



SOLAR WATER PUMP

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**JABATAN KEJURUTERAAN MEKANIKAL
(PEMBUNGKUSAN)**

JUNE 2020

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SOLAR WATER PUMP

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

**JABATAN KEJURUTERAAN MEKANIKAL
(PEMBUNGKUSAN)**

JUN 2020

AKUAN KEASLIAN DAN HAK MILIK

TAJUK : SOLAR WATER PUMP

SESI : JUNE 2020

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Adalah pelajar tahun akhir **Diploma Kejuruteraan Mekanikal (Pembungkusan), 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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sebagai penyelia projek pada tarikh: /.... /2020) NURUS SADIQIN BT. ABDUL

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ABSTRACT

Solar Water Pump is a tool that makes it easier for farmers, gardeners and consumers to water plants. It is suitable for use in large agricultural areas and small crops or shrubs such as vegetable or fruit farms. The problem that farmers and gardeners often face is that they feel tired when they have to go back and forth to fetch water from their water source or reservoir. If they are old, they might experience joint and body pain while for the simple they do not have time to water their plants. Thus, the objective of this study is to design a tree watering device using solar energy and build an IOT system on a plant watering device. This project will serve as automatic water watering that uses solar energy and farmers do not have to use a lot of energy. The scope of use is not only for farmers, but it can also be used by people who have an interest in planting in their backyard. In addition, the research methodology is based on a mobile system that is IOT (Internet of Things) on the environmental detector sensor. Thus the watering of the crop will occur automatically if in a hot environment. The findings of the study found that this system helps farmers, gardeners or consumers in terms of cost, time and energy. The results of data collection from survey studies using 'google form' are also obtained from the results of respondents. This tool can be improved by placing a ground humidity sensor. Therefore, it can water the plants when there is less soil moisture.

Keyword : Water pump, solar, IOT

ABSTRAK

Solar Water Pumper adalah sebuah alat yang memudahkan petani, pekebun mahupun pengguna untuk menyiram tumbuh-tumbuhan. Ia sesuai digunakan di kawasan pertanian yang luas dan tanaman yang kecil atau renek seperti ladang sayur atau buah-buahan. Masalah yang sering dihadapi oleh petani dan pekebun adalah mereka berasa letih apabila terpaksa berulang-alik mengambil air di punca air atau di takungan air mereka. Jika mereka berusia tua, mereka akan mengalami kesakitan sendi dan badan manakala bagi golongan muda mereka tidak mempunyai masa untuk menyiram pokok tumbuhan mereka. Justeru, objektif bagi kajian ini adalah merekabentuk alat penyiraman pokok menggunakan tenaga solar dan membina sistem IOT pada alat penyiraman pokok. Projek ini akan berfungsi sebagai penyiraman air automatik yang menggunakan tenaga solar dan petani tidak perlu menggunakan tenaga yang banyak. Skop kegunaan bukan sahaja untuk petani, malah ia juga boleh digunakan oleh orang yang mempunyai minat dalam penanaman di halaman rumah mereka. Disamping itu, metodologi kajian adalah berdasarkan sistem mudah alih iaitu IOT (Internet of Things) pada sensor pengesan persekitaran. Dengan itu penyiraman tanaman akan berlaku dengan cara automatik jika dalam persekitaran panas. Dapatan kajian mendapati sistem ini banyak membantu para petani, pekebun atau pengguna dari segi kos, masa dan tenaga. Hasil pengumpulan data dari kajian tinjauan (survey) dengan menggunakan 'google form' juga didapati dari hasil responden. Alat ini boleh ditambah baik dengan meletak sensor pengesan kelembapan tanah. Oleh itu, ia boleh menyiram tanaman apabila kurang kelembapan tanah tersebut.

Kata Kunci: Pengempam air, Solar, dan IOT.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

For our final year project, we came out with Solar Water Pumper for our team project. This project is mainly for the gardeners and farmers that plant small type of plantation for their own home or industry of planting. For example, they plant vegetable, strawberry and more. Some of the issue that we know for all the gardener and farmer are every time they wanted to water their plants, they will carry a big gallon of water or a watering can to water their plants. The result they will be tired and take long hours to water the plants depend on how wide the plantation area.

With this project Solar Water Pumper will lift their burden and time of watering a large amount of plants. They can just set the system when and what time for the system to help them to water the plants. Our project is also an environmental friendly system because as you read the name for our project is 'SOLAR', we use solar panels to collect energy to generate the Solar Water Pumper and we use solar photo voltaic cells for pumping water. The photovoltaic modules convert sunlight directly to electricity which is used to run a dc motor pump for bailing of water. It consists of solar photovoltaic modules, power conditioner to protect storage batteries from overcharging during non-sun shine and a dc water pup. Solar Water Pumper is also affordable for farmers and gardeners because the low maintenance make it less worried for them to try this product.

Therefore, this product can attract more people to gardening and planting because it is easy to just set the pumper and do not use any energy to water the plant. They can spend time with their family and do more thing other than watering plant. We hope that our product will make the planting industry more easier to water their plants and makes everyone life easy.

1.2 PROBLEM STATEMENT

The problem that every farmers and gardeners are mostly when they water their plants, they will carry a heavy watering can or going to take the water from water sources again and again to water their plants.

This effort will make them tired and waste their energy for just watering their plants. For example, they might get body aches and soaring joints especially the elderly people.

Next, for the younger age like adult, they are to busy with their work and do not have time to water their plants at home. Then, the plant will have lack of water and slowly dying.

1.3 RESEARCH OBJECTIVES

The objectives to this research are:

- ✓ Lighten the burden of the farmers or anyone who have planting areas to water
- ✓ Save electricity by concept of green house and reduce the use of wires from the power sources
- ✓ Encourage to do plantation
- ✓ Farmers can utilize it at affordable cost

1.4 RESEARCH QUESTIONS

This study will answer the following research questions:

- i. Is it possible to create a lighter prosthetic that are high in quality?
- ii. What type of material that can be used to make prosthetic cheaper?
- iii. What are the possibilities of making prosthetic a biodegradable material?

1.5 SCOPE OF RESEARCH

The scopes and limits to this research are:

✓ **This water pumper can only use in small plants.**

- For example, they have strawberry farm or vegetable farm and have their own garden at their houses.

✓ **Range age that can use this water pumper is elderly and adult**

- Because sometime for elderly they might have body aches and sore joints when standing and more same as adult too but some adults whom have their own garden too and they do not have time to water it because of their work.

✓ **The planting industry can use this pumper**

- For example, they have large areas and have to hire workers to water the plantation.

✓ **Can not be for big plantation**

- Just like big trees of fruits and etc.,

1.6 Significance of Research

The panel is kept under the sun for radiation. The photon energy from the sun lights that incident on the top metallic grid causes the electrons in the P-layer and holes in the N-layer to diffuse towards the junction. In this process the electrons collected on the N-side and holes collected on the P-side charge these two sides oppositely. This develops an open circuit voltage across the two terminals. The energy conversion process continues as long as light is incident on the active top surface of the cell

The power developed by these cells are collected and stored in a battery. The power from the battery is sent to the DC motor. It runs the pump coupled to it. The suction head is connected to the well and discharge head is directed towards the field. The water from the well is pumped out and it is used for the domestic or agricultural purpose.

