POLITEKNIK
Seberang Perai
Jabatan Pengajian Politeknik

PSP

POLITEKNIK SEBERANG PRAI PULAU PINANG

OFF GRID DOMESTIC SOLAR SYSTEM

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JABATAN KEJURUTERAAN ELEKTRIK

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Finally, we hope that our final semester project this can have a big impact to the community to use our project and can save electricity generation in Malaysia but not only Malaysia but through out the world

ABSTRACT

Solar panel has been used increasingly in the recent years in converting the solar energy into electrical energy. The solar panel can be used either as a stand-alone system or as a large solar system that is connected to the electricity grids. Nowadays, humans are trying to consume more energy from the sun using solar panel. In order to maximize the conversion from solar to electrical energy, the solar panel has to be positioned perpendicular to the sun. Thus, the tracking of the sun's location and positioning of the solar panel is important. The goal of this project is to design off-grid domestic solar system, which can supply another energy. This system produce more output energy. This system is the new technology introduced which is able to give a good impact to every consumer who is concerned about the performance of the solar panel.

CHAPTER 1: INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Overview

Energy is the primary and most universal measure of all kinds of works by human beings and nature. Everything what happens in the world is the expression of flow of energy in one of its forms. Most people use the word energy for input to their bodies or to the machines and thus think about crude fuels and electric power. Energy in the form of electricity plays a very important role in the life of a normal man. Electricity is one of the greatest wonders of science. Next to man, it is the most important and revolutionary creation in this world of ours .It has practically revolutionized the world .The gradual but excessive use of electricity has come to bring about a stupendous changes in industry. Our modern gigantic tools are worked. Computers as also calculators sum up totals and make other calculations with the utmost accuracy. Newspapers and books are printed in millions overnight. There is not a single phase of human life that is not indebted to electricity for its progress .The modern age has, therefore, been truly called the "age of electricity." We do many things with electricity nowadays. We warm our homes, we drive the machines in factories, we run our trains and buses. Electricity has completely revolutionized the methods of travel and transport .It has enabled us to travel in aeroplanes and fly into cold atmosphere of the sky. We also have electric trains in our country. So today our whole life style is dependent on electricity with the increasing population the use of electric power is also increasing. But know that the resources to generate electricity are limited, and this has lead to the energy crisis. During this scenario we need to generate electricity from things used in day-to-day life. As we know, sun is a one of the most important component in this world. Without sun, it is impossible for a human or living creature to live in this world.

Humans nowadays feel uncomforted about the global warming situation. Even this kind of situation bring a lot of negative perception, they should have to think it through the positive way. One of the way to reduce the global warming is to reduce the utilizing of electrical voltage and change to a natural voltage source like wind, rain, tides, sunlight and geothermal heats. So, the engineers try to create a new device that can convert the natural energy to an electrical energy like solar panel for sunlight energy, wind turbines for wind energy, water turbines. The problem that still exists now is the device that invests by an engineer. For example, the solar panel that many of the users use is only in a one way direction. If the sun located at the direction that is not perpendicular to the solar panel, the

power that can be generate is low compare to the when the sun located exactly perpendicular to the solar panel. The sun is rotate from east to west but the highest power that can be generate by the solar panel is when location of sun is perpendicular to the solar panel. So the power that can be used in the night day is quite short.

1.2 Research Background

Solar energy or photovoltaic energy (PV energy) is a very popular alternative power nowadays due to its renewable and free features. It is also used to generate and supply the electricity for commercial or residential usage. Due to the ever-increasing of the fossil fuel or gas price, other payment charges have also been affected such as the payment charges for electricity. Therefore, a lot of the researches have been conducted in order to develop other sources of energy that can replace the fossil fuel or gas. The photovoltaic energy is a form of solar energy which is considered as one of the alternative to produce energy. Because the solar panel that made up from the solar cells, the solar panels have the ability in converting the sunlight to electrical energy.

The performance of the solar cells in producing the electricity depends on the angle of the prevalence of the sunlight. It can be received well when the sunlight is perpendicular to the solar cells. However, the available solar cells today have its position fixed. It should moves within time to increase the efficiency of the solar cells in producing electricity. Therefore, this project will develop a simple solar tracker system which has been designed as the one way to improve its efficiency. This project consists of software and hardware implementation. It is divided into two parts which are mechanical parts and electrical parts. Both of the parts have been designed by considering the cost, performance, maintainability and capability.

1.3 Problem Statement

As we can see, there are many problems that occur in our daily life in using electricity. Sometimes electricity went breakdown. To overcome this problem we created off-grid domestic solar system that can generate electricity from sun.

1.4 Project Objectives

The objectives of this project are:

- To develop the prototype of off-grid domestic solar system.
- To design a suitable system for off-grid domestic solar system.
- To analyse the performance of the off-grid domestic solar system.

1.5 Project Scopes

The scope of this project is focusing in designing and developing the prototype of the off-grid domestic solar system. This system will able to be an alternative way to produce electricity from sun.

CHAPTER 2 : LITERATURE STUDIES

CHAPTER 2

LITERATURE REVIEW

2.1 Basic principles of solar system

Sunlight is made up of photons, small particles of energy. It passes through and absorbed by the materials of the photovoltaic solar or solar cells panel. Photovoltaic provides electrical current source under the influence of light or similar radiation. The solar cells are pieces of silicon based materials which able to absorb the sunlight. When it absorbs the sunlight, it causes the electron to move. The electrons typically move in a certain direction known as current. The electricity produced from the solar panel is in the form of direct current (DC). The output from a single solar cells is small, therefore it is arranged together in a photovoltaic module whereas the module are grouped together to form an array. The output power is then used to charge inverters and the electrical energy produced can be used by appliances and other household electrical items. The photovoltaic solar are used in several ways which are primarily to power homes or interconnected with grid.

2.2.1 Solar system

Solar systems are one of the processes to convert the sunlight energy to electrical energy. Solar cell is the electrical devices that will produce the electricity. It is also known as the photovoltaic cell or photocell. The process of receiving and collecting the light is by using the solar panel. Most of the solar panel nowadays has the thickness range of 3 to 6 cm and in square shape for easy installation. The figures 2.1 below, shows the process of the system.

