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On-Road Charging Electric Vehicle

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Abstract: Transportation-related greenhouse gas emissions are one of the most serious environmental concerns, and they are increasing at an alarming rate. As a result, solar energy for transportation may be able to alleviate this issue. The goal of the proposed effort is to offer a technology that promotes green energy; for example, assume a situation in which we might utilize solar energy to charge an electric vehicle, with solar panels built-in, but the next question is if this is practical during the rainy season. During the rainy season, charging internal solar panels is problematic. The SPEV system includes a charging wire that connects to both the car and a 230v wall outlet. A security system, drive guiding system, route detection, and other features are included into the electric car. Support for Android apps, Wi-Fi, Battery Update, and LoRa. Our research findings are thoroughly examined. Hence The use of a solar-powered electric vehicle (SPEV) results in fewer pollution. The majority of automobiles are powered by gasoline. Hazardous gases are emitted by these vehicles. This contributes to global environmental contamination. In recent years, academics have proposed the use of hybrid vehicles to minimize pollution. Many countries have chosen to reduce pollution by employing electric vehicles as one of their answers (EV). EVs have been rising in popularity in recent years. The electric vehicle's battery is a critical component. The efficient utilization of battery is a critical parameter for electric vehicles. The efficiency of electric vehicles can be improved by using renewable energy sources such as solar energy could be increased In electric vehicles, the energy management system (EMS) is crucial. Because the number of subsystems and components in electric vehicles is growing, enhancing EV efficiency through the use of EMS is desirable. Various EMS systems are explored in this research, and an energy model for effective battery use to increase EV performance is proposed.

Index Terms - SPEV; Solar powered Electric Vehicle EV; Electric Vehicle EMS; Energy Management System

I. LITERATURE REVIEW

When This paper, we discussed about the usage of solar energy to power up the vehicle. In order to achieve the required voltage, the Photo Voltaic (PV) Module may be connected either in parallel or series, but its costlier. Hence, to make it cost effective, power converters and batteries are being used. The electrical charge is combined from the PV panel and directed to the output terminals to produce low voltage (Direct Current). The charge controllers direct this power acquired from the solar panel to the batteries. According to the state of the battery, the charging is done, so as to avoid overcharging and deep discharge. The voltage from the solar panels is increased up to a certain level that matches the level of the load by a converter viz. MPPT or charge controller, which results in driving our load for example, charging the battery or running the motor. According to the application with respect to load, the components such as the solar panels, charge controller, battery, motor, motor controller are determined. The abovementioned components are so selected that their features are well-suited for application. When UV rays strikes the PV cells in the solar panel, there occurs a chemical reaction between the layers of solar panel (p-n junction) which results into generation of electricity. Mostly, solar panels are made of Silicon as their parent compound which gives the overall efficiency around 15-20%. [1] The future electric vehicles had the main role in transportation. Existing fuel based internal combustion an engine has been replaced by EV. More research analysis and implementation had taken place in automobile industries by means of electrical energy sources due to exhaust of oil resources [1]. In the other way EV have more efficiency, less noise and no pollution. This paper provides the information about the system of EV and need for that in the environment. Many of the car manufacturers and heavy vehicle factories were focusing on the electric based locomotive.

II. INTRODUCTION

The goal of the literature review in the subject of electric vehicles was to gain a basic understanding of prior conversations and views about the technology, including if it has been successful and, if not, what the constraints were. SEFPHV stands for Solar/Electric/Fuel Powered Hybrid Vehicle, and it is a solution that addresses the key issues of fuel and pollution. The term "hybrid vehicle" refers to a vehicle that is powered by a combination of different sources. Solar power, electric power, and a small amount of fuel will be used to power the cars [3]. The BLDC (Brushless DC) motor in the vehicle is powered by rechargeable batteries. The hybrid vehicles are powered by both solar and internal combustion engines. Solar power, plug-in electric power supply, and IC are used in the SEFPHV system. engine. The benefit of a hybrid car is that it reduces pollutants, greenhouse gas emissions, and CO2 emissions. This approach uses a very small amount of gasoline. They talked about how hybrid vehicles have three modes of functioning. Two solar panels are employed in mode 1. Each solar panel generates 230 watts of solar energy. Two-stroke IC engine in mode 2. Connect the energy source in mode 3. (with step down transformer and diode rectifier). BLDC motors and PMDC (Permanent Magnet DC) generators are the two most used systems. Hybrid powered vehicle technology solves a number of environmental issues with this strategy. The ever-increasing demand for automobiles has compelled with hybrid EV, conversion

technique solution. The car's speed can be controlled using an IR speed sensor and PWM technologies in this hybrid vehicle. This strategy may be effective in improving the performance of electric vehicles.

