DEPARTMENT OF MECHANICAL ENGINEERING

SOCIAL DISTANCING DETECTOR

DJJ50193 PROJECT 2

SESI 1 : 2021/2022

TEAM MEMBER:	**MATRIX NO:**
AHMAD SYAHMI BIN SHAHABUDDIN	(08DKM19F1030)
NURUL MUHAIMINAH BINTI AZMAN	(08DKM19F1013)
NUR LIYANA BINTI MOHAMAD SALEHUDIN	(08DKM19F1027)

SUPERVISOR:

DR. NORASIAH BINTI MUHAMMAD

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SOCIAL DISTANCING DETECTOR

AHMAD SYAHMI BIN SHAHABUDDIN

(08DKM19F1030)

NURUL MUHAIMINAH BINTI AZMAN

(08DKM19F1013)

NUR LIYANA BINTI MOHAMAD SALEHUDIN

(08DKM19F1027)

DEPARTMENT OF MECHANICAL ENGINEERING

SESI 1: 2021/2022

DECLARATION OF ORIGINALITY AND COPYRIGHT

SOCIAL DISTANCING DETECTOR

Perbadanan Harta Intelek Malaysia
Intellectual Property Corporation of Malaysia
Unit 1-7, Ground Floor, Menara UOA Bangsar, No. 5, Jalan Bangsar Utama 1,
59000 Kuala Lumpur. Tel: +603-2299 8400 Fax: +603-2299 8989
Website: http://www.myipo.gov.my

REGISTER OF COPYRIGHT SUMMARY

Disclaimer: The information provided below are derived from the applicants. MyIPO shall not be liable for any inaccuracies based on the information given.

Application No	: **LY2021W05117**	Category of Work	: **Literary**
Application Date	: **23 NOVEMBER 2021**	Date of Creation/Fixation	: **01 October 2021**
Legal Status	: **New Application**	Date of Publication	: **01 October 2021**
Title of Work	: **SOCIAL DISTANCING DETECTOR**	Date of Notice/Certificate Issued	: **03 January 2022**
Translation	:	End of Protection Date	:
Transliteration	:		

Author

DR. NORASIAH BINTI MUHAMMAD
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH PERSIARAN USAHAWAN SEKSYEN U1
40150 SHAH ALAM SELANGOR
MALAYSIA

NUR LIYANA BINTI MOHAMAD SALEHUDIN
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH, PERSIARAN USAHAWAN, SEKSYEN U1,
40150 SHAH ALAM SELANGOR
MALAYSIA

AHMAD SYAHMI BIN SHAHABUDDIN
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH, PERSIARAN USAHAWAN, SEKSYEN U1,
40150 SHAH ALAM SELANGOR
MALAYSIA

NURUL MUHAIMINAH BINTI AZMAN
POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH, PERSIARAN USAHAWAN, SEKSYEN U1
40150 SHAH ALAM SELANGOR
MALAYSIA

Owner

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH
PERSIARAN USAHAWAN, SEKSYEN U1, 40150 SHAH ALAM, SELANGOR
MALAYSIA

Date Printed : **03 Jan 2022**
Printed By : **System Customer**
Note: This document is computer generated and no signature is required.

Page 1 of 1

ACKNOWLEDGEMENT

Praise and gratitude to Allah S.W.T for providing me with sufficient physical and mental power to complete my final year project up to completion. Here I express my infinite gratitude and thanks to my supervisor, Dr Norasiah Binti Muhammad, for her unwavering support, guidance, sharing of opinions and unfailing patience throughout the project's duration. Under her guidance, I've learned a lot, both practically and intellectually. Aside from that, I owe a debt of gratitude to my parents and all of my friends who have aided me in the implementation of this project by providing feedback.

Finally, a million thanks to everyone who helped make this project a reality, whether directly or indirectly. The assistance provided to me was invaluable, from the tiniest to the largest.

ABSTRACT

This project aim is to provide an effective social distance monitoring solution in a pandemic situation. The raging coronavirus disease 2019 (COVID-19) caused by the SARS-CoV-2 virus has brought a global crisis with its deadly spread all over the world. The problem is people all over the country feel that society was insensitive in keeping a distance during the COVID-19 pandemic. There are two method selection procedures which are the software method and the hardware method. Firstly, the software method of encoding with Arduino code was chosen. The USB cord was used to connect the Arduino to the PC, then the Arduino IDE was opened and picked the appropriate board and port. The second one is the hardware method of 3D printing. The process of layering materials to create objects with varying shapes and sizes using filament PLA. The result of the project was successful and working well, as it detected body heat within 1 metre. Even though it occasionally buzzes without detecting any body heat, it has been sufficient to demonstrate that met the goal thus far. In a nutshell, this project is really helpful in many ways that can be observed. The benefit of this project is it can solve the problem that people face nowadays, which is the social distancing of the new norm. This project also assists many people who are struggling in this pandemic with maintaining their social distance. especially for blind people. This proves that this social distancing detector is a good innovation project.

ABSTRAK

Projek ini bertujuan untuk menyediakan penyelesaian pemantauan jarak sosial yang berkesan dalam situasi pandemik. Penyakit coronavirus 2019 (COVID-19) yang meruncing yang disebabkan oleh virus SARS-CoV-2 telah membawa krisis global dengan penyebaran mautnya ke seluruh dunia. Masalahnya, rakyat di seluruh negara merasakan masyarakat tidak peka dalam menjaga jarak semasa pandemik COVID-19. Terdapat dua prosedur pemilihan kaedah iaitu kaedah perisian dan kaedah perkakasan. Pertama, kaedah pengekodan perisian dengan kod Arduino telah dipilih. Kord USB digunakan untuk menyambungkan Arduino ke PC, kemudian Arduino IDE dibuka dan memilih papan dan port yang sesuai. Yang kedua ialah kaedah perkakasan percetakan 3D. Proses melapis bahan untuk mencipta objek dengan pelbagai bentuk dan saiz menggunakan filamen PLA. Hasil projek itu berjaya dan berfungsi dengan baik, kerana ia mengesan haba badan dalam jarak 1 meter. Walaupun ia kadangkala berdengung tanpa mengesan sebarang haba badan, ia sudah memadai untuk menunjukkan bahawa ia mencapai matlamat setakat ini. Secara ringkasnya, projek ini sangat membantu dalam banyak cara yang boleh diperhatikan. Faedah projek ini adalah dapat menyelesaikan masalah yang dihadapi oleh orang ramai pada masa kini, iaitu penjarakan sosial mengikut norma baharu. Projek ini juga membantu ramai orang yang bergelut dalam pandemik ini dengan mengekalkan jarak sosial mereka. terutama bagi orang buta. Ini membuktikan bahawa pengesan jarak sosial ini adalah projek inovasi yang baik.

CONTENT

LIST OF FIGURES

LIST OF ABBREVIATION

CHAPTER 1
INTRODUCTION

1.1 BACKGROUND OF THE PROJECT

Motion detection is the action of sensing physical movement in a given area. Motion can be detected by measuring change in speed or vector of an object in the field of view. This can be achieved either by mechanical devices that physically interact with the field or by electronic devices that quantifies and measures changes in the given environment.

There are two device of motion detection which is the mechanical device, and the other one is electronic device. In the mechanical device, a tripwire is a simple form of motion detection. If a moving objects steps into the tripwire's field of view then a simple sound device like bells may alert the user.

Mechanical motion detection devices can be simple to implement, but at the same time, it can be defeated easily by interrupting the devices' mechanics like "cutting the wire". While in electronic device, the electronic motion sensing such as motion detectors, can prevent such mechanical intervention. The principal methods by which motion can be electronically identified are optical detection and acoustical detection. Infrared light or laser technology may be used for optical detection.

In addition, as people are entering the Industrial Revolution 4.0 (IR4.0) era, having a Social Distancing Detector with a motion sensor and system fulfil the requirement of IR 4.0 component where it consist 2 out of 4 IR4.0 major components which is Internet of Things (IoT).

1.2 PROBLEM STATEMENT

Main issue that are being confront by people all over the country is that society was insensitive in keeping a distance during the Covid-19 pandemic. This has resulted in the number of covid-19 patients increasing daily across the country. Next, people with disabilities find it difficult to practice social distancing like the visually impaired.

