



P.O. Box 236, Tororo, Uganda
Gen: +256 - 45 444 8838
Fax: +256 - 45 4436517
Email: info@adm.busitema.ac.ug

www.busitema.ac.ug

FACULTY OF ENGINEERING
DEPARTMENT OF CHEMICAL AND PROCESSING ENGINEERING.
DESIGN AND CONSTRUCTION OF A LENS BASED SOLAR WATER HEATER.

BY
MWESIGYE EDWIN
REG NO:BU/UG/2014/13

EMAIL:andellaedwin@gmail.com
PHONE NO:0757312658



SUPERVISORS
MR SSERUMAGA PAUL
MR ASHABAHEBWA AMBROSE

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ABSTRACT

The most common sources of energy for heating water include wood, charcoal, liquefied petroleum gas, fossil fuels and grid electricity. Due to increased need of energy, there is too much dependence on energy from fossil fuels to meet the energy requirements. These emit carbon dioxide and other forms of pollution every second and the fossil fuels will eventually run out. Therefore in order to obtain a clean and sustainable energy that will not harm the environment, people are looking for eco-friendly alternative sources of energy such as solar and biodiesel. (Chu, 2011)

The purpose of this project is to design and construct a lens based solar water heater for water heating for domestic purposes like dish washers, clothes washers, bathing and cooking so as to reduce energy costs using a free energy resource use and reduce emissions of greenhouse gases into the environment.

In order to achieve the above purpose, the methodology below was used; data collection which involved literature surveys and reviews, direct observations and interviews, data analysis and design procedure, different construction techniques, testing the performance and economic evaluation of the proposed energy system.

Once all these methodologies were met, the energy system was designed, constructed, tested and economically evaluated. The implementation therefore reduces on energy consumption and conserve the environment.

ACKNOWLEDGEMENT

With pleasure, I would like to extend my sincere thanks to the department Agro processing Engineering and all my lecturers for professional guidance and mentorship they have given me.

Great thanks go to my supervisors Mr. Sserumaga Paul and Mr. Ashabahebwa Ambrose for their tireless efforts rendered to me during the preparation of this piece of work, may the good Lord bless you abundantly.


DEDICATION

This report is dedicated to my beloved parents Mr. Kamusiime James & Mrs. Kembabazi Sedrad in appreciation for their selfless care and support provided to me since childhood, and for the spirit of hard work, courage and determination instilled into me, which attributes I have cherished have indeed made me what I am today. May the almighty God bless you abundantly.

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DECLARATION

I MWESIGYE EDWIN, hereby declare, to the best of my knowledge, that this research project report is an outcome of my original work except where indicated with reference and that it has not been presented to any institution of learning for an academic award

Student's signature: 

Date: 23rd May 2018.



APPROVAL

This proposal report has been submitted for examination with approval from the following supervisors:

MR. Sserumaga Paul

Signature

Date

Mr. Ashabahebwa Ambrose

Signature

Date

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Due to increased need of energy, there is too much dependence on energy from fossil fuels to meet the energy requirements. These emit carbon dioxide and other forms of pollution every second and the fossil fuels will eventually run out. Therefore in order to obtain a clean and sustainable energy that will not harm the environment, people are looking for eco-friendly alternative sources of energy such as solar and biodiesel.(Chu, 2011)

Uganda is blessed with abundant sunshine all year round and solar resources are readily available and accessible. Solar energy is collected using artificial devices called solar collectors and this energy is used in thermal processes and photovoltaic processes. In photovoltaic process, the incident solar energy is directly converted into electricity by the help of PV panels while in a thermal process the incident solar radiations are converted into thermal energy by use of specific surfaces for various applications such as cooking, heating water and mini electric power production.(Gujrathi & Gehlot, 2014)

Domestically hot water is used to serve different purposes like in car washers, dish washers, clothes washers, showers, and during cooking. This hot water is obtained by utilizing different energy types like grid electricity, oil, diesel, petrol, liquid petroleum gas and natural gas. Most of these energy types hold a great negative impact to the environment.

Solar energy which is readily available can be harnessed to solve of the energy problems. One of the most recent methods of collecting solar thermal energy is the use of water lens technology. A water lens is able to focus this energy at a single point basing on a principle that incident parallel light rays parallel to the principle axis after meeting the lens surface they are refracted at one point that is the principle focus. (Tripathi, Verma, & Nuzaif, 2014)

Therefore, this research aims at developing an appropriate solar water heating system for domestic applications based on water lens technology.

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