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# Design and Fabrication of Self Rechargeable Bicycle

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**Abstract:** *The principle point of the venture was "Creation of self battery-powered bike" for business utilization in present day lifetime by thinking about the capacity, wellbeing and simple upkeep. Since the fuel costs in India as well as all through the world is expanding step by step, hence there is an enormous need to look for an option or monitoring these characteristic assets. Presently a days there are such a significant number of vehicles on street, which requires more fuel and furthermore dangerous to our condition. With the expansion in fuel costs, contamination content in environment is uprising and because of steady decrease of the non inexhaustible wellsprings of vitality we need to change the wellspring of our vitality in our vehicles. It is our most extreme obligation to lessen the utilization of fuel and its unsafe emanation items. Thinking about this it is our little advance towards diminishing the utilization of more fuel devouring vehicles and draws in the eye of individuals towards its choices for example Electric bike. In light of this reason the self battery-powered bike is made for a productive travel.*

**Keywords:** *Bicycle, Battery, Renewable sources.*

## I. INTRODUCTION

The primary point of this task is to conceptualize, plan and create a completely utilitarian self battery-powered bike which keeps running in a proficient way. An Earth-wide temperature boost is turning into a blemish issue in the present situation. Hence individuals attempt to move towards clean vitality. Transportation is one of the wellsprings of contamination due to bicycle or any kind of vehicle which take a shot at fuel like oil, diesel and it consumes and delivers unsafe gases in air because of that contamination is increments. Electrical bicycle is one of the approaches to diminish these sorts of issues. The electric bike is an electrical helped gadget which is intended to convey the electromagnetic energies to a bike in this manner soothing the client of creating the vitality basic to run the bike.

It contains a solid engine and enough battery control that is required charging to help in slope climbing, create more noteworthy motoring speeds and furthermore gives a totally free electric transportation. We realize that in todays the world is so quick and this is conceivable simply because of quick transportation. An Electric bike would, anyway offer other minimal advantages that are especially disregarded by the very commercial center.

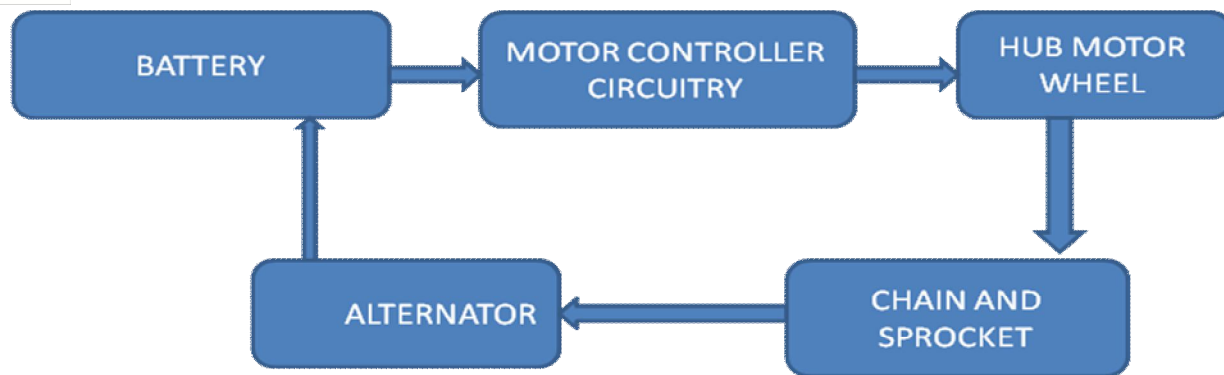
These incorporate the string decrease in the oil utilization that its far reaching use would realize. Significantly less of oil would be required in light of the fact that just a minor extent of power is created from oil. The further major non-advertise advantage would be the bringing down of ozone depleting substance discharges.

That time different organizations won't create some other kind of items because of that request of that specific item increments. This produces impact on financial state of our nation's development and accordingly plainly from above precedent what is essential of transportation in our customary life.

It implies when the transportation is at a skirt of best the more development and economy. Presently a day's every one of the vehicles take a shot at fuel yet capacity of fuel is most imitated and that implies when the capacity of fuel is thoroughly complete that time transportation is absolutely stop. In this manner the present need is self power creating electrical bicycle and that bicycle produce proprietor the power and work on self power and without impact on working of activity and this isn't having any kind of outer vitality it is free from contamination.