III. WORKING

The photovoltaic (PV) modules can be wired in series or parallel, with charge controllers directing the sun energy to the batteries. A boost DC-DC converter boosts the DC voltage from the PV panel, and an inverter transforms DC power to AC power, which drives the Brushless DC motor that acts as the vehicle's drive motor. This research focuses on the design, simulation, and implementation of numerous vehicle components such as the solar panel, charge controller, battery, DC-DC boost converter, DC-AC power converter (inverter circuit), and BLDC motor. We also introduce On-Road Charging with this EV. The notion is that mechanical energy may be transformed to electrical energy if an alternator is installed It may be utilised to drive by storing the charge in the form of chemical energy in the battery. The controller absorbs and regulates electrical energy from batteries and inverters, and the inverter then delivers a specified quantity of electrical energy to the motor after it has been programmed (according to the depth of pressure on the pedal) An electric motor's rotor converts electrical energy into mechanical energy (rotation), which rotates the gearbox and causes the wheels to turn and the car to drive.

IV. SCOPE OF THE PROJECT

In India, environmental pollution has nearly reached critical levels. India is ranked in the top five countries in the Climate Risk Index 2020, indicating that it is vulnerable to climate change. As a result, adopting e-mobility appears to be the only viable choice. To address environmental concerns, the Indian government has chosen to promote the use of electric vehicles (EVs) to minimise pollution. However, according to a Castrol analysis, new car owners would not purchase electric vehicles until 2030 due to a variety of circumstances. One of the most important things is proper infrastructure. Regardless of the drawbacks of utilising and promoting electric vehicles on Indian roads, the total number of electric vehicles on Indian roads will reach about 100 million by 2030, up from less than half a million in the previous year 2020

V. OVERVIEW

The surge in oil prices, as well as concerns about pollution, has heightened interest in the development of electric vehicles. The primary premise of a solar-powered electric vehicle is to use energy stored in a battery to power a motor that propels the vehicle forward or backward. The photovoltaic (PV) module can be connected in series or parallel, and the charge controllers route the solar energy to the batteries. The DC voltage from the PV panel is then boosted using a boost DC-DC converter, and then an inverter converts DC power to AC power, which then powers the Brushless DC motor that serves as the vehicle's drive motor. The subject of this paper is the design, simulation, and implementation of the numerous components for the vehicle application, including the solar panel, charge controller, battery, DC-DC boost converter, DC-AC power converter (inverter circuit), and BLDC motor. In this EV, we also introduce On-Road Charging. The idea is to use an alternator to convert mechanical energy to electrical energy, which may subsequently be used for driving by storing the charge in a battery as chemical energy. The first solar car appeared in 1955[3], World Solar Challenge (WSC) events have been held in Australia since 1987 [4], and regular solar car challenge events have been held in the United States since 2005 [5]. Solar vehicles are currently not sold as everyday mobility devices, but rather as demonstration vehicles and engineering exercises by university professors, frequently with government funding agencies. Many institutions and colleges have been successful in developing a solar car. Solar car races are held by a variety of groups to encourage people to design and build solar-powered automobiles. The basic technique and design criteria were presented in this document to give the reader a quick overview of solar car design.

VI. MAIN COMPONENTS

1. 48V ELECTRIC MOTOR

BLDC motor for motors up to 500 watts running on 48 volts. Bikes, scooters, and tricycles can all benefit from a universal motor. Specifications for Motors Specified Voltage DC 48 volts 500W rated power There is no load. 3000 RPM is the maximum speed. 1:5.4 is the gear ratio. 26.2/21.10A Full Load Current 4.50/4.0A No-Load Current 20.60 N.m. Rated Torque The weight of the load is estimated to be roughly 1000 kilogrammes. The motor that powers your bike forward is housed here. This comprises the controller, which controls the flow of energy to all sections of your car's throttle components, as well as accessories such as a speedometer. The components of an e-car conversion kit are the same as those found in any electric automobile, from high-end to low-cost models. The power of an electric motor in a vehicle, like that of other vehicles, is measured in kilowatts (kW). Although most electric motors offer full torque over a wide RPM range, the performance is not similar, and far exceeds the performance of a 134 horsepower (500 kW) fuel-powered motor with a narrow torque curve. Direct current (DC) electricity is typically routed through a DC/AC inverter, which converts it to alternating current (AC) electricity, which is then linked to a three-phase AC motor. DC motors are commonly utilised in electric trains.

