# Design and Fabrication of Solar Car

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## ABSTRACT

*This report shows the design and Fabrication of body parts for solar cars because this play an important role in the motor industry today and solar car also powered by sun energy (solar). This is obtained from solar panels on the surface of the vehicle. Photovoltaic (PV) cells convert the sun's energy directly into electric energy. This project involves many processes, starting from the design concept to power generation. In coming years the major problem is depletion of ozone layer which is caused by release of CFC's from vehicles. So the implementation of solar energy cars should be progressed. This project deals with features involved in a solar energy car which plays a vital role for the upcoming energy crisis.*

***Keywords:*** Solar cars,PVcells,Powertrackers,Batteries

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### 1 INTRODUCTION

Solar car is a solar vehicle used for land transport. Mini Solar cars combine technology typically used in the aerospace, bicycle, alternative energy and automotive industries. The design of a solar vehicle is severely limited by the amount of energy input into the car. Most solar cars have been built for the purpose of solar car races. Since 2011 also solar-powered cars for daily use on public roads are designed.

Solar cars are often fitted with gauges as seen in conventional cars. To keep the car running smoothly, the driver must keep an eye on these gauges to spot possible problems. Cars without gauges almost always feature wireless telemetry, which allows the driver'steam to monitor the car's energy consumption, solar energy capture and other parameters and free the driver to concentrate on driving.Solar cars depend on PV cells to convert sunlight into electricity. Unlike solar thermal energy which converts solar energy to heat for either household purposes, industrial purposes or to be converted to electricity, PV cells directly convert sunlight into electricity. When sunlight (photons) strikes PV cells, they excite electrons and allow them to flow, creating an electrical current. PV cells are made of semiconductor materials such as silicon and alloys of indium, gallium and nitrogen. Silicon is the most common material used and has an efficiency rate of 15-20%.


Figure 1: typical schematic diagram of the solarmodule

Nowadays, developed countries and big citiesthroughout the world are embarking on policies toencourage the research and use of EVs [1,2]. China also has introduced several policies to encourage the use and promotion of new

energy vehicles. China's large cities have air pollution can not be ignored. Automobile exhaust emissions are one of the major sources of pollution. China has 10 cities were included in the global atmospheric pollution in the world's most serious among the 20 cities. However, global fossil fuels will beexhausted by the middle or end of 21st centuryand we will have to look to another major sourceof clean and renewable energy to support therequest of human being [3]. Research anddevelopment of electric vehicles in China is not atemporary short-term measure, but a significantand long-term strategic consideration.

**2 LITERATURE REVIEW**

The first combination of photovoltaic devices and electricvehicles happened in the late 1970's. Pressured by the oil crisis, engineers and environmentalists began looking for alternative energy sources and eventually turned to solar. To generate more publicity and research interest in solar powered transportation, Hans Tholstrup organized a 1,865 mi (3,000km) race across the Australian outback in 1987. Called the World Solar Challenge (WSC), competitors were invited from industry research groups and top universities around the globe. General Motors (GM) won the event by a large margin, achieving speeds over 40 mph with their Sunraycer vehicle [4].