1.3 OBJECTIVE

The objectives of this project are:

i. To design a new device that can track social distance between communities.
ii. To develop social distance detectors for the community within this new norm.
iii. To maintain 1 meter distance between communities in new norm.
iv. Using IoT to track social distance.

1.4 RESEARCH QUESTIONS

Due to the fact that we need to gather opinions from the public about social distancing detector , these questions will be asked in the form of Google Forms as a survey so that we will be able to collect the data required.

i. How does people maintain social distance between each others?
ii. Are you a person who its difficult to maintain social distance?
iii. Is it possible for this detector can help people to maintain social distance?

1.5 SCOPE OF PROJECT

The scopes to this project are:

i. Its suitable for use for all ages
ii. Used when going anywhere. For example, supermarkets, restaurants and so on.
iii. Designed in the form of a keychain that can be placed on a handbag or key.

1.6 SIGNIFICANCE OF PROJECT

In this chapter, the study explains about social distancing detector in general and it relates to communities. All the objectives were conceived out of all the problem statements. The main objective that will be focus more on this project is social distancing detector to solve problem of being confront by people all over the country. For example, they insensitive in keeping a distance during the Covid-19 pandemic and make sure this social distancing detector would help community to develop social distance for this new norm. This has become a problem for communities to maintaining social distancing and it is not easy to practice in a short time in the new norm. Issues and the scope of this project will only be focusing more on the design of social distancing detector and how it help communities to maintaining social distancing. Therefore, this new prosthetic can be beneficial not only to communities, but also to the whole country to reduce covid-19 cases.

1.7 DEFINITION OF OPERATIONAL TERMS

Motion Sensor:

a motion sensor (or motion detector) is an electronic device that is designed todetect and measure movement.

Internet of Thing (IoT):

a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers.

Industrial Revolution 4.0 (IR4.0):

Refers to a new phase in the Industrial Revolution that focuses heavily on interconnectivity, automation, machine learning, and real-time data

1.8 SUMMARY

The research in this chapter explained where the project ideas and inspirations came from. All of the objectives were created as a result of the problem statements. The major goal of this research will be to develop a social distancing detector to address the challenge of keeping a safe distance during the Covid-19 pandemic. This study only focus on the possibilities of sensor technology systems and how they can assist consumers during the Covid-19 pandemic. As a result, not only will this new prosthetic benefit customers, but it will also help to minimise the number of Covid-19 instances.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION OF SOCIAL DISTANCING DETECTOR

The creation of this social distancing detector had been create nowadays because of the pendemic of the virus,Covid-19.This virus is seriously treacherous for us. MKN (MALAYSIAN NATIONAL SECURITY COUNCIL) have made a law of this pandemic which is the SOP of Covid-19. This SOP is including the social distancing between people.

As we can saw that mostly people were not that really care of this social distancing as well as been oder to them but what most sad is the blind people can't even tells that whether their were in the social distancing.Because of that,this social distancing detector that using the motion sensor, Passive infrared(PIR) motion sensor that can detect the people by detecting the body heat of people.

People just need to attached their social distancing detector at their body while them went out of their houses.Thus,this social distancing would detect the body heat of others people and alarm that will be triggered as them were within the range of 1 meter from the host.This social distancing detector can detects motion in a high sensitivity so anyone can easily used it especially for blind person.Unfortunately,this detector is quickly to detect the motion that it is also would became the problem for people to struggle adjusting their distance from others.

2.2 PREVIOUS RESEARCH / REVIEWS / INVESTIGATION

SOCIAL DISTANCING DETECTOR ACROSS THE TIME

2.2.1 Point Grab

prepared by: Nur Liyana Binti Mohd Salehudin

PointGrab developed its technology before the pandemic to help workspace managers optimize how employees use office space. About the size of a smoke alarm, the sensors can record the exact number and location of people in buildings including offices, hotels and restaurants.PointGrab's sensors were connected to screens in the building to show the availability of desks and shared areas in real time. PointGrab has adapted the technology so the sensors can also monitor social distancing by keeping track of how far apart people are, and whether they're traveling in one direction around a building. Workspace managers can set up alerts for when two people are closer than two meters for more than 30 seconds [1] . Figure 2.2.1 shows the PointGrab.

Figure 2.2.1 PointGrab

2.2.2 Security Camera

prepared by: Ahmad Syahmi Bin Shahabuddin

As the name implies, motion sensors detect moving objects outside or even inside your home. They are often tied to lights, alarms, security cameras, and most recently, smart doorbells. Motion sensors are integrated into other products to detect and trigger a response such as the light turning on or the camera commencing recording. The purpose is to trigger an alarm, light, or camera recording to deter or catch criminals.

While motion detection is a good first step, relying solely on motion sensors can result in false alarms. Instead, look for a security system that uses infrared heat sensors for more accuracy. As security systems often notify you when they are triggered, infrared heat sensing ensures you won't be bombarded by unnecessary notifications. When looking for a security camera with infrared technology there are two options on the market, PIR and True Detect™ [2] . Figure 2.2.2 shows the Security Camera.

Figure 2.2.2 Security Camera

2.2.3 Safe Spacer

prepared by: Nurul Muhaiminah Binti Azman

Safe Spacer ™ is a lightweight wearable device that helps employees and visitors maintain a safe social distance, enabling workplaces and public spaces to reopen and operate quietly.

Using Ultra-wideband technology, the Safe Spacer runs wirelessly on a rechargeable battery and is accurate when other devices are within 2m / 6 feet, alerting the wearer with a choice of visual, vibration or audio alarms. Easy to use, Safe Spacer features a patent-pending algorithm that works instantly out of the box, with no special setup or infrastructure required and can be worn comfortably on a bracelet, with a belt, or carried in a pocket. It offers ultra-accurate measurements of up to 10cm / 4 "- ten times more accurate than Bluetooth applications. Outside factories, warehouses and offices, Safe Spacer can also be used by visitors to public spaces such as schools, hospitals, gyms, museums, hotels, casinos and more.Designed for quick and easy disinfection, it is also waterproof.For minimal handling, Safe Spacer works wirelessly via NFC or Bluetooth contactless technology [3]. Figure 2.2.3 shows the Safe Spacer.

Figure 2.2.3 Safe Spacer

DEFINE MOTION SENSOR

Motion sensors are popular when it comes to security and energy efficiency. They can be used for burglary alarms or security cameras, activating these devices when it senses motion in the vicinity. It can be an energy saver by shutting off lights in a building when it senses no motion anymore, which is used regularly in office buildings or restrooms. There are three types of motion sensors that are used frequently: Passive Infrared (PIR), Microwave, and Dual Tech/Hybrid.

The PIR is a motion sensor that you might have seen when you enter a restroom or an office space, usually having a white cover. They are small, low power, easy to use, and inexpensive. The way it senses movement is by sensing the change in temperature between the background and a warm body.

PIRs have a pyroelectric sensor that detects levels of infrared radiation – everything emits some low-level radiation, but a human body emits a good amount of heat. The PIR has two slots made of a special material that is sensitive to infrared. When the sensor senses a differential change between the two slots, this causes a pulse, which is what it detects as "movement".

2.2.4 APPLICATION OF MOTION SENSOR IN SOCIAL DISTANCING DETECTOR

It is important to place the Sensors at the right place and angle to avoid causing a false alarm. Avoid placing Sensors close to heat vents or drafty places that can easily trip the sensors due to temperature shifts.Place the sensors opposite to doorways or entrances so that the device senses movement at the earliest. Avoid blocking the sensors by placing them above tall furniture. It can restrict the infrared radiation as it doesn't penetrate through hard objects like furniture. Test the motion sensors for the right area and its functioning as per your expectations. Dust particles on the sensors can restrict the functioning of the sensors; hence regular maintenance of the devices is necessary.

2.3 SUMMARY

This chapter reviewed all relevant material used in the Social Distancing Detector study. It is clear from this chapter that developing a smart social distancing detector is necessary nowadays. Traditional social distancing detectors can still be used and have their own set of benefits and drawbacks, but they are too time-consuming for people who are too busy to deal with their social distancing for the day. It was also revealed that this social distancing detector was invented in recent years, but it is prohibitively expensive for the general public to own. As a result, this project attempts to address the issue by manufacturing the social distancing detector and putting it on the market a reasonable price, so that people can buy it and relieve themselves of the burden of having to check their social distance.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

Methodology provides an overview of the research methods used in the study. The research design that was adopted for the purpose of this study, as well as the reasons behind that choice, is described under methodology. The data gathering approach is also detailed, as are the techniques employed to carry out this project. The instrument that was used to fabricate this project are also detailed, as are the methods that were followed to conduct this project. Finally, the ethical considerations that were taken into account during the procedure are highlighted.

