

# Design & Fabrication of Solar Operated Tricycle

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## ABSTRACT

Nowadays, non-conventional form of energy production is flourishing all over the world. As it does not require more Raw Materials, we can get the power for life time. In this project, we are fabricating the concept converting solar energy into electrical energy to run tricycle for both handicapped person and normal person. This Project consists of the following main parts; - solar panel, battery and DC motor. This paper explains the design of solar powered tricycle for physically challenged persons. At present considering the automotive market in India, China and Vietnam there is no standard vehicle for hands as well as leg impaired people which is least expensive and easily accessible

**Keywords :** Automation, Tricycle, DC Motor, Solar Plate, Non- Renewable Energy, Battery

## I. INTRODUCTION

The greatest problem that faces the world today is Global Warming. It is more apparent here in India than anywhere else, especially Nagpur where temperature last summer from 44deg C to 46deg C. The principal form of renewable energy suitable for places which lie in the tropics is the wind and solar energy. The solar panels seen on the roof tops are usually for producing hot water and should not be confused with those used to produce electricity which is photo voltaic panels. They are made of 2 thin plates of silicon containing slight impurity which when exposed to sunlight experience a stimulation of electrons. If positive and negative terminals connected by a wire are added, as in battery, the electrons will flow round the wire producing electricity.

The objective of this project is to design and fabricate a solar operated tricycle. To serve this purpose a field survey will be done which includes physically challenged persons. The design includes development of frame and other subsystems of the vehicle which would be validated by software's such as

SOLIDWORKS, ANSYS and WORKING MODEL. The design of the vehicle is its compactness and accessibility. The design will aid the above purpose. The fabricated vehicle will be tested under several conditions. This is done to ensure the safety of the vehicle, so that vehicle can be used under any condition.

## OBJECTIVE

- ✓ To develop a vehicle that use renewable energy, environmentally friendly and cheap.
- ✓ To develop an electrical 4 wheeler that can charge the battery when it is not in used.
- ✓ To develop low speed 4 wheeler, but for a longer distance.
- ✓ To find the alternative of fuel.
- ✓ To maintain the ecological balance.
- ✓ To form the economical

## II. DESIGN & SPECIFICATION

### Specifications of vehicle

- ✓ Solar panel: 12 volt, 30W= 2Nos.
- ✓ Motor: brushless dc motor, 48volt, Maximum load current is. Power rating is 850 W, 300rpm.

- ✓ Battery: 12 V- 4 Nos.
- ✓ Charging time: 12 hr.
- ✓ Maximum speed: 40 km/hr.
- ✓ Frame: Steel in parts with high strength requirements.
- ✓ Tires: Front 23 x 2.50. Rear 20 x 2.00 / 2.25 moped strength.
- ✓ Size: Length 2.3 M. Width - 1.2 M.
- ✓ Load Capacity: 100 kg
- ✓ Handlebars: Maxims Design.

## CONSTRUCTION

1. The design & fabrication of automatic operated solar agro sprayer system in which the mechanisms consist of the frame made up of cast iron.
2. The system consists of the Solar panel, Battery, Centrifugal Pump, Tank, .Sprayer sticks with nozzle, High speed Dc motor, Impeller, and Automation Unit

## Component

### 1. Solar Panel



Fig 1: Solar Panel

A photovoltaic (in short PV) module is packaged, connected assembly of typically 6\*10 solar cells. Solar photovoltaic panels constitute the solar array of a photovoltaic system that generates & supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under

standard test conditions, and typically ranges from 100 to 365 watts. The efficiency of a module determines the area of a module given the same rated output- an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module. The price of solar panel, together with batteries for storage, has continued to fall so that in many countries it is cheaper than ordinary fossil fuel electricity from the grid( there is “ grid parity “).

