POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SECURE PARCEL DROP BOX

MUHAMMAD AQIL HAKIMI BIN ZAINI	**08DMP19F1060**
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JABATAN KEJURUTERAAN MEKANIKAL

SESI 1 : 2021/2022

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Laporan ini dikemukakan kepada Jabatan Kejuruteraan Mekanikal sebagai memenuhi sebahagian syarat penganugerahan Diploma Kejuruteraan Mekanikal (Pembungkusan)

JABATAN KEJURUTERAAN MEKANIKAL

SESI 1 : 2021/2022

AKUAN KEASLIAN DAN HAK MILIK

SECURE PARCEL DROP BOX

1. Kami, **MUHAMMAD AQIL HAKIMI BIN ZAINI (NO KP: 010702-10-0057), HAFEEF HAZEEQ BIN MOHD FARHADI (NO KP: 010806-01-0937), MUHAMMAD HAZIM BIN NORJAYA (NO KP:010619-01-0851)** adalah pelajar Diploma Kejuruteraan Mekanikal (Pembungkusan), Politeknik Sultan Salahuddin Abdul Aziz Shah, yang beralamat di **Persiaran Usahawan, Seksyen U1, 40150 Shah Alam, Selangor**. (Selepas ini dirujuk sebagai 'Politeknik tersebut').

2. Saya mengakui bahawa 'Projek tersebut di atas' dan harta intelek yang ada di dalamnya adalah hasil karya/ reka cipta asli saya tanpa mengambil atau meniru mana-mana harta intelek daripada pihak-pihak lain.

3. Saya bersetuju melepaskan pemilikan harta intelek 'Projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk penganugerahan **Diploma Kejuruteraan Mekanikal (Pembungkusan)** kepada saya.

Diperbuat dan dengan sebenar-benarnya diakui)
oleh yang tersebut;

MUHAMMAD AQIL) …….……
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ACKNOWLEDGMENT

I would like to express my deepest appreciation to all those who provided me the possibility to complete this report. A special gratitude I give to our final year project supervisor, Ms Isnuraini Binti Ismail@Kassim whose have invested his full effort in guiding the team in achieving the goal. I have to appreciate the guidance given by the supervisor as well as the panels especially in our project presentation that has improved our presentation skills thanks to their comment and advises.

A special thanks goes to all of the team member, who work well together throughout the process of Project 2 and gave their full commitment to the project “SECURE PARCEL DROP BOX”.

ABSTRACT

Nowadays, many people are buying their stuff trough online platform. However, the parcel delivery process allows parcels to be left in the property foyer, often in unsafe places where the delivery can only be picked up and carried by thieves. Besides, parcels are at risk of being damaged due to bad weather. The main objective of this project is to design and fabricate a Secure Parcel Drop Box, to protect parcel from bad weather and from thieves and to promote contactless delivery. The scope of this study is to carried out to ensure the safety of packages during the absence of package recipients during the delivery process. In addition, it also wants to promote to the people regarding the government recommendations to practice '3W' and avoid '3C'and also can avoid meeting people. The study also includes a literature review, we have done a research on the internet to get more review about the parcel drop box. Next, the purpose of this project is to create the design of the Secure Parcel Drop Box, protect parcels from bad weather and thieves and to avoid from meeting people. As the results of data analysis, we make two testing for the parcel drop box. Maker UNO sensor is use to detect the parcel received. Every time the parcel dropped 'Blynk app' will received the notification and alert the owner. Water proof testing is conducted and the result shows it's still dry until 10 minutes. This test shows the effectiveness of the 'Secure Parcel Drop Box' in protecting parcel from bad weathers. As a conclusion this project is acknowledged the importance of practising the 'SOP's, the concerns about the safety of the parcel that is left at customers house without any security aspect and to avoid situations where we need to collect our parcel at the final distribution center due to our absence at home when the parcel is arrived earlier.

ABSTRAK

Pada masa kini, ramai orang membeli barangan mereka melalui platform atas talian. Walau bagaimanapun, proses penghantaran bungkusan membolehkan bungkusan ditinggalkan di ruang legar rumah, dan selalunya di tempat yang tidak selamat di mana bungkusan hanya boleh diambil dan dibawa oleh pencuri. Selain itu, bungkusan berisiko rosak akibat cuaca buruk. Objektif utama projek ini adalah untuk mereka bentuk dan membuat ‘Secure Parcel Drop Box’, untuk melindungi bungkusan daripada cuaca buruk dan daripada pencuri dan juga untuk mempromosikan penghantaran tanpa sentuh. Skop kajian ini dijalankan bagi memastikan keselamatan bungkusan semasa ketiadaan penerima bungkusan semasa proses penghantaran. Di samping itu, ia juga ingin mempromosi kepada rakyat mengenai saranan kerajaan untuk mengamalkan ‘3W’ dan mengelakkan ‘3S’ dan juga boleh mengelak daripada bertemu orang ramai. Kajian ini juga termasuk kajian literatur, kami telah membuat kajian di internet untuk mendapatkan lebih banyak ulasan tentang ‘parcel drop box’. Seterusnya, tujuan projek ini adalah untuk mereka bentuk ‘Secure Parcel Drop Box’, melindungi bungkusan daripada cuaca buruk dan pencuri serta mengelak daripada berjumpa orang. Sebagai hasil analisis data, kami membuat dua ujian untuk ‘parcel drop box’. Sensor ‘Maker UNO’ digunakan untuk mengesan bungkusan yang diterima. Setiap kali bungkusan itu jatuh 'aplikasi Blynk' akan menerima notifikasi dan memaklumkan kepada pemiliknya. Ujian kalis air dijalankan dan keputusan menunjukkan ia masih kering sehingga 10 minit. Ujian ini menunjukkan keberkesanan ‘Secure Parcel Drop Box’ dalam melindungi bungkusan daripada cuaca buruk. Sebagai kesimpulan, projek ini mengakui kepentingan mengamalkan 'SOP', kebimbangan tentang keselamatan bungkusan yang ditinggalkan di rumah pelanggan tanpa sebarang aspek keselamatan dan untuk mengelakkan situasi di mana kita perlu mengambil bungkusan kita di pusat pengedaran akhir kerana ketiadaan kita di rumah apabila bungkusan itu sampai.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Parcel shipping refers to shipping lighter, smaller boxed items. Typically, parcel means packages that weight 45 kilogram or less and can be moved manually without any assistance. Shipping parcels is an easy way and requires low costs to ship the product. Most of parcel available in the market are made out of polythene polybag and corrugated box.

