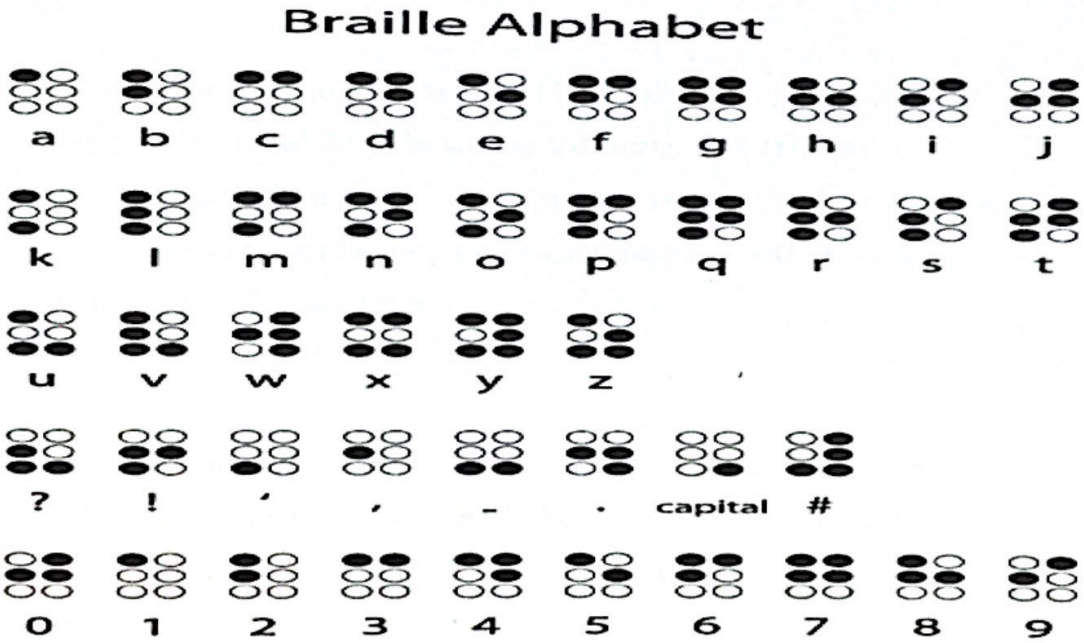
Osama Bader AL-Barrm, JeenVinouth [5] proposed that detects the obstacles in the path of the blind using ultrasonic sensors. It consists of these sensors to scan three different directions, a microcontroller, buzzer and DC vibration motor. The buzzer and vibration motor is activated when any obstacle is detected.

Srirama Divya, B. Navya, P. Suma manasa, S. Chitra [6] the paper presents a theoretical model and a system concept to provide a smart electronic aid for blind people. The system is intended to provide overall measures – Artificial vision and object detection. The aim of the overall system is to provide a low cost and efficient navigation aid for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic objects around them. Ultrasonic sensors are used to calculate distance of the obstacles around the

blind person to guide the user towards the available path. Output is in the form of sound and vibrator motor which the blind person can hear and sense the vibrate e.g., right, left etc. The hardware consists of Arduino Nano board, ultrasonic sensors, buzzer and vibrator motor.

Ankit Agarwal, Deepak Kumar, Abhishek Bhardwaj [7] this paper proposes an economical ultrasonic stick for visually challenged people, so as to gain a personal independence and free from the external help. A portable user friendly device is developed that can identify the obstacles in the path using ultrasonic sensors and the buzzer and vibration motor is activated when any obstacle is detected.

1.7.1 Braille font



Braille is a tactile writing systems used by people who are blind or visually impaired. It is traditionally written with embossed paper. Braille-users can read computer screens and other electronic supports thanks to refreshable braille displays.

1.7.1(b) Braille in computer screen

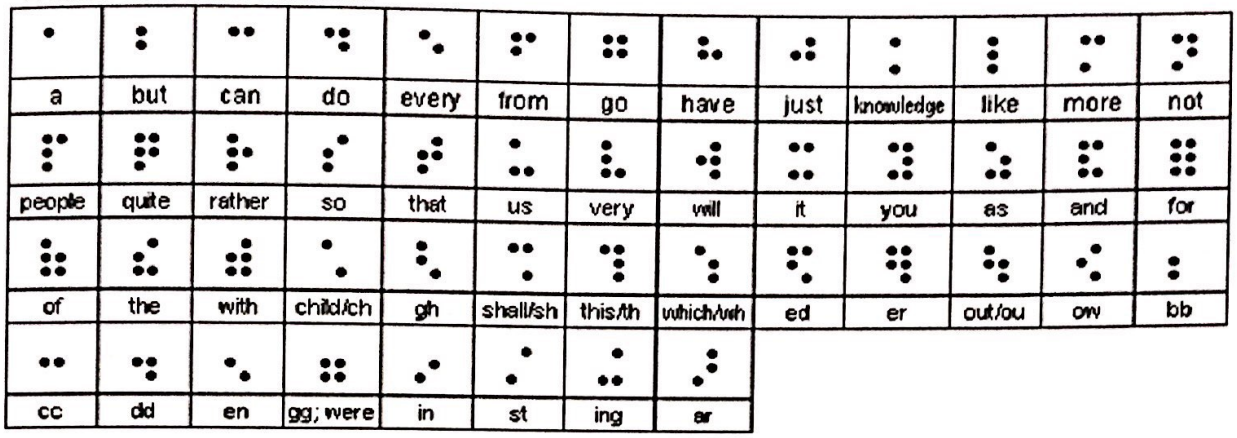
They can read braille with the original slate and stylus or type it on a braille writer, such as a portable braille note-taker, or on a computer that prints with a braille embosser.

Braille characters are small rectangular blocks called cells that contain tiny palpable bumps called raised dots. The number and arrangement of these dots distinguish one character from another. Since the various braille alphabets originated as transcription codes of printed writing systems, the mappings (sets of character designations) vary from language to language.

Futhermore, in English Braille there are three levels of encoding which is Grade 1- a letter by letter transcription used for basic literacy, Grade 2 – an addition of abbreviations and contractions; and Grade 3 – various non-standardized personal shorthands.

a	b	c	d	e	f	g	h	i	j	k	l	m
n	o	p	q	r	s	t	u	v	w	x	y	z

Words and abreviations



a	but	can	do	every	from	go	have	just	knowledge	like	more	not
people	quite	rather	so	that	us	very	will	it	you	as	and	for
of	the	with	child/ch	gh	shall/sh	this/th	which/wh	ed	er	out/ou	ow	bb
cc	dd	en	gg; were	in	st	ing	ar					

1.7.1 (d) Grade 2- An addition of abbreviations and contractions

CHAPTER 2

LITERATURE REVIEW

2.0 FA-G@obstacle aided

The visually impaired have a lot of challenges they face in their day to day lives. Tasks that seem to be so meager to able bodied people such as a walk to the park or social networking with friends may not be that simple. Most of the visually impaired individuals do not have a very high income thereby accessibility to resources are again limited. Research on the blind shows that the visually impaired who are secure and capable of movement are better adjusted psychologically and have an easier time in gaining employment . Thus, the need for an easily accessible navigation tool comes into the picture. Some other researches include the Multimodal Electronic Travel Aid' device which uses a laser pointer to gauge the angular depth and position of the object . This mechanism is heavy on power consumption due to the use of a laser, hence the battery life of the device suffers.

2.1 Introduction

The invention relates to mobility canes for sightless persons in general and to such canes incorporating ultrasonic obstacles detection apparatus. The white cane is not just a tool that can be used to achieve independence. It is also a symbol of the blind citizens in our society. To honor the many achievement of blind and visually

impaired Americans and to recognize the white cane's significance in advancing independent we observe October 15th of each year as "White Cane Safety Day." Today, the white cane works both, as a tool for the blind as well as a symbol, but this has not always been the case

During most years since 1964, the President has proclaimed October 15th as White Cane Safety Day. On October 15, 2000, President Bill Clinton again reminded us of the history of the white cane as a tool, and its purpose as a symbol of blindness: "With proper training, people using the white cane can enjoy greater mobility and safety by determining the location of curbs, steps, uneven pavement, and other physical obstacles in their path. The white cane has given them the freedom to travel independently to their schools and workplaces and to participate more fully in the life of their communities. It reminds us that the only barriers against people with disabilities are discriminatory attitudes and practices that our society has too often placed in their way. As we observe White Cane Safety Day, 2001, let us recall the history of the white cane, its emergence as a tool and a symbol through history; a staff of independence. Let us also recall the events that have permitted us to celebrate October 15th as White Cane Safety Day.

2.0(a) White cane

2.2 Clinical

2.2.1 Sense of hearing

The sense of hearing is the senses that can detect the source of the sound produced by vibrating objects. The sense balance is the senses that is responsible for controlling the balance (equilibrium) when the body moves. Ear is the organ for hearing. Humans have two ears located on the side of the head. The ear is divided into three parts, the middle ear and inner ear. The outer ear and the middle ear is filled with air, while the inner ear is filled with fluid.

External side :

Section	Structure	Function
Outside ear: Pinna	Funnel shaped and made of cartilage	Collect and directs sounds wave into the ear
Ear canal	A narrow tube to prevent into the eardrum	Send sound waves to the eardrum
Eardrum	A thin membrane that separates the outer ear from the middle ear	Vibrate and send sound waves to ossicles

Internal side :

Section	Structure	Function
Cochlea	Coiled tubing and full of fluid. Wall it has nerve endings that are sensitive to sound vibrates.	Changes the sound vibration to impulse
Semicircular canals	Three channels is at right angles to each other. Has small pouch which is filled with fluid and nerve endings sensitive to the balance of the physical body.	Balance the body position

Auditory nerve	Nerves that connect the sensory cells to the brain.	Send impulse from cochlea to brain to be interpreted

Eustachian tube and semi-circular duct is not part of the ear involved in hearing. Eustachian tube pressure balance on both sides of the eardrum. Semicircular comprises three tubes filled with a fluid called endolymph. Head movement will affect the state of endolymph. Endolymph movement will stimulate cells to produce sensory impulses. These impulse are sent to the brain to detect the position and direction of movement of the head.