1.7 CHAPTER'S SUMMARY

In this chapter, the statements can explained that this project can help and inspired people not just certain people can use this Solar Water Pumper. All the objective is based on the problem statement given. The objective that state to lift the burden for people to water their plants and low maintenance for it can be use for a long period of time. Not just that, the pumper also use renewable energy to power up the pumper. Thus, this project is new and hope to be use on the daily basis for us and to everyone.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

In this project, various sources like articles in the internet and books related are reviewed on the aspect of lighten the burden of the farmers or anyone who have planting areas to water. Different articles provides us the detail and information on coming up with our own customized way to ease owner of plantation. The different reviews helps us to come up with the best idea to fulfill our objective.

2.2 CONCEPT / THEORIES

The concept of our solar water pump are focused on saving time and energy of plantation owners. Our project also designed to increase the efficiency of watering plantation. We used solar powered panels to design a water pump that helps the farmers to water their plants. The panel is kept under the sun for radiation. The photon energy from the sun lights that incident on the top metallic grid causes the electrons in the P-layer and holes in the N-layer to diffuse towards the junction. In this process the electrons collected on the Nside and holes collected on the P-side charge these two sides oppositely. This develops an open circuit voltage across the two terminals. The energy conversion process continues as long as light is incident on the active top surface of the cell. The power developed by these cells are collected and stored in a battery. The power from the battery is sent to the DC motor. It runs the pump coupled to it. The suction head is connected to the well and discharge head is directed towards the field. The water from the well is pumped out and it is used for the domestic or agricultural purpose.

2.3 MATERIAL STUDIES

1. Solar Panel

- Solar electric systems are sometimes called photovoltaic systems. The word 'photovoltaic' is often abbreviated PV. Most solar panels or modules generate direct current (DC) electricity. A group of modules is called an array. It absorbs sunlight to supply power to batteries.

2. Battery

- Store energy to generate the water pump and recharge from the solar panel when there is absence of energy. Converts chemical energy to mechanical energy.

3. Moisture Sensor

- A device that, when placed on a water line and will sense the moisture of the soil is it dry or not

4. Water Tank

- Provide storage of the water for agriculture irrigation.

5. Pipe

- A hollow cylinder that transport water from tank to plantation

6. Water Pump

- DC water pumps in general use one-third to one-half the energy of conventional AC (alternating current) pumps. DC pumps are classed as either displacement or centrifugal, and can be either submersible or surface types. Displacement pumps use diaphragms, vanes or pistons to seal water in a chamber and force it through a discharge outlet. Centrifugal pumps use a spinning impeller that adds energy to the water and pushes into the system, similar to a water wheel. Submersible pumps, placed down a well or sump, are highly reliable because they are not exposed to freezing temperatures, do not need special protection

from the elements, and do not require priming. Surface pumps, located at or near the water surface, are used primarily for moving water through a pipeline. Some surface pumps can develop high heads and are suitable for moving water long distances or to high elevation.

2.4 ADVANTAGE AND DISADVANTAGE

As we inventing this solar water pump we discuss many advantages. One of the advantages is the solar water pump has least maintenance cost. For an example there is no transportation from long distance, no rent for electricity and no fuel is required for operation.

Besides, another advantages is about the technical aspect. This solar water pump has long life as the is no moving parts and the solar water pump has no sound pollution as it has noiseless operation. So this water pump is pollution free.

Although there are many advantages, there are still have some disadvantages too. One of the the disadvantages is they do need sunlight to work. If you are wanting to irrigate in the early morning or late evening, you may find there is not enough sunlight for your solar water pump to work. To overcome this problem, we add battery as our alternative energy source. The energy from sunlight will stored in battery and we can use the water pump even there is absence of sunlight.

Another problem is the upfront cost of solar water pumps can be a barrier to some farmers, as you need to buy the water pump and panels all at once. Even thought, it is valuable to buy because in the long-term, solar pumps are the cheaper option for irrigation. This is because of the water pump has long pump lifetimes, no ongoing fuel costs and low labour and maintenance costs.

2.5 PREVIOUS RESEARCH

Comparison with the common and Solar Water Pump method:

Common Method	With Solar Water Pump
<ul style="list-style-type: none">• Have to carry watering can when watering the plants.• Run back and forward from the water source.	<ul style="list-style-type: none">• It will automatically water the plants or plantation by moisture sensor.• Do not have to bring heavy watering can and save time.

Table 2.5.1

2.6 CHAPTER'S SUMMARY

From the aid of different articles, we have come up with an idea to lighten the burden of the farmers or anyone who have planting areas to water. From this project, many people are encourage to do plantation. The objective of this project can be achieve.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

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 throughout the making of our final project. There will be a flowchart showing the process of us making the whole project. This flowchart 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.