A Parcel Drop Box is a unit that is installed alongside neighborhood delivery and collection box units or in conjunction with PO Boxes in a retail facility. They are used for parcel and package deliveries. The main function of the drop box is to prevent the parcel from being stole and to avoid the weather from damaging the parcel.

Parcel drop box is basically an innovation of a normal mailbox. This difference is that a parcel box is bigger because the box wants to store larger item which is parcel that comes in various kind of size. A parcel drop box also usually will using a more thick and sturdier material because a parcel may contain a heavy product which need a strong material to accommodate the load of the goods.

1.2 RESEARCH BACKGROUND

A parcel drop box is designed to receive delivered packages and store them in a secure compartment. Because of how they are designed, only someone with a key can retrieve the packages. So once the delivery person has dropped in the package no one can take the parcel out without the correct keys.

Parcel drop boxes are usually made from strong metal all round to ensure no one can break into them. Installation is easy. Depending on the measurement and design. If the box is not being installed around the front door area where it is more visible. Otherwise they may just leave the packages on your foyer. In Malaysia, a parcel drop box is not a common thing to be seen in front of our house, but in the United States it has already started to be used by their people as a security to protect their parcel.

The next thing that is related to this drop box is the e-commerce sector that is growing in our country. Based on references from Wikipedia, E-commerce (electronic commerce) is the activity of electronically buying or selling of goods on online services or over the Internet. E-commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. E-commerce is in turn driven by the technological advances of the semiconductor industry, and is the largest sector of the electronics industry.

The diagram below is showing about the e-commerce activities that is going on Malaysia in the year of 2019:

(**Diagram 1.1**: Malaysia e-commerce activities in the year of 2019)
(Source : https://datareportal.com/reports/digital-2019-ecommerce-in-malaysia)

From the year 2018 to 2019, Malaysia had the biggest increase in foreign e-commerce activities (54.9 per cent) among the ASEAN countries. This shows that Malaysians are increasingly inclined to shop online for foreign brands. For the period of 2018 to 2023, Malaysia is expected to have the highest growth rate (41.2 per cent) for foreign e-commerce activities in ASEAN.

1.3 PROBLEM STATEMENT

On this day, the parcel delivery process allows parcels to be left in the property foyer, often in unsafe places where the delivery can only be picked up and carried by thieves. Nowadays, pandemic is occurred worldwide and many people buying stuff online, so they do not have a proper place to put the parcel. Other than that, easy to get hassle of bad weather affecting to the parcel.

1.4 OBJECTIVE

1. To design and fabricate a Secure Parcel Drop Box.
2. To protect parcel from bad weather and from thieves.
3. To promote contactless delivery.

1.5 RESEARCH QUESTION

1. How to make sure that our parcel is safely arrived at our house even when we are not at home?

2. How to practice social distancing when we are receiving a parcel from couriers?

3. How to make sure that variety size of parcel can be fitted into the drop box?

1.6 RESEARCH SCOPE

This project is carried out to ensure the safety of packages during the absence of package recipients during the delivery process. This project also wants to promote to the people regarding the government recommendations to practice '3W' and avoid '3C'. With this project we can avoid meeting people such as the courier and can indirectly keep ourselves safe from transmission of the viruses.

1.7 IMPORTANCE OF STUDY

This project carried out have several interests. Among them are such as, to review the level of safety of this 'Secure Parcel Drop Box' in protecting the packages or parcel from any possible damages. Besides, this project is developed to help the people to avoid meeting with strangers which are very risky in this pandemic era. In addition, this project can help reduce the risk of infection of COVID-19 among the society.

Furthermore, we also want to do this project because the number of people who do online shopping in Malaysia is growing rapidly. This shows that our project has a significant function in this digital era.

1.8 TERM DEFINITION

A parcel is an object or collection of objects wrapped in paper or plastic in order to be carried or sent by post. A drop box means a secured container or receptacle into which items such as returned books, keys, payments, charity donations or parcel delivery can be deposited. Therefore, this project means a box which is developed to have a security system to protect our parcel that we are going to receive especially at our home.

1.9 CONCLUSION

From this project, we acknowledge the importance of practising the 'SOP's that is introduced by the Malaysia Ministry of Health in this pandemic era. We also aware that there are a lot of Malaysians that is working and cannot be at home when their parcel is being delivered to their house, and this condition brings concerns about the safety of their parcel that is left at their house without any security aspect.

This project will also avoid situations where we need to collect our parcel at the final distribution center due to our absence at home when the parcel is arrived earlier. This will will also be saving time for both parties.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION (MUHAMMAD AQIL HAKIMI BIN ZAINI)

A parcel drop box is designed to receive delivered packages and store them in a secure compartment. Because of how they are designed, only someone with a key can retrieve the packages. So once the delivery person has dropped in the package no one can fish it out.

There are some parcel drop box design available on the market that we have use as a reference or idea for the Secure Parcel Drop Box project (https://securityclub.co.uk/best-parcel-drop-box reviews/#:~:text=It%E2%80%99s%20a%20mail%20box%20for%20your%20parcels.%20A,the%20package%20no%20one%20can%20fish%20it%20out.)

(**Diagram 2.1.1:** Parcel drop box A)

(**Diagram 2.1.2:** Parcel drop box B)

(**Diagram 2.1.3:** Parcel drop box C)

2.2 PREVIOUS RESEARCH (HAFEEF HAZEEQ BIN MOHD FARHADI)

Characteristic of parcel drop box product that are on the market:

2.2.1: PRODUCT A - ALUMINIUM

Product A uses a material made of aluminum. Aluminum is a metal that has many advantages, it is a lightweight material and easy to mold. It can be cast, melted, molded, machined and extruded meaning it can be produced into a variety of shapes and then designed to suit a variety of uses.

The advantages of aluminum

1) It is not easily attacked by pests, especially termites because pests usually will attack material such as woods.

2) Resistant to high weather or temperatures. Aluminium is well known as a material that is strong and will always stand intact even when the weather is bad,

3) It is easier to shape and bend aluminium. Aluminum is a ductile metal that's easy to bend and shape. With only using basic tools and minimal pressure, manufacturing companies can mold aluminum into the necessary shape for their respective applications. Aluminium low ductility makes it ideal for forming and molding process when compared to metals with a higher ductility.