Mechanism of ear hearing :

- ✓ Sound transmitted from one area to another in the form of waves.
- ✓ Earpiece collect and direct to the ear canal
- ✓ Ear canal directs the sound waves to the eardrum
- ✓ Ear vibrate when it receives a sound wave
- ✓ Amplified sound wave vibration/ intensified/ enhanced by 22 times the ossicles
- ✓ Enhanced vibration is then transmitted to the cochlea via oval window
- ✓ Vibration oval window causes the endolymph in the cochlea to vibrate and stimulate the nerve cells in the cochlea
- ✓ Nerve cells in the cochlea to the brain via auditory nerve to be interpreted as sound

2.2.2 Blind people more sensitive in their hearing

Researches from Montreal Neourological Institute (MNI) have shown that people who are blind have keener hearing than people who are not blind but this usually only occurs in people who are blind from a young age or as early births. In the area there is a part of the brain called the occipital lobe, which is located at the very back of the skull that separates the cerebrum and cerebellum. This lobe function

in dealing with visualing perception, including visual reception, visual spatial processing, movement and color recognition.

In people who are not blind, occipital lobe plays an important role in sending visual signals, but there are people who are blind early in life will operate to recognize the voice of the occipital lobe. This makes the blind hear better than people who are not blind. In addition, at birth or young age the brain that governs vision, hearing and other senses are still connected to each other, existing connections will be maintained and used to process voice sometimes blind because it not only has a good hearing, but also touch and keen sense of smell.

2.3 Electronic

2.3.1 Sensor, buzzer, and vibrator

We use ultrasonic sensor (HC-SR04) to detect obstacle around them and using vibrator and buzzer to give signal to them by vibration at their finger and sound. As we know, human with visually impaired is sensitive to sound and it also sensitive to touch. Since the ultrasonic sensor used is able to detect obstacles between 2cm until 300cm, the system has been set to detect obstacles below 25cm, below 45cm, and below 70cm. For instance, if obstacles detected at a distance 46-70cm and above, the buzzer will beep slowly but when the obstacles at distance 26-45cm and below, the buzzer will beep very faster. But the vibration we set into the same range for all conditions.

2.3.2 Microcontroller

We use Arduino software which is ARDUINO NANO. Arduino nano is a surface mount breadboard embedded version with integrated USB. It is smaller,complete, and breadboard friendly. Arduino Nano are used in automatically

controlled products and devices, such as for our project arduino nano which have program to control the function of each component. For example are ultrasonic sensor, buzzer and vibrator. The advantages of arduino software is it is ready to use structure. As arduino comes in a complete package form which includes 5V regulator, a burner, an oscillator, a microcontroller, serial communication interface, LED, and headers for the connection. Besides, its have their examples of codes. Its library of examples present inside the software of arduino.

2.4 Program

```
#define trigPin 7
#define echoPin 6
#define motor1 10
#define motor 9
#define buzzer 8

void setup()
{
Serial.begin(9600);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(motor1, OUTPUT);
pinMode(motor, OUTPUT);
pinMode(buzzer,OUTPUT);
}
```

command for identify the pin to connect to Arduino Nano

Command for identify the input and output :
echoPin as a transmitter
trigPin as a receiver
motor@motor1as a vibrator motor

```
void loop()
{
long duration, distance;
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

duration = pulseIn(echoPin, HIGH);
distance = (duration/2) / 29.1;
Serial.print(distance);
Serial.println("cm");
//delay(35);
```

Command for declare the ultrasonic sensor

```
if (distance < 29) // Checking the distance, you can change the value
{
analogWrite(motor,155); // When the the distance below 29cm
analogWrite(motor1,155);
digitalWrite(buzzer,HIGH);
}

else if ((distance > 30) && (distance < 45 )) // Checking the distance, you can change the value
{
analogWrite(motor,155);
analogWrite(motor1,155); // When the the distance below 45cm & greater than 30cm
tet1();
}

else if ((distance > 46) && (distance < 70)) // Checking the distance, you can change the value
{
analogWrite(motor,155);
analogWrite(motor1,155); // When the the distance below 70cm & greater than 46cm
tet();
}
```

Command for distance and sounds

- Distance Between 46cm to 70cm Vibrator motor is vibrate

Buzzer will sound

- Distance between 30cm to below 45cm

Vibrator motor is vibrate

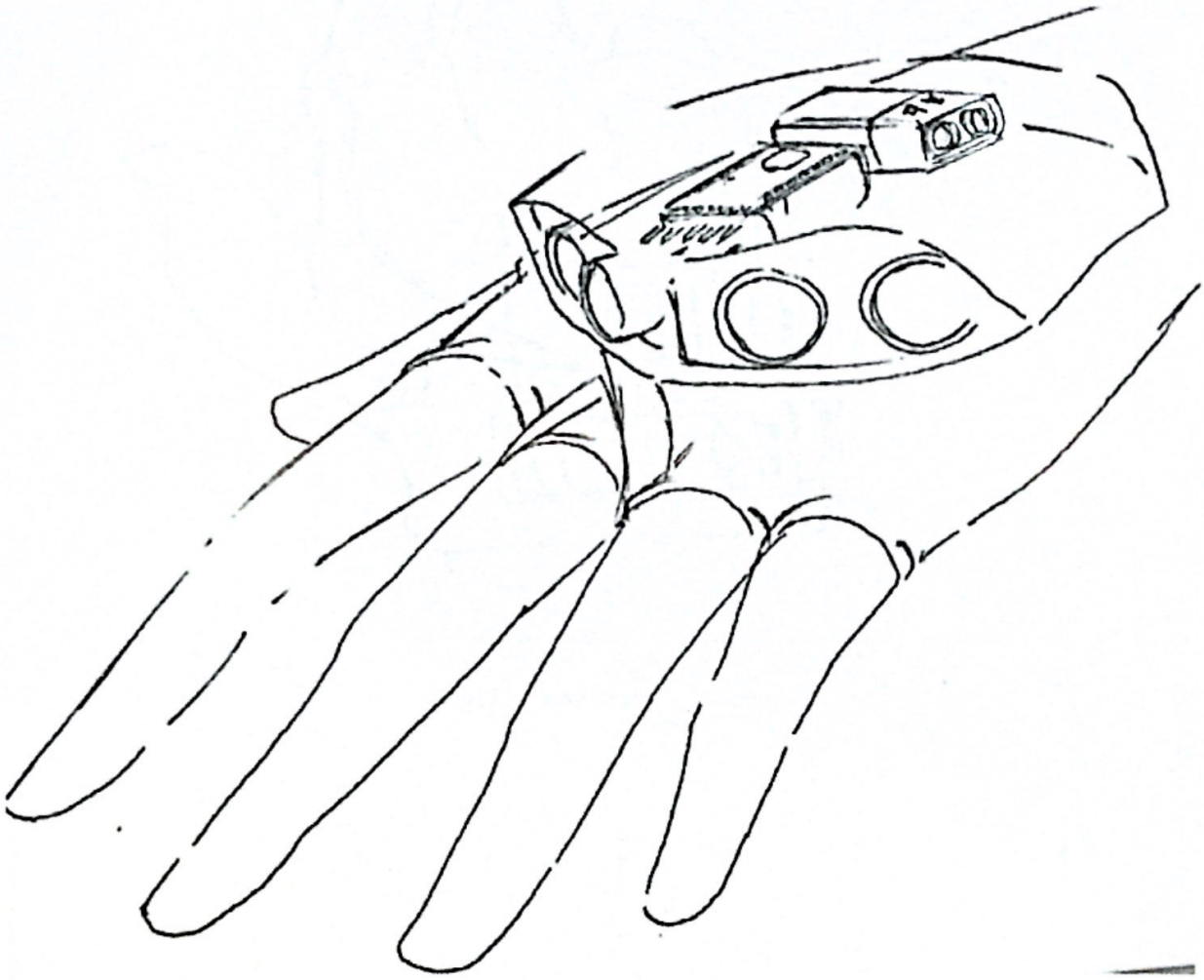
Buzzer will sound fast (tet)

