POLITEKNIK MALAYSIA

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

ELECTRONIC GRASS CUTTER

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DEPARTMENT OF MECHANICAL ENGINEERING

JUNE 2020

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

JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : ELECTRONIC GRASS CUTTER

SESI : JUN 2020

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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal, Jabatan Kejuruteraan Mekanikal, Politeknik Sultan Salahuddin Abdul Aziz Shah**, yang beralamat di **Persiaran Usahawan, 40150, Shah Alam, Selangor**. (selepas ini dirujuk sebagai 'Politeknik tersebut').

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

3. Kami bersetuju melepaskan pemilikan harta intelek 'projek tersebut' kepada 'Politeknik tersebut' bagi memenuhi keperluan untuk peanugerahan **Diploma Kejuruteraan Mekanikal** kepada kami.

Diperbuat dan dengan sebenar-benarnya diakui

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ABSTRACT

"Electronic Grass Cutter" is a lawn mower that uses the UNO Arduino control concept. The purpose of this study is to overcome the problem of management and collection of dried leaves and grass in maintaining the landscape management of residential areas and around polytechnics. Based on the analysis, we found that the level of dry leaf management is unsatisfactory. Even the tools used by the management have also caused noise pollution through the use of blowers. So with this we have agreed to create a tool that can help solve this problem. In addition, the main objective of our project is to build a more efficient lawn mower and build it with low cost capital. In addition, based on the research that has been conducted, we have planned to innovate lawn mowers based on a future full of technological uses. Therefore, we have planned to implement our project "Electronic Grass Cutter" an automatic lawn mower that is fully operated by the Arduino UNO system. With this, it is also capable of mowing grass automatically without the need for human discovery. This system uses a 12V battery to move the movement of the machine as well as the lawn mower. The motor for machine movement is connected to the UNO Arduino system which controls the movement of all the motors. This machine also has automatic movement with the use of the UNO Aduino system. In conclusion, this lawn mower with Arduino UNO control can solve the problem of lawn mower that works manually.

Keyword : Electronic Grass Cutter, Arduino UNO

ABSTRAK

“Electronic Grass Cutter” merupakan mesin pemotong rumput yang menggunakan konsep kawalan Arduino UNO. Kami telah menjalankan kajian secara soal selidik di kawasan berdekatan. Tujuan kajian ini adalah untuk mengatasi masalah pengurusan dan pengumpulan daun kering serta rumput dalam menjaga pengurusan landskap kawasan perumahan dan sekitar politeknik. Berdasarkan analisis tersebut,kami mendapati tahap pengurusan daun kering tidak memuaskan. Malah alatan yg digunakan oleh pihak pengurusan juga telah menyebabkan pencemaran bunyi melalui penggunaan alat blower. Jadi dengan ini kami telah sepakat untuk mereka cipta alat yang dapat membantu mengatasi masalah ini. Di samping itu, objektif utama projek kami adalah membina mesin pemotong rumput yang lebih efisien dan membinanya dengan modal kos rendah. Selain itu, berdasarkan penelitian yang telah kami jalankan, kami telah bercadang untuk membuat inovasi mesin pemotong rumput berdasarkan masa depan yang penuh dengan kegunaan teknologi. Oleh itu, kami telah bercadang untuk melaksanakan projek kita iaitu “Electronic Grass Cutter” sebuah mesin pemotong rumput automatik yang dikendalikan sepenuhnya oleh sistem Arduino UNO. Dengan ini, ia juga mampu memotong rumput secara automatik tanpa memerlukan penemuan manusia. Sistem ini menggunakan bateri 12V untuk menggerakkan pergerakan mesin dan juga mesin pemotong rumput. Motor untuk pergerakan mesin dihubungkan ke sistem Arduino UNO yang mengawal pergerakkan semua motor tersebut. Selain itu, alat ini mampu memotong rumput dengan kawalan Arduino UNO. Mesin ini juga mempunyai pergerakkan secara automatic dengan kegunaan sistem Aduino UNO. Kesimpulannya, kami berharap mesin pemotong rumput dengan kawalan Arduino UNO ciptaan kami dapat mengatasi masalah mesin pemotong rumput yang berfungsi secara manual.

Kata Kunci : Mesin Pemotong Rumput Automatik, Arduino UNO

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CHAPTER 1
INTRODUCTION

1.1 RESEARCH BACKGROUND

Prepared by Siti Nurhusena Binti Prasert

As you know lawn mower (also named as mower, grass cutter or lawnmower) is a machine utilizing one or more revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower, but generally is adjustable by the operator, typically by a single master lever, or by a lever or nut and bolt on each of the machine's wheels. The blades may be powered by manual force, with wheels mechanically connected to the cutting blades so that when the mower is pushed forward, the blades spin, or the machine may have a battery powered or plug-in electric motor.

Therefore, he most common self-contained power source for lawn mowers is a small (typically one cylinder) internal combustion engine. Smaller mowers often lack any form of propulsion, requiring human power to move over a surface; "walk-behind" mowers are self- propelled, requiring a human only to walk behind and guide them. Larger lawn mowers are usually either self-propelled "walk-behind" types, or more often, are "ride-on" mowers, equipped so the operator can ride on the mower and control it. A robotic lawn mower ("lawn- mowing bot", "mowbot", etc.) is designed to operate either entirely on its own, or less commonly by an operator by remote control.

Furthermore, two main styles of blades are used in lawn mowers. Lawn mowers employing a single blade that rotates about a single vertical axis are known as rotary mowers, while those employing a cutting bar and multiple blade assembly that rotates about a single horizontal axis are known as cylinder or reel mowers). Besides that, there are several types of mowers, each suited to a particular scale and purpose. The smallest types, non-powered push mowers, are suitable for small residential lawns and gardens. Electrical or piston engine-powered push-mowers are used for larger residential lawns Riding mowers, which sometimes resemble small tractors, are larger than push mowers and are suitable for large lawns, although commercial riding lawn mowers can be "stand-on" types, and often bear little resemblance to residential lawn tractors.

1.2 PROBLEM STATEMENT

Prepared by Dhurges Kumar A/L Kasivishva Nathan

The current lawn movers that we now in our society is mostly made of a huge engine and also uses petrol, thus this emmits a bad smoke as well while using it. The cost of petroleum is also high and the smoke which is being emmietd by the exhaust is also bad for our health. If the machine is having any malfunction, the cost for repairing it is also high as well. Plus, in order to own a lawn mover is also high in price due to current economy in our country.

Besides that, in the other hand there are also the uses of tools such as shovels, scrapper, scissors and old lawn machines. This uses a lot of time to get a simple work done. It is not advisble to waste so much time to just get a simple work done. Thus, they have to go through a lots of process in order to get the grass being cut and collected. The collection of the grass which is being cut is also not well disposed since it's being depend on the use of brooms. This will not be effective since it's using our manpower in order to clean up the area which is being cut. Mostly, the machine out there uses manpower and will make the person to loose all the energy and unable to complete other tasks as well.

Moreover, there are many problems of power loss while mowing. The reason can be for dirty air filter that you will be needing to either clean or replace just like it has been mentioned previously. Dirty spark plug can also be the reason to make your mower stop working. While mowing your lawn, the amassing of debris and clippings can cause the power to wear down. The blunted blade can also be another problem you can face while mowing your lawn. What it causes is, cut the grass inappropriately or make your machine stop working. Lastly, when dried leaves and the leftover grass which is being cut is done, the workers uses a lot of plastic to wrap the wastes. This has also led to an increase on the use of plastics.

1.3 RESEARCH OBJECTIVE

Prepared by Kavines A/L Ganson

The objectives to this research are:

i. Design a more efficient and effective grass cutting machine
ii. Grinding leaves neatly and in a large quantity of the specified area
iii. Build a machine that uses low cost capital
iv. Produce quality projects by using experience and what they have learned
v. Making sure students know how to apply what they have learned, especially in technical

in example mechanical

vi. Giving early exposure as a preparation to the real work environment
vii. Enhance skills and creativity in terms of ideas about components and to design a project
viii. To give students an idea of how a system operates
ix. capable of repairing a system using the methods learne

1.4 RESEARCH QUESTIONS

Prepared by Dhurges Kumar A/L Kasivishva Nathan

This study will answer the following research questions:

i. Is it possible to create a efficient grass cutter that are high in quality?

ii. What type of material that can be used to make the grass cutter cheaper?

iii. What are the possibilities of making this grass cutter a better choice?

iv. Does this grass cutting machine helps to reduce the use of manpower?

1.5 ADVANTAGES OF THIS PRODUCT

Prepared by Kavines A/L Ganson

There are many advantages of using this Electric Grass Cutter. They usually have a cord that can be plugged into a power outlet while some are rechargeable and semi-cordless. Thus, the advantages are as below:

- Electric lawn mowers are less noisy compared to gas lawn mowers. They run on electric power, therefore, their noise is lesser
- They don't emit exhaust and are better for the environment. With them, there is little danger of air pollution as they are environmental-friendly
- They are cheaper in the long run and don't need the use of spark plugs as well
- They're easier to start and use as there is no pulling or cranking like in a gas engine
- Electric lawn mowers are lighter because their motors aren't as heavy as gas lawn mowers

1.6 SCOPE OF RESEARCH

Prepared by Dhurges Kumar A/L Kasivishva Nathan

The scopes and limits to this research are:

i. This dry leaf grinder can reduce the use of plastic (dry leaf or waste wrapper)
ii. This machine is capable of cutting and grinding dried leaves. With this method cleaning work can be done in on time
iii. This machine has sensors that can detect if there are other objects capable of damaging the machine such as stone and wood
iv. This machine can be remotely controlled
v. This machine uses the Arduino system which controls every movement and function of the machine

1.7 SIGNIFICANCE OF RESEARCH

Prepared by Siti Nurhusena Binti Prasert

Although, there are lots of lawn mover and grass cutter which are being used out there, most of the machines have their disadvantages as well. Moreoevr, the machines that are being used out there are manual kind of machine which uses lots of manpower. Besides, our Electronic Grass Cutter works fully automatic and will never be a burden to the consumers. In the other hand, it is able to control the time management. The older machines works in a low speed and also takes much longer time to get the work done. Thus, the cost to own a lawn mover which are being sold now is also very high as well as the cost for maintenance too. Last but not least, this machine will definetly gives a huge impact and also increase in the growth of our economy in Malaysia.

1.8 CHAPTER'S SUMMARY

Prepared by Siti Nurhusena Binti Prasert

The use of the "Electronic Grass Cutter" helps to reduce the burden in cleaning the dried leaves and also to grind the grass as well. This machine also can be used in housing area, school area, building area, all around our polytechnic and etc. It's used in the work of grinding the grass and dried leaves. We hope that the use of this machine will be able to replace the old machines that are being used now. The versatility of this machine is expected to make it easier and safe to be used.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

Prepared by Dhurges Kumar A/L Kasivishva Nathan

In this chapter, will be showing the materials that is being used to make our Electronic Grass Cutter. As we have implemented the use of Internet Of Things due to the development of technologies in this era. The main reason why did we planned to use the IOT is to make sure that we are on the same level of technologies used in every machine nowadays. The internet of things, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

IOT devices are becoming a part of the mainstream electronics culture and people are adopting smart devices into their homes faster than ever. By 2020, it is estimated that there will be up to 21 billion connected devices to the internet. The more data that IOT devices collect, the smarter they will become. This was the main reason why it is being implemented in our project as the Electronic Grass Cutter.

In the past and even until now, cutting of grasses in the schools, sports tracks, fields, industries, hotels, public centre, etc. was done with a cutlass. This method of manual cutting is time consuming because human effort is needed for the cutting. Also inaccuracy in cutting level was observed using the manual cutting method. This work deals with the cutting of verdant (shrubs, stubborn, grass, flowers, leaves of trees) and also with the design of the machine, its efficiency, rigidity, mode of operation and the selection of materials. The design gives a greater degree of flexible mobility and interchangeability. The aim of this work includes, but not limited to the following :

1. To reduce labour input in the cutting of not only weeds or grass but also in the trimming of flowers and trees.
2. To reduce cost, time of cutting and also to beautify the environment.

