

**POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH**

**SMART RAIN GUTTER CLEANER**

**AZRUL NAIM BIN MUHAMMAD HASRIZAL**

**(08DKM19F1209)**

**AMIRUL AIMAN BIN ROSMINI**

**(08DKM19F1193)**

**AMMAR FAYYADH BIN AHMAD FAHIZAL**

**(08DKM19F1192)**

**JABATAN KEJURUTERAAN MEKANIKAL**

**1 2021/2022**

# CONTENTS

CHAPTER	THINGS	PAGE
	ABSTRACT	iv
<b>1</b>	<b>INTRODUCTION</b>	
	1.1 Introduction	2
	1.2 Background research	2
	1.3 Statement of problem	3
	1.4 Research objective	3
	1.5 Research question	3
	1.6 Scope of research	4
	1.7 Significance of the study	4
	1.8 Expected project findings	4
	1.9 Summary	5
<b>2</b>	<b>LITERATURE REVIEW</b>	
	Part A: Gutter Cleaner	
	2.1.1 Introduction	6
	2.1.2 The history of Gutter Cleaner	6
	2.1.3 Previous studies	7
	2.1.4 Concept selection	7
	Part B: Internet of Things (IOT)	
	2.2.1 Introduction	8
	2.2.2 History Of IOT	9
	2.2.3 Previous Study	10
	2.2.4 Concept Selection	10
	Part C: Wi-Fi System	
	2.3.1 Introduction	11
	2.3.2 History Of Wi-Fi System	11
	2.3.3 Previous Study	12
	2.3.4 Concept Selection	12
	2.4 Summary	12

<b>3</b>	<b>METHODOLOGY</b>	
3.1	Introduction	13
3.2	Project design	16
3.2.1	Type Of Study	19
3.2.2	Material And Equipment	20
3.3	Summary	21
<b>4</b>	<b>PRELIMINARY INVESTIGATION OF THE STUDY</b>	
4.1	Introduction	22
4.2.1	Demographic profile of respondent	23
4.2.2	Respondent age	24
4.2.3	Work status	25
4.2.4	Time for cleaning the gutter on the green house	26
4.2.5	Does the respondent have problem when cleaning the gutter	27
4.2.6	Is it dangerous to clean the gutter	28
4.2.7	Will the rain gutter cleaner will help your problem	29
4.3	Summary	29
<b>5</b>	<b>CONCLUSION</b>	
5.1	Introduction	30
5.2	Conclusion	30
5.3	Suggestion	30
5.4	Upcoming suggestion	31
5.5	Reference	31
5.6	Attachment	31

## LIST OF TABLE

<b>TABLE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
3.1.1	Gant chart	14
3.1.2	Flow chart	15
3.2.1	Manufacturing Costs and Suggested Selling Prices	21

## **ABSTRACT**

Smart rain gutter cleaner is a product design as a tool that works to clean the rain gutter. Rain gutter is a tool that helps to prevent rainwater from entering a building, But it also have a disadvantage. Sometimes when the building is in a wooded area, many fallen leaves will fall into the gutter. For a short time, it will not cause problems to the gutter, but for a long time it could cause the fallen leaves to accumulate in the gutter and cause the gutter to clog. The original rain gutter cleaner was used human energy to work. However, with Smart Rain Gutter Cleaner which is a new product develop by our team can work without using human energy. The old rain gutter cleaner need human to climb the roof to clean the gutter because the old gutter cleaner cannot reach some place. Therefore, it will be dangerous and unwanted accidents can happen any times. When we talk about time, when using the old rain gutter, people can only clean the gutters when they have free time so it will cause some trouble when they not at home. Nevertheless, with this product, the problem can be solve because this product is using Internet of Thing (IOT) technologies which is you can control this product from anywhere and anytime. It also can reduce chance of an accident because it not use human power to work

# **CHAPTER 1**

Written By: Azrul Naim, Amirul Aiman

## **1.1 INTRODUCTION**

Rain Gutter is a component of a water discharge system for a building. It is necessary to prevent water dripping or flowing off roofs in an uncontrolled manner for several reasons. To prevent it damaging the walls, drenching persons standing below or entering the building, and to direct the water to a suitable disposal site where it will not damage the foundations of the building. In the case of a flat roof, removal of water is essential to prevent ingress and to prevent a build-up excessive weight.

Water from a pitched roof flows down into a valley gutter, a parapet gutter or an eaves gutter. Water running down the walls causes dampness in the affected rooms and provides a favorable environment for growth of mold and wet rot in timber.

Rain Gutter Cleaner is a tool that helps to facilitate people in their daily work. This tool has been introduced over the past few years. This tool is used to clean the gutter that is always clogged due to fallen leaves where by pushing the leaves it will clean the gutter. The use of Rain Gutter Cleaner will increase after rainy or windy days due to the fallen leaves stuck inside the gutter. A common gutter cleaner that are already in market is made of an iron rod that can be change in length. It can be extend up to 5-10 meters and requires human labor each time it wants to be use. Other than that, the user has to climb up the stairs to clean the rain gutter themselves, which could be risky.

Smart Rain Gutter Cleaner (SRGC) is a drone-like machine that can clean the gutter with just a press of a button from our smartphone. Reduces the risks of falling to zero, making sure your rain gutter is clean and save up your time with the cleaning process with an affordable price. This product uses IOT system to be able to be switch on through our smartphones. This product is consist of the body of remote control car, a scope and some electrical components.

## **1.2 BACKGROUND RESEARCH**

Nowadays, we hardly see people clean the rain gutter at their house nor the gutter in the greenhouse. This may happen due to the lack of free time to do the cleaning since most of the people work from 8am-5pm and when they reach their residents, it is already dark to do the cleaning. It is also dangerous to clean the gutter by themselves since the gutter is install next to the roof and they are expose to falling from high places. There are gutter-cleaning tools in the current market. It is rod-like shape, which can be extend up to 5-10 meters but still requires human labor each time it is used.

We can call for rain gutter cleaning service. However, how often do we would want to call them if it keeps rain regularly since the gutter needs to be clean regularly to prevent the mold from growing or water leaking out from the gutter due to clogged. Therefore, the charges for the service will be skyrocketing and it would not be benefitting for the user in the long-term.

