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# Dual-Axis Solar Tracker: An Efficient Budgetfriendly Way to Utilize Solar Energy

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## Abstract

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### Abstract:

In order to improve solar energy collecting, this study investigates the development of an affordable dual-axis sun tracking apparatus. This technological attempts to increase efficiency by continuously altering the orientation of solar panels to follow the course of the sun throughout the day, as solar power gains popularity worldwide as a clean alternative to fossil fuels. The study begins with a historical overview of solar energy evolution and focuses on practical implementation using basic components like solar panels, servo motors, and light sensors. By constantly adjusting based on sunlight angles, the dual-axis system boosts energy generation efficiency. Mathematical calculations optimize panel angles for maximum sunlight exposure. Its affordability and practicality provide a sustainable solution for regions with abundant solar radiation, such as India. This research highlights the dual-axis system's potential to promote sustainable energy practices, reduce fossil fuel dependence, and mitigate environmental impact. Its cost- effectiveness makes it viable for widespread adoption in residential and commercial settings, contributing to increased global solar energy use.

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### I. Introduction

In order to meet the world's growing energy demands while lowering reliance on fossil fuels, renewable energy, particularly solar energy, is essential. The main energy sources used today are fossil fuels are limited and contribute significantly to environmental pollution [1]. The urgent need for sustainable alternatives has driven research into harnessing clean energy from natural sources like the sun. Solar energy, collected through photo-voltaic (PV) systems, has undergone signif 19th century [2]. Important turning points include the discovery of the photo-v Sign in to Continue Reading Becquerel in 1839 and the subsequent developments by Richard Evans Day and William Grylls Adams in 1876, which laid the groundwork for solar cell technology. Further developments in the early 20th century, such as Albert Einstein's work on light quanta and the creation of the silicon solar cell by Bell Laboratories in 1953, have been pivotal in modern solar power

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