2.2 CONCEPT / THEORY

Prepared by Kavines A/L Ganson

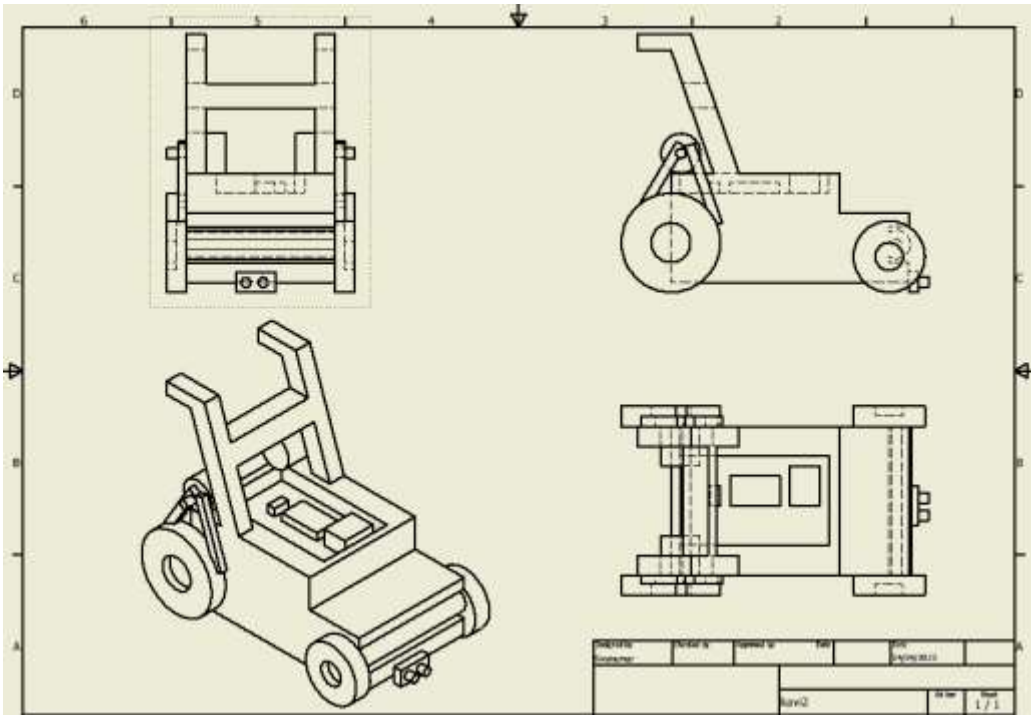


Figure 2.2.1 – Concept of Electronic Grass Cutter

By carrying out this project, we had come to an idea of the structure and concept of our "Electronic Grass Cutter", the picture above shows all the views of our project. The drawing and design above is done by using the Inventor software which is very use

ful to all students. As you can see, there a separate compartment for us to store the circuit and power supply as well. There are a lot of ideas that we had implemented into the design above which will work efficiently.

2.3 PREVIOUS RESEARCH

Prepared by Siti Nurhusena Binti Prasert

Comparison of the Machines

NORMAL GRASS CUTTER	ELECTRONIC GRASS CUTTER
It uses a lot of manpower	Reduce the burden and work automatically
Takes a lot of time	Work can be done within a short period
Have to move by our own speed	Moves with fully motorised system
There’s no safety when using it	This machine is more safe to be used

Table 2.3.1

2.4 PRODUCT RESEARCH

Prepared by Kavines A/L Ganson

The method that we have used to carry out the research is by observing the situation. We have seen all the grass cutters using the manual method which was quite tough to them even working on a hot day as well. Therefore, we have implemented a grass cutter which is fully controlled by our Arduino UNO system. Below we will describe briefly regarding the system.

Arduino Bluetooth Control

How Does It Work (sample showing how to light a LED Bulb)

There are three main parts to this project. An Android smartphone, a Bluetooth transceiver, and an Arduino.

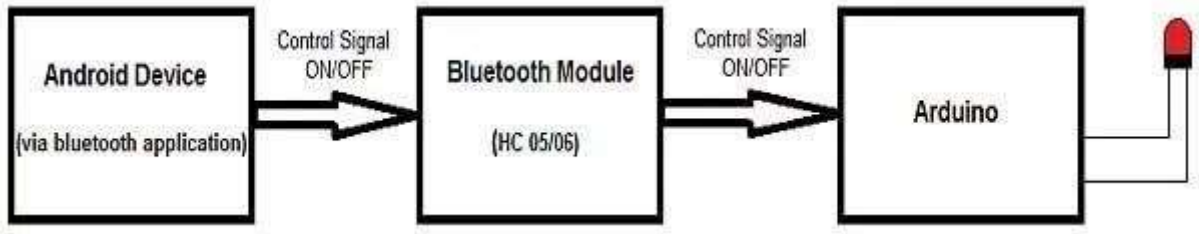


Figure 2.4.1 – Parts of Arduino UNO

HC 05/06 works on serial communication. The Android app is designed to send serial data to the Arduino Bluetooth module when a button is pressed on the app. The Arduino Bluetooth module at the other end receives the data and sends it to the Arduino through the TX pin of the Bluetooth module (connected to RX pin of Arduino). The code uploaded to the Arduino checks the received data and compares it. If the received data is 1, the LED turns ON. The LED turns OFF when the received data is 0. You can open the serial monitor and watch the received data while connecting.

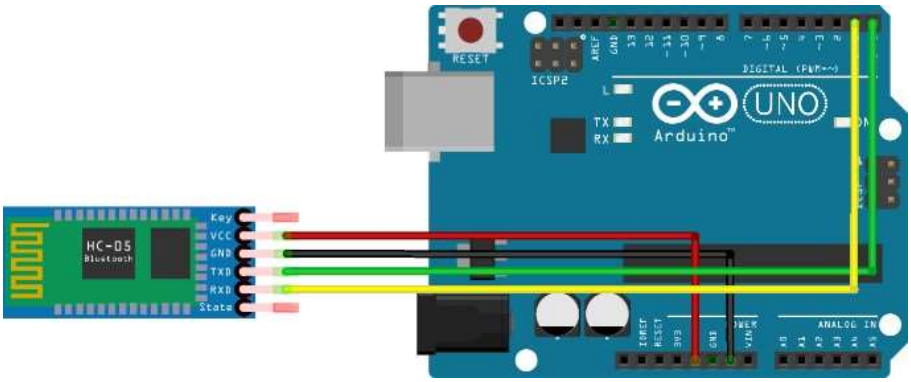


Figure 2.4.2 – Arduino UNO Circuit

Programming The Arduino

No extra library is used to connect to the Bluetooth module because the RX and TX pins of the Arduino are shorted with those of the module. All data outgoing and incoming will have to go through the module. Interfacing the module is that easy. To see how this works, let us connect a DHT-11 Temperature Sensor to the Arduino. When the letter "t" is received, the temperature, humidity, and heat index will be transmitted bac

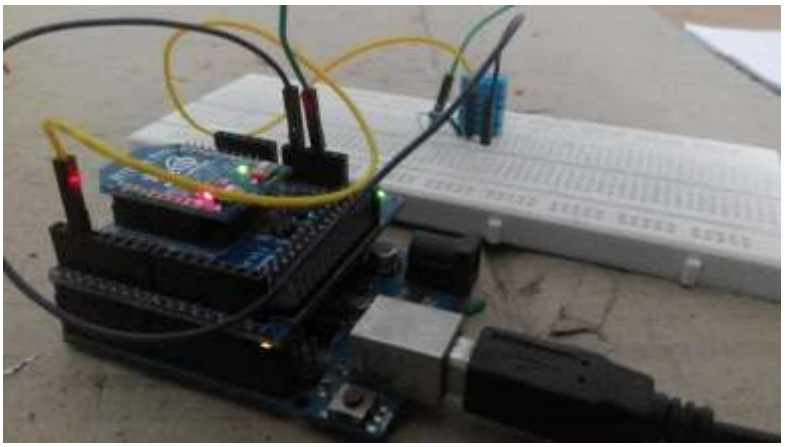


Figure 2.4.3 – Arduino UNO Complete Set

The Android App

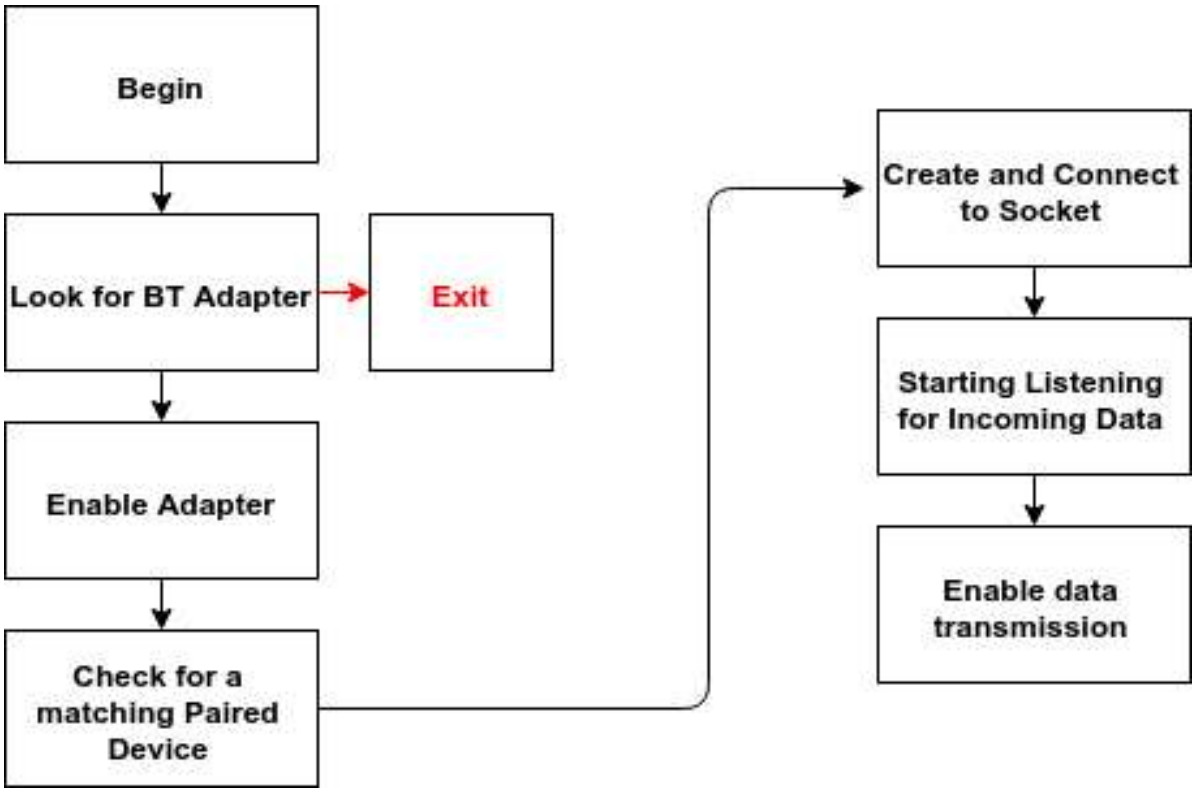


Figure 2.4.4 – Arduino UNO Application

Arduino Technology

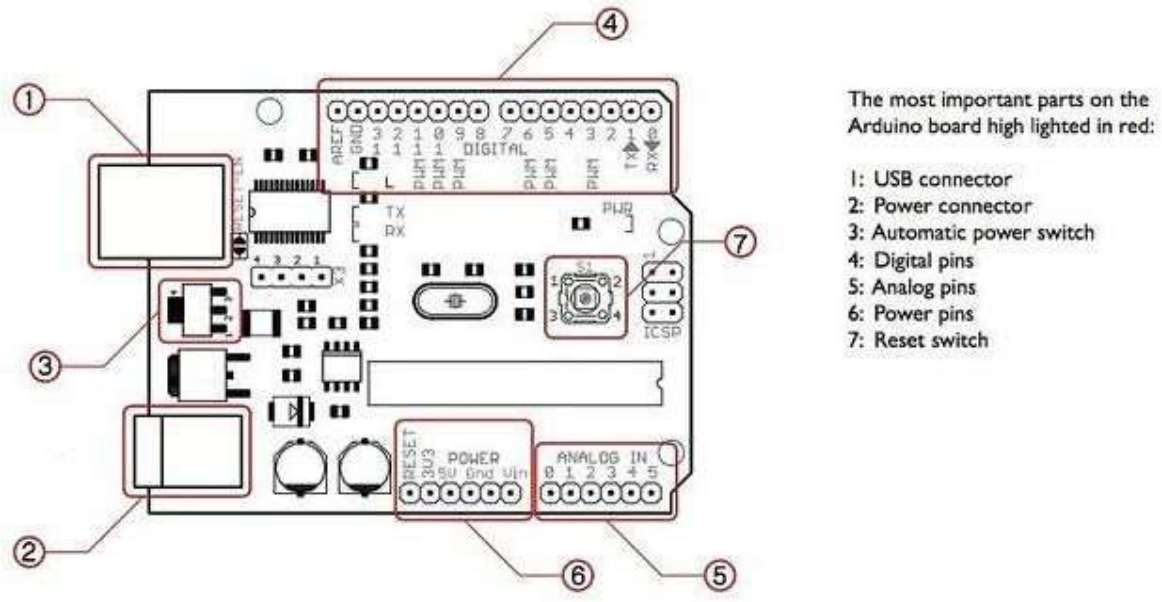


Figure 2.4.5 – Arduino Technology

How to program an Arduino UNO

The main advantage of the Arduino technology is, you can directly load the programs into the device without the need of a hardware programmer to burn the program. This is done because of the presence of the 0.5KB of boot loader, that allows the program to be dumped into the circuit. The Arduino tool window contains a toolbar with a various buttons like new, open, verify, upload and serial monitor. And additionally it comprises of a text editor (employed to write the code), a message space (displays the feedback) like showing the errors, the text console, that displays the o/p & a series of menus just like the file, tool menu & edit.

