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BACHELOR OF ENGINEERING (HONS)
IN MECHANICAL

A STUDY ON THE APPLICATION OF
SOLAR ENERGY USING PHOTOVOLTAIC MODULES

PREPARED BY:
MOHD AMIN BIN ROSTAM
ZULKIFLI BIN NORDIN

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“May ALLAH Bless You”

- Mohd Amin Bin Rostam
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Abstract

Renewable energy has become important today, since the world is shortage oil as the main source of energy. Government and private organizations seriously do many research and development activities towards the new energy sources from solar, biomass, hydro and wind energy. As solar energy is concern, it has many advantages. Some of the advantages are it has high reliability, low operating cost, environmental friendly, modularity and low construction cost. In this project report, a survey of the applications of solar energy systems using photovoltaic modules in various fields has been done. An experiment of the performance of solar panels having different structures of silicon materials was also studied. Three panels having structures of mono-crystalline, poly crystalline and amorphous silicon materials were placed under identical conditions. The power generated by each panel was calculated and the results were compared. In order to obtain better understanding of solar energy principles, a white board mechanized eraser was fabricated. A mechanism that can erase the writing on the white board by using the solar energy from photovoltaic module was fabricated.

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1 The Importance of Renewal Energy

1.1 Introduction

As the world is shortage of oil due to its wide use all over the world, the effort of searching for new energy sources has become popular. Research towards the new energy sources from the solar, biomass, hydro and wind are seriously done in the early 1980's.

Research and development activities are well funded but not utilized aggressively in many sectors. Some individuals and organizations seem to be disillusioned or attracted more by all the money that being given on high tech but non-renewable options. Yet the benefits of renewable energy are very much tangible. The Penang Declaration adopted by the Solar Summit in January.1996 admitted this. But at the end of the day, Malaysian Renewable Energy will keep blowing in the wind unless effective measures are taken to make its applications operable, through ease of use, convenience and affordability. The challenge is how to do this before the stock of fossil fuels is completely exhausted and the earth polluted beyond redemption!

1.1.1 Solar Energy

The sun is a sphere of intensely hot gaseous matter with a diameter of 1.39×10^9 m and is on the average 1.5×10^{11} m away from the earth. As seen from the earth, the sun rotates on its axis about once every four weeks.

The sun has an effective black body temperature of 5762K. The temperature in the central interior regions is variously estimated at 8×10^6 to 40×10^6 K and the density at about 100 times that of water. The sun is, in effect, a continuo fusion reactor with its constituent gases as the "containing vessel" retained by gravitational forces. Several fusion reactions have been suggested to supply to the energy radiated by the sun.

This energy is produced in the interior of solar sphere at temperatures of many millions of degrees. It must be transferred out to the surface and then be radiated into space. A succession of radiate and convective processes must