## II. METHODOLOGY

In this project, first we are modifying the bicycle in the suitable way for reproducing it into a electric bicycle. The back wheel was removed and the hub motor wheel was fixed and wheel is attached on back wheel. Then the hub motor wheel is connected to the battery supply. The lead acid type battery was used. The battery will supply the power to the hub motor and the wheel can rotate. The chain sprocket and chain was used to connect the hub motor wheel and alternator. When the hub motor wheel rotates, the alternator connected to it also rotate. Due to this process the electric energy was produced and it's used to recharge the lead acid battery.



### III. COMPONENTS USED

The following components are used in this project,

#### A. Hub Motor Wheel



A hub motor is a device which converts electrical energy into mechanical energy. The hub motor is mainly made of stator and rotor. The direction of the force movement of electric conductor in the magnetic field in coils is related to the direction of current and magnetic inductance. The working principle of the motor is the effect of magnetic field on the current force of the coils, which makes the motor rotate.

A motor is a rotating electric machine that transforms electrical energy into useful mechanical energy. It is an electric motor that is made into the hub of the wheel and drives it directly. The motor used is here is brushless dc motor. The brushless dc motor is the dc motor where the mechanical commutation is actually replaced by electronic commutation for better efficiency. This removes all contacts between rotor and stator and gives the motor a longer life and also improves the power density of the motor.

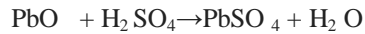
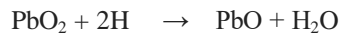
The rotor is a permanent magnet and the stator is made up of coil arrangements. D.C power is given to one phase of coil so coil is energised and becomes electromagnet and the opposite poles of rotor and stator are attracted. Then phase two is energised while de-energising phase one and thus the rotor is kept rotating.

### B. Lead Acid Battery

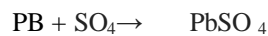
The lead– corrosive battery was made by French physicist Gaston Plante and it is the most established kind of battery-powered battery. Despite very low energy to weight ratio and low energy to volume ratio, it is able to supply high surge currents means that the cells have a relatively large power to weight ratio. These features, along with their lesser cost, make them good-looking for use in motor vehicles and to provide the high current required by automobile starter motors .

The lead acid battery consists of two plates . The positive plate is lead dioxide and the negative plate is pure lead . Both the plates connected in a circuit and immersed in a solution of dilute  $H_2SO_4$  mixed with water .

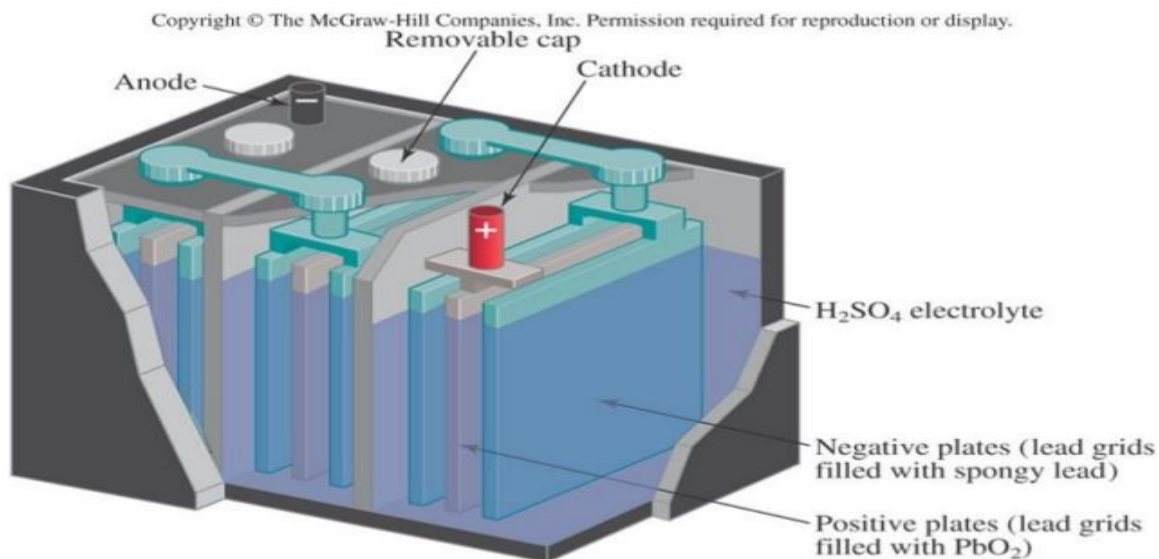
The hydrogen ions move towards lead dioxide plate and reacts with electrons forming hydrogen atoms which reacts with lead dioxide to form  $PbSO_4$ .