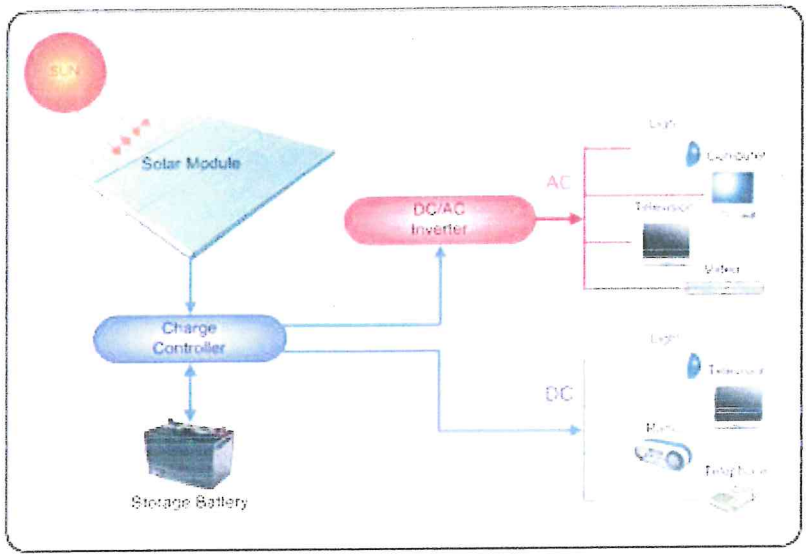
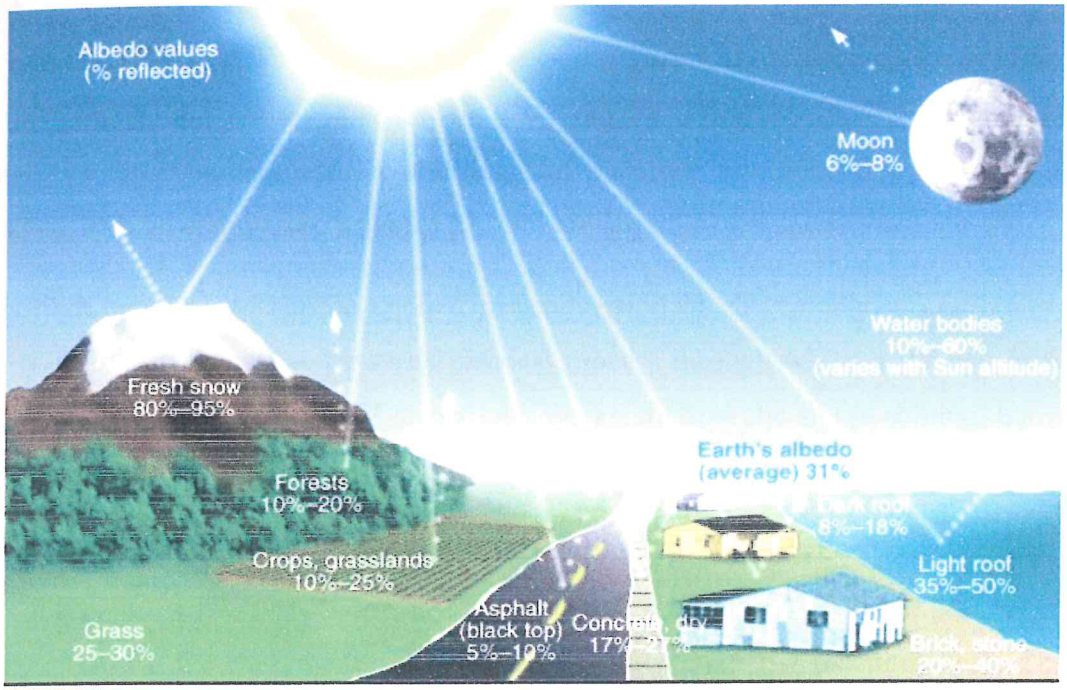


Figure 2.1: The process of solar tracker system

2.1.2 Solar Energy

Solar energy is radiant energy acquired from the sun. Since it provides the world directly or indirectly with almost all of its energy, it is considered as vital for living things. In order to provide the sustainable energy to the world, solar energy is stored in fossil fuels and biomass, and is responsible for powering the water cycle and producing wind. The sun radiates every day, and sends out an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time. Solar comes from within the sun itself.

Solar energy is considered as a renewable energy source. Renewable sources of energy are resources that are continually renewed by nature, and hence it will never runs out. Solar power is considered as renewable due to the nuclear (fusion) reactions that the sun are expected to keep generating sunlight for many billions of years



Figures 2.2: Solar energy reflected on the earth's surfaces

2.1.3 Solar cell

Solar cell that also known as photovoltaic cell or photocell had been discovered by the French physicist, Edmund Becquerel in 1839.The physicist found that, the voltage produced when one of the two identical electrodes in a weak conducting solution was illuminated. The first solar cell that produces electrical currents which can be measured was in 1953, developed by bell laboratories. Solar cell can generate electricity due to its semiconductor devices. When the light falls in the solar cells, the electricity will be produced. Solar cells are divided into a few types which are single-crystal silicon, polycrystalline silicon and amorphous thin film structures. The type of the solar cell that generally used is silicon type. Silicon is an intrinsic semiconductor in its purest form, although the intensity of its semiconductor is highly increased by introducing small quantities of impurities.

2.1.4 Photovoltaic effect

In general, the photovoltaic effect (PV) can be described as a generation of an electromotive force (voltage) within the range of materials non-homogeneity during light illumination with an appropriate wavelength. Only in specially prepared structures, the

effect is high enough and can be applied for conversion of electromagnetic radiation into electricity. It is also known as the basic physical process through which a PV cell converts sunlight directly into electricity. PV technology works anytime the sun is shining, but more electricity is produced when the light is more intense and when it strikes the PV modules directly, which is when the sunrays are perpendicular to the PV modules.