Disadvantages of aluminum

1) Aluminium cannot be weld. Aluminium is a bad conductor of heat, and when it is being weld, a break might be occurred if the process is not done precise enough

2) It has a relatively expensive price compared to wood and plastic.

2.2.2: PRODUCT B - WOOD

Parcel drop box product B uses the main material made of wood. There are several advantages and disadvantages of products made using wood, among them are:

The advantages of wood

1) Woods available in various sizes and types. There are over 100,00 types of wood in this world. The high quality of woods is such as, oak wood, walnut wood, pine wood and ash wood.

2) It is suitable for all types of construction. As we already know, woods can be made as small as a home furniture and even as big as a traditional Malay house.

3) It is suitable for finishing materials such as glue, shell and wood tones.

Disadvantages of wood

1) Woods are easy to shrink when too exposed to water. This is because woods Wood is known as hygroscopic, which means it act like a sponge the moisture content will change depending on relative humidity of the ambient air. When humidity increases, the wood will absorb moisture from the air making the wood to expand.

2) Woods are easy to be attacked by pests if not preserved such as termites.Termites, carpenter bees, carpenter ants, powder post beetles and wood-devouring fungi are all common as a wood-destroying pests. These pests are difficult to identify, expensive to eradicate, and can do great amounts of damage that is virtually invisible until it's too late to repair.

2.2.3: PRODUCT C - PLASTIC

Parcel drop box product C uses the main material that is made out of plastic. There are several advantages and disadvantages of products that use plastic materials as their main materials, among them are:

The advantages of plastic

1) Plastic has a cheaper price compared to wood and aluminum. Due to its light weight, plastic tend to saves more especially in shipping and transportation costs. Plastic saves both in the cost to get products to consumers and in the cost to get post-consumer materials to recycling centers.

2) It is waterproof. Acrylic Plastic for example is waterproof material and commonly used in outdoor-type furniture and window panels in property

3) Good electrical insulation. Plastic such as 'Polyvinyl chloride' is a material that does not conduct any electricity power at any cost.

Disadvantages of plastic

1) Plastic is not resistant to weather or temperatures that are too high. The strength and toughness will be decreasing, becoming more likely to cracking, chipping, and breaking, at a level in proportion to the temperature and minutes of exposure.

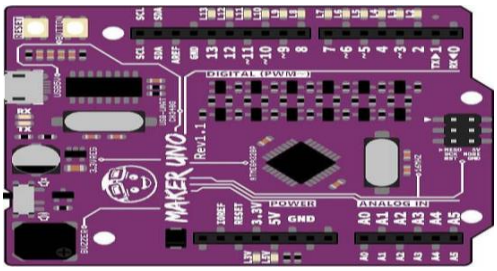
2) Soft and less elastic. This is a major disadvantages of plastic in heavy industries because it cannot be produced into a variety of shapes .

3) It is flammable. Because it is constructed of oil and gas materials, plastic produces a large amount of heat when burned. Flammable material are very dangerous to be in our household area if it is not taken care of properly.

2.3 IOT SYSTEM (MUHAMMAD HAZIM BIN NORJAYA)

There are various IOT system that is available currently in the market such as QR code, sensor, smartwatches and many more. But the one that we have chose are called Maker UNO sensor and Blynk App. The combination of this two system or device are very useful to our project as it will adding an additional value.

2.3.1: MAKER UNO SENSOR



This sensor works to detect any presence of packages or parcels that is being left by courier worker inside of the drop box. When this sensor successfully detects a parcel or packages, it will be sending a notification trough 'Blynk app' to alert the owner.

2.3.2 BLYNK APP

Blynk is an IoT platform for iOS or Android smartphones this is used to control Arduino, Raspberry Pi and NodeMCU thru the internet. This utility is used to create a graphical interface or human gadget interface (HMI) through compiling and imparting the ideal cope with at the available widgets. It is able to manage hardware remotely, it can show sensor records, it could shop records, visualize it and do many other cool matters.

2.4 CONCLUSION (MUHAMMAD AQIL HAKIMI BIN ZAINI)

Conclusion for this chapter two is that we make a research on the types of parcel drop boxes that are available in the market for us to make ideas or references for us to succeed in our project that is called as (Secure Parcel Drop Box).

From the parcel drop box products that are in the market, we make improvements and innovations to our project so that our products can compete with other products that are in the market. Therefore, we can take the weaknesses and advantages of drop box parcel products on the market for us to make improvements to our project.

CHAPTER 3
METHODOLOGY

3.1: Introduction (MUHAMMAD HAZIM BIN NORJAYA)

In this chapter, we will discuss about the materials and the equipment that will be used in to make this 'Secure Parcel Dropbox'. We will also be discussing about the technique and the method that will be applied to this project.

3.2: Project design (MUHAMMAD AQIL HAKIMI BIN ZAINI)

