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Electrical Vehicle Charging Using Solar Technology

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ABSTRACT

This paper is about charging process for electric vehicle (EV) by solar energy. Thus, the renewable charging technology for electric vehicle will be consist of the solar panel and also the grid connection. This will help in charging when cloudy climatic condition occurs. The vehicle can be charge by solar energy using photovoltaic (PV) cell-based charging facilities, thus the solar panel will trap the energy from the sun that will charge the battery and thus battery will store the charge that to be readily available to charge an electrical vehicle. This solar charging technology charged electrical vehicle rapidly. It saves the electricity and it is ecofriendly to environment. Thus, the charging unit to be located at parking area, also as a business modal and has a residential installation. Thus, charging model consist of solar panel, charging circuit, battery, connector and also the car model consist of the charging circuit, motor1, motor2 and switches. Thus, obtaining result that shows electrical vehicle will be charge by renewable source of energy that could be help to reduce the pollution and make pollution free environment.

Keywords : Solar energy, charging circuit, charge storage battery, EV.

I. INTRODUCTION

Now a days the automobile sector increases day by day. Thus, it affect on the vehicle's economy and fuel. Thus, the increases in the number of vehicles are mostly affect on the fuel. Thus, the cost of fuel will be increases and the storage of fuel will be reduce day by day, and entirely disappear in future. It may cause global warming and climatic change. For reducing such problems the automobile sector will move towards electrical vehicles. These vehicles are ecofriendly. The electrical vehicles manufacture by many industries but there is lack of charging station. The time required for charging is more. Electric vehicles. So, the demand of this vehicle Therefore

people are not move towards the is less in India as compared to other country.

Electrical charging unit is an element in infrastructure that supplies electric energy for the recharging of vehicles, such as plug in electric vehicles including electrical car, plug in hybrid, etc. The charging electrical vehicles have fundamental and practical applications for sustainability.

The solar charging stations utilize solar PV modules to generate the electrical energy to charging vehicles thus the solar charging unit consist of charging circuit, battery, switch board, etc. thus the solar panel will convert sun energy into electrical energy which stored in battery via battery charging circuit this

circuit protect battery from over charging. This circuit disconnected battery automatically when battery is fully charged. The battery is lead acid battery which acts as energy sources for charging electric vehicles plug is connected in electric vehicles for charging the battery.

II. DESCRIPTION

A. Solar Panel:

Photovoltaic modules used light energy (photon) from the sun to generate electricity through the photovoltaic effect. The PV module is an assembly of photovoltaic cells mounted in a frame for installation.

The polycrystalline solar panel is lower efficiencies than monocrystalline solar panel. Polycrystalline solar panel are made from silicon. Their advantage is a lower price point. The polycrystalline solar panel are also referred to as “multicrystalline”, or many – crystal silicon. Because this are many crystals in each cell, there is to less freedom for the electrons to move. As a result, polycrystalline solar panel have lower efficiency rating than monocrystalline panel. Polycrystalline tend to have slightly lower heat tolerance than monocrystalline solar panel. The heat can affect not only the performance of polycrystalline solar panels but it projected to substantially shorten their life span. Thus, panel also less efficient in low light condition.

B. Battery Charging System:

The battery charging circuit is use to protect the battery from excessive charging. It disconnects automatically when battery is fully charge. We use the lead acid battery act as an energy source for charging electrical vehicles. the plug is provided for to connect the battery to electrical vehicle for charge the electrical vehicles.

C. Battery:

The purpose of the battery is to supply the necessary current to the starter motor and the ignition system while cranking to start the engine. Lead-acid battery is an electrochemical that produces voltage and delivers current to start the vehicles. When automobile is running the battery, electrochemical action is reversed, recharging the battery and allowing it to have many years of service. The battery is charged up to the limit. through the battery charging system. Thus, the battery also be use in the car (electrical vehicles).

D. Motor:

Motor is connected to drive the car. Motor converts electrical energy from solar panel to mechanical energy. In this model dc motor is used which is of rating.

III. BLOCK DIAGRAM

a) Block Diagram of Charging Station:

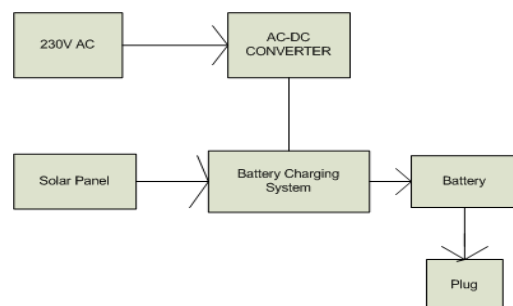


Figure (a). Block Diagram of Charging Station

The EV charging system path diagram shown in below fig.(a). thus, the charging the electrical vehicle through the solar panel and battery thus the solar panel and battery will connected through the medium which will be charging unit.