- Distance below 29

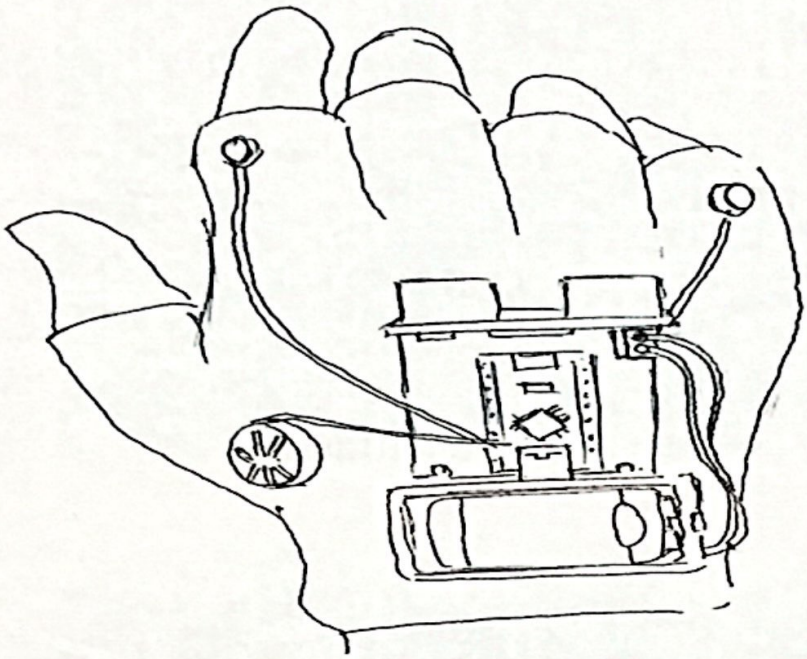
Vibrator motor is vibrate

Buzzer will sound very faster

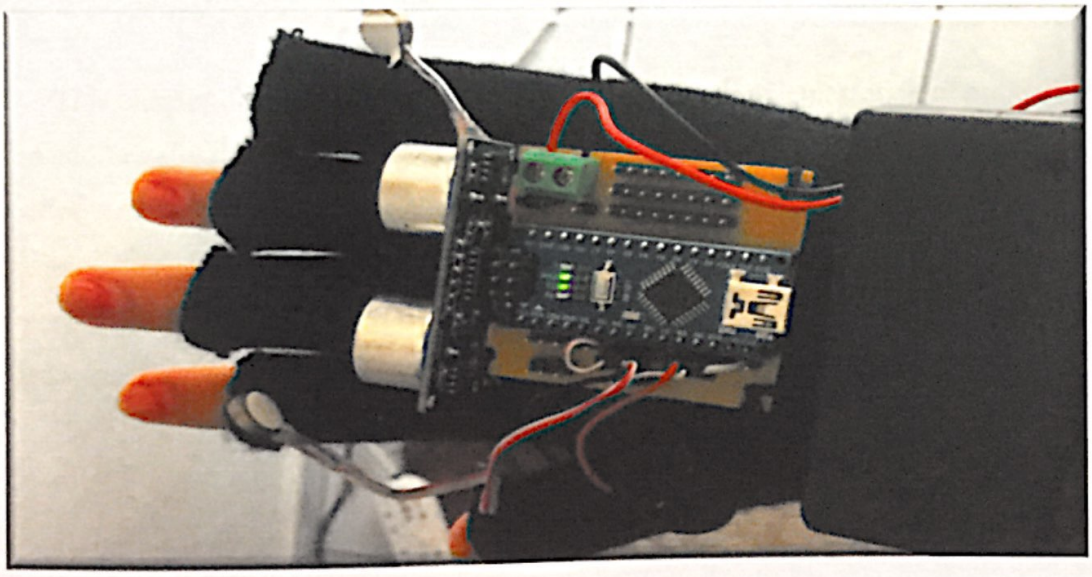
2.5 Electrical



2.5(a) First draft



2.5(b) Second draft



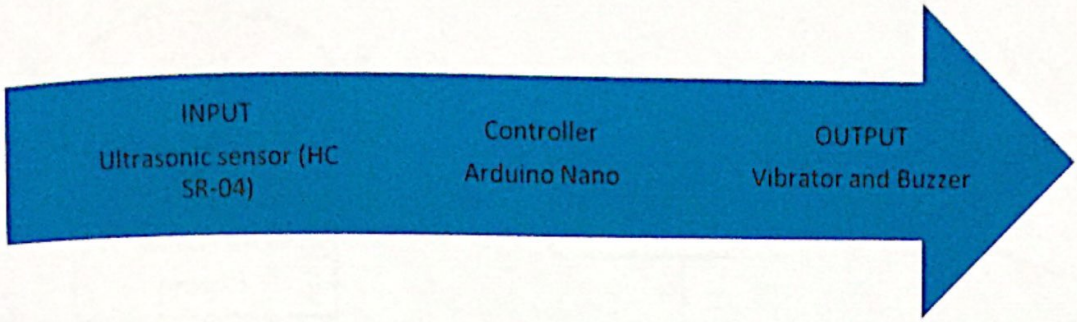
2.5(c) Complete circuit

CHAPTER 3

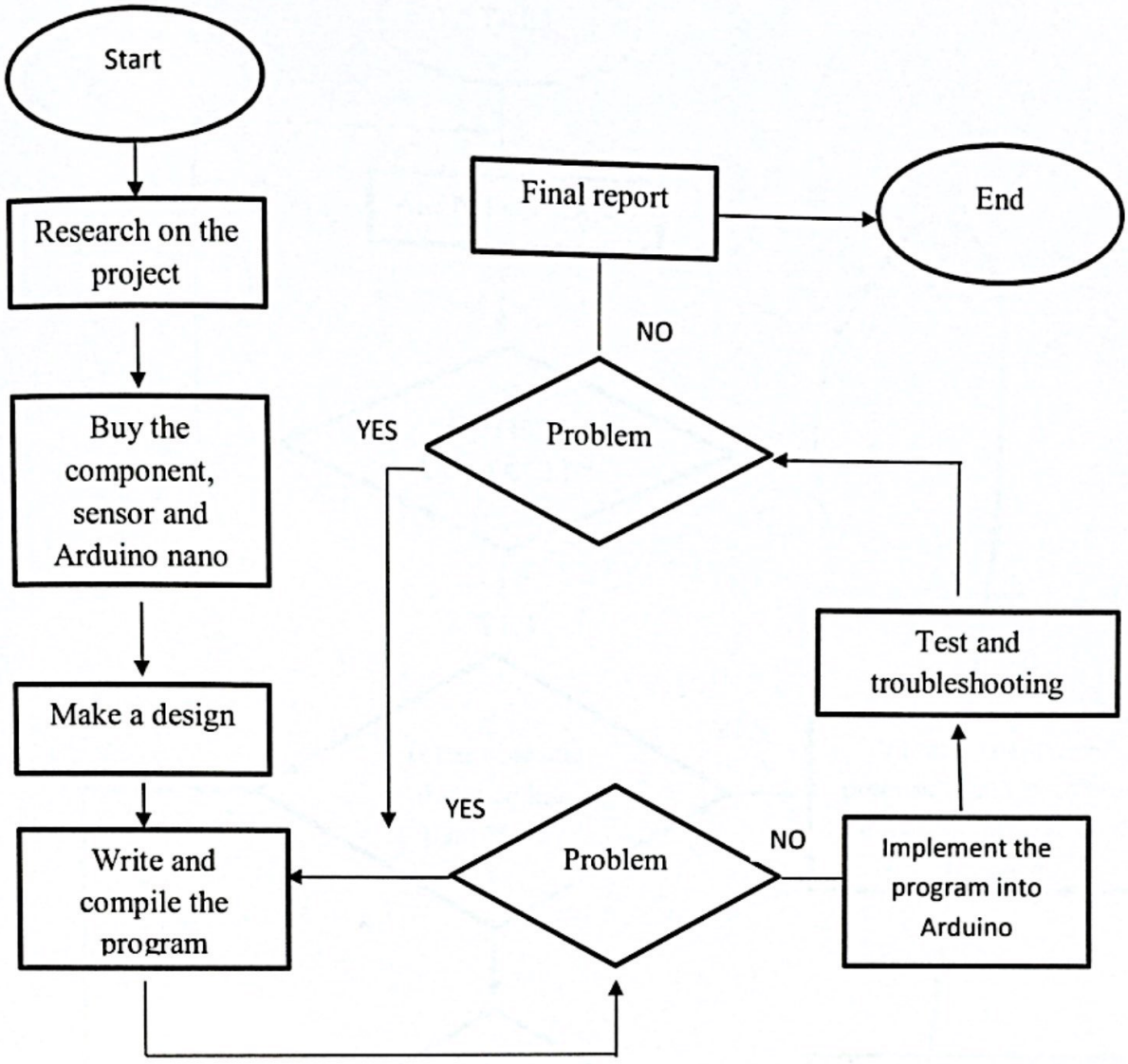
METHODOLOGY

3.0 Introduction

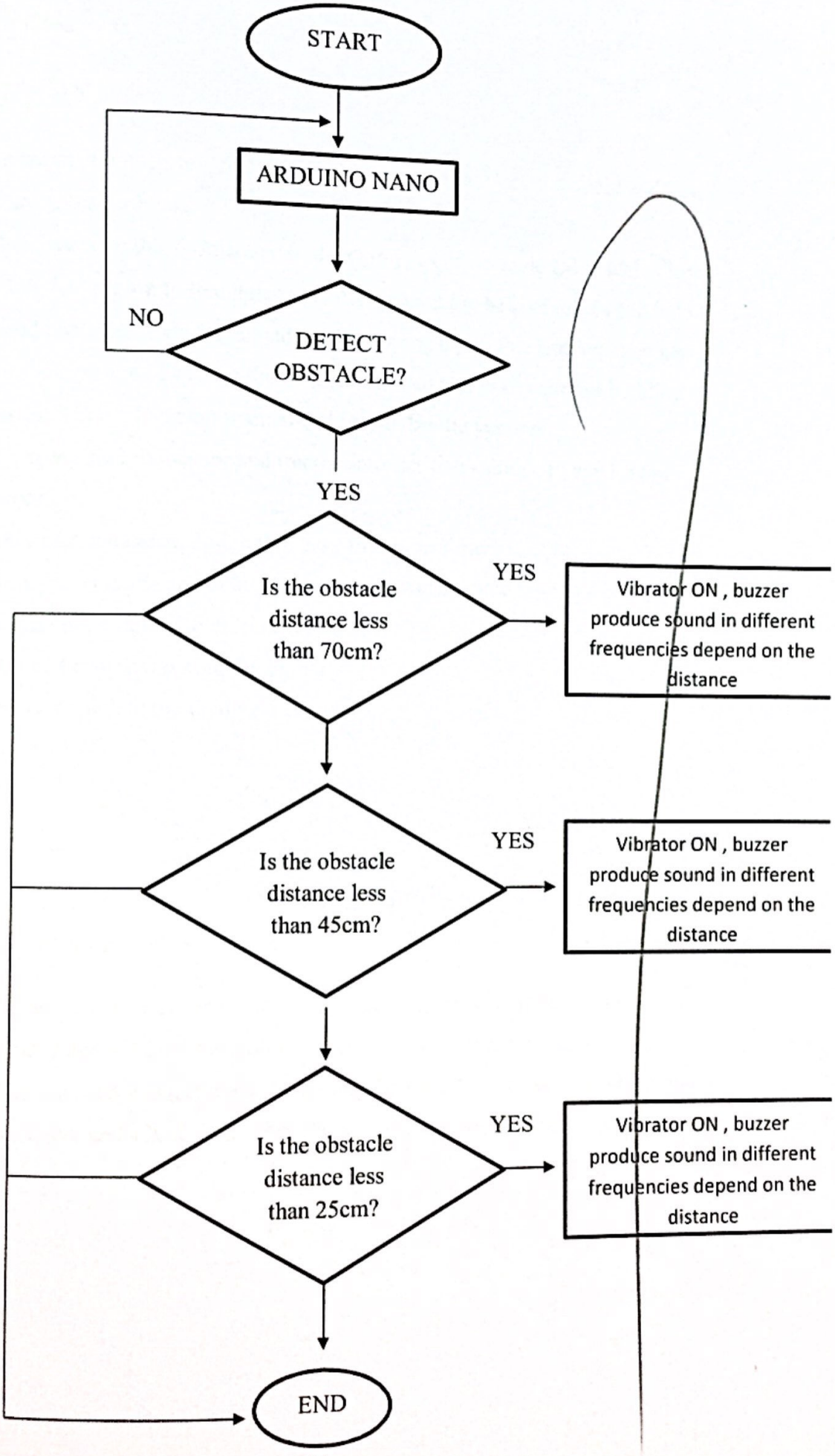
This chapter describe the methods of assembling and implementation of project and additionally the sort of component utilized. The choice of component and software must suit the project. To get the outcomes and accompolished of the projects, there are few things that need to be concern before making this project. Operation of the project is described in this chapter including the use of software and hardware. The overall process of this project is



3.0(a) Process of product



3.0(b) Progress of work



3.1Block diagram

Progress work

a. Research about the project which is identify the problem statement and how to solve the problem.
b. Then, we state the 3 objective to develop FA-G@obstacle aided which is to help OKU person to live independently without the help of others and help to avoid obstacles. Besides, aimed on developing a portable and low cost glove with integration of system that can be afforded and easily carried by blind person. Lastly, Develop manual and info in braille version.
c. Then, we find the sensor and microcontroller that suitable to use for our project.
d. After that, we create design that easy to user to wear it.
e. We try to compile and debug the program. At the same time, we create the manual book in braille version for user.
f. Test and troubleshooting the circuit
g. Lastly, complete the final year report.

