



POLITEKNIK SULTAN SALAHUDDIN

ABDUL AZIZ SHAH

MINI SOLAR CHAINSAW

KUNJAMBOO AJAY A/L SUDIR

08DKM19F1076

WAN DANISH SYAZWAN BIN WANZULKIFLI

08DKM19F1075

SARIPAH MAISARAH BINTI MOHD NASIR

08DKM19F1086

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

JABATAN KEJURUTERAAN MEKANIKAL

SESI 1 :2021/2022

AKUAN KEASLIAN DAN HAK MILIK MINI SOLAR CHAINSAW

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2. Saya mengakui bahawa Mini Solar Chainsaw 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 Mini Solar Chainsaw kepada Politeknik Sultan Salahuddin Adul Aziz Shah bagi memenuhi keperluan untuk penganugerahan **Diploma Kejuruteraan Mekanikal** kepada saya.

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ABSTRACT

This study is to analyze the efficiency of the type of hacksaw in wood use activities and improve the type of saw to obtain a neater wood cutting result and faster to use. Deforestation is a major problem in the world because it affects to temperature and increasing carbon dioxide. In this research, it is therefore proposed that the sound signal inspection of chainsaw which take place from deforest activity and localize the position of deforesting by using the sound signal detection of chainsaw that travels in two mediums are in the air and soil and find the time difference which two waves in both medium travel to the observer or the detector. Which the proposed system is low complexity and energy-saving and can move easily. From the system test, it was found that the accuracy was 95%. Due to the high risks involved in using electric chainsaws, they were introduced in the non-professional and professional applications. However, they are still very dangerous and should only be used as much as possible. The experiment involved using two factors, namely, chain tension and time of cross-cutting. The results of the experiment revealed that the use of electric saws resulted in a lower efficiency than petrol powered saws. The lower efficiency of electrical saws is caused by the reduced power of their engines. Also, the speed of chain rotation is lower than that of mechanical saws.

ABSTRAK

Kajian ini adalah untuk menganalisis kecekapan jenis gergaji besi dalam aktiviti penggunaan kayu dan meningkatkan jenis gergaji untuk mendapatkan hasil pemotongan kayu yang lebih kemas dan lebih cepat digunakan. Penebangan hutan adalah masalah besar di dunia kerana mempengaruhi suhu dan meningkatkan karbon dioksida. Oleh itu, dalam penyelidikan ini, dicadangkan agar pemeriksaan isyarat bunyi gergaji yang berlaku dari aktiviti penebangan hutan dan melokalisasikan kedudukan penebangan hutan dengan menggunakan isyarat bunyi pengesanan gergaji yang bergerak dalam dua medium berada di udara dan tanah dan mencari perbezaan waktu yang mana dua gelombang di kedua-dua medium bergerak ke pemerhati atau pengesan. Mana sistem yang dicadangkan adalah kerumitan rendah dan penjimatan tenaga dan dapat bergerak dengan mudah. Dari ujian sistem, didapati bahawa ketepatannya adalah 95%.

Oleh kerana risiko tinggi terlibat dalam penggunaan gergaji elektrik, mereka diperkenalkan dalam aplikasi bukan profesional dan profesional. Walau bagaimanapun, ia masih sangat berbahaya dan hanya boleh digunakan semaksimum mungkin. Eksperimen ini melibatkan dua faktor, iaitu ketegangan rantai dan masa pemotongan silang. Hasil eksperimen menunjukkan bahawa penggunaan gergaji elektrik menghasilkan kecekapan yang lebih rendah daripada gergaji bertenaga petrol. Kecekapan yang lebih rendah dari gergaji elektrik disebabkan oleh pengurangan kuasa enjinnya. Juga, kelajuan putaran rantai lebih rendah daripada gergaji mekanikal.

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CHAPTER 1 INTRODUCTION

**PREPARED BY: SARIPAH MAISARAH BINTI MOHD NASIR
(08DKM19F1086)**

1.1 INTRODUCTION:

Mini Solar Chainsaw (MSC) is a tool that innovated from its original tool which is a chainsaw that has been existed from 100 years ago. In fact, the first chainsaw was made for medical purposes where it was used to cut human bones, designed by German orthopedist Bernhard Heine in 1830 (literally, the bone cutter). Then, it was used in the forestry industry in the 1920 to replace the use of axes/lumberjack in cutting twigs and trees. This tool is easy to carry anywhere due to its light weight and small size. Although this tool is small and light, but it is more effective in its use. Nowadays, there are various type of chainsaw which is.

1.2 BACKGROUND RESEARCH:

As we know, there are corded and cordless chainsaws in the market today. However, solar panels are not included in the purchase of the chainsaw. In this case, a corded chainsaw such as an electric chainsaw can certainly not be used in areas that do not have a power source. However, for cordless chainsaw, which is battery powered chainsaw, it's quite good but not good enough because it still can be used outside the areas that do not require a power source, but its usability only depends on the battery capacity. Meanwhile for our project, it is 90% same as battery powered chainsaw, but solar panel were added to increase its usability in daily activities. Solar panel used to charge the chainsaw battery when they are used up. Therefore, the chainsaw can be use again after it is completely charge.

