SINGLE – AXIS SOLAR TRACKER

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ABSTRACT

The purpose of this study is to improvise a static solar panel to increase the power output from solar panels. This project is vital since the sun's position will change throughout the time during the day, where it will move from the north to the west. Thus, having a static solar panel as a power generator will limit its function due to it wasn't designed to move around and follow the sun's position. The construction of this system used a Servo motor controlled by an Arduino microcontroller, which intelligently adjusts the prototype's position based on input from light-dependent resistor (LDR) sensors. In addition, the temperature sensor, DHT 11, also plays a part in this system which detects surrounding temperature and is expected to be displayed via a Wi-Fi module, on a device such as a computer or a smartphone. Another objective of producing this system is to encourage people especially electricity users to use solar energy as one of the power sources since it's eco-friendlier and easier to get. The purposes of this study have been proven by several studies that have demonstrated that the proposed solar tracker successfully maximizes power output from solar panels.

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CHAPTER ONE

1.1 BACKGROUND OF STUDY

Solar energy is a renewable energy form obtained from the radiation of the sun. It is an environmentally friendly, abundant, and sustainable energy source that recently gained significant attention and widespread acceptance. Although the concept of utilizing solar energy has existed for centuries, advancements in technology and increasing concerns regarding climate change and energy stability have propelled its rapid advancement and adoption.

The sun emits an inexhaustible amount of energy in the form of sunlight, which can be harnessed for electricity generation or used directly for lighting and heating purposes. Solar energy technologies primarily involve the utilization of solar panels, also referred to as photovoltaic (PV) panels, which directly convert sunlight into electricity through the photovoltaic effect. These panels consist of multiple solar cells, typically silicon, which absorb photons from the sun's rays and release electrons. These electrons flow through an electrical circuit, creating a direct current (DC) that can be converted into alternating current (AC) using inverters, enabling practical applications in homes, businesses, and industries.[2]

Solar energy offers significant environmental advantages [1]. Unlike fossil fuels, solar energy production does not emit detrimental greenhouse gases or other pollutants that contribute to climate change, air pollution, and health issues. Furthermore, in comparison to conventional energy sources such as coal or natural gas, solar energy systems have a comparatively minimal impact on land and water resources [1].

Solar energy is recognized as a decentralized energy source, empowering individuals, communities, and businesses to generate electricity and reduce reliance on centralized power grids. This decentralization fosters energy independence, enhances resilience, and contributes to overall energy stability. Moreover, solar energy provides financial advantages as well. The cost of solar panels and associated technologies has considerably decreased, making them more affordable and accessible to a broader consumer base. [3] Additionally, solar energy systems have the potential to deliver long-term savings on electricity bills, especially in regions blessed with ample sunlight and favorable solar energy policies.

The purpose of developing a solar tracker is to create an environmentally friendly device capable of efficiently generating energy. With traditional energy sources such as fossil fuels