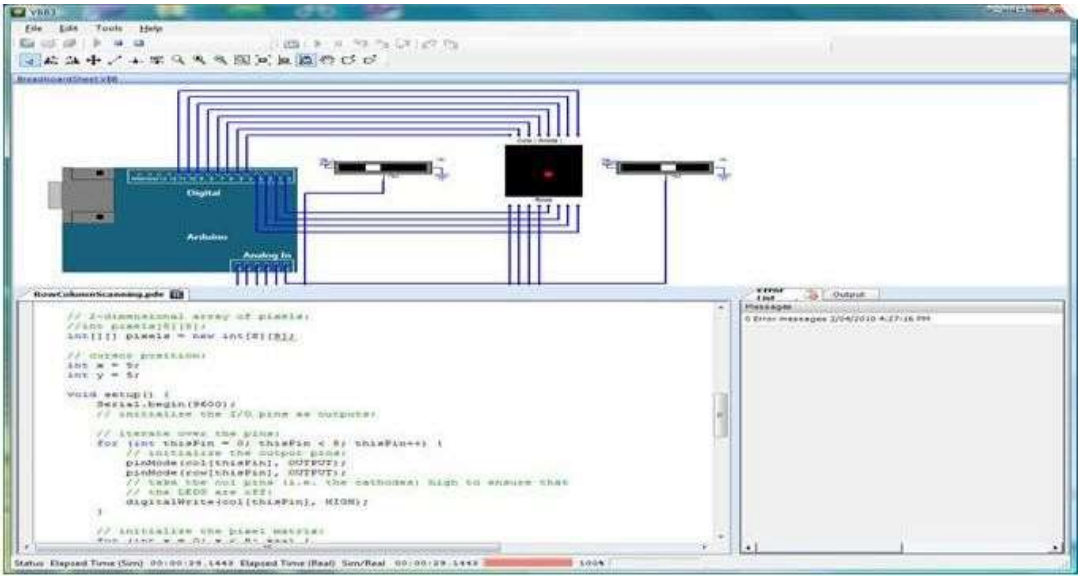


Figure 2.4.6 – Arduino UNO Programming

Advantages of Arduino Technology

We know that Arduino is a great microcontroller platform for anyone interested in building a project in electronics. One of the best thing about it is that it's undergoing constant innovation. There are a variety of Arduino boards available in the market that we can use as our controller. So we need to find out the perfect hardware for the kind of project that you will be working on. Arduino Uno is the most standard board available and probably the best choice for a beginner. It is a good all-purpose board that has enough features for a beginner to get started with. Some of its better features are:

- Its biggest advantage is that we connect the board to the computer via a USB cable which does a dual purpose of supplying power and acting as a Serial port to interface the Arduino and the computer.
- It can also be powered by a 9V-12V AC to DC adapter.
- The ATmega328 chip can be newly bought, removed and replaced if damaged which is not possible with other versions.
- The board operates at 5V throughout, i.e. digital pins output or read 5v and analog pins read in the range 0-5V.
- Lots of example code and projects are done using Arduino Uno, hence will get good support.
- The Uno features 14 Digital I/O pins and 6 Analog I/O pins.
- Lot of extra Add-on hardware is built for Uno. Special hardware is available for Internet, Bluetooth, Motor control etc.
- It is the cheapest board (RM40 only) with all these features.

2.5 ISSUE OF THE CURRENT PRODUCT

Prepared by Siti Nurhusena Binti Prasert

Below here are the list of problems in the current machine that is being used

- Uses human energy and the uses of petroleum
- The existing lawn mowers have no safety features, as the machine's eye blade has no cover
- Existing lawn mowers have no protection against their users, for example when stone debris and leaves can enter the eye.
- Also, when using an existing lawn mower, it is usually the people who are cutting it will get hurt due to the tiny stones and etc.

2.6 MATERIAL STUDY

Prepared by Dhurges Kumar A/L Kasivishva Nathan

Rubber Wheel

Figure 2.6.1 – Rubber Wheel

Made of durable rubber material, it is compact with good elasticity. Heavy duty, each wheel is constructed of high quality rubber which withstand a load up to 265lbs. Reusable and durable, the wheel can be used repeatedly and durable for long use. Scrape-proof and scratch resistant, this wheel is guaranteed safe to use on a variety of surfaces, best suited for outdoor use. Using this set of casters can save your labour and enhance the work efficiency. It is made with hard fit rubber.

12V Car Battery

Figure 2.6.2 – Car Battery

The battery is the most vital piece of equipment in your vehicle. Your vehicle could be from a reputable manufacturer, be well maintained, have a full tank of fuel and fitted with brand new tyres - but if you've got a flat battery you won't be going anywhere. The majority of automotive lead-acid batteries are now classed as being "maintenance free" but this doesn't mean there isn't anything you can do to help extend their service life.

Arduino UNO Full Set

Figure 2.6.3 – Arduino UNO

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (For prototyping) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.

These are the examples of the Bluetooth and Ultrasonic sensors.

Figure 2.6.4 - Bluetooth Sensor

Figure 2.6.5 - Ultrasonic Sensor

Windscreen Wiper Motor

Figure 2.6.6 – Windscreen Wiper Motor

In a windshield wiper for a vehicle, the driver of the vehicle typically sets a desired wiping speed, based on intensity of rain or snow. In some wiper systems, the motor is of the DC type, and speed is controlled by adjusting applied voltage.

Steel Beams / Rods

Figure 2.6.7 – Steel Beams

Structural steel is a category of steel used for making construction materials in a variety of shapes. Many structural steel shapes take the form of an elongated beam having a profile of a specific cross section. Structural steel shapes, sizes, chemical composition, mechanical properties such as strengths, storage practices, etc., are regulated by standards in most industrialized countries.

Gear Sprocket and Roll Chain

Figure 2.6.8 – Gear Sprocket and Roll Chain

A sprocket, sprocket-wheel or chainwheel is a profiled wheel with teeth, or cogs, that mesh with a chain, track or other perforated or indented material. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain,passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system.

Extra Carbon Wires

Figure 2.6.9 – Carbon Wires

A wire is a single, usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals. A key property of a wire is its Pike constant: a measure of the maximum current that can pass through a given cross- sectional area of the wire material.

Bearing

Figure 2.6.10 - Bearing

The bearing in its current form was developed towards the end of the 19th century. It was initially made by hand. Nowadays, bearings are one of the most commonly used machine parts because their rolling motion make almost all movements easier and they help reduce friction.

2.7 CHAPTER'S SUMMARY

Prepared by Siti Nurhusena Binti Prasert

In conclusion, we had discussed among our group members to get the perfect and suitable parts indeed. Thus, we have briefly explained regarding each and every parts that we are using in our project. Besides that, we had surveyed in all the suppliers regarding the prices of the parts to get the reasonable price and the best one. Before getting to a point, we had carried out lots of research among our group members also. 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.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

Prepared by Siti Nurhusena Binti Prasert

What is methodology? A methodology is a plan-of-attack, especially when that plan- of-attack is used repeatedly. This might be obvious, but the word methodology is related to the word method. In fact, a methodology is a system of methods followed consistently. Scientists, for example, use various methodologies as they perform experiments. It might seem like the world is nothing but chaos and disorder. But actually, sometimes there is a method to this madness. And sometimes there's a methodology.

In this chapter, there will be a lot of information about the process and journey through out the making of our final project. There will be flow chart showing the process of us making the whole project. This flow chart will explain the processes we took. Next, is the Gantt Chart, which will show the actual and planning throughout all the 13 weeks of our final year project journey. However, in this chapter, we also will show 3 methods we researched to carry our final year project. Although, these 3 methods have its own pros and cons and it will be explained individually by the teammates.

3.2 FLOW CHART

Prepared by Kavines A/L Ganson

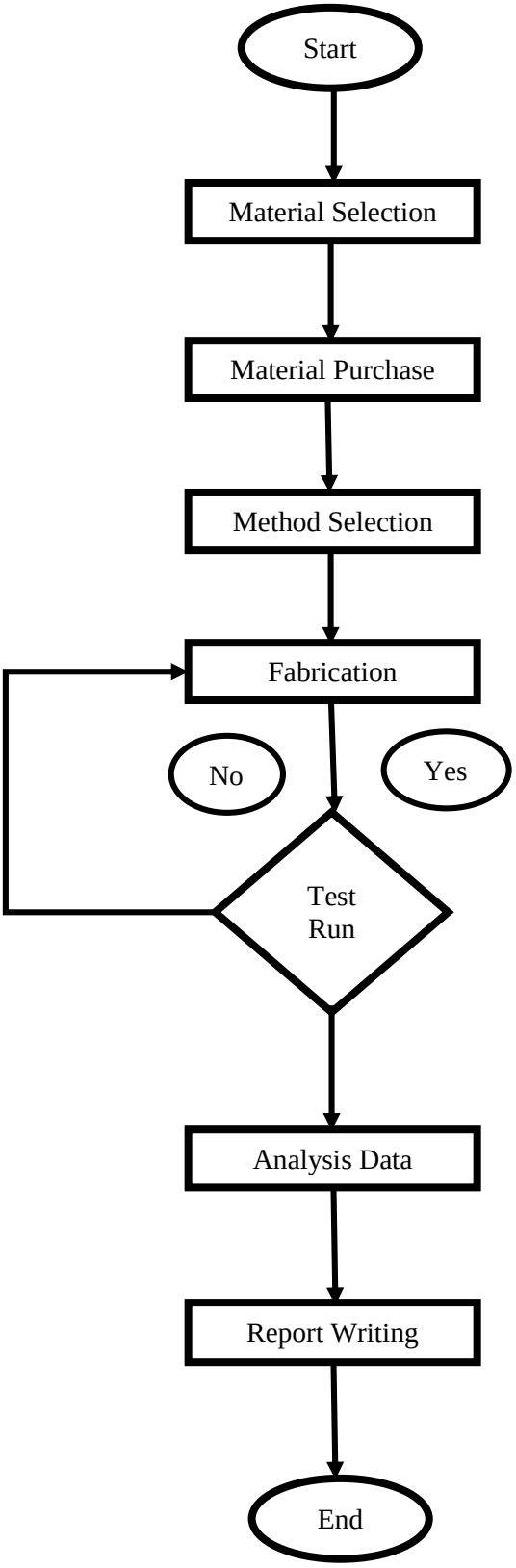


Figure 3.2.1 - Flow Chart

3.3 FLOW CHART EXPLAINATION

Prepared by Dhurges Kumar A/L Kasivishva Nathan

- **Material Selection**

The process of material selection is one of the most important process in this final year project. The main factor of material selection is to discuss and finalized which materials that will be use in the project in order to avoid wasting of money and time. The material selection need to be done precisely so that the risks could be avoided.

1) Spray Paint

Figure 3.3.1 – Spray Paint

Spray paint gives your pieces a smoother look because there aren't any paint brush marks. This is perfect when painting a piece of furniture so that surfaces are even. Of course, before you paint anything, lightly buff it first with a piece of fine-grit sandpaper to remove the original varnish. The most commonly found chemicals are Acetone, Xylene and Toluene. They could be ingested by inhaling, or through the skin in some cases of exposure.
The inhalation of those substances is possible through spray paint fumes. Spray painting is a painting technique in which a device sprays coating material (paint, ink, varnish, etc.) through the air onto a surface.

2) Rubber Wheel

Figure 3.3.2 – Rubber Wheels

Rubber wheels are widely used and provide elasticity and provide good traveling performance on uneven road surface. In addition, rubber wheels are cheaper than urethane wheels. When we're talking about tires, we're referring to just the rubber part of the wheel. The tire is the part of the wheel that makes contact with the road. It's the cushioned support that keeps you driving safely on the road. Before rubber was developed, the first versions of tires were simply bands of metal fitted around wooden wheels to prevent wear and tear.

