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DESIGN AND ANALYSIS OF SOLAR POWERED VEHICLE

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***Abstract* - One of the front runners in the area of renewable energy resources to day is solar power. Photo voltaic cells are used to convert solar energy in to useful electrical energy. The paper illustrates how the charge generated by an array of solar panels is received and its flow in and out of a battery pack is to be controlled using a microcontroller based charge controller to ensure efficient storing of charge in a battery pack. It is run with from the charge generated by an array of solar panels is received and its flow in and out of a battery pack is to be controlled using a microcontroller based charge controller to ensure efficient storing of charge in a battery pack.**

The stored energy would be divulged to a DC moto r which would run the car. The design of a motor controller to control the car's speed and forward direction of motion is shown. The mechanical construction from scratch of the chassis along with all necessary mechanical systems is illustrated. Finally, the wiring of the electrical system onto the mechanical body is demonstrated.

Keywords: Solar Power, Renewable Energy, Microcontroller, DC Motor

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. Photo voltaic production becomes double every two years, Increasing by an average of 48 percent each year since 2002. Due to its innumerable benefits in environmental, economic and social aspects PV systems have becomes the world's fastest growing energy technology. It can arguably be said that the only limitation to solar power as an energy source is our understanding of developing efficient and cost effective technology which can implement it .

II SOLAR PANEL

Solar panels have been around since the nineteenth century and since then till to day people have been using them for a variety of applications at home, business, for transportation and even for agricultural use. Solar panels are still considered expensive and their performance needs to be verified without completely relying on the provided ratings by the company producing them. In the case of a solar car, the solar panels will be the ultimate supplier of energy for the whole car to function; for all intents and purposes it will be akin to the heart that pumps blood around the human body. Therefore, a thorough verification of the performance of the solar panels to be used for the solar car was carried out.

2.1 How Solar Panel Work

Sun gives of radiated energy in the form of light photons which is converted into electrical energy by the solar panels. Solar panels are composed of silicon based semiconductors and when the radiation comes in contact with the silicon atoms,

The photons are absorbed and the electrons are separated from the rest of the atoms. These free electrons are responsible for carrying and creating an electrical current. The electricity generated is most usually stored in batteries to be used later.

2.2 *Objective*

The main objective of this project is to construct a solar car to allow transport for people travelling a certain amount of distance every day, for distance, the office commuters of with virtually no cost as it will run off free renewable solar energy. Since cars are the major mode of transport for office commuters in Dhaka city, shifting to this ecofriendly car would be beneficial on an enormous scale. The car would be able to commute safely a maximum round trip distance of 35km for example from Uttara to Motijheel, which is considered to be one of the largest office travelling distances in Dhaka city. Calculations shown later prove that this is easily possible. The proto- type solar powered car to be designed and built specifically f or the daily office goers of Dhaka ci t y would be light - weight, clean, environment friendly and completely independent of fossil fuels.

III LITERATURE SURVEY

The scope of the project involves designing and constructing a proto -type solar powered clean car that would be economical, reliable and environmentally friendly. The specifications of the motor driving the car is calculated based on the intended desired speed and acceleration to be achieved. This will in turn help calculate the battery capacity and a charge controller with the option of addition charging from AC lines, and a motor controller to control the speeding and

direction of motion of the car is designed. The chassis of the car is constructed with key components such as suspension system, a rack and pinion, drum braking system all put into place. Finally, an aerodynamic outer body shape is proposed.

IV TYPES OF SOLAR PANELS

There are three kinds of solar panels and they are,

1. Mono crystalline Silicon
2. Polycrystalline Silicon
3. Thin Film Amorphous Modules

4.1 Mono crystalline Silicon

Monocrystalline silicon solar panels have square-shaped cells and are one of the most efficient types of solar panels. These devices have the most silicon content out of all the different panel types, which makes them more expensive to make but conversely takes up quite less relative space. These solar panels are typically used in high reliability applications like telecommunications.