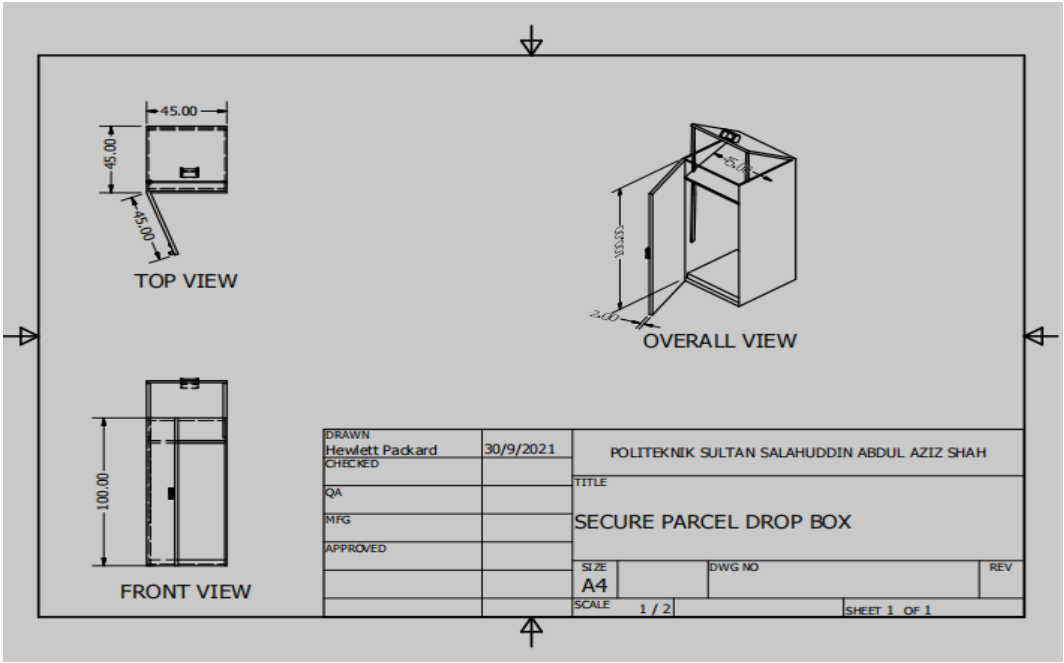


Diagram 3.2.1: Secure Parcel Drop Box Orthographic Drawing

3.2.1: Method / Procedure / Project development technique

This project will be using the drilling methods to build the framework and walls of the project.

1. The first step of the process is to build the framework using wooden plank to make sure that the box is sturdy.

2. After the framework is built, the walls of the box will be installed using hammer and nails. The wall will be made out of polycarbonate.

3. After that, polycarbonate plane will be installed on the outer part of the box to make sure that this drop box is waterproof

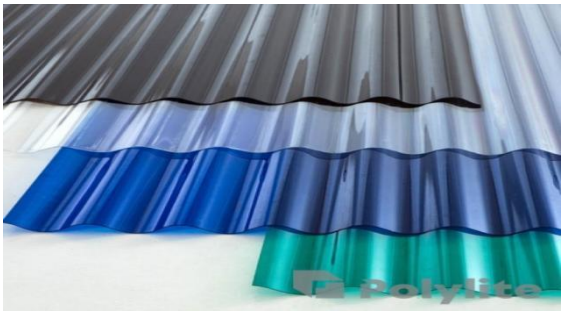
4. Next, doors and hinges will be attached to the top and front of the box. A bracket will also be installed to attach the top door and the plank inside the box.

5. Moreover, a Maker UNO sensor will be paste on the plane inside of the box.

6. Lastly, a shock absorbing foam will be put on the floor of the drop box to absorb any shock from a falling parcel/packages.

3.2.2: Materials and Equipment

1) Polycarbonate



(**Diagram 3.3.2:** Polycarbonate)

Polycarbonate is a high-performance tough, amorphous and transparent thermoplastic polymer with organic functional groups linked together by carbonate groups (–O–(C=O)–O–) and have a unique combination of properties. Polycarbonate is mainly used as an engineering plastic owing to its unique features that include:

- High impact strength
- High dimensional stability
- Waterproof

2) Wooden Plank

(**Diagram 3.3.3:** Wooden plank)

A plank is a timber that is mostly flat, elongated, and rectangular with parallel faces that are higher and longer than wide. Used primarily in carpentry works, planks are very important in the construction of ships, houses, bridges, and many other structures. Planks also serve as supports to form furniture such as shelves and tables.

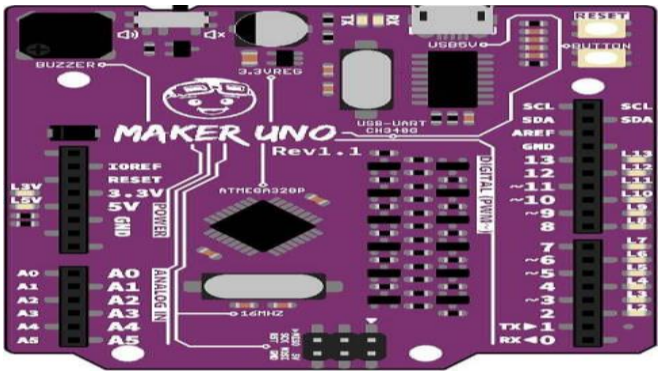
3) Shock absorbing foam

(**Diagram 3.3.4:** Shock absorbing foam)

A shock absorbing foam is a foam that is created to absorb any shock from any item that falls onto the foam. The materials that is commonly used for making shock absorbing foam is polyethylene. As for our project, this foam will be absorbing shock from parcel that is falling

.

4) Maker UNO sensor



(**Diagram 3.3.5:** Maker UNO sensor)

This sensor is the main IOT system in our project. This sensor works to detect any presence of packages or parcels that is being left by courier worker inside of the drop box. When this sensor successfully detects a parcel or packages, it will be sending a notification trough 'Blynk app' to alert the owner.

5) Hinge

(**Diagram 3.3.6:** Hinge)

A hinge is a mechanical bearing that connects two solid objects usually doors and windows, typically allowing only a limited angle of rotation between them. Two objects connected by an ideal hinge rotate relative to each other about a fixed axis of rotation all other translations or rotations being prevented, and thus a hinge has one degree of freedom. Hinges may be made of flexible material or of moving components.

6) Metal chain

(**Diagram 3.3.7:** Metal chain)

This metal chain is used to connect the top door and the board that will go up as a place to leave the parcel. This chain will be pulling the wooden board upwards as soon as the top door is being open.

7) Hand Drill and Hammer

(**Diagram 3.3.8:** Hand drill and hammer**)**

Hand drill and hammer are usually use in carpentry works. Both of this tool are serving the same function which is to drive screw or nails to a surface.

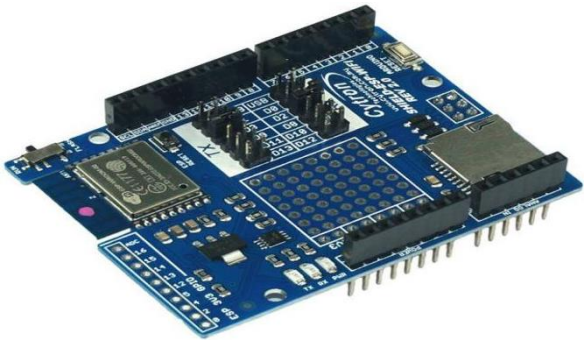
In this project, both of this equipment will be used to build the framework, attach the doors with hinges and building the polycarbonate walls.

