SOLAR TRACKING EV CHARGING STATION

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Abstract
Natural energy sources have become increasingly essential as the world's energy demand and environmental issues grow. With the immense potential it offers environmentally and economically, the renewable energy sector is quickly gaining traction as a new growth area for many countries. Solar energy is a significant source of energy, particularly in rural areas. The goal of this project is to build a process for tracking the sun and achieving optimum efficiency utilising a 555 IC and an LDR sensor for realtime monitoring. The hardware and software development stages of the project are split into two parts. Two light dependent resistors (LDRs) were employed in the hardware development to capture the maximum amount of light. The motor utilised was a servo motor.
Keywords- Solarpanel, Arduino, Motor, Battery.

1.Introduction

Photovoltaic (PV) is a way of generating electricity that involves converting solar radiation into direct current electricity using photovoltaic semiconductors. Solar panels made up of a number of solar cells containing a photovoltaic material are used in photovoltaic power generation. Solar photovoltaic power generation has long been regarded as a clean, long-term energy source that takes advantage of the planet's most abundant and widely dispersed renewable energy source – the sun. There are no moving parts or environmental emissions during the direct conversion of sunlight to energy. PV has recently grown in popularity and has a wide range of applications in today's technology environment. After hydro and wind power, solar photovoltaic is now the third most important renewable energy source in terms of installed capacity worldwide.

The idea behind the Solar Based Charging Station was to bring the cost of electricity into the reach of rural people. It was also designed to serve the community and small company owners by meeting their electrical needs without relying on the national grid. Solar energy can be used as a backup for electricity generation in India, which can help to alleviate power shortages caused by load shedding, frequent maintenance issues with older power plants, and a lack of gas and coal, among other factors. Furthermore, the electrical issue is wreaking havoc on our impoverished rural areas. As a result, this project was started in order to make solar energy more accessible.

2.Objectives

Electrical energy supplied by the national grid is a non-renewable resource derived from non-renewable fuels such as gas and coal. As a result, it cannot be regarded a long-term contributor because both fuels are limited in quantity and will eventually run out. Incomplete combustion of these fuels pollutes our environment by producing greenhouse gases, non-biodegradable waste products, and other pollutants. Furthermore, despite the fact that the situation in metropolitan regions is improving, the power crisis in rural areas remains severe. Electricity from the national grid is used to charge the batteries of electric motorcycles and other electric vehicles. The amount of power required every day is a substantial fraction of the daily demand because there are nearly thousands of them.

1. Our charging station can be rented or paid for on a monthly basis to charge batteries, including external battery rails.

2. If our proposal is implemented in rural areas, unemployed people in village communities would be able to make money and support their families by working at charging stations.
3. The national grid's load will be reduced greatly.

3.Block Diagram

The system contains a number of components and is divided into two sections: tracking and charging. The tracking portion increases the power output of the PV panel, and the energy is stored and the E-vehicle is charged by the charging section.

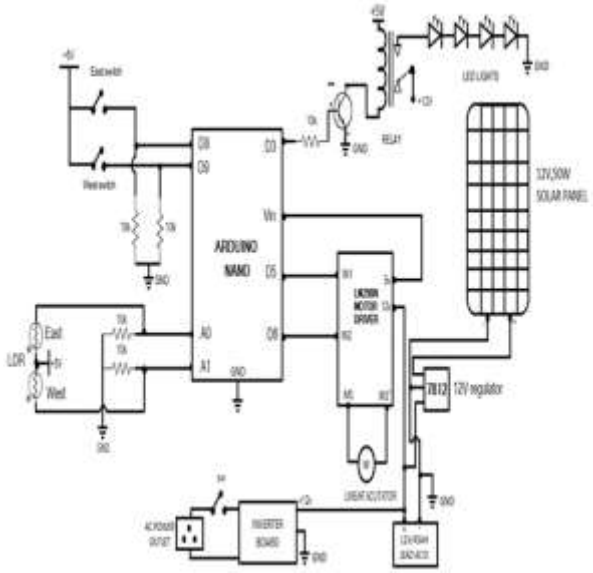

Fig 1:Block Diagram

4.Components Description

A) Arduino UNO

The Arduino Nano is, after the Arduino UNO, the most popular board in the Arduino lineup. Although both the UNO and the Nano are based on the ATmega328P microcontroller, the Nano is substantially smaller than the UNO. Despite its small size, the Arduino mini has many of the same functions as the Arduino UNO. When comparing the UNO and Nano, the Nano is missing the DC Power Jack and just has a mini-B USB port. Aside than that, Nano and UNO are pretty comparable in terms of functionality. The Nano board's pins are intended to fit on a breadboard, allowing you to simply place it on one for your DIY projects. Overall, the Arduino Nano is a great replacement for the Arduino UNO.