3.2 FLOW CHART

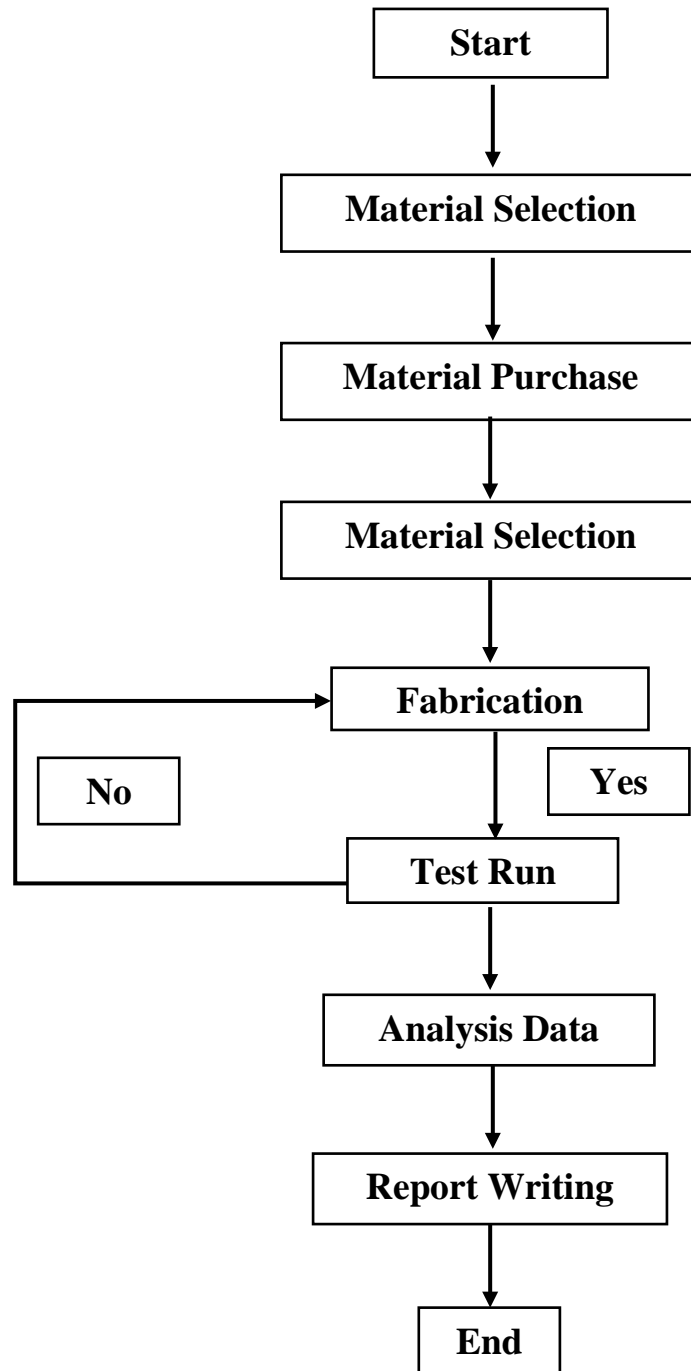


Figure 3.2.1 – Flow Chart

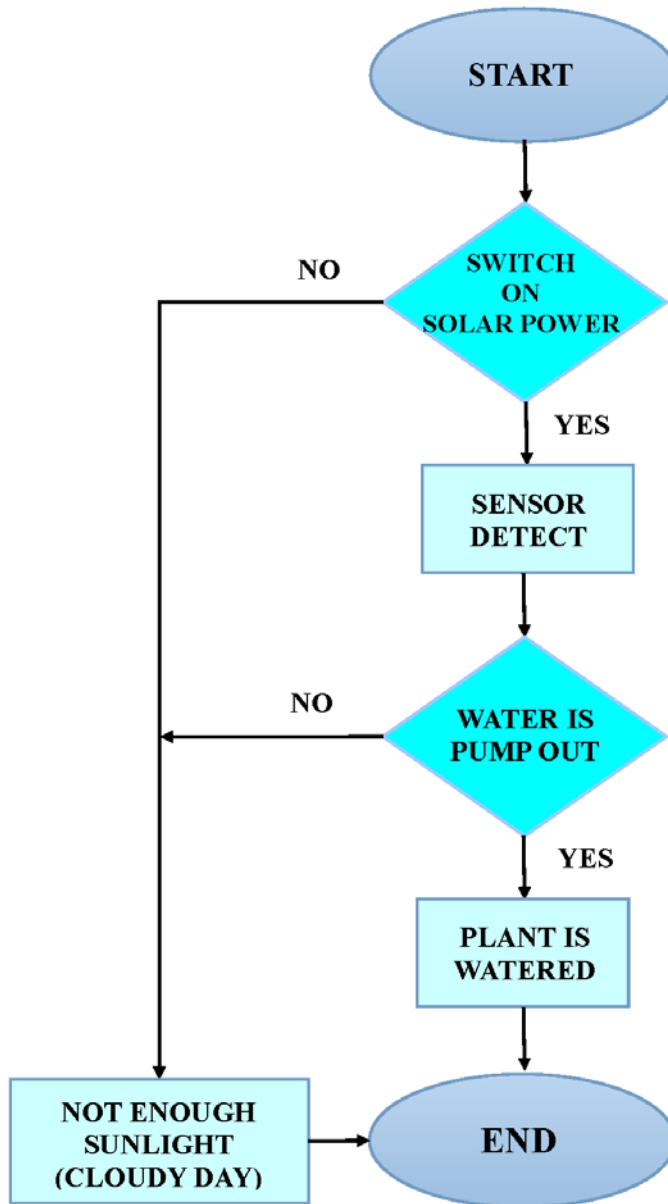


Figure 3.2.2: Flow Chart Product

3.3 FLOW CHART EXPLANATION

- **Material Selection**

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

- 1) Solar Panel



Figure 3.3.1- Solar Panel

Solar electric systems are sometimes called photovoltaic systems. The word ‘**photovoltaic**’ is often abbreviated PV. Most solar panels, or modules, generate direct current (DC) electricity. A group of modules is called an array. It absorbs sunlight to supply power to batteries.

- 2) Battery

Store energy to generate the water pump and recharge from the solar panel when there is absence of energy. Converts chemical energy to mechanical energy.

3) Moisture Sensor

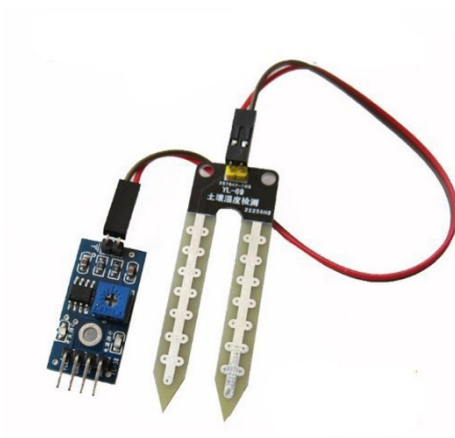


Figure 3.3.2 – Moisture Sensor

A device that, when placed on a water line, it will automatically sense moisture and less moisture in the soil. Then the water will flow through the use of an electro-mechanically actuated ball valve or embedded (solenoid) Valve if the soil is not moist enough.

4) Water Tank

Water tank is to provide a storage for the water for agriculture irrigation. If the water ran out, the water will be filled from the water source because it will be connected together. So the water tank will be always filled with water.

5) Pipes



Figure 3.3.3 - Pipes

A hollow cylinder that transports water from tank to the sprinkler and across the plantation.

6) Water Pump



Figure 3.3.4 – Water Pump

DC water pumps in general use one-third to one-half the energy of conventional AC (alternating current) pumps. DC pumps are classed as either displacement or centrifugal, and can be either submersible or surface types. Displacement pumps use diaphragms, vanes or pistons to seal water in a chamber and force it through a discharge outlet. Centrifugal pumps use a spinning impeller that adds energy to the water and pushes into the system, similar to a water wheel.

Submersible pumps, placed down a well or sump, are highly reliable because they are not exposed to freezing temperatures, do not need special protection from the elements, and do not require priming. Surface pumps, located at or near the water surface, are used primarily for moving water through a pipeline. Some surface pumps can develop high heads and are suitable for moving water long distances or to high elevations.

- **Material Purchase**

The process of materials purchasing is crucial to collect and obtain all the materials needed. In this process a lot of research on the places and suppliers that the materials are going to be purchased 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. 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 chosen 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 two methods that could be carried out:

1) Injection Moulding

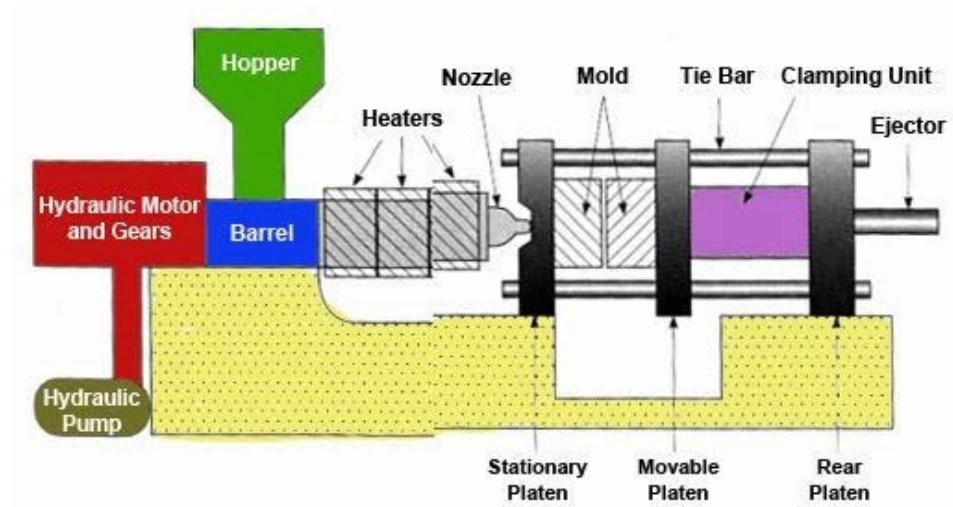


Figure 3.3.5 – Injection Moulding

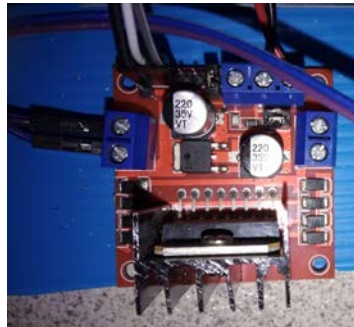
The use of plastic injection moulding for electrical cover parts. It has become more commonplace, as the durable and light qualities of plastic make it one of the best materials to use, along with being cost-efficient and easy to manufacture. This makes injection moulding companies even more important in the prosthetic industry, as their capabilities allow them to quickly manufacture and distribute more efficiently compared to using other materials. Prosthetic is an important part of the medical industry, and injection moulding will only help push its development forward.