3) Carbon Wire

Figure 3.3.3 – Carbon Wire

Low carbon wire is available as galvanized, bright, and annealed with wire processing options that include cold heading and straighten and cut. It is used primarily for components in applications such as the construction, automotive and military. Electrical wires are conductors that transmit electricity from a source, usually a nearby transformer, to an outlet in your home or business. They also conduct electricity in appliances and electronic devices.

4) Car Battery 12V

Figure 3.3.4 – Car Battery

An automotive battery is a rechargeable battery that is used to start a motor vehicle. Its main purpose is to provide an electric current to the electricity-powered starting motor, which in turn starts the chemically-powered internal combustion engine that actually propels the vehicle. An automobile battery is an example of a wet cell battery, with six cells. Each cell of a lead storage battery consists of alternate plates made of a lead alloy grid filled with sponge lead (cathode plates) or coated with lead dioxide (anode). Each cell is filled with a sulfuric acid solution, which is the electrolyte.

5) Metal Plate

Figure 3.3.5 – Metal Plate

A metal plate is a flat plate used to cover large defects of the skull following major trauma or the need to decompress the brain. Plates are thick slabs of metal that are normally used for structural purposes. Available from Continental Steel in a number of different materials, plates are usually cut as their size makes them difficult to shape or bend. Metal plates and metal plate stock includes metals and alloys in the form of blanks, flats, bars, plates, and sheet stock. Metal and alloy plates and plate stock are used in a variety of applications such as raw material feed for machining or forming of parts, flooring or floor fabrication, and building and construction materials.

6) Welding Electrode

Figure 3.3.6 – Welding Electrode

In arc welding, an electrode is used to conduct current through a workpiece to fuse two pieces together. Depending upon the process, the electrode is either consumable, in the case of gas metal arc welding or shielded metal arc welding, or non-consumable, such as in gas tungsten arc welding. An electrode is a coated metal wire. It is made of materials similar to the metal being welded. Thus the number E6013 written on an electrode indicates that it is a rutile potassium based flux coated mild steel electrode with 62,000 psi minimum tensile strength having light penetration which can be used in all positions of welding except vertically down.

- **Material Purchase**

The process of materials purchasing is very important to collect and obtains all the materials needed. In this process a lot of research on the places and suppliers that the materials are going to be purchase is done. This step is important so that the risk of material wasting or money-loss will not happen. However, to carry out material purchasing, a well-made purchasing plan needed to be made. First, the suppliers will be contacted to make sure the availability of the materials. Therefore, we had even visited the suppliers store to bargain and get the right prices as well. Then, the calculation of the amount of materials needed and also the price of the materials. After that, surveys of price must be carried out to determine the better selling prices. Then finally, the purchases could be made.

- **Method Selection**

This method selection process is important so that the method choose is accurate and suitable for the product. This method selection will avoid money-lost and time taking processes. Hence, it is important to carry out this method selection process. There are three methods that could be carried out:

1) Welding

Figure 3.3.7 - Welding

Welding is a fabrication process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing them to cool, causing fusion. Welding is distinct from lower temperature metal-joining techniques such as brazing and soldering, which do not melt the base metal. Joining Metals Typically with the addition of a filler material. Heat at a high temperature causes a weld pool of molten material which cools to form the join, which can be stronger than the parent metal. Pressure can also be used to produce a weld, either alongside the heat or by itself.

i. The first and most important thing to consider while using any sort of welder is safety. Not only is the electricity required for arc welding extremely hot, but it also generates dangerous UV light that can easily damage your eyes if you look directly at it.
ii. Next, you will need to make sure you have all the tools required for the project at hand.
iii. Removing contaminates such as rust or paint will drastically increase the quality of your welds, so taking the time to clean up your project before you start welding is always a good idea.
iv. Then, we need to the turn on the welder and adjust the settings. As the metal you are welding increases in thickness, you will want to increase the voltage and wire speed as you see fit.
v. Thus, tack-weld the corners of your work-piece together. When tack welding, it is important to make sure that you are actually fusing both sides of the metal together.
vi. After you've welded everything together, there is going to be a bunch of spatter and slag left over from the flux. Now is the time to use the chipping hammer and wire brush to remove as much of this as possible before you start grinding.

Figure 3.3.8 – Welding Process

2) Metal Grinding

Figure 3.3.9 – Metal Grinding

Metal grinding is a process that is used extensively in metal fabrication. Metal Grinding is used to finish off rough edges, deburr metal parts, smooth welds, create sharp edges and sometimes create unique finished looks like the jitterbug finish on a metal part. Grinding is commonly used on cast iron and various types of steel. Bench grinder, which usually has two wheels of different grain sizes for roughing and finishing operations and is secured to a workbench or floor stand. Its uses include shaping tool bits or various tools that need to be made or repaired. Bench grinders are manually operated.

Figure 3.3.10 – Grinding Process

3) Arduino UNO System

Figure 3.3.11 – Arduino UNO System

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. Arduino is an open-source electronics platform based on easy-to-use hardware and software. The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button.

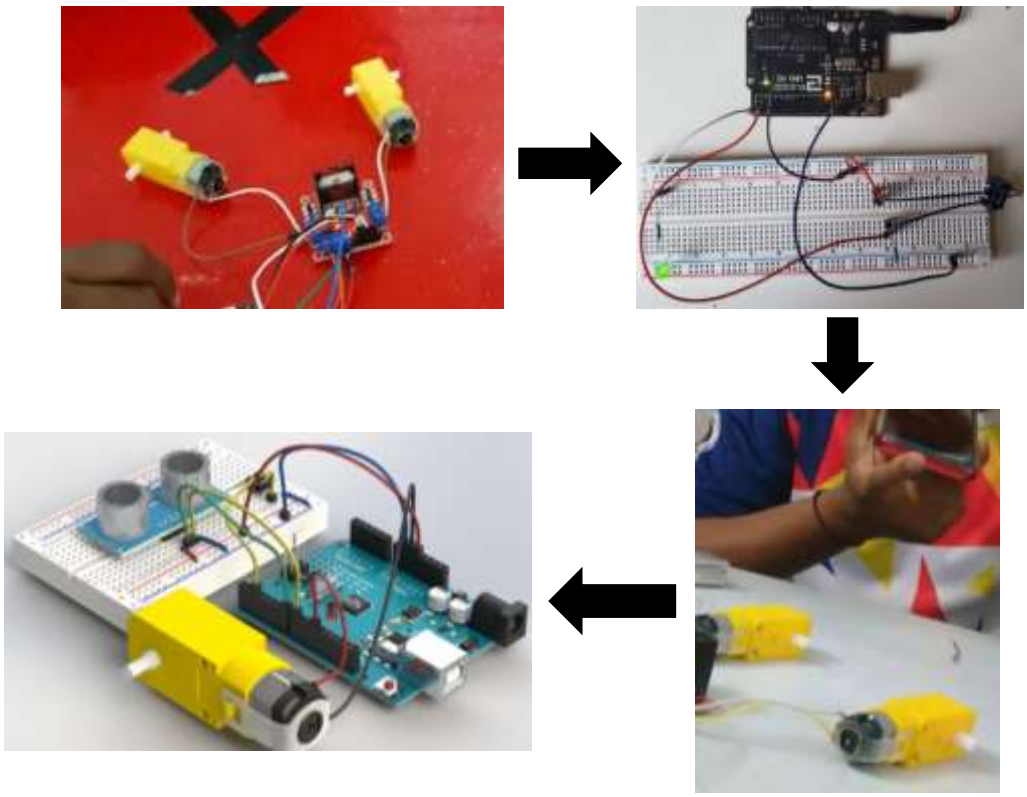


Figure 3.3.12 – Arduino UNO Testing

- **Test Run**

  Test run is carried out to determine the strength and end result of the product. In this test run, the Arduino UNO is tested for the movement of the machine. First ,the system is turned on and it is being connected to our handphone. Then, the movement of the Grass Cutter is controlled fully by the handphone. Next, the machine moves and the cutting blades rotate accordingly to cut the grass efficiently. This shows that machine works in a good state without any sort of malfunction. The test run was carried out in both manual and automatic movement, both gave a positive respond and worked very well.

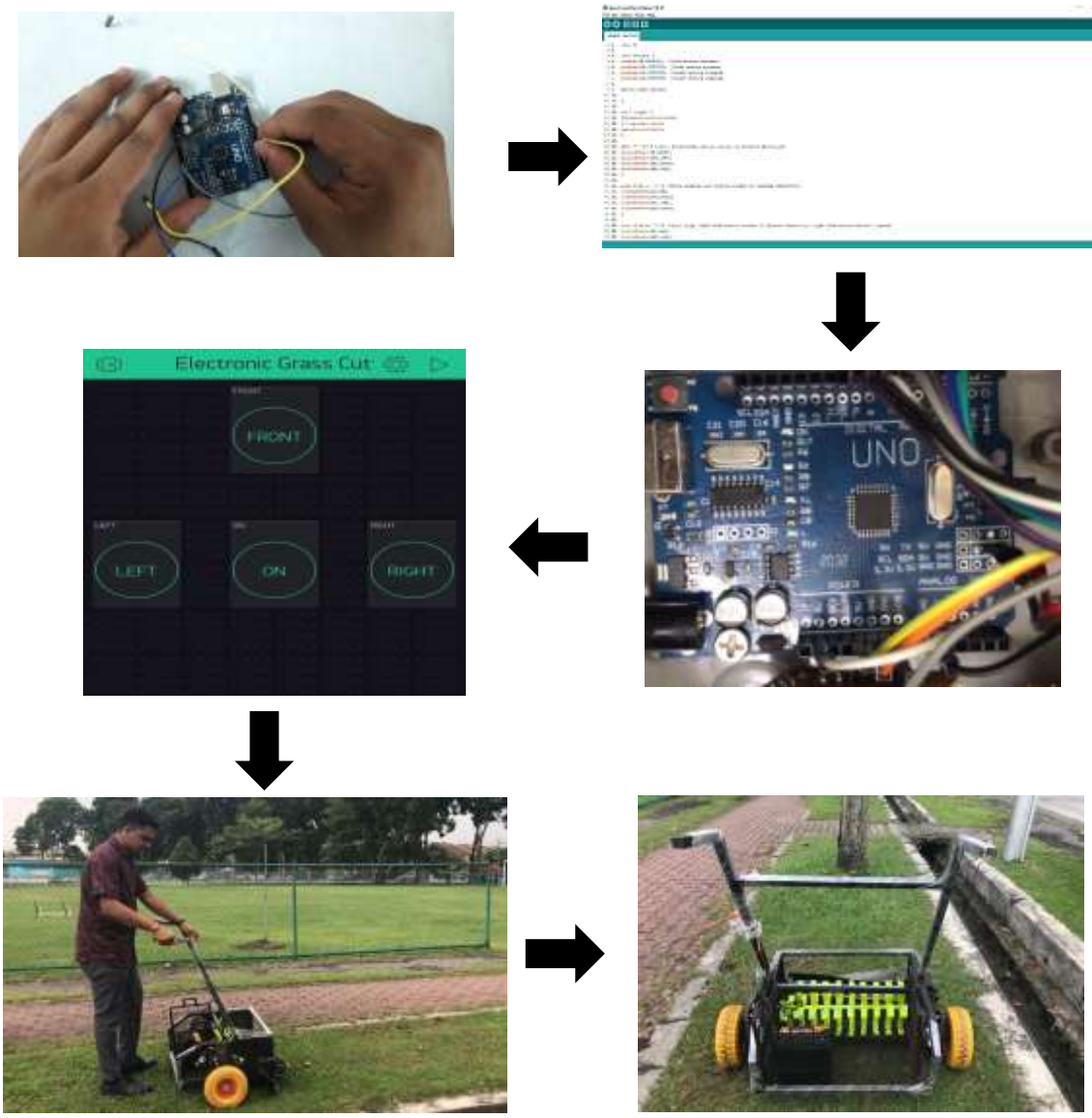


Figure 3.3.13 – Test Run Project

- **Analysis Data**

  The process of evaluating data using analytical and logical reasoning to examine each component of data provided. This form of analysis is just one of the many steps that must be completed when conducting a research experiment. Data from the test run is gathered, reviewed and the analysed to form findings, discussions and conclusion. In this project the data collection is collected from the tensile strength of the material we created.

- **Report Writing**

  Report writing is one of the most crucial step in every project invented. It is important to make a report based on the project, test run and analysis so that future improvements nor expansion of knowledge could be done. Our report writing is based on the analysis and findings that we collected throughout this whole process of completing this project.

