

Working Of Solar Power Electric Vehicle

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ABSTRACT:-Electric vehicle with more advantages of no noise, no pollution, saving energy and reduce carbon dioxide emissions is to power-driven vehicle with a motor drive wheels moving. All advantages of solar electric vehicle make research and application of solar electric vehicle and the trend of future cars. Solar electric vehicle is made of PV panels, battery, electric motor, vehicle controller and vehicle body. Solar electric vehicle can achieve low-carbon, energy saving, environmental protection and true zero-emissions for the future of human life. Solar energy is a renewable energy which would exist for even billions of years more. In 2015, COP21 known as the 2015 Paris Climate Conference took place in Paris with the aim of keeping global warming below 2°C In this conference many condition were imparted on developing nation like India to reduce carbon monoxide emission, which ultimately effect the transportation by road and their development. Thus, the use of renewable energy, like solar energy has to be use in transportation to reduce the carbon monoxide emission without any lag in development. Solar electric vehicle can make to reduce our greenhouse gas emissions and other pollution. This is the research paper for working of solar power electric vehicle.

KEYWORDS:Solar, Car, PV Panel, Electric Power, Renewable Energy

I. INTRODUCTION:-

The quests for a constant, safe, clean, environmental-friendly fuel is never-ending. Carbon-based fuels, such as fossil fuels are unsustainable and hazardous to our environment. Some of the alternatives are renewable energy sources which include all fuel types and energy carriers, different from the fossil ones, such as the sun, wind, tides, hydropower and biomass. Amongst these elements, solar energy is preferred since it could provide the cleanest sustainable energy for the longest duration of time – the next few billion years. To overcome the problem of fuel scarcity and environmental degradation we decided

to design a single seated vehicle which is operated by DC Motor and power source will be a battery which is charged using solar panels mounted on the top of the vehicle.

II. LITERATURE REVIEW:-

Because of zero pollution there is the development of "future car" called solar car. In solar car there is no engine, gear box and other component. It is composed of battery board, storage appliances and motor. Solar vehicle depend on PV cells to convert sunlight into electricity to drive electric motors. Unlike solar thermal energy which converts solar energy to heat, PV cells directly convert the sun into electricity.

The solar panels will collect energy from the sun and convert it into usable electrical energy, which in turn will be stored in the lead acid batteries to be supplied to the motor when necessary. The batteries are connected to a charge controller which will ensure healthy life of the batteries by preventing it from over charging and over discharging.

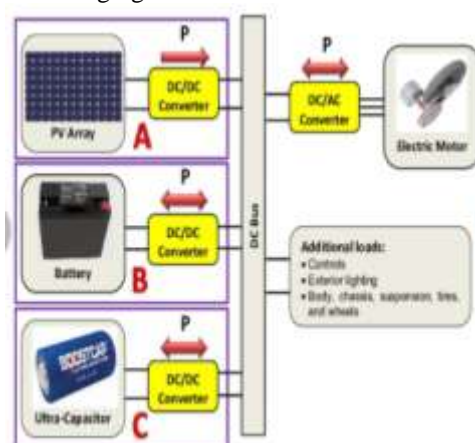


Fig. 2.1 Block diagram of EV

A microcontroller inside the charge controller is programmed to detect the voltages at the battery terminal and/or the solar panel terminals and accordingly determine what charging current

the battery needs to be supplied. The motor used is a Brushless DC motor which is rated at 750W, 48V, 12 A. This Brushless DC motor is sufficient to get the vehicle up and running as will be shown in details later. The motor controller is designed to control the speed of rotation of the motor as well as the direction of its rotation. In other words, it determines the vehicles speed and forward/reverse direction of motion of the wheels. It is obvious that the output power varying different area when we change the working voltage in the area of constant current source the sensitivity is low and in constant voltage load the sensitivity is obvious so the tracking method should be improved In order to improve the accuracy of the maximum power point tracking, when the temperature and the light intensity are definite, and the output power of the photovoltaic cell is close to the maximum power which is the most at the current condition same extent, the tracking step length will be properly lessened , in order that the maximum power point can be tracked more accurately Keeping the fact that there is no future fossil fuel we had think of using non-conventional energy in effective manner. we have overcome many disadvantage of normal car such as minimizing Coupling losses, BLDC minimizes field losses, smooth handling of speed and fuel cost is minimized .The major parts used while manufacturing a solar car are chain drive gear sprocket belts or pulley for braking system Photovoltaic module, Solar tubular batteries, BLDC, Ackerman steering, Mechanical structure and MCB .Some of the accessories of solar car are Ackerman steering, Mechanical structure, Miniature Circuit Breaker. At present, the designed solar car runs at a speed of 30 Km/hr for one charging which takes approximately 18 hours and successfully tested for 100Km per charge. Further work is in process to develop the vehicle with Reluctance motor as now it is run by BLDC. It is also proposes to use solar panels of higher efficiency with minimal size. Various drawbacks of the vehicles are studied and steps are in process to eliminate them, hoping that a successful commercial model of solar car will be developed in the future.

