International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

MANUFACTURING OF SOLAR CAR

Kanse Akshay[1], Patil Hemant[2], Kumbhar Avdhut[3], Rode Atul[4], Dr. Mahatme A. B.[5]

[4]Student, Fabtech Technical Campus College of Engg. And Research Sangola.
[5]Professor, Dept. of Mechanical Engineering, Fabtech Technical Campus College of Engg. And Research Sangola, Maharashtra, India.

Abstract - *In this paper a detailed study of a solar powered manufacturing solar car has been carried out. The sustainability and efficiency of electric vehicles (The E-Car) has been assessed as well. The factors that have been considered in this study are energy flow, the electric system design, mechanical features and overall weight and costs. This paper describes theeffect of a solar panel area and orientation within this tropical region like Bangladesh. Also, the vehicle dimensions and electrical system components on vehicle performance, weight, and fuel savings have analysed. It is seen that significant fuel-savings could be achieved by using solar & electric power in comparison to the traditional vehicle. A complete set of data are analysed to examine the technical aspects of the hybrid car technology. The solar radiation data and sky clearance rate for various time period in Bangladesh have been shown using HOMER software analysis. Hybrid technology is highly prospective in the near future*.

Keywords: **Solar pannel, batteries, BLDC motor, charge controller, electrical system.**

1. INTRODUCTION

The unsustainable nature of fossil fuel and its horrendous effect on our environment create concerns to find an environment friendly alternative energy source as dependency on fossil fuel is increasing exponentially. Quest of finding environment friendly energy source show us the alternatives of all fuel types and energy carriers types renewable energy sources like sun, wind, tides, hydropower and biomass which are safe, clean and different from fossil fuel. All renewable energy sources are effective but solar energy is the most sustainable as our sun will provide this solar energy for another billion year. Photovoltaic cell efficiency increases every year as new ideas with new technology keeps improving every year and production of photovoltaic panels is now most than ever before, doubling its production in every two years. Now it is the fastest growing alternative energy source of all renewable energy sources. So, considering improvement in solar energy technology, growth, efficiency and effectiveness we should implement this technology as this is environment friendly and sustainable. In last few years, lots of researches have been conducted and increasing attention has been spent towards the applications of solar energy to car. Various solar cars have been built and tested. In spite of a significant technological effort and some spectacular outcomes, several limitations, such as low power density, energetic drawbacks, weight, fuel savings and cost, cause pure solar cars to be still far from practical feasibility. So the necessity tells us that we need such a tool or system that can evaluate overall performance of a solar car in different conditions.

2. BLOCK DIAGRAM

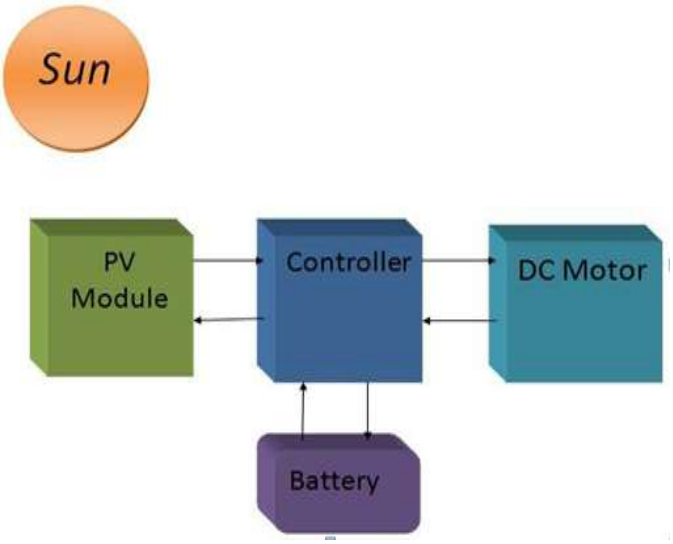


Fig. Block Diagram of Project

Figure shows the fundamental parts of solar car which we are going to model and implement. The main four parts are PV Module, Battery, DC motor and charge controller.

3. IMPELEMENTATION METHODOLOGY

3.1. Hardware Discription

A. SolarPanel

Solar cars are powered by the sun's energy. Solar panels are the most important part of a solar car since they are solely responsible for collecting the sun's energy. We will install the panel and observe different characteristics of it.

B. Battery:

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.

C. BLDC Motor:

The motor drives the car by the converting electrical power to the mechanical. Here we are using hub motor which having zero transmission losses.

D. Charge Controller:

A charge controller is used to maintain the proper charging voltage on the batteries. As the input voltage from the solar array rises, the charge controller regulates the charge to the batteries preventing any overcharging. The basic functions of a controller are quite simple. Charge controllers block reverse current and prevent battery overcharge. Some controllers also prevent battery over discharge. So, it is an essential part of nearly all power systems that chargebatteries.

