WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Self-Adjusting Solar Panels for Optimal Sunlight Absorption

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[4] Project Guide:-
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ABSTRACT :-

The analysis and design of an autonomous sun-tracking solar panel using the open loop idea. The primary goal of this project is to maximize solar energy use by effectively absorbing sunlight and converting it into electrical energy for various applications. The method improves power output and sunlight absorption by orienting the solar panel perpendicular to the sun's beams. Additionally, regardless of the sun's beam intensity, this tracking system accurately calculates the sun's coordinates and automatically adjusts its position in accordance with them. The remarkable dependability and effectiveness of the solar panel are ensured by this procedure. This initiative's ability to provide access to a sustainable and eco-friendly energy source is its main advantage. When connected to large battery banks, this solar tracking technology can be used by local communities to independently supply their energy demands. All things considered, this study advances renewable energy technology, making it possible for solar power systems to be installed widely.

1 INTRODUCTION :-

A solar photovoltaic panel is oriented toward the sun using an electro-mechanical device known as a solar tracker. It serves a variety of purposes, including as traffic signals, lighthouses, and emergency phones positioned on highways. Its main objective is to maximize battery charge by determining the maximum amount of sun radiation. To ensure that the focused sunlight is delivered precisely to the powered device in solar cell applications, a high degree of accuracy is required. An electro-mechanical gadget called a solar tracker directs a solar photovoltaic panel in the direction of the sun trackers. Active or passive, single-axis or dual-axis solar trackers are both possible. Polar mounts are frequently used with single axis trackers for maximum solar efficiency. For manual elevation (axis tilt) modification, they also use a second axis, which can be adjusted frequently during the year. The cost of photovoltaic trackers can be affordable. As a result, they are especially compatible with photovoltaic systems that employ high-efficiency panels. Regular maintenance, such as inspection and lubrication, is usually necessary for solar trackers. Active trackers use motors and gear trains and are controlled by an electronic circuit that responds to the sun's direction. This paper focuses on the design and analysis of an open-loop Automatic Sun Tracking Solar Panel. The primary goal of the project is to maximize the utilization of solar energy by effectively absorbing sunlight and converting it into electrical energy for a variety of applications by positioning the photovoltaic cells perpendicular to the Sun's beams. This innovative technique eliminates the requirement for permanent placement and lessens the efficiency limitations of traditional solar panels. We can greatly expand the usage of solar energy for the generation of electrical power by exploring the potential of this autonomous sun tracking system. This study helps to move toward a more sustainable and ecologically friendly energy landscape by developing renewable energy technology.

2 LITERATURE REVIEW :-

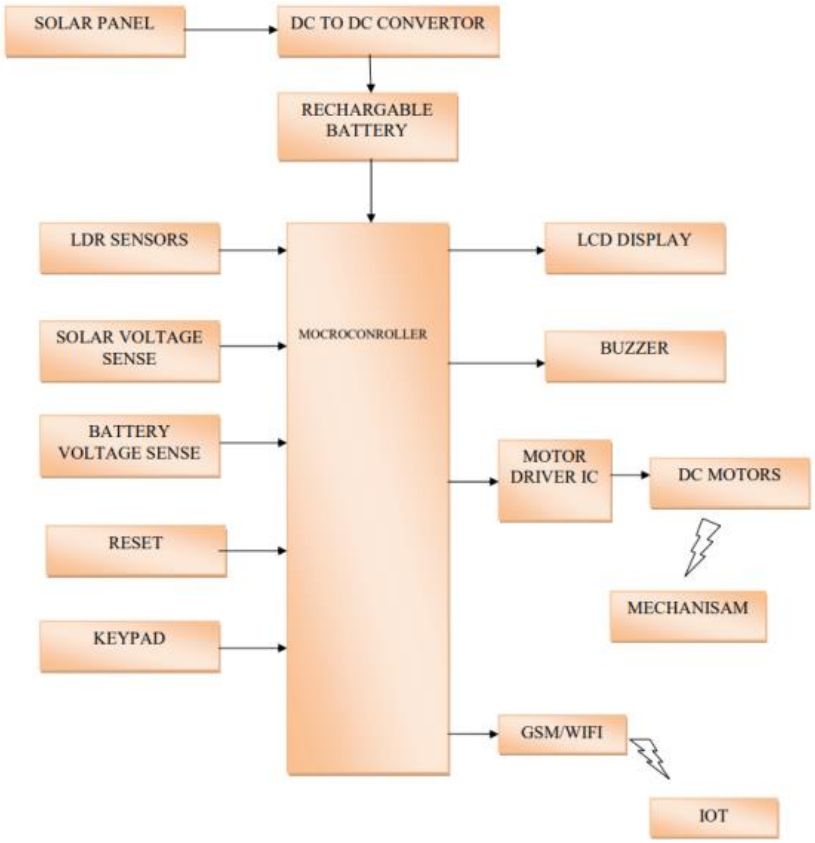
The Locker Security System with Facial Recognition and One Time Password (OTP) is a dependable and useful way to secure your belongings. The combination of OTP protection and facial recognition technology in this system ensures that only authorized users can access lockers. [1]

2. This study presents hand gesture analysis for human-security system interaction. It successfully implemented a bank security prototype with a 95.7% detection accuracy rate against robberies and evaluated an improved webcam-based hand motion recognition system. [2]

3. The system in this study will continuously send picture data to the remote location control rooms over a local area network (LAN) for web-based monitoring. The system can also send a warning text short messaging service (SMS) to the operator using the GSM technique. [3]

4. Providing a solution for a comprehensive biometric-based authentication system that will be utilized to run the safety lockers is the primary objective of this article. [4]

3 ACTUAL METHODOLOGY FOLLOWED :-



In conclusion, the primary element of the self-optimizing solar panel system is a solar panel that converts sunlight into electrical power. A rechargeable battery regulates and stores this electricity. The microcontroller receives data from LDR sensors that detect the amount of sunshine so that DC motors can move the solar panel into position for optimal energy capture. The system is monitored by an LCD panel that displays the solar and battery voltages. A motor driver and relay control the motors, and a buzzer alerts users to important system occurrences. Real-time tracking and solar energy usage optimization are made possible by the system's remote management and monitoring via GSM/Wi-Fi or Internet of Things technologies. Using a spray pump to clean the solar panel's surface preserves its efficacy. The entire system is designed to be as energy-efficient as possible while ensuring remote control, self-maintenance, and ease of use.

3.1 Impact of the project :-

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4 Future Scope -

• Time of Use (TOU) pricing options for solar electricity are offered by utilities in various locations. This implies that power generated during the day's peak hours will cost the utility more. In this case, it is beneficial to generate more electricity during these peak hours of the day. Using a tracking system maximizes the energy gains during these peak periods.

• The reliability of electronics and mechanics has improved, and technical breakthroughs have led to a significant decrease in long-term maintenance issues for tracking systems.

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