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Renaisa-The Eco-Friendly Transportation

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Abstract: Now days, the prices of conventional fossil fuels have hiked up and their availability is not as before. The major threats faced by the earth such as greenhouse effect, global warming, pollution are influenced by the conventional fossil fuels. At the same time, the basic commodities fundamentally required by the people of the world are mainly met out through various transportation modes. Therefore, we are in need of an alternative either in the form of a fuel or in the form of a vehicle for transport. This search led to the invention of the next generation vehicles-THE HYBRID ELECTRIC VEHICLES. The next step to this HEV is RENAISA.

Key words: Renaisa % Fossil fuel % Hybrid energy

INTRODUCTION

A hybrid electric vehicle (HEV) is a hybrid vehiclewhich combines a conventional propulsion systemwith an on-board rechargeable energy storage system(RESS) to achieve better fuel economy than a conventional vehicle without being hampered byrange from a charging unit like a battery electric vehicle (BEV), which uses batteries charged by an external source.

The Factors That Have Been Discussed in this Paper Are

- History of Hybrid electric Vehicles
- Overview of PV technologies for vehicular applications
- How Renaisa differs from Hybrid vehicles.
- Applications of Renaisa
- Eco friendly approach
- Cost Analysis
- Future Scope of this transportation

This paper discuss about the real usage of solar PV in transportation and how to make the transportation in an eco friendly manner. The designed Renaisa is composed of all the components similar to a Hybrid electric vehicles but it has an extra two components embedded in it is thin film solar panel with a kit that helps to emit oxygen instead of emitting harmful gases like co2, co etc.

History of Hev: In general, HEVs outperform conventional vehicles in terms of fuel consumption and pollutant emissions. However, the degree of HEV performance and cost savings achieved largely depend on its application (including the types of trips), the level of available technical service and maintenance, fuel price, and the availability of optimal fuel quality.

Essential Parts of a Hybrid Electric Vehicle:

- Gasoline engine
- Fuel tank
- Electric motor
- Generator
- Batteries
- Transmission
- Converters and Inverters
- Power splitting device

Operations Involved:

- Starting
- Low Speed
- Cruising
- Passing
- Braking
- Stopping

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Overview of Pv Technologies for Vehicular Applications: The selection of the PV generator for the hybrid or electric car should be governed by the following requirements: it should be as efficient as possible, lightweight and reasonably priced [1]. We give here a short description of the available PV technologies in terms of their suitability for vehicular applications. The photovoltaic technologies that are available today include mono crystalline silicon solar cells (c- Si), polycrystalline silicon (poly-Si) and amorphous Si (a-Si). Recently, but the trend is now towards thin film PV. Thin-film PV are developed using materials that absorb the solar radiation strongly so that the devices can be very thin (of the order of 10 lm or less instead of about 300 lm of monocrystalline silicon) and a smaller amount of material is needed. As a consequence, these cells can be more economical and less heavy.

A. Thin Film Solar Cells: Research efforts have also concentrated on thin film solar cells. The market share of thin film PV at the moment is approximately 15% but it is rapidly increasing, while crystalline silicon covers the other 85%. The arguments favouring thin-film PV have been based on better utilization of costly pure semiconductor, large-scale manufacturing advantages and lower energy requirements for their production. They also have the advantage of being very light, which is very important for applications on vehicles and, depending on the material used, they may be also less expensive. The main thin film technologies currently on the market are based on the heterostructure CdS/CdTe. The next best known are based on Cu(In, Ga) (Se, S)2 also known as CIGS or CIS, on GaInP/GaInAs, or on other III/V compounds. Many of these technologies can give low-cost and lightweight PV cells suitable for vehicular applications. Thin film solar cells are therefore considered suitable for use on electric and HEV since they combine reasonable price and relatively light weight with satisfactory solar energy conversion efficiency.

B. The Pv Array and Batteries: The suitability of PV panels and batteries for vehicular applications is assessed according to certain criteria. In the case of PV panels, the main selection criteria are the following: (i) price (ii) efficiency, (iii) lifetime, (iv) weight per peak watt of electric output.

How Renaisa Differs from Hybrid Vehicles: In an ordinary hybrid electric vehicle, the dependence on the fuel will be 50%.

f The carbon monoxide after passing through the catalytic converter comes out as carbon dioxide which in turn increases the earth's optimum temperature thereby leading to serious ill effects.