This chapter will go over the steps involved in fabricating a social distancing detector in greater depth. The system was programmed using the Arduino UNO software. Following that, Autodesk Inventor Software was used to design the project model. The components, as well as all of the materials required for the project, were discussed. Apart from that, a Gantt Chart of our project was also discussed, which will display and explain all of the project's processes and planning across the 14-week period.

3.1.1 METHODOLOGY FLOWCHART

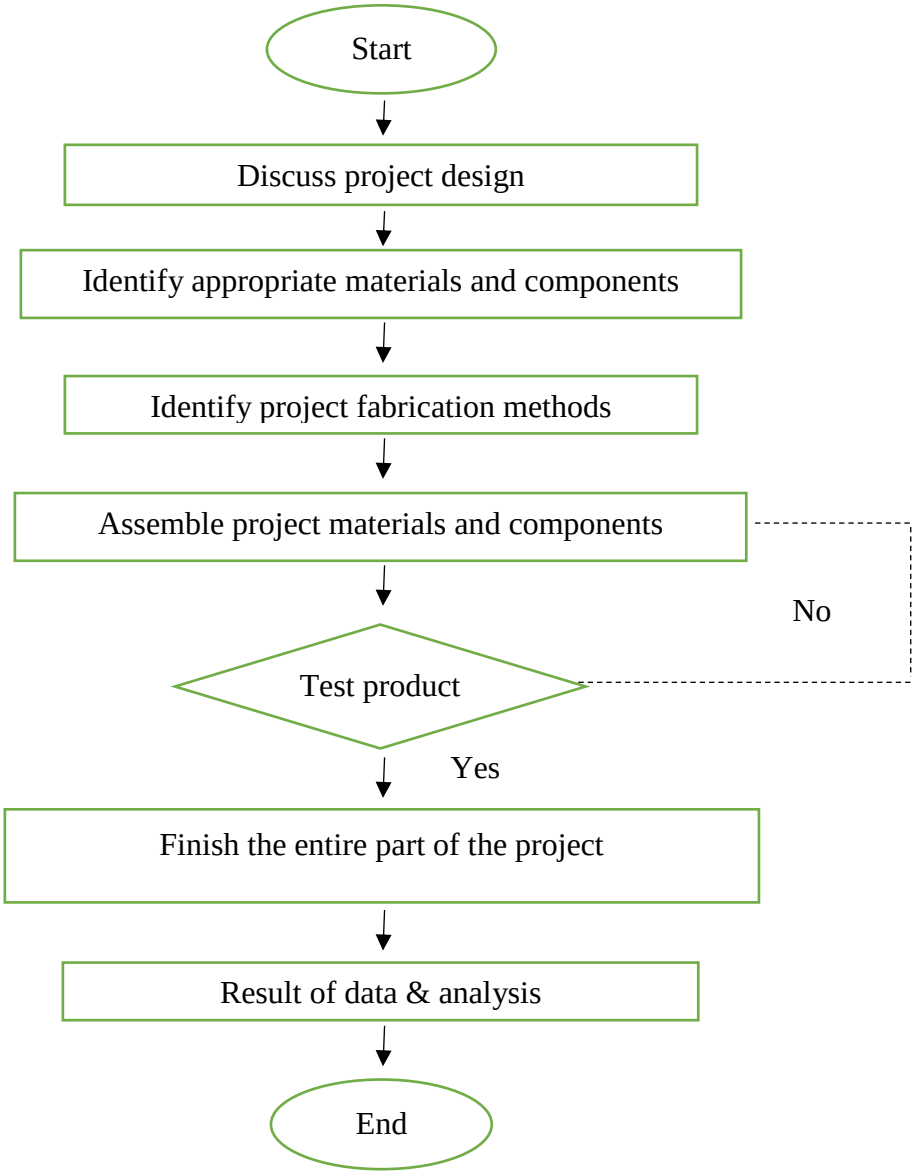


Figure 3.1.1 Project Development Methodology Flowchart

3.2 PROJECT DESIGN

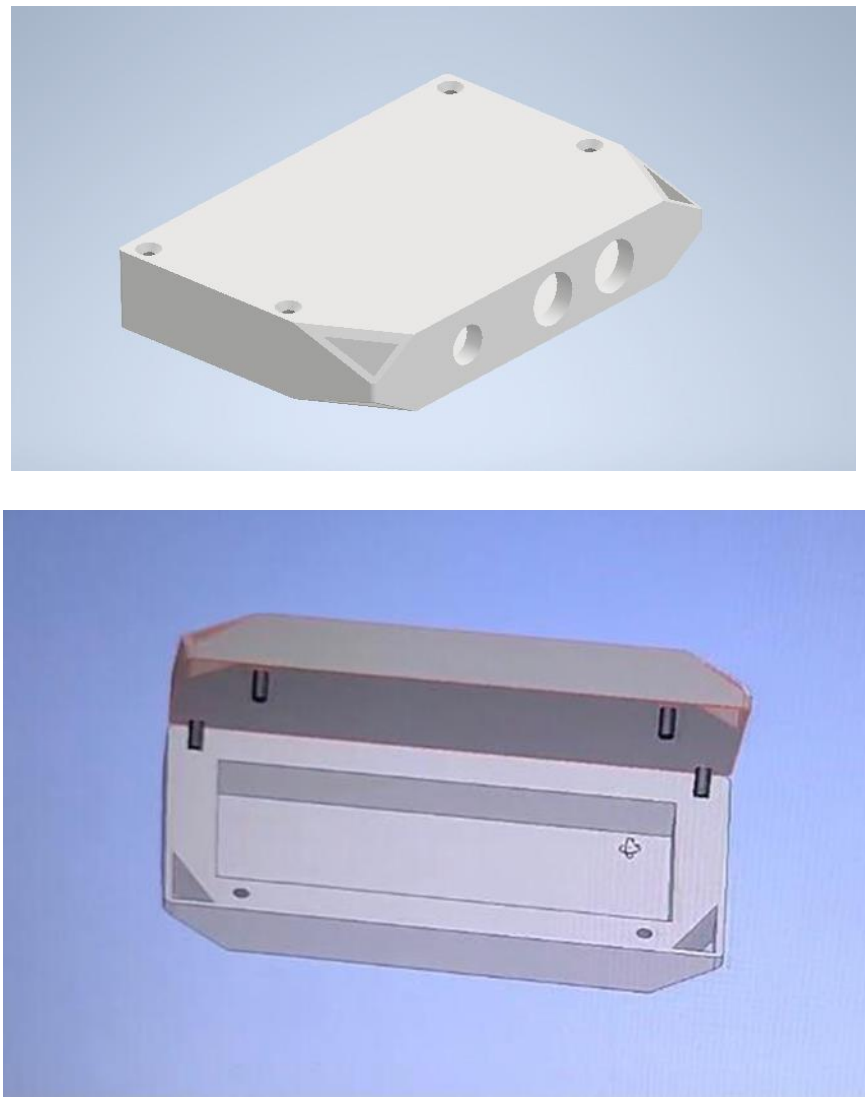


Figure 3.2 Social Distancing Case

3.2.1 METHOD OF PROJECT DEVELOPMENT

This method selection procedure is crucial in ensuring that the method chosen is precise and appropriate for the product. This approach selection will help us avoid wasting money and time. As a result, it is critical to complete this technique selection process. There are two of them:

- **SOFTWARE METHOD**

Arduino Code:

The Arduino board connects to a computer via USB and then to the Arduino development environment (IDE). The user creates Arduino code in the IDE and then uploads it to the micro controller, which runs it and interacts with sensors and piezo buzzer. The Arduino code is written in C++, with a few extra methods and functions that we'll go through later. C++ is a computer language that is easy to understand. A 'sketch' (the name given to Arduino code files) is processed and compiled to machine language when we produce it.