2. BATTERY

Rechargeable 48V 100Ah LiFePO4 battery made up of all 3C cells for Electrical vehicles like E rickshaw, electrical bikes, Solar power plants, Telecommunication towers etc. Direct replacement of lead acid battery with 2-year warranty. Comes fitted with BMS device for charging control & overload protection, Temp protection + under and overcharge protection. A lithium-ion battery or Liion battery is a type of rechargeable battery in which lithium ions move from the negative electrode through an electrolyte to the positive electrode during discharge and back when charging. Li-ion batteries use an intercalated lithium compound as the material at the positive electrode and typically graphite at the negative electrode. Li-ion batteries have a high energy density, no memory effect (other than LFP cells) and low self-discharge. Cells can be manufactured to either prioritize energy or power density. They can however be a safety hazard since they contain flammable electrolytes and if damaged or incorrectly charged can lead to explosions and fires.

3. MOTOR CONTROLLER

You've come to the right place if you're looking for a Brushless DC Controller for a 36V 1000W motor. Get the greatest deal on a high-quality controller for your electric vehicle. One of the most crucial components of an electric vehicle is the controller. EVs often include both pedal-assist sensors and a throttle. Some electric vehicles have an electric motor that only runs when it is needed. The electric motor is engaged and operated manually in this situation, using a throttle that is often located on the hand-grip, similar to those seen on a motorcycle or scooter. The BLDC motor is commonly referred to as a scooter motor or a general-purpose motor. It is incredibly long-lasting and dependable. It's often seen in 48V scooters or electric bicycles it's even been used in miniature kiddie carts, and it's a proven motor in robotics. The EV controller is the vehicle's brain. It is linked to all other electronic components, including the battery, motor, and, if applicable, the throttle. It takes all of the other components' inputs and calculates what should be communicated back to them.

4. ALTERNATOR

An alternator is an electrical generator that transforms mechanical energy into alternating current electrical energy. Most alternators employ a spinning magnetic field with a stationary armature for affordability and simplicity. A linear alternator or a spinning armature with a stationary magnetic field may be employed on occasion. In theory, any AC electrical generator may be termed an alternator, however the name is most commonly used to refer to compact rotating machinery powered by automobile and other internal combustion engines. A magneto is an alternator with a permanent magnet for its magnetic field. Turbo-alternators are alternators used in power plants using steam turbines. DC motor, 250W, 24V, 2650 RPM It includes an 11-tooth, #25 chain sprocket as well as an 11-tooth, #25 chain sprocket on the base, there is a 4-bolt mounting bracket (threaded M6). Because this is a DC motor, it can rotate clockwise or counterclockwise by just switching the battery polarity to the motor, and it can also be changed in speed. Please have a look at our available speed controllers if you wish to adjust the speed of these.

5. SOLAR PANEL

A photovoltaic (PV) module is a pre-assembled, plug-and-play assembly of 6-10 photovoltaic solar cells. The photovoltaic array of a photovoltaic system that generates and provides solar power in commercial and residential applications is made up of photovoltaic modules. The DC output power of each module is rated under standard test conditions (STC) and normally ranges from 100 to 365 watts. The area of a module is determined by its efficiency. Page 17 of the E-MOB SUNCRUISER An 8 percent efficiency 230-watt module will have double the area of a 16 percent efficient 230-watt module with the same rated output. There are a few commercially available solar modules that are more efficient than 22 percent, and some are even more efficient than 24 percent. A single solar module can only provide a certain amount of energy; most setups include many modules a number of modules an array of photovoltaic modules, an inverter, a battery pack for storage, interconnecting wire, and optionally a solar tracking device make up a photovoltaic system. Photovoltaic modules use the photovoltaic effect to create electricity from light energy (photons) from the Sun. Wafer-based crystalline silicon cells or thin-film cells are used in the majority of modules. A module's structural (load-bearing) element might be either the top layer or the rear layer. Mechanical and moisture damage to cells must also be avoided. The majority of modules are stiff, however semi-flexible modules based on thin-film cells are available. The cells must be electrically linked in series, one after the other. Most solar modules include MC4 connections on the outside to make weatherproofing easier

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