That is where our product will shine, our Smart Rain Gutter Cleaner (SRGC) can be use from a safe spot because we use IOT system. IOT system enable our product to be activate through our smartphones, which in this modern era, almost everyone have it. Our SRGC are also rechargeable, so you only need to buy it once and you can use it anytime when you need to. With our SRGC, we were able to reduce the risks of falling from high place to zero and making the cleaning process become super easy and efficient as the user can do other things while waiting the cleaning process.

### **1.3 Statement of problem**

- i. From observation, existing gutter cleaners require labor each time they want to be used and need to be done more frequently during the rainy season so that water does not stagnate and overflow. From this lack of technology situation, the gutter cleaners need to use a lot of energy in order to clean the gutter so that the water does not stagnate and overflow. Because of this, the Gutter cleaner performance will decrease throughout the day because a lot of energy has already been use just for cleaning the gutter by themselves.
- ii. In addition, since the gutter are place at a very high place, it can be very dangerous for people to clean the gutter by themselves without using protection. This is because cleaning the gutter requires some people to climb to a high place and difficult to reach every time they want to clean the gutter. Because of this, it can be very dangerous and can cause any unwanted incidents to happen.
- iii. Lastly, we found that cleaning the gutter cleaner without using the proper way and tool could be very expensive. This is because the lack of knowledge on how to clean the gutter can make the gutter cleaner spend money on unnecessary stuff such as hire a lot of people just to clean the gutter, buying inappropriate tool to clean the gutter or buying an overrated expensive tool just to cleaned the gutter.

## **1.4 Research objective**

- i. First objective is to make sure that this tool really can help to reduce the risk of accidents when the user is cleaning the gutter. This is because cleaning the gutter can be very dangerous because the gutter located at a high place.
- ii. Second objective is to make sure that this tool can make the gutter cleaning process faster. This is because, we found that many of our respondent have a very busy schedule. Therefore, with fast working tool it really can help them to reduce the time on cleaning the gutter.
- iii. Lastly, creating a tool that can help the user to clean the gutter with affordable price. We found that many smart tools this day a very pricey. Because of that, lot of people does not want to try the smart tool because of the burdensome price. So with this tool we will make sure that the price is affordable so that people will still buy the tool.

## **1.5 Research questions**

Among the questions of this study are:

- Is this tool safe enough to use
- Is this tool able to save work time when doing tasks
- Is this device able to run smoothly when weather problems such as drought and heavy rain occur

## **1.6 Scope of the research**

The study conducted is to facilitate the daily work of human beings without having to use a lot of labor. The method to be used is through the internet of things (iot). This method will achieve the national goal of mrnjali more advanced in line with industry i.r 4.0

## **1.7 Significance of the study**

This study has many importances. Among them are:

- Clean gutters that are always clogged due to leaves
- Able to launch an irrigation system
- can save time to clean gutters that are always clogged
- reduce the level of danger when using Smart Rain Gutter Cleaner

## **1.8 Expected Project Findings**

At the end of this study, it is expected to be a potential solution for people to low the risk accident saves time and make our lifestyle comparable to Industry I.R 4.0.

## **1.9 Summary**

Nowadays, the use of "Rain Gutter Cleaner" can facilitate the job with the help of equipment or machines is a good action and beneficial to all parties. This project can be used in places such as housing sites and so on. In particular, in this chapter we have discussed and explained the introduction, research background, problem statement, research objectives, research scope, research interests, definitions of terms and summary in this study. In conclusion, all these factors are very important in the success of a product. This study is important to get the details that need to be studied, updated and taken into account for the success of this project.

## **CHAPTER 2 LITERATURE VIEW**

Written by : Ammar Fayyadh Bin Ahmad Fahizal

### **PART A: GUTTER CLEANER**

#### **2.1 Introduction**

In this chapter, we will explain about the literature review for this project briefly. This chapter will discuss about the previous studies, concept and theory that related with the project.

#### **2.2 The History of Gutter Cleaner**

There is no history for the Gutter Cleaner .Usually the rain gutter will be cleaned by human labor using detergent, pipe cleaner, and gully emptier. A gully emptier is a type of specialized tank truck with suction gear that can suck wastewater, mud, and sludge out of hollows such as the hollows below drain grids in street gutter and carry it to a suitable disposal point. It needs to be able to suck out and pump through into its tank any road grit and miscellaneous solids that have entered the hollow.

### **2.2.1 Previous Studies**

Aim to see how far this product fits in the market. The rain gutter cleaner is also designed and built to see the effectiveness of the current level of security used and able to assist make it easier for users. Simple and compact design can save space as well as attractive shapes to attract customers to buy.

### **2.2.2 Concept Selection**

A new and creative idea usually results from the observation of a problem faced by a handful or a group of people and the idea aims to simplify the work and the way, saving time, energy and most importantly avoiding waste of energy and time. In addition, product quality must be at a higher level and safer than existing products in order to attract more consumers. The survey method was used to obtain the design of the project and suitable for production. Among the factors selected are such as time saving, labor saving, easy to operate, and cost saving. The project design must be simple but attractive and effective

## **PART B: IOT (INTERNET OF THINGS)**

### **2.1 INTRODUCTION**

The Internet of Things (IOT) refers to a system of interrelated, internet-connected objects that are able to collect and transfer data over a wireless network without human intervention.

The personal or business possibilities are endless. A ‘thing’ can refer to a connected medical device, a biochip transponder (think livestock), a solar panel, a connected automobile with sensors that alert the driver to a myriad of possible issues (fuel, tire pressure, needed maintenance, and more) or any object, outfitted with sensors, that has the ability to gather and transfer data over a network.

Today, businesses are motivated by IOT and the prospects of increasing revenue, reducing operating costs, and improving efficiencies. Businesses also are driven by a need for regulatory compliance. Regardless of the reasons, IOT device deployments provide the data and insights necessary to streamline workflows, visualize usage patterns, automate processes, meet compliance requirements, and compete more effectively in a changing business environment.



Diagram 2.1 (IOT Development Board)

## 2.2 History Of (IOT)

The term Internet of Things is 16 years old. However, the actual idea of connected devices had been around longer, at least since the 70s. Back then, the idea was often called “embedded internet” or “pervasive computing”. Nevertheless, Kevin Ashton coined the actual term “Internet of Things” in 1999 during his work at Procter & Gamble. Ashton who was working in supply chain optimization, wanted to attract senior management’s attention to a new exciting technology called RFID. Because the internet was the hottest new trend in 1999 and because it somehow made sense, he called his presentation “Internet of Things”.