How its work

Ultrasonic sensor detect obstacle in range 46cm to 70cm the buzzer will sound slowly and vibrator motor will vibrate.

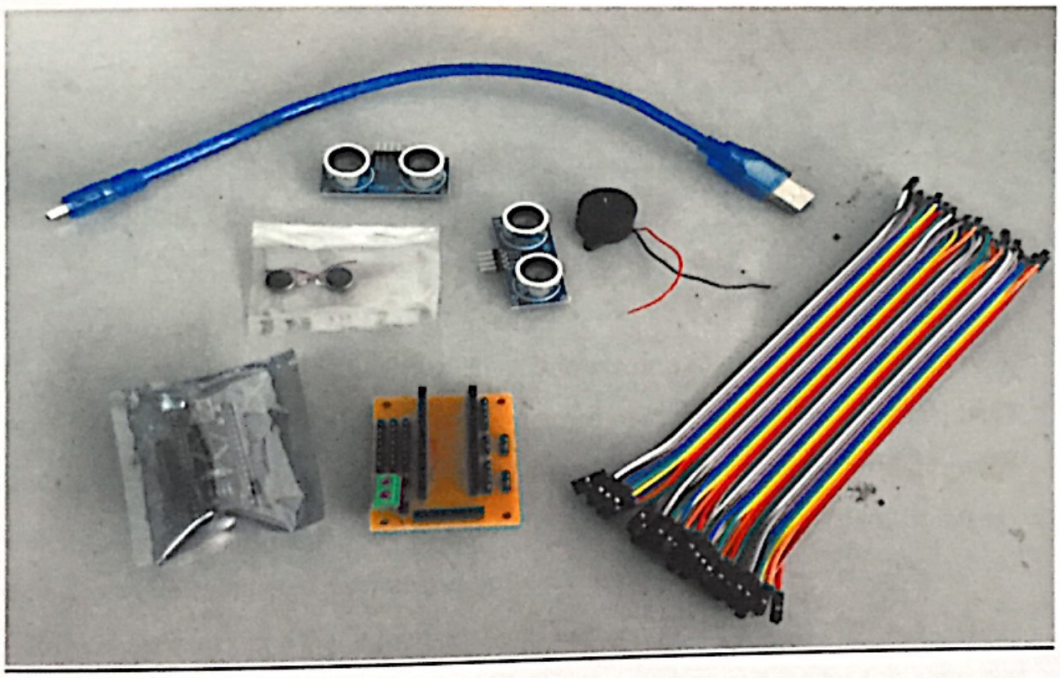
I. Ultrasonic sensor detect obstacle in range 26cm to 45cm the buzzer will sound faster and vibrator motor will vibrate in the same range
II. Ultrasonic snsor detect obstacle in range below 25cm the buzzer will sound very faster and vibrator motor will vibrate in the same range

3.2 Program code

(APPENDIX 1)

3.3 Component

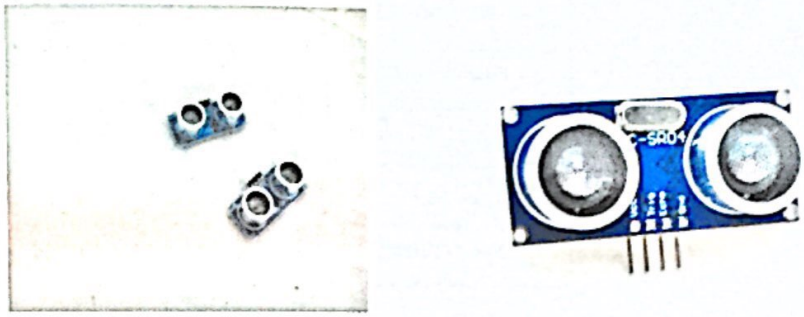
3.3.1Component Used



3.3.1 List of component use

3.3.2 Ultrosonic sensor

Ultrasonic sensors work by transmitting a pulse of sound, much like sonar detectors, outside the range of human hearing. This pulse travels away from the range finder in a conical shape at the speed of sound (340m/s). the sound reflect off an object and back to the range finder.

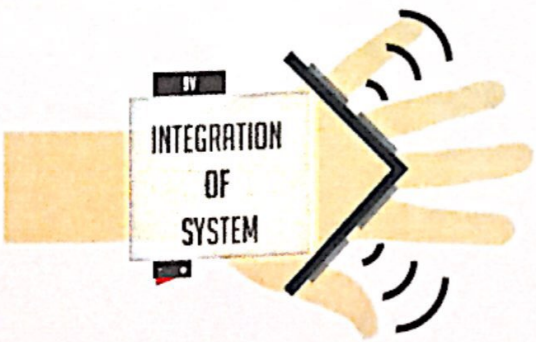


3.3.2 HC-SR 04 Ultrasonic sensor

HC-SR04 Ultrasonic Sensor

This type of ultrasonic sensor has an ability to determine the distance of objects with high accuracy and provide stable reading of data.[14] The sensor wide used for the blind because it does not affected by environment noise.[15] Its work by transmitting an ultrasonic burst and provide output pulse which correspond to the time required for the burst echo to return to the sensor. The distance to the target or objects can be calculated by measuring the echo pulse width.

Ultrasonic sensor has 4 pin which are Vcc, Trigger, Echo and Ground pin. The Vcc pin will connected to 5v DC voltage which is the require voltage for this sensor to work. The trigger pin and echo pin will connected to microcontroller. The angle of detection for this sensor is 30 degree and the effectual angle is 15 degree.

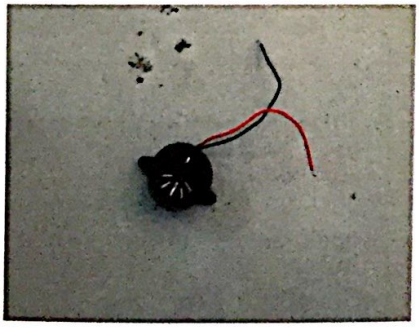


Features and Specification of Ultrasonic Sensor

Features	Specification
Voltage supply	5V
Steady current	<2milli amp.
Working current	15milli amp.
Effective angle	<15 degree
Range distance	2cm-300cm
Resolution	0.3cm
Measuring angle	30 degree
Trigger input pulse width	10micro sec.

3.3.3 Buzzer

This project used buzzer 6-12V. its function is detect obstacles, buzzer 6-12V will give the beep sound.

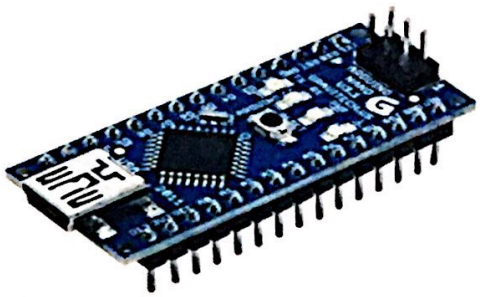


3.3.3 Buzzer

3.3.4 Arduino NANO

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B

The Arduino Nano is open-source hardware



Technical Specs

Microcontroller	ATmega328
Architecture	AVR
Operating Voltage	5 V
Flash Memory	32 KB of which 2 KB used by bootloader
SRAM	2 KB
Clock Speed	16MHz
Analog I/O	8
EEPROM	1 KB
DC Current per I/O Pins	40 Ma (I/O PINS)
Input Voltage	7 – 12 V
Digital I/O Pins	22
PWM Output	6
Power Consumption	19 mA
PCB Size	18 x 45 mm
Weight	7 g
Product	A000005

Power

The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.

Memory

The ATmega328 has 32 KB, (also with 2 KB used for the bootloader. The ATmega328 has 2 KB of SRAM and 1 KB of EEPROM.

Input and Output

Each of the 14 digital pins on the Nano can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip.

External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.

LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Nano has 8 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the analogReference() function. Analog pins 6 and 7 cannot be used as digital pins. Additionally, some pins have specialized functionality:

I2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wire library (documentation on the Wiring website).

There are a couple of other pins on the board:

AREF. Reference voltage for the analog inputs. Used with analogReference().

Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Communication

The Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provide UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino software) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the FTDI chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows for serial communication on any of the Nano's digital pins.

The ATmega328 also support I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus. To use the SPI communication, please see ATmega328 datasheet.

Programming

The Arduino Nano can be programmed with the Arduino software (download). Select "Arduino Duemilanove or Nano w/ ATmega328" from the Tools > Board menu (according to the microcontroller on your board).

The ATmega328 on the Arduino Nano comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol.

You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar.

Automatic (Software) Reset

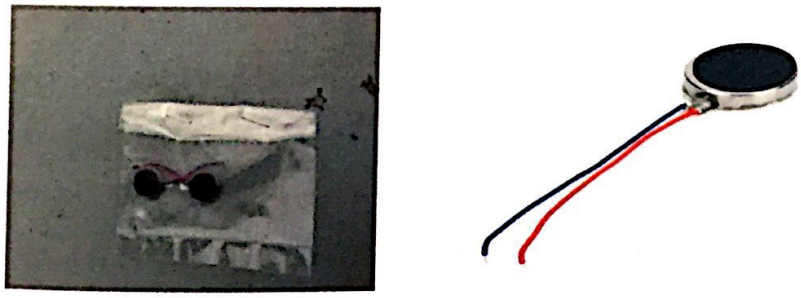
Rather then requiring a physical press of the reset button before an upload, the Arduino Nano is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the FT232RL

is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload.

This setup has other implications. When the Nano is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Nano. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data

3.3.5 Vibrator

A vibrator is a mechanical device to generate vibrations. The vibration is often generated by an electric motor with an unbalanced mass on its driveshaft.



3.3.5 Vibrator

There are many different types of vibrator. Some are components of larger products such as cellphones, pagers.