8) Screws and nails

(**Diagram 3.3.9:** Screws and nails**)**

Both screws and nails are for connecting to piece of material together. The main difference between screws and nails is the way they are driven into the work-piece. While screws have a thread that cuts into the wood, nails have a threadless shank that is driven into the wood with sheer force. Because of the difference in design, both of them also have their own advantages and disadvantages

9) Cytron ESP8266 WiFi shield



(**Diagram 3.3.10:** Cytron ESP8266 WiFi Shield**)**

A WiFi is needed in this project in order for the sensor to sends notifications to alert the owner. This WiFi shield will be act as a connector between the sensor and the WiFi. It will help to connect both Maker UNO sensor and WiFi.

10) IR Line Tracking Module

(Diagram 3.3.11: IR Line Tracking Module)

IR Line tracking module works very simple, it is almost the alike the obstacles avoidance tracking module, the difference is that it has a low power transmitter. Because it consists of an infrared transmitter which will sends the infrared signal to its desired area.

11) Male to female jumper wire

(Diagram 3.3.12: Male to female jumper wire)

A jump wire which is also known as jumper/ jumper wire/ jumper cable/ DuPont wire / cable is an electrical wire, or group of them in a cable, with a connector or pin at each end (or at times without them simply "tinned"), which is mostly used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

3.2.3: HOW TO USE THIS PRODUCT

(HAFEEF HAZEEQ BIN MOHD FARHADI)

1) TO PLACE THE PARCEL

i. First, open the top door of the drop box and a plank will rise up.

ii. Second, put the parcel on the plank of the drop box.

iii. Third, close back the door.

2) TO TAKE THE PARCEL

i. First, the owner will get the notice trough ‘Blynk app’ that the parcel is arrive.

ii. Second, the owner can open the big door using the specific key.

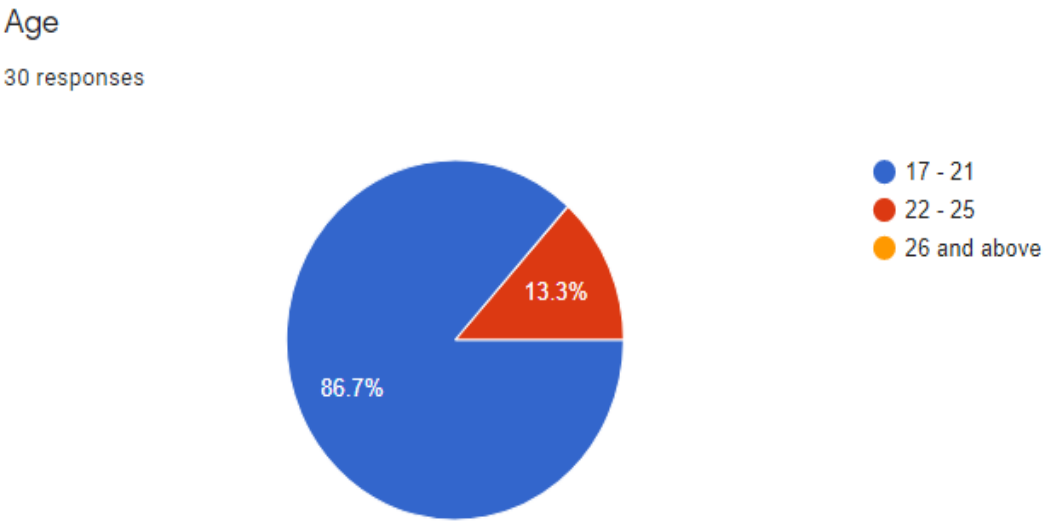
iii. Lastly, the parcel can be picked up by the owner.

3.2.4: Questionnaire

(HAFEEF HAZEEQ BIN MOHD FARHADI)

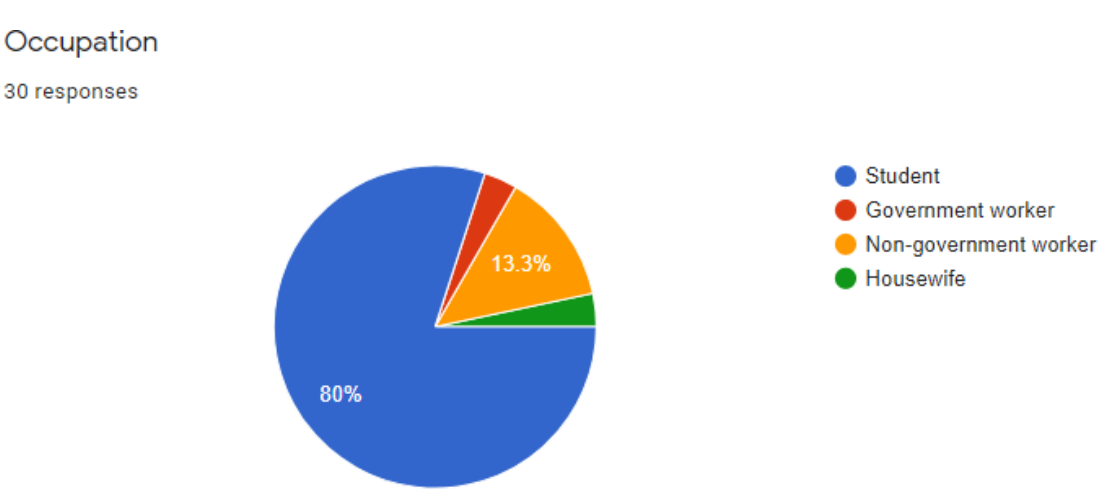
We have made a Google form to do some questionnaire with the people that might be using our project product. This questionnaire was held to receive feedback about our project and to listen about their opinion on our project. This questionnaire involves 30 respondents.