Diagram 2.2 (Mr. Kevin Ashton)

The concept of IOT started to gain some popularity in the summer of 2010. Information leaked that Google’s Street View service had not only made 360-degree pictures but

also had also stored tons of data of people's Wi-Fi networks. People were debating whether this was the start of a new Google strategy to not only index the internet but also index the physical world.

The same year, the Chinese government announced it would make the Internet of Things a strategic priority in their Five-Year-Plan.

In 2011, Gartner, the market research company that invented the famous "hype-cycle for emerging technologies" included a new emerging phenomenon on their list: "The Internet of Things".

The next year the theme of Europe's biggest Internet conference LeWeb was the "Internet of Things". At the same time popular tech-focused magazines like Forbes, Fast Company, and Wired starting using IOT as their vocabulary to describe the phenomenon.

In October of 2013, IDC published a report stating that the Internet of Things would be an \$8.9 trillion market in 2020.

The term Internet of Things reached mass-market awareness when in January 2014 Google announced to buy Nest for \$3.2bn. At the same time, the Consumer Electronics Show (CES) in Las Vegas was held under the theme of IOT.

The above graph shows impressively how the term "Internet of Things" has outgrown all other related concepts in popularity.

### **2.2.1 Previous Study**

Aim to see how far this product can fits in the market. The Internet of Things (IOT) is also designed and built to see how the Rain Gutter Cleaner able to assist make it easier for the user. A simple but effective tool can really help the user to do the work easily.

### **2.2.2 Concept Selection**

The reason for using the Internet of Things (IOT) for our project are because to make it more useful and easier for the user to use. Besides that, to fulfil our criteria for our project which is creating a 21<sup>st</sup> century product that really involve technology in mechanical engineering field.

## **PART C: WIFI SYSTEM**

### **2.1 Introduction**

Wi-Fi stands for Wireless Fidelity and is the same thing as saying WLAN, which stands for "Wireless Local Area Network." Wi-Fi works off the same principal as other wireless devices - it uses radio frequencies to send signals between devices. The radio frequencies are completely different say from walkie-talkies, car radios, cell phones, and weather radios. For example your car stereo receives frequencies in Kilohertz and Megahertz range (AM and FM stations), and Wi-Fi transmits and receives data in the Gigahertz range.

### **2.2 History of Wi-Fi System**

Wi-Fi was invented and first released for consumers in 1997 when a committee called 802.11 was created. This lead to the creation of IEEE802.11, which refers to a set of standards that define communication for wireless local area, networks (WLANs). Following this, a basic

specification for Wi-Fi was established, allowing two megabytes per second of data transfer wirelessly between devices. This sparked development in prototype equipment (routers) to comply with IEEE802.11, and in 1999, Wi-Fi was introduced for home use.

### **2.2.1 Previous Study**

In order to see how far this product can fit in the market, the Bluetooth System is designed and built in the Rain Gutter Cleaner. This is to see how by using this smart tool system can assure the safety of the user.

### **2.2.2 Concept Selection**

A new and creative idea usually results from the observation of a problem faced by a handful or a group of people and the idea aims to simplify the work and the way, saving time, energy and most importantly avoiding waste of energy and time. In addition, product quality must be at a higher level and safer than existing products in order to attract more consumers. The survey method was used to obtain the design of the project and suitable for production. Among the factors selected are such as time saving, labor saving, easy to operate, and cost saving. The project design must be simple but attractive and effective.

## **2.3 Summary**

In conclusion, after having a study and observation on the items and components required in this project, it is really show that the suitable and appropriate item and components need to be in the projects so that incidents or accidents can be avoid. In addition, the cost of the item and component also need to be consider in order to make this project success. Lastly, there are no problem that cannot be solves during this project creation.

## **CHAPTER 3 METHODOLOGY**

Written By: Amirul Aiman Bin Rosmini

### **3.1 Introduction**

In this chapter, we will explain the flow of choosing the title for this project until the presentation day. For this chapter, it also contain Project Design, Sampling, and data collection method and analysis data. For more detail information about how its implementation, the methodology will shows in the form of Flow Chart.

For the title, we choose “Rain Gutter Cleaner” as our project is because of Azrul have a relative that work in a greenhouse. His relative greenhouse a gutter clogged, and he asked Azrul if he could create a project to help him solve his problem. The design of this project is not very complicated and it must be lightweight due to the weight limit for the gutter. For the material wise, we need to look for a material that is durable enough to withstand extreme weather. We also plan to make a gutter cleaner that can lighten the burden of the user by make accessible through your phone. The only downside of this project is if you do not have any connection to nearest WIFI it would not work.

