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Design and Development of Solar Two Wheeler

Prof.P.L.Chavan
Department of Electrical Engineering AMGOI Vathar

Gavandi Munir Akram
Department of Electrical Engineering AMGOI Vathar.

Varute Jaysing K.
Department of Electrical Engineering AMGOI Vathar,

.Patil Vaibhav N.
Department of Electrical Engineering AMGOI Vathar

Patil Pradip D.
Department of Electrical Engineering AMGOI Vathar

Kamble Sagar H
Department of Electrical Engineering AMGOI Vathar

ABSTRACT

In a world where environment protection and energy conversion are growing concerns, the development of solar vehicle has taken on an acceleration pace. The dream of having commercially viable solar vehicle is becoming a reality. EV's are gradually available in the market. This opportunity is taken towards design and development of Solar two wheeler. Solar vehicle is a multi-disciplinary subject which covers broad and complex aspects. However, it has core technologies, namely propulsion technology, energy source technology, storage and control technology. As energy source solar panel is used and developed voltage is stored in battery and used for the drive the hub motor which is used as rare wheel of the vehicle.

Introduction

Now, present day nonrenewable energy sources are being destroyed so we need the use of renewable energy sources. A renewable energy sources is a natural sources of energy which can be replenished with time through natural processes so we use the renewable energy sources like solar energy by using solar panel ,we design solar electrical scooter The present day main problem is population ,with growth of population increase the number of vehicles which is run on petrol-diesel. This creates the environmental pollution and effect on human life. If all the vehicles are propelled by internal combustion engines, where will oil comes from? In our work to design a scooter with renewable solar energy we firmly. Believe that solar electrical scooter is one of the best methods to minimizing environmental damage caused by co2 emissions

The advantages of solar electrical scooter are –

(1) Give clean energy which will reduces co_2 Emission
(2) There is no need of fuel
(3) Noiseless and low maintenance.

In this work our focus towards use the maximum renewable energy, which is coming from sun by using solar panel

Methodology

In our project solar photon energy is used as fuel. It is converted into electrical energy by using solar panel. This energy is used as a power to electrical vehicle .A regular IC engine scooter modified for our project .The engine of this scooter is replaced by DC hub motor. The rating of that hub motor is 48 volt, 0.33 Hp. This hub motor get power from 48 volt, 7.5 Ah Lead acid battery bank. For controlling the speed potentiometric method is used. A single 75 watt solar panel is used to charge battery.

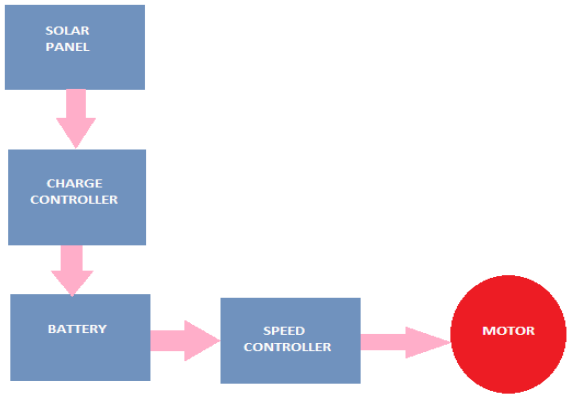

Fig.1: block diagram

A. Solar Panel

Multi-crystalline type Solar panel converts photon energy of the sun into electrical energy. It Is mounted on a scooter such way that it receive more and more photon energy . multi-crystalline type solar panel is more efficient than the other type mono crystalline . in our PV module 36 cells are used .for protection purpose thick glass is used to cover module.

Table .1: Specification of solar panel

Panel size	
Cost of panel	3375
Weight of panel	8kg
Maximum power	75W
Open circuit Voltage	21V
Short circuit current	4.20A

B. Lead-Acid Batteries

Lead acid batteries have ability of fully high current .This batteries has good power density and emery density ratio. Its charge, discharge, efficiency is about 80% [1]. Lead acid batteries have large power to weight ratio, the lead acid batteries are safe, its cost his low and also these batteries are reliable because its popularity and demand modified version of these batteries cells are used to improve storage times and reduces maintenance requirement.