Unlike the solar system for heating water, PV does not produce heat to make electricity. Instead, PV cells generate electricity directly from the electrons freed by the interaction of radiant energy with the semiconductor materials in the PV cells. Sunlight is composed of photons. When it strikes a PV cell, it can be reflected or absorbed, the energy of the photons is transferred to electrons in the atoms of the solar cell, which is a semiconductor. The newfound energy makes the electrons able to escape from its normal positions associated with the atoms to become part of the current in an electrical circuit. By leaving its positions, the electrons cause holes to form in the atomic structure of the cell into enabling other electrons to move. Special electrical properties of the PV cell, a built in electric field, provides the voltage needed to drive the current through a circuit and power up an external load such as a light bulb.

2.1.5 Advantages of solar electricity

The 89 petawatts of sunlight reaching the earth's surface is plentiful - almost 6,000 times more - compared to the 15 terawatts of average power consumed by humans. Additionally, solar electric generation has the highest power density (global mean of 170 W/m²) among renewable energies.

Solar power is pollution free during use. Production end wastes and emissions are manageable using existing pollution controls. End-of-use recycling technologies are under development.

Facilities can operate with little maintenance or intervention after initial setup. Solar electric generation is economically superior where grid connection or fuel transport is difficult, costly or impossible. Examples include satellites, island communities, remote locations and ocean vessels.

When grid-connected, solar electric generation can displace the highest cost electricity during times of peak demand (in most climatic regions), can reduce grid loading, and can eliminate the need for local battery power for use in times of darkness and high local demand; such application is encouraged by net metering. Time-of-use net metering can be highly favourable to small photovoltaic systems.

Grid-connected solar electricity can be used locally thus reducing transmission/distribution losses (transmission losses were approximately 7.2% in 1995). Once the initial capital cost of building a solar power plant has been spent, operating costs are extremely low compared to existing power technologies. Solar electricity is almost always more expensive than electricity generated by other sources.

2.1.6 Disadvantages

Solar electricity is not available at night and is less available in cloudy weather conditions. Therefore, a storage or complementary power system is required. Limited power density: Average daily isolation in the contiguous U.S. is 3-7 kW·h/m² and on average lower in Europe. Solar cells produce DC which must be converted to AC (using a grid tie inverter) when used in currently existing distribution grids. This incurs an energy loss of 4-12%.

2.2 Solar panel performances

The amount of output power is determined the performance of the solar panel. The output power of the solar panel will be compared with the rated output power in order to know the efficiency of the solar panel. Besides, the current and power output is approximately proportional to the sun intensity. At a given intensity, the output current and voltage of the solar panel are determined by the characteristics of the load. Figure 2.6shows the relation of the output current and voltage of the solar panel. There is the simplest solar panel operating

point at a given temperature and light intensity. The increasing of the temperature will increase the output current but significantly decrease.

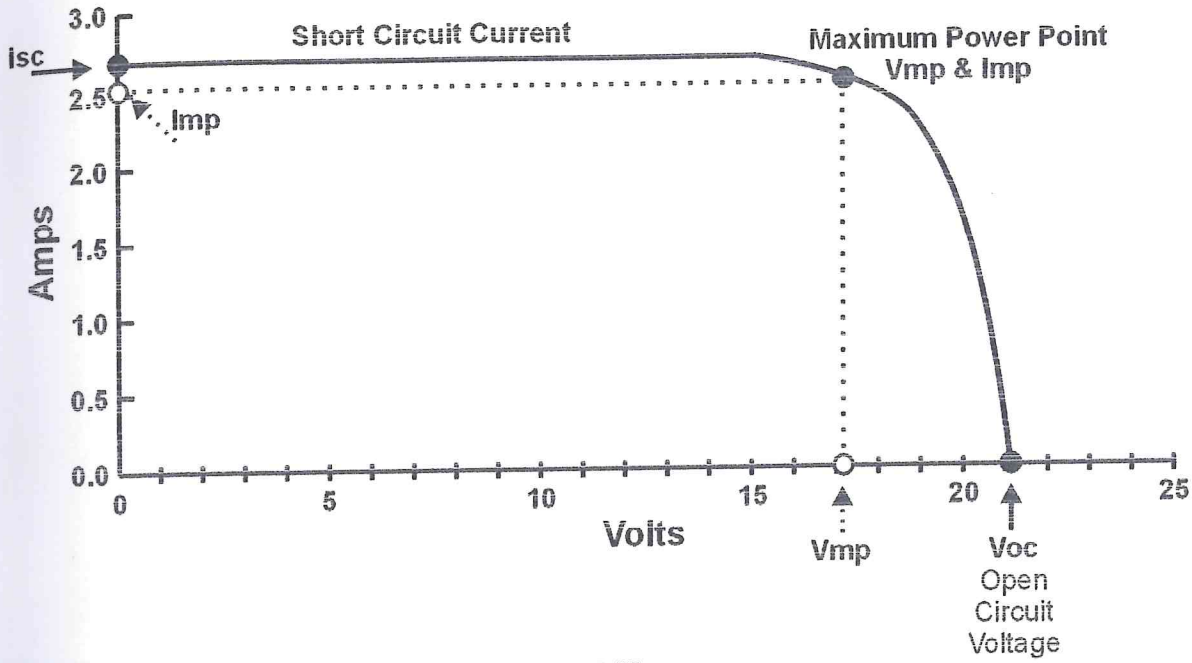


Figure 2.3 : I-V curve

A solar panel, which is rated at 22 volts will produce output less than, its rated power when used in a battery system. It is because the working voltage will be between 18 and 21 volts. Power is the product of volts multiplied by the amps, the module output will be reduced. This is important to remember when sizing a PV system.

2.3 Types Of Battery

There are few types of battery based on their function.

(i) Zinc Battery

Carbon or simple carbon battery. Being used in AA, C and D battery (refer Figure 2.4).