## Gantt chart

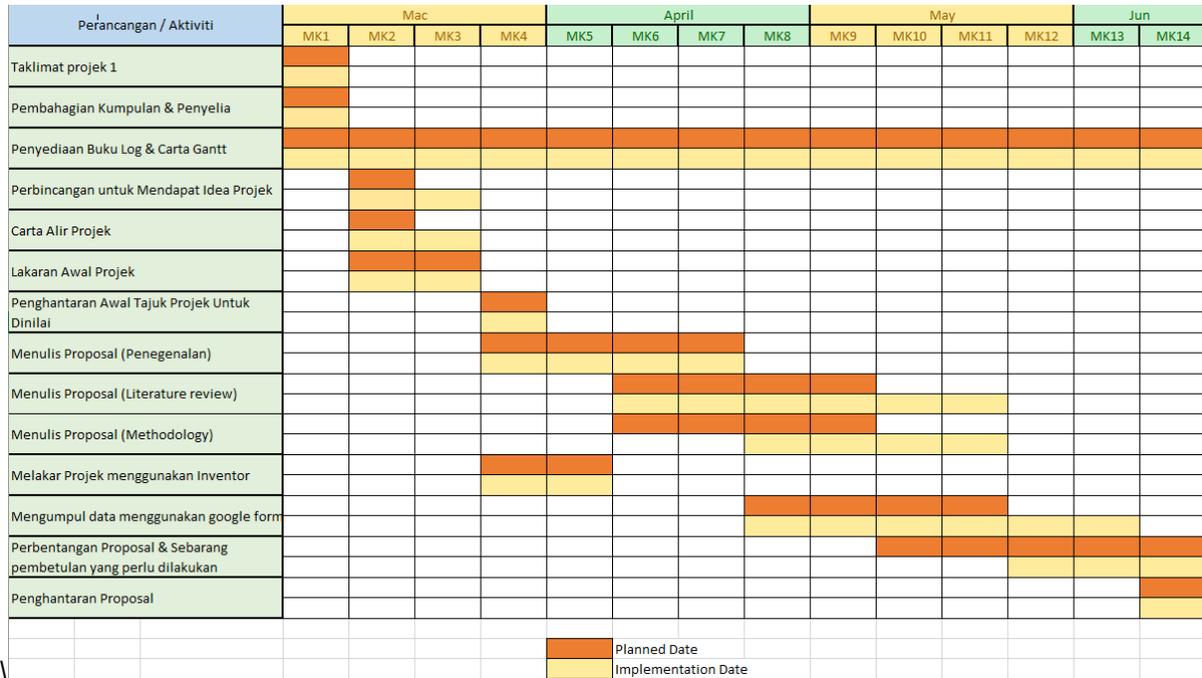


Table 3.1.1



## 3.2 Project Design

The existing gutter cleaner is a rod-like vacuum that you need to handle it by yourself or you need to climb a ladder to clean it by hand. Our group plan is to make a gutter with a simple design that can activate the gutter with just a press of button from your phone. For the design, it was initially sketch by Azrul and was made an adjustment by all of us. We also make sure that the size for the project is fit for the gutter. For this section, we will show the design from sketching until the final adjustment.

