

# Development and Production of Solar Electric Bicycles

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## Abstract

Since the price of gasoline is rising all over the world, there is a pressing need to find a substitute in order to protect these natural resources. It is becoming essential to increase the use of renewable energy sources namely solar energy as compared to conventional sources of energy generation [4]. A solar bicycle, for example, is an electric vehicle that provides that option by using solar energy to charge the battery and thus supply the necessary voltage to drive the engine. Because India has nine months of sunshine, the thought of a solar bicycle is particularly appealing to Indians. A hybrid bicycle combines solar energy with a dynamo that rotates through the pedals to regulate the battery that powers the bicycle. As a result, the solar hybrid bicycle has the potential to become a very powerful substitute for the powered automobile, and its commerce is critical.

**Keywords:** Travelling, Electric Bicycle, Electric Energy, Solar Panels, Fuel Economy.

## Introduction

Nowadays in India, frequent power cuts are very commonly observed. Hence consumer tend to adopt alternative measures to generate power [3]. Mopeds, bikes, and vehicles abound in global markets. Mopeds and cars, on the other hand, are a suitable choice for short-distance travel. However, they have a number of significant disadvantages, including a high initial purchase price, rising fuel prices, particularly for gasoline, and expensive maintenance costs. On the other hand, because the rider wastes a lot of physical strength pumping the pedals to rotate the driving rear wheel, the classic bi-low cycle's purchase price and negligible operating cost can be incomprehensible. As a result, we must discover new approaches to address these issues and provide assistance to economically disadvantaged people while still protecting the environment.

## CURRENT SCENARIO OF E-BIKE IN THE WORLD

In 2016, 210 million electric bikes were in use on a daily basis around the world. In early 2010, it was predicted that 120 million e-bikes were sold in China, and sales are rapidly increasing in India, the United States of America, Germany, the Netherlands, and Switzerland. The world's fifth-largest car market is preparing for a massive transformation: by 2030, it will be entirely dominated by electric vehicles (EVs). It will establish vehicle standards and specifications, as well as instructions to encourage their adoption. In conclusion: - Solar bikes, according to this section of the article, are pollution-free vehicles that people can use in their daily lives to lessen their reliance on fossil fuels. They are efficient and cost less to operate and maintain than other cars. They have the potential to be successful in the future.

The project's objectives

1. Due to its light weight and ease of handling, it is suitable for use by everyone.
2. The rider's safety is ensured by the controlled speed.

3. Older demographics can use it.
4. Charging station on site. There's no need to go to the gas station.
5. To create a car that runs on renewable energy and is both ecologically benign and affordable.

### SYSTEM ARCHITECTURE:

The solar power bicycle employs a methodology that converts renewable solar energy into mechanical work. Solar panels, batteries, DC motors, and bicycle wheels are the components utilised in solar electrical energy. A solar panel is a device that converts solar energy into electricity. The rechargeable battery stores this electrical energy. The DC motor attached to the bicycle's wheel rotates using the electrical energy stored in the battery.

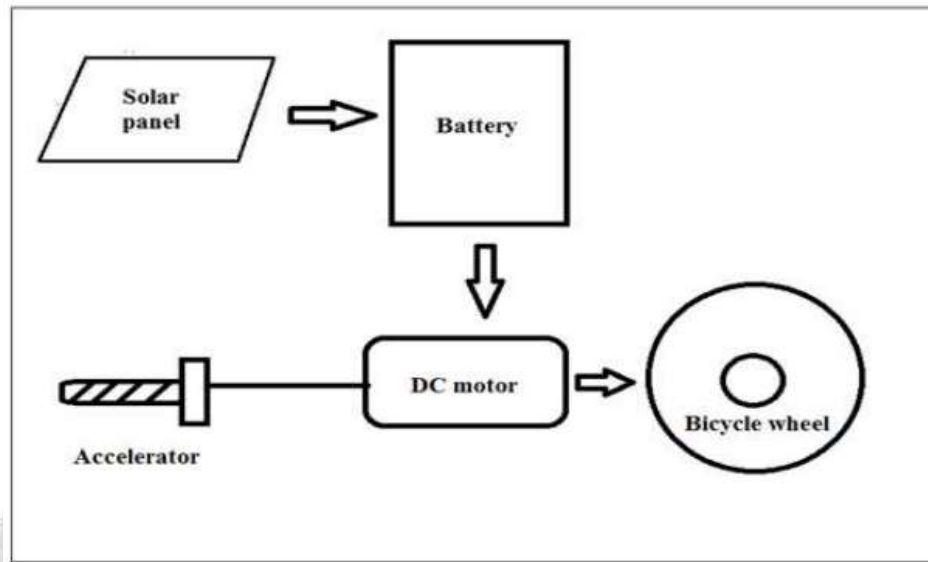


Fig. Block diagram of System

The rider initially pedals the bicycle, which give initial torque requirement to run the cycle. As soon as the cycle comes in dynamics, we turn on the motor by throttling. This is the most attractive feature of our cycle. As our bicycle has this feature, we almost encounter the chances of damage of motor. So our bicycle works efficiently when we pedal initially and then by using power of motor.

The block diagram hybrid bicycle driven by DC motor fitted on middle shaft of bicycle & operated by battery energy shown in fig1. The solar panel mounted on carriage. Solar panel generates 12v power when sun light falls on it and its terminals are connected to charge controller. Dynamo is mounted on side shaft of bicycle, supports in such a manner that dynamo shaft is touching the back wheel tyres. As wheel rotates dynamo shaft rotates and generates 12V power. Its terminals are also connected to charge controller. When the bicycle is idle in day time, the solar panel will charge the battery. Due to non-uniform sunlight and varying in wheel speed, output voltage from both solar panel and dynamo is varying in nature. Charge controller adjusts the constant voltage of 12 volt and charges the battery. The power flow acts in parallel with the power delivered by the rider via the pedaling. The rider of an solar bicycle can opt the motor completely or pedaling (as in conventional bicycle).