Table.2: Specification of Battery

Weight of battery	4*2.5=10Kg
Rated Current	7.5Ah
Operating Voltage	12v
Cost of battery	3200

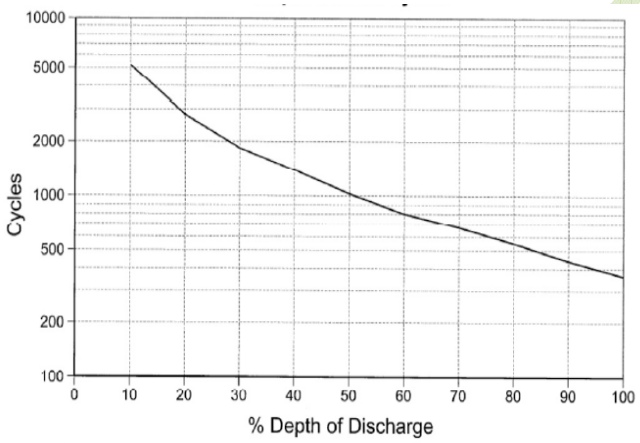

Fig.2: Battery discharge graph

a) **HUB motor**:

The basic idea is just the cell in an ordinary motor we have a hollow outer ring shaped permanent magnet that stay static (called as stator) and an inner metallic core that rotted inside it called rotor. The spinning rotor has an axel running through the middle that we used to drive the machine. But what if we hold the axel firmly then rotor and stator have no choice but to swap their roles. When we switch the power the outer part of motor rotates, becoming wheel that powers the vehicle forward.

Table.3: Specification of Hub motor

Operating power	250W
Operating voltage	48v
Operating current	5.20A
Motor cost	2500
Motor speed	1240RPM

DEVELOPMENT OF DRIVING CYCLE

The first step in developing a driving cycle is to measure and record real driving behaviors. The Obtained data has to be analyzed in forming a representative cycle from real conditions. The initial need for this work is to measure and record the vehicle speed. The measurement of speed by using the equipment provided in the vehicle like speedometer.

A. Design and Development

The design concept is developed for driving a scooter with individual wheels of the vehicle separately propelled with different sources. The rear wheel will be coupled to the vehicle as in before driven by hub motor, whereas the rare wheel is replaced with an electric motor in-

wheel drive driven by fore DC batteries. The chosen test vehicle for the analysis purpose is TVS Spirit made, two-stroke, continuously variable transmission, more suitable for testing purpose. For analysis, the mechanical arrangements with respect to suspension in the rare wheel are being altered as per the required design for holding the motor wheel.The controller for the motor is being interfaced with the motor speed regulation. The speed controlling throttle is being interfaced through the motor controller circuit. The motor used here is 48V, 250W, 5.20Ampere made hub motor. The controller for the motor is also Ampere made suitable for controlling the specified motor. The throttle is an ampere made throttle for speed regulation of the specified motor. The input to the motor is supplied by fore Exide made Electra lead-acid batteries each of 12V, 7.5Ah through controller for testing purpose.

Analysis Of The Design

The hardware model is developed for the testing purpose as displayed below.

Fig.3: Designed test vehicle.

Anyalysis Of The Recorded Data

As the primary need for this work is to record the data, the method of recording the speed is done through tachometer provided in the vehicle. The following data are recorded by making the vehicle to travel in the selected route. The total distance covered in this trip is 3Km. The time taken for covering this distance is 272 seconds under moderate traffic condition.

The designed test vehicle is analyzed in the test area route. The area considered for stock vehicle analysis in deriving the above driving cycle is the same route chosen for analyzing the design. The vehicle is driven in the test area and observed parameters are given below in table 4.

Table.4: Observed parameter

Maximum speed attained at the end of acceleration period	30kmph
Time of run	350seconds
Total distance	3km
Average speed	30kmph

DISCUSSION AND CONCLUSION

Solar energy, a renewable source of energy is an upcoming form, which if properly used, can give rise to tremendous energy which can further be used in different forms. Research is still in progress on applications like solar powered automobiles, solar powered steam turbines, etc. A solar electric scooter, is a basic type of automobile which can run both on solar power as well as electricity. With an unhealthy hike in the prices of petrol and diesel, an automobile running on solar power can create a trend. This kind of a scooter is user friendly. It is very simple to use and manage. It can be used even during the times when there is no sunlight. Because, the sun's energy trapped by the solar panel can be efficiently converted in electrical energy and stored in a battery. The importance of these kinds of applications is gradually increasing with the diminishing non renewable energy sources like fossil fuels and the like.

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