Encoding with Arduino code is the method of choice. We use a USB cord to connect the Arduino to the PC, then open the Arduino IDE and pick the appropriate board and port. Then, copy the code and open it in the Arduino IDE until the code is uploaded to the Arduino. This method can be used to demonstrate how the Social Distancing Detector is processed automatically with buzzer when motion sensor detect the the limit of distance between communities. Figure 3.2.1 (a) below shows Arduino Encoding.

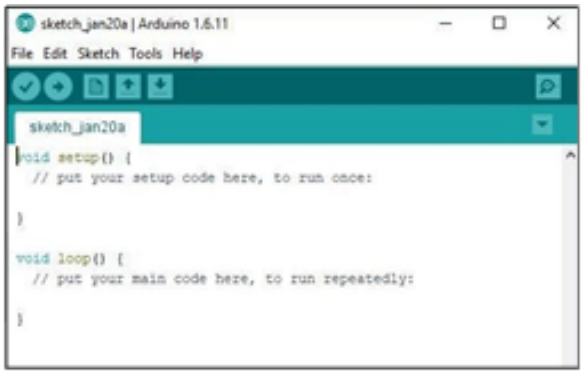


Figure 3.2.1 (a) Arduino Encoding

❖ HARDWARE METHOD

3D Printing:

Three-dimensional objects are created using computer-aided design through a layering process (CAD). 3D printing, also known as additive manufacturing, is the process of layering materials such as plastics, composites, or bio-materials to create objects with varying shapes, sizes, rigidities, and colours. 3D printers are members of the additive manufacturing family and function similarly to inkjet printers, but in three dimensions. A combination of cutting-edge software, powder-like materials, and precision instruments is required to create a three-dimensional object from scratch. Because our project is made of plastic rather than metal, we use 3D printing. Figure 3.2.1 (b) shows a 3D printing machine.

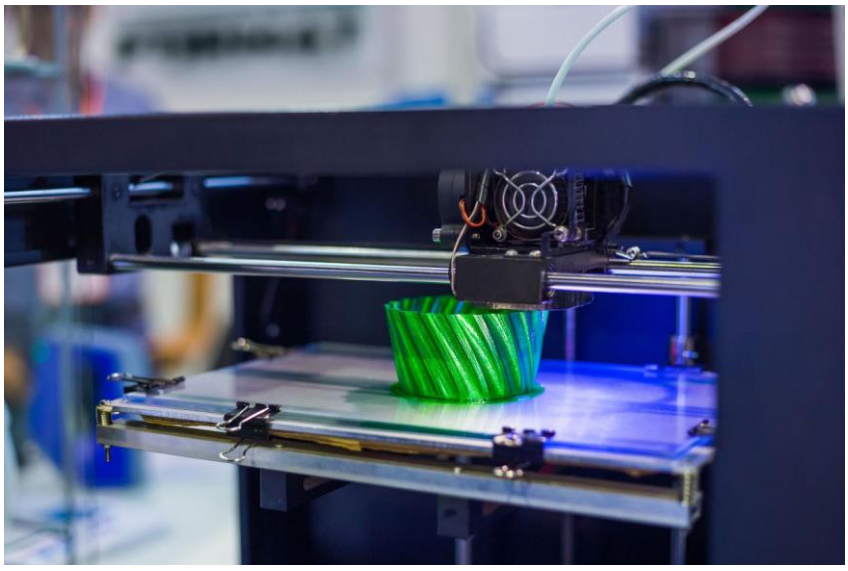


Figure 3.2.1 (b) 3D Printing Machine

3.2.2 MATERIAL EQUIPMENTS

Material selection is a step in the process of designing any physical object. The selection of materials must be appropriate to the project to be carried out to avoid losses.

- **PIR Motion Sensor Module for Arduino**

  prepared by: Nur Liyana Binti Mohd Salehudin

  PIR Motion Sensor is based on infrared technology, with automatic control, high sensitivity, high reliability, ultra-small and ultra-low-voltage operation mode. Because of the minimum size and low-power operation mode, it is widely used in various auto-sensing of electrical equipment, especially battery-powered automatic control products. Small size makes it easy to apply to real applications commonly found in appliances and gadgets used in homes or businesses. [4] Figure 3.2.2 (a) below shows a PIR Motion Sensor Module.

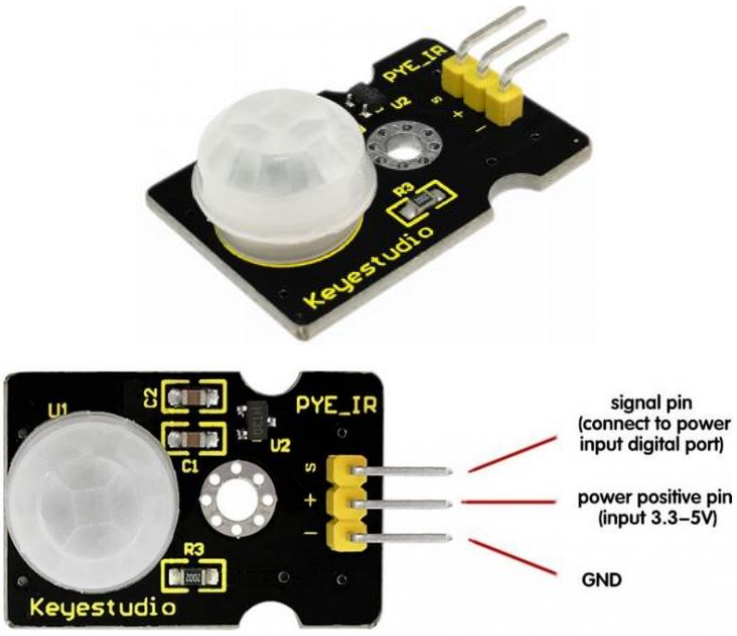


Figure 3.2.2 (a) PIR Motion Sensor Module.

- **Arduino Uno Rev3-Main Board**
  prepared by: Nurul Muhaiminah Binti Azman

  Arduino is an open-source physical computing platform based on a simple i/o board and a development environment that implements the Processing/Wiring language. Arduino can be used to develop stand-alone interactive objects or can be connected to software on your computer (e.g. Flash, Processing, MaxMSP).

  The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

  The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. [5] Figure 3.2.2 (b) show a Arduino Uno Rev3-Main Board.

3.2.2 (b) Arduino Uno Rev3-Main Board.

"Uno" means "One" in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

Features:

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by the bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Below,figure 3.2.2 (c) show a pin diagram of Arduino Uno Rev 3 Main Board.

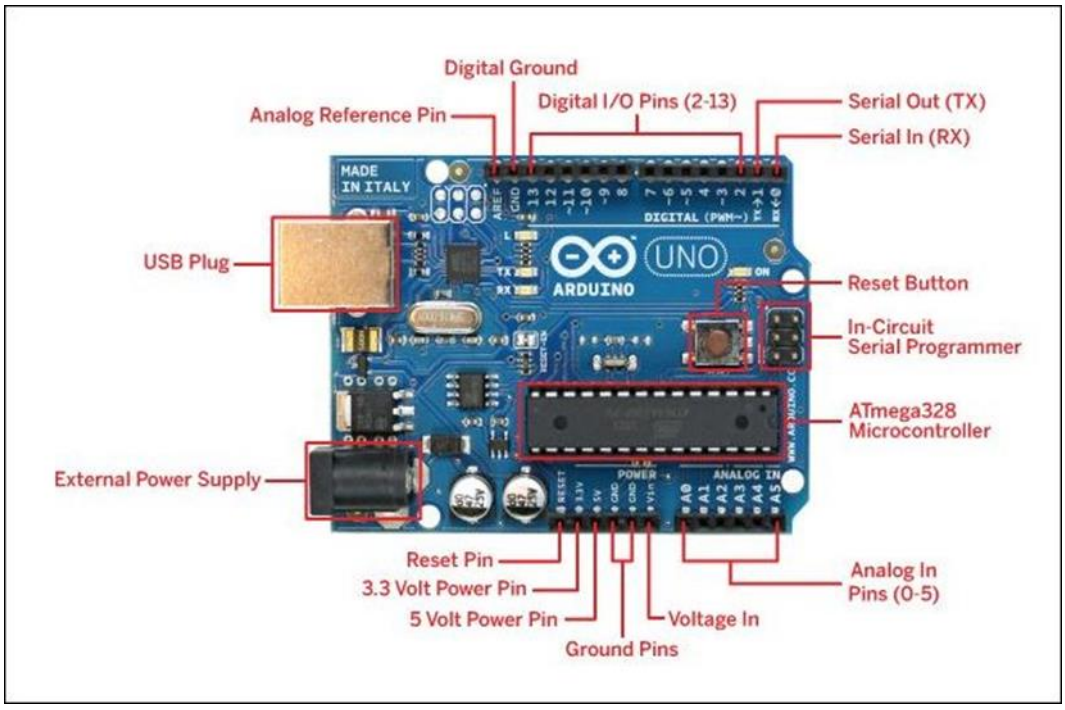


Figure 3.2.2 (c) Pin Diagram of Arduino Uno Rev 3 Main Board

- **Breadboard 400 Holes**

  prepared by: Nur Liyana Binti Mohd Salehudin

  A modern solderless breadboard socket consists of a perforated block of plastic with numerous tin plated phosphor bronze or nickel silver alloy spring clips under the perforations. The clips are often called tie points or contact points. The number of tie points is often given in the specification of the breadboard.

