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Solar Tracking System

[1]Prof. Pradip Balbudhe, [2]Thaneshwar Billore, [3]Alish Sheikh, [4]Rohit Kumbhalwar, [5]Pikumar Narule

Abstract— The project's goal is to use solar panels to absorb the most sun energy possible. A solar tracker is a piece of equipment with built-in solar panels that follows the sun's path throughout the day to make sure the solar panels receive the most sunlight possible. A solar cell will produce the most power when it is facing the sun, or when the angle between its surface and the sun's rays is 90 degrees. Solar tracking makes it possible to produce more electricity since it keeps the solar array aligned with the sun. Its build included servo motor, Arduino, and LDR components. There are two categories in this project: hardware and software. 4 light dependent resistors (LDRs) have been employed in the hardware component to track the synchronisation of sunlight by measuring sunlight brightness. One conventional servo motor has been used for the rotational component. The code for the software component is created using C programming and entered into Arduino. This project is intended to be portable and low power. It is therefore appropriate for use in rural areas. Additionally, the efficiency of the output power generated by solar collection is improved.

Keywords— Solar Tracker, Monitor, Energy

I. INTRODUCTION

The demand for energy is rising in tandem with the daily growth in world population. As the world's primary energy sources today, oil and coal are predicted to become extinct in the coming century, posing a severe challenge to humanity's ability to access a cost-effective and dependable energy supply. Renewable energy comes from ongoing natural processes that replenish it. Renewable energy is energy that comes from a natural source, such as the sun, the moon, the tides, the wind, the rain, the waves, and so on. The energy derived from the sun in the form of solar radiation is known as solar energy. Solar energy is a huge, limitless source of power. The primary pollution-free and environmentally friendly technique of creating electricity nowadays is solar energy. The amount of solar energy that the earth interrupts is roughly 1.8*1011MW, which is millions of times more than what the planet now uses in terms of all commercial energy sources combined. This paper's major goal is to make solar trackers better. Each day, the sun rotates from the east to the west, and the Solar Tracker device tracks its path. The quantity of solar energy that the solar energy collector receives changes when solar trackers are used, and thus changes the heat/electricity output that is produced.

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Prof Pradip Balbudhe, Thaneshwar Billore, Alish Sheikh, Rohit Kumbhalwar, Pikumar Narule, Department of Computer Engineering Suryodaya College of Engineering and Technology, Nagpur, Maharashtra, India.
Mail *pb6143@gmail.com, billoredeep10@gmail.com, alishsheikh793@gmail.com, rohitkumbhalwar1@gmail.com, pikumarnarule30@gmail.com*

II. LITERATURE REVIEW

A solar tracking system is a device that enables a solar panel to follow the sun's movement throughout the day, thereby maximizing its exposure to sunlight and improving its efficiency. In recent years, solar tracking systems have gained popularity as they can significantly increase the energy output of a solar panel. In this literature review, we will discuss some of the latest research studies conducted on solar tracking systems.

One of the recent studies conducted on solar tracking systems is by Hammad et al. (2021).

The authors developed a solar tracking system using an Arduino-based microcontroller, a stepper motor, and a light sensor. The system was tested under various weather conditions, and the results showed that it increased the energy output of the solar panel by up to 30%.

In another study, Ajit et al. (2021) proposed a dual-axis solar tracking system that used a combination of fuzzy logic and artificial neural networks (ANN) to control the movement of the solar panel. The system was designed to operate in both grid-connected and standalone modes and showed an increase in energy output by up to 45%.

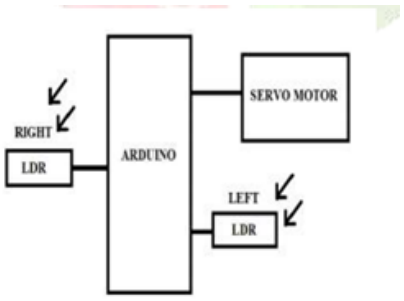

Figure 1: proposed system design for solar using arduino
Table 1: Summary of previous research work of Current

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Detector Home Safety Device

Authors	Components Used	Methodology	Findings
Ms.Vibha Patro,ch.Pawan Kumar (2018)	Servo motor, the position of LDR for tracing	LDRs, motors, resistor, Arduino	Prototype of sun tracker has been designed and implemented
Emmanuel karabo,Oduetese Matsebe(2017)	Dual axis, functional analysis	IOT technology	Design and performance of dual axis is implemented
Raul Gregor Yoshihiko Takase (2015)	Model Based on single and double diode.	Elevation mechanism, linear motor model.	Variable Elevation and Azimuth Sun's as the reference.

III. PROPOSED SYSTEM

A device that converts energy into electricity is a sun-oriented cell, also known as a photovoltaic cell electrical vitality created by light vitality. Since a single sun-oriented cell produces only a small amount of energy (roughly.6 volts DC), they are typically arranged in a coordinated fashion called a sun-based electrical board. Daylight is a somewhat diffuse source of energy, and only a portion of the light that is captured by a sun-powered cell is converted into power.

The energy particles that make up daylight are referred to as photons. A portion of the photons are held by the material when they hit the semi-conductor layer (usually silicon) of a solar cell rather than ricocheting off of it or being absorbed by it.

When a photon is used up, its energy is converted into an electron in a tiny portion of the cell, causing the electron to escape from its normal positionThis creates a gap in the molecule at its core. This gap draws in a different electron from a nearby particle, creating a new gap that is then filled once more by an electron from a different molecule.

The changing output of solar panels is one of the issues with solar energy. The goal of these solar systems is to collect as much power as possible from the solar panels and store it in the battery. After the sun sets, these solar charge controllers also prevent panels from being discharged through the batteries. The solar panels used to capture and convert energy from the sun into electrons are offered in various volts gradations; a solar panel battery charger is available from 2 watt to 30 watt range.

In the current work, an Arduino solar tracker was created and built. LDR light sensors were utilised to measure the solar light incidence's intensity on the photovoltaic cell panel. The project's conclusions can be summed up as follows: The existing tracking system successfully sketched the light source, regardless of whether it was a modest torch light, in a dark room, or it was the sun's rays. The Arduino ATmega328p microcontroller is used in the Arduino solar tracker with servo motor. The Arduino Uno is used to develop the necessary software.

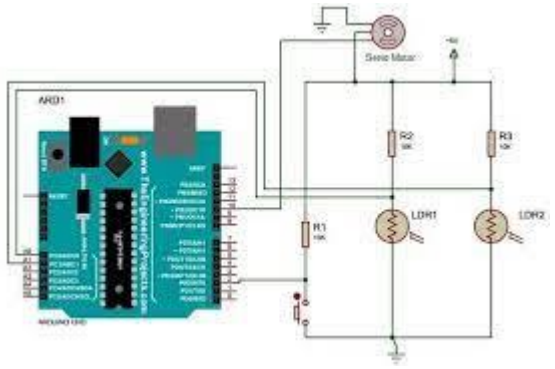

Figure 1: Arduino Based Solar Tracker Using Ldr & Servo Motor

IV. CONCLUSION

In the current work, an Arduino solar tracker was created and built. LDR light sensors were utilized to measure the solar light incidence's intensity on the photovoltaic cell panel. The project's conclusions can be summed up as follows: The existing tracking system successfully sketched the light source, regardless of whether it was a modest torch light, in a dark room, or it was the sun's rays. The Arduino ATmega328p microcontroller is used in the Arduino solar tracker with servo motor. The Arduino Uno is used to develop the necessary software.

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