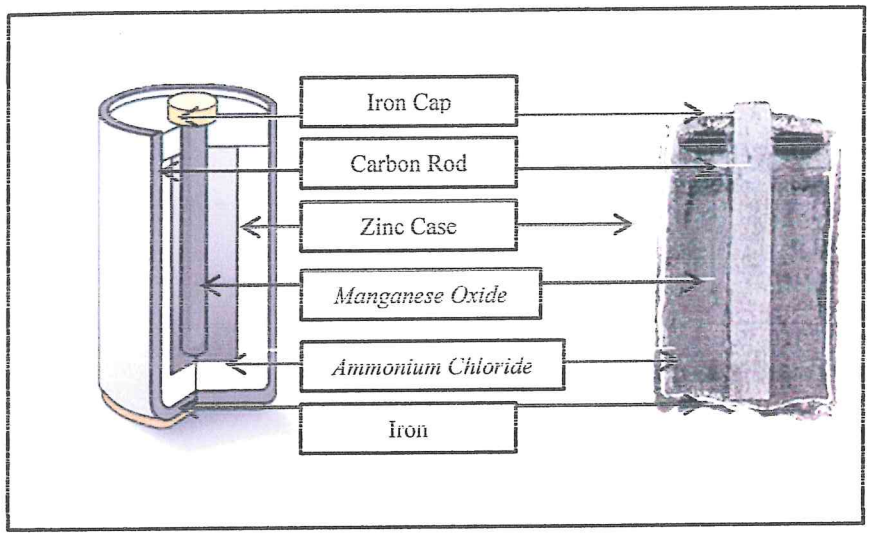


Figure 2.4: Zinc Battery

(ii) Alcaly Battery

Being used in Duracell and Energizer battery (refer figure 2.5).

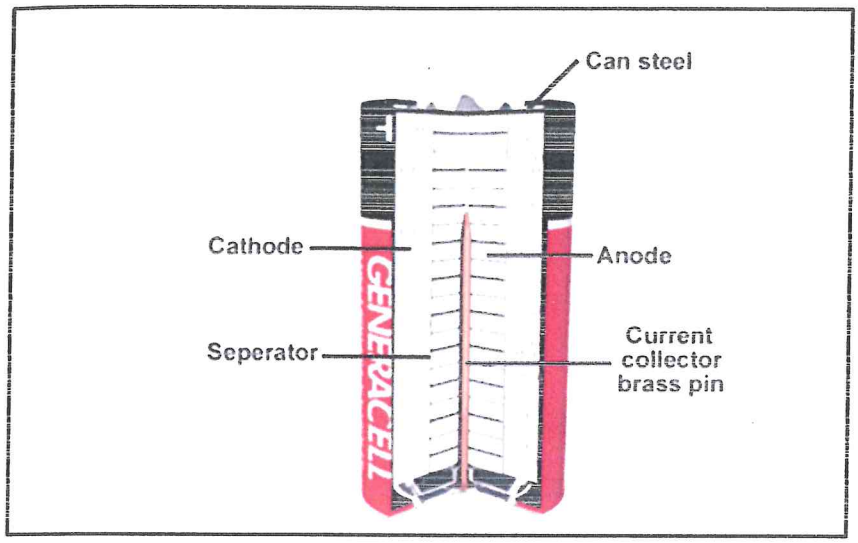


Figure 2.5: Alcaly Battery

(iii) Lithium Battery

Being used for bulb (refer Figure 2.6).

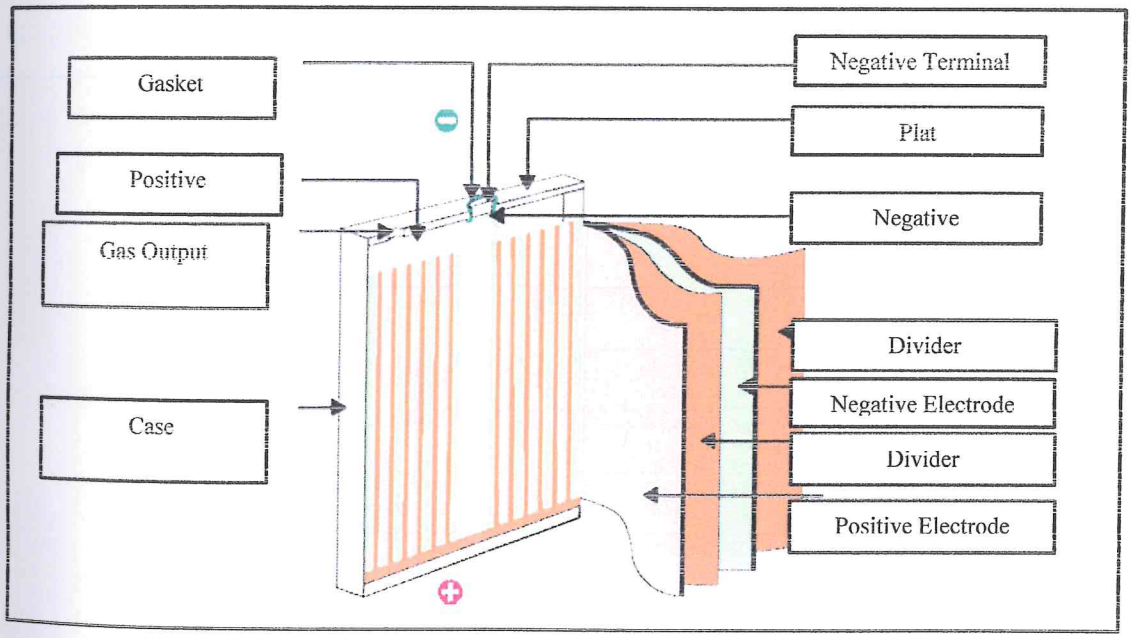


Figure 2.6: Lithium Battery

(iv)Nikel Cad Battery

Can be charged (refer Figure 2.7).