3.2. Proposed system:

3.2.1. Working and operation of vehicle:

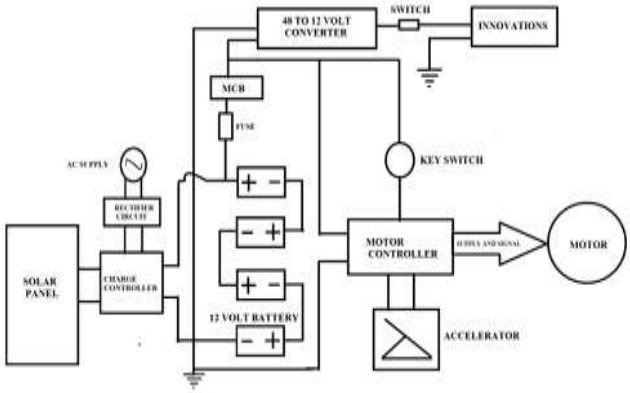
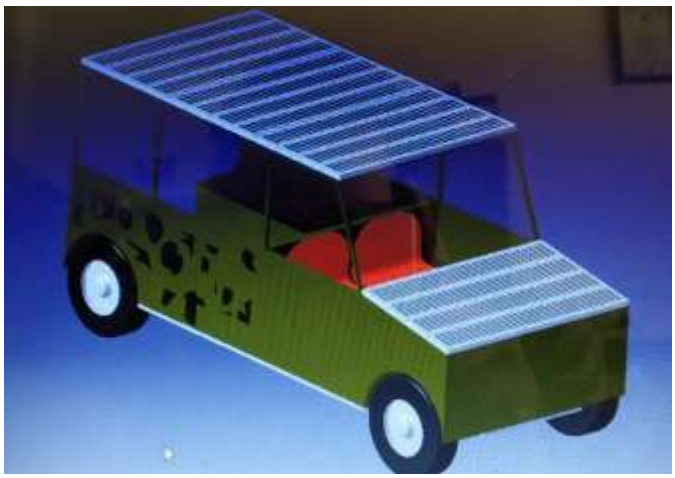


Fig. Schematic Diagram of Electrical System

Smart solar vehicle comprises above electrical accessories which combines with mechanical components and acts as electric automobile vehicle. Since pollution becomes major issue to the human society, electric vehicle becomes a vital solution in all aspects hence we aimed to this project. In this project an advanced motor acts as drive which works on signals and electric power. As the awareness of environmental protection and energy saving continues to rise, only the electric vehicle can realize real zero oil consumption and zero pollution. The gasoline engine and the diesel engine (no matter how much their efficiency is improved) as well as hybrid vehicles all consume fossil fuel, so there is still some way to go in realizing real zero emissions. Therefore, the electric vehicle with zero emission will undoubtedly become the mainstream means of private transportation in the future. The Governments of each country and their societies have outlined large scale plansto promote battery-powered electric vehicles and are vying for considerable opportunities to change the nature of private vehicles. In electric accessories batteries, solar panel, electric motors (BLDC) are major parts. Although several batteries and fuel cells have been developed, only available at affordableprice is the lead acid battery. Therefore, electric vehicle are generally powered by lead acid battery. For this project 48 volts supply is obtained by combining 4 batteries of 12 volt each in series having 60 ampere hour rating separately. These batteries are lead acid batteries, having 80% deep charging with nominal charging voltage 14.8 volt individually. In motor selection we can choose series and separately excited dc motor, permanent magnet dc motor, brushless dc motor and induction motor can be used in electrical vehicles as a drive. In order to make the operation more reliable, more efficient and less noisy BLDC motor is used as drive efficiency of BLDC motor is typically around 85-90% where as conventional brushed motor are only 75-80% efficient also BLDC motor has better speed control, here BLDC motor used as main drive having power rating 900 wattage, nominal operating DC voltage 48v.maximum rated current of 17 ampere. Out-Runner BLDC motor in which runner if fitter around stator. In runner BLDC design in also available in the market. Out-Runner design has a definite mechanical advantage over the in-runner design. At higher speed the runner tends to expand slightly due to centrifugal force. As the result, in runner design a good amount of clearance should be given between the rotor and runner to avoid collision. Such higher clearance increases the magnetic flux leakages and reduces efficiency of the motor. But the outer runner design has no such limitation, as the runner at the outside is free to expand.

4. RESULT AND OBSERVATION:



5. CONCLUSION:

Facing the ongoing energy crisis of the world, it is important that we harvest all the energy available to us and implementing them such a way that will bring us in taking a step ahead towards doing so. Solar energy more specifically solar vehicles would be an amazing advancement in future vehicle technology because it is infinite, efficient, cheap and of course eco-friendly. It also makes good sense to develop a green vehicle technology that vehicle manufactures will be able to save energy without cutting down on the luxuries that they provide to their customers. Since we develop a dynamic model of a solar vehicle, we hope that it will help to examine

the technical aspects of the solar vehicle technology. This model provides a clear understanding about the temperature effects on the model as well as we come to know the charging/discharging rate (SOC) changes the capacity and all other functions of it are very much related with it. Also it will be used for research work and educational purpose. In future we will try to research on the C-rate or deep cycle of the battery through this model to figure out the battery's longevity which will be very much helpful for the user.

6. REFERENCES:

1) Silvana Botti, Julien, "Vidal Energy Generations ; Solar Energy," JWST Feb 2013

2) V.B.Bhandari, "Design Of Machine" Tata McGraw-Hill Education, 2010

3) Kirapal Singh "Automobile Engineering Vol.1 and Vol.2-Standard Publiccation,2010

4) R.S.Khurmi "Theory of Machine" Eurasia Publishing House, 200.