1.3 PROBLEM STATEMENT:

- i. Most of the chainsaw machines used currently are somewhat heavy and require a lot of work by users.
- ii. The chainsaw machine used produces a very loud noise that disturbs the peace of the environmental area and causes noise pollution.
- iii. The average chainsaw machines that use fuel release dirty smoke into the air around and being the main cause of air pollution.

1.4 OBJECTIVES PROJECT:

- i. Produce a chainsaw machine that uses solar energy to replace the use of petrol which causes air pollution.
- ii. Create a chainsaw machine that has a lower cost and is affordable to own.
- iii. Able to cut and split wood in a short time.

1.5 PROJECT QUESTIONS:

- i. This study will answer the following research questions:
- ii. Can this mini solar chainsaw save users time to cut wood?
- iii. Is this product able to reduce heavy load while cutting wood?
- iv. Is this product able to avoid the sources of air and noise pollution?

1.6 SCOPE OF THE RESEARCH:

- i. This product can only cut wood.
- ii. This product cannot be used during rain. (not waterproof)
- iii. This product cannot cut thick wood. for example, the thickness of wood does not exceed 30cm.

1.7 THE IMPORTANCE OF PROJECT

The importance of this project is to facilitate local workers as well overseas traders engaged in the task of cutting timber or trees. This project is also not just focusing on traders even this project is also friendly to use to individuals who always uses a chainsaw at home. This project can make it easier the individual to use it at any desired time in a short time and be able to produce beautiful and neat pieces of wood.

1.8 CONCLUSION

The summary of this chapter is to provide an understanding of the introduction to the Project this. We hope you can understand what we describe in chapter 1 this in addition to being able to describe the situation or design of this project is even better if can you describe how this project works. We also hope to be interesting Your interest in getting to know and understand more about this project.

CHAPTER 2 LITERATURE REVIEW

PREPARED BY : WAN DANISH SYAZWAN BIN WAN ZULKIFLI (08DKM19F1075)

2.1 INTRODUCTION

Our Final Year Project which is Mini Solar Chainsaw (MSC) is a portable chainsaw that can cut twigs and tree woods more easily than an axe/lumberjack. This tool is easy to carry anywhere due to its light weight and small size. Although this tool is small and light, but it is more effective in its use. This tool consists of three main components which is the chainsaw itself, battery, and solar panel. This chapter will discuss previous research about all types of chainsaws. Literature review is a literature search and evaluation that is available in the selected subject area or topic. It is a state-of-the-art document about a topic or topic that is written.

2.2 CHAINSAW

2.2.1 The History of Chainsaw

A chain saw is a portable tool that uses a set of teeth to cut wood. It was first used in 1830 by German orthopedist Bernhard Heine for medical purposes.



Figure 2.1: First Chainsaw was invented, to cut bone (medical purposes).

2.2.2 The Development of Chainsaws

After that, chainsaws were developed in the 1920 to cut twigs and trees. The introduction of the motorized saw enabled producers to increase their timber production at a level comparable to that of the non-motorized saw. Before the electric chainsaw became mainstream, there were plenty of researchers searching for ways to improve the efficiency and strength of their equipment. The first patent for a chainsaw was issued in 1926. Before the Second World War, all chainsaws were carried and used by two people. As the metal parts started to get lighter, the chainsaw became more versatile. In 1959, the first motorized chainsaw was introduced, the Husqvarna 90.



Figure 2.2: Husqvarna 90 Chainsaw from 1959

In 1964, the first anti- vibration handle was introduced. This one utilized buffer elements to absorb vibrations.

2.2.3 The Innovation of Chainsaw



Figure 2.3: Husqvarna 180 Chainsaw

Figure 2.4: Dolmar D80, year of manufacture 1938



Figure 2.5: Dolmar DB35, year of construction 1948



Figure 2.6: Stihl BL, year of construction 1951



Figure 2.7: Barkas SEL 100, year of construction 1962



Figure 2.8: Solo 635, year of construction 1965



Figure 2.9: Stihl 042, year of construction 1976

2.2.4 Difference Types of Chainsaws

Nowadays, we have various of chainsaw as it definition which is portable gasoline, battery-powered and electric chainsaw. So, these are differences between those types of chainsaws.

Table 2.1 : Differences Types of Chainsaw

TYPES	Electric Chainsaw (Corded)	Battery-Powered Chainsaw (Cordless)	Gas Chainsaw
Weight	Lightweight and compact	Lightweight and compact	Heavy
Noise	Quiet and no fuel emissions	Quiet and no fuel emissions	Loud and has a gas smell
Turn on option	Starts with a button	Starts with a button	Starts by pulling a cord
Power source	Use electric power source	Use battery	2-cycle uses gas/oil mix and 4-cycle uses gas only
Suitable use for	Good for basic yard work	Good for basic yard work	Good for all types of yard work and heavy-duty jobs
Maintenance	Relatively no maintenance	Relatively no maintenance	Needs routine maintenance
Price	Cheapest type of chainsaw	Affordable	Expensive
Duration of use	Runs forever (as long the electricity is available)	Runs as long the battery is still available	Runs as long you can refuel it
Consumption limits	Limited in reach	Extremely mobile with no limits	Extremely mobile with no limits
Blade Length	Blades only go up to 18 inches	Blades only go up to 18 inches	Blades go up to 72 inches

2.3 BATTERY

Batteries come in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to small, thin cells used in smartphones, to large lead acid batteries or lithium-ion batteries in vehicles, and at the largest extreme, huge battery banks the size of rooms that provide standby or emergency power for telephone exchanges and computer data centers.