So, the above mentioned problems have to be solved using new parts.

The Eco-friendly Approaches: As a solution, two additional parts have been proposed. i) A solar photovoltaic cell panel which would be placed at the top of the car such that the solar energy is converted into electrical energy and it is being stored in the battery. ii) A kit containing calcium hydroxide next to the catalytic converter purifies the effluent and gives out oxygen. Hence, the proposed model with the new parts is named RENAISA

Solar Photovoltaic Panel: A solar cell or photovoltaic cell is a device that converts solar energy into electricity by the photovoltaic effect.

Thin-Film Photovoltaic Cell: Thin-film photovoltaic modules are manufactured by depositing ultra-thin layers of semiconductor material on a glass or thin stainless-steel substrate in a vacuum chamber. A laser scribing process is used to separate and weld the electrical connections between individual cells in a module. Thin-film photovoltaic materials offer great promise for reducing the materials requirements and manufacturing costs for PV modules and systems.

Classification: There are three main types of thin-film solar cells, depending on the type of semiconductor used:

- Amorphous silicon (a-Si),
- Cadmium telluride (CdTe) and
- Copper indium gallium deselenide (CIGS).

Of the three, CIGS is more effective with 20%practical efficiency

The Kit:

- Here, the kit contains Ca(OH)2 solution which reacts with the CO2 and thereby, oxygen and water vapor are sent out to air [2].
- The chemical reaction is as follows:
  CO2 + 2Ca(OH)2 Æ 2H2O + 2O2

- The remaining carbon in the kit is converted into carbonic acid which is sprayed on the surface where the vehicle is moving.

E. Additional Feature: One more additional feature that makes RENAISA more efficient than an ordinary HEV is that the converter and inverter that are used could be made up of semiconducting material Silicon Carbide (SiC) than usual semiconducting material Silicon (Si) due to the following reasons:

- SiC is a wide-band gap semi conductor. SiC-based power devices have higher breakdown voltages (5 to 30 times higher than those of Si) because of their higher electric breakdown field.
- SiC devices are thinner and they have lower on-resistances. The substantially higher breakdown - voltage for SiC allows higherconcentrations of doping and consequently alower series resistance. For low- breakdown voltage devices (~50V), SiC unipolar device on-resistances are around 100 times less; and at higher breakdown voltages (~5000V), they are up to 300 times less. With lower R_{on}, SiC unipolar power devices have lower conduction losses and therefore higher overall efficiency.
- SiC has a higher thermal conductivity and thus a lower junction-to-case thermal resistance, $R_{th\text{-}jc}$. This means heat is more easily conducted away from the device junction, and thus the device temperature increase is slower.
- SiC can operate at high temperatures because of its wider band gap. SiC device operation at up to 600 . Most Si devices, on the other hand, can operate at a maximum junction temperature of only 150 deg C.
- Forward and reverse characteristics of SiC power devices vary only slightly with temperature and time; therefore, SiC devices are more reliable.
- SiC-based devices have excellent reverse recovery characteristics. With less reverse recovery current, the switching losses and electromagnetic interference (EMI) are reduced and there is less or no need for snubbers
- SiC is extremely radiation hard; i.e., radiation does not degrade the electronic properties of SiC.

Advantages of Renaisa over Hev: In RENAISA, the dependency on fossil fuel reduces from 50% to 30% as 20% of the total power required to drive the vehicle is contributed by solar PV cells. RENAISA is eco-friendly as it differs from other vehicles by giving out oxygen gas. Of the total power required,70% is renewable contributed by the battery and the solar cells.

Cost Analysis: The additional cost of renaisa when compared with HEV is pv panel cost and battery storage depending on the power requirement. Though the cost many increase when compared with HEV but electric power and fuel consumption is reduced to an extent and also its pollution free source. When we Incorporate kit containing Ca(OH) 2 solution automatically the cost of the car may increase but it is environment friendly and also we receive an intensive solar radiation in our region the and hence source of energy if free.

Future Scope of this Transportation: Presently, the simulation work of RENAISA is being done using Simulator. After simulation, we have a hope build RENAISA in real time. Hence, the purpose of implementing RENAISA in real time is to build a peaceful, eco-friendly environment for the future generation for their better and happy living thereby creating renaissance-the full form of RENAISA in their life.

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