The greatest advance in solar vehicles over the last fewdecades is due to improvements in battery technology. Early vehicles used lead-acid batteries, a chemistry still found in most combustion engine vehicles. Though this type of battery is inexpensive and easy to manage, lead-acid cells can represent nearly half the weight of a typical solar vehicle. Improvements in technology led to the use of nickel-metal hydride (NiMH) and nickel-cadmium (NiCad) batteries which have better power to weight ratios than lead-acid batteries [4].
The surface of solar panels on a car is limited, with respect to most stationary applications. Itis therefore important to maximize their power extraction, by analysing and solving the problems that could reduce their efficiency. Part of these aspects are common to the stationary plants also, but some of them are quite specific of automotive applications. For example, the need of connecting cells of different types (technology as well as electrical and manufacturing characteristics) within the same array usually leads to mismatching conditions. This may be the case of using standard photovoltaic cells for the roof and transparent ones, in place of glasses, connected in series. Again, even small differences among the angles of incidence of the solar radiation concerning different cells/panels that compose the panel/string may cause a mismatching effect that greatly affects the resulting photovoltaic generator overall efficiency. Such reduction may become more significant at high cell temperatures, with a de-rating of about 0.5%/°C for crystalline cells and about 0.2%/°C for amorphous silicon cells (Gregg, 2005).
A solar cell is an electronic device which can use photovoltaic (PV) effect to directly convert sunlight into electricity. Light shining the solar cell will produce both a voltage and a current to generate electric power[11]. A typical schematic diagram of silicon solar cell is shown in Fig. 1. PV energy conversion in solar cells consists of two essential steps. First, a material in which the absorption of light generates an electron-hole pair is required. The electron and hole are then separated by the structure of the device electrons to the negative electrode and holes to the positive electrode thus generating electrical power.

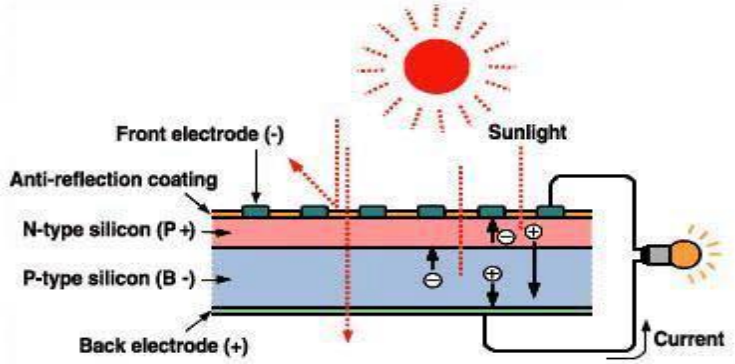


Figure 2: typical schematic diagram of the solar cell

**3 WORKING**

A Mini solar car gets the energy it needs to move from sunlight. If you look at the mini solar car below you can see that much of its surface looks black. This helps it to absorb the sunlight-black objects absorb most of the light that falls upon them.

Usually, black objects just get hot in the sun. But in a mini solar car, some of the light is converted to electricity by a device called a "solar cell." Each of the dark panels that you can see in the photograph contains many such solar cells. The electricity is used to drive the car's electric motor. Excess electricity is stored in a battery for cloudy periods.

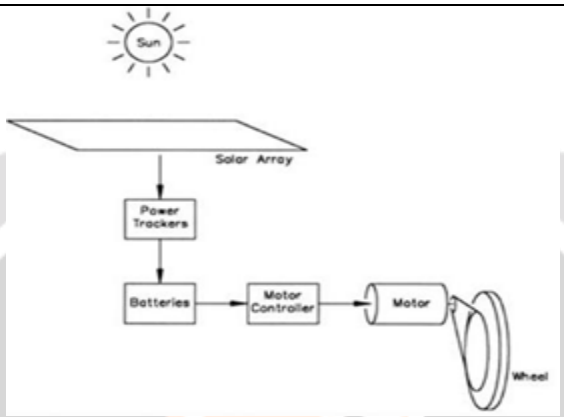


Figure 3: Working Principle

This car was created large-20 feet long and 6 feet wide-in order to catch a lot of sun. If we could make perfect solar cells that converted all the light falling on the car, its engine would have about 10 horsepower. But even the best of today's solar cells can convert only 20% to 24% of the sun's power into electricity. Therefore, under full sunlight, the motor puts out about 2 hp. With the help ofthe battery, output-for short times—can be increased to 8 hp.