When mobile phones and pagers vibrate, the vibrating alert is produced by a small component that is built into the phone or pager. Many older, non-electronic

buzzers and doorbells contain a component that vibrates for the purpose of producing a sound. Tattoo machines and some types of electric engraving tools contain a mechanism that vibrates a needle or cutting tool.

Vibrators are used in many different industrial applications both as components and as individual pieces of equipment.

Vibratory feeders and vibrating hoppers are used extensively in the food, pharmaceutical, and chemical industries to move and position bulk material or small component parts. The application of vibration working with the force of gravity can often move materials through a process more effectively than other methods. Vibration is often used to position small components so that they can be gripped mechanically by automated equipment as required for assembly etc.

Vibrating screens are used to separate bulk materials in a mixture of different sized particles. For example, sand, gravel, river rock and crushed rock, and other aggregates are often separated by size using vibrating screens.

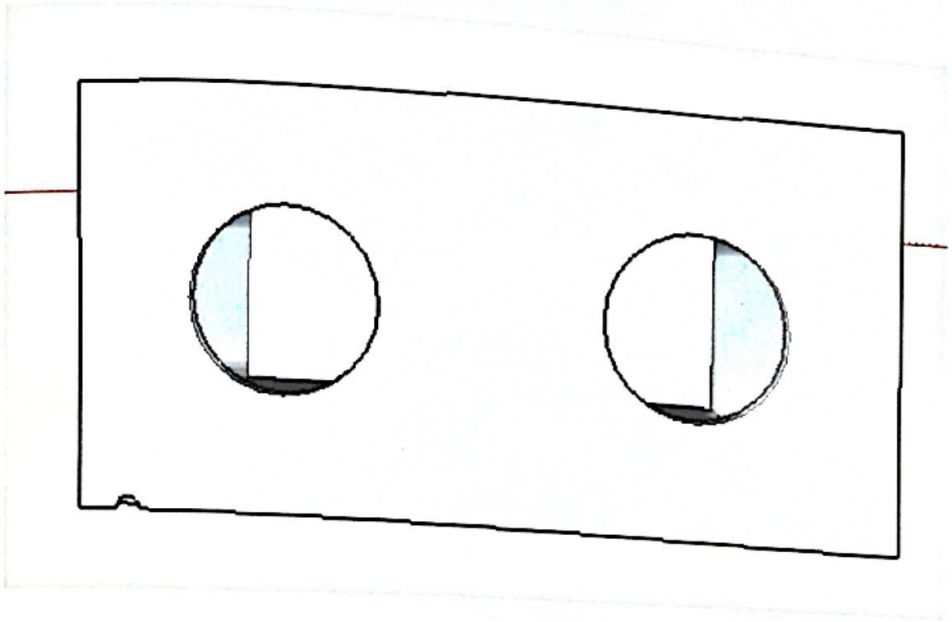
Vibrating compactors are used for soil compaction especially in foundations for roads, railways, and buildings.

Concrete vibrators consolidate freshly poured concrete so that trapped air and excess water are released and the concrete settles firmly in place in the formwork. Improper consolidation of concrete can cause product defects, compromise the concrete strength, and produce surface blemishes such as bug holes and honeycombing. An internal concrete vibrator is a steel cylinder about the size of the handle of a baseball bat, with a hose or electrical cord attached to one end. The vibrator head is immersed in the wet concrete.

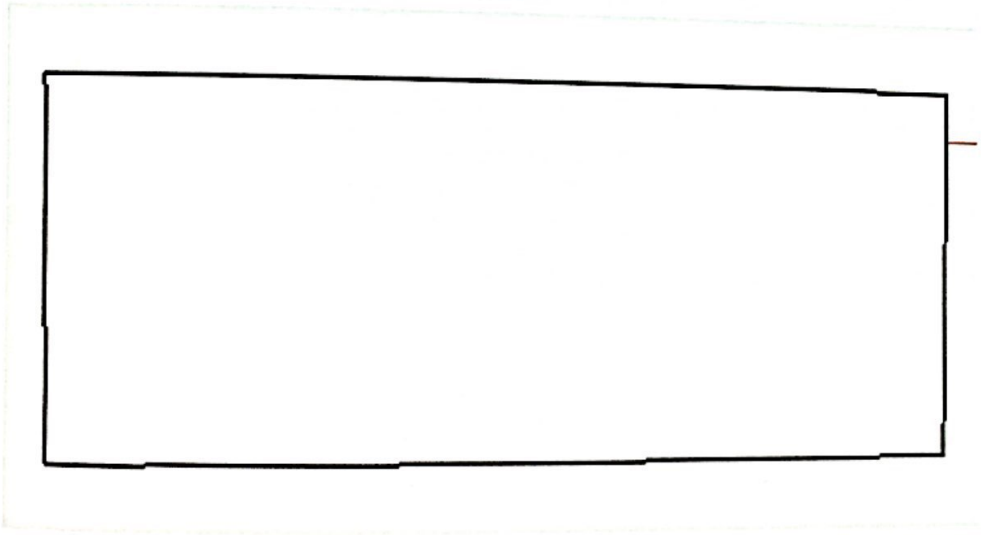
External concrete vibrators attach, via a bracket or clamp system, to the concrete forms. There are a wide variety of external concrete vibrators available and some vibrator manufacturers have bracket or clamp systems designed to fit the major brands of concrete forms. External concrete vibrators are available in hydraulic, pneumatic or electric power.

Vibrating tables or shake tables are sometimes used to test products to determine or demonstrate their ability to withstand vibration. Testing of this type is commonly done in the automotive, aerospace, and defense industries. These machines are capable of producing three different types of vibration profile sine sweep, random vibration, and synthesized shock. In all three of these applications, the part under test will typically be instrumented with one or more accelerometers to measure component response to the vibration input. A sine sweep vibration profile typically starts vibrating at low frequency and increases in frequency at a set rate (measured in hertz per second or hertz per minute). The vibratory amplitude as measured in gs may increase or decrease as well. A sine sweep will find resonant frequencies in the part. A random vibration profile will excite different frequencies along a spectrum at different times. Significant calculation goes into making sure that all frequencies get excited to within an acceptable tolerance band. A random vibration test suite may range anywhere from 30 seconds up to several hours. It is intended to synthesize the effect of, for example, a car driving over rough terrain or a rocket taking off. A synthesized shock pulse is a short duration high level vibration calculated as a sum of many half-sine waves covering a range of frequencies. It is intended to simulate the effects of an impact or explosion. A shock pulse test typically lasts less than a second. Vibrating tables can also be used in the packaging process in material handling industries to shake or settle a container so it can hold more product.