  Breadboard is ideal for a beginner to learn in building the circuitry. The breadboard does not require soldering to make connections. Sometimes, it is called as solderless breadboard. You can just experiment with your circuit design by plug in the components without any soldering. Thus, this breadboard and the components are reuseable, you can modify your circuit easily without any hesitation. With this feature, it is suitable for beginners like students to build the prototype on the breadboard in order to test the circuit design. [6] Figure 3.2.2 (d) below show a solderless Breadboard 400 holes.

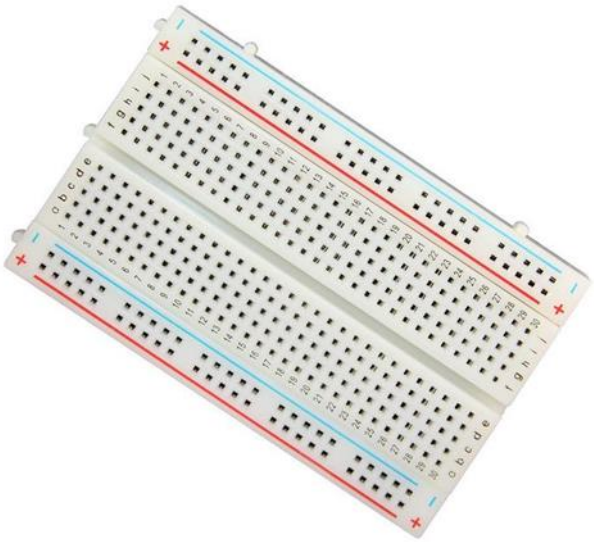


Figure 3.2.2 (d) Breadboard 400 Holes

- **Jumper Wire M/F**

prepared by: Nurul Muhaiminah Binti Azman

Jump wires (also called jumper wires) for solderless bread boarding can be obtained in ready-to-use jump wire sets or can be manually manufactured. The latter can become tedious work for larger circuits. Ready-to-use jump wires come in different qualities, some even with tiny plugs attached to the wire ends. Jump wire material for ready-made or homemade wires should usually be 22 AWG (0.33 mm2) solid copper, tin-plated wire - assuming no tiny plugs are to be attached to the wire ends. The wire ends should be stripped 3⁄16 to 5⁄16 in (4.8 to 7.9 mm). Shorter stripped wires might result in bad contact with the board's spring clips (insulation being caught in the springs). Longer stripped wires increase the likelihood of short-circuits on the board. Needle-nose pliers and tweezers are helpful when inserting or removing wires, particularly on crowded boards. [7] Jumper wire M/F picture in figure 3.2.2 (e) below.

Applications:

- Connect sensors to your Arduino board.
- Connect a breadboard to your Arduino board.
- Connect other hardware PCB's together.
- Wire hardware in a final product.

Figure 3.2.2 (e) Jumper Wire M/F

- **Screw**

prepared by: Nur Liyana Binti Mohd Salehudin

Screw is a type of fastener, in some ways similar to a bolt typically made of metal, and characterized by a helical ridge, known as a male thread (external thread). Screws are used to fasten materials by digging in and wedging into a material when turned, while the thread cuts grooves in the fastened material that may help pull fastened materials together and prevent pull-out. There are many screws for a variety of materials; those commonly fastened by screws include wood, sheet metal, and plastic. [8] Figure 3.2.2 (f) below show a size of Screw.

Figure 3.2.2 (f) Size of Screw

- **Polylatic Acid (PLA) Printer Filaments**

  prepared by: Nurul Muhaiminah Binti Azman

  Polylactic Acid (PLA) is different than most thermoplastic polymers in that it is derived from renewable resources like corn starch or sugar cane. Most plastics, by contrast, are derived from the distillation and polymerization of non-renewable petroleum reserves. Plastics that are derived from biomass (e.g. PLA) are known as "bio plastics."

  Polylactic Acid is biodegradable and has characteristics similar to polypropylene (PP), polyethylene (PE), or polystyrene (PS). It can be produced from already existing manufacturing equipment (those designed and originally used for petrochemical industry plastics). This makes it relatively cost efficient to produce. Accordingly, PLA has the second largest production volume of any bio plastic (the most common typically cited as thermoplastic starch).

  PLA is one of two common plastics used on FDM machines (3D printing) and is commonly available as a 3D printable filament; the other common 3D printer plastic is ABS. PLA filament for 3D printing is typically available in a myriad of colours. Polylactic Acid could be CNC machined but it is typically not available in sheet stock or rod form. It is, however, typically available as a thin film for thermoforming or in the form of plastic pellets for injection moulding. To adjust material properties, plastic injection mould pellets are typically produced and/or blended together. [9] Figure 3.2.2 (g) below shows various colour of PLA 3D Printer Filaments.

Figure 3.2.2 (g) PLA 3D Printer Filaments

- **USB B type Cable**

  prepared by: Ahmad Syahmi Bin Shahabuddin

  This is a standard USB 2.0 cable. This is the most common A to B Male-Male type peripheral cable, the kind that's usually used for printers. Compatible with most SFE designed USB boards as well as USB Arduino boards like the Uno.[10] Figure 3.2.2 (h) below shows USB B Type Cable

Figure 3.2.2 (h) USB B Type Cable

- **9 Volt battery with Connector to DC Jack Arduino**

  prepared by: Ahmad Syahmi Bin Shahabuddin

  The nine-volt battery format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury-oxide batteries of this format, once common, have not been manufactured in many years due to their mercury content. Designations for this format include NEDA 1604 and IEC 6F22 (for zinc-carbon) or MN1604 6LR61 (for alkaline). The size, regardless of chemistry, is commonly designated PP3—a designation originally reserved solely for carbon-zinc, or in some countries, E or E-block. [11] Figure 3.2.2 (i) below show a 9 Volt Battery with Connecter to DC Jack Arduino.

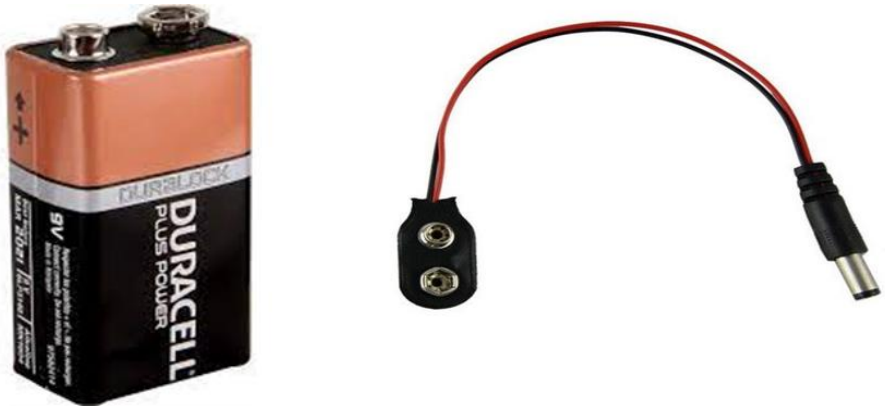


Figure 3.2.2 (i) 9Volt Battery with A Connector To DC Jack Arduino

- **Piezo Buzzer**

prepared by: Ahmad Syahmi Bin Shahabuddin

Piezo buzzers are used in applications similar to magnetic buzzers. Piezo buzzers are constructed by placing electrical contacts on two disc faces of piezoelectric material and then supporting the disc at the inner edge of the enclosure. When a voltage is applied at both electrodes, the piezoelectric material changes mechanically due to the applied voltage. The movement of a piezo disk inside a buzzer produces sound in a manner similar to the movement of a ferromagnetic disk in a magnetic buzzer or speaker cone mentioned above.[12] Figure 3.2.2 (j) below show a Piezo Buzzer.