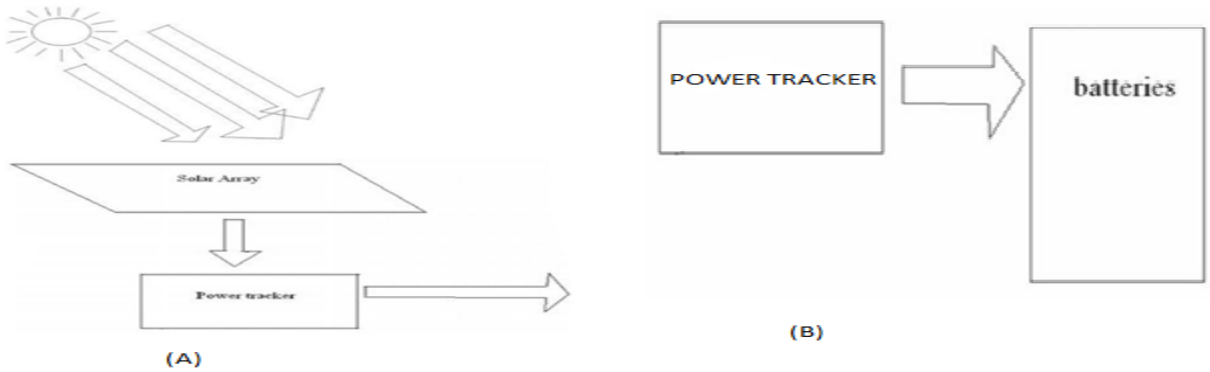


Figure 4: (A) Conversion of Solar Energy into Usable Energy (B) Line Diagram of Power Tracker

**Power Trackers**

- Power trackers convert the solar array voltage to the systemvoltage.
- In this step the power tracker in the car receive the energy from the solar array, and change the energy that it receive to energy that the car can be use

  After it converts energy, it send the energy to the battery

**Batteries**

- The batteries store energy from the power tracker and make them available for the motor's use.

**Use of Battery**

- After the power tracker converts the energy to the energy that is usable for the car, it sends to the battery then the battery store the energy.
- This energy is send to the motor and controller.

**Motor and Controller**

- The motor controller adjusts the amount of energy that flows to the motor to correspond to the throttle.
- The motor uses that energy to drive the wheels.

**How Mini Solar-Power Car Runs**

- When the energy is send from the battery to the motor, the motor adjust the amount of energy that flows to the throttle. The motors use the energy that receives to run the wheel.
- This is the process how solar car runs.

## SOLAR ENERGYCALCULATION

One single solar panel from type standard 150 Watt/24 volts can deliver a power of 150 Wattper hour, considering full sunshine. Knowing that the sun shine vary during the day, the effective sun power of one day is equal from 4 to 6 hours of a maximum measured at midday.

Since this maximum at midday is not the same every day, it should be taken in consideration, that more or less heavy cloud reduces the possible power. The electrical power is stored into batteries, similar to the one used in cars.

## CONCLUSION

Solar Cars have the cleanest and easiest energy output around, yet our technology is still farA solar car is really an electric vehicle powered by solar energy

The solar vehicle solves many problems related to environment and is the best pollution free method. We need to make use of them so that we can reduce our dependence on fossil fuels.Solar vehicles have some disadvantages like small speed range, initial cost is high,but these disadvantages can overcome byconducting further research in this area, like the problems of solar cells can be solved by using the ultra efficient solar cells that give about 30-35%efficiency.

Though the majority of the population will never own ordrive a solar vehicle, photovoltaic technologies are beginningto be applied to combustion engine vehicles. Work has beendone to use solar power to offset the electrical need of conventionalvehicles and reduce the engine load. One applicationinvolves the use of solar power to active cool the passengercompartment while the vehicle is parked [5]. The use of airconditioning to cool the vehicle introduces additional load tothe engine and results in increased emissions.Additional technologies from solar vehicles can benefit theelectric cars being developed today. The use of electric vehiclesis becoming increasingly more common and will continueto do so over the next few decades. The environmental,economic, and political concerns over combustion vehicleswill contribute to an increase in the use of electric vehiclesand drive further advances in battery technologies vehicleefficiencies.

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