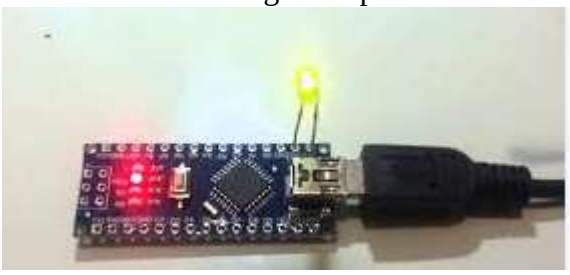

Fig 2:Arduino uno

B) L298N Motor Drive

The L298N module is a twin full-bridge motor driver module with high voltage and current for controlling DC and stepper motors. It can control the rotation direction as well as the speed of two DC motors. An L298 dual-channel H-Bridge motor driver IC is used in this module. The speed and rotation direction of the DC motors are controlled using two ways in this module. PWM is used to control speed, and H-Bridge is used to control rotation direction. These modules may simultaneously control two DC motors or one stepper motor.

C) LDR Sensor

Fig 3-LDR Sensor

The resistivity of a Light Dependent Resistor (additionally called a photoresistor or LDR) is a characteristic of the incident electromagnetic radiation. As a result, they're photosensitive devices. Photoconductors, photoconductive cells, and surely photocells are different names for them. They are made composed of high-resistance semiconductor materials. A photoresistor or LDR is denoted through loads of symbols, one of the maximum common of that's depicted withinside the determine below. Light is falling on it, as proven through the arrow.

D) PV Panel

A PV module is an installation-ready assembly of photovoltaic cells installed in a frame. Photovoltaic cells generate direct current electricity using sunlight as a source of energy. A PV Panel is a collection of PV modules, and an Array is a collection of Panels. A photovoltaic system's arrays provide solar energy to electrical equipment.

E) Buck boost converter

A buck-boost converter generates a DC output voltage that can be more or lesser than the DC input voltage. It combines the capabilities of a buck converter (used for DC voltage step-down) and a boost converter, as its name suggests (used for DC voltage step-up).

5.Working Model

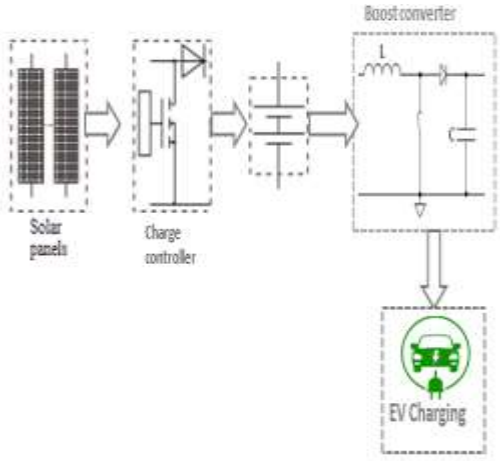

Fig 4-Implementation of Solar Tracking EV Charging Station

The controller is connected to the battery, and the controller is connected to the solar panel. The battery's output is connected to the Dc-Dc boost converter, and the converter's output is connected to the charging EV batteries. The battery is charged with the help of a PWM charge controller during daylight hours (10am to 4pm), and the supplied power is stored in a maintenance-free lead acid battery. The battery's output is connected to a dc-dc boost converter, which transforms input 12v dc to output 24v, which is used to charge electric vehicle batteries.

6. Testing

Fig 5- Testing Tracker

By doing the project we obtained the maximum power from the solar panel. The output obtained after setting up tracker is more than the solar panel which is kept constant

7.Results &Conclusion

As a result, a single axis sun tracking device for an EV charging station has been devised and deployed. We used the movement of a torch light to test the prototype's tracking ability. A gear motor is also suited for light tracking in order to give a wide range of PV panel movement. The comparison of single axis tracking systems and PV systems with fixed mounting.

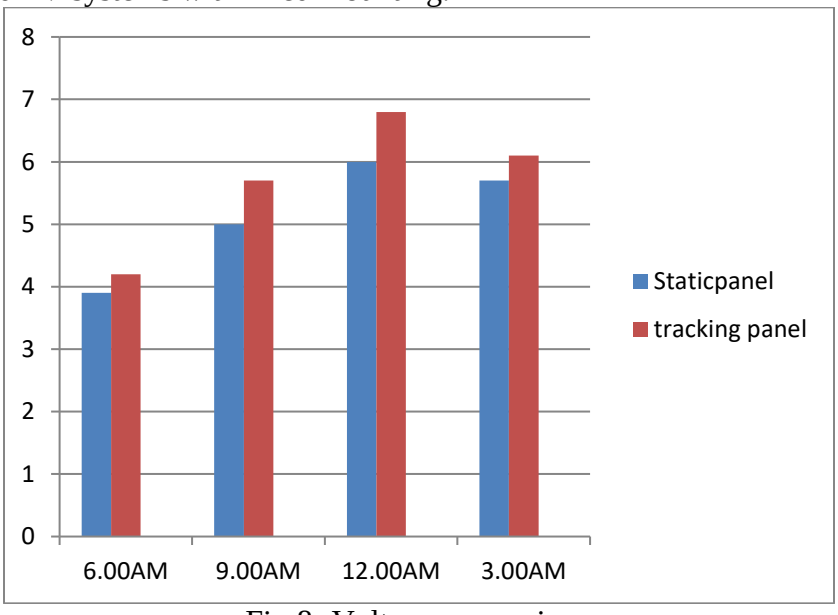

Fig:8- Voltage comparison

An effective technique of tracking has been created and used to a 10W, 12V solar panel using an MPPT algorithm for a single axis solar tracking system.

When compared to the current system, the efficiency of this technology can be increased by 35-40%.

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