

E-Vehicle Solar Charging Station at Public Places

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Abstract

The solar energy creates from sunlight which is renewable energy source

The solar public charging station proposed that to meet the high demand of energy need in a sustainable way.it is built in solar panel, charge controller and battery. Solar energy can easily get from sunlight, Now days e-vehicles are future of road transportation as societies move towards better resource. Solar is easy way to provide electricity to rural areas for overcome to their energy and future development. A simple and cost effective way to enhance our saving and pledge for a greener and cleaner environment.

Keyword: Solar panel, Charge controller, Battery, Renewable energy, Sunlight.

I. INTRODUCTION

The amount of energy in the form heat and radiation called solar energy. The most advantages of solar energy that it is free reachable to common people and available in large quantities of supply compared to that of the price of various fossil fuels and oil, Everyday earth receives sunlight above (1366W approx.). This is an unlimited source of energy at free of cost.

Sunlight bump on the solar cells, energizing electrons in the cells and created motion,

When the flow of electrons flows out of the junction between cell layers, creating an electric current, Metal plates and wires capture the flow of electron and generate electricity [5].

The solar energy requires lower man power expenses over existing energy production system. The solar charging Station is a charging stations for electric vehicles have emerged as one of the best ways to reduce India's dependence on fossil fuels for powering various modes of transport. This is due to the fact that electric vehicles are generally powered by electricity produced by fossil fuels, which is a massive cause of concern. As electric vehicles are getting more and more popular, we need to fulfil their requirement.

Solar can use in residential places for water heating, Batteries can store the energy and use throughout the day, In Industrial places solar energy used in office, Ware house and industry to supply power. Solar energy is used for transportation such as trolley, Buses and light rails.

Mobile charging by solar in sea, Land expeditions, Camping and hiking, Solar energy is power back up for users facing frequent power cuts. Solar water pump systems use electricity generated from solar radiation in order to pump water over long distances or from deep wells and can be applied for supplying water for feedstock, crop irrigation or drinking and cooking.

The source providing electricity to their charging station is most likely a fossil fuels. The EV owner can charge their cars for using renewable energy source, Not just fossil fuels.

It is estimated that the world's oil reserves will last for 30 to 40years, whereas solar energy is forever. Solar energy has

two big advantages over fossil fuels. The first is in the fact that it is renewable; it is never going to run out. The second is its effect on the environment. Burning of fossil fuels introduces many harmful pollutants into the atmosphere and contributes to global warming and acid rain. Solar cell directly converts solar energy into electricity. The solar cells that are connected together make up the solar panel. This can last up-to several decades without replacement. However, there is a drawback of solar power: energy can be produced only in the presence of sunlight. To overcome this, the solar panels are coupled with the rechargeable batteries, which can store excess power generated and provide energy in the absence of sunlight. Solar energy has advantages over other renewable energy sources including wind and water power: solar power is generated using solar panels, which do not require any major mechanical parts, such as wind turbines. These mechanical parts can breakdown and cause maintenance issues and can also be quite noisy. Both of these issues are virtually non-existent with solar panels. It aims at harvesting solar energy and storing it in a rechargeable battery. Using this battery various low-voltage device can be charged. Also, the charge in the battery is displayed on an LCD through a micro-controller.

II. Literature review

The most common charging station power source is natural gas. There are charging stations which are connected to the grid system [3]. Solar charging station is environment friendly option of charging vehicles. All the cities experience different weather conditions throughout the year the analysis done by various author. India is majorly divided into five major climatic zones: cold, composite, hot & dry, warm & humid, and temperate Day length is the time between sunrise and sunset, whereas the ‘actual number of sunshine hours’ refers to the effective day length without cloud cover. Like turbidity is a factor assigned for the level of suspended particles in the atmosphere. This can be smoke, dust, fog, or small water droplets. The higher the concentration of suspended particles, the higher the turbidity factor. Due to variations in the instantaneous ambient temperature, global irradiation, cloudiness levels, and turbidity values, a fixed parameter known as ‘average full sun hours’ has been computed for every city[2]. This represents the annual average of the number of units of energy produced by a 1 kWp installation per day if it is tilted at the latitude angle. This parameter is essential for initial system sizing; however, it does not mention instantaneous energy generation [5], [6].

III. Problem Definition

Fossil fuels are not renewable energy sources Fossil fuels pollute the environment, In the case of irresponsible use, they can be dangerous. So Solar energy has the least negative impact on the environment compared to any other energy source It does not produce greenhouse gases and does not pollute the water. It also requires very little water for its maintenance, unlike nuclear power plants for example, needing 20 times more water. Solar energy production does not create any noise, which is major benefit, since a lot of solar installations are in urban areas, such as domestic solar panels [3],[1],[4].