### Raw Sketch

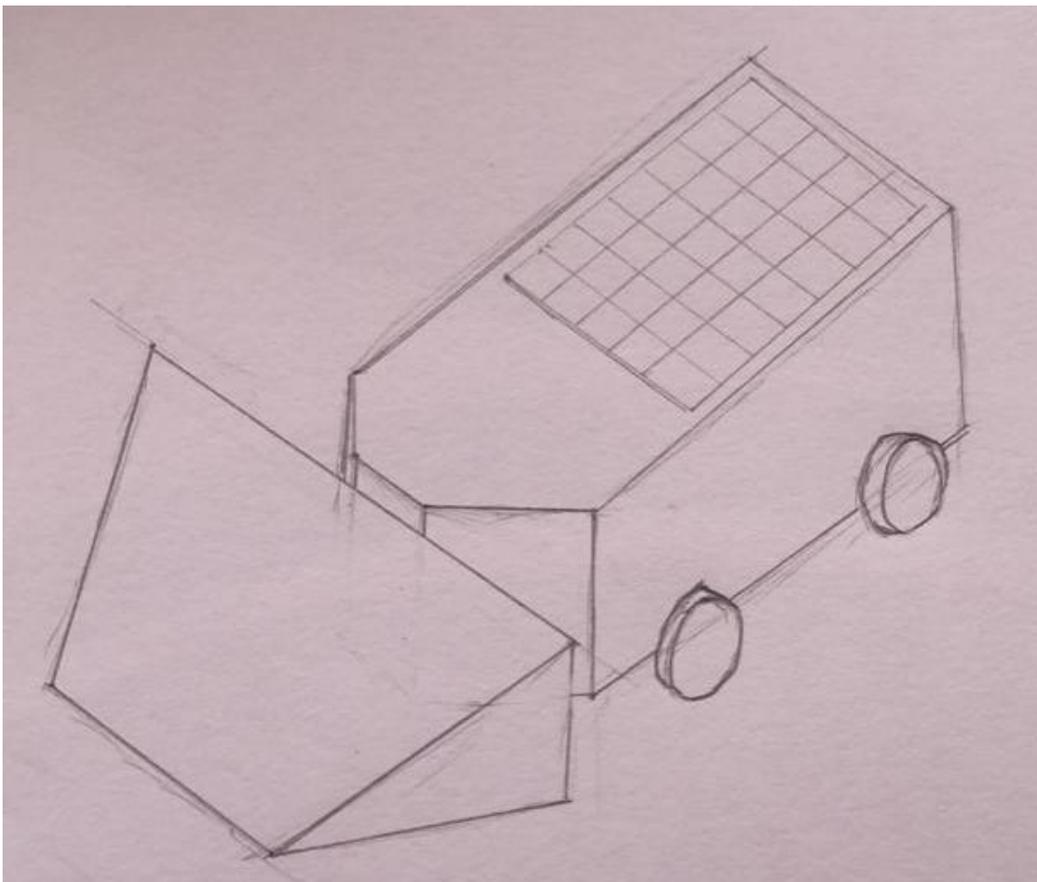


Diagram 3.2.1

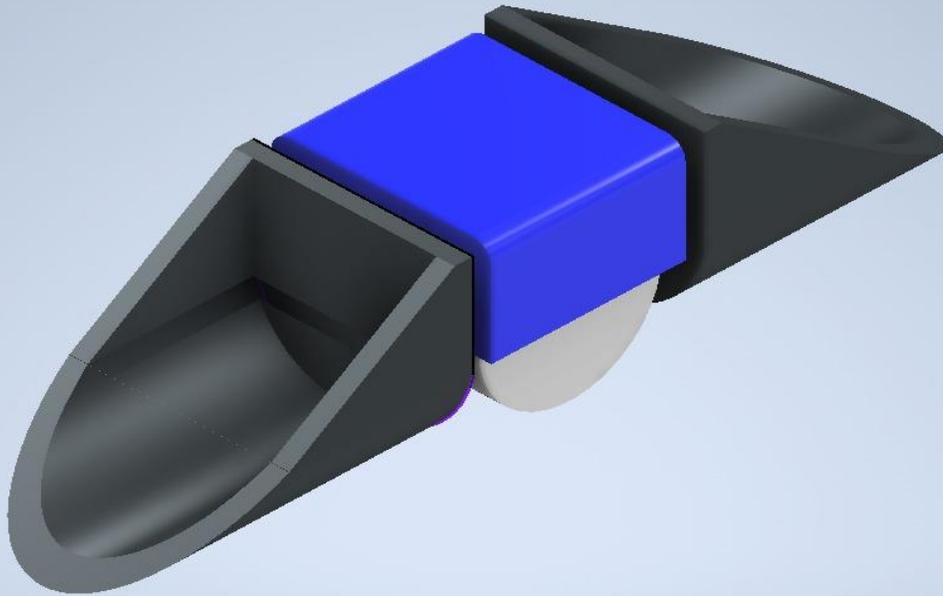
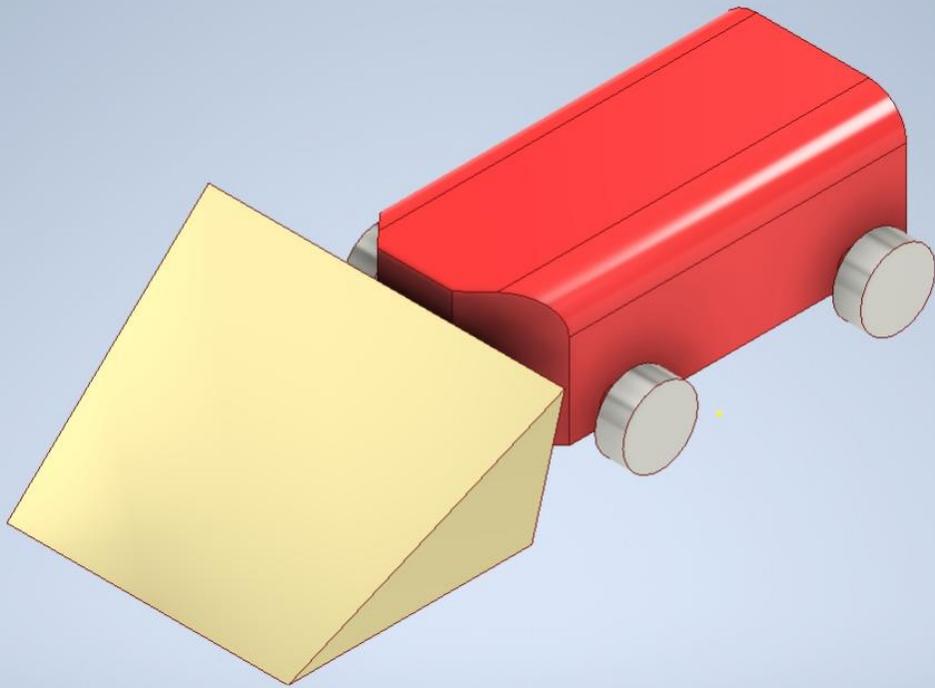


Diagram 3.2.2 and 3.2.3

## Final Design

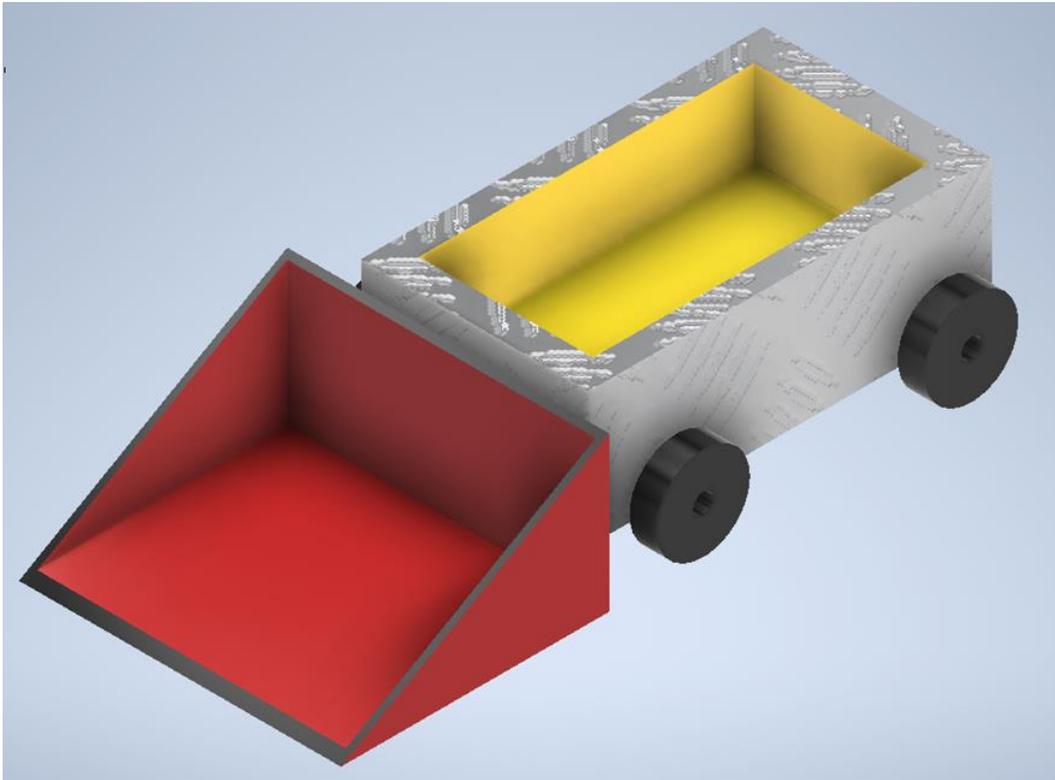


Diagram 3.2.4

### **3.2.1 Type of Study**

#### **I. Sampling**

The method that we choose for this is Purposive Sampling. We use this method to gain detailed knowledge about the respondents that have gutter at their houses or workplace to help the with clogged gutter problem.

#### **II. Data Collection Method**

This study was carry out using a quantitative method through use questionnaire method. Questionnaires were distribute to respondents to answer through “Google Form”. We also use “WhatsApp” application to distribute the form. The duration for data collecting was about 6 weeks. After that, we used the data that we received to make a pie chart for easier reference.

#### **III. Data Analysis Method**

The collected data were processed and analysed using descriptive statistics through seven short question that we prepared. Respondent were give a few selection for their answer. We received around 37 respondents from this questionnaire. The received data were turn into a pie chart through the google form extra features for easier reference.

### 3.2.2 Material & Equipment

For this project, our current plan is to use “Tamiya” car for the base body, and use metal plate to cover the body. For the scoop, we still looking for a suitable material to withstand the extreme weather. We currently testing the normal plastic scoop that you can find in DIY store. After the resistance test, we also need to see if the scoop is strong enough to move the leaves on the gutter. The measurement for the scoop need to be no more than 100mm wide. For the tyre, we cannot just simply use a round rubber tyre; we need to choose a specific thread of tyre so that it can move around in the gutter.