And on the other plate lead the sulphate ions give the negative ions to the lead plate and become sulphate reaction with lead forming lead sulphate.

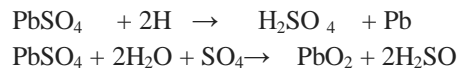


Lead Acid Battery



Then the discharging of battery takes place, during discharge the electrons flow from lead plate to lead dioxide plate which are circuited to a load and thus the power is generated.

After this a d.c supply is given so that the battery can be recharged. During recharge as the solution contains sulphuric acid the positive hydrogen ions move towards the lead plate and the negative sulphate ions move towards the lead dioxide plate . Thus recharging takes place.



### C. Alternator

Alternator is an electrical generator which changes over mechanical vitality into electrical vitality through substituting flow. The working standard of alternator is exceptionally straightforward. It is much the same as the essential standard of DC generator. It depends on Faraday's law of electromagnetic induction. It arranges the enormous preponderance of power , to each of the automobile's electronics and is one of the most vital tools in your appliance. It also holds its account for replenishing your power unit .



- 1) Alternators are the workforce of the modern power generation industry.
- 2) The alternator consists of stator and rotor coils.
- 3) Rotor produces rotating magnetic flux and the armature coils are stationary
- 4) And the rotating magnetic flux induces current in the armature coil.
- 5) Rotor coils are provided with a d.c power source and the rotor is rotated with the help of a prime mover .
- 6) Thus rotating magnetic flux is produced.
- 7) Such revolving magnetic flux intersects the armature coils.
- 8) This generates an alternating e.m.f across the winding.
- 9) After the rotating hub motor rotation rotates the prime mover of alternator as both motor and alternator are coupled.
- 10) Then the alternator generates a.c current and this power is again supplied to battery.
- 11) Thus the power consumption of battery is highly reduced and the process is economical and pollution free.

### D. Chain Sprocket

A sprocket is a profile wheel with teeth, cogs, or even made of sprockets that meshes with a chain, track or other perforated or indented material of use. Sprocket is just any wheel generally upon which are radial projections that engage a chain passing over it. It is different from a gear in that sprockets are never meshed together directly, and differs from the pulley in that sprockets that have teeth and pulleys are generally smooth. Sprockets are generally used in bicycles, motorcycles, cars, tracked vehicles, and other machinery for transmitting rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape and other things as required. Chain mechanism is a practice that is largely copied from bicycles. Sprockets come of various designs, a maximum of efficiency being claimed for each by its originator. Sprockets typically do not have flanges. Some sprockets are used with timing belts and have flanges to keep the timing belt centered. Sprockets and chains are also used for power transmission from one shaft to another where slippage is not allowable, sprocket chains being used instead of belts or ropes and sprocket-wheels instead of pulleys. They could be run at high speeds and some forms of the chain are so constructed as to be noiseless even at high speed.

#### IV. WORKING



- A. The working of the self rechargeable depends on the battery and the hub motor .
- B. Then the lead acid battery provides the required power for the operation of the hub motor wheel .
- C. The power produced by the lead acid battery is 36v and 7 ah.
- D. This runs the hub motor wheel which operates at 36v 250w.
- E. The rotating hub motor runs the bicycle wheel.
- F. Thus the bicycle moves as desired speed.
- G. Then the hub motor wheel is also coupled to the prime mover of the alternator.
- H. The coupling is done with the help of chain sprockets.
- I. The prime mover contains the rotor of the alternator.
- J. Thus the power generated in the alternator is again given to the battery.
- K. Thus the efficiency of the battery is highly increased as the power input to battery is greatly reduced.
- L. Most **electric bikes work** in a different way. They have flexible **electric** motors built into the hub of the back or front wheel.

#### V. COST ESTIMATION

| S.NO | NAME OF THE COMPONENTS | SPECIFICATION | COST   |
|------|------------------------|---------------|--------|
| 1.   | BATTERY                | 48V 7Ah       | 2,200  |
| 2.   | HUB MOTOR WHEEL