### Schematic Diagram of Project

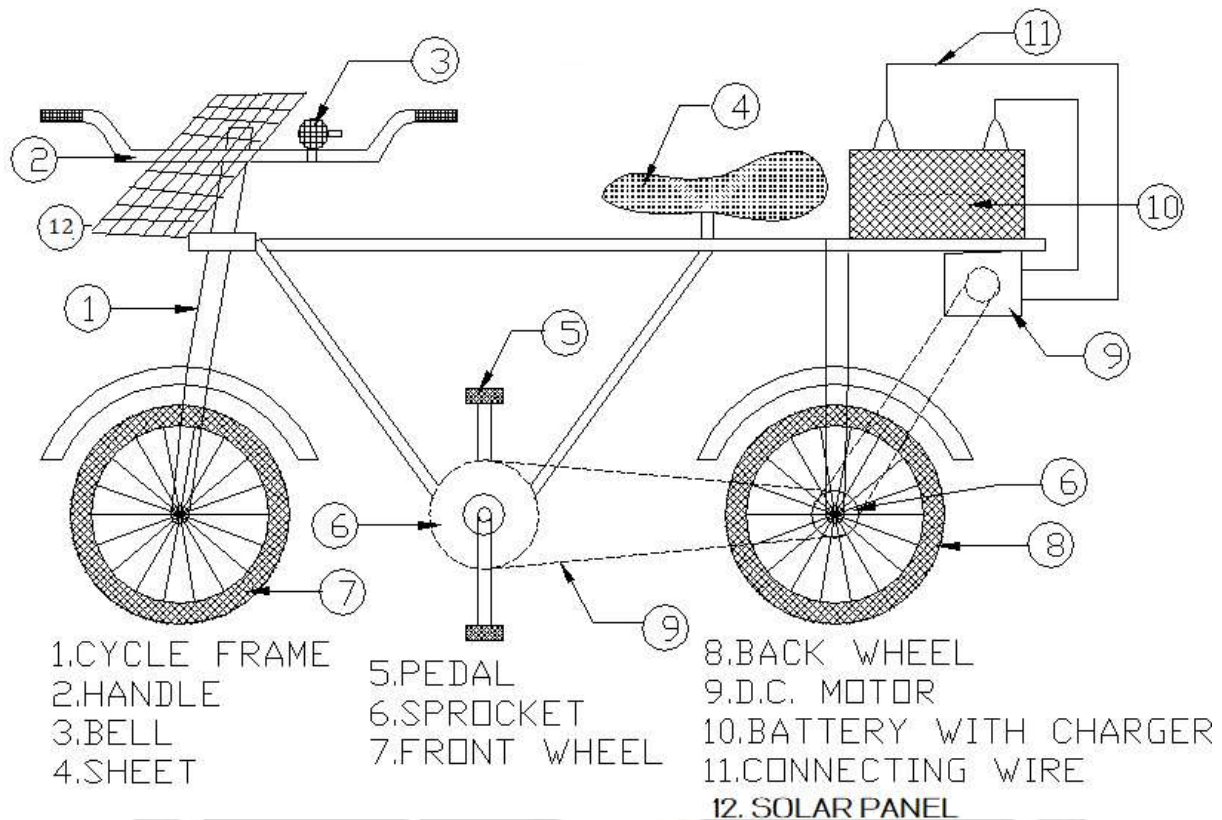


Fig.3. The various parts attached to Pedal-Solar Powered Bicycle

The electric bike speed controller sends signals to the bike's motor in many voltages. These signals detect the direction of a rotor relative to the starter coil. The suitable function of a speed control depends on the employment of various mechanisms. In a purpose-built electric bike, Hall effect sensors help detect the location of the rotor. If your speed controller does not include such sensors and the speed controller on an adaptive bike may not the electromotive force of the un-driven coil is calculated to get the rotor orientation. The mechanism of an electric speed controller differs depending on whether you own an adaptive or purpose build electric bike. An adaptive bike includes an electric drive system installed on an normal bicycle. A purpose built bike, more expensive than an adaptive bike, provides easier acceleration and affords extra features.

#### **HARDWARE DESCRIPTION:**

##### **1. D. C. MOTOR:**

DC motor is appended to the framework with a specific end goal to give the essential torque to the chain drive and the pulley framework. Here we are utilizing 2 DC motors one for driving the sprocket of the chain drive, to move the move of the chassis. Details- 24 volt, rpm 6.84 Nm torque.

##### **2. BATTERY:**

Batteries work by changing over compound vitality into electrical vitality through electrochemical release responses. Batteries are made out of at least one cells, each containing a positive terminal, negative anode, separator, and electrolyte. Cells can be partitioned into two noteworthy classes: essential and optional. Essential cells are not rechargeable and must be supplanted once the reactants are drained. Auxiliary cells are rechargeable and require a DC charging source to reestablish reactants to their completely charged state.

Details- 12 volt 7 Amp. Lead acid battery.

### 3. Solar panel

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

Details- 12 volt, 20 watt 1 amp solar panel.

### 4. Electronic module

Electronic module contains accelerator assembly to change speed of DC motor and motor controller which are mounted behind the seat.

## Conclusion

This solar bike is one of the most environmentally friendly and sustainable means of transport. It is environmentally friendly and the investment cost is minimal. In this project, the bike uses solar energy for its work. In the future, other renewable resources such as wind power may also be used for this purpose. It also costs around INR 13,200 and has a good speed. Much more can be done in this area. Indicators, advanced sensors, navigation systems, and more can also be used for additional performance.

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