Question 1:



(Diagram 3.3.13: Respondent age)

Question 2:



(Diagram 3.3.14: Respondent occupation)

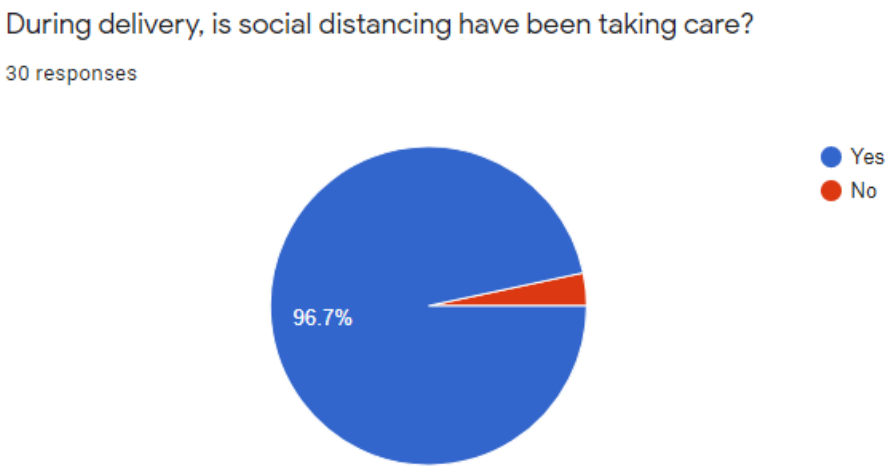
Question 3:

(Diagram 3.3.15: Question 3)

Question 4:

(Diagram 3.3.16: Question 4)

Question 5:



(Diagram 3.3.17: Question 5)

Question 6:

(Diagram 3.3.18: Question 6)

3.2.5: Budget

(MUHAMMAD HAZIM BIN NORJAYA)

NO.	ITEM	QUANTITY	PRICE PER UNIT(RM)	OVERALL PRICE(RM)
1.	Polycarbonate (100cmx45cm) + (45cmx45cm)	4 & 2	158.80	158.80
2.	Shock absorbing foam (5.08x32.6x60 cm)	1	39.85	39.85
3..	IOT system set (Maker UNO, WiFi shield etc.)	1	82.80	82.80
4.	Hinge	4	0.80	3.20
5.	Metal chain (3mm x 2m)	1	13.90	13.90
TOTAL = RM 382.70				

Table 3.1: Budget

3.3: Conclusion

(MUHAMMAD HAZIM BIN NORJAYA)

As a conclusion, we learned that our project needs a lot of different item combined together to build it. In this methodology, we also learned that to make a good project, the process needs to be researched deep enough so that we know if we make any mistake in the process.

Besides, we also have discover about the price of each material and equipment that is involved in this project.

CHAPTER 4
DATA ANALYSIS

4.1 Introduction

In this chapter we will explain on how we are doing our data analysis regarding our project. There will be two test that we already done to test the ability of our project.

The first data was taken to test the effectiveness of the sensor (Maker UNO) to detect parcels left by the courier. The data also tests if the notification is successfully sent or not to the user through the Blynk app.

The second data was conducted to test the resistance of the drop box against bad weather that might be happening in real time when a parcel is arrived.

4.2 First data taken (MUHAMMAD HAZIM BIN NORJAYA)

4.2.1 Introduction

The Maker UNO is an Arduino compatible board specially designed to simplify building projects. Coding & electronics is made easy and affordable with 12 built in LEDs, a built-in buzzer and a button. In our project, it is used as a sensor to detect the arrival of parcel and will be sending notification through an app called 'Blynk App'.

4.2.2 Apparatus/Equipment

1) Parcel (box)
2) Smartphone
3) Secure Parcel Drop Box
4) Blynk app (from Google Play Store)

4.2.3 Method to analyse data

1) A parcel will be put inside of the drop box.

2) After the door on the top side of the drop box is closed, we will check if there any notification on the Blynk app.

3) Repeat step 1 and 2 with another parcel.

4.2.4 Safety precautions

1) Make sure that the parcel (box) is being put one by one to the drop box.

2) Wi-Fi connection needs to be turn on before the test is performed.

4.2.5 Results:

ITEM N0.	BLYNK APP (NO. OF NOTIFICATION)
1	1st
2	2nd
3	3rd
4	4th

Table 4.1 : Data that is successfully taken for the first test

Graph:

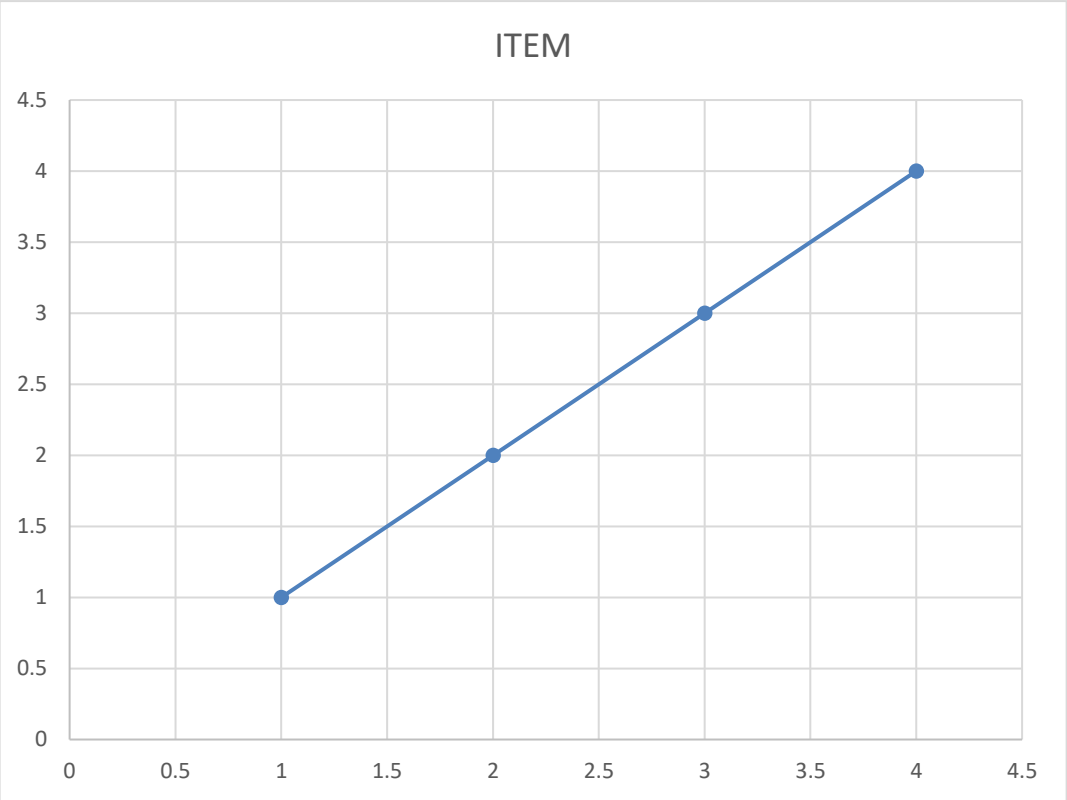


Diagram 4.1: Graph of item number against the number of notifications received

4.2.6 Analysis from tables and graphs

Based on the tests conducted, we found that the sensor 'Maker UNO' will be sending a notification trough Blynk App each time a parcel is being drop inside the box. This is shown when the first parcel is placed in the box, the first notification will be received and this trend continues until the fourth parcel is placed. In conclusion, the number of notifications increases when the number of parcels placed inside the box increase.