#### I. Orthographic

#### Drawing

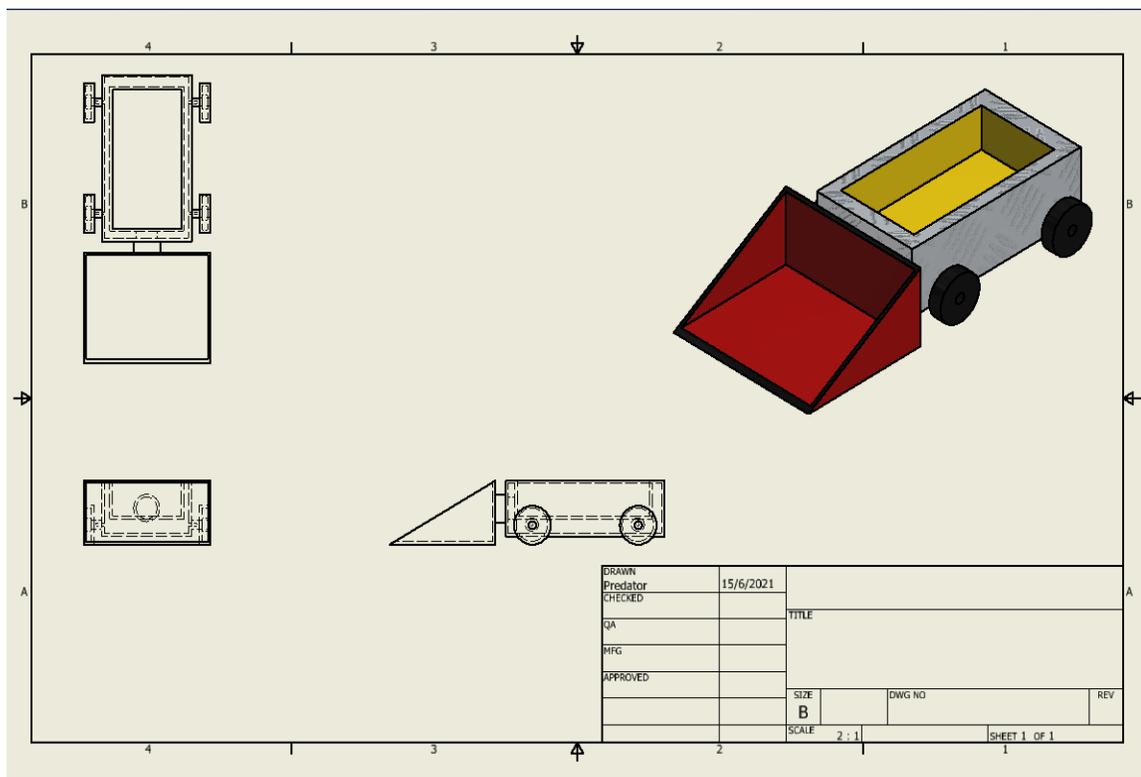


Diagram 3.2.5

## II. Manufacturing Costs And Suggested Selling Prices

<b>Material</b>	<b>Price</b>
Mini Solar Panel	RM 15.00
Internet Of Things (IOT)	RM110.00
DC Motor	RM 10.30
Rubber Tire	RM 6.00
Metal Plate	RM 15.00
Body Parts	RM 25.00
Total Price	RM181.30
Suggested Selling Price	RM199.00

Table 3.2.1

### 3.3 Summary

"Rain Gutter Cleaner" is a gutter cleaner that can be activate through Wi-Fi connection. The current gutter in the market is the rod-like shape that you need to handle it yourself. Our gutter is the first smart gutter that can be activate by just pressing the button on your smartphone. We know that even though our project is quite costly, it could also be a big demand because of the easiness that it comes with.

## **CHAPTER 4: PRELIMINARY INVESTIGATION OF THE STUDY**

Written by: Azrul Naim Bin Muhammad Hasrizal

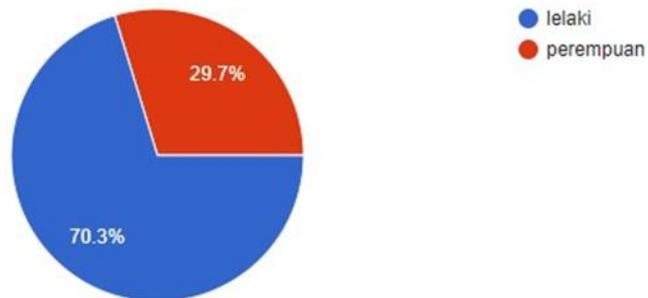
### **4.1 Introduction**

Once all the data and information were obtain, analysis need to be done to see the reaction of consumers of this product. The results obtained in this chapter are the results obtained from the online questionnaire. The data obtained from this online questionnaire were analyze in more detail to draw conclusions based on the objectives of the study that have been state. The study was conducted by using respondents who have filled in the online questionnaire. Several aspects are the focus, namely:

1. Demographic of respondent (gender and age)
2. General view of the study
3. Respondent perspective on the product
  - Shape
  - Function
  - Material used
  - Advantage

## 4.2.1 Demographic Profile of Respondent

jantina  
37 responses

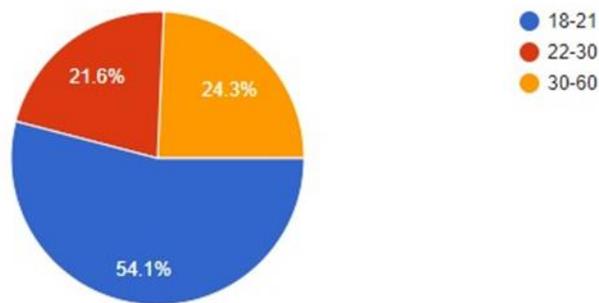


**Diagram 4.1 Respondent Gender**

Diagram 4.1 show that the percentage of respondent gender that give respond for this project.70.3% of the respondent are man while 29.7 % of the respondent are women. The percentage for the man is the highest because usually the gutter usually been clean by man rather than women.