The main objective of this system is to charge the electrical vehicle through the sun light, and storing

energy to the battery and for the backup we provide the grid supply to the battery. The solar panel will work by absorbing the sunlight with photovoltaic cell, generating direct current energy then thus the energy supply towards the battery charging circuit for to charge the battery. The battery charging circuit is use to protect the battery from excessive charging. It disconnects automatically when battery is fully charge. We use the lead acid battery act as an energy source for charging electrical vehicles. the plug is provided for to connect the battery to electrical vehicle for charge the electrical vehicles.

In the case of absence of sunlight, we provide grid connection as a backup source thus the grid provides the 230V AC supply for charging the battery. Thus, the AC supply will be converted into DC for the charging circuit through the AC to DC convertor that provide the DC source to charging circuit for charge the battery.

b) Block Diagram of Electrical Vehicle:

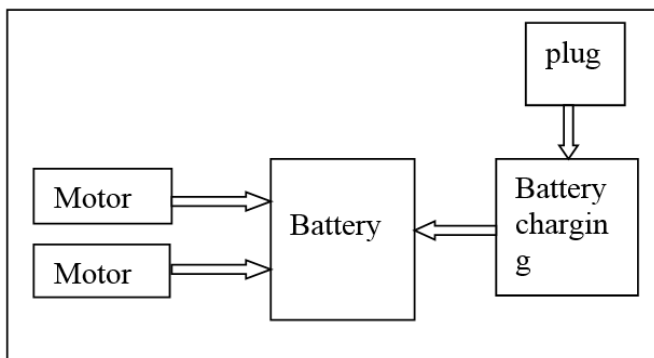
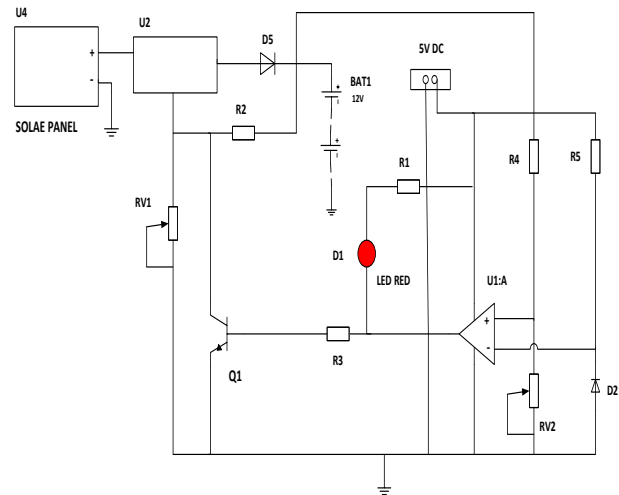


Figure (a). Block Diagram of Electrical Vehicle

Figure (b). Shows the block diagram of electric car using solar technology. It consists of plug, battery, battery charging circuit and motor which drive car. The battery in charging circuit of charging station is connected to plug, plug in electric vehicle is connected with battery charging circuit in electric car.

The battery is charged through battery charging circuit available in electric car whenever the battery is fully charged it disconnect the energy flow to avoid the overcharging of battery. Battery is connected to motors which drives the vehicle. An EV charging system can provide even faster charging during the day when few solar panels are producing electricity.

c) Circuit Diagram:



IV. OPERATION

The circuit diagram is given as above. It consists of solar panel, voltage regulator, diode, transistor, op-amp, LED, transistor, variable resistor, Zener diode, battery, connector. A solar panel used to convert solar energy to electrical energy it has two terminal one is ground and other is connected to voltage regulator LM 317T which is used to adjust the voltage for battery charging circuit. Diode is connected in series with voltage regulator in forward bias to avoid returning path for current for protect battery from overcharging. Whenever desired supply is supplied from op-amp LED glows and transistor act as a cut-off region and the power is passes to voltage regulator it continued the supply to battery. If the desired supply is not given from op-amp LED does not glow and transistor act as saturation region. The Voltage

regulator stop the supply to avoid overcharging of battery. Since battery is fully charged it connected to motor which drives the car.

V. CONCLUSION

Solar power is a renewable source of directly useable energy and ultimately creates other energy resources: wind, biomass, hydro power and wave energy. Efficient utilization of solar energy involved choosing proper component that provide the required energy capacity to charge electric vehicles. Since the solar generation and charging occurs during day time thus the cars are charged during working hours. Car is charged using photovoltaic module thus it is eco-friendly. Since the requirement of fuel and vehicles increases as population increases gradually. Hence due to this requirement of solar energy dependent vehicle is increased which will have significant effect on decreasing carbon emission during the day which is main human concern.

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