4.3 SECOND DATA TAKEN (HAFEEF HAZEEQ BIN MOHD FARHADI)

4.3.1 Introduction

Parcel is a packaged that is wrapped properly that contains variety kind of product to be sent by a courier company to the customer. The parcel is usually being left by the delivery man at the foyer of a house or at the front door of a house if the parcel recipient is absent during the delivery process. This situation can cause the parcel package being damaged if there is any bad weather happening during the time the parcel is left.

4.3.2 Explanation

This test is conducted to test the resistance of the drop box against bad weather that might be happening in real time when a parcel is arrived.

4.3.3 Apparatus/Equipment

1) Parcel (any kind of box)

2) Secure Parcel Drop Box

3) Water supply

4) Stopwatch

4.3.4 Method to analyse data

1) A parcel will be placed inside of the ‘Secure Parcel Drop Box’.

2) Water supply from the tap will be poured to the ‘Secure Parcel Drop Box’ for 2 minutes for the first attempt.

3) After 2 minutes, the condition of the parcel will be observed.

4) Repeat step 1 to 3 with the change in the time taken to pour the water to 4,6 and 8 minutes.

4.3.5 Safety precautions

1) Make sure that the door of the drop box is shut properly.

2) Be alert of the time taken on the stopwatch so that the data taken is accurate.

4.3.6 Results:

TIME TAKEN (MINUTES)	PARCEL CONDITION
2	DRY
4	DRY
6	DRY
8	DRY
10	DRY

Table 4.2 : Data taken from the second test

4.3.7 Analysis from the tables:

After the test is run, we found that the parcel stay dry even after 8 minutes that the drop box being poured by water. This test shows the effectiveness of the 'Secure Parcel Drop Box' in protecting parcel from bad weathers.

4.4 Conclusion (MUHAMMAD AQIL HAKIMI BIN ZAINI)

As a conclusion, this project is acknowledged the importance of practising the 'SOP's, the concerns about the safety of the parcel that is left at customers house without any security aspect and to avoid situations where we need to collect our parcel at the final distribution center due to our absence at home when the parcel is arrived earlier.

CHAPTER 5
DISCUSSION AND COCLUSION

5.1 INTRODUCTION

For this chapter, the decisions made are based on all the results obtained from the experiments conducted and the discussions in the previous chapters. In this chapter as well, relevant matters are related to the objectives of the study and also recommendations for the study conducted. In addition, conclusions were drawn for this experiment.

5.2 DISCUSSION

(MUHAMMAD AQIL HAKIMI BIN ZAINI)

For our Secure Parcel Drop Box, we make a testing for the parcel drop box. Maker UNO sensor is used to detect the parcel received. Every time the parcel dropped 'Blynk app' will received the notification and alert the owner. This is shown when the first parcel is placed in the box, the first notification will be received and this trend continues until the fourth parcel is placed. In conclusion, the number of notifications increases when the number of parcels placed inside the box increase.

(HAFEEF HAZEEQ BIN MOHD FARHADI)

In addition, Waterproof testing is conducted, and the result shows it's still dry until 10 minutes. This test shows the effectiveness of the 'Secure Parcel Drop Box' in protecting parcel from bad weathers. After the test is run, we found that the parcel stays dry even after 8 minutes that the drop box being poured by water. This test shows the effectiveness of the 'Secure Parcel Drop Box' in protecting parcel from bad weathers.

(MUHAMMAD HAZIM BIN NORJAYA)

This project is acknowledged the importance of practising the 'SOP's, the concerns about the safety of the parcel that is left at customers house without any security aspect and to avoid situations where we need to collect our parcel at the final distribution centre due to our absence at home when the parcel is arrived earlier.

5.3 CONCLUSION

(MUHAMMAD AQIL HAKIMI BIN ZAINI)

Our main objective for this project is to design and fabricate a Secure Parcel Drop Box to be more suitable for customer. Other than that, our objective is to protect the parcel from bad weather and the thieves and we want to promote contactless delivery. We have made two testing for the parcel dop box and we have collected the data. One of the testing is we used the maker UNO sensor to detect the parcel received. Owner of this parcel drop box will received the notification from "Blynk app" if the parcel is in the box. This parcel drop box is using power bank to connected the apps.

(HAFEEF HAZEEQ BIN MOHD FARHADI)

We use strong materials to protect the parcel from bad weather. We make a testing on materials by doing water proof testing. We put the time until ten minutes, and the parcel drop box still dry. It shows that the effectiveness of this materials to protect the parcel from bad weather. We use the high quality and strong materials such as wooden plank, polycarbonate, shock absorbing form. We use recycle wooden plank because it will save cost and protect the environment. The absorbing form is used for protect the parcel from hit the ground. So, the parcel can be received without any damage. The total manpower to made this product are three persons. This parcel drop box can be used anytime either owner is at home or not.

(MUHAMMAD HAZIM BIN NORJAYA)

Overall, this Secure Parcel Drop Box is safe to use since the strong materials and Blynk technology are used. It also recommended to person who regularly do online shopping and it also benefit to any property with more front spaces as a landed house or office. The owner of the parcel no need to worry about the parcel because the

parcel drop box can protect their parcel. With this size of the parcel drop box, it can manage 10kg at a time. So, it is useful for every owner that want to have this Secure Parcel Drop Box.

5.4 SUGGESTION

Drop box is used to receive delivered packages and store them in a secure compartment away from severe weather and thief.

Here are some things that are suggested to further enhance the study that will be done on the drop box to find out the level of effectiveness. :-

1) Replace or add QR code as an IOT system on the drop box rather than using sensor alone. **(MUHAMMAD AQIL HAKIMI BIN ZAINI)**

2) Can make a hole on the parcel drop box to connect the USB cable directly to the plug (power source). **(HAFEEF HAZEEQ BIN MOHD FARHADI)**

3) Put the cover on the sensor so that it is always safe and secure from thieves. **(MUHAMMAD HAZIM BIN NORJAYA)**

5.5 SUMMARY

The results of the experiments conducted on Secure Parcel Drop Box, it can be concluded that this project has achieved the objective of the study which is to protect parcel from bad weather and from thieves plus, to promote contactless delivery. As a conclusion, this project is acknowledged the importance of practising the ‘SOP’s, the concerns about the safety of the parcel that is left at customers house without any security aspect and to avoid situations where we need to collect our parcel at the final distribution centre due to our absence at home when the parcel is arrived earlier.