2) Process Completing The Project



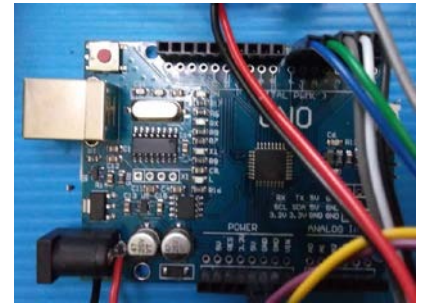
Moisture Sensor

+



Motor Driver

+



Arduino

+



Wires

+



Relay Board

+



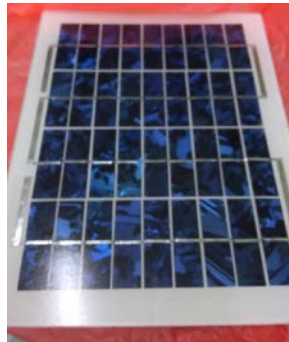
LCD

+



Water Pump

+

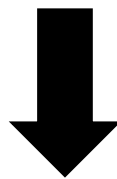


Solar Panel 60W

+



Sprinkler



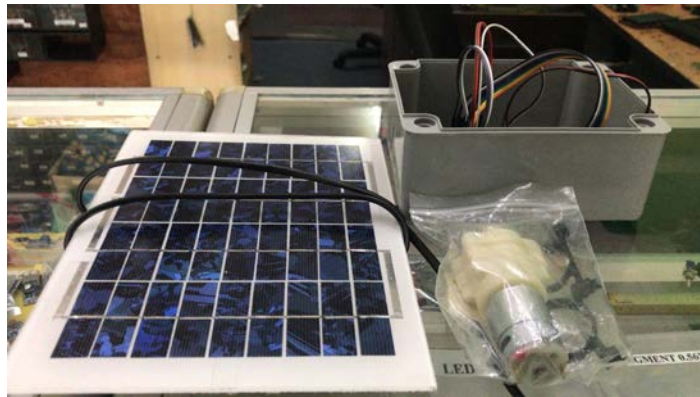
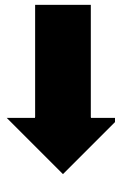
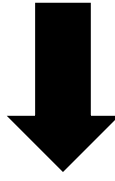


Figure 3.3.6: Process Completing The Project

- **Test Run**

Test run is carried out to determine the strength and end result of the product . In this test run , Kenaf plate is tested to determine the strength and stiffness .First , bricks were stacked up on top of the kenaf plate to determine its stiffness, after 7 bricks , the kenaf start to bend but did not break at all. Then , another test run is carry out where , we tried to smash the kenaf plate with hammer and turned out the brick below broke but the kenaf is still going strong.

```
#include<SoftwareSerial.h>
SoftwareSerial Serial1(2,3);

#include<LiquidCrystal.h>
LiquidCrystal lcd(14,15,16,17,18,19);
int led=13;
int flag=0;
String str="";

#define motor 11
#define sensor 7
```

```
void loop()
{
  lcd.setCursor(0,0);
  lcd.print("Automatic Mode  ");
  if(digitalRead(sensor)==1 && flag==0)
  {
    delay(1000);
    if(digitalRead(sensor)==1)
    {
      digitalWrite(led, HIGH);
      sendSMS("Low Soil Moisture detected. Motor turned ON");
      lcd.begin(16,2);
      lcd.setCursor(0,1);
      ....
      ....
    }
  }
}
```

Figure 3.3.7 – Test Run

- **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 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 DATA ANALYSIS FROM GOOGLE FORM

We ask them 13 question about our SOLAR WATER PUMPER using google form. So this is the chart based on every question that we ask and on;y 27 response to this survey.

Question 1

What is your gender ?

27 responses

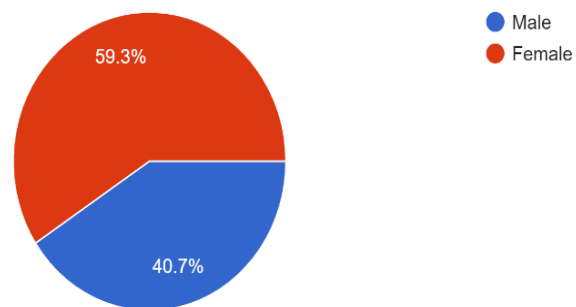


Figure 3.4.1: Question 1

Question 2

What is your age ?

27 responses

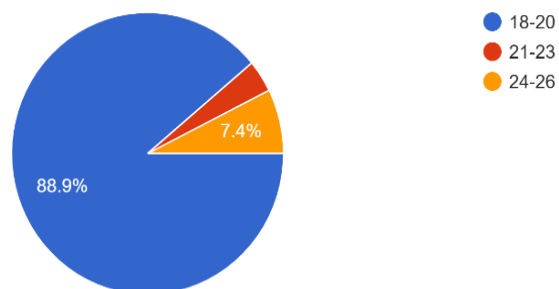


Figure 3.4.2: Question 2

Question 3

What type of area are you at ?

27 responses

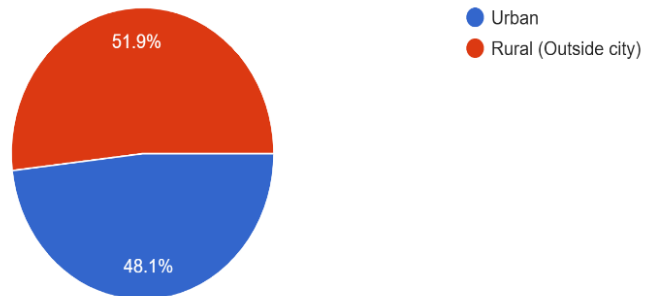


Figure 3.4.3: Question 3

Question 4

Do you like mass plantings or farming ?

27 responses

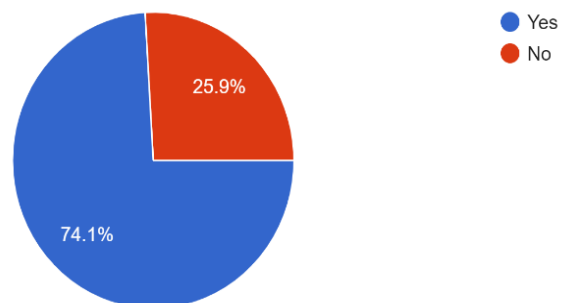


Figure 3.4.4: Question 4

Question 5

Will you use sprays or any kind of pumps to water/pesticide the plant?
27 responses

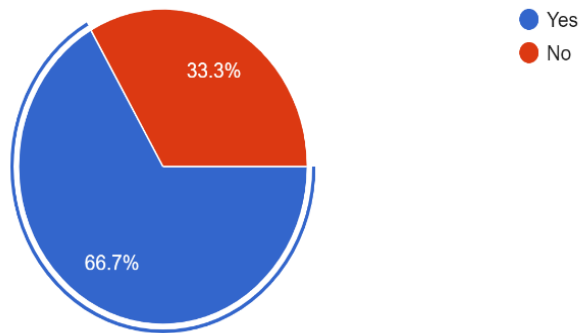


Figure 3.4.5: Question 5

Question 6

When it comes to farmers spraying pesticide or watering their plant, which would prefer them to use ? The manually controlled pump or automatic system?
27 responses

