

FABRICATION OF SOLAR POWERED VEHICLE FOR FOUR WHEELER

Saurabh KR. Mishra¹, Sangam Yadav², Siddharth Upadhyay³, Bhoopendra KR. Singh⁴, Akash⁵,
Mr Vivek Narayan⁶

¹⁻⁶Department of Mechanical Engineering, BBDITM, Lucknow, India

Abstract - The idea of this project is to design a solar car that aims to tackle the problems related to pollution and shortage of fuel.

The renewable energy is significant for today's world as in near future the non-renewable sources that we are using are getting to get exhausted. The solar vehicle may be a step in saving these non-renewable sources of energy. The basic principle of solar car is to use energy that's stored during a battery during and after charging it from a solar array. The charged batteries are wont to drive the motor which serves here as an engine and moves the vehicle in reverse or forward direction. The electrical tapping rheostat is provided so on control the motor speed. This avoids excess flow of current when the vehicle is meant to be stopped suddenly because it is in normal cars with regards to fuel. This a way, which may help to protect our fuels from getting exhaust in future.

Key Words: Non-Conventional Energy, Used for running Eco-friendly vehicles

1. INTRODUCTION

1.1 Problem Statement

Energy is one among the foremost vital needs for human survival on earth. We are hooked in to one sort of energy or the opposite for fulfilling our needs. One such sort of energy is that the energy from FOSSIL FUELS. We use energy from these sources for generating electricity, running automobiles etc. But the most disadvantages of those FOSSIL FUELS are that they're not environmental friendly and that they are exhaustible. To affect these problems of FOSSIL FUELS, we'd like to seem at the NON- CONVENTIONAL SOURCES of energy. With regard to this idea we have designed an Electrical vehicle which runs from solar energy. The vehicle designed may be a three wheel drive and may be used for shuttle and short distances. As these vehicles form the longer term of the automotive industry, we'd like to consider improving their design and making them cost effective. This vehicle is an initiative in this direction.

The main source of the energy for this vehicle is 'Sun'. The Sun Energy is captured by the solar panels and then converted into electricity. The electricity thus formed is being fed to the batteries that get charged and is employed to run 24VD Chightorques DC series motor. The motor shaft is connected to the back wheel of the vehicle by chain sprocket. The batteries are initially fully charged and thereafter they're charged by panels. This helps incompleting the

charging-discharging cycle of the batteries, which is extremely important for correct working of batteries.

This Project helps people by saving money, time and energy. This Project uses solar power there won't be any pollution so no caused to be worried.

This will minimize the waste of fossil fuel. The Vehicle Developed by using mono-crystalline solar panel uses the energy of sun to run the vehicle.

1.2 OBJECTIVE

a. The main objective of this project is design and manufacturing a vehicle that is capable for city transport using Solar Energy.

b. Individual can easily operate this vehicle with a minimum knowledge without any problem.

c. Save electricity by using solar panel, which produce pure clean energy.

d. Eco- Friendly, self power generation were used but in our proposing system we will minimise the cost and improve the efficiency by using mono-crystalline solar panel, in our project we are using solar energy.

2. LITERATURE REVIEW

Vishal S [1] "Improved that the solar car is to make an eco-friendly vehicle with the assistance of solar power. Initially solar panels are used as a source of power to charge the batteries in addition self power generation system and thermo-electrical power generation system is also used as an alternate source to charge the batteries. The mentioned systems help to run the solar vehicle during the absence of solar power".

Sharma et al. [2] "Discussed about the future of vehicles that seems to be with the combination of various energy sources. This sort of growth in vehicles to look for the benefits from the best quality of each energy source and it is particularly useful in urban driving vehicles. Cities of India one of the major medium of transportation like buses, lorries and auto rickshaws, which produce a huge amount of air contamination as well as greenhouse gases like CO₂. At present, transportation charges increases due to the usage of costly non-renewable fuel".

Wamborikar et al. [3] “Discussed that the sources of energy for generating electricity, running automobile vehicles etc. But the main drawbacks of these fossil fuels are that they are not environmental friendly and they are exhaustible. To deal with these problems of fossil fuels, it is necessary to look at the non- conventional sources of energy. Because of this, an Electrical motor vehicle that runs on solar energy is designed”.

Xiujuan, et al [4] “Explained the advantage of electric vehicle that has zero discharge, less noise and wide source for energy supplement the transformation efficiency of the photovoltaic cell plate is very low (i.e.) 14% because of strong maneuverability the working environment of the solar car changes frequently algorithm of max power point tracking should be increased to urge high transformation efficiency condition at the present , the common maximum point tracking methods are the constant voltages tracking method, the perturbation and observation control and therefore the conductance increment method. The conductance increment method for accuracy tracking is the best among them. It achieves the tracking of the utmost point . It is obvious that the output power varying different area once we change the working voltage within the area of constant current source the sensitivity is low and in constant voltage load the sensitivity is clear therefore the tracking method should be improved so as to enhance the accuracy of the utmost point tracking, when the temperature and the light intensity are definite, and therefore the output power of the solar cell is on the brink of the utmost power which is that the most at the present condition same extent, the tracking step length would properly lessened , in order that the maximum power point can be tracked more accurately”.