2.3.1 The History of Battery

The usage of battery to describe a group of electrical devices dates to Benjamin Franklin, who in 1748 described multiple Leyden jars by analogy to a battery of cannon. Italian physicist Alessandro Volta built and described the first electrochemical battery, the voltaic pile, in 1800. This was a stack of copper and zinc plates, separated by brine-soaked paper disks, that could produce a steady current for a considerable length of time. It consisted of a copper pot filled with a copper sulfate solution, in which was immersed an unglazed earthenware container filled with sulfuric acid and a zinc electrode.

2.3.2 Principle of Battery Operation

In many cases, the electrical energy released is the difference in the cohesive or bond energies of the metals, oxides, or molecules undergoing the electrochemical reaction. For instance, energy can be stored in Zn or Li, which are high-energy metals because they are not stabilized by d-electron bonding, unlike transition metals. A battery consists of some number of voltaic cells. Each cell consists of two half-cells connected in series by a conductive electrolyte containing metal cations. Cations are reduced at the cathode, while metal atoms are oxidized at the anode.

2.3.3 Categories and Type of Batteries

Batteries are classified into primary and secondary forms:

- I. Primary batteries are designed to be used until exhausted of energy then discarded. Their chemical reactions are generally not reversible, so they cannot be recharged.
- II. Secondary batteries regenerate the original chemical reactants, so they can be used, recharged, and used again multiple times.

2.3.4 Lithium Polymer Battery

These batteries provide higher specific energy than other lithium battery types and are used in applications where is a critical feature such as radio-controlled aircraft, some electric vehicles, and portable electric devices.

Table 2.2: Pros and Cons Li-ion and Li-po Batteries

	Li-ion Battery	Li-polymer Battery
Usable voltage range	from 3V to 4.2V	from 3V to 4.2V
Energy density	High energy density	Low and decreased cycle count compared to Li-ion
Flexibility	Low	High
Safety/Explosive risk	More volatile as compared to Li-Po	More safety. Less chances to explosion
Cost	Cheaper	Slightly expensive
Aging	Loses actual charging capacity over time	Retains charging capacity better than Li-ion
Temperature range usage	-20 to 60° C	-20 to 70° C
Impedance	<100 mΩ	<50mΩ
Charge Temperature	0 to 40° C	0 to 40° C

As all the battery fact shown above, my group decided to use 12V Li ion battery forour Mini Solar Chainsaw (MSC) which is suitable with our budget. There are manytypes of brands to choose from such as.

Table 2.3: Type of Li-po Battery Brand

Brand	Alienmodel	AHTECH	MaxPower	ERC
Battery Design				
Voltage	3S (11.1V)	3S (11.1V)	3s (11.1V)	2S (7.4V)
Capacity	2200mAh	2200mAh	2200mAh	5300mAh
Discharge Rate	50c	45c	120c	90c
Weight	180g	188g	183g	184g
Price	RM63	RM82	RM128	RM113

2.4 SOLAR PANEL

2.4.1 The History of Solar Panel

A solar panel, or photo-voltaic module, is an assembly of photo-voltaic cells mounted in a framework for installation. A collection of PV modules is called a PV panel, and a system of panels is an array. A solar panel, or photo-voltaic module, is an assembly of photo-voltaic cells mounted in a framework for installation. Arrays of a photovoltaic system supply solar electricity to electrical equipment. Initially, the use of solar energy was used only to produce steam so that it could be used to power machines.

Becquerel's discovery then led to a new discovery in 1893 by Charles Fritts in which the first native solar cell was formed by a layer of selenium with a thin layer of gold. Russel Ohl, a researcher at Bell Laboratories originally from America, patented the world's first silicon solar cell in 1941. Solar panels discovered their first mainstream use on space satellites. Nowadays, solar panels and complete solar panel systems are used to provide energy to consumers.

2.4.2 How Does Solar Panels Work?

Light striking certain compounds, in particular metals, causes the surface of the material to emit electrons. It is the combination of these two compounds that can cause electrons to flow through a conductor. This phenomenon is what we term the photo-electric effect.

2.4.3 The Major Types of Solar Panels

There are three major types of solar panels.

- i. Mono-Crystal Silicon Solar PV (Monocrystalline Solar Cell)
- ii. Poly-Crystal Silicon Solar PV (Polycrystalline Solar Cell)
- iii. Thin Film Solar Cell (TFSC)

Table 2.4: Pros and Cons Between the Type of Solar Panel

Diagram	Solar Panel Type	Advantages	Disadvantages
	Monocrystalline	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • higher cost
	Polycrystalline	<ul style="list-style-type: none"> • low cost 	<ul style="list-style-type: none"> • lower efficiency/performance (13-17% efficiency)
	Thin film	<ul style="list-style-type: none"> • portable and flexible • lightweight • aesthetics 	<ul style="list-style-type: none"> • lowest efficiency/performance (7-13% efficiency)

In a nutshell, Mono-Crystalline which is the highest purity silicon solar PV cell produced from a single mass-produced silicon crystal. Its performance is known to be better than Poly-Crystalline. In recent years, there has been an increase in manufacturing and coating processes, making the two crystals quite close in competition, with Mono slightly ahead in efficiency but more expensive. Mono-Crystalline also works better in hot temperatures and low light.