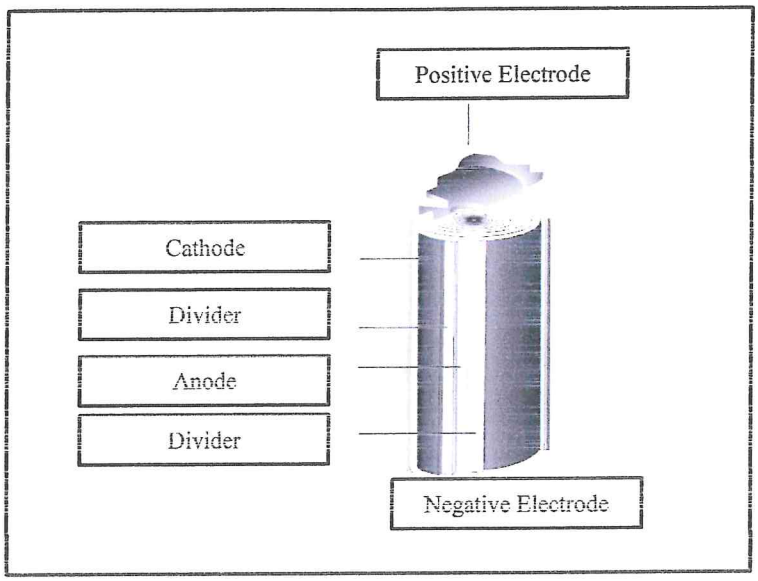


Figure 2.7: Nikel Cad Battery

CHAPTER 3 : RESEARCH METHOLOGY

CHAPTER 3

METHODOLOGY

3.1 Introduction

For the methodology process, we used Quality Function Deployment (QFD) as our method for our research. The QFD process is often depicted as being driven by a sequence of matrices. One popular strategy is pictured in Figure 1. The four phases and their respective matrix constituents are:

1. Product planning, the phase discussed so far in this paper. In this phase, we are concerned with identifying technical requirements that satisfy customer wants.

2. Component deployment. This phase identifies the component characteristics needed to satisfy the technical requirements identified in Phase 1.

3. Process planning. This phase identifies the process characteristics that lead to the component characteristics identified in Phase 2.

4. Production planning. Defines the production requirements to achieve the process characteristics identified in Phase 3.

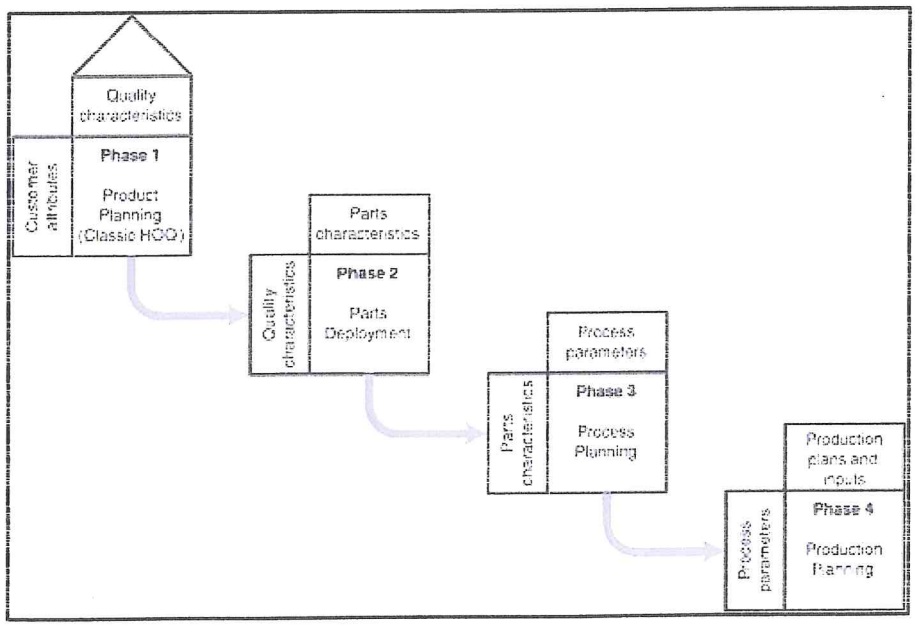


Figure 1 QFD Phases

3.2 Project Methodology

The project is divided into two parts which is Final Year Project 1 and Final Year Project 2. For FYP 1, students need to find the related information to the project. Each of the students needs to start with the literature review part which is required for the students to find any information or any previous works or project that related with the title. All the theories, backgrounds, objectives and scopes of the project have to be clarified in order to plan the expected outcomes of the project. From the journal reading, students will be able to identify the problem statement of the project which will require the solution to overcome the problem. Followed by, a plan for the future works to ensure the works are on schedule thus enabling the student to complete the research on time.

For FYP 2, the students are required to produce the result and apply necessary analysis for the result which will be recorded later on. The result can determine whether the project is successful or not. Based on the results, students are required to come up with the conclusion of the project and recommend improvements to improve the result of the project.

3.3 Design Working Principle

Figure 3.1 show the off-grid domestic solar system working design where it starts from sun as energy supply to solar panel.