4.2 Polycrystalline Silicon

Polycrystalline silicon solar panels use less silicon, which makes them somewhat less efficient. However, the unique design, which features strips of silicon wrapped around rectangular conduit wires, allows them to function more efficiently. Certain circumstantial use of polycrystalline silicon solar panels such as when used on roof tops can yield efficiency as close to as those of monocrystalline silicon solar panels

4.3 Thin Film Amorphous Modules

Thin film solar panels are one of the cheapest types of panels, but are also the least efficient. The efficiency of amorphous modules to convert sunlight to electricity is half of polycrystalline or monocrystalline panels. These are not suitable for reliable home or Commercial use. However when the focus is on quantity rather than quality i.e. where large numbers of solar panels are required to produce a large amount of energy (e.g. in large array solar farms), due to their cheap mass production cost they become important.

solar cars have much less energy to work with to drive the car compared to say energy provided by internal combustion engines, it is important that this small energy is as efficiently utilized as possible. Also the lesser the space the solar panels take up over the body of the car the better it is. Therefore judging from the characteristics of the 3 types of solar panels as described above it was most prudent to go with the monocrystalline type of solar panels. Considering solar panel cost, durability, longevity, warranty, size and watt age, five monocrystalline flexible solar panels, bought from Chinese based company " Shenzhen Shi ne Solar Co. Lt d " was used in this thesis. It is very important to note that each of the panels were semi flexible which allowed the roof of the car (where the panels are to be placed) to have a more curved and aerodynamic shape rather being flat .

IV SOLAR VEHICLE

Solar vehicle are mechanical devices and have been in use since 1930s. A scissor jack is a device constructed with a cross-hatch mechanism, much like a scissor, to lift up a vehicle for repair. It typically works in a vertical manner. The jack opens and folds closed, applying pressure to the bottom supports along the crossed pattern to move the lift. When closed, they have a diamond shape. Scissor jacks are simple mechanisms used to handle large loads over short distances. The power screw design of a common scissor jack reduces the amount of force required by the user to drive the mechanism. Most scissor jacks are similar in design, consisting of four main members driven by a power screw.

- When compare to mechanical paper cutting machine, in this no damage will be occur.
- Production will be increased.
- The maintenance of the machine is low.
- It is more efficient than the hydraulic paper cutting machine.
- In this machine there will be no damages will be occur of ten like the mechanical cutting machine.
- We can stop the process of cutting at any situation and we can proceed the process from that point .
- Safety measurement is high when compared to mechanical paper cutting machine.

V CONCLUSION

In order to cope with the increasing demands for fuel and the disastrous environment pollution due to driving carbon-based vehicles, it is quite necessary to switch to a new source of energy, i.e. the solar power which would be a cheap, efficient, limitless and of course an eco-friendly alternative.

Solar-powered electric vehicles are safe with no volatile fuel or hot exhaust systems. They are zero emission vehicles, odorless, smokeless and noiseless. They require minimal maintenance, are more reliable with little or no moving parts and can be efficiently charged nearly anywhere. Needless to say it is very much cost efficient. Since solar cars can easily incorporate future technology, we hope that it would not be long before the majority of the world's 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 transport at on over vehicles with internal combustion engines

V FUTURE SCOPE

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IX REFERENCES

[1] Srinivasan.R, " Hydraulic and Pneumatic controls" , Vijay Nicole, 2006.
[2] Shanmugasundaram.K, " Hydraulic and Pneumatic controls" , Chand & Co, 2006.
[3] Majumdar S.R., " Pneumatic systems– Principles and maintenance " , Tata McGraw Hill, 1995
[4] Anthony Lal, " Oil hydraulics in the service of industry " , Allied publishers, 1982.
[5] Harry L. Stevart D.B, " Practical guide to fluid power " ,Taraoeala sons and Port Lt d. Broadey , 6. 1976.
[6] Michael J, Prinches and Ashby J. G, " Power Hydraulics" , Prentice Hall, 1989.
[7] Dudelyt , A. Pease and John T. Pippenger, " Basic Fluid Power" , Prentice Hall, 1987.s