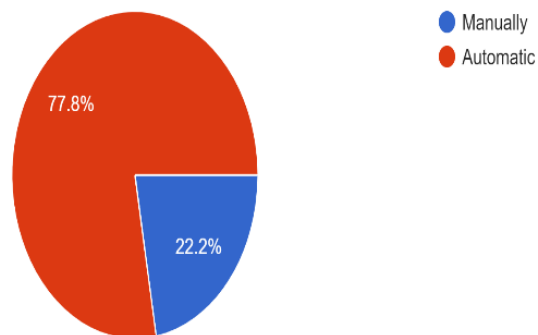


Figure 3.4.6: Question 6

Question 7

Would you encourage/support people to use more renewable energy sources ?
27 responses

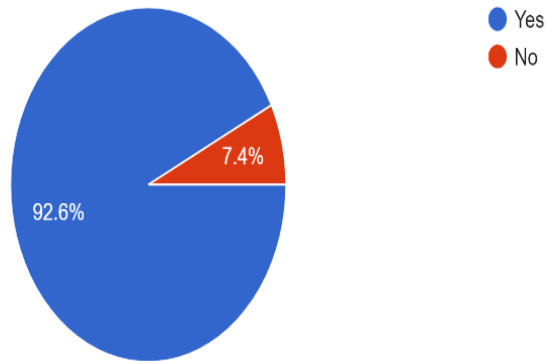


Figure 3.4.7: Question 7

Question 8

The use of solar powered spray pump is less effective in watering/pesticide the plants.
27 responses

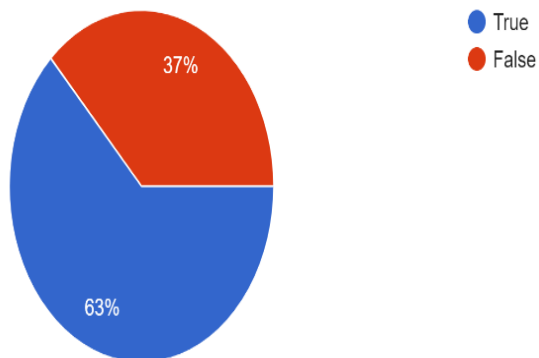


Figure 3.4.8: Question 8

Question 9

Would you buy or recommend this Solar Water Pump if you were a farmer ?
27 responses

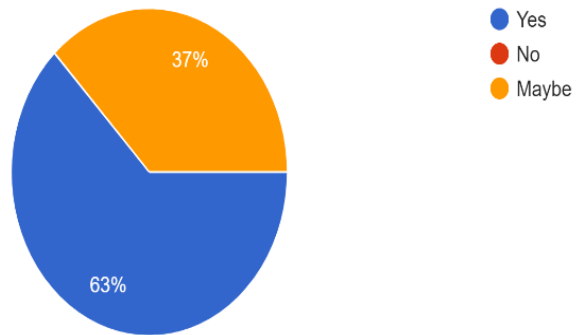


Figure 3.4.9: Question 9

Question 10

What you the value the most while buying a spray pump ?
27 responses

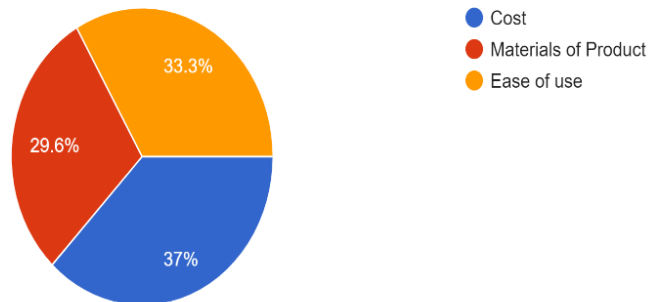


Figure 3.4.10: Question 10

Question 11

Do you find any trouble in handling or setting up a spray pump ?
27 responses

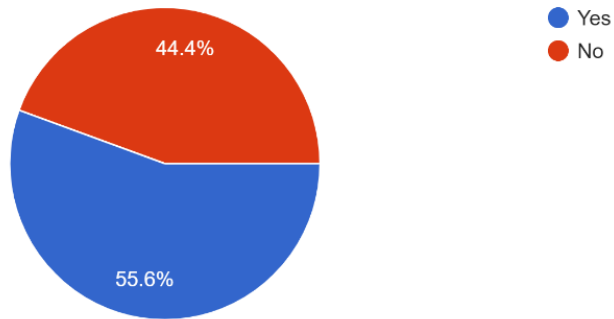


Figure 3.4.11: Question 11

Question 12

Is it effective to use this Solar Water Pump in farmer's / our daily life in watering or pesticide plants ?
27 responses

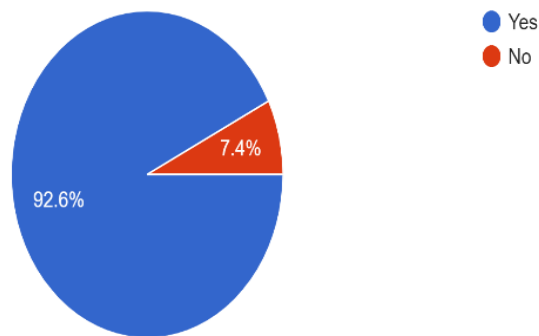


Figure 3.4.12: Question 12

Question 13

What are your thought on this Solar Water Pump?

- One of the respons is:
- Good Innovation
- An environmental friendly
- Efficient project
- Suitable for farmers

Lastly, at the end of the survey we have lots of positive comments and responses through the survey. They hope that our project would be success to all the people who needed this product. However, we also hope for the best for our product to become popular to the plantation industry section.

