

STUDY AND DESIGN SOLAR TRACKER SYSTEM

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SUPERVISOR DECLARATION

“I hereby declare that I have read this thesis and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Automotive)”

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This report is presented in partial fulfilment of the requirements for the degree of
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DECLARATION

“I hereby declare that the work in this report is my own except for summaries and quotations which have been duly acknowledged.”

Signature:

Author:

Date:

Especially for beloved mom, dad and family

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ABSTRACT

Solar energy is the primary energy to continue the process of life in the earth system especially for human, animal and plants. As we know, solar energy is clean, environmentally friendly and definitely does not produce any pollution. This energy does not cause damage to natural resources and most importantly solar energy is the one of the most popular sources of energy and fastest growing in the world. To ensure the use of solar energy at the maximum level, a solar tracking system should be developed. This is because in order to maximize the utilization of solar energy, solar panel must be constantly aligned towards the direction of the sun. So, the function of the solar tracking system is to ensure that the solar panel is always parallel to the sun for the maximum energy output. This thesis will discuss the development of the dynamic solar tracker compared to static solar tracker. A solar tracking system is designed, implemented and experimentally tested. The potential and advantages of proposed solar tracker together with analysis and improvement for the future are shown.

ABSTRAK

Tenaga suria merupakan tenaga utama bagi meneruskan proses kehidupan dalam sistem bumi terutamanya kelangsungan hidup manusia, haiwan dan juga tumbuhan. Seperti yang di ketahui, tenaga solar adalah bersih, mesra alam sekitar dan semestinya tidak menghasilkan sebarang pencemaran. Tenaga ini tidak menyebabkan kerosakkan sumber semulajadi dan yang paling penting tenaga ini merupakan salah satu sumber tenaga yang popular dan paling pesat berkembang di dunia. Bagi memastikan penggunaan tenaga solar ini pada tahap maksimum, satu sistem penjejak solar perlu dibangunkan. Ini kerana untuk memaksimumkan penggunaan tenaga solar, panel solar mestilah berada pada kedudukan selari dengan matahari. Jadi fungsi sistem penjejak solar ini adalah untuk memastikan panel solar sentiasa selari dengan matahari bagi mendapatkan tenaga keluaran yang maksimum. Tesis ini akan membincangkan tentang pembangunan penjejak solar dinamik berbanding dengan penjejak solar statik. Penjejak solar ini direka, dilaksanakan dan diuji. Potensi dan kelebihan penjejak solar ini bersama analisis serta penambahbaikan untuk masa hadapan juga di tunjukkan.

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LIST OF SYMBOL

A_s	=	Austenite start temperature
A_f	=	Austenite finish temperature
Au-Cd	=	Gold cadmium Alloy
D	=	Diameter
d	=	Depth
E_c	=	Conduction band
E_g	=	Band gap
E_v	=	Valence band
F	=	Focal point
M_s	=	Martensite start temperature
M_f	=	Martensite finish temperature
NiTi	=	Nickel Titanium
PV	=	Photovoltaic
R	=	Radius

θ_p = Panel Movement Angle

SMA = Shape Memory Alloy

SME = Shape Memory Effect

LIST OF APPENDIX

APPENDIX	TITLE
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CHAPTER 1

INTRODUCTION

This chapter will briefly discuss about the background study of the project. Besides that, objectives, scope and problem statement also have been discussed

1.1 BACKGROUND OF THE PROJECT

This project only consist of hardware implementation, including mechanical design this project was built as a problem solving to the most existed solar tracker which is still used a fixed solar panel. It also as an optional prototype compared to existing solar tracker. This tracker system has been made by considering a few criteria such as, cost, maintainability, and capability.

1.2 PROBLEM STATEMENT OF THE PROJECT

A solar panel receives more sunlight when it is perpendicular or parallel to the sun, but the direction of the sunlight is always changes depends on the movement of the sun in a day. Mostly, the existed solar panel was installed statically, means that it does not moves to follow the position of the sun. In addition, most existed solar tracker consists of many components and surely has many failure modes. Besides that, it also expensive and moreover it mainly used electric as a power sources. Based on that, this solar tracker system was fabricated in order to solve following problem and decrease the cost.

1.3 OBJECTIVES OF THE PROJECT

Basically there are two main objectives of this project:

- To design a tracker system that can maximize the utilization of solar energy
- To develop a prototype of tracker system that can track the movement of the sun.

1.4 SCOPE OF THE PROJECT

The scope is to develop a prototype of tracker system that can track the movement of the sun to improve the overall electricity generation based on tracking system. This prototype consists of fully mechanical design without any electrical sources. This prototype is a single axis orientation, which follows the movement of the sun in a day from morning to evening. This tracking system designed to automatically follow the sun and from the input received, it can actuate some mechanism to position the solar panel where it can receive maximum sunlight to produce more energy output then.