Figure 3.2.2 (j) Piezo Buzzer

- **HC-SR04 Ultrasonic Distance Sensor**

The HC-SR04 Ultrasonic Distance Sensor is a sensor used for detecting the distance to an object using sonar. It's ideal for any robotics projects your have which require you to avoid objects, by detecting how close they are you can steer away from them. The HC-SR04 uses non-contact ultrasound sonar to measure the distance to an object, and consists of two ultrasonic transmitters (basically speakers), a receiver, and a control circuit. The transmitters emit a high frequency ultrasonic sound, which bounce off any nearby solid objects, and the reciever listens for any return echo. That echo is then processed by the control circuit to calculate the time difference between the signal being transmitted and received. This time can subsequently be used, along with some clever math, to calculate the distance between the sensor and the reflecting object. [13] Figure 3.2.2 (k) below show a HC-SR04 Ultrasonic Distance Sensor.

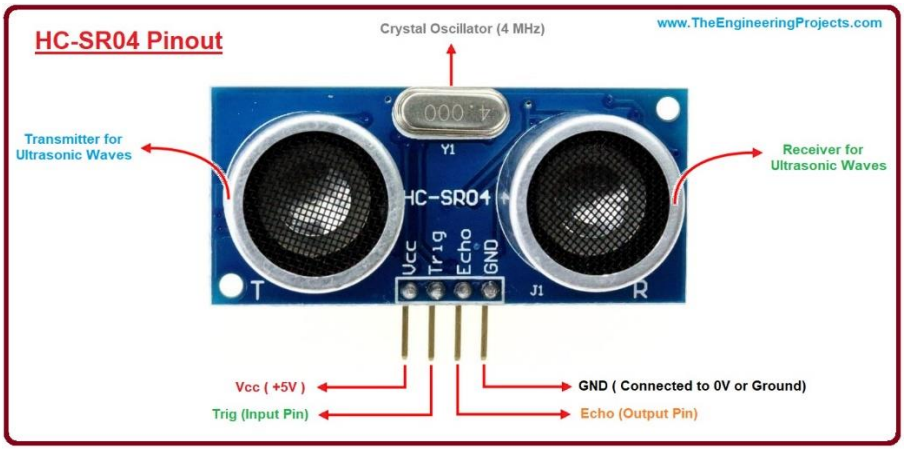


Figure 3.2.2 (k) HC-SR04 Ultrasonic Distance Sensor.

3.2.3 METHOD OF DATA ANALYSIS

During the period allotted for this project, the analysis was conducted using Google Form. The value of the Social Distancing Detector has been questioned.

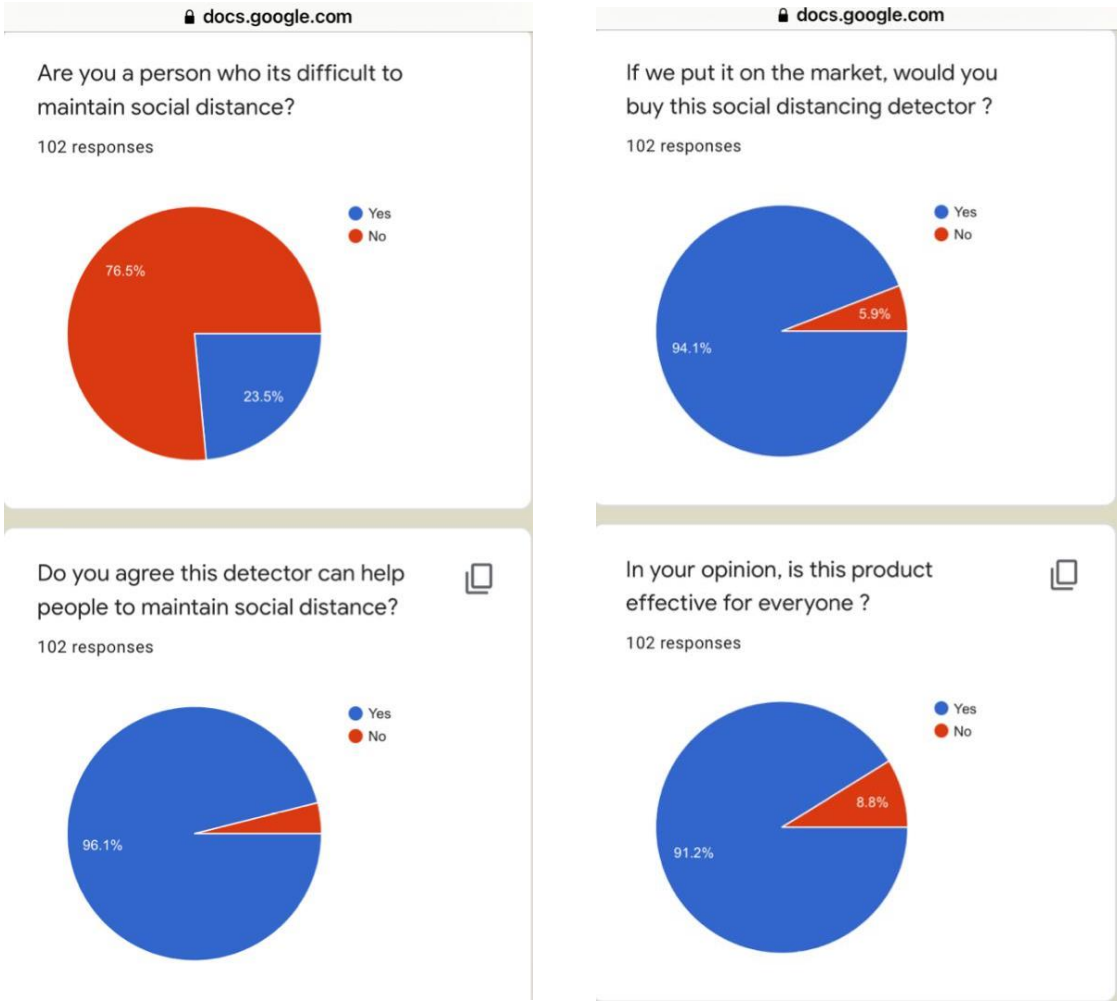


Figure 3.2.3 Google form analysis

As many as 94.1% out of 100% agree if this social distancing detector is on the market

3.3 SUMMARY

This chapter's research explains project methods, materials purchased, estimate calculations, product design, and a time frame. We had made a complete explanation in order to gain a better understanding of the project's title.We also discusses estimating costs and purchasing materials in this following section of this chapter. Furthermore,we had provided more information on the materials required for social distance detectors. To ensure that the budget in this project is affordable,we carefully made the calculation of the material purchase budget includes the actual purchase price. Following that, we also discussed the method selection in greater depth throughout this chapter. It is concerned with the methods that will be used to solve and create the project worisome.So,3D modelling can also be used to display product design, which could be useful for the project.

CHAPTER 4

RESULT AND ANALYSIS

4.1 INTRODUCTION

In this chapter, its had present data and analysis derived from the testing of social distancing detector products. This is to ensure that all research objectives and scope are met. To ensure the project's success, every piece of data had been analized.

4.2 PROECT FINDINGS AND OUTCOME OF TEST

4.2.1 RESULT OF PROJECT :

The project was successful and working well as its detected body heat within 1 metre.Even sometimes its does buzzed suddenly without detected any body heat but so far it was good enough to prove that we achived our objective.

As been programmed it using Arduino IDE,its had set up to programming pir motion sensor and ultrasonic sensor to the arduino digital board with the buzzer.

