SOLAR POWERED VEHICLE

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Abstract: The renewable energy is vital for today's world as in near future the non renewable sources that we are using are going to get exhausted. The solar vehicle is a step in saving these non renewable sources of energy. The basic principle of solar car is to use energy that is stored in a battery during and after charging it from a solar panel. The charged batteries are used 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 as to control the motor speed. This avoids excess flow of current when the vehicle is supposed to be stopped suddenly as it is in normal cars with regards to fuel. This idea, in future, may help protect our fuels from getting extinguished. All recent electric vehicles present drive on AC power supplied motor. The setup requires an inverter set connected to battery through which DC power is converted to AC power. During this conversion many losses take place and hence the net output is very less and lasts for shorter duration of time. Although this is cheaper the setup and maintenance required is much more in AC drive than DC drive.

I. INTRODUCTION

Solar energy is radiant energy that is produced by sun. Every day the sun radiates, or sends out, an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time. It comes from within the sun itself. Like other stars, the sun is a big ball of gases- mostly hydrogen and helium atoms. The hydrogen atoms in the sun's core combine to form helium and generate energy in a process called nuclear fusion. During nuclear fusion, the sun's extremely high pressure and temperature causes hydrogen atoms to come apart and their nuclei (the central cores of the atoms) to fuse to become one helium atom. But the helium atom contains less mass than the four hydrogen atoms that fused. A solar car gets the energy it needs to move from sunlight. If you look at the solar car below you can see that much of its surface looks black. This helps it to absorb the sunlight-black objects absorb most of the light that falls upon them. Usually, black objects just get hot in the sun. But in a solar car, some of the light is converted to electricity by a device called a "solar cell." Each of the dark panels that you can see in the photograph contains many such solar cells. The electricity is used to drive the car's electric motor. Excess electricity is stored in a battery for cloudy periods.

II. WHY SHOULD WE CHANGE OUR CARS?

In the last years, there is an increasing awareness about the need to achieve a more sustainable mobility, allowing meeting the mobility needs of the present without compromising the ability of future generations to meet their needs .The most pressing arguments towards new solutions for personal mobility are the following:

- The CO2 generated by the combustion processes occurring in conventional thermal engines contributes to the greenhouse effects, with dangerous and maybe dramatic effects on global warming and climatic changes.
- The worldwide demand for personal mobility is rapidly growing, especially in China and India; as a consequence, energy consumption and CO2 emissions related to cars and transportation are expected to increase;
- Fossil fuels, largely used for car propulsion, are doomed to depletion; their price is still growing, and is subject to large and unpredictable fluctuations.
- Transportation has a marked impact on acoustic and atmospheric pollution in urban areas: consequently, there is an increasing trend to create emissions-free urban areas accessed only by ULEV's (ultra low emissions vehicle) or ZEV's (zero emissions vehicle).
- Manufacturing prize on car is very low.
- Cost reduce on petrol, diesel.

a) WHY SOLAR ENERGY ?

The Kyoto Protocol, and the subsequent decisions taken at various political levels, have emphasized the recourse to renewable energy sources as one of most effective solution to such problems. Is it therefore natural to wonder about possible use of solar energy for automotive applications. The conversion from light into direct current electricity is based on the researches performed at the Bell Laboratories in the 50's, where the principle discovered by the French physicist Alexandre-Edmond Becquerel (1820-1891) was applied for the first time. The photovoltaic panels, working thanks to the semi conductive properties of silicon and other materials, were first used for space applications. The diffusion of this technology has been growing exponentially in recent years, due to the pressing need for renewable and carbon-free energy. World solar PV installations were 2.826 gig watts peak (GWp) in 2007, and 5.95 gigawatts in 2008, with a 110% increase. The amount of solar energy is impressive: the 89 pet watts of sunlight reaching the Earth's surface is almost 6,000 times more than the 15 terawatts of average electrical power consumed by humans (Smil, 2006). The applications range from power station, satellites, rural electrification, buildings to solar roadways and, of course, transport.

III. OBJECTIVE OF SOLAR CAR

- Unlike regular cars, solar energy powered
- Cars are able to utilize their full power at any speed.
- Solar powered cars do not require any expense for running.
- Solar cars produce less noise.
- Solar cars essay to maintenance.
- Solar cars produce no harmful emissions.
- A solar powered car is gasoline independent, thus it will help to protect our budget as well as the environment.
- Driving a regular car is the most air-polluting act, while driving a solar powered car that is very quit has zero harmful emission and does not need expensive fuel.
- Less vibration.

