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Dual Axis Solar Tracking System

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Abstract: *Dual-axis solar tracking systems represent a leap forward in solar energy optimization. Unlike single-axis systems, they pivot along both horizontal and vertical axes, ensuring precise alignment with the sun's position throughout the day and seasons. This dynamic adjustment maximizes energy capture, surpassing fixed installations in efficiency and output. Not only do these systems cater to diverse geographical conditions, but they also enhance reliability and longevity, promising a sustainable future for solar energy.The goal of this thesis was to develop a laboratory prototype of a solar tracking system, which is able to enhance the performance of the photovoltaic modules in a solar energy system. The operating principle of the device is to keep the photovoltaic modules constantly aligned with the sunbeams, which maximises the exposure of solar panel to the Sun's radiation. As a result, more output power can be produced by the solar panel. The work of the project included hardware design and implementation, together with software programming for the microcontroller unit of the solar tracker. The system utilised an ATmega328P microcontroller to control motion of two servo motors, which rotate solar panel in two axes. The amount of rotation was determined by the microcontroller, based on inputs retrieved from four photo sensors located next to solar panel. At the end of the project, a functional solar tracking system was designed and implemented. It was able to keep the solar panel aligned with the sun, or any light source repetitively. Design of the solar tracker from this project is also a reference and a starting point for the development of more advanced systems in the future*

Keywords: Dual-axis solar tracking systems

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