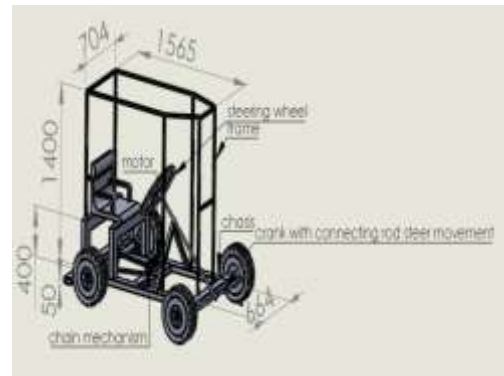


Fig. 2.2 Design structure of EV

In order to find the performance the present worth of all component ,present worth of any item is the amount of money that need to be invested. The solar car with 1 seat contain 700 w motor with 48 v battery with 200w solar panel will be required to supply the necessary power. Three different power operation modes are defied for the converter, Depending on utilization state of the battery. Battery charging in the system is carried out from the amorphous solar panel mounted on the body. The efficiency of the system will improve since the solar energy is directly given to the DC load. The capacitor which is connected to the lead acid battery will charge at off peak hours and discharge during the acceleration time of the car.

III. METHODOLOGY:-SOLAR SYSTEM:-

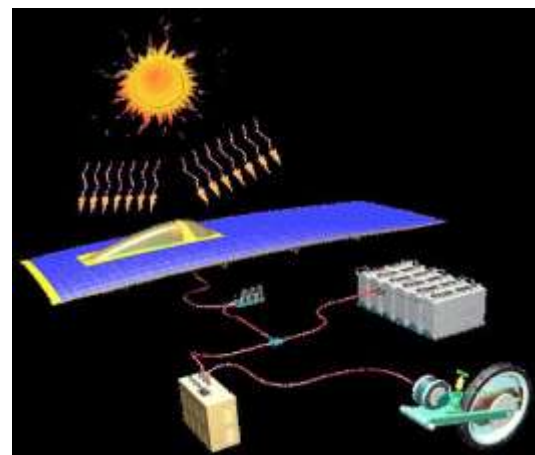


Fig. 3.1 Solar power used in operation of EV

The BLDC motor is an alternating current electric motor excited by DC electricity and from a mathematical modeling viewpoint looks similar to DC motors.



Fig. 3.2 DC Motor used in operation of EV

The axial flux BLDC motor named as “pancake” has a stationary wound stator and two rings of magnets that turn the wheel and make the Vehicle move. A power electronics converter controls the motor speed and torque through pulse width modulation (PWM).

Solar arrays are built by connecting several individual solar cells in different series and parallel combinations in order to increase the voltage or current output of the array, respectively.



Fig. 3.3 solar (PV) panel used in operation of EV

It is usually recommended to connect the PV panels in parallel to overcome the shading effect problem. Therefore, in our proposed design, all PV panels will be connected in parallel. It is also decided to choose monocrystalline silicon solar panels because they are space efficient and have longer life time.

One of the major elements of any electric vehicle is its battery pack. The battery pack has three main functions:

- ❖ To provide an energy store for use whenever the solar array is not producing enough energy.
- ❖ To supply direct current to the motor when required.

- ❖ To smoothen the fluctuation of the current and voltage output from the PV arrays into the loads.

The motor controller allows the motor to rotate at different speed; it takes the input from the battery and gives output for motor.



Fig. 3.4 Battery

Controller used in the solar car has an input and output rating of 48 to 60 volt and has a current rating of max 30 ampere.



Fig. 3.5 Controller used in operation of EV

There are two outputs from the motor controller, one for the acceleration pedal and other for the motor. The internal circuitry for acceleration control further converts the input voltage into low current system.



Fig. 3.5 Boost Converter

Boost converter is basically a dc transformer which can step up or step down the voltage on the basis of chopper circuit. We can increase the output voltage by increasing the duty cycle of semiconductor switch. We can directly charge the battery through an inductor to prevent the sudden change in current. We can, as well as connect the Dc motor directly to the circuit.

IV. RESULT & CONCLUSION:-

Many research works has been carried out in developing solar electric car and increasing its performance. The above review paper presents all the major research carried out in the area of solar electric vehicle. After performance study, it is obtained that storage system can run the solar vehicle about 12 km. The maximum speed of the solar vehicle has been found at 20 km/h. Since solar cars can easily incorporate future technology, we hope that it would not be long before the majority of the worlds' people would switch to driving this modern vehicle and thereby bring about a positive change in their lives and the environment. This is just the beginning of a new technology and it is guaranteed that future developments will make solar cars the predominant mode of transportation over vehicles with internal combustion engines.

V. FUTURE SCOPE:-

The solar car will offer the ability to drive anywhere without burning any environmentally damaging fuels or needed to plug in for a charge; it runs completely, as the name suggests, on solar energy. It is an extremely tantalizing idea for those of us looking to reduce humanity's carbon footprint.

Solar energy/Solar panels are playing a major role in the economy today in terms of saving electricity & creating green house or eco-friendly atmosphere. But when it comes to the automobile industry and their quest of powering the huge engines, it is still in the research phase as to how to compete with the fuel efficient vehicles. Most of the concept cars launched today are focusing on solar energy & Hybrid technology. These vehicles are superstitious in design but also carry one of the most expensive components to assemble a vehicle such as titanium, carbon fiber & fiber glass etc.

India aims to achieve 100GW of solar capacity by 2022. Charging an electric vehicle with a renewable source of energy like solar power will drastically help reduce overall carbon emissions. Where solar powered vehicles extract energy from direct sunlight, Hybrid vehicles are restricted to use

battery to a specific speed limit and then automatically convert on fuel.

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