IV. METHODOLOGY

The solar car gets the energy it needs to move from sunlight. If you look at the solar car below you can see that much of its surface looks black. This helps it to absorb the sunlight-black objects absorb most of the light that falls upon them. Usually, black objects just get hot in the sun. But in a solar car, some of the light is converted to electricity by a device called a "solar cell." Each of the dark panels that you can see in the photograph contains many such solar cells. The electricity is used to drive the car's electric motor. Excess electricity is stored in a battery for cloudy periods.

The solar car is consist of following part

1) Chassis
2) Battery
3) Motor
4) Solar panel
5) Break
6) Wheel

V. WORKING

The solar module mounted on the top of car is used to charge the batteries via charge controller. A 140 WP solar module is used with output ranging from 24V to 25V at STC. The batteries are initially fully charged and then they are connected to solar module for charging. This helps to keep the battery charged always. This is also done as the efficiency of solar module is only 15%.Thus under this condition the battery gets fully charged again within 3hrs-3.5hrs. Thus to keep the full sine wave of charging this time lap is made. The maximum solar radiations are obtained between morning 10am to evening 3:30pm. Hence the panel is so mounted that maximum output may be obtained. As the supply is given through DPDT switch the motor takes a high starting current to propel the wheel to move in forward direction. On start the load on motor is nearly 180 kg including the weight of person driving it. The motor after start acquires the maximum speed of 20kmph to 30kmph. The batteries get charged always from the solar panel and so it provides the continuous run for the vehicle. Motor must be started on top most gear so as to get maximum torque and speed to lift the full load. The speed may be varied later according to the driver's requirements.

The speed varies the load current also varies. So the speed variation must be low to keep battery alive for maximum duration of time. For stopping the motor, the speed control switch should be brought to minimum gear and then switch should be open; thereafter the mechanical brakes should be applied. The mechanical brakes can be applied instantly during emergency but this should be avoided as this could damage the motor and also produce unnecessary back emf. The average battery back-up is around four hours.

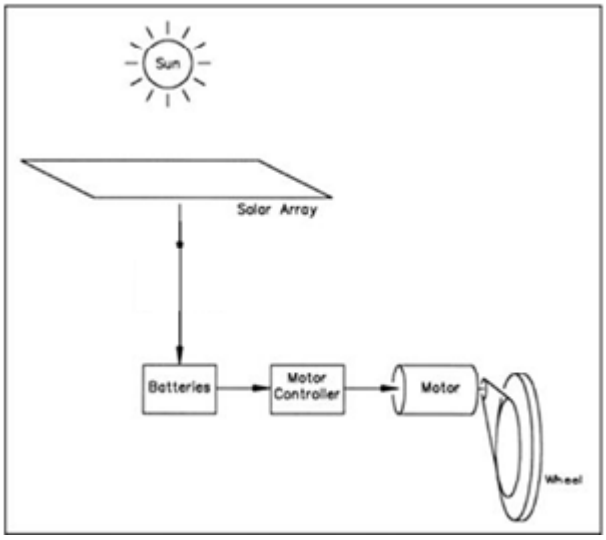

Fig. 1 Basic block Diagram Representation of Solar vehicle

VI. ADVANTAGES

- Unlike regular cars, solar energy powered cars are able to utilize their full power at any speed.
- Solar powered cars do not require any expense for running.
- Solar cars produce less noise.
- Solar cars essay to maintenance.
- Solar cars produce no harmful emissions.

VII. LIMITION

- Solar cars don't have speed or power that regular cars have.
- Solar powered cars can operate only for limited distance.
- If there is no sunlight.
- If it is dark out for many days, the car battery will not charge and this can be a problem.
- This is the main reason why people don't rely on solar cars.
- Good solar powered car is expensive. It cost around $200,000 or more.
- Parts used in solar cars are not produced in large quantity so they are expensive.

VIII. FUTURE WORK

Hybrid solar car use a combination of internal combustion engine (ICE) and solar panel, electric motor powered by

stored battery system. It is driven by specified petrol engine and solar energy obtained from solar panels on the surface (generally, the top or window) of the car vehicle. The stored battery system can be recharged by the solar energy and IC energy as well as regenerating braking system Photovoltaic cells converts the sun's energy directly into electrical energy. Hybrid Solar cars combine technology typically used in the auto three-wheeler, and four wheeler etc, alternative energy and automotive industries.

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