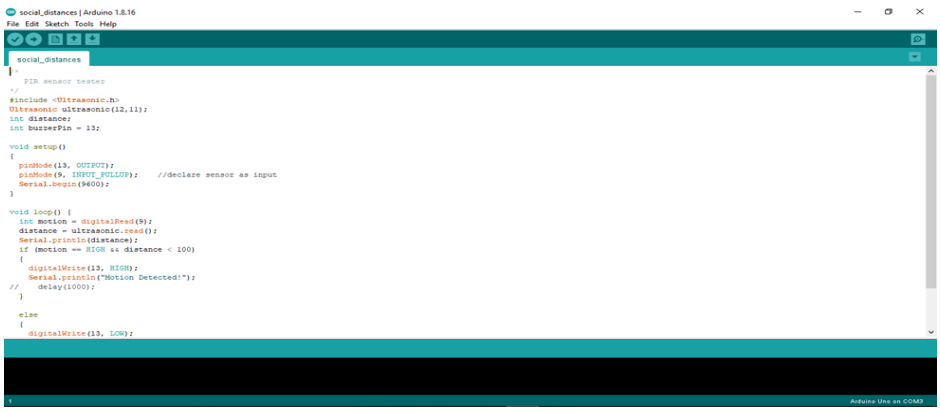


Figure 4.2.1.1 Result of Project

As we can saw above, its had connect the all of the electronic component and programmed it to the suitable pin based on each sprcification of the electronics component.The pir pin connect to the pin number 9 which it's the input source and the ultrasonic sensor at the pin number 12 (trigger) and 11 (echo).Next,we conneted the buzzer pin at number 13 as the output source.This is because whenever the sensor detected body heat (the input)and the ultrasonic sensor detected the certain distance,it would sent the information to the buzzer which is the output and it buzzed.So the programmed was success and we finished it with upload to the Arduino board.

4.2.2 THE CASING :

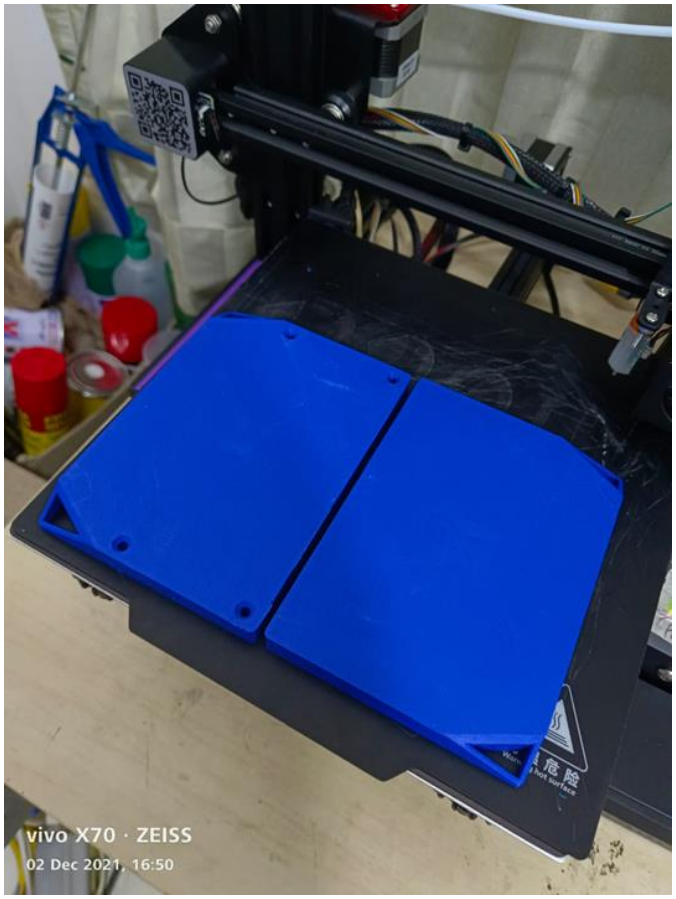


Figure 4.2.2.1 The Casing After 3D Printing

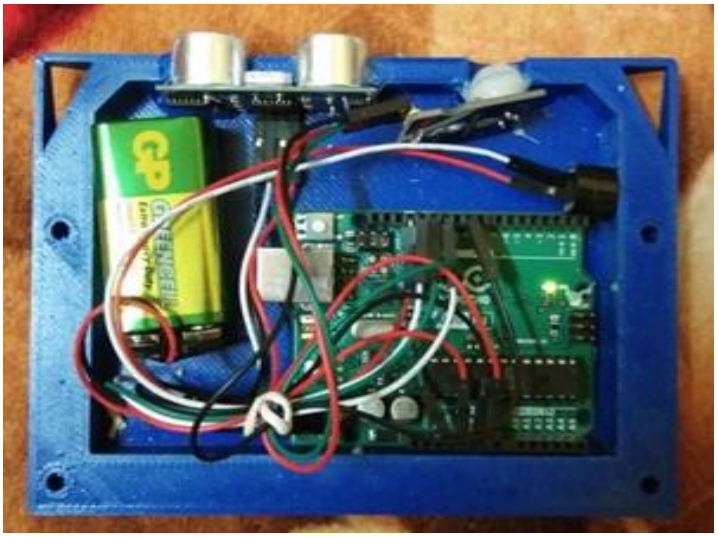


Figure 4.2.2.2 Arduino Board and Sensor in The Case.

Figure 4.2.2.3 Complete Set Up With Screw to The Casing.

As we can saw the above,it was the casing for the product that made of using 3D printing method.With all the measurement of the casing,we had put and arrange the Arduino board and the sensors.

4.3 DISCUSSION

As had been discussed, we had known that this project was a good achivement to ourself and others people.We can saw that this project brought us a lot of good advantages plus achive the objective.For us,this project was a great headstart to gain more experience and knowledge about engineering and Iot which can lead us to help more people in the future as a mechanical engineering's students.

4.4 SUMMARY

This chapter had explanained that the result of the project have a great success rate as it develop well in the community.So much that we had learned from the result and gradually practice it in this new norm.Even with so many hurdle we crossed path,we had countinuesly getting better to overcome the problem so as result it happen with flying colours.As the method we used, we had could do many of the mechanical practices that been learn especially for the programming and the 3D printing. As a result, not only will this new prosthetic benefit customers, but it will also help to minimise the number of Covid-19 contagion.

4.4 FINDINGS PRELIMINARY RESULT

- The sensor of this product can detect people within 1 m longer.
- The battery that be used can kept up the function of the sensor till 21 days.
- The casing is neatly constructed so that no water can enter.
- The sensor is detecting perfectly so it would not gave us the false alarm.

4.5 CONCLUSION

For the conclusion we had discussed,we had conclude that there are advantages and disadvantages of this project.We really hope that the advantages we achive from this product can provide benefits and convenience to the community. Next to the shortage, we also will improve and been looking for more research on this project so that it will had reached its maximum capabilty.Therefore,this project will be beneficial in the future. More testing and analysis should be done so that the product will be more accountable in the future.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

In this chapter, it is explained the project in terms of finishing and suggestion based on the product perfomance.To ensure that the product were deserved high praise, all of the recommandation had been displayed here.

5.2 CONCLUSION

In a nutshell, this project is helpful in many ways that can be observed. The benefits of this project can solve the problem that people face nowadays, which is the social distancing of the new norm. This project also assists many people who are struggling in this pandemic with maintaining their social distance. especially for blind people. This proves that this social distancing detector is a good innovation project.

5.3 RECOMMENDATION

The sensor should be more exact and precise; example 360° detection with high advanced programming so it would be in a high quality.In the future project, this Social Distancing detector could detected body heat with an accurate detection so it would helped people more alert of thier surrounding.

5.4 PROJECT LIMITATION

- Time taken for the sensors to detect : 1 second delay
- Distance for the sensors to detect : 1 metre
- Size of the casing : (140 x 100) mm

5.5 SUMMARY

This chapter had explained that, this project had achived a great success.So many conclusion and recommendation could be made to help this project walks to become more great or maybe the greatest project in the future.