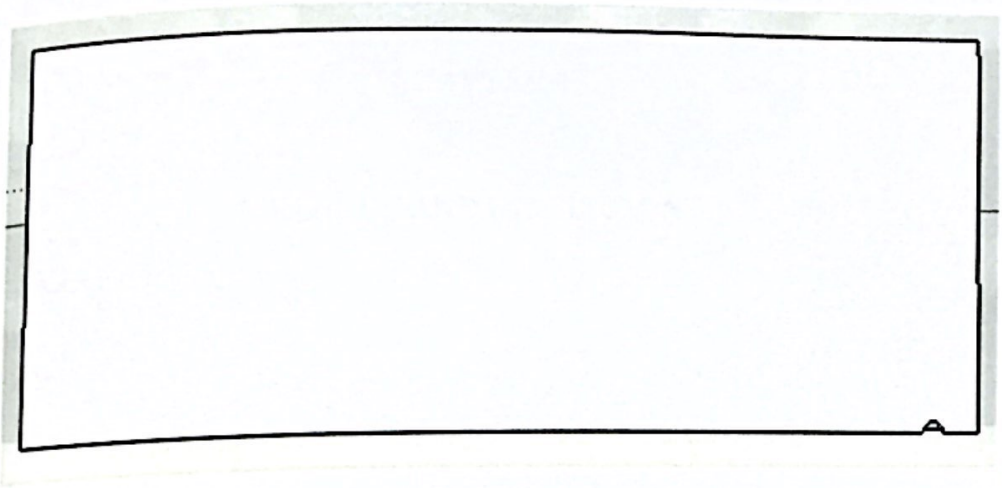
3.4 Design casing



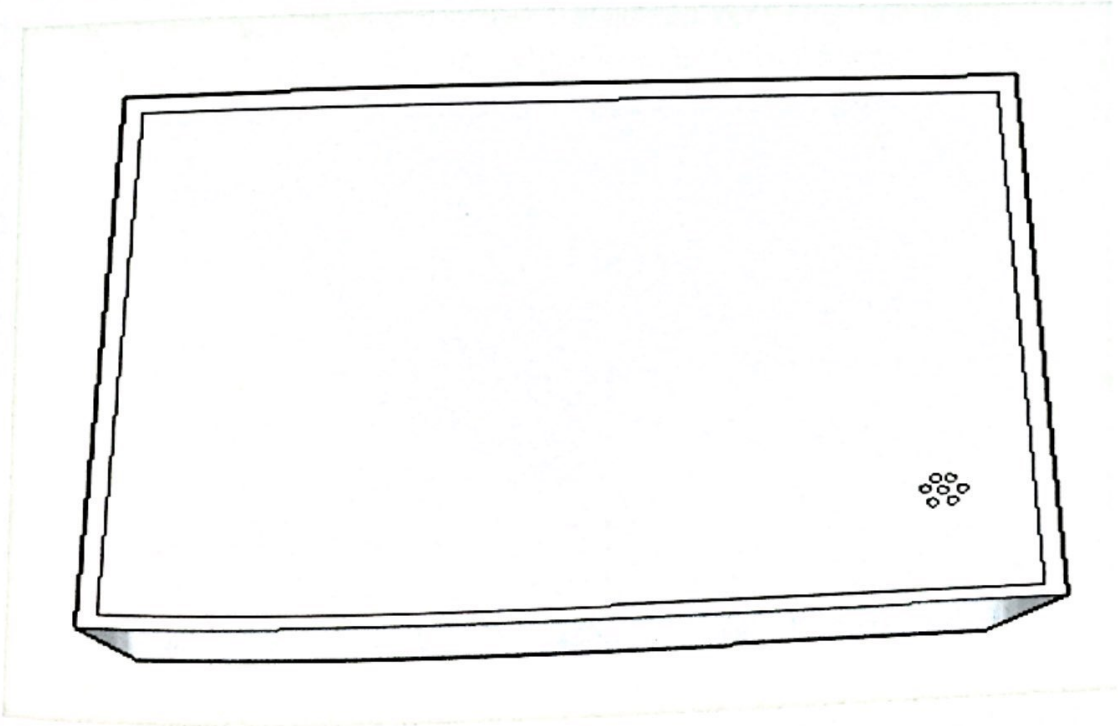
3.4(a) Front view



3.4.2 Left view



3.4.2 Side view



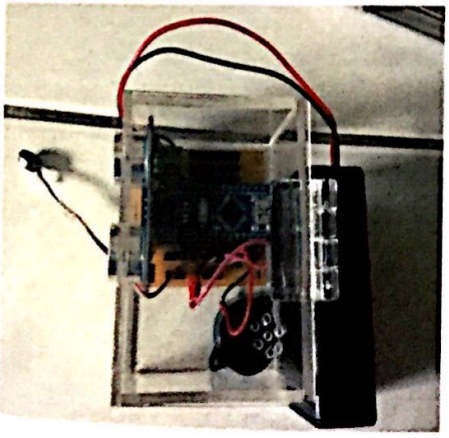
3.4.3 Upper view

CHAPTER 4

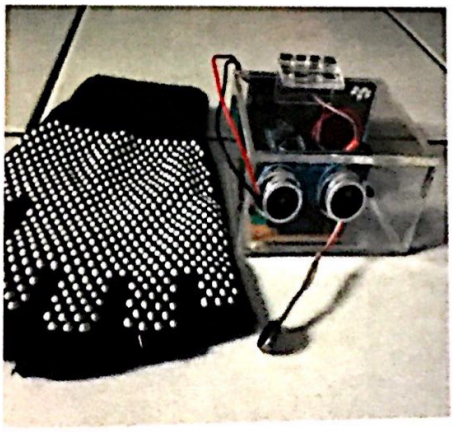
RESULT AND DISCUSSION

4.1 Introduction

The glove with integration of system for the blind was tested to 20 volunteers include the real blind people. The glove was tested by normal people with blind folded. Each of the volunteer will rate the glove based on 4 main criterias which are the efficiency, weight, safety and size. The evaluation form for the experiments shown in the Appendix. Beside that, a few thing also has been discussed together with volunteers to determine the advantages and limitation of the glove.



4.1(a) Completed project



4.1(b) FA-G@Obstacle aided

4.2 Prototype of the Project

The prototype of this project was successfully developed and tested. Figure 4.1 show the sketch of prototype with the labelling of the component. Figure 4.2 shows the system after assembled with the glove.

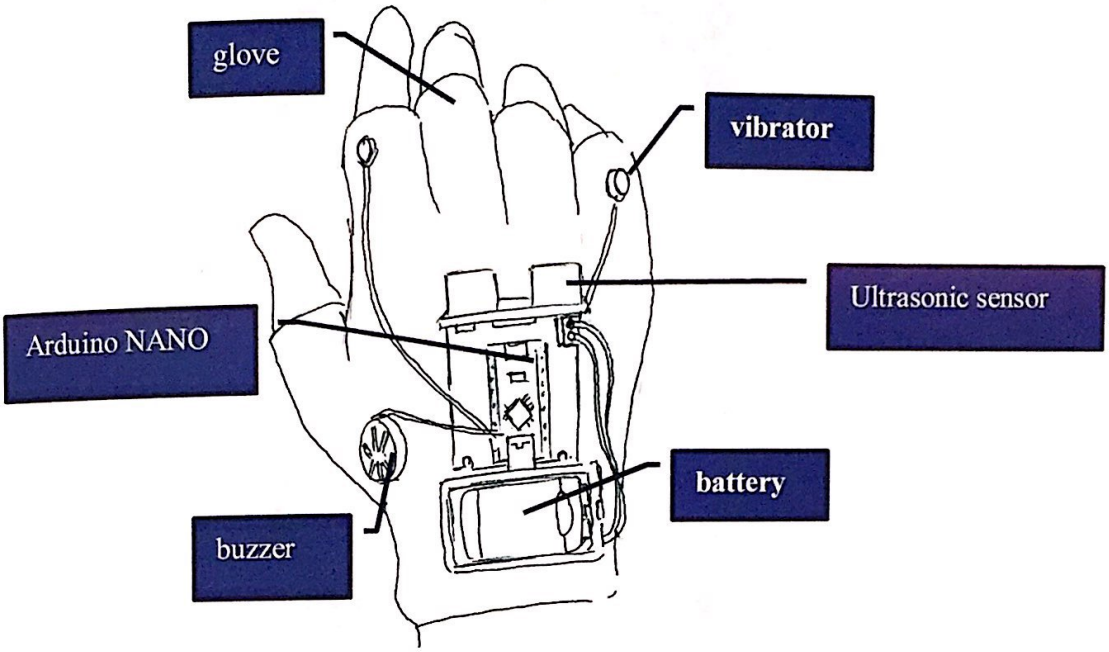


Figure 4.1 sketch with the labelling

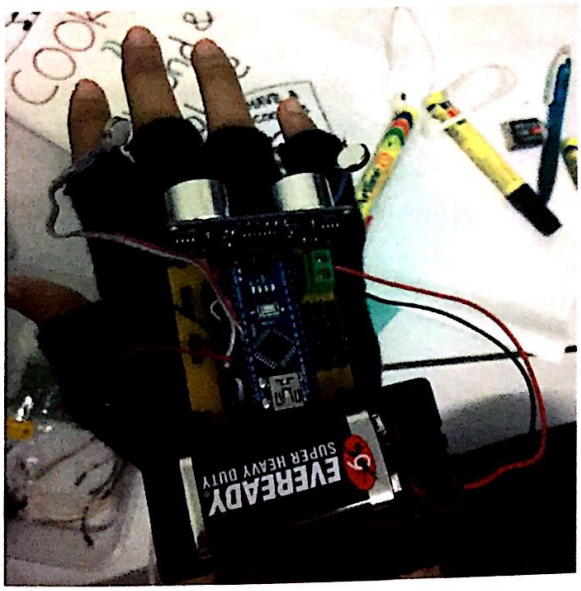


Figure 4.2 prototype assembled with glove

4.3 Experiment

The blind people was asked to read the user manual and info about the product that created in braille as figure 4.3 so that she can used the FA-G@obstacle aided with the right way.

Figure 4.3 blind people read the user manual

All the volunteers were brought to some places to test the glove include the people with visual impairements. Once the normal volunteers wear the glove and blind folded, they will try to walk and prevent from hit the obstacles as well. While the blind people was brought at the place that have stairs and wall. After the experiment conducted, they were given a form to rate the performance of the glove as state in section 4.1 and for the blind user, video has been recorded while she doing the experiment and rate the product.

4.4 Results

All the result were analyzed and summarized in the form of pie chart for each criteria. In the pie chart there are 3 colours which indicate the output of the rated form. Discussion was made with the users and they gave their own opinion about the performance of the glove.

4.4.1 Efficiency

Statement : This glove was efficient and can be used by blind people.

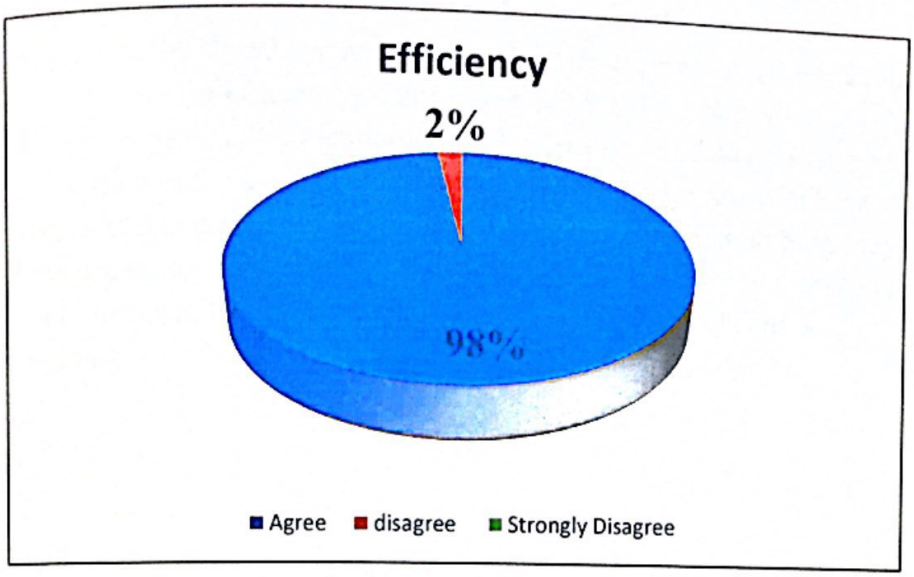


Figure 4.4.1: Efficiency

Pie chart shown in Figure 4.4.1 describe the efficiency of the glove. From the chart, it can be see that 98% of the user rated the glove as effective to use and can help them to walk with the closed eye and can avoid the obstacle around them. 2% of other users disagree about the efficiency of this glove. After having some discussion, volunteers who were disagree mention about the detection of many distance which will result in confusion of the user and this FA-G @ obstacle aided does not have motion sensor to detect other people in front of them. Although the different frequency of buzzer has been set for each different detection distance, some volunteers still disagree about the efficiency of the glove. Otherwise, the glove will bring confusion to user without training.

4.4.2 Weight

Statement : The weight of the glove was light and can easily be carried by user.