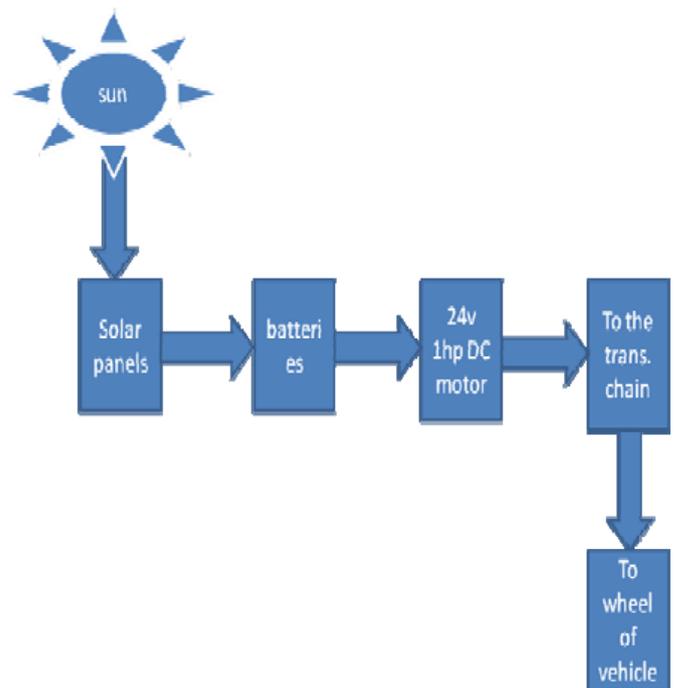
N.Sasikumar, Dr.P.Jayasubramaniam [5] “Explained Conventional energy sources like coal, oil, gas , etc., are limited in quantity, and if these still be depleted at this rate, these will be exhausted in the coming decades. Energy demand is resulting in the creation of fuel based power plants leading to substantial greenhouse emission emissions having an adverse impact on heating and

climate change Solar energy is a clean, climate-friendly, abundant and inexhaustible energy resource for humans. The costs of solar power are falling rapidly and are entering new areas of competitiveness. Solar Thermal Electricity (STE) and Solar Photo Voltaic Electricity (SPV), both become in competition against conventional electricity generation in tropical countries Solar photovoltaic (SPV) cells convert solar radiation (sunlight) into electricity. A photovoltaic cell may be a semiconducting device made from Silicon materials, which, when exposed to sunlight, generates electricity. Solar cells are connected serial and parallel combinations to make modules that provide the specified power.”

3. METHODOLOGY

- 3.1 In this proposing system we will going to make the vehicle that will help full for transportation.
- 3.2 In this vehicle solar panel is used to consume solar energy and this energy is converted into electrical energy. The electrical energy stored inside a 12 v battery which then gives the necessary power to a DC motor.
- 3.3 Mono-Crystalline Solar Panel is used and this panel collects peak energy from sun.
- 3.4 The stored Solar energy in form of Electrical energy in battery is used drive the motor of the vehicle, i.e, Solar vehicle runs . We are improving the efficiency of the solar vehicle by using mono-crystalline solar panel which is very much efficient than the other solar panels, so the number of solar panels used in our project is less so its weight also become less.

4. BLOCK DIAGRAM



5. COMPONENTS/ HARDWARES

- 5.1 Controller
- 5.2 Motor
- 5.3 Wheel
- 5.4 Chasis
- 5.5 Screw
- 5.6 Solar Panel
- 5.7 Battery

6. SELECTION OF VARIOUS PARTS THAT ARE USED IN THIS PROJECT

6.1 Controller-

A controller is a small computer (which is used to operate all devices like DC motor, Bluetooth module etc.) on a single integrated circuit.

6.2 DC Motor-

The motors used for this vehicle are of following specifications-

Voltage- 3V

Torque- 4.2N/m

Speed- 428 rpm

6.3 Solar Panel-

The solar panel which we are using is of following specifications-

Voltage- 4C

Current- 1.425 A

6.4 Battery-

The battery we are using in our project is of following specification-

Voltage- 8V

Current- 1 Amp

Rechargeable battery

7. DESIGN AND CALCULATIONS

7.1 Drag Force

Force exerted on the vehicle is due to its shape. The formula for calculating drag force is given by $F_d = \frac{1}{2}\rho C_d A V^2$

Where, F_d = Drag force; C_d = Drag coefficient; A = Projected frontal area; V = Velocity of the car; Density of air = 1.2 Kg/m^3

For this car, $C_d = 0.338$, $A = 0.4425 \text{ m}^2$,

$V = 2.777 \text{ m/s}$

$F_d = \frac{1}{2}\rho C_d A V^2 = 0.5 \times 0.338 \times 0.4425 \times 7.72 \times 0.3$

$= 0.1732 \text{ N}$

7.2 Frictional Force

Frictional force of the car,

$F_r = W \times C_d \times 9.81 = 40 \times 0.338 \times 9.81 = 132.6312 \text{ N}$

Where, W = Total car weight; F_r = Rolling friction of wheel.

7.3 Power Produce

$P = F_r \cdot V$

$F_r = F_r + F_d = 0.1732 + 132.6312 = 132.8 \text{ N}$

Power Produce = Voltage \times Current = $V \times I$

$= 1 \times 4.275 \times 1.45 = 2.033 \text{ W}$

8. CONCLUSIONS

In order to deal with the increasing demands for fuel and therefore the disastrous environment pollution thanks to driving carbon-based vehicles, it's quite necessary to modify to a replacement source of energy, i.e. the solar energy which might be an inexpensive, efficient, limitless and in fact an eco-friendly alternative. Solar vehicles are safe with no volatile fuel or hot exhaust systems.

They are eco-friendly vehicles, odorless, smokeless and noiseless. They require less maintenance, and more reliable with little or no moving parts and may be efficiently charged nearly anywhere. Needless to mention it's considerably cost efficient.

9. REFERENCES

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