Table 2.5: Pros and Cons of Solar Power

Advantages	Disadvantages
Renewable energy source	High cost
Reduce electricity bills	Weather dependent
Diverse applications	Solar energy storage is expensive
Low maintenance cost	Uses a lot of space
Technology development	Associated with pollution

Table 2.6: Advantages of Solar Power

Renewable energy source	We cannot run out of solar energy sunlight will be available to us for at least 5 billion years when according to scientists the sun is going to die.
Reduce electricity bills	How much you save on your bill will be dependent on the size of the solar system and your electricity or heat usage. There is also a possibility to receive payments for the surplus energy that you export back to the grid through the Smart Export Guarantee (SEG)
Diverse applications	Solar energy can be used to produce electricity in areas without access to the energy grid Solar energy can also be integrated into the materials used for buildings.
Low maintenance	You only need to keep them relatively clean, so cleaning them a couple of times per year will do the job Also, as there are no moving parts, there is no wear and tear.
Technology development	Technology in the solar power industry is constantly advancing and improvements will intensify in the future.

Table 2.7: Disadvantages of Solar Power

High cost	<p>This includes paying for solar panels, inverter, batteries, wiring, and the installation.</p> <p>Solar technologies are constantly developing, so it is safe to assume that prices will go down in the future.</p>
Weather dependent	<p>During cloudy and rainy days, the efficiency of the solar system drops.</p> <p>You should also take into account that solar energy cannot be collected during the night.</p>
Solar energy storage is expensive	<p>Solar energy has to be used right away, or it can be stored in large batteries.</p> <p>It is smarter to just use solar energy during the day and take energy from the grid during the night</p>
Uses a lot of space	<p>The more electricity you want to produce, the more solar panels you will need</p> <p>Solar PV panels require a lot of space and some roofs are not big enough to fit the number of solar panels that you would like to have.</p>
Associated with pollution	<p>Transportation and installation of solar systems have been associated with the emission of greenhouse gases.</p> <p>There are also some toxic materials and hazardous products used during the manufacturing process of solar photovoltaic systems</p>

2.5 CHAPTER SUMMARY

In a nutshell, these studies were explained about how to choose a very convenient tools or item to use in our project. As to conclude this chapter, literature review is important to showcase all the studies of materials and methods to enhance the knowledge on this project. Every and other projects that are related to this is helpful especially for us to understand it completely. After a lot of materials and methods were discussed and researched were done, we have chosen the materials that are the most compatible for our project.

CHAPTER 3 METHODOLOGY

PREPARED BY: KUNJAMBOO AJAY SUDIR (08DKM19F1076)

3.1 INTRODUCTION

A Methodology is a plan-attack, especially the plan-of-attack is used repeatedly. So, this might be obvious that the word methodology is related to the word method. In fact, a methodology is a system of methods followed consistently.

3.1.2 EXPLANATION

The Solar Powered Mini Chainsaw is designed and completed by the complete methodology which were our complete guideline throughout our project. As a first step, we had to conduct a brief and clear explanation with our supervisor to make a complete study about our project. Then, we did a small meeting with our own teammates to make a plan of our daily and weekly task and duty. We divide the work equally with our teammates.

3.2 PROJECT DESIGN

The design of this project is the concept of a chainsaw which works in rechargeable battery. A Solar panel is used as charger for the battery. The things used in this chainsaw are a 12v dc motor, 1800 mAh battery, a PWM controller, saw chain with bracket, and solar controller. Our project works from solar power. That is why our project is called as a "Solar Powered Mini Chainsaw".

3.2.1 DATA COLLECTION METHOD

The data collection method we use to achieve the project objectives is through quantitative methods. We provide a virtual questionnaire form called 'Google Form'. In this method we provide some questions about the problem in connection with the equipment. Besides, we used qualitative data collection methods that is by interview. We had a chat friends and the public to get data on our project improvement ideas in terms of design, materials and materials required.

3.2.2 PROJECT PRODUCTION PROCESS.

In project production, the first thing to consider is selection material. The selection of materials for the project should be appropriate and accurate and should be studied beforehand make a choice of such materials to build a quality and solid project suitable for its usefulness. The second process is the design concept. The shape is very important for a project to ensure that the project works well. So, we study about the appropriate design for our project to ensure the project we work properly. The next process is engineering analysis. Analysis engineering is a matter of concern because without the analysis something the project could not be produced brilliantly. So, we did an engineering analysis to ensure our project can run smoothly and efficiently. And the last process is the measurement, each project to be carried out must have accurate measurements so that the project looks nice and easy to build. So, we study about the measurements so that it will help us to build our project successfully.

3.2.3 PROCESS/METHOD OF MANUFACTURING

Before starting the manufacturing process, we will make the process of compiling the project material and tools to ensure the manufacturing process can be carried out orderly. After that we did a planning to ensure the manufacturing process works in systematically and smoothly. The manufacturing process that we use is drilling and joining parts. Besides, we use a measuring tape to get a correct measurement of the material make sure every material and part we build has the right size so it will ease the process. Apart from that, we use the grasping method which is Named 'Hot Glue Gun' to glue the parts and materials made of plastic. We also use the saw method to cut the material according to accurate size.

