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**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF COMPUTER AND ELECTRICAL ENGINEERING**  
**DIPLOMA IN ELECTRONICS AND ELECTRICAL ENGINEERING**  
**FINAL YEAR PROJECT REPORT:**  
**AN AUTOMATIC DUAL AXIS SOLAR TRACKING SYSTEM**

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**FINAL YEAR PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF  
ELECTRONICS AND ELECTRICAL ENGINEERING AS A PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE AWARD OF A DIPLOMA IN ELECTRONICS  
AND ELECTRICAL ENGINEERING**

## **ABSTRACT**

In this project, photovoltaic conversion panel is expected to be used in and automatic microcontroller based solar tracker system. Our aim is to design a dual axis solar tracker system. The sun is tracked by the tracker and its position is changed in such a way that it maximizes power output. The solar panel is moved by two geared DC motors so that the sun's light is able to remain aligned with the solar panel. The operation of the device is based on a DC motor which is intelligently controlled by the dedicated drive until that moves a mini photovoltaic panel, the presence of the two simple but efficient light sensors receive signals by the microcontroller. The performance and characteristics of the solar tracker device are experimentally analyzed.

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Furthermore, I would like to pay my sincere appreciation and innumerable thanks to Head of Department of computer and electrical engineering, whose guidance, constructive comments, support and advice has enabled me gain profound understanding throughout this period. I also like to express my sincere thanks to all the members of the department, who have helped me at times and in many ways and made this whole effort demanding process pleasant

Finally, I would like to thank our supervisor **ENG. MUGWANYA PATRICK** who trusted us and gave us opportunities to prove ourselves and also he polished us well by assigning us worthy tasks with help of which we gained professional knowledge and enhanced our learning by letting us participate in professional conferences and gave us confidence.

In the last, I would like to express our acknowledgement to our parents for everlasting love, dreams and sacrifices they made throughout their lives to make us see this day. We could not find the appropriate words to properly describe our appreciation for their endless devotion, support and faith in my abilities in achieving our goal.

## **DECLARATION**

I do hereby declare that all the written material contained in the report is an account of my own efforts and has never been submitted to any university or institution for an academic award

I wish to extend our sincere gratitude to the Almighty God for letting us finish our presentation successfully

## **DEDICATION**

I dedicated all our efforts and struggles to our dear parents, without them we are meaningless, I also dedicate this report to the entire Busitema university for providing the better and convenient platform for our studied and other co-curricular activities which we acquired from the university, we humbly thank for their support during our studies, may the Almighty God bless you all abundantly.

**APPROVAL**

The project was done under the guidance of the instructors and supervision of my supervisor from the department of computer engineering and therefore I forward it to the department with the approval of the supervisor **ENG. MUGWANYA PATRICK**

**NAME:** .....

**SIGNATURE:** .....

**DATE:**.....

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# Chapter one: Introduction

## 1.1 Project definition

Sustainable power source gather by solar panel in form of sunlight is converted in to power which would then be able to be utilized to give capacity to electric loads. Several individual solar cells are contained by solar panels which are themselves made out of layers of silicon, phosphorous which gives the negative charge, and boron which gives the positive charge. Solar panels ingest the photons and in doing as such start an electric flow. The subsequent energy produced from photons striking the outside of the solar panel enables electrons to be struck out of their nuclear circles and discharged into the electric field created by solar cells which at that point move these free electrons into a directional flow and this procedure is called Photovoltaic effect.

The aim of this project is to ensure the sunlight rays are falling perpendicularly on the solar panel to give the maximum solar energy. Normally a solar panel converts only 30 to 40 per cent of the incident solar radiation in to electrical energy. An automated system is required to get a constant output, which should be capable to constantly rotate the solar panel. The sun tracking system was made as a prototype to solve the problem. It will be automatic and keeps the panel in forward-facing of sun until that is visible. The unique characteristic of this system is that instead of taking the earth as its reference, it takes the sun as a guiding source. The sunlight is monitored by the active sensors and rotates the panel towards the direction where the intensity of sunlight is maximums

## 1.2 Project objectives

Our project is based on the following objectives:

- To create a non-soldering, in expensive smart computer controlled, dual axis tracker for school and home use.
- To achieve more energy out of a solar panel of about 30% more than the day to day fixed solar panel.
- Ability to manually rotate the tracker with the usage of a controller alongside the overall ecliptic
- To design and improve a solar panel.

## 1.3 Problem statement

For most of our common every day solar cells run at an efficiency of 18 to 20%, simply meaning they convert 18-20% of every they receive into electricity which doesn't quite meet our power needs. To bring in enough, we either need to improve efficiency of the solar panels or find ways of getting more from our current solar panels.

Every panel we see every day is in fixed position, most likely facing south at a 45degree angle. While this approach is simple and meets the needs of smallest applications, it isn't producing as much energy as it could be.

The single most way of getting more energy out of a solar panel is to have it track the sun. In fact, solar panels that track the sun will create around 30% more energy per day than the fixed panel.

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