## 4.2.2 Respondent Age

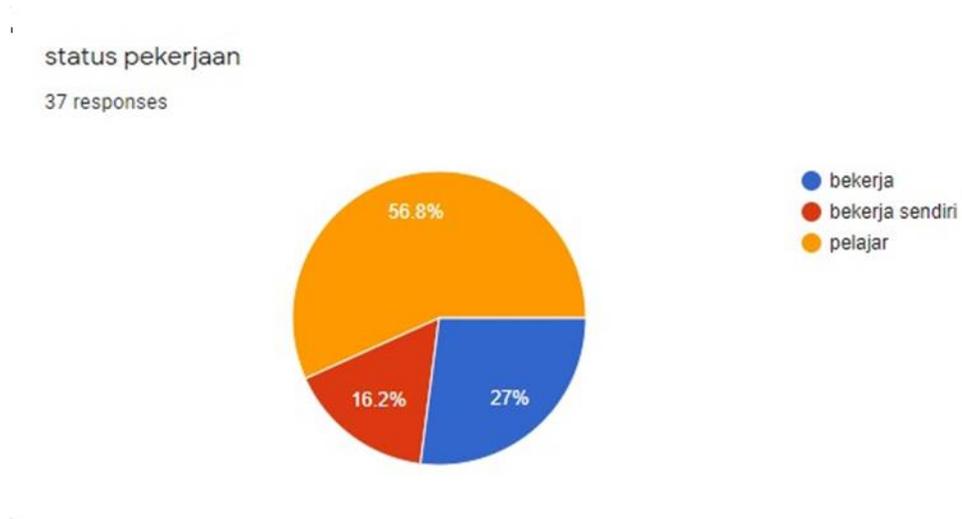
Umur  
37 responses



**Diagram 4.1.2 Respondent age**

Diagram 4.1.2 shows that the age of our respondent that responding to our project. The diagram show that 54.1% of the respondent are in 18- 21 years old is the highest percentage because they consist of first year and final year students namely in the semester 1, 2, 3, 4 and 5. Most of them are student who taking diploma in mechanical engineering and civil engineering. In addition, 24.3% are respondent that around 30-60 years old and 21.6% are around 22-30 years old.

### 4.2.3 Work Status



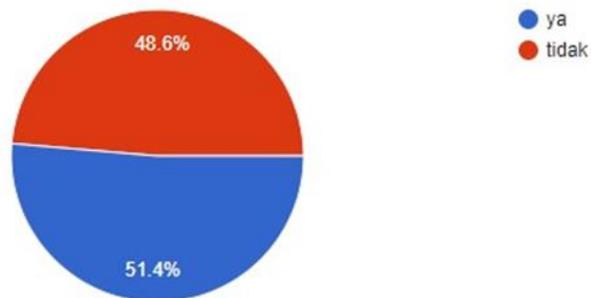
**Diagram 4.1.3 Respondent Work Status**

Diagram 4.1.3 show that the work status for our respondent that give respond to our project. The 56.8% of the respondent are student. This is because most of the student are taking diploma in mechanical engineering and civil engineering and most of them are in the 1,2,3,4 and 5 semester. Next, the 27% are respondent that work such like engineer and technician. Lastly, the 16.2% are for respondent that work alone.

#### 4.2.4 Time for Cleaning the Gutter on the Green House

Adakah anda mempunyai masa untuk membersihkan salur air di bumbung rumah/green house anda?

37 responses



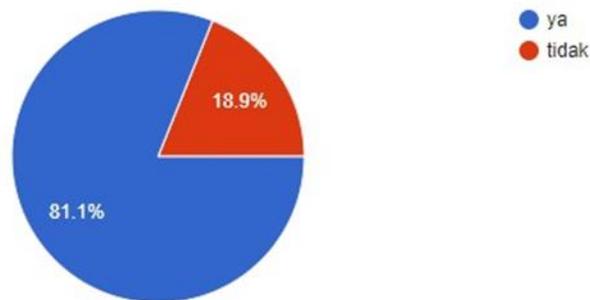
**Diagram 4.1.4 Respondent Time to Clean the Gutter on the Green House**

Diagram 4.1.4 shows that the free time that the respondent have in order to clean the gutter on the roof of their house or the green house. The 51.4 % of respondent says that they have a free time to clean the gutter. Most of the respondent says they usually clean their gutter once per 2 month on weekend. The 48.6% of respondent says that they do not have time for cleaning their gutter. This is because they are busy with work until they had no time to clean their gutter even once a year.

#### 4.2.5 Does the Respondent Have Problem When Cleaning the Gutter

adakah anda mempunyai masalah untuk membersihkan saluran air di bumbung rumah/green house anda

37 responses



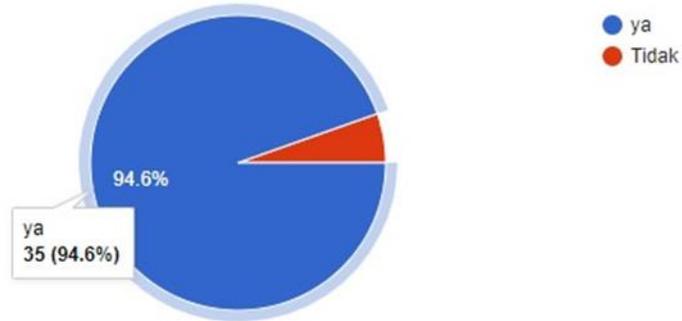
**Diagram 4.1.5 Percentage of Respondent That Have Problem When Cleaning the Gutter**

Diagram 4.1.5 shows that the percentage of respondent that have problem when cleaning the gutter. The Diagrams show that 81.1% of respondent say that they had a problem when cleaning the gutter. They said they do not have a suitable equipment in order to clean the gutter perfectly. The other 18.9% of respondent says that they do not have any problem when cleaning the gutter.

## 4.2.6 Is it Dangerous to Clean the Gutter

adakah anda merasa terlalu merbahaya untuk anda membersihkan salur air tersebut sendiri

37 responses



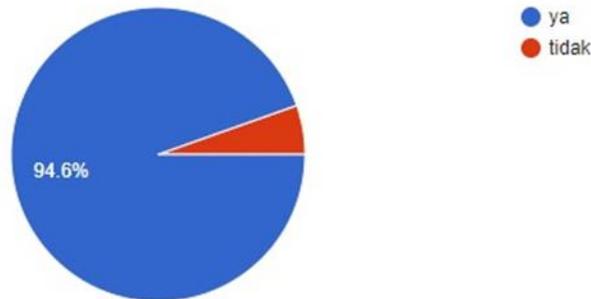
**Diagram 4.1.6 Percentage of Respondent That Say Cleaning the Gutter Is Dangerous**

Diagram 4.1.6 shows that the percentage of respondent that says cleaning the gutter can be dangerous. Diagrams shows that 94.6% of respondent says that it is dangerous to clean the gutter. They said that the position of the gutter that is too high is dangerous to be clean personally or physically.