3.2.4 THEORETICAL PROBLEMS/PROBLEM SOLVING.

After fixing and joining the parts, we test the project for few times to make sure there is no malfunction. If there is any problem, detect on any part means we will fix it and will repeat the test process to keep the project in perfect condition.

3.2.5 MATERIALS AND EQUIPMENTS AND THEIR FUNCTIONS.

List of components :

- Mini Chainsaw
- 21V rechargeable battery
- Solar panel
- Solar charge controller
- Wire

The materials that need to purchase are:

- 12V Battery
- DC Motor
- Solar Panel
- Bearing
- Saw chain
- Chainsaw bracket
- Solar charge controller
- Wooden block
- Soft start reversible motor speed controller
- PVC pipe
- Screws
- Sprocket
- Wheel step timing pulley

3.2.6 DRAWING

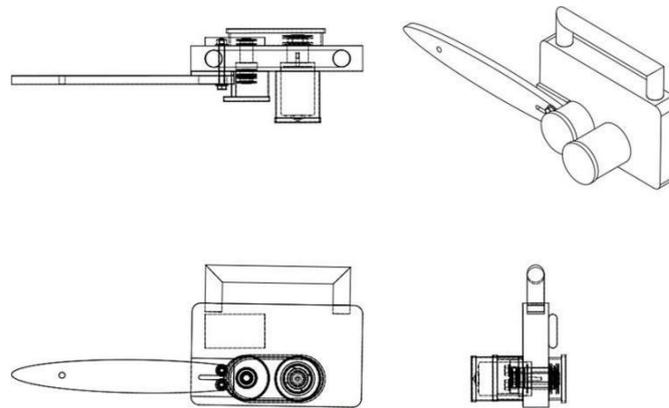


Figure 3.1: Chainsaw View

The solar powered chainsaw design is appropriately designed based on actual dimensional estimates. Because further planning is to build the whole casing by using 3D printing method, the dimensions are calculated accurately to avoid any errors during the printing process in the future. However, this 3D drawing has succeeded quite a bit in this project. This matter because, we have got the full picture to produce it in our final product as real chainsaw. We have sketched and painted each component as well as part using standard millimeter(mm) which is available on Autodesk Inventor software. In the beginning we had sketched each component in 2D form. Then we made each component to the 3D object by using all available gaze as with using the Extrude method and the final drawing is shown in the figure below.

RENDER VIEW

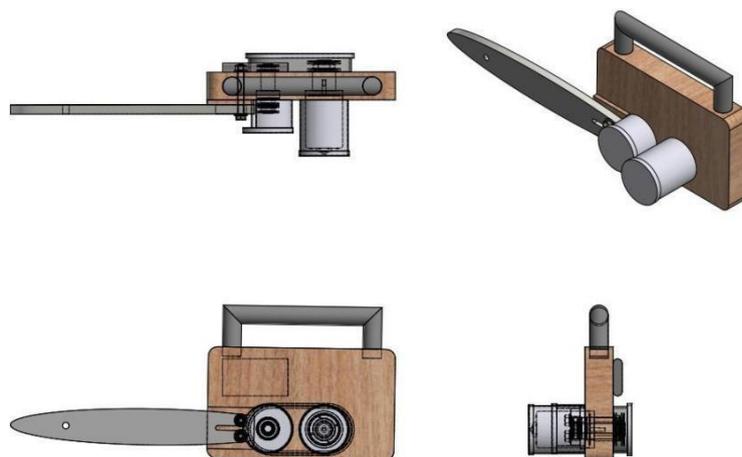
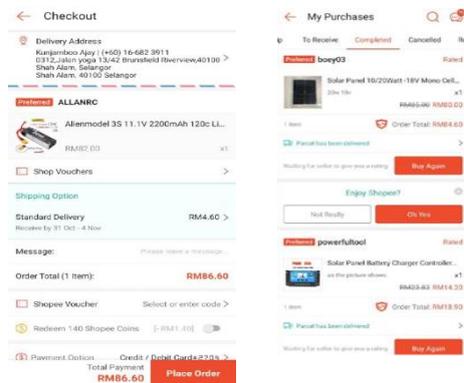


Figure 3.2: Render View Of Drawing Mini Solar Chainsaw

3.3 PRODUCT REVENUE

1. We buy the component through online shopping application Shopee.



2. There's still some item didn't arrives yet since the item is from China.
3. There's also item we need to buy at hardware to save cost.
4. There's a component we couldn't find through hardware shops and online shopping thus cannot proceed our original plan project.
5. Couldn't find mandrill (plan to make as shaft and connect to timing pulley).



6. We Change plan.
7. Tried to create our own mandrill by using lathe machine which we will apply facing and threading operations.
8. There's problem while we want to apply thread to the component which make the component slightly slanted caused by the inappropriate threading tool that we used.
9. We cannot proceed with this plan.
10. We Change plan which we will buy the mini-Chainsaw itself and do some innovation about its battery to increase its usability.
11. Do wiring to connect solar panel, solar charge controller and the rechargeable battery.