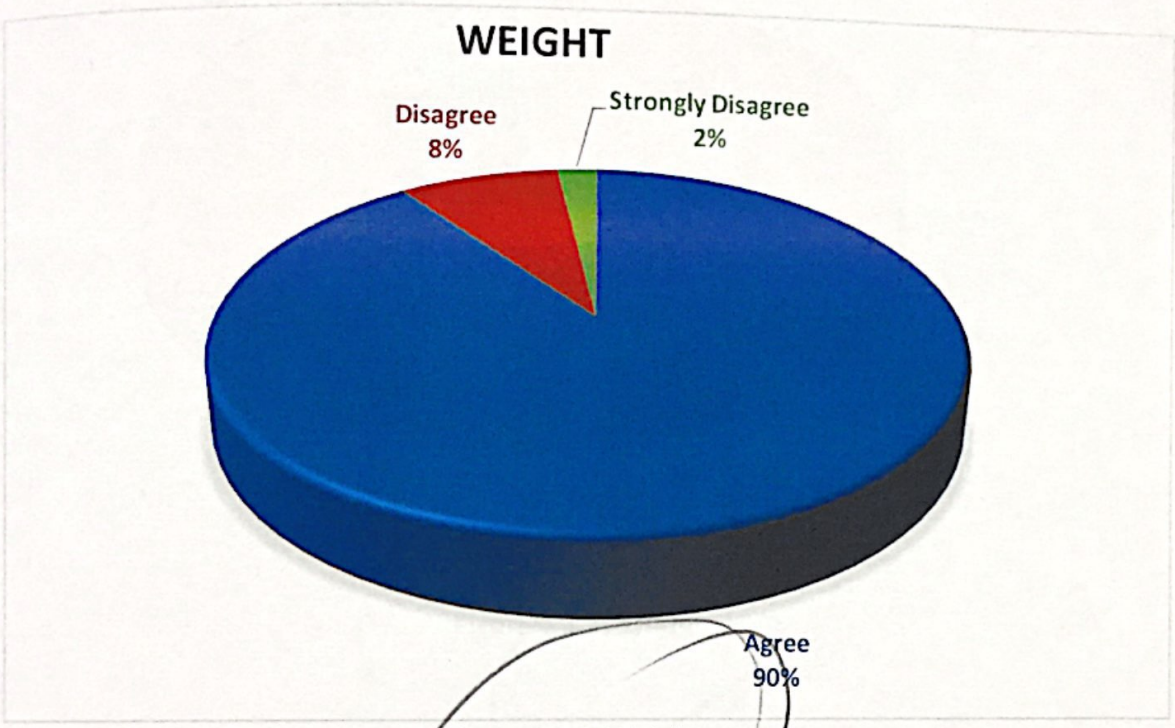


Figure 4.4.2: Weight

As shown in Figure 4.4.2, minority of the volunteer which was 2% from all of them strongly disagree about the portability of the glove. Only 8% are disagree the glove can easily be carried by blind people and the rest of them rate the weight of the glove was suitable for visual impairment user that used the FA-G @ obstacle aided . During the discussion, minority volunteer state the use of 9V battery had a high influence in determining the weight of the glove. The rest of them state that Arduino NANO is a good choice to used in this project rather than Arduino UNO .

4.4.3 Safety

Statement : The glove is safe to be used and does not bring any injuries to user.

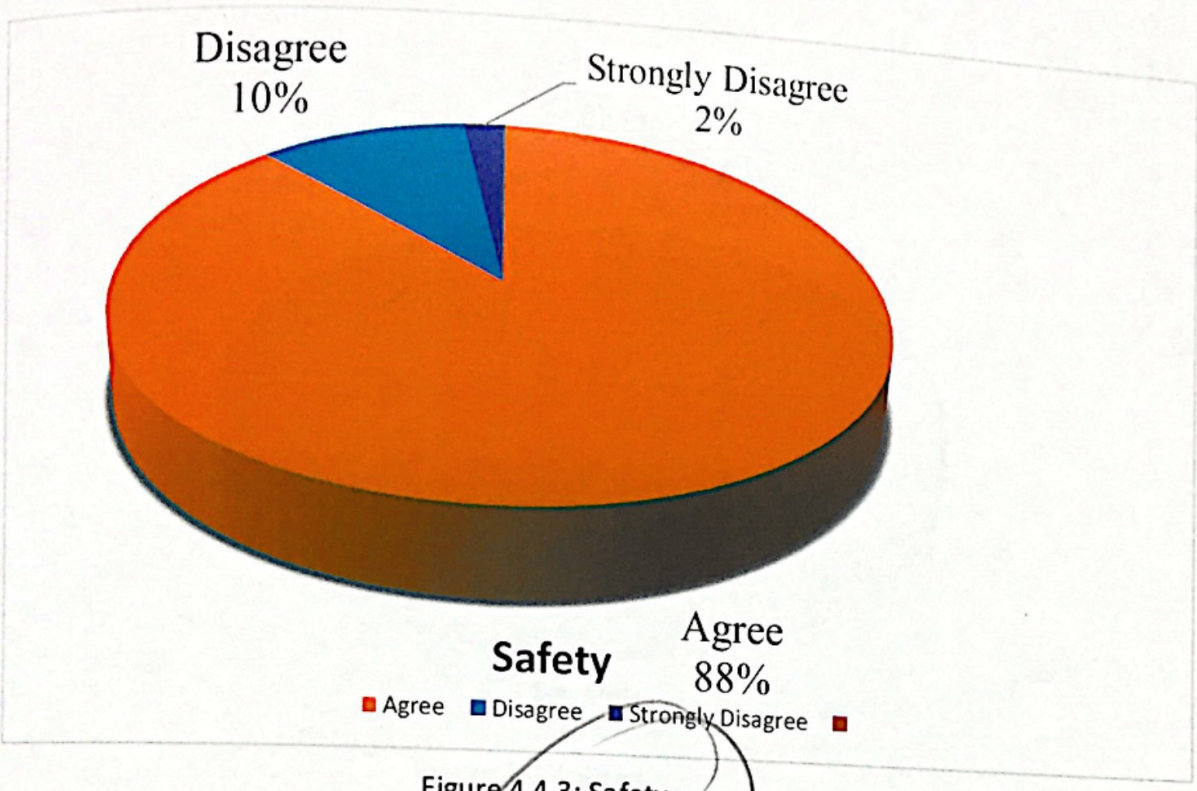


Figure 4.4.3: Safety

Figure 4.4.3 describe the rated result of volunteer based on safety criteria. 88% from all of the volunteer agree the glove is safe to use and 2% rated it strongly disagree while another 10% disagree about the safety of the glove. Since the glove only use a 9V battery, so the probability of the user getting shock by electric is low and can be stated equal to zero. The system also was covered with perspex to protect the user from damaging the system accidentally. The user who disagree with the safety of the glove state that the edge of the perspex can bring injuries to user since the perspex was designed in a rectangular shape.

4.4.4 Sized

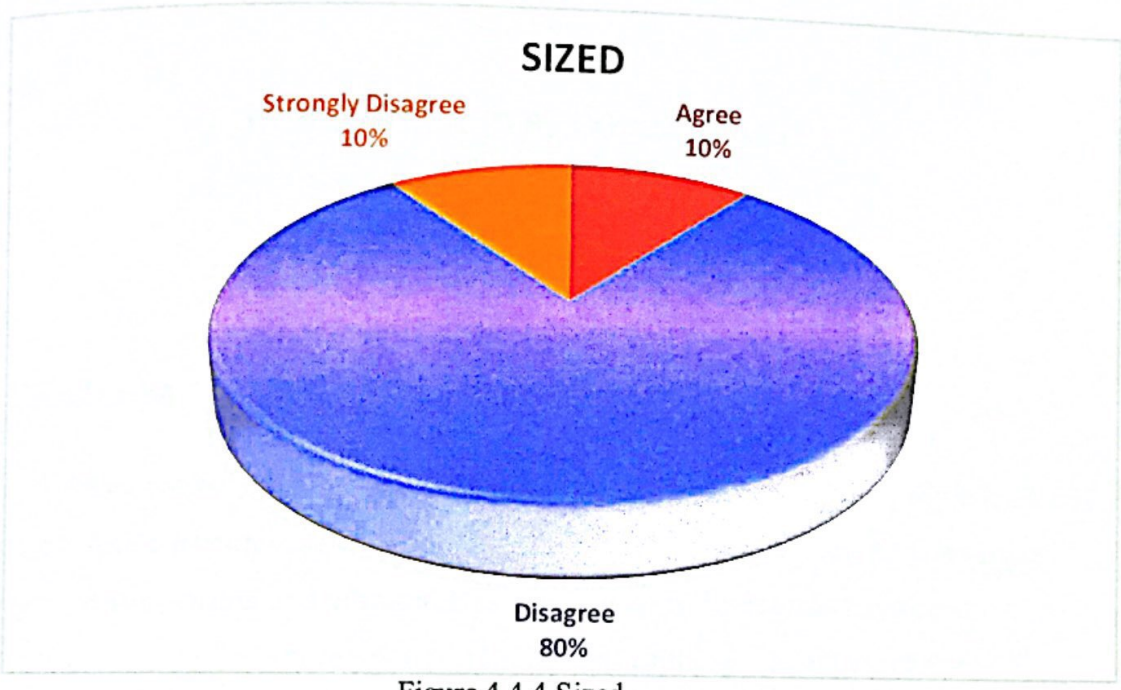


Figure 4.4.4 Sized

Statement : " The size of the component at the top of the glove disturbing the user"

Figure 4.4.4 describe the rated result of user based on sized criteria. 80% from all of the volunteer disagree about the size of the component at the top of the glove disturbing the user and 10% rated it strongly disagree while another 10% disagree . Most of them are accept the sized of the FA-G @ obstacle aided without any problem and with that sized it easy for them to bring it anywhere without disturbing their movement and so on. The minority user that agree with the statement *" The size of the component at the top of the glove disturbing the user"* state that they want a smaller size than FA-G @ obstacle aided and the best way is to used all the smallest component.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

FA-G@obstacle aided for the blind was developed to help blind people walk and estimate distance from obstacles. Main component for this project are Arduino Nano, ultrasonic sensor, buzzer and vibrator. Based on the experiment that have been conducted, there are few advantages and limitations of this project. One of the advantages for this project was the use of ultrasonic sensor and buzzer. The sensor is very sensitive and will trigger faster when it detect obstacles. The system has been set to detect obstacles below 25cm,26cm to 45cm and 46cm to 70cm. For instance, if obstacles detected at a distance 46cm to 70cm, the buzzer will beep slowly but when the obstacles at distance 25cm to below, the buzzer will beep very faster. Besides, the cost to develop this project was low and affordable to all people. The limitations of this project was the ultrasonic sensor used can detect only 30 degree angle width and only detect obstacle around them in distance 2cm until 3m. Furthermore, this project can be used by blind people and blind deaf people.if the user come from blind deaf people, the vibrator will let them know if the ultrasonic sensor detect obstacles around them and the user can feel the vibration. Future improvement, can be made when sound can be identify the object to increase the performance of this project.

5.2 Recommendation

This project had successfully achieve the main objectives which is to help blind people walking without relying on others and also walking stick. However, there are some improvement that need to be considered in order to increase the performance of this project. The proposal below will describe the thing that will increase the diversity of this project.