3.4 Research Design

Prepared by Kavines A/L Ganson

The design of the study is important for a study as a guide to ensure that the objectives of the study are met and then answer the research question. This study aims to look at the impact of using the Electronic Grass Cutter in the society where does it really help the people of there in using these technologies and machines. The researcher had asked several questions regarding our topic. By doing this, we were able to come out on an assumption whether is it a good choice for us to innovate the current grass cutting machines. It is must for us to study on the safety of using the machine as well since most of the machines out there could be risky and dangerous. The researcher had asked question also regarding the dried leaves cleaning and we have gotten the responses which could be mesmerizing. The quantitative approach used by the researches in this to collect primary data was through the questionnaire instrument.

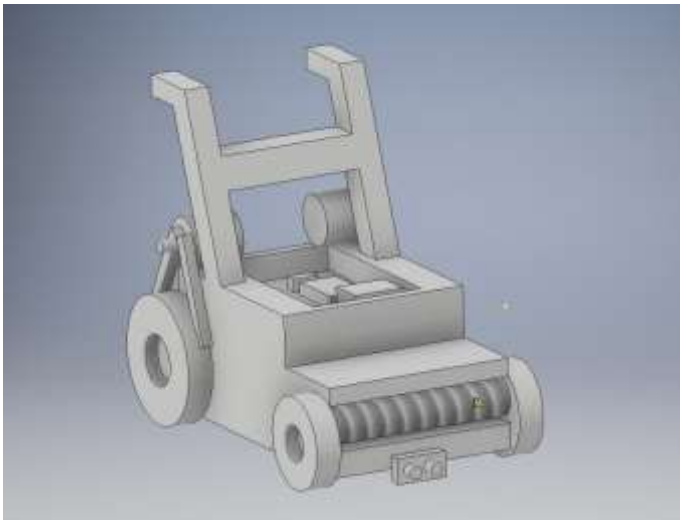


Figure 3.4.1 – Inventor Design

3.5 DATA COLLECTION METHOD

Prepared by Dhurges Kumar A/L Kasivishva Nathan

There are several methods of data collection in action research, commonly used are the observation methods.

Observation is one of the most important method that have to be used. This method of observation requires a broad background of knowledge and understanding of situation in order to make the perfect and real observations.

As a Sultan Salahuddin Abdul Aziz Shah Polytechnic student, we have observed the place around our polytechnic. For example, the lecturer's dome, field and also the pathway and also the places where you can see dried leaves and grass. The most common method used by the grass cutters are the normal machines where they have to use it manually to cut. After it's being cut, they have to sweep it by themselves where some are also too lazy to do it and just let it be. By this, we could see that it is very important for us to innovate our project in order to help the one who are suffering. Therefore, the use of our Electronic Grass Cutter will definitely be the right choice in order for them to fix the problems being faces.

Besides that, we have also planned to do a second observation on the housing area nearby our Polytechnic which is the TTDI Jaya residential area. From what we have seen, we knew that all of them are using the manually used grass cutter, which is not convenient for them as well. After it's being cut, they also have to sweep it off and pick it up and this uses a lot of their time. Thus, we are sure that the usage of our Electronic Grass Cutter will surely lighten their burden in doing their works.

3.6 RESEARCH INSTRUMENT

Prepared by Siti Nurhusena Binti Prasert

This study was conducted on qualitative and quantitative method. There are several instruments and research tools used to obtain data such as questionnaires, observations and unstructured interviews. The questionnaire test instrument was chosen to obtain data from this study while the interviews and observations were to further validate the findings. The method of questionnaire that we have been carried out is by using the Google Form method.

3.7 ANALYSIS AND FINDINGS

Prepared by Dhurges Kumar A/L Kasivishva Nathan

The data collected consisted of questionnaires. The analysis of this data is was to evaluate the percentage of respondents who have answered the questionnaire. The pie chart is used to indicate the scores and percentage used more clearly to explain the thought and feedback from the respondent. The test result was gained based on the respondent's feedback. The questionnaire was opened to all polytechnic students and the people around that respective area as well. Below here shows the information and data that we have gathered, we had around 63 respondents who have answered our survey.