12. Make sure the project can run perfectly.
13. Modified the charger by using solar panel.
14. Connect the solar panel to solar charge controller and the battery.



15. The project can run perfectly.



16. Result and discussion .

The chainsaw does not require to much energy from users to cut wood and takes a short time to cut neatly. Meanwhile our solar panel does a good job to charge the battery quickly.

CHAINSAW	
WOOD DIAMETER (mm)	TIME TAKEN TO CUT WOOD (s)
40	2.5
60	7
80	13

SOLAR PANEL	
CHARGING TIME (h)	BATTERY CAPACITY (mAh)
4.5	2000

3.4 SUMMARY

The summary of sub-headings that have been presented in chapter 3 includes the types of projects/studies, method of implementation of project/study as well as data reporting methods. In addition, it also contains description and justification of the selected research/project method without introducing new material to show continuity to the next chapter.

CHAPTER 4 PRELIMINARY FINDINGS OF THE STUDY

PREPARED BY: SARIPAH MAISARAH BINTI MOHD NASIR
(08DKM19F1086)

4.1 INTRODUCTION

In the preliminary investigation of this study, we will discuss about the comparison inbetween a mini solar chainsaw project with a chainsaw that has been sold in the market. In addition, we will also make an evaluation of the project as well as the advantages and disadvantages of the project. We will also discuss projects that have been innovated

4.2 FINDINGS/DATA/PRELIMINARY INVESTIGATION OF THE STUDY

Nowadays, the use of mini solar chainsaws is becoming more contagious everywhere in the store or at home. It aims to cut wood more easily, quickly, and neatly.

4.2.1 BELOW IS A COMPARISON BETWEEN OUR PROJECTS WITH THE EXISTING CHAINSAW ON THE MARKET .

Below is a comparison between the projects our mini solar chainsaw with chainsaw available in the market.

Table 4.1: Comparison Our Mini Solar Chainsaw and Existing Chainsaw

TYPE OF COMPARISON	MARKET PRODUCTS	OUR PRODUCTS
TYPE OF BATTERY	Erc	Alienmodel
TYPE OF MOTOR	Pjm Motor	Dc Motor
ENERGY USED	Using Petrol Or Electricity	Using Solar Energy- Monocrystalline
WEIGHT CHAINSAW	Heavier	Lighter
TYPES OF POLLUTION	Causes Of Environmental Pollution Due To Noise And Smoke Produces	More Care towards the environment.
PRICES	Rm238 And Above	Rm210

4.2.2 ANALYSIS

Readymade product.

- Requires a lot of energy to cut wood because the chainsaw is too heavy and takes a long time to cut.

Products that have been innovated

- Does not require much energy to cut wood and takes a short time to cut neatly.

4.2.3 ADVANTAGES AND DISADVANTAGES OF EXISTING PRODUCTS.

Table 4.2: Advantages and Disadvantages of Existing Products.

Advantage of product	Lack of products
Quite easy to use	Take a long time
Can cut thick wood	Produces a noisy sound

4.2.4 ADVANTAGES AND DISADVANTAGES OF PROJECT INNOVATION.

Table 4.3: Advantages and Disadvantages of Project Innovation.

Advantages of project innovation	Lack of project innovation
Shorter and lighter time	Cannot cut wood that is too thick
Easy to use and produce a neat cut	Expensive

4.2.5 SAFETY PRECAUTIONS.

1. Find a place to Cutting logs or branches is a great way to start cutting but don't start by cutting down large trees - start with small trees.
2. the cut wood should not be held by others.
3. Start your hacksaw make sure the chain brake is activated.
4. Hold your saw with both hands. Never use one hand.
5. Do not rush. Take a break, If you are not sure what to do. next, turn off your hacksaw and make a plan in advance.
6. While moving from tree to tree be sure to turn off your saw or press the chain brake first.
7. Keep your chainsaw out of reach of children.

4.2.6 SURVEY

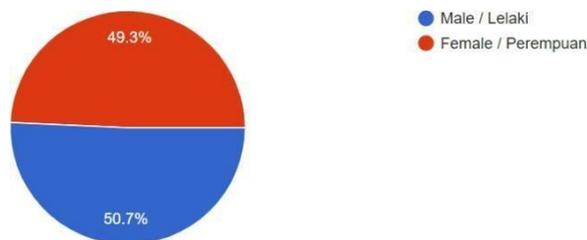
i. INTRODUCTION

Assalamualaikum and greetings, thank you for taking the time to answer our questionnaire. We are students from Polytechnic Sultan Salahuddin Abdul Aziz Shah currently in our fourth semester in Diploma of Mechanical Engineering would like to do conduct a survey about the usage of Mini Solar Chainsaw. We hope through this survey we can gain opinions from mini solar chainsaw user. Your kind and sincere cooperation to answer this questionnaire are really appreciated. Please take note that all information obtained will be kept confidential for this study only. Thank you for your valuable time and cooperation.