### 2. Battery:



Fig 2. Battery

Batteries are usually lead-acid type (electric cars may also use in addition to non-lead batteries), and are made of six galvanic cells connected in series to provide a nominally 12-volt system. Each cell provides 2.1 volts for a total of 12.6 volts at full charge. Heavy vehicles, such as highway trucks or tractors, often equipped with diesel engines, may have 2 batteries in series for a 24-volt system or may have series-parallel groups of batteries supplying 24V. Lead-acid batteries are made up of lead and separate plates of lead dioxide, which are submerged into an electrolyte solution of about 38% sulfuric acid and 62% water. This causes a chemical reaction that releases electrons, allowing them to flow through conductors to produce electricity.

### 3. DC MOTOR

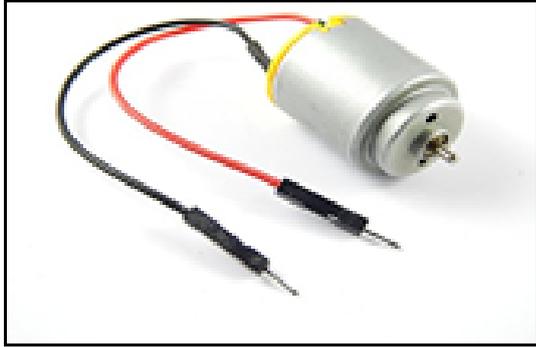


Fig 3. DC Motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in the part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.

The universal motor can operate on direct current but is a light weight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

### III. WORKING

- ✓ The solar panels transfer energy to 12 volt deep cell batteries located on the bikes frame just below chair. From there, a small brushless DC motor between the front wheel hubs powers the bike.
- ✓ The whole system is on a continuous feedback loop enabling the bike to partially recharge while in use thus extending the bike's range.
- ✓ A DC motor is located in front wheel is controlled by the speed controller & throttle... When not in

use solar panel continues to recharge the batteries.

- ✓ The solar operated tricycle consists of following components to full fill the requirements of complete operations of a machine.

### PROPOSED DESIGN OF SOLAR OPERATED TRICYCLE

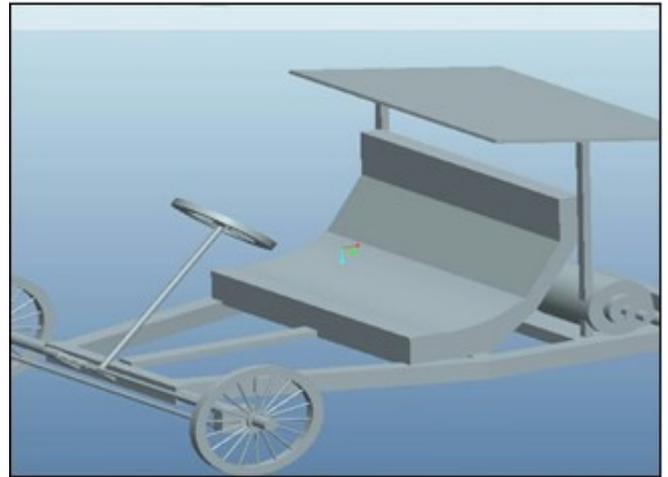


Fig 4. Block Diagram of Solar Tricycle

### IV. FUTURE ASPECTS

- ✓ In future, we are giving reverse gear to vehicle.
- ✓ For future aspect, we will provide four wheeler mechanisms for better look.
- ✓ For future aspect, we are planning to give rack & pinion steering mechanism.
- ✓ For future aspect, we are planning to make this vehicle for both handicapped person & normal person.
- ✓ For future aspect, we are planning to make a seat of the tricycle easily removal so handicapped person can easily sit on vehicle.

### V. CONCLUSION

We can say our project can be a success considering the changes we had to make in the spring once we actually found out how the hybrid solar tricycle was for. We can achieve our five aims, and we believe that we have a system that will be effective in providing

mobility for persons who have disabilities. One of the major lessons we have learned is that designing an appropriate technology is a huge challenge. Appropriate is more than just availability for replication, it considers longevity, reliability, and efficiency.

## RESULTANT VEHICLE



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