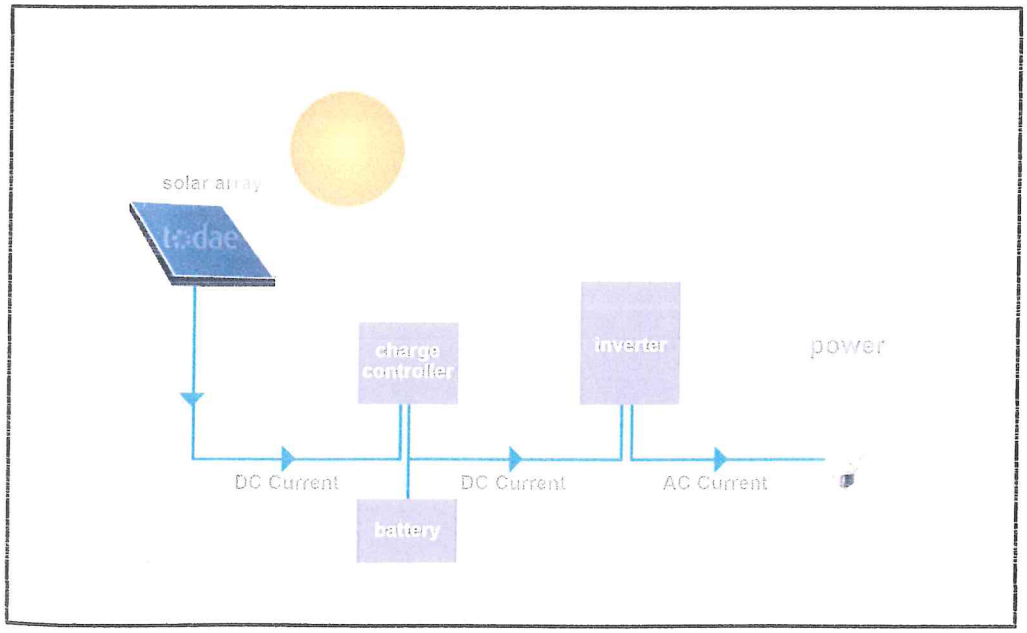


Figure 3.1: Project Block Diagram

3.4 Working of Design

An off-grid system requires a storage system for the electricity that you produce so that it will be available for times when there is no source of electricity. This storage system is one of the main features that distinguish an off-grid system from a grid-tied system. The other is a backup generator for long periods of cloud or calm. Figure 3.1 shows the basic components for an off-grid system. A solar array and an optional wind turbine provide electricity to run the appliances in your home. Whatever you don't need immediately is stored in the battery bank. Since you are completely reliant on your own resources the battery bank must be large enough to see you through at least 3 days without any solar or wind charging. This typically means very large battery cells forming a bank that requires a space that is a minimum of 2′ wide by 4′ long and 3′ high.

Planning your energy use using a load analysis so that the charging system and battery bank is large enough to meet your needs. Heating your home in a cold climate will present some challenges. Some heating systems are difficult or prohibitively expensive to operate with an off-grid system. For example, you cannot run a geothermal system with off-grid power – the power requirements for the pumps are too large. Passive solar design and an in floor heating system are usually the best options for off-grid systems.

3.5 Data Collection

In this research, data collection is very important for accurate output power calculation. For this reason, complete implementation process is divided by several steps depending on the daylight. Sun plays an important role for supplying energy to solar panel.

CHAPTER 4 : FINDINGS

CHAPTER 4

DATA ANALYSIS

4.1 Solar Panel Analysis

Solar panels are fast becoming a very attractive renewable energy option, which could end up being incredibly beneficial to the environment. The process of converting sunlight to electrical energy is one that has improved dramatically over the last few decades, and is now more efficient than ever. The use of solar energy has been around for years in small devices such as calculators, but now many are talking about powering houses and businesses off of these panels. Solar is one of the most promising renewable energy sources currently available, due to the fact that solar power is abundant. The rays that emanate from the sun can produce nearly 1,000 watts of energy for every square meter of the earth's surface. By collecting that energy, we would never have to rely upon damaging fossil fuels again. A solar PV system uses sunlight to generateelectricity which you can use to power your home or office that can reduce your carbon footprint and impact on the environment.

Solar energy is created using the energy which has been generated by the sun. A solar power panel is able to function using the solar energy which is derived from the sun. Every solar power panel contains many different silicon cells or solar cells. They are building blocks of solar panels. The energy from the sun is absorbed by these solar cells. The solar energy derived from the sun is converted into electricity with the help of a solar power panel. For this reason, it is important to understand exactly how solar panels work, and how they can be used to produce electricity for the average home.

An important step in kicking off a successful PV installation is verifying module operation. This includes checking the open-circuit voltage (Voc) (refer Figure 4.1) and short-circuit current (Isc) (refer Figure 4.2) of each module on the ground—before it gets mounted. Exactly how to measure a module's voltage and current depends on the type of meter you are using. You can take measurements with a digital multimeter (DMM), which uses test leads for measuring voltage and current, or a clamp meter, which has a openable jaw that goes around the wire to measure current. (Some clamp meters also have test lead jacks for plugging in leads for measuring voltage, and some DMMs have clamp accessories that plug into jacks.)

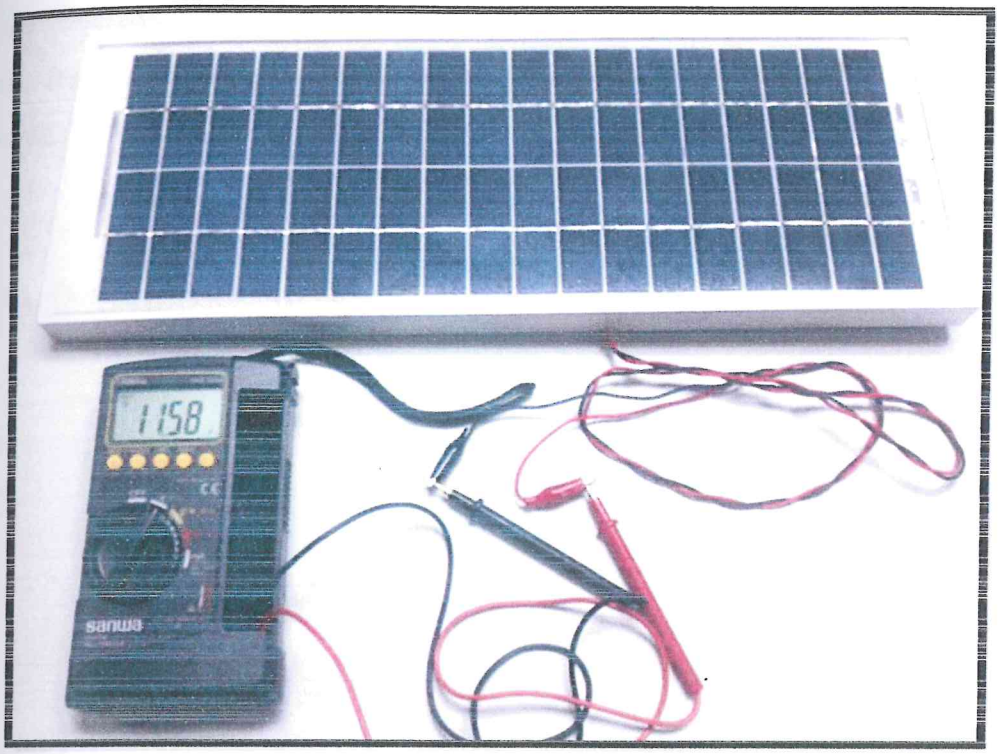


Figure 4.1: Open-Circuit Voltage Test

Figure 4.2 : *Short Circuit Current Test*

This panel solar only being used only on a daylight where its function when get supply from sun. This panel solar cannot supply same voltage all the time because its depends on light from sun. Because of that, researchers have taken 3 different times to get the voltage from the solar panel. Table 4.1 show the output voltage.