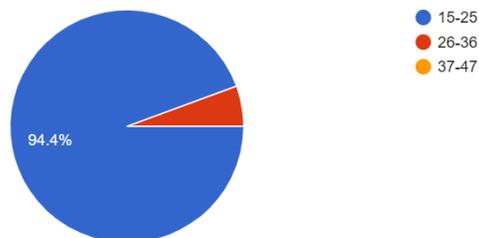
i. RESPONDENT INFORMATION

a) DEMOGRAPHIC INFORMATION

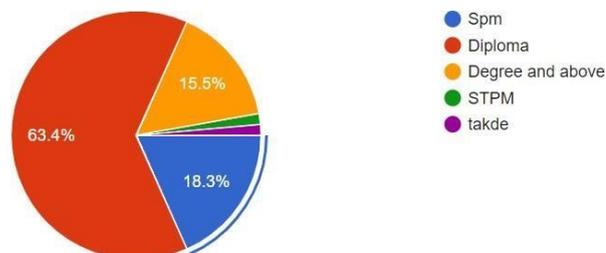
1. Gender / Jantina



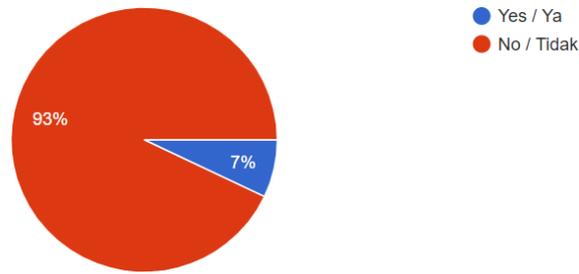
1. Age / Umur



2. Education / Taraf Pendidikan

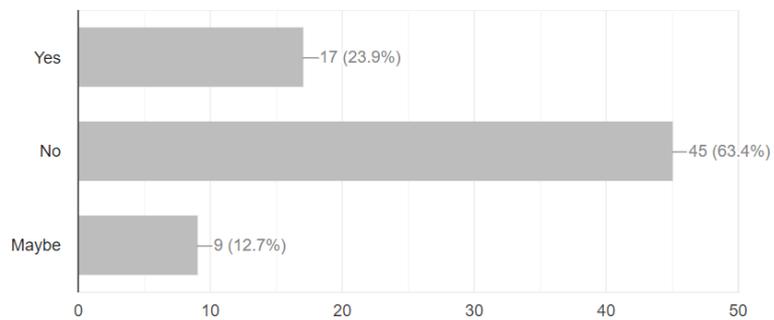


3. Are you a user of mini solar chainsaw ? / Adakah awak penggunamini solar chainsaw?

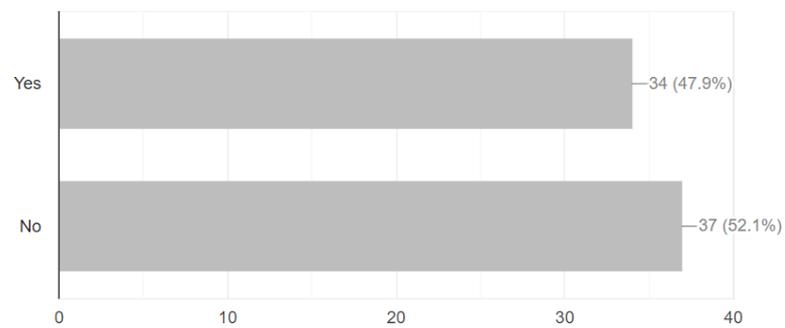


b) GENERAL INFORMATION

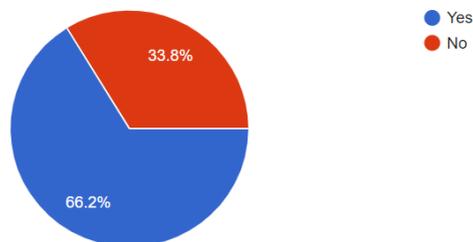
1. Do you have a chainsaw ?



2. Have you ever used a chainsaw?

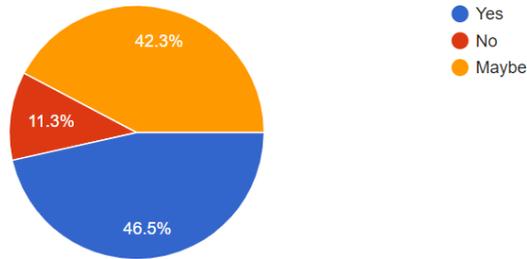


3. It is a chainsaw difficult to use?

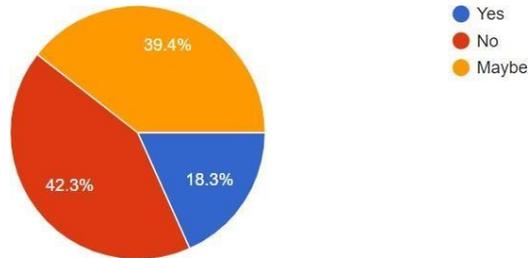


c) PROBLEM STATEMENT

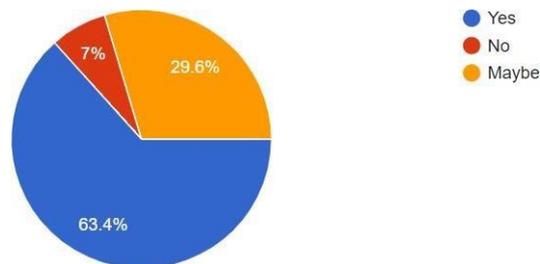
1. It is a heavy chainsaw to use?



