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**BUSITEMA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING
DESIGN OF A SEMI-AUTOMATED SOLAR PANELS CLEANING DEVICE WITH
A TECHNIQUE FOR REUSING WATER**

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DECLARATION

We affirm that the component of our project proposal is, to the best of our knowledge, the result of our research and work, and it has never been offered or submitted to any organization or university for an academic prize.

APPROVAL

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

Name: Pabniak M

Signature: [Signature]

Date: 11/08/2023

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ABSTRACT

The use of solar energy as an energy source has grown significantly in Uganda during the past few years. According to some, using solar energy to generate electricity is more affordable than using conventional methods that need significant capital inputs to build transmission and distribution networks. This essay aims to develop a Microcontroller-based embedded real-time and low-cost technology for an automatic self-cleaning solar panel. When the panel notices that a cell is being shaded, it activates a cleaning mechanism to remove the obstruction and return the panel to normal operation. The 12V battery that powers this system is charged by solar energy while the cleaning mechanism is not in use, and it is shut off automatically once the battery is fully charged.

CHAPTER ONE

Introduction

Globally, there is more than enough solar radiation to meet the demand for solar power systems. The percentage of the sun's rays that reach the surface of the planet is sufficient to meet the world's energy needs 10,000 times over. Each square meter of land costs, on average is exposed to sunlight long enough to generate 1,700 kWh of energy annually. Our planet is greatly impacted by solar panels. Solar power plants need to be cleaned at least every three days, but it can benefit our environment by reducing the demand for other power producing facilities that can harm the environment. Generally speaking, it depends on the nation. For instance, in the Middle East, it will cost a lot because it needs to be cleaned every day(El-Nakla, 2020).

There are many methods for cleaning solar panels; but, in order to maintain a solar panel's high level of efficiency, our concept is to create a smart solar panel that cleans itself automatically and remotely(El-Nakla, 2020).

Less than 7% of the rural population in Uganda, which makes up about 73 percent of the country's total population, has access to electricity (NPA, 2015). The use of solar energy as an energy source has grown significantly in Uganda during the past few years. Only 5% of Ugandan families without access to the national grid, according to Mr. Dirk Kam, managing director of Barefoot Power Uganda, have access to solar electricity(Umaru et al., 2021).

In Uganda, adoption and use of solar energy solutions have grown steadily and significantly over the past few years, and there are now about 50 participants in the solar industry. As opposed to 50 to 100 kWp per month in 2002, it is projected that roughly 600 kWp to 1 MWp of solar capacity is imported into Uganda on a monthly basis(Umaru et al., 2021). Waste water is recycled and reused during cleaning by flowing through a waste water guide slot to a waste water tank, where it then flows back to a clean water tank after passing through a filtering plate. By largely reusing non-potable effluent, water reclamation or recycling reduces the financial and environmental burden of developing new water sources. The practice of gathering, purifying, and using wastewater, particularly from industries, municipalities, is known as water recycling and reuse(Cisneros, 2014).

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