3.5 PRODUCT DESIGN

Prepared by Nurul Syamimi

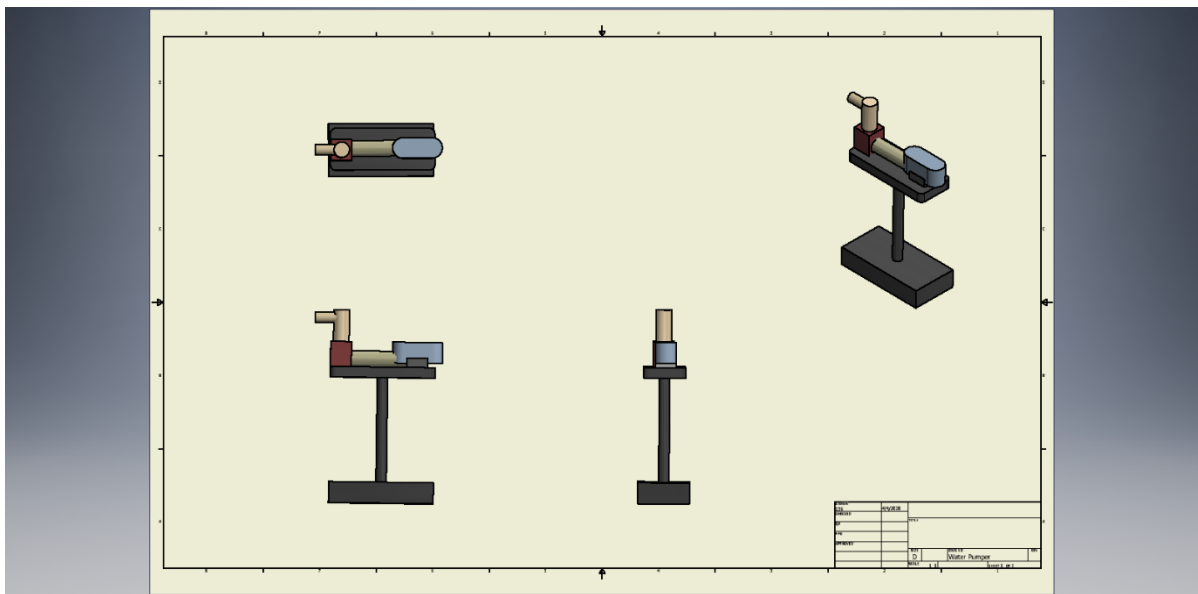


Figure 3.5.1 – Prototype Design

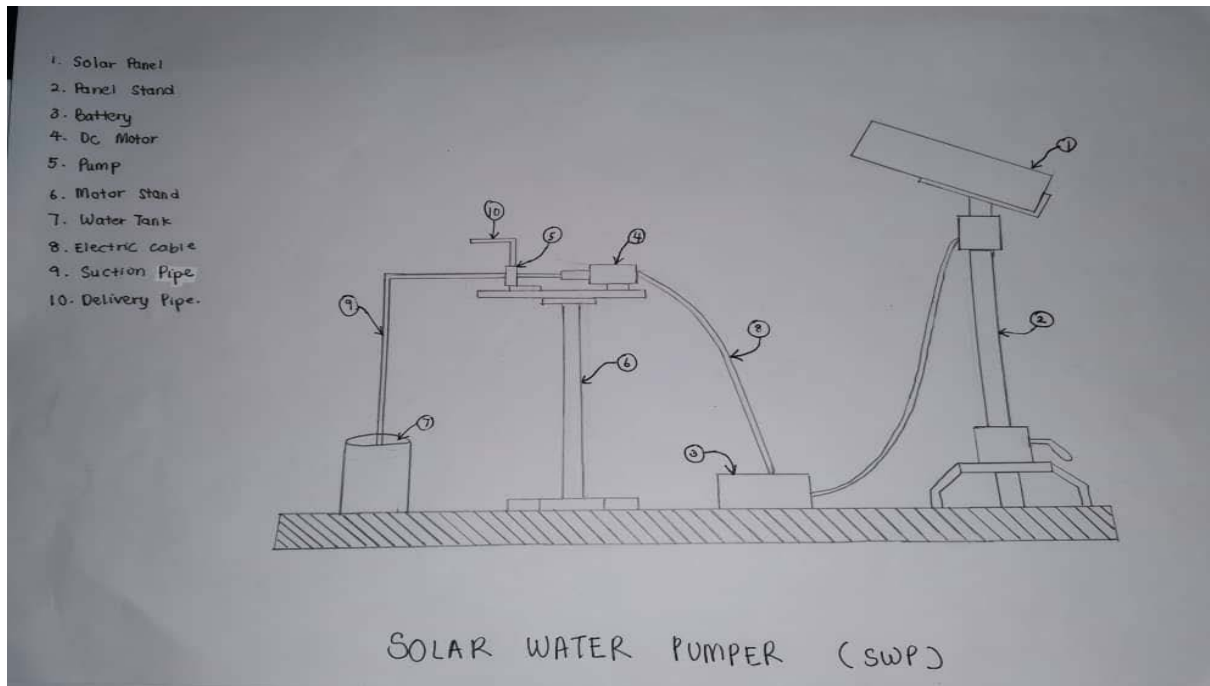


Figure 3.5.2 – Sketches

3.6 OPERATIONAL METHODOLOGY

Prepared by Datshan A/L Kalidass

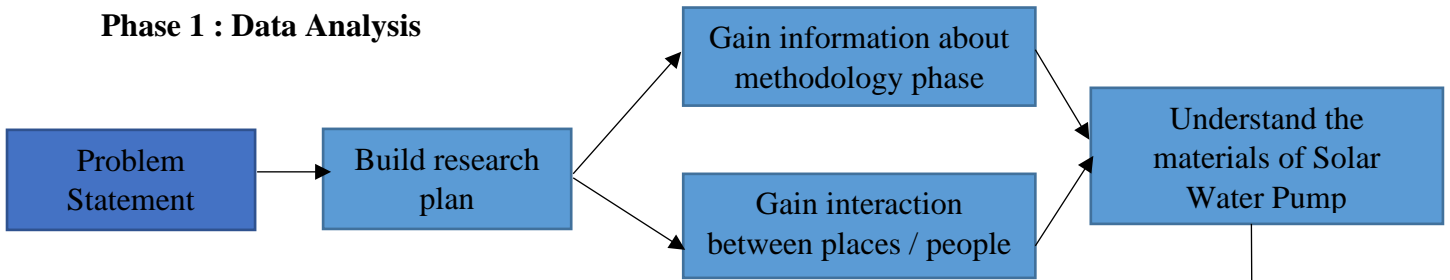
The panel is kept under the sun for radiation. The photon energy from the sun lights that incident on the top metallic grid causes the electrons in the P-layer and holes in the N-layer to diffuse towards the junction. In this process the electrons collected on the Nside and holes collected on the P-side charge these two sides oppositely. This develops an open circuit voltage across the two terminals.

The energy conversion process continues as long as light is incident on the active top surface of the cell. The power developed by these cells are collected and stored in a battery. The power from the battery is sent to the DC motor. It runs the pump coupled to it. The suction head is connected to the well and discharge head is directed towards the field. The water from the well is pumped out and it is used for the domestic or agricultural purpose. Initially we have designed the circuit diagram for installing the solar pump, the circuit diagram is as follows, as we are aware that solar panels never gives us a constant voltage i.e, output at 100 % instead it gives an a variable voltage, to overcome this problem we are planning for an "Charge controller".

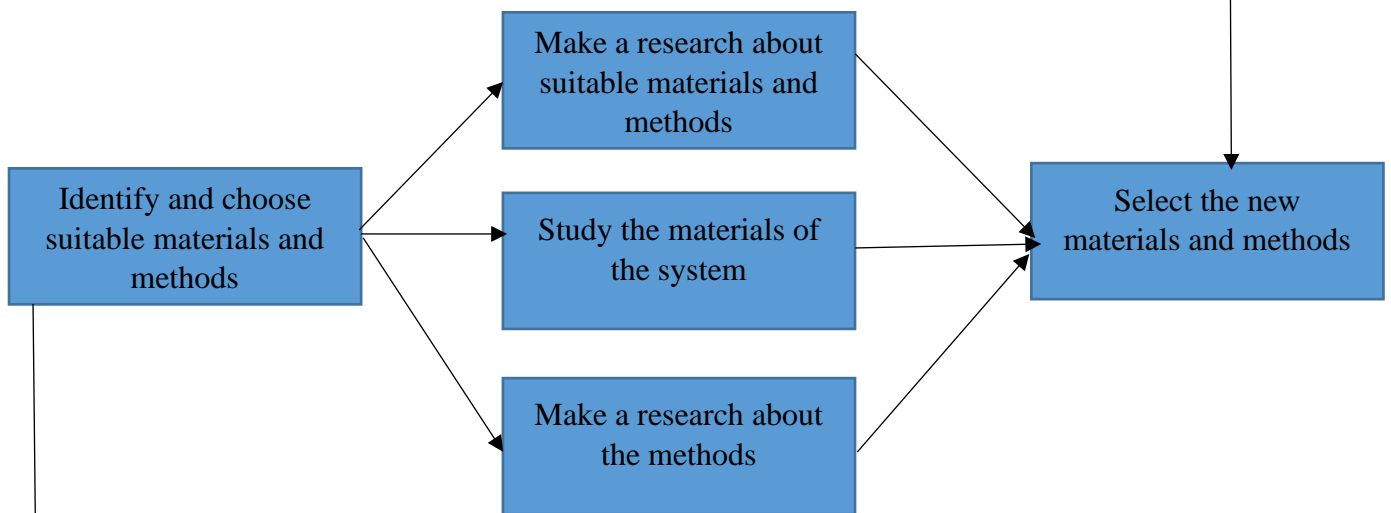
The pump controller protects the pump from high- or low-voltage conditions and maximizes the amount of water pumped in less than ideal light conditions. An AC pump requires an inverter, an electronic component that converts DC electricity from the solar panels into AC electricity to operate the pump.

