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Review Paper on Solar Powered Energy Management System for Electric Vehicle

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***Abstracts*- Most of the vehicles are running on the gasoline fuels. These vehicles exhaust hazards gases. This increases the environmental pollution in the word. In recent years to reduce the pollution researchers have given the solution of hybrid vehicles. One of the solution opted by many countries on environment pollution control through using electric vehicle (EV). In recent days EV's are gaining more popularity. Battery is the important component of the EV. The effective use of battery is crucial parameter for EV. With the help of renewable sources such as solar energy the efficiency of the EV may be increased.**

Energy management system (EMS) is playing a key role in EV. Due to increasing number of subsystem and components in EV, increasing the efficiency of EV using EMS is desirable. In this paper various EMS systems are studied and proposes energy model for effective use of battery to improve the performance of EV.

Keywords:- Solar panel, Energy management system (EMS), Electric vehicle (EV), Battery, DC motor.

I. INTRODUCTION

In recent decades demand for vehicles are increased that caused the environmental pollution everywhere. The fossil fuel such as petrol and diesel are expensive. The use of fossil fuel based vehicle causes the air pollution which is very harmful for the human beings. Transportation of this fossil fuel to rural area is a big problem. There are many renewable sources such as solar energy, Wind energy, Tidal energy for reducing the environmental pollution and saves the electricity.

One of the greatest energy sources is the solar energy. Solar system can be classified into two categories; thermal system which converts solar energy to thermal energy and photovoltaic system which converts solar energy to electrical energy. In the last two centuries, solar energy is used to generate the electricity. Solar energy is the renewable source and freely available. Solar energy is converted and stored in the batteries and the stored energy is utilized for EV. Similarly in Solar vehicle Photo Voltaic (PV) cell converts sunlight into electricity. Solar panels are relatively easy to install and very low maintenance. To achieving the required voltage, PV cells are connected in either series or parallel thus it make cost effective.

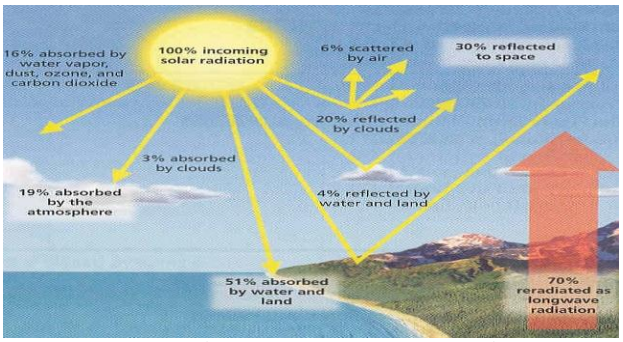

Fig1. Distribution of Solar Energy (image courtesy of google.com)

Fig1 gives the distribution of solar energy over the different parts such as 16% is absorbed by water, vapor, dust, ozone and CO2, 19% absorbed by atmosphere. 6% absorbed by air, 20% reflected by clouds, 51% absorbed by water and land, 3% absorbed by clouds, 4% reflected by Water and land and 30% reflected to space.

Energy management System is most important in the EV. This paper reviews the energy consumption models of EV's in real time application. The comparison is made based on mainly three parameters are battery charging and discharging, subsystem consummation and dc drive consummation. In this paper comparison of solar powered air conditioning (AC) are considered.

II. DISCUSSION

EMS has an important task in EV due to increasing the number of subsystem, components and energy storage devices. AC is the main concern of EV to consume energy. The most common energy storage device in EV is the battery. Due to more weight and long charging time, battery has some drawback. To overcome the limitation of battery high power ultra capacitors and fuel cell are used. ESS can be designed by installing the battery with high capacitance and this is called as hybrid Energy Storage System (ESS) [1]. Author briefed about three parts, ESS, load control application and asynchronous controller. ESS is the main part of the EV. To designing the ESS controller Null Conventional Logic (NCL) is used. NCL provides low energy consumption with efficient time.

Electric Drive Vehicle (EDV) has many advantages than the gasoline vehicle. Battery charging and discharging can be controlled by EMS in EV. EMS is very efficient to managing the energy in EV. In EDV, battery storage is one

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of the most components. Battery in EDV can be charged from the power grid. The charging station consists of AC/DC convertor for grid interface and multiple DC/DC convertors for battery management [2]. The author has explained variable charging and discharging conditions of battery with physical constraints of power convertors.

Solar/Electric/Fuel Powered Hybrid Vehicle (SEFPHV) system which solves the major problem of fuel and pollution. Hybrid Powered Vehicle is the combination of multiple sources. The vehicles will run with the help of solar power, electric power and less amount of fuel [3]. Rechargeable batteries are used to drive the BLDC (Brushless DC) motor in vehicle. The hybrid vehicles are run on solar power as well as on the engine. SEFPHV system uses the three sources are solar power, plug in electric power supply and IC engine. The advantage of the hybrid vehicle is to reduce the pollution, green house effect and CO2 emission. In this method very less amount of fuel is used. They discussed that there are three modes of operation in hybrid vehicle. In mode 1, two solar panels are used. Each solar panel having the solar energy is 230watt. In mode 2, two stroke IC engine. In mode 3, plug in energy source (with step down transformer and diode rectifier). The main two systems used are BLDC motors, PMDC (Permanent Magnet DC) generators. With this method many problems related to the environment are solved by hybrid powered vehicle technology.

The increasing demand of vehicles forced to convert technique solution with hybrid EV. In this hybrid vehicle IR speed sensor and PWM methods can be used for controlling the speed of the vehicle. This method may be efficient to improve the performance of EV [4].

A solar powered Air conditioning system (SAV) is presented to replace the conventional system. Using photovoltaic technique and intelligent power control, SAV switches on board AC to solar power when petrol engine shuts off. This system continue to keep the AC system on during the sunny days even when the vehicle engine is switched off. They claimed that adapting this system can help to save driver petrol and fuel cost of 100 liter for one year [5].

Fig2. Solar Powered Car (image courtesy of Wilfred Lai)

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III. CONCLUSION

Solar energy technology and its uses are very important for developing countries. Many countries are adopting green machine concept in automotive sectors. Electrical Vehicle plays important role to saves the nonrenewable sources such as petrol, diesel. Batteries are easily charged using the solar systems which results in saving of electrical energy.

The solar cooling in SAV reduces required energy for AC. Using Energy Management System efficiency of EV's can be further increased.

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