Table 4.1: Output Voltage Measurement

Output Voltage Measurement	**Morning**	**Lunch**	**Evening**
Output Solar	18V	32V	30V

4.2 12 V Battery Analysis

There a few types of battery need to be known. In this project, researcher used dry charged battery. Purpose of using this battery is to charge voltage provide from solar panel and also function as backup generator. Table 4.2 show battery specification that being used.

Table 4.2: Battery Specification

Specification	UNIT
Length	15 cm
Height	10 cm
Width	6.5 cm
Weight	8 Kg
Voltage	12 Vdc
Current	2.1 A
Quantity	1

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Discussion

In the coming days, as demand of electricity is increasing every moment, it will prove a great boon to the world, since it will save a lot of electricity of power plants which are wasted in illuminating the street light. Future aim of this research is to develop our country by enriching it in utilizing its sources in more useful manner. Any country can only develop when it uses power supply frequently and not by getting breakdown in middle course of time. Now times comes when these types of innovative ideas should be brought into practice. At least, by this idea we should start to think something about to save electricity.

5.2 Conclusion

This project has demonstrated that power from a renewable energy source such as solar can be fed into a power system that produces power from conventional means such as diesel generators and hydropower. With the appropriate project size and site, the affected recipient community and the host organization (the power utility) could better appreciate the impacts of this type of project. PV grid connected projects are technically capable of reducing fossil fuels that are used for power generation and therefore it could be used as a tool for mitigating climate change. The cost per kg of CO2 mitigated may appear to be high, but for a larger scale project which is supplied and installed on an open and cost competitive basis based on the actual project site and which contract renumeration is tied to the project output costs could be significantly reduced.

APPENDIX

PROJECT COSTING

NO	MATERIAL	QUANTITY	UNIT PRICE (RM)	TOTAL (RM)
1	*Angle Bar 1/8"x 1"x 236"*	1 Piece	15.00	15.00
2	*Paint*	1 tin	7.00	7.00
3	*Rectangular Pipe 1" X 2" X 236"*	3 Piece	14.00	42.00
4	*Solar panel*	1 Piece	1200.00	1200.00
5	*Battery*	1 Piece	47.00	47.00
6	*Wire*	2 meter	3.00	6.00
TOTAL				1317.00

INVERTER CIRCUIT COSTING

NO	MATERIAL	QUANTITY	UNIT PRICE(RM)	TOTAL (RM)
1	*Resistors*	17	0.40	6.80
2	*Cement Resistors*	2	2.50	5.00
3	*Preset Resistors*	1	2.00	2.00
4	*Capacitor*	10	0.40	4.00
5	*Diode*	6	0.50	3.00
6	*IC Comparator*	1	4.00	4.00
7	*IC Switch Regulator*	1	4.50	4.50
8	*IC Socket*	2	2.00	4.00
9	*Terminal Block*	2	2.00	4.00
10	*Heatsink*	2	2.00	4.00
11	*P-Channel Mosfet*	2	2.50	5.00
12	*Transformer*	1	60.00	60.00
13	*Banana Socket*	5	1.00	5.00
14	*Black Cable*	1	1.50	1.50
15	*Plastic Casing Small*	1	14.00	14.00
16	*PCB Board*	1	1.00	4.00
17	*Plastic Casing*	1	15.00	15.00
18	*PCB Stand*	4	1.50	9.00
TOTAL				154.80

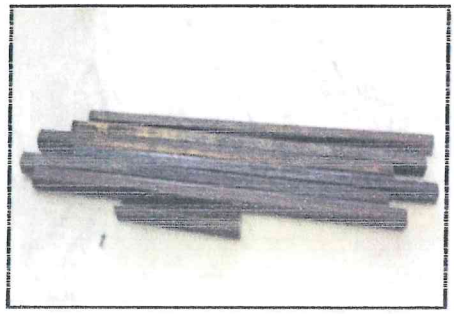
CHARGING CIRCUIT COSTING

NO	MATERIAL	QUANTITY	UNIT PRICE (RM)	TOTAL (RM)
1	Resistors	9	0.10	0.90
2	Capasitors	5	0.50	2.50
3	Ic NE555	1	2.00	2.00
4	Ic L7806CV	1	2.50	2.50
5	Ic Socket spin	1	0.30	0.30
6	Transistor(CS9012)	1	0.70	0.70
7	Transistor(CS9013)	1	0.60	0.60
8	Transistor(MOSFET)	1	0.70	0.70
9	Diode zener	3	0.50	1.50
10	LED	4	0.20	0.80
TOTAL				12.50

ALL PROJECT COSTING

NO	MATERIAL	TOTAL (RM)
1	Basic Material	1317.00
2	Inverter Circuit	154.80
3	Charging Circuit	12.50
TOTAL		680.60

