

Solar Electric Bicycle

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Abstract : *This project deals with the design and fabrication of a Solar Powered Bicycle which makes use of solar energy as the major source of power. The complete design of the charging system of battery, transmission of power and salient features of the bicycle are dealt with. Provision is made in the design to charge the battery from electrical source also so that the usage of the cycle is extended in places and time where solar power is not available. The transmission drive used in our project is chain drive and motor is BLDC gear motor. The whole assembly is modified on the existing bicycle without implement new design making this project cost efficient and easily available.*

Keywords: *Solar panel, BLDC Motor, Solar Powered Vehicle, Electricity, E-Bike*

I. INTRODUCTION

As we know that energy crisis is one of the major concern in today's world due to fast depleting resources of petrol, diesel and natural gas. In present scenario, owing to the increasing number of automobiles the need for petroleum products is reaching its peak point. Petroleum products are non-renewable and may possibly get exhausted in future. so it is better to move to alternate energy sources. So our project gives the best solution for these problems. The project which we are innovated is "Electric Bicycle". This bicycle works on Solar Power which is renewable source of energy.

An Electric Bicycle is a low cost alternative to an automobile. Although the concept of electric bicycle is not new. It has not been completely explored. This project focuses on the design and testing of an electric bicycle. The project is challenging with respect to the conversion of the existing mechanical system to the one that incorporates both human pedaling and utilization of solar energy. "Electric and solar hybrid" usually indicates the use of multiple energy sources to provide power to a vehicle. Energy from ac wall outlet, solar power as well as from human pedaling is utilized in this project to charge a battery. Solar power is not only used to charge the battery, but may also be used for powering communications, controls and other auxiliary functions. The hub motor attached to the front wheel of the bicycle is charged from the battery. India is spending large amount of foreign exchange to import crude oil even though we have abundant resource of solar energy. If we utilize solar power for local conveyance, a large amount of currency can be saved and we can also ensure pollution free environment and contribute to nation's economy. The general mode of transportation for local trip is a bicycle, motorcycle or electric bicycle. Bicycles are cheapest, healthiest and eco- friendly but posses problem in climbing slopes.

II. METHODOLOGY

The methodology used in constructing the Electric Bicycle has been illustrated as a block diagram in figure 1. The main aim of the project was to ensure efficient operation of the Electric Bicycle by meeting the drive requirements. Considering legal limits on the speed of electric bicycles, the maximum speed of the Electric Bicycle was considered to be 28kmph. Since regeneration is involved, determining the type of components to be used, given the constraints of weight and size became more crucial.

The electric bicycle consists of following components:

- Motor
- Battery
- Controller
- Solar Panel
- Sprockets
- Chain Drive
- Throttle

A. Motor

The motor which we are used is BLDC Gear Motor having a capacity of 350 watt. Its specifications are as follows:

Voltage Rating: 24 volt

Current Rating: 14.53 amp
Speed: 1800 rpm



Fig. 2.1. DC Motor

B. Battery

The total no. of battery we are using is two. Specifications are as follows:

Voltage Rating: 12 volt ; for two battery $V=24$ volt

Current Rating: 7.6 amp

Power: 184.4 watts



Fig. 2.2 Battery

C. Controller



Fig. 2.3 Controller

D. Solar Panel

Solar panel charges the battery. Specifications are as follows:

Voltage Rating: 12 volt

Current Rating: 2.5 amp

Power: 30 watt



Fig. 2.4 Solar Panel

E. Sprockets

Sprockets is a profiled wheel teeth , cogs or even sprockets that mesh with a chain, or other perforated or intended material.

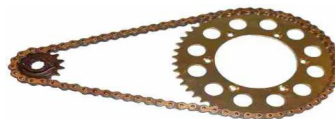


Fig. 2.5 Sprockets

F. Chain Drive

Chain Drive is an array of links which connected together with each other with the help of pins.

G. Throttle

A throttle allows us the acceleration.



Fig. 2.6 Throttle

III. ADVANTAGES

- A. Less maintenance cost.
- B. Less energy consumption.
- C. Zero emission.
- D. Cost is very low.
- E. Easy to carry since it is portable.
- F. Non polluting.

IV. CONCLUSION

The solar powered bicycle has the following salient features. A cycle can run at an average speed of 15 kmph. The standard torque generated on wheel is 1.92Nm and from calculation we can determine the slope can easily climb by our electric bicycle. The battery can be charged in dual mode, Solar or Electrical supply. The battery can be charged in rainy season or at nights also. The cost is less Rs 13000/- compared to Luna (Rs 30000 /-) or E – Bike (Rs 25000 and above). Eco - friendly, No Pollution. The battery is being charged while riding in sun. Hence charging and usage takes place simultaneously. No running cost. It can be easily recommended as a local vehicle.

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