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ATTACHMENT

ATTACHMENT A	**Gantt Chart (Project 1)**
ATTACHMENT B	**Gantt Chart (Project 2)**
ATTACHMENT C	**Methodology Flow Chart**
ATTACHMENT D	**Plagiarism Report**

ATTATCHMENT A

Gantt Chart (Project 1)

WEEK/ PROJECT ACTIVITY	STATUS	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
Project briefing. Brainstorming.	P														
	A														
Introduction of the project Define Problem Statement. Identify the characteristic of product/innovation developed. Identify project title	P														
	A														
Writting the project proposal	P														
	A														
Literature Review	P														
	A														
Project Methodology	P														
	A														
Resources identification and selection	P														
	A														
Construct project planning according to time frame	P														
	A														
Project proposal presentation	P														
	A														
Accomplished	P														
research/project design stage															
Accomplished research/project design stage	P														
	A														
Analyzed preliminary finding	P														
	A														
Correlate preliminary results finding with theory and literature review	P														
	A														
Propose solutions through logbook and planning for Project 2	P														
	A														

Legend:

Planning

Actual

ATTACHMENT B

Gantt Chart (Project 2)

WEEK/ PROJECT ACTIVITY	STATUS	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14
Course Registration	P														
	A														
Writing Final Report	P														
	A														
MyIPO Registration	P														
	A														
Installing Project Materials and Components	P														
	A														
Product testing	P														
	A														
Finish the entire part of the project	P														
	A														
Data Analyze	P														
	A														
Plagiarism Review (Turnitin)	P														
	A														
	P														

Project Progress Presentation	A														
Presentation Preparation	P														
	A														
Abstract review by supervisor	P														
	A														
Technical Paper Review by supervisor	P														
	A														
Correction/ Refinement of Final Report	P														
	A														
Abstract Review by Interpreter	P														
	A														
PITEX JKM	P														
Video, technical paper, poster, Abstract (after review)	A														
Submission of Final Report	P														
	A														
RICE PSA	P														
	A														

Logbook Submission	P														
	A														

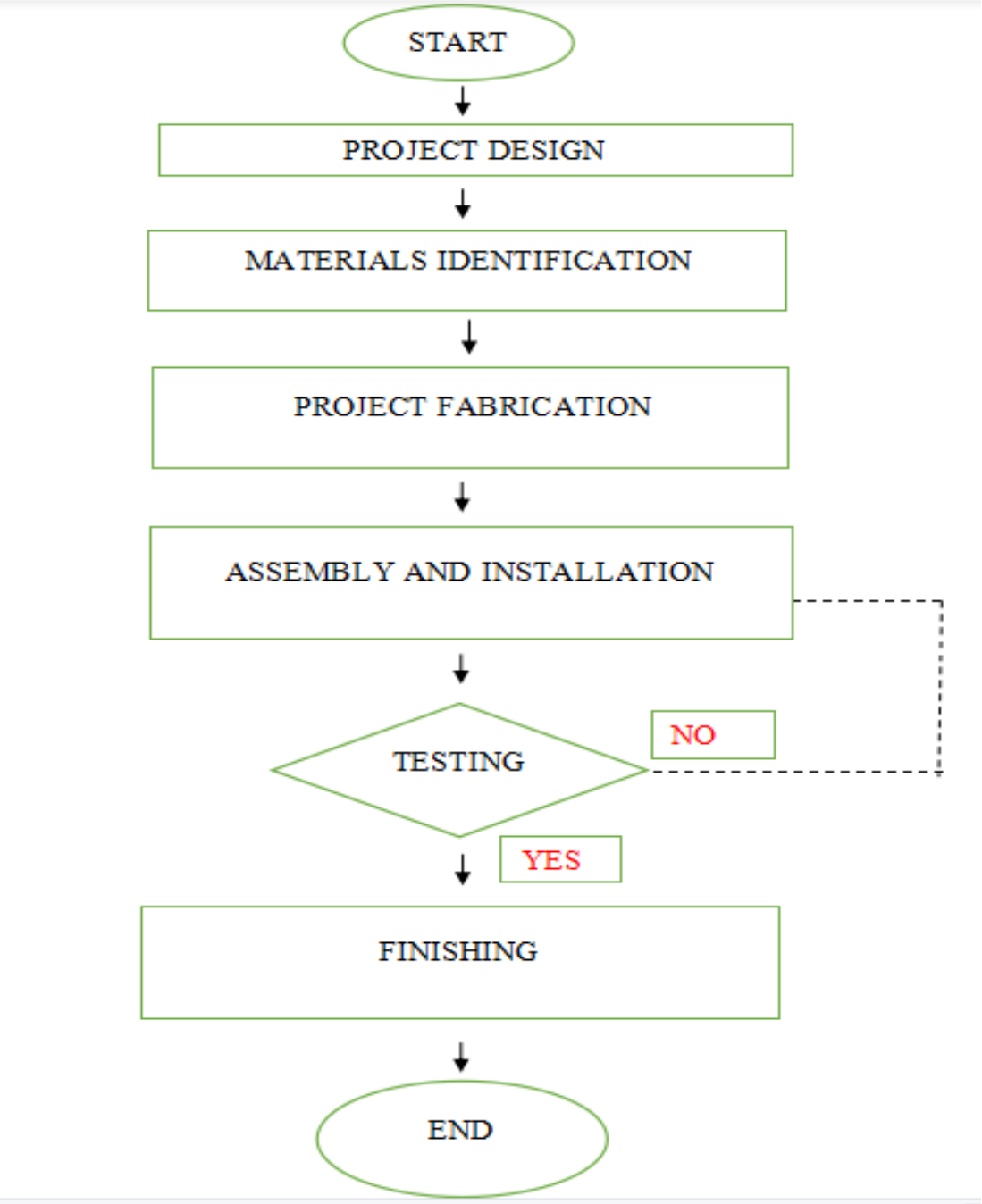
Legend:

Planning

Actual

ATTACHMENT C

Methodology Flow Chart



ATTACHMENT D

Plagiarism Report