PROJECT MAIN MATERIAL

NO	COMPONENT	SPESIFICATION	MATERIAL
1	Main Frame		Iron

CARTA GANTT PERLAKSANAAN KERJA PROJEK AKHIR DIPLOMA 1

TITLE: OFF GRID DOMESTIC SOLAR SYSTEM

Minggu / Perkara yang dibincangkan	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Pemilihan tajuk dan menghantar tajuk Projek Akhir 1														
Mengemaskini jadual pertemuan dengan penyelia														
Perubahan tajuk Projek Akhir														
Mendapatkan persetujuan tajuk dan hantar pada penyelaras														
Mengumpulkan maklumat yang berkaitan dengan tajuk.														
Mengumpul bahan bagi Bab 1, 2 dan 3														
Membuat perangkaan bagi Bab 1														
Menghantar draf Bab 1 dan mengumpul bahan bagi Bab 2														
Membuat perangkaan bagi Bab 2														
Menghantar draf Bab 2 dan membaiki kesalahan Bab 1														
Membuat perangkaan bagi Bab 3														
Menghantar keseluruhan Bab 1, 2 & 3 untuk disemak														
Menyiapkan keseluruhan Bab 1,2 & 3														
Laporan penuh dan laporan teknikal yang siap dihantar untuk pengesahan penyelia														
Menghantar laporan akhir kepada penilai														
Membuat persediaan seminar 1														
Seminar 1														

CARTA GANTT PERLAKSANAAN KERJA PROJEK AKHIR DIPLOMA 2

TITLE: OFF GRID DOMESTIC SOLAR SYSTEM

Minggu / Perkara yang dibincangkan	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mengemaskini jadual pertemuan dengan penyelia														
Mencari dan mengumpul maklumat sumber maklumat mengenai reka bentuk														
Pertemuan dengan penyelia berbincang mengenai reka bentuk														
Mendapatkan dan membeli barang keperluan														
Menghasilkan reka bentuk kerangka utama														
Meneruskan langkah membangunkan projek														
Membuat penambahan dan pengubahsuaian														
Membuat analisis hasil dapatan dan bacaan														
Menghantar draf bab 4 dan 5														
Pembetulan bab 4 dan 5														
Menghantar draf tesis kepada penyelia														
Memperbaiki kesilapan dalam penulisan														
Menghantar laporan penuh														
Seminar Projek Akhir 2														

Off-Grid Domestic Solar System

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Abstract— **Solar panel has been used increasingly in the recent years in converting the solar energy into electrical energy. The solar panel can be used either as a stand-alone system or as a large solar system that is connected to the electricity grids. Nowadays, humans are trying to consume more energy from the sun using solar panel. In order to maximize the conversion from solar to electrical energy, the solar panel has to be positioned perpendicular to the sun. Thus, the tracking of the sun's location and positioning of the solar panel is important. The goal of this project is to design off-grid domestic solar system, which can supply another energy. This system produce more output energy. This system is the new technology introduced which is able to give a good impact to every consumer who is concerned about the performance of the solar panel.**

Keywords—solar panel, electricity grids, off-grid

I. INTRODUCTION

Solar energy or photovoltaic energy (PV energy) is a very popular alternative power nowadays due to its renewable and free features. It is also used to generate and supply the electricity for commercial or residential usage. Due to the ever-increasing of the fossil fuel or gas price, other payment charges have also been affected such as the payment charges for electricity. Therefore, a lot of the researches have been conducted in order to develop other sources of energy that can replace the fossil fuel or gas. The photovoltaic energy is a form of solar energy which is considered as one of the alternative to produce energy. Because the solar panel that made up from the solar cells, the solar panels have the ability in converting the sunlight to electrical energy. The performance of the solar cells in producing the electricity depends on the angle of the prevalence of the sunlight. It can be received well when the sunlight is perpendicular to the solar cells. However, the available solar cells today have its position fixed. It should moves within time to increase the efficiency of the solar cells in producing electricity. Therefore, this project will develop a simple solar tracker system which has been designed as the one way to improve its efficiency. This project consists of software and hardware implementation. It is divided into two parts which are mechanical parts and electrical parts. Both of the parts have been designed by considering the cost, performance, maintainability and capability.

II. LITERATURE REVIEW

Solar energy is radiant energy acquired from the sun. Since it provides the world directly or indirectly with almost all of its energy, it is considered as vital for living things. In order to provide the sustainable energy to the world, solar energy is stored in fossil fuels and biomass, and is responsible for powering the water cycle and producing wind. The sun radiates every day, and sends out an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time. Solar comes from within the sun itself. Solar energy is considered as a renewable energy source. Renewable sources of energy are resources that are continually renewed by nature, and hence it will never runs out. Solar power is considered as renewable due to the nuclear (fusion) reactions that the sun are expected to keep generating sunlight for many billions of years.

III. METHODOLOGY

QFD model has been adopted to develop the design the generation of electricity using speed breaker.[1] QFD is methods of developing a design aimed at satisfying customers and translate it into design targets that are identified to ensure quality assurance. This is to ensure that the voice of the customer towards the specific needs and requirements of a given customer segment can be heard clearly in line with the development and use of a product or service. QFD is carried out in four phases. Phase I and II enabled the researchers to identify the critical components in the product. Phase III and IV allows researchers to choose the most suitable design.[2]

IV. DATA ANALYSIS

Solar panel only being used on day time where it function when get light from sun. Voltage produced by solar are not stable because its depend on light from sun. For that researcher took the data using 3 different times as shown in table below.

Table 1: Measurement of Solar Output Voltage

Measurement of output voltage	Morning	Noon	Evening
Solar Output	18.5V	21V	20V

CONCLUSION

In the coming days, as demand of electricity is increasing every moment, it will prove a great boon to the world, since it will save a lot of electricity of power plants which are wasted in illuminating the street light. Future aim of this research is to develop our country by enriching it in utilizing its sources in more useful manner. Any country can only develop when it uses power supply frequently and not by getting breakdown in middle course of time. Now times comes when these types of innovative ideas should be brought into practice. At least, by this idea we should start to think something about to save electricity. This project has demonstrated that power from a renewable energy source such as solar can be fed into a power system that produces power from conventional means such as diesel generators and hydropower. With the appropriate project size and site, the affected recipient community and the host organization (the power utility) could better appreciate the impacts of this type of project. PV grid connected projects are technically capable of reducing fossil fuels that are used for power generation and therefore it could be used as a tool for mitigating climate change. The cost per kg of CO2 mitigated may appear to be high, but for a larger scale project which is supplied and installed on an open and cost competitive basis based on the actual project site and which contract renumeration is tied to the project output costs could be significantly reduced

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