3.7 METHODOLOGY PHASE

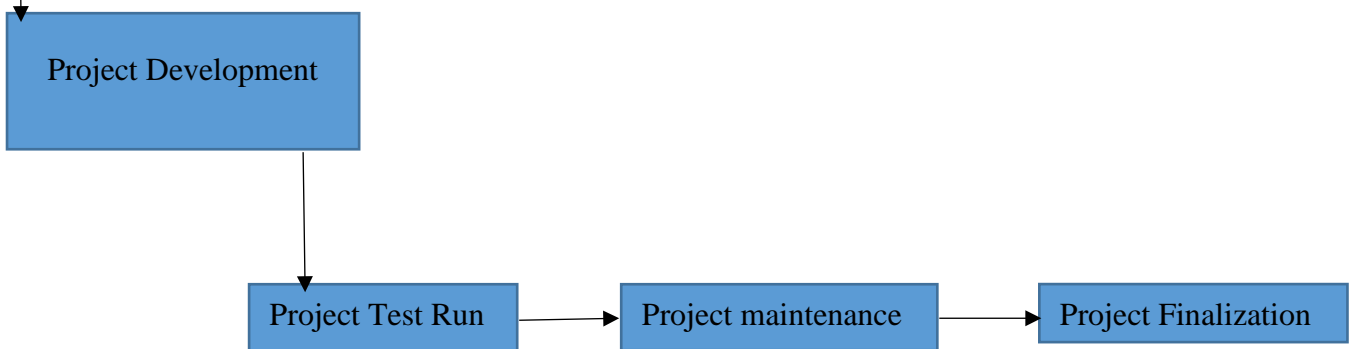
Phase 1 : Data Analysis



Phase 2 : Method and Material



Phase 3 : Preliminary Study



3.8 BUDGET CALCULATION

Prepared By Datshan A/L Kalidass

No.	Materials / Equipment	Amount	Price
1.	Solar Panel	1	RM60
2.	Battery	1	RM50
3.	Moisture Sensor	1	RM12
4.	Water Tank	1	RM20
5.	Pipes	4+	RM15
6.	Water Pump	1	RM80
7.	System and Assembling		RM200
TOTAL			RM437

Table 3.8.1

3.9 PROJECT ACTIVITY

project Activity	weeks													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing and Project Planning	Green													
	Red													
Project Design		Green												
		Red												
Material Selection			Green											
			Red											
Materials Purchase				Green										
				Red										
Method Selection					Green									
					Red									
Fabrication						Green	Green	Green						
						Red	Red	Red						
Test Run									Green					
									Red					
Analysis Data										Green				
										Red				

3.10 SUMMARY

As a conclusion, the methods implemented in this project are very crucial and important to complete the project. Thus, as stated above, this project is agreed and accepted by Mdm Nurus. The materials used in the project will create an effective and very useful water pump yet cheap and saves electricity , hence this project is very convenient to the users who are mostly farmers and also benefits the environment because of renewable energy sources. However, this method will affect the result totally if one of the methods is changed. Initially we have designed the circuit diagram for installing the solar pump, the circuit diagram is as follows, as we are aware that solar panels never gives us a constant voltage i.e, output at 100 % instead it gives an a variable voltage, to overcome this problem we are planning for an "Charge controller".

The pump controller protects the pump from high- or low-voltage conditions and maximizes the amount of water pumped in less than ideal light conditions. An AC pump requires an inverter, an electronic component that converts DC electricity from the solar panels into AC electricity to operate the pump.

CHAPTER 4

FINDINGS AND ANALYSIS

4.1 INTRODUCTION

Prepared By Datshan A/L Kalidass

This chapter combines data and analysis of the Solar Water Pump and its materials calculations. This data and analysis are very important for this project to achieve the objectives and scope of the project. This data indicates the successful results of the materials testing. After getting all of this data, we analyze every single possible to make it perfect.

4.2 TEST RESULTS

After finishing assembling and setting up the project, few tests were carried out to view the function and full capability of it. The tests were about time taken for full charging of battery and run time of full charged system. After carrying out the test, we found out that this project takes around 2 hours of full charge in one continuous turn. The run time was about 40 minutes as it is. The run time was really impressive noting that it was powered by renewable energy and quite good compared to other ordinary water pumps.

Furthermore, the energy used so called 'manpower' for handling this project is at a very minimum level. This is due to automatic charging if the battery is low and also automatic watering with the help of a moist sensor. Energy is only used when inspecting the project or changing the fixed place. The user will only need to switch on the button for the system to function.

There is zero risk of having injuries of incase of mishandling of the project. The system is very easy to understand and to handle as it is not complicated from viewing from out.

Types of test	Time taken
Full charging from solar energy	≅ 1 hours
Run time till full usage of charge	≅ 40 minutes

Table 4.2.1 Test outcomes

4.3 PROJECT ANALYSIS

Every project has its own pros and cons, the pros will help the people and also the environment. However, the cons or the disadvantages must be improved or changed for the future so that we could enhance the good and very efficient product that hardly finds a disadvantage in the project.

Solar powered energy consumption has a lot of advantages to help users and also the environment. Besides the advantages, this project also disadvantages that we must overcome it in the future for the better good.

4.4 CHAPTER'S SUMMARY

As a conclusion for this chapter , the analysis and findings have been made. This Solar Water Pump has a lot of advantages however there are every cons to pros. Hence, the challenges are taken as a room for improvements and more developments for future generations and well as to enhance their knowledge on the project we carried out. Test run is carried out to determine the fullest potential and functionality of the system and it is proven that the solar charging and moist sensor are both very effective and energy saving. The relationship is really well shown in the graphs.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 INTRODUCTION

Prepared by Yogendren A/L Subramani & Datshan A/L Kalidass

Based on the results obtained from chapter 4, a discussion of the finding is presented in this chapter. The findings from the study are used to discuss whether the proposed objectives are supported. All the tests that are carried out will be discussed and finally the achievement of research objectives are determined.

5.2 DISCUSSION OF RESULTS

We had made a total 5 run tests. From three tests, we had known that our final design of the solar water pump meets with objectives of our project. In the first runtest, our project had problems with the arduino. It fails to read inputs from the moist sensor. So we encounter the issue and get ready for the second runtest.

In the second runtest, we misplace the moist sensor. Therefore the moist sensor fails to detect the dryness of the soil. We discussed and found a suitable way to solve this problem. After the issue has been fixed, we get ready for the third runtest.

The third runtest worked successfully but the component misplacement, especially the driver of moist sensor was quite far from the soil which made the system and wirings clumsy and not systematic. So we decided to rearrange the components in the correct places and continued our 4th run test.

