

# Design and fabrication of self-charging bicycle

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**Abstract** — In the new era the e- bicycle has the more importance than other fuel vehicle like motor cycle, car etc. basically for the short distance travel the bicycle is more useful and e-bicycle is effortless. It is also eco-friendly technology bicycle was the most depended mode of transportation. A self-charging battery electrical bicycle which utilize the mechanical energy to electrical energy of wheels to charge the battery. A system which make the vehicle pollution free. We are using the component like hub motor, dynamo, controller, battery, etc. It is pollution free and no fuel consuming type of vehicle and it is good for greenhouse effect. The rider cab be chosen that the bicycle can be driven completely with the hub motor or to be driven manually by him with a pedaling.

**Index Terms**- Bicycle, Hub motor, Dynamo, Controller, Battery, Clean energy.

## 1. INTRODUCTION

Now a day's more economical, noiseless, emission free and uninterested alternate source of electricity named self-charging bicycle or electrical drive bicycle. Were the electric bicycle gives more comfort to human being but and also give good effect of human health. Electric bicycle getting attention world-wild or global. The electric bicycle decreases the use of non-conventional resources like petrol diesel, gas, etc. Global warming and resources are becoming the major problems in the world. It also reduces the pollution and other vehicle use. There is a large demand or requirement pollution free vehicle like electric bicycle. The electric bicycle is use for short and moderate distance instate of using motor cycle or car, which consume fuel and produce pollution. In many country, the use of electric bicycle is already in use and the people of the country are participating to get pollution free country by using electric bicycle.

### 1.1 Hub Motor:

Brushless DC-motor have been in commercial use. This motor develops a maximum torque when stationary. Hub motor principle depend upon Fleming right hand rule. Rule state that thumb of right hand middle figure, index figure. Middle figure indicate current flow; index figure shows direction of magnetic field. Thumb will indicate direction of movement.

Permanent magnets which are placed in a brushless DC motor, those magnets rotate around a fixed armature. An electronic controller replaces brush assembly of brushed motor turning. Brushless motor has more advantages than DC motor which includes more torque more weight and also torque per watt.



Fig- Hub Motor

#### SPECIFICATION:

- Power : ½ hp motor
- Volts : 48v
- Amps : 7amp
- Speed : 1200 rpm
- Poles : 4
- Weight : 12 kg

### 1.2 Dynamo:

In electric bicycle system we use a dynamo as electric generator. Which convert the mechanical energy into the electrical energy. In the electrical bicycle the dynamo is placed in the rear wheel to

convert rotational energy into electrical energy when the bicycle is running. In dynamo use rotating coil of wire and magnetic so it converts mechanical rotation into an electrical current through Faraday's Law of induction.

Faraday's first law of induction state that whenever a conduction is placed in varying magnetic field EMF are induced which is known as induced EMF if the conductor circuit is closed current are also induced which are called induced current.

Ways of changing magnetic field:

1. By rotating the coil relative to the magnet.
2. By moving the coil into or out of the magnetic field.
3. By changing the area of a coil placed in the magnetic field.
4. By moving a magnet towards or away from the coil.

$$\epsilon = -N \frac{\Delta\phi}{\Delta t}$$



Fig-Dynamo

### 1.3 Motor Controller:

A motor controller is device which control or manage the device. Motor controller is manual or automatic type which controlled the starting and stopping of the motor, forward and stopping of the motor. It also regulates the speed limit and torque. And protect against over load and faults.



Fig-Motor controller

### 1.4 Battery:

Battery is the main compost of e-bike their many type of battery but the popular ones are NiMH, Lithium Ions battery. The battery quality is measured by how many cycle they can take to charged. How much percent they work until fixed duration length. Original capacity of battery at the manufacturing time in NiMH battery around 400-800 cycle recharging is possible. Lithium battery 1000 cycle.



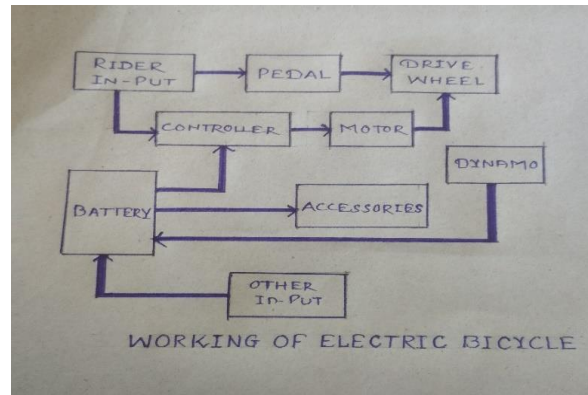
Fig-Battery

We use lithium acid battery which is used many electrical vehicles they are potentially useable in hybrid application. Lead acid battery can be produces high power and in expensive safe and reliable and easily available. It is very economical in cost and it is long life and easy to replaced.

## 2 CONSTRUCTION & WORKING

It consists of Hub motor, dynamo, controller, Battery, brakes, throttle, speedometer etc.

Working: As the paddling start the real wheel start rotating and the or which the dynamo is placed which is also rotating at a same speed as of the wheel and convert the rotational or mechanical energy of wheel into an electrical energy which is stored in the battery for the further used.



The stored electrical energy from the battery supply to the hub motor which is placed on the front wheel and start rotating according to the motor controller

and accelerator. Controller control the speed of the hub motor with the help of accelerator which is connected to the controller and hub motor. Speedometer is also being in the system to measure the speed of the bicycle. It is analogue or digital type.

### 3 CONCLUSION

Simplified to riding with minimum effort. With the increasing the consumption of natural resources of petrol diesel natural gases it is necessary to shipped towards alternator resources. This bicycle also gives safety driving for human because of its limited speed. It necessary to identify to new way of transport increases the production of electrical bicycle is cheaper affordable to anyone. In the coming future, it is for thought that all the petrol bike's need to be replaced by the bicycle (E- bike). The most important future of electric bicycle is that is not consuming fossil fuels, the very most important facture for human being for electric bicycle is pollution free noise pollution free ecofriendly, clean energy or green energy. It is required maintained speed.

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