

# Study of Solar Powered Cars

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**Abstract-** Until now vehicles totally depend on fossil fuels for power. Electric vehicles and or plug-in hybrid electric cars are rapidly replacing these vehicles. However, these electric cars still face the problem of energy availability because they depend on energy from biomass, hydropower and wind turbines for electric power generation. The abundance of solar energy and its use as power source in electric cars is not only an important decision but also a necessary condition for elimination of environmental pollution. [1]

Electric vehicle with more advantages of no noise, no pollution, saving energy and reduce carbon dioxide emissions is to power-driven vehicle with a motor drive wheels moving. Solar electric vehicle can make to reduce our greenhouse gas emissions and other pollution. All advantages of solar electric vehicle make research and application of solar electric vehicle as a very important topic of research for automotive industry and the trend of future cars. Solar electric vehicle is made of PV panels, battery, electric motor, vehicle controller and vehicle body. Solar electric vehicle drives using dual- mode of PV and battery hybrid. It can be achieved PV-driven and battery-driven independently. In good sunny conditions, the full charge endurance of solar electric vehicle can be increased about 35% substantially compared with no PV panels [2]. Solar electric vehicle can achieve low-carbon, energy saving, environmental protection and true zero-emissions for the future of human life.

**Keywords-** solar power, solar car, electric motor, chassis, solar array, power tracker.

## I. INTRODUCTION

In current years, greenhouse fuel emissions and exhaustion of types of fossil sources have grown to be a severe international issue. Energy delivery and global warming preserve to question all nations round the sector of world financial system and planet environment. Renewable electricity technology are brought to fulfill the demanding situations of electricity and weather conditions, in addition to booming local monetary improvement. Transport is certainly considered one among the most important assets of human

precipitated greenhouse gas emissions and fossil-fuels consumption [3]. Air pollution from a vehicle make contributions to now no longer most effective local environmental issues inclusive of human-fitness consequences however international environmental problems like weather conditions because of CO<sub>2</sub> emissions.[4] Thus, the proper destiny shipping ought to be directed in the direction of to using the 0-emission, no pollution, electric powered car and fuel-cell car, which makes use of a different fuel. With ever-growing issues over environmental safety, carbon emission, electricity conservation and electricity performance in current years, studies and improvement on numerous new electric powered car technology are actively conducted. Electricity has been explored as an opportunity strength supply to update or supplement the inner combustion engine for decades. However, international fossil fuels can be exhausted through the center or the cease of twenty first century and we are able to ought the appearance to some other foremost supply of smooth and renewable electricity [5]. It is fabricated from PV panels, battery, electric powered motor, car controller and car body. It has pushed the use of a mode of PV and battery hybrid. It can be done as PV pushed and battery pushed independently. In suitable sunny conditions, SEV doesn't want a commercial strength charging for numerous days. Solar electric powered automobiles can attain low-carbon, electricity saving, environmental safety and 0 emissions for the destiny of human life.[6]

## SOLAR CAR

A solar energy automobile is used for land transport. Solar energy vehicles run from electricity of the sun, however a few fashions will complement that electricity the use of a battery or use PV panels to recharge batteries or run auxiliary structures for a automobile that specially makes use of battery electricity. Solar vehicles are advanced with the aid of using a sun array that makes use of photovoltaic cells (PV cells) to transform daylight into electricity. Unlike thermal power, which converts sun's power to heat, PV cells without delay convert daylight into electricity. When daylight strike PV cells, they excite electrons and permit them to flow, an electric powered current. PV cells are product of semiconductor

substances inclusive of silicon and alloys of indium, gallium and nitrogen. Crystalline silicon is the most usual substance used and has an performance charge of 15-20%. [7]

**II. WORKING PRINCIPLE**

Solar powered vehicles are run through the solar's power. The predominant aspect of a solar vehicle is its sun bracket, which receives the power from the solar and converts it into usable electric power. The sun cells acquire a part of the solar's power and keep it inside the batteries of the sun vehicle. Before that happens, energy trackers convert the exponent gathered from the sun array to the whole machine voltage, in order to do that the batteries and the motor can use it. After the power is saved into the batteries, it's to be had for use through the motor and motor controller to power the vehicle. The motor controller adjusts the quantity of power that flows to the motor to correspond to the throttle. The motor makes use of that power to power the wheels. [8]

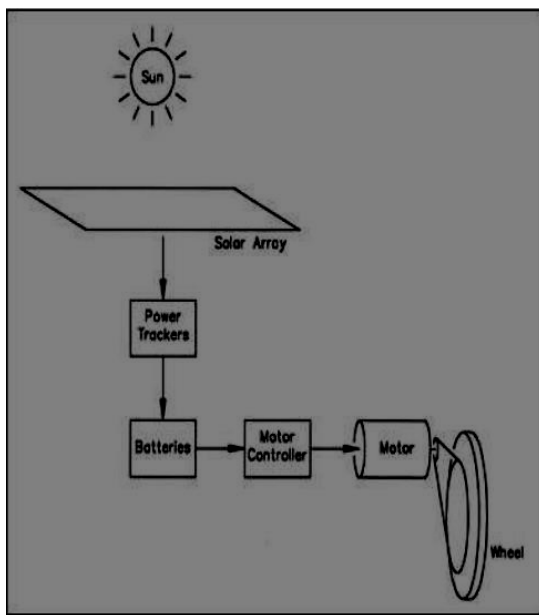


Figure 2.1. Working Principle [8]