Question 1

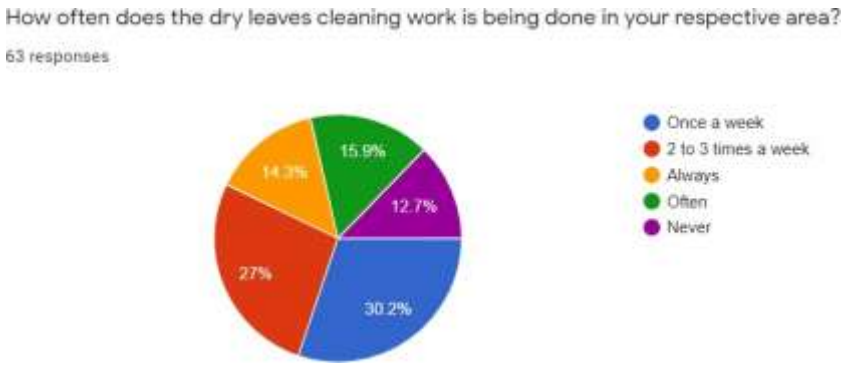


Figure 3.7.1 – Question 1 Result

Question 2

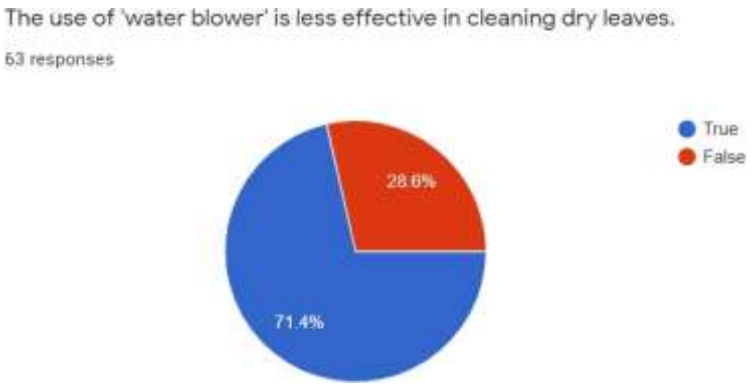


Figure 3.7.2 – Question 2 Result

Question 3

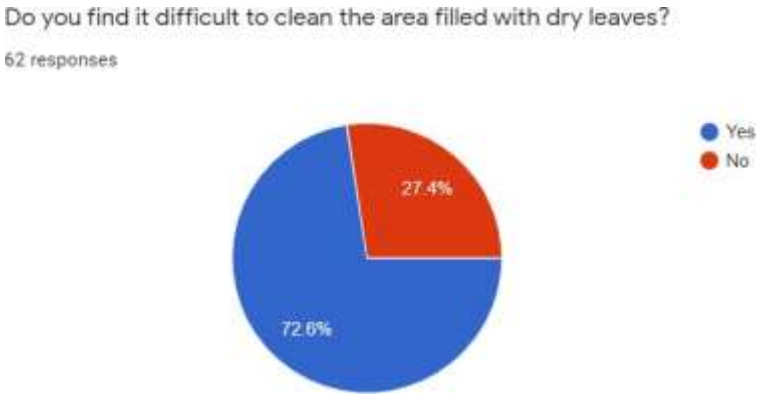


Figure 3.7.3 – Question 3 Result

Question 4

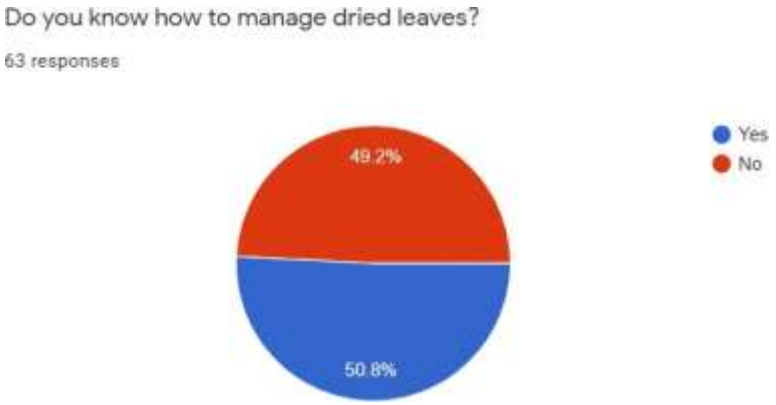


Figure 3.7.4 – Question 4 Result

Question 5

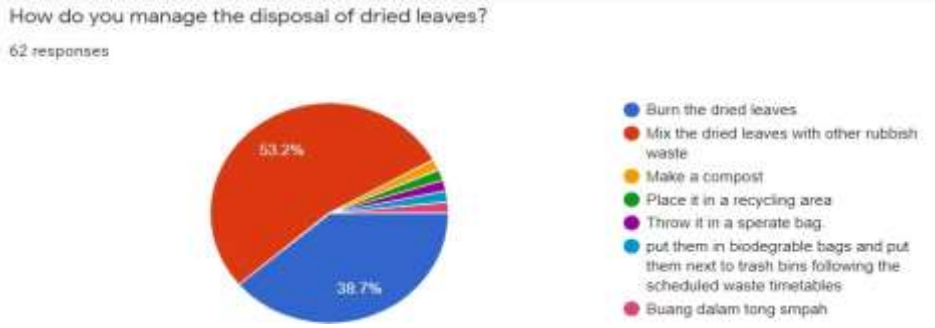


Figure 3.7.5 – Question 5 Result

Question 6

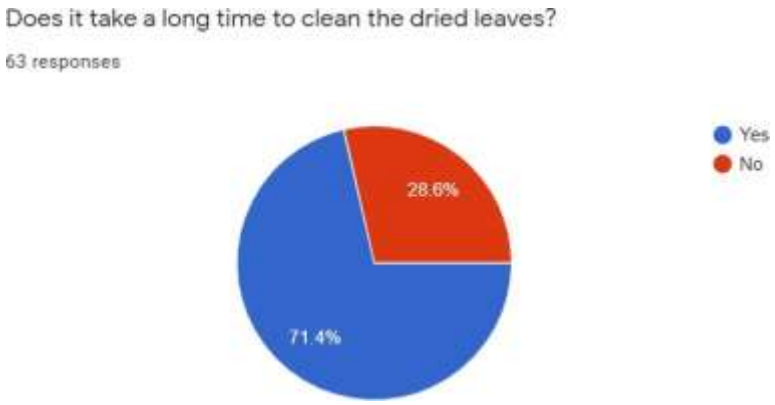


Figure 3.7.6 – Question 6 Result

Question 7

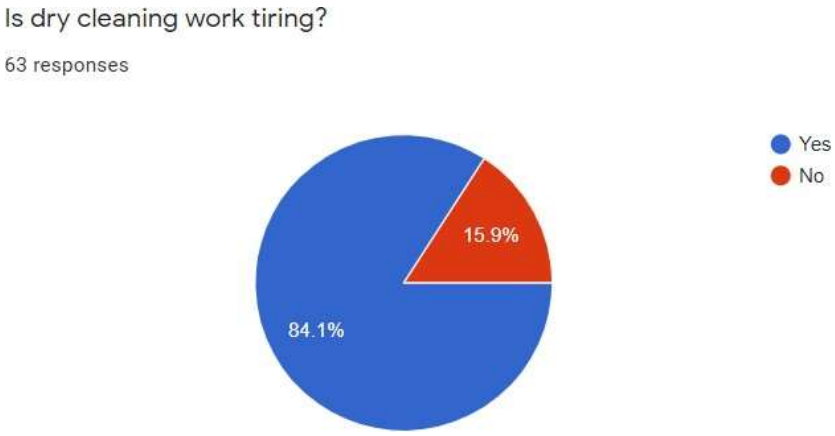


Figure 3.7.7 – Question 7 Result

Question 8

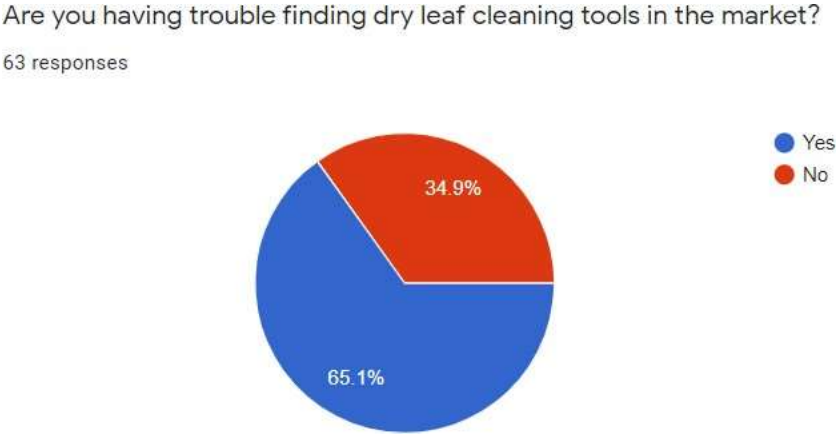


Figure 3.7.8 - Question 8 Result

Question 9

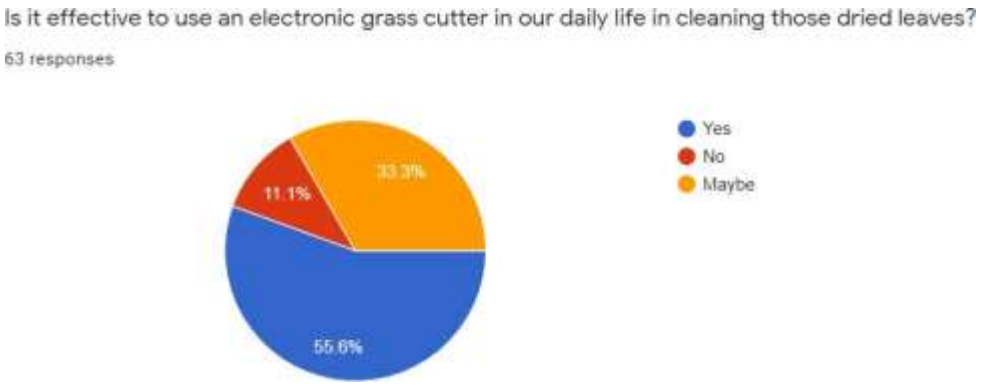


Figure 3.7.9 – Question 9 Result

Question 10

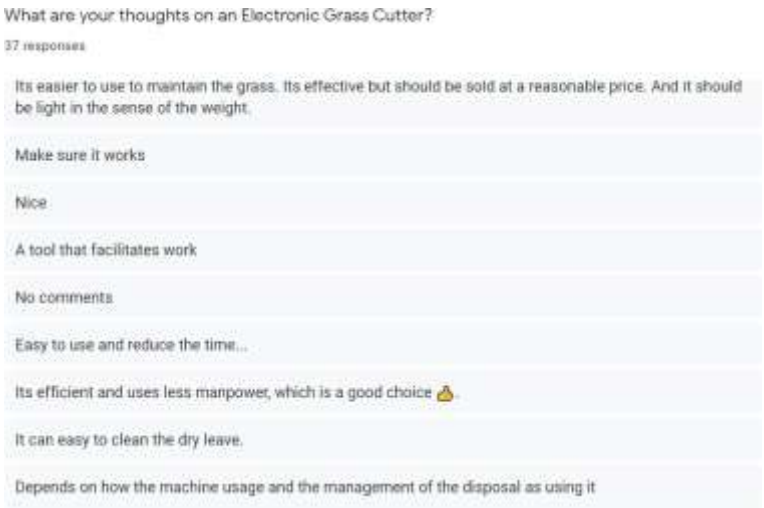
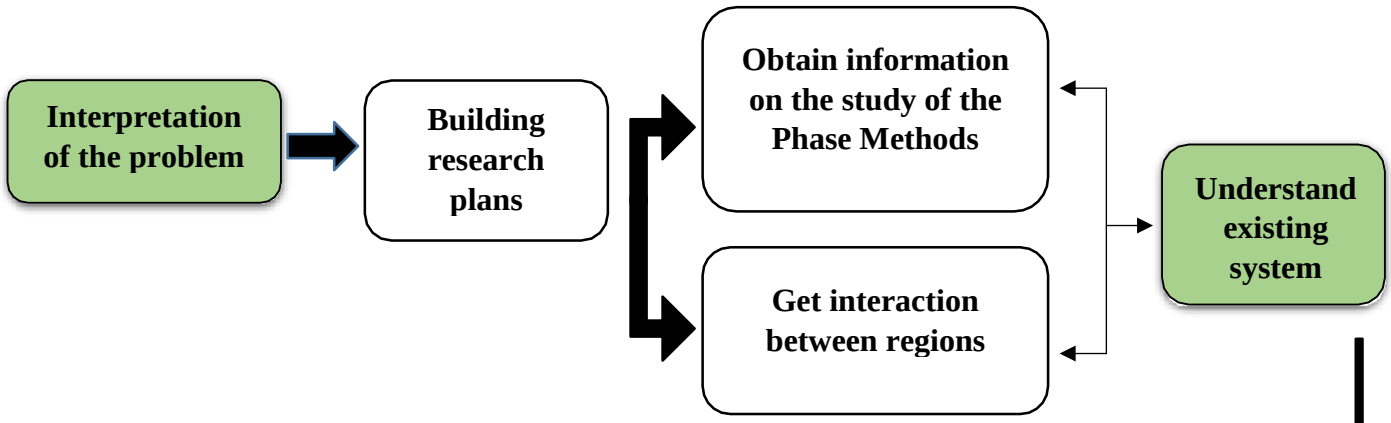


Figure 3.7.10 – Question 10 Result

PHASES

PHASE 1: ANALYZE PROJECT DATA



PHASE 2 : SYSTEM DESIGN

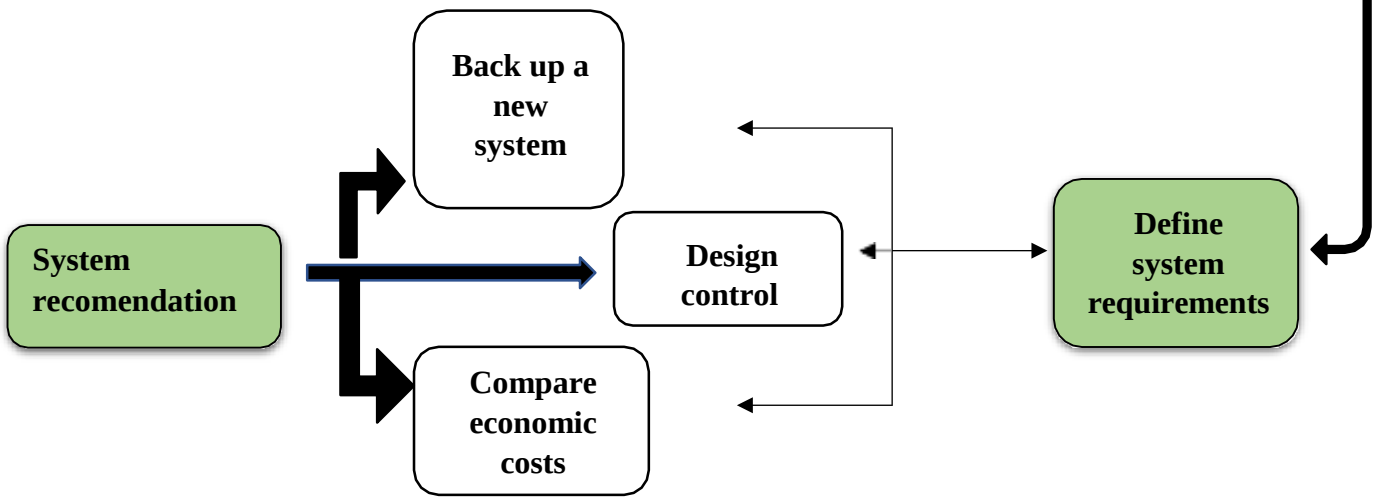


Figure 3.7.11 – Phases Diagram

3.8 CHAPTER'S SUMMARY

Prepared by Siti Nurhusena Binti Prasert

The methodology of this project shows the method or framework used in the completion of this project. Methodological studies show the methods and approaches used such as data collection methods, models, making the selection of ideas, selection of methods, and the best materials. Also, do testing on project materials. Next, the study methodology of this project also shows the factors that need to be considered in the selection of a particular method or approach.Based on the detailed information presented in this chapter, the researcher was thought to follow the methodologies and procedures outline. This is to make sure that our research have obtained the objective of this project. In conclusion, the research that we have conducted hasn given a lot of informations regarding the choice of the society.

CHAPTER 4
FINDINGS AND ANALYSIS

4.1 INTRODUCTION

Prepared by Kavines A/L Ganson

This chapter discusses the findings of the study based on testing of the projects that have been carried out. It cannot be implemented if the final project is not yet fully completed. In this chapter we will also discuss about the study and project results carried out. Every project undertaken must be tested to achieve the objectives that have been stated by the group members to prove that the project works well and successfully or vice versa. The objective in Electronic Grass Cutter is to cut efficiently and to not use a lot of manpower.

There are several key studies conducted and will be discussed in completing this project. The results obtained are not only in the form of study charts that have been conducted but in the form of advantages and disadvantages of the concept. Therefore, it can also be seen the advantages and disadvantages of the project that has been done. From the entire project that has been done, it has succeeded in achieving the objective where the Electronic Grass Cutter project can cut the grass efficiently without the use of petroleum and other resources. The results shown are very positive where the objectives are successfully achieved and function well.

4.2 FINDINGS

Prepared by Dhurges Kumar A/L Kasivishva Nathan

We have done some observation based on the grass cutter than being used now and compared to our Electronic Grass Cutter. After we have fixed all the parts to our machine and also painted it to give an elegant look, we have done a testing on the movement of our machine as well as the use of the cutting blades. Thus, it is clearly stated and proven that our machine cuts the grass very efficiently by working automatically then the manual grass cutting machines out there. To get the best finding on this we had also made a comparison on our machine when it works manually and also automatically.

Therefore, when we tried by using manually we had found out that we need a lot of manpower in order for us to be able to cut the grass. Thus, after it's being cut there is also a huge time wastage by sweeping and collecting the grass and also dried leaves as well. Moreover, while using our machine which works automatically we were able to see that it was the best decision. The movement of the machine is controlled by the motor and gear system which gives a huge impact to the cutting blades for it to rotate in a higher speed.

Besides that, it is possible to get the work done in short time period by using this grass cutter which works automatically. Then, the position of the machine is also stable while cutting the grass, this is to make sure that it cuts evenly and have a clean work. Hence, this machine doesn't emit gases from the exhaust and cause pollution since this works with the use of batteries. The maintenance cost for this project is also low cost capital and this would definitely give a good impact to the consumers.

Below here we have compiled the data by using the manual and automatic grass cutter to cut a 2500 square feet on a home land.

Type Of Machine	Time Taken	Weight Of Dump	Cost For Energy
Manual	4 hours	0.8kg	High cost for petrol
Automatic	2 ½ hours	2.5kg	Low cost using batteries

Table 4.2.1

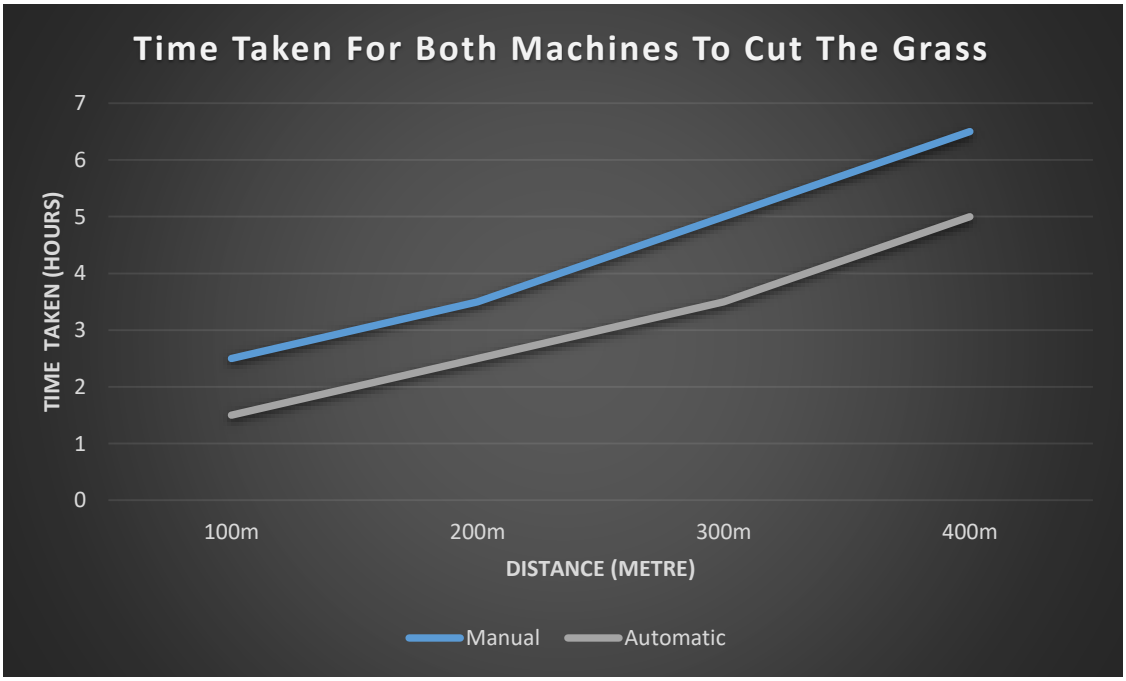


Figure 4.2.2 – Graph of The Machine

4.3 PRODUCT / PROJECT ANALYSIS

Prepared by Siti Nurhusena Binti Prasert

There's always advantages and some disadvantages in every project that we have done. After we have done with the process of completing the project and also testing it out, we have known that this Electronic Grass Cutter has some advantages and disadvantages. Thus, the advantage of this project is based on the objective stated which is that this Electronic Grass Cutter are cheaper in the long run and don't need the use of spark plugs and it is not using any sort of engine to work. It's because this grass cutter is working with the use of the rechargeable batteries and does not produce any sort of noise while using it. Next, it does not emit exhaust are better for the environment. Since, it uses battery and motors this machine is fully motorised and it's user-friendly. Based on our findings, it is clearly stated that the manual grass cutter takes longer time in completing the given task since it uses lots of manpower. Whereas, this Electronic Grass Cutter is fully automatic and saves our time while using it as well. Since we are leaving in an modern environment and everything is moving fast from time to time, this would definetely give a huge impact to the society. Back to the findings, the time to get the work done for a manual machine in 2 times longer compared to our Electronic Grass Cutter.

Therefore, as we know every machine will always have some disadvantages and our Electronic Grass Cutter have some minor disadvanatges as well. One of it is that this Electronic Grass Cutter is heavy in weight. The manual lawn mower / grass cutter weighs way more lesser compared to this Electronic Grass Cutter. This is because, the cutting blades for the machine is heavy in weight due to the use of heavy duty metal plates and also it's functioning by the use of car batteries which weigh roughly around 15kg. Next, this machine moves automatic by the use of Arduino UNO system, this could lead to connection lost due to the cutting of wave from the motor driver. Since we are using motors with high voltage, it really depend on the use of electronics most of the time even when we are in a modern era.

4.4 CHAPTER'S SUMMARY

Prepared by Dhurges Kumar A/L Kasivishva Nathan

In conclusion, at the end of this chapter we have briefly elaborated and explained regarding the findings and analysis of our Electronic Grass Cutter. There is some analysis which have been explained in this chapter. Thus, at the end of this chapter, there are the full details stated regarding the advantages and disadvantages of our project. Finally, we are satisfied with the finding and the result of our Electronic Grass Cutter.

CHAPTER 5
DISCUSSION , CONCLUSION AND UPGRADE PLAN

5.1 INTRODUCTION

Prepared by Dhurges Kumar A/L Kasivishva Nathan

Discussions are made to submit questions related to the project throughout the production of the project. This is to ensure that all work methods can be carried out and reported in the report book as well as projects that are fully operational. These discussions are also conducted from time to time to ensure the objectives are fully achieved. Without proper planning, it is possible that the resulting work is moderate and unsatisfactory. After the discussion and study, a project called Electronic Grass Cutter. The process in designing this tool includes several stages. Among the things and issues that need to be discussed. is in terms of capital, project quality, survey on the use and effective ways to implement its manufacture. In addition, we have arranged daily tasks that need to be done every month to ensure the smooth production of the project.

5.2 DISCUSSION

Prepared by Kavines A/L Ganson

The Electronic Grass Cutter project has successfully reached the objective as stated before. The main objective of this Electronic Grass Cutter is to less the burden of the consumer's in cutting the grass automatically. Compared to the manual grass cutting machine, it uses a lot of manpower where the amount of grass being cut is based on the power that we are pushing with the force. In the other hand, the project's maintenance is not a big hassle as the parts can be replaced easily with the suitable tools and equipment. By referring to the cost, compared to the lawn mower and grass cutters that is being sold out there, our Electronic Grass Cutter is slightly cheaper in price and the maintenance cost is also affordable. Thus, our project has fully equipped with good quality of metal and also steel to avoid spoilage or rustiness. As we all know, the grass cutting machine which we have out there has a different design of blades to cut the grass. Thus, the one we have on our machine is a new design by ourselves and it works excellently.

While this project is being carried out, there were some issues and problems being faced. Firstly, it was from our welding machine where we didn't measure the accurate reading of voltage for the specific metal. Thus, it had caused a deep hole on our metal beam. Then, we had surveyed and continued our work smoothly by having the correct reading voltage for the welding work. This, is very important while carrying out a project as we need to be aware of what are we doing and be able to face any sort of errors.

Moreover, we had some problem while grinding the surface of the metal beam after it was being cut by the cutter. While grinding, we had forced the metal by pressing it towards the grinder. As the force was at only one side, the final outcome was uneven. We had to look carefully after that and correct the surface of the metal to get it smooth.

Last but not least, while testing our project we need to make sure the Arduino UNO system is done perfectly for the movement of the Electronic Grass Cutter. We had learnt the basic knowledge of the Arduino system by learning the tutorials from YouTube. We had a hard time to get the right coding which works perfectly on our machine. After we are done with the coding, we had the problems of connection lost from the motor driver which is too close to our motor and battery and caused some break on the waves. We had figured out a new placing to get the connection at the best point.

5.3 CONCLUSION

Prepared by Dhurges Kumar A/L Kasivishva Nathan

In conclusion, this project had a good feedback from the community as we can see from the survey that we had conducted. Most of the grass cutters and also normal housewives were really impressed with our project. Even we had lots of issues in the beginning of the project, at the end we had upgraded and corrected our mistakes to give the best output. These types of project will need a long duration of time to satisfy all the criteria needed. With all the support that we had from our supervisor, lecturer's, and friends, this project was finally done with an excellent job.

After all the investigations and findings that we have carried out, we came to know that the use of this Electronic Grass Cutter have successfully helped the household people and the grass cutters at the same time it gave a huge positive impact to the young entrepreneurs. It gives a good amount of sales and income as well.

In a nutshell, this project had meet all the criteria and objective as stated since the starting of the project because it helps to cut the grass efficiently without causing any sort of pollution and completing the task in a shorter time range. The Arduino UNO system has also helped in the movement of the machine and proved it is a worthy one.

5.4 UPGRADE PLAN

Prepared by Dhurges Kumar A/L Kasivishva Nathan

By having our project in the market, we hope that the usage on an Electronic Grass Cutter is the best choice to everyone out there. As this helps to cut the grass neatly and make sure the surroundings are always neat and tidy. Even though this project looks easy, there is a lot of work behind it to get it as how it is right now. Besides that, as our country is merging towards the growth of technologies, this would definitely be the right choice. It doesn't only help the housewives, grass cutters but also gives an encouragement to the young generations for using it as it's an essential.

In addition, we hope that by having this project as our innovation, it helps to attract the interest to everyone and mainly our young generations for not forgetting to keep our nature clean as it is a gift from God. Thus innovation doesn't only help us to satisfy our needs but also to reduce our burden as well. At the same time, we wish that our project will give a huge impact to the gardener's and also not to forget the farmers. This is definitely something to be taken as a big achievement by changing the lifestyles of the people who are using the current manual grass cutting machine.

5.5 CHAPTER'S SUMMARY

Prepared by Siti Nurhusena Binti Prasert

In conclusion, the study conducted has achieved the set objectives. The Electronic grass cutter can be produced according to the objectives and specifications. All guides and scientific and past studies were very helpful in the study and production of electronics grass cutter machine. The results obtained from the tests conducted show that this product meets the objective. Throughout the making of this machine there were also some issues and problems, but it was managed well and overcome it in the best way. For example, there were some malfunction on the connection of the Arduino UNO system, but it was managed well by thinking of another alternative way to get it done excellently.

In this study, the effectiveness of the sieve is more focused on productivity and time saving. The results of the old cleaning work using this machine is quite satisfactory considering that the machine is designed with more functions than the existing machine. From the evaluation made, overall the Electronic Grass Cutter designed is effective and meets the design features set and requires low cost in maintenance. Maintenance can be done on its own in the event of a defect in the blade blender. In addition, with this Electronic Grass Cutter can grind dry leaves and a lot of grass at one time. Overall, with this electronic grass cutter site cleaning work can be completed easily and save time. Hence, we hope that this project could expand even more through out all the upcomings generations.

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- William Mccoy. (2020) https://www.hunker.com/12594560/uses-of-grass-cutters#:~:text=Manual%20Shears&text=These%20manual%20grass%20cutters%20or,close%20around%20trees%20or%20gardens

APPENDIX

Prepared by Dhurges Kumar A/L Kasivishva Nathan

A. BUDGET CALCULATION

B. GANTT CHART

C. DRAWING

BUDGET CALCULATION

	BUDGET CALCULATION			
No	**Item**	**Quantity**	**Price Per Unit**	**Total**
1.	12V Car Battery	1		RM120.00
2.	8 Inch Big Tyres	2	RM12.50	RM25.00
3.	2 Inch Small Tyres	2	RM 9.99	RM19.98
4.	Arduino UNO Full Set	1		RM55.00
5.	12V Wiper Motor	2	RM16.87	RM33.74
6.	Arduino Jumper Wires	2	RM 3.00	RM 6.00
7.	10m Wires	1		RM10.08
8.	Rubber Grip	1		RM 8.97
9.	Gear Sporcket & Chain	2	RM35.00	RM70.00
10.	Arduino Bluetooth	1		RM 8.52
11.	Arduino Ultrasonic Sensor	3	RM 3.10	RM 9.30
12.	Spray Can	2	RM 7.90	RM15.80
13.	Switch	2	RM 2.89	RM 5.78
14.	Iron Bar / Rods			RM40.00
15.	Metal Plate & Grills			RM40.00
16.	Ball Bearing	4	RM11.90	RM47.60
17.	Other Extra Materials			RM30.00
			TOTAL	**RM 545.77**

Table 3.9.1

GANTT CHART

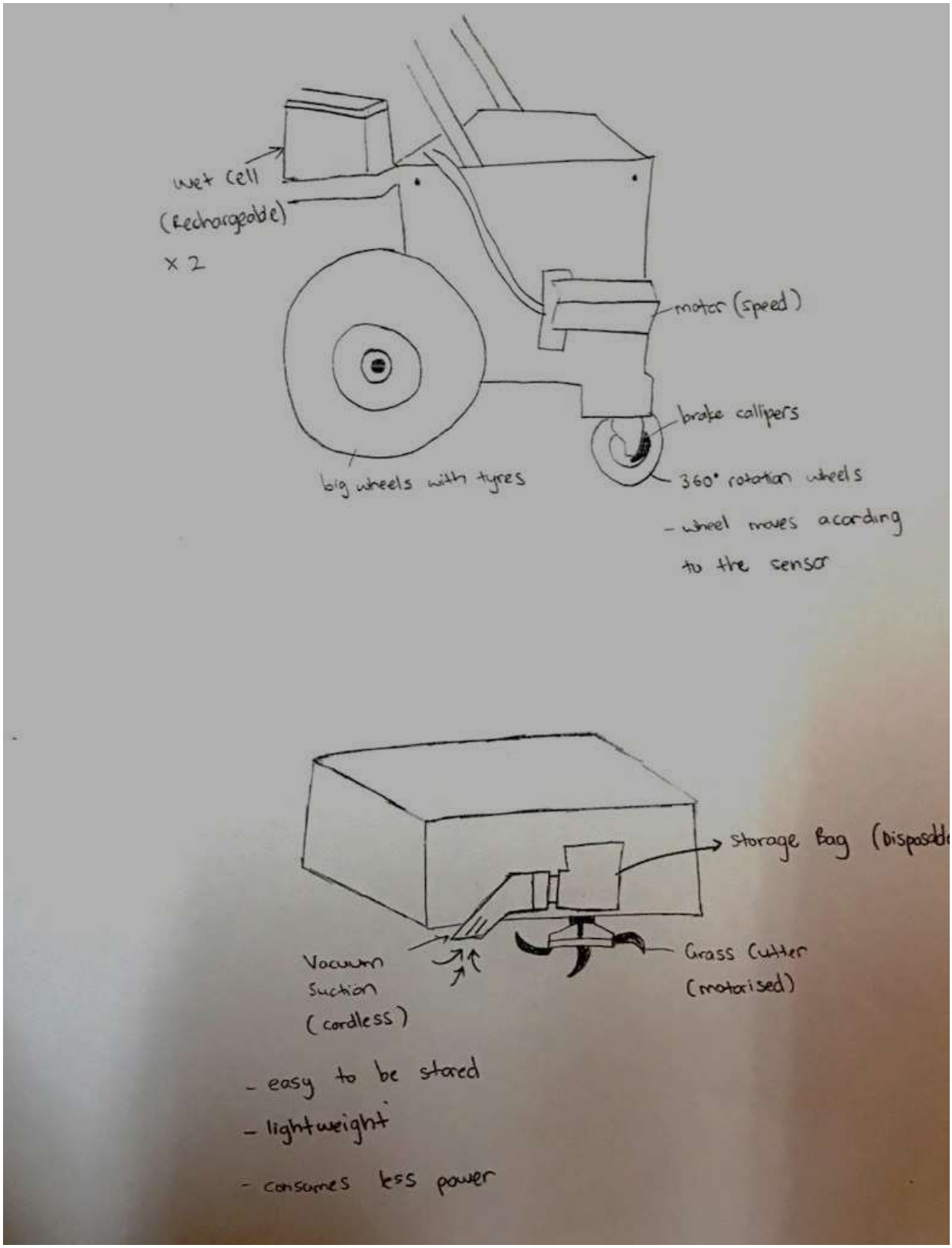
Project Activity	Weeks														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Briefing and Project Planning															
Project Design															
Material Selection															
Materials Purchase															
Method Selection															
Welding Grinding Machining															
Arduino UNO															
Arduino UNO Test Run															
Analysis Data															
Report Writing															
Project Testing															
Report Preparation															

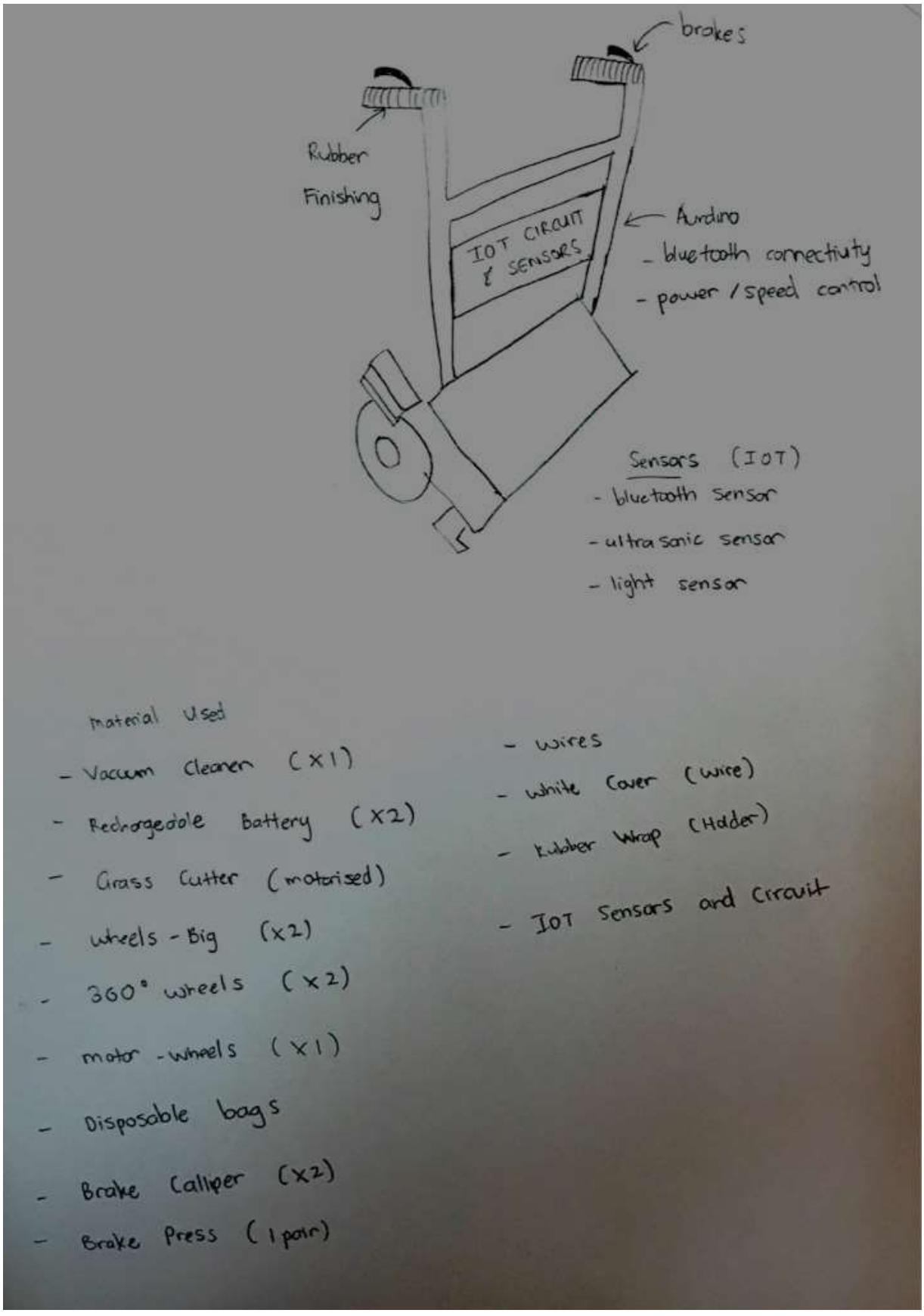
Table 3.9.2

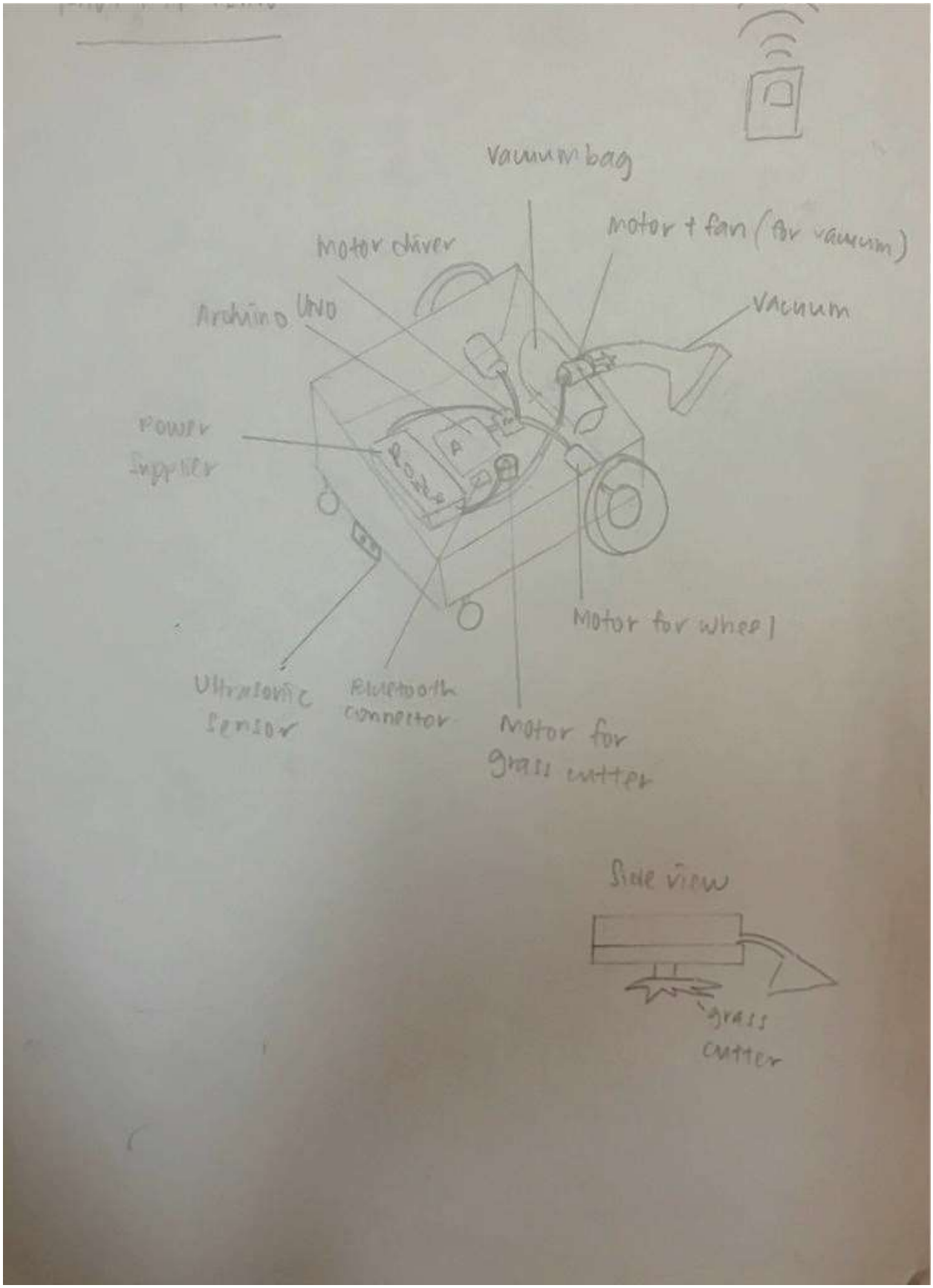
Planning

Actual

DRAWINGS


wet cell
(Rechargeable)
x 2
motor (speed)
brake callipers
big wheels with tyres
360° rotation wheels
- wheel moves acording
to the sensor
Storage Bag (disposable
Vacuum
Suction
(cordless)
Grass Cutter
(motorised)
- easy to be stored
- lightweight
- consumes less power


brakes
Rubber
Finishing
IOT CIRCUIT
& SENSORS
Arduino
- bluetooth connectivity
- power / speed control
Sensors (IOT)
- bluetooth sensor
- ultrasonic sensor
- light sensor
Material Used
- Vacuum Cleaner (x1)
- Rechargeable Battery (x2)
- Grass Cutter (motorised)
- wheels - Big (x2)
- 360° wheels (x2)
- motor - wheels (x1)
- Disposable bags
- Brake Caliper (x2)
- Brake Press (1 pair)
- wires
- white Cover (wire)
- Rubber Wrap (Holder)
- IOT Sensors and Circuit


Vacuum bag
motor + fan (for vacuum)
Motor driver
Arduino Uno
Vacuum
Power supplier
Motor for wheel
Ultrasonic Sensor
Bluetooth connector
Motor for grass cutter
Side view
grass cutter

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CR - 1

Application No : LY2020005767

Applicant :

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Title of work (Original language) : ELECTRONIC GRASS CUTTER

Translation :

Transliteration :

Name of the Language (*Language that been used in the work) : BAHASA INGGERIS

If published in a periodical or serial (Literary Work) : (Volume / Number) (Issue Date) (On Pages)

Section A : Type of Works

☒ Literary ☐ Musical ☐ Artistic ☐ Film ☐ Sound Recording

Date of Fixation / First Published / Erected / Incorporated : / /

Section B : Publication

The Work is : ☒ Published ☐ Unpublished

If published : 2020 (Year of Compilation) 30 / 09 / 2020 (Date of first publication) MALAYSIA (Country)

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Period of Agreement : ___/___/___ until ___/___/___

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*Company Registration No.	:				
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Address 2	:				
Address 3	:				
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"ELECTRONIC GRASS CUTTER"

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Kavines A/L Ganson
Politeknik Sultan Salahuddin Abdul Aziz Shah
Siti Nurhusena Binti Prasert
Politeknik Sultan Salahuddin Abdul Aziz Shah

DESCRIPTION OF INNOVATION

Lawn mower also named as mower, grass cutter or lawnmower is a machine utilizing one or more revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower, but generally is adjustable by the operator, typically by a single master lever, or by a lever or nut and bolt on each of the machine's wheels. The blades may be powered by manual force, with wheels mechanically connected to the cutting blades so that when the mower is pushed forward, the blades spin, or the machine may have a battery powered or plug-in electric motor. Thus, our Electronic Grass Cutter works automatically based on the Arduino UNO system.

IMPACT OF INNOVATION

- Reduce the burden and work automatically
- Work can be done within a short period
- Moves with fully motorized system
- This machine will definitely get support from the public with the use of this machine which is very satisfactory
- The machines we produce also use low cost and with this, we can definitely attract targeted customers

OBJECTIVE / SCOPE

- Design a more efficient and effective grass cutting machine
- Grinding leaves neatly and in a large quantity of the specified area
- Build a machine that uses low cost capital
- Enhance skills and creativity in terms of ideas about components and to design a project
- To give students an idea of how a system operates

DIAGRAM BLOCK/ OPERATING FLOW CHART

View of our project design