BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

AN AUTOMATIC SOLAR POWERED LAWN MOWER

By

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DECLARATION

I JULIAN KYALUZI, declare to the best of my knowledge and understanding that this project Report unless otherwise stated is my original work and has never been submitted to any institution for any award.

Signature …….

Date …….

APPROVAL

This is to certify that the project report under the title "***An automatic solar powered lawn mower"*** has been done under my supervision and is now ready for examination

Mr. Arineitwe Joshua

Department of Computer Engineering

Sign:…….

Date:……..

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ABSTRACT

The system development is being motivated by the need to reduce on the cost incurred on buying fuel for lawn mowers. This has affected lawn mower users due to the increasing fuel prices almost every year. The system though has more added advantages like reducing pollution and automation.

The system comprises of different units, the solar powering unit, the grass cutting unit and the movement unit which includes the obstacle avoidance unit.

The system is powered by solar energy which is generated by a solar panel that moves with the system on top, the generated energy is then stored by two solar batteries through a solar charge controller. The batteries then supply power to the movement motors and to the grass cutting motors plus other electronic components.

The system operates in such a way that a user inputs the dimensions of the area to be cut in terms of length and width through a keypad and an LCD, then the system starts to move the input dimensions while cutting the grass and avoiding any obstacle found along its route. When the input area is covered, the system will automatically stop.

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LIST OF ACRONYMS

AC: ALTERNATING CURRENT

AGV: AUTOMATED GUIDED VEHICLES

DC: DIRECT CURRENT

IDE: INTERGRATED DEVELOPMENT ENVIRONMENT

GHG: GREEN HOUSE GASES

LCD: LIQUID CRYSTAL DISPLAY

CHAPTER ONE

1.0 Background

A lawn mower (grass cutter) is a machine that uses a revolving blade or blades to cut a lawn at an even height [1]. Lawn mowers employing a blade that rotates about a vertical axis are known as *rotary mowers*, while those employing a blade assembly that rotates about a horizontal axis are known as *cylinder or reel mowers*.

Many designs have been made, each suited to a particular purpose. The smallest types, pushed by a human, are suitable for small residential lawns and gardens, while larger, self-contained, ride-on mowers are suitable for large lawns, and the largest, multi-gang mowers pulled behind a tractor, are designed for large expanses of grass such as golf courses and municipal parks.

The most common power source for lawn mowers is an internal combustion engine [2], particularly for larger, self-propelled mowers. Smaller mowers often lack any form of propulsion, requiring human power to move over a surface; "walk-behind" mowers are self-propelled, requiring a human only to walk behind and guide them. Larger lawn mowers are usually either self-propelled "walk-behind" types, or more often, are "ride-on" mowers, equipped so the operator can ride on the mower and control it. A robotic lawn mower is designed to operate either entirely on its own [3], or less commonly by an operator with a remote control. Some lawn mowers are powered by electricity and others are gas powered [1].

Currently in Uganda, the commonly used type of lawn mowers are petrochemical powered and they consume large amount of conventional energy [4]. Due to the fact that the price of petrol increases almost every year in Uganda [5], it has become expensive to use such lawn mowers. Moreover, it is anticipated that the effect of the gasses emitted from such combustion of petroleum products will be critically hazardous to the climate [6]. Besides the effects of using such power is the cost involved in importing the fuel and the fact that the current lawn mowing system require energetic youths [7] yet such work

could be done by disabled and the elderly who are often left at home during working hours.

In this current world energy crisis therefore, Uganda like most of the developing countries is still relying on the prospects of fossil fuels [5]. Therefore we are still relying on foreign imports of fuel which in return depletes the little foreign exchange the country earns. This situation is further worsened by the already exhausted wood reserves (e.g. forests) which are the readily available source of energy for most of the national population composed of almost 80% of the population [5]. This also has a direct negative effect on the countries climatic changes, considering all these we are compelled to look for an alternative, cheap source of energy. The immediate solution is solar energy.

The concept of solar energy is not a new one but its various applications are, this is due to the unpopularity of its applications resulting from the previously accomplished sources of energy like fossil fuels and wood fuels. However, due to the world's awareness of fossil fuel pollution, most countries and people are turning to harvest it both in large and small scale. This project was therefore decided upon so as to make use of the various applications of solar energy and address a number of issues that standard internal combustion engine mowers do not.

Remote and autonomous operation of robotic platforms is revolutionizing the way in which work is done and information is gathered [8]. Through the removal of the human element, costs decrease, quality of work increases, and continuous operation is achievable at little to no additional cost. Remote control and automation offers almost all individuals regardless of physical limitations the ability to operate machinery and perform labor intensive tasks at a safe distance [8]. For these reasons therefore, I intend to make the system robotic and automatic.

1.1 Problem statement

Fuel prices in Uganda have been on an increasing trend over the past years up to date. This has caused a negative direct impact on the use of fuel powered devices in the country. For lawn mower users in particular, it has become expensive to use their fuel powered lawn mowers since most people cannot cope up with such increasing fuel prices. A lawn mowing Systems with an alternative, cheap source of energy is therefore needed to address such an issue. Therefore, this calls for the development of an automatic solar powered lawn mower.

1.2 Objectives

1.2.1 Main objective

To design and implement a lawn mower that will be powered by solar and operate automatically.

1.2.2 Specific objectives

i. To study and review the literature that will be used to design an automatic solar powered lawn mower
ii. To design an automatic lawn mowing system and a solar system to power the lawn mower
iii. To implement the automatic solar powered lawn mower
iv. To test and validate the automatic solar powered lawn mower

1.3 Justification

Since people always have to mow the grass in environments around them like compounds for better sanitation and cleanliness, it becomes necessary to ensure that the mowing work is done in a way that is less costly, friendly to the environment, and easy to use. The existing systems that are currently under use have not addressed such issues. This therefore creates a need for a system that is user friendly, cost effective safe to use and environmentally friendly.

This automatic solar powered lawn mower will thus help to completely do away with fuel costs, labor costs, it will be friendly to the environment and also it will be easy for the elderly, disabled and the younger to easily accomplish the task of mowing their lawn.

1.4 Scope

The system is aimed to be used on small residential lawn areas

I considered two stages in the technical scope of this project; stage one involved integration of parts to make a solar powered lawn mower.

The second stage was to take the mower created in the first stage and adapt it so that it operates automatically

1.5 Limitations

- The system should be used on a fairly flat land
- For best operation, the system works best during a sunny weather conditions since it uses solar power except when enough power had already been stored
- The system cuts grass which is not higher than 4inches.
- Obstacles considered in the lawn area are trees and flowers or any other tall obstacles

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