## 4.2.7 Will the Rain Gutter Cleaner Can Help Your Problem

adakah rain gutter cleaner dapat membantu masalah anda

37 responses



**Diagram 4.1.7 the Percentage of Respondent That Say Rain Gutter Cleaner Can Help Them Solve Their Problem**

Diagram 4.1.7 shows that the percentage of respondent that say 'Rain Gutter Cleaner' can help them to solve their problem. Diagram shows that 94.6% of respondent say that 'Rain Gutter Cleaner' can help them solve their problem. This is because the smart tool contains 'IOT' that really can help them save their time so that that can do their own work while still can clean the gutter. Besides that, the respondent also say that this tool can avoid harm for some individual that usually clean the gutter personally or physically.

## 4.3 Summary

In conclusion, the respondent respond important in order to have a successful project because their perspective can help us achieve the perfect objective and help us to fulfill some spot that are less in our project.

## **CHAPTER 5 CONCLUSION AND SUGGESTION**

Written by: Ammar Fayyadh Bin Ahmad Fahizal

### **5.1 Introduction**

Introduction of this chapter is intended to inform about the content of the chapter as a whole.

### **5.2 Conclusion**

The quality of this project will be constantly monitored so that the best feature based on desired objectives can be create and to make sure that safety is more assured. The findings of the study should be conclude in line with the research question.

### **5.3 Suggestion**

The research proposal is a listing of several further research recommendations to strengthen the research findings in the field studied. In other words, new recommendations resulting from the findings of the study should be put forward. The significance of the study and the implication of the study for the future should be also be included in this section.

## 5.4 Up Coming Suggestion

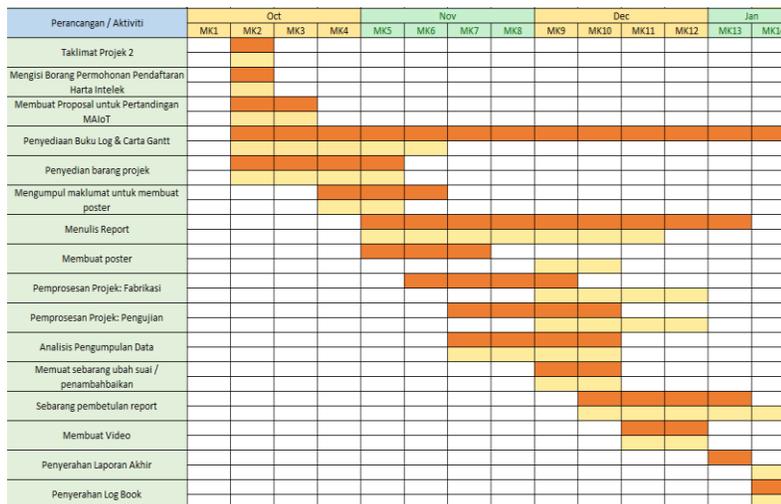
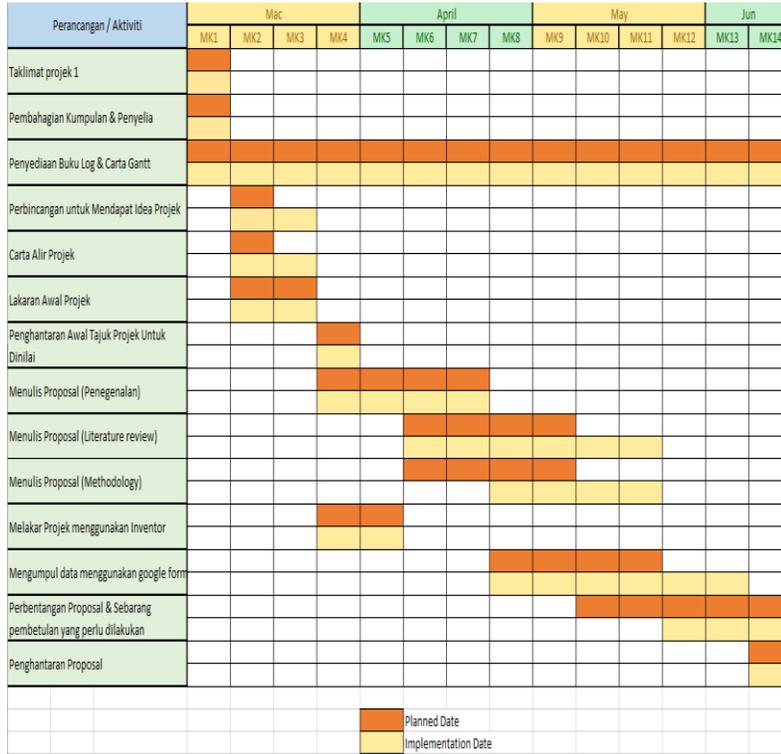
- I. Add interesting feature such as detector to detect the presence of dry leaves
- II. Able to control the speed of the gutter cleaner
- III. Add cooler to gutter cleaner in case the weather is super hot

## 5.5 References

- I. [https://www.youtube.com/results?search\\_query=rain+gutter+cleaner](https://www.youtube.com/results?search_query=rain+gutter+cleaner)
- II. <https://shopee.com.my/>
- II. [https://www.academia.edu/33613049/Contoh\\_Penulisan\\_Laporan\\_Projek\\_Akhir\\_Diploma\\_Kejuruteraan\\_Awan](https://www.academia.edu/33613049/Contoh_Penulisan_Laporan_Projek_Akhir_Diploma_Kejuruteraan_Awan)
- IV. [https://en.wikipedia.org/wiki/Gutter\\_cleaner](https://en.wikipedia.org/wiki/Gutter_cleaner)

## 5.6 Attachment

### I. Gantt Chart



## II. Cost And Expenses

<b>Material</b>	<b>Price</b>
Mini Solar Panel	RM 15.00
Internet Of Things (IOT)	RM110.00
DC Motor	RM 10.30
Rubber Tire	RM 6.00
Metal Plate	RM 15.00
Body Parts	RM 25.00
Total Price	RM181.30
Suggested Selling Price	RM199.00

### III. Flow Chart