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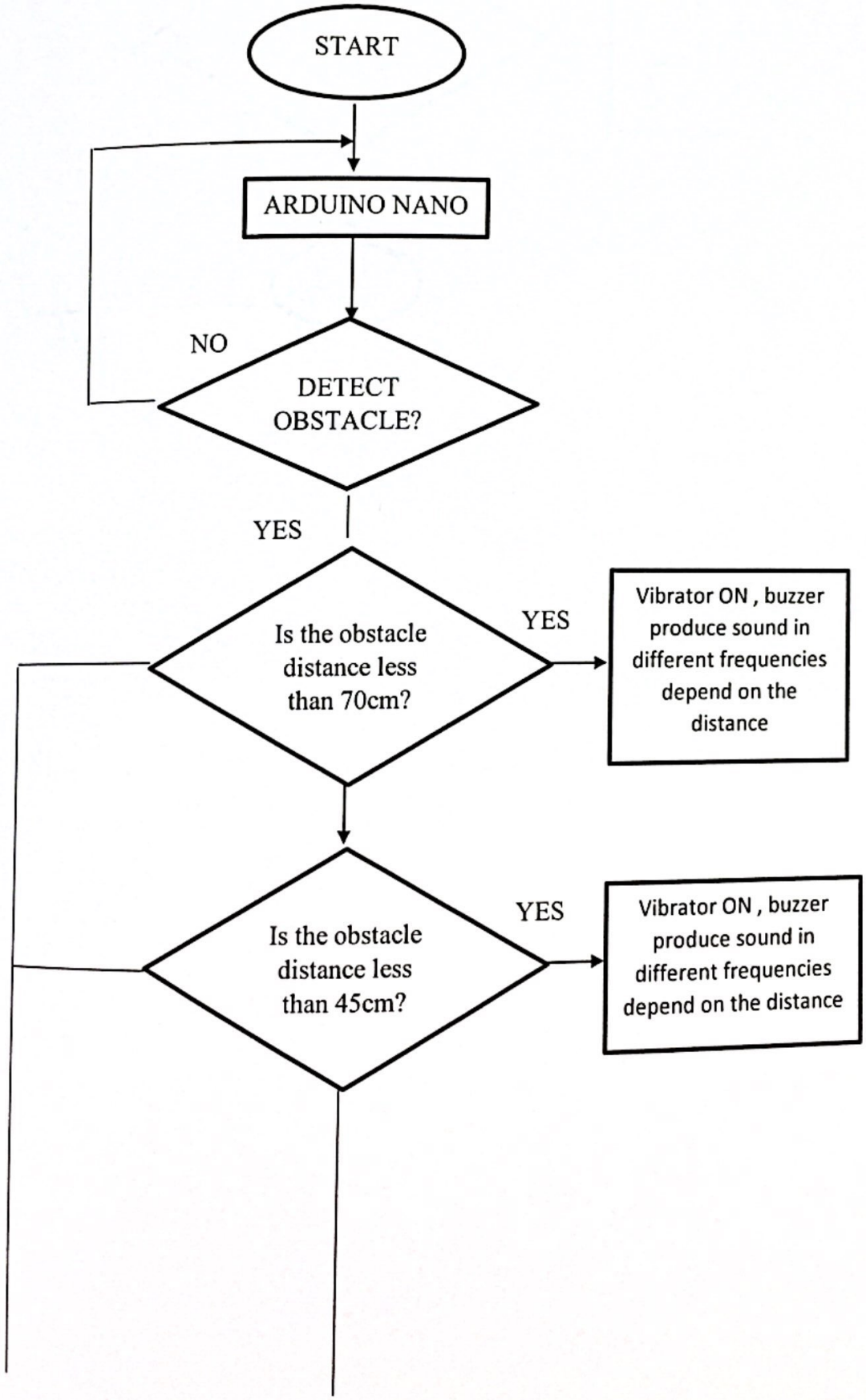
Program Code

```
#define trigPin 7
#define echoPin 6
#define motor1 10
#define motor 9
#define buzzer 8

void setup()
{
Serial.begin(9600);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(motor1, OUTPUT);
pinMode(motor, OUTPUT);
pinMode(buzzer,OUTPUT);
}

void loop()
{
long duration, distance;
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
```

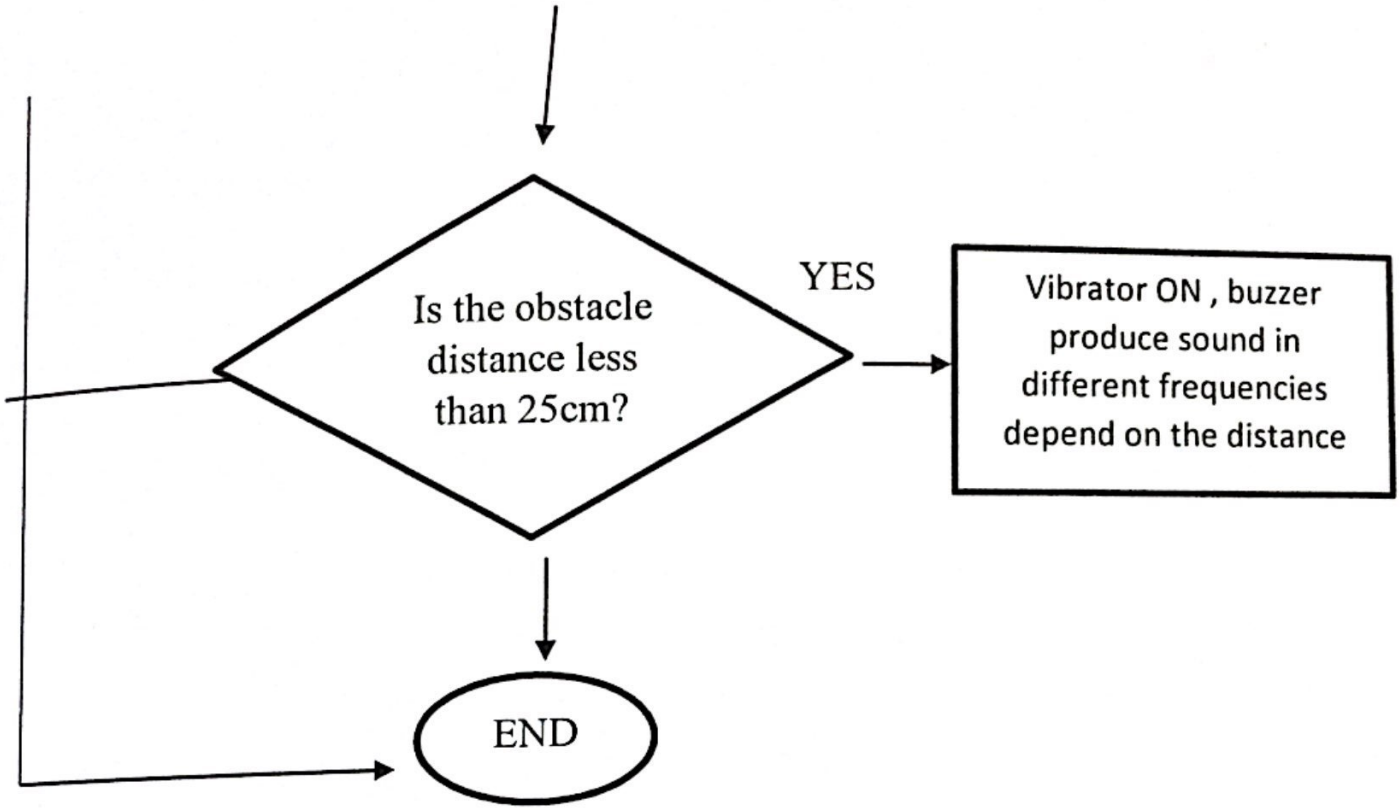
```
duration = pulseIn(echoPin, HIGH);
distance = (duration/2) / 29.1;
Serial.print(distance);
Serial.println("cm");
//delay(35);

if (distance < 29) // Checking the distance, you can change the value
{
analogWrite(motor,155); // When the the distance below 29cm
analogWrite(motor1,155);
digitalWrite(buzzer,HIGH);
}

else if ((distance > 30) && (distance < 45 )) // Checking the distance, you can
change the value
{
analogWrite(motor,155);
analogWrite(motor1,155); // When the the distance below 45cm & greater than 30cm
tet1();
}

else if ((distance > 46) && (distance < 70)) // Checking the distance, you can change
the value
{
analogWrite(motor,155);
analogWrite(motor1,155); // When the the distance below 70cm & greater than 46cm
tet();
}

else
{
```

```
analogWrite(motor,0);
analogWrite(motor1,0);
digitalWrite(buzzer,LOW);
}
}

void tet()
{
digitalWrite(buzzer,HIGH);
delay(120);
digitalWrite(buzzer,LOW);
delay(60);
}

void tet1()
{
digitalWrite(buzzer,HIGH);
delay(50);
digitalWrite(buzzer,LOW);
delay(25);
}
```

FLOWCHART PROGRAM



APPENDIX 2



EVALUATION FORM

TITLE : FA-G@Obstacles Aided

PART A : Respondent background

Instruction : Please tick (/) where applicable

1. Gender
   - Male ( )
   - Female ( )
2. Race
   - Malay ( )
   - Cina ( )
   - Indian ( )
   - other ( )

Criteria	Agree	Disagree	Strongly disagree
Efficiency "This glove was efficient and can be used by blind people"			
Weight "The weight of the glove was light and can easily be carried by user"			
Safety "The glove is safe to be used and does not bring any injuries to user"			
Sized " The size of the component at the top of the glove disturbing the user"			

APPENDIX 4

GANTT CHART

GANTT CHART FOR FYP 1

TASK \ WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Select project to undertake and plan project														
Problem statement and literature review														
Presentation of the confirmation topic														
Search a journal and info that related with project														
Design the schematic of the system														
Build a circuit that related with project using Proteus software														
Block diagram and how its work														
Buy the fetal heart rate detector to collect the data analysis														
Solve the problem that occurs with this project														

GANTT CHART FOR FYP 2

TASK \ WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Find the component for the fetal HR eco kit circuit and try to solve the problem that occurs														
Change a new project title and prepared the problem statement and objective														
Choosing component that related with a new project and start write the program in c language using Arduino software.														
Implement the program code into Arduino nano.														
Collect the data analysis and learn how to write in braille font														
Troubleshooting and design the casing														
Try to make a manual in braille font for user														
Integrated the hardware with the glove														
Project report														
Presentation														