IV. Objectives

- I. To understand the solar energy system.
- II. To design and implement e-Vehicle solar energy stations at public places.
- III. To specify the benefits of e-Vehicle solar energy stations for society.
- IV. To lowering the dependence of fossil fuels.
- V. To fulfill the high demand of electricity with convenient way.

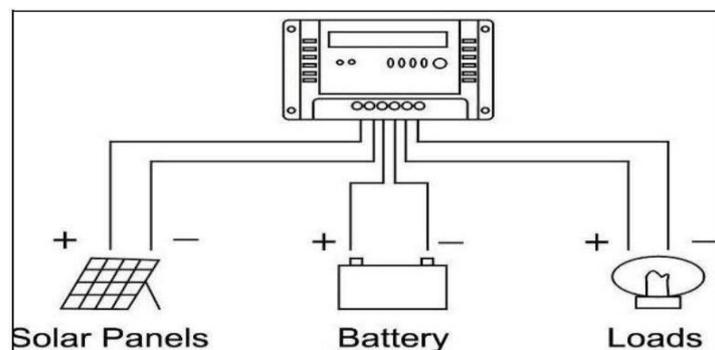


Source: chargedevs.com

V. Research Methodology

This research is based on an exploratory method. Data is gathered from primary and secondary sources. Primary data is collected from a few experts who have been involved in implementation of solar energy systems in various domains. Secondary data is collected from various web sources, articles, and published research papers. On the basis of collected data, researchers have been motivated to undertake the above objectives for implementation of solar energy systems which will be helpful to solve people's problems when they are at public places. Therefore, this research is explored for implementation of generic public e-vehicle recharge centers.[2] ,[3][4],[5].

VI. Design & Analysis



In the above diagram there are main three component Solar panel, Battery and Charge controller.

A. Solar panel



1. In 1839, French Scientist Edmond Becquerel discovered the photovoltaic effect. Photo means light and voltaic means electricity in Latin, photovoltaic means electricity from light. Solar power contains solar cells when light hits the cell, Electrons are separated from their atoms and flow through the cells then the electricity generated.

There are two types of solar panel monocrystalline and polycrystalline, Monocrystalline are more efficient than polycrystalline. Monocrystalline are Lower temperature coefficient/more effective when temperature changes, Polycrystalline are Higher temperature coefficient/less effective when temperature changes. The life span of Monocrystalline and polycrystalline is more than 25 years.

B. Battery

The power generated by solar panel will be store in the batteries for the overall use. Rechargeable solar batteries are used in off-grid PV systems to store excess electricity. There are two types of battery flat bate battery and tubalr battery, Battery backup time depends upon Ampere Hour (Ah). Higher the Ah, more will be backup time. For Example, 200 Ah battery will give backup of around 4 to 5 Hours



C. Charge Controller

The next component is solar charge controller are required to fully charge batteries from solar panels without permitting overcharge, They prevent reverse current flow at night[3] ,[4].

It is used to avoid battery from overcharging by regulating the voltage and current from solar panels to the batteries. It uses MPPT (maximum power point tracking) to accelerate solar charging of the battery up to 30% per day



VII. Limitation

- 1.The initial setup cost for Solar Charging station is high, this includes paying for solar panels, inverter, batteries, wiring, and the installation.
- 2.Solar panels are to effectively gather solar energy, few cloudy, rainy days effect on solar energy, solar energy difficult to collect during the night.
- 3.The solar energy is not 100% reliable.
4. Material used to make solar panel can cause pollution to environment

VIII. Future Scope

- 1.Reduces carbon emission (Not removed completely). A vehicle charged with solar-powered electricity emits 0.6 kg of carbon into the atmosphere whereas a gasoline-driven vehicle would emit 13 kg of carbon for every 100km ride.
- 2.Charging cost will reduce.
- 3.India will reduce its dependency on fossil fuels for driving electric vehicles, The load on the grid reduce.
- 4.Clean, Quite and easy to use .

Benefits of solar charging station

1. In Industrial places solar energy used in office, Ware house and industry to supply power.
2. Saves money & maximize your energy resilience.
3. Generate new revenue streams.

IX. Conclusion

Solar energy produces clean and renewable energy. It's good for ourselves and for our earth. For some, eliminating their consumption of fossil fuel-generated energy is reason enough the energy must be conserved and used efficiently

REFRENCCE

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