REFERENCE

1. https://edition.cnn.com/2020/10/23/tech/pointgrab-sensors-social-distancing-office-spc-intl/index.html
2. https://www.swann.com/blog/motion-security-sensors-explained/
3. https://www.prnewswire.com/news-releases/safe-spacer-wearable-social-distance-monitoralarm-helps-keep-people-safe-and-workplaces-or-public-spaces-open-301059368.html
4. https://my.cytron.io/p-hc-sr505-mini-pir-motion-sensor-module?search=pir%20sensor&description=1
5. https://my.cytron.io/p-arduino-uno-rev3-main-board
6. https://robolabor.ee/en/components/250-breadboard-400.html https://my.cytron.io/p-breadboard-8.5x5.5cm-400-holes
7. https://www.coursehero.com/file/p5ba3gtd/The-clips-on-the-right-and-left-of-the-notch-are-each-connected-in-a-radial-way/
8. https://www.designingbuildings.co.uk/wiki/Types_of_screws
9. https://www.creativemechanisms.com/blog/learn-about-polylactic-acid-pla-prototypes
10. https://my.cytron.io/p-usb-b-type-cable
11. https://en.wikipedia.org/wiki/Nine-volt_battery
12. https://www.cuidevices.com/blog/buzzer-basics-technologies-tones-and-driving-circuits
13. https://www.piborg.org/sensors-1136/hc-sr04

14. DATA & ANALYSIS
    https://docs.google.com/forms/d/e/1FAIpQLSedUaHsb8JIuqxZP_hMHbNiuN3_A_hNVGawDojU5_fvST1deg/viewform?usp=sf_link

APPENDICES

ATTACHMENT A	**Gantt Chart (Project 1)**
ATTACHMENT B	**Gantt Chart (Project 2)**
ATTACHMENT C	**Project Budget**
ATTACHMENT D	**Project Dimension**
ATTACHMENT E	**Project Dimension**

ATTACHMENT A

Gantt Chart (Project 1)

Project Activity	Weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing and Project Planning														
Material Selection														
Materials Purchase														
Project Design														
Method Selection														
Proposal Writing														
Slide														

	Planning
	Actual

ATTACHMENT B

Gantt Chart (Project 2)

Week / Activities	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12	W 13	W 14
Course registration														
Write the Final Report														
MyIPO Registration														
Assemble project materials and components														
Product testing														
Finish the entire part of the project														
Data Analysis														
Plagiarism Review (Turnitin)														
Progress Presentation Project Progress Presentation														
Presentation Preparation														
Abstract review by supervisor														
Technical Paper Review by supervisor														
Correction/Refinement of Final Report														
Abstract Review by Interpreter														
Submission of Final Report														
RICE PSA														
Logbook Submission														

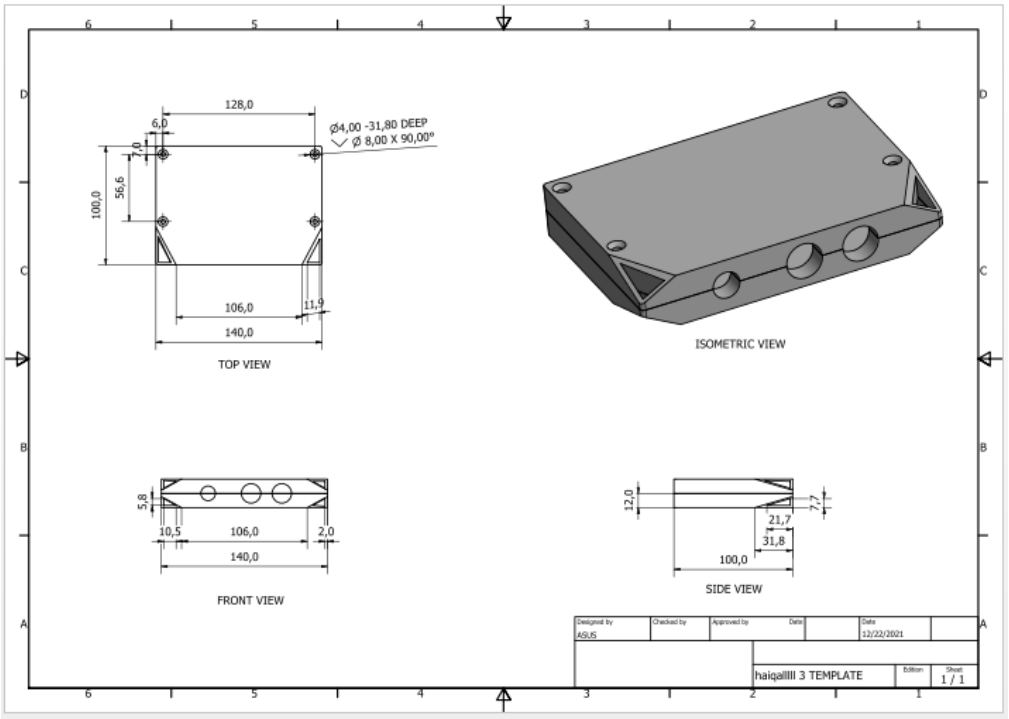
ATTACHMENT C

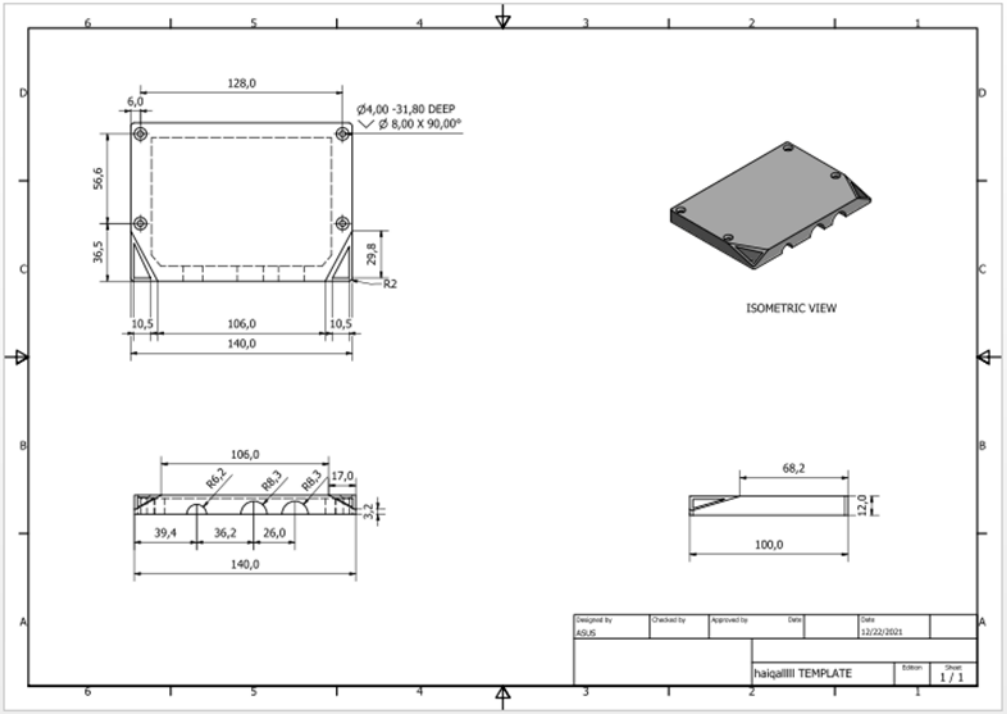
Project Budget

NO	MATERIAL	QUANTITY	PRICE PER UNIT	PRICE
1.	PIR Motion Sensor Module for Arduino	1	RM 12.00	RM 12.00
2.	Arduino Uno Rev3-Main Board	1	RM 109.00	RM 109.00
3.	Breadboard 400 Holes	1	RM 2.70	RM 2.70
4.	Jumper Wire M/F	5	RM 2.00	RM 10.00
5.	Jumper Wire M/M	5	RM 4.50	RM 22.50
5.	Polylatic Acid (PLA) Printer Filaments	2	RM 16.80	RM 33.60
6.	USB B type Cable	1	RM 3.20	RM 3.20
7.	9 Volt battery with Connector to DC Jack Arduino	1	RM 6.50	RM 6.50
8.	Skru M4*20mm	10	RM 0.10	RM 1.00
9.	Piezo Buzzer	1	RM 2.50	RM 2.50
10.	HC-SR04 Ultrasonic Distance Sensor	1	RM 4.90	RM 4.90
TOTAL		RM 207.90		

ATTACHMENT D

Product Dimension





ATTACHMENT E

Project Dimension