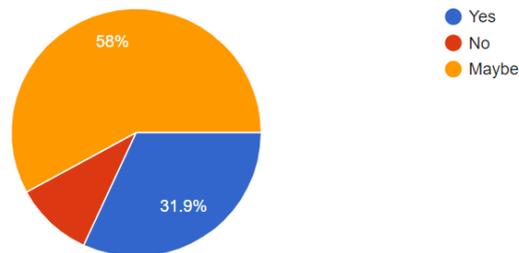
2. Do you think using a chainsaw can pollute the air?



1. Is it true that by using a chainsaw it can produce noise pollution?

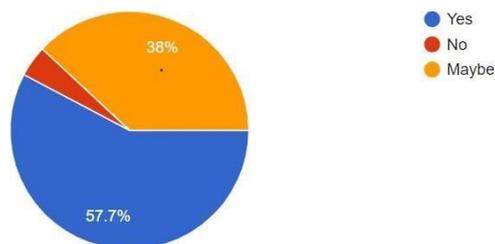


2. If you are a chainsaw user, is it difficult for you to replace the oil on the chainsaw if the oil runs out?

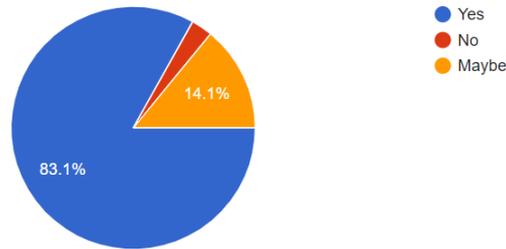


b) SOLUTION QUESTION

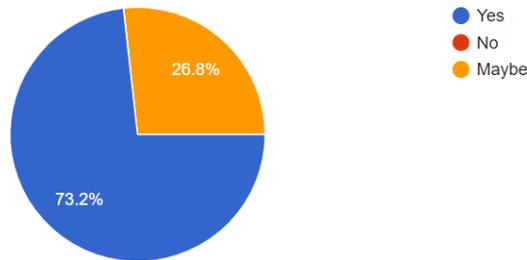
1. Our mini solar chainsaw saves time, would you like to buy it if available in the market?



2. Do you agree if we make a mini chainsaw using solar to replace oil to avoid air and noise pollution?



3. Our mini solar chainsaw easy to carry, do you recommend it to your friends?



4.3 RECOMMENDATIONS.

We found weaknesses present during planning and implementation while creating a mini solar chainsaw needs proper improvements in order weaknesses throughout creating this mini solar chainsaw can be instructive to all of us in planning, implementing, and creating something better. First, we need to set a date to plan the desired project created in advance to ensure sufficient time to prepare in advance because a good project requires a long planning to produce. In addition, we also need to produce a project that is not too sharp so that injuries do not occur. In addition, you also need to use lightweight components in order to project we are not too heavy during use.

4.4 FORMULATION.

In conclusion, our products are more suitable for use by farm workers or workers in need for tree felling or wood cutting. This is because, they are easier to cut wood with large quantity without taking long time and large manpower. In addition That is, our products can also be used suitable for home use, this is because, this product has a small size and good security to be placed at home and can be convenient users a mini solar chainsaw to cut wood while at home.

CHAPTER 5 CONCLUSION AND SUGGESTION

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 CONCLUSION

In short, this tool can give a lot of contribution to gardeners. This project encourages creativity in creating projects and improve existing projects to be more creative in innovating. This mini solar chainsaw is improved by using solar energy from sunlight. This project also has a positive effect. in saving time in making something work in cutting wood in a short time and reducing noise pollution. These tools have the potential to be added to the market to assist the community especially gardeners in facilitating their work. Advertising is recommended to help inform customers about the Mini Solar Chainsaw.

5.3 SUGGESTION

The suggestion for this Mini Solar Chainsaw for improvement is a larger chainsaw size for easy wood to cut if the size is large. Lastly, for more comfort is for the addition of a suitable place for solar placed on the chainsaw so that it is easy to do the work easily. In future projects, this Mini Solar Chainsaw works more widely as well as being more practical and safer to use.

5.4 PROJECT LIMITATIONS

- Battery lasts for 3 hours usage continuously.
- Solar panel longevity up to 15 years
- Solar panel have greater heat resistance.

5.5 CONCLUSION

This chapter has explained that, this project has achieved the set objectives. So many conclusions and suggestions can be made to help this project become even greater or perhaps the greatest project in the future.

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7. ATTACHMENT

GANTT CHART

PROJEK 1

Task / Month	March			April				May				June		
Week	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Product Selection	■	■												
Introduction			■	■	■	■								
Literature Review				■	■	■	■	■						
Methodology							■	■	■	■	■			
Result and Discussion										■	■	■		
Report Submission													■	
Presentation														■

PROJEK 2

TASK	WEEK														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing and Project Plan	■														
Buy the materials		■	■	■											
Create the Project				■	■	■									
Run the Project							■	■							
Analysis Project Data							■	■	■	■					
Report Writing									■	■	■	■	■	■	■
Preparation Project Video										■	■	■			
PITEX Presentation													■		
Submit Logbook and Report														■	■