**III. COMPONENTS OF SOLAR CAR**

**SOLARARRAY**

A solar array is a set of n number of panels that formulate strength as a whole. Solar arrays describe them themselves and the way they may be placed. UV rays reach surface in the array and creates DC current strength. This cluster is hooked up to the alternator system, and it alters the DC strength into operable current (AC) strength. These arrays are likewise referred to emphasize large -scale solar farms however, it may be referred to explain pretty much any

collection of these sets. It can also be used for homes, which might be positioned at the roof. [9]



Figure 2.2.I Solar arrays in field [10]

**POWER TRACKERS**

Power trackers tracks the strength coming from the sun array to enhance the strength and supply it both to the batteries for holding or on occasion to the motor controller for propulsion. When the sun array is charging the batteries, the strength trackers assist to shield the batteries from being broken via means of overcharging. The wide variety of strength trackers. Power trackers are very light-weight and generally attain efficiencies above ninety five percent.[12]



Figure 2.2. II. Power tracker [12]

**ELECTRIC MOTOR**

An electricity powered motor is actually the foremost and maximum essential a part of a sun car. It works with premiere energy and the performance need to be high. An electric powered mechanism is a tool which usage of electric strength to supply mechanical strength, almost constantly through the interplay of magnetic flow and present day sporting conductors. These cars perform via the interplay among the machine's magnetic space and electric powered flow present in a twined cable to create pressure withinside the shape of torque carried out at the motor's shaft. [13]



Figure 2.2.III. Electric motor [13]

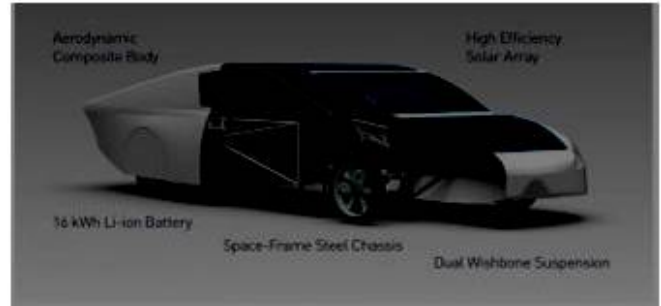


Figure 2.2.V. Chassis of solar car [20]

**SPEED CONTROLLER**

The cause of a motor speed controller is to take a sign representing the desired pace and to power this machinery at that particular pace. It can also additionally or won't definitely degree the velocity of the motor. A digital pace manipulator is a digital circuit that controls and regulates the velocity of an electricity charged motor.[14] It can also offer reversing of the motor and dynamic braking. Miniature digital pace controls are utilized in electrically powered radio-managed models. Full-length electricity charged motors additionally have structures to manipulate the velocity in their power motors

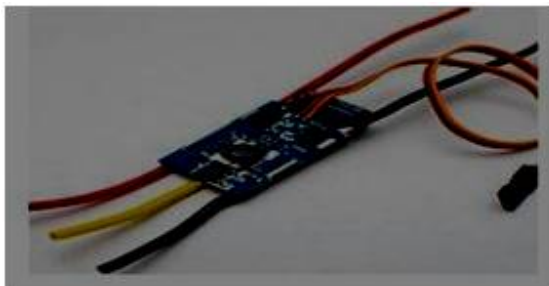


Figure 2.2. IV. Speed controller [14]

**CHASSIS**

Chassis is a collective time period for all of the elements of a car besides the body. Every essential part of a car is together referred to as chassis. It consists of four wheels, brakes, suspension, axles, engine, etc. The very first venture in growing a powerful sun automobile chassis is to maximise the energy and protection, however reduce the weight. However, protection is a number one difficulty and the chassis ought to meet stringent energy and protection requirements. [17]

**BATTERY**

A Battery is the principle power deliverer to an automobile. It is a tool that holds synthetic chemical strength and transforms it in an electronic form. The batteries shop strength from the tracker and shop it for motor necessities in similarly operation of sun vehicle functioning. [18]



Figure 2.2.VI. Battery [18]

**IV. FUTURE OF SOLAR CARS**

One of the auto enterprise of Netherlands has released this Light yr one. With a distance potential of 435 miles (seven-hundred kilometers), it makes use of photovoltaic cells that, in step with its creators, can save 20 percentage extra electricity than conventional ones, and that they perform independently, even if a few are included through shade. With a €150,000 fee tag, it isn't a feasible choice for maximum people, however the concept that different producers ought to use this generation holds thrilling promise [19]. The destiny of sun vehicles may be very shiny and well-known vehicle agencies are running tough to get it cheaper, in order that it turns into low priced to everyone.



Figure 2.3. “Light year one” solar car [19]

## V. CONCLUSION

Solar Cars have the cleanest and easiest energy output around, yet our technology is still far. A solar car is really an electronic automobile driven by solar energy. Air toxins from an automobile contribute to not only regional environmental problems such as human-health effects but global environmental issues like weather corruption due to CO<sub>2</sub> release. Thus, the ideal future conveyance should be directed towards these of 0 emissions, no degradation of air, electric vehicle and fuel-cell vehicle, which uses different fuel.

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