In the runtest four, there is no issue found in the solar water pump. Everything runs perfectly as we planned and our objective is achieved. To make double confirmation, we conducted a fifth runtest and it was also a success.

5.3 IMPLICATIONS AND RECOMMENDATIONS

From the results of this study, it is clear that in order to gain consumers' intention to purchase a solar water pump and use it in daily life, manufacturers should focus on a number of factors pertaining to intention to purchase. The factor that manufacturers should pay attention to is the users' need to encounter an old classic watering system. The manufacturers should really educate and update themselves with the modern world. They should sync them up with the busy lifestyle of farmers. It is so simple that one cannot build a better invention than others if we are still attached to the same old problem.

Since the world has upgraded itself and many new world problems have presented themselves, a new solution will be welcomed very well. In their busy schedule, farmers will not be able to water all their plantation areas by themselves. If so by having a solar water pump, farmers don't have to go to the plantation area and water their plants. Perhaps new ideas can inspire the youth to continue to think creatively and give this innovation to be greater and can be widely used not only in small area plantations but also in larger areas

5.4 CONCLUSION

In conclusion, this project is well received by employers such as farmers and garden owners. Although at the beginning of the project there were some problems such as difficult use and lack of safety features, the project was eventually able to be improved and generally accepted. Such a project does take a long time to meet the set criteria. With the cooperation provided by each team member guided by the project supervisor, this project could not be completed successfully.

Solar water pumps provide many advantages for users to ease farmers ease and cope up with the modern world. It lightens the burden of the farmers or anyone who has a planting area to water. Our research goal is to save electricity by the concept of greenhouse and reduce the use of wires from the power sources. We also encourage many others to do plantations with our project, solar water pumps where they can utilize it at an affordable price. Towards this goal, this project has taken the initiative to invent a solar water pump that is smart and exceptional from others.

After various studies and tests that have been done on this project, it was found that the use of Solar Water Pump successfully helps users and gives a positive impact to farmers.

Overall, this project has helped the criteria or objectives of the project because it can facilitate and can help water the plants easily in a short time. The system used is well received because it is easy to operate and maintain this project. Comparison with other methods further strengthens the usefulness of this project.

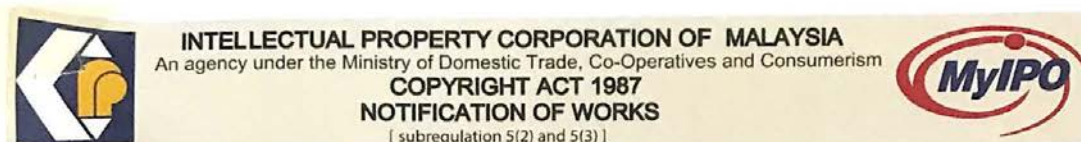
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APPENDIX

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APPENDIX 1 – CERTIFICATE OF AUTHORITY AND OWNERSHIP



CR - 1

Application No :

LY2020 005762

Applicant :

Owner Author Licensee

Title of work (Original language) : SOLAR WATER PUMPER

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 / 9 / 2020 (Date of first publication) MALAYSIA (Country)

Section C : Author (If author is "same as owner" go to Part D - if more than one author, please attach a list of names and addresses of all the author)

Name : REFER ATTACHMENT

National Identification No. / Passport No. : _____

Address 1 : _____

Address 2 : _____

Address 3 : _____

Postcode : _____ City : _____ Nationality : _____

State : _____ Country : _____

Telephone No. : _____ E-mail : _____ *Date of Death : ____/____/____

Fax No. : _____



APPENDIX 2- PITEX POSTER





SOLAR WATER PUMPER

Nama ketua kumpulan:DATSHAN A/L KALIDASS
Institusi:POLITEKNIK SHAH ALAM
Nama ahli kumpulan 1:NURUL SYAMIMI BINTI MOHD NUR
Institusi:POLITEKNIK SHAH ALAM
Nama ahli kumpulan 2:YOGENDREN A/L SUBRAMANI
Institusi:POLITEKNIK SHAH ALAM


DESCRIPTION OF INNOVATION

Our final year project is a system that facilitates and helps farmers water their plants. This study is suitable for farmers who make extensive agriculture and small crops such as vegetable farms, strawberries and other crops that fits the system. This project will serve as compact automatic watering system that uses solar energy and farmers do not have to use non-renewable energy.

The scope of use is not only for farmers, but it can also be used by people who have an interest in planting in their backyard. The problem often faced by farmers and gardeners is that they feel tired when they have to go back and forth to fetch water from their water source or reservoir. If they are old, they might experience joint and body pain while for the young ones, they do not have time to water their plants. The objective of our study was to ease the burden on farmers and gardeners. In addition, it can save electricity because it uses solar energy. Futhermore, it can also attract people to garden with a simple watering method and farmers also use this system at a low cost. Our research methodology is based on the mobile system of IoT (Internet of Things) on the system. Thus the watering of the crop will occur automatically. The results of data collection from survey studies using 'google forms' we also get from the results of the respondents as well. Referring to the results from the respondents, we found some improvements namely adding more soil moisture detector sensors. Therefore, it can water the plants when there is less moisture in the soil.

IMPACT OF INNOVATION

- 1.Reduced bills for mains electricity and diesel
- 2.Reduced connection and infrastructure costs when new power lines and poles can be avoided if fully replacing mains electricity
- 3.No noise, fumes or fuelling runs if replacing diesel
- 4.Scalable – additional panels can be added to increase output
- 5.-Flexible – solar power can be integrated with mains electricity supply if desired
- 6.Low maintenance. Aside from tracking systems, traditional solar generators have no moving parts and are generally very reliable.
- 7.Protection from rising energy costs. Sunshine is free so generating energy on farm reduces exposure to rising electricity and diesel prices.

OBJECTIVE

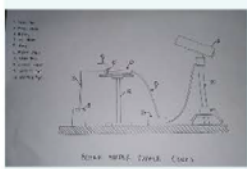
Main objective= To design a solar water pump

- 1.Lighten the burden of the farmers or anyone who have planting areas to water.
- 2.Save electricity by concept of green house and reduce the use of wires from the power sources.
- 3.Encourage to do plantation.
- 4.Farmers can utilize it at affordable cost.

DIAGRAM BLOCK/OPERATING FLOW CHART

```

graph TD
    Start([START]) --> Switch{SWITCH ON SOLAR POWER}
    Switch -- NO --> End([END])
    Switch -- YES --> Sensor[SENSOR DETECT]
    Sensor --> Water{WATER IS PUMP-OUT}
    Water -- NO --> End
    Water -- YES --> Plant[PLANT IS WATERED]
    Plant --> End
    Cloud[NOT ENOUGH SUNLIGHT (CLOUDY DAY)] --> End
                    
```

APPENDIX 3 – PURCHASING THE MATERIALS



APPENDIX 4- GANTT CHART 1

	PROJECT ACTIVITI	WEEK														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Design Analysis	Product Title Selection	Yellow	Yellow													
			Red	Red												
	Study the problem of the Project			Yellow	Yellow											
					Red	Red										
	Implementation Study						Yellow									
							Red	Red								
	Conducted a Survey								Yellow							
									Red	Red						
	Design Sketch									Yellow						
										Red	Red					
	Material Survey										Yellow					
											Red	Red				
	Prototype Sketch											Yellow				
													Red	Red		
	Division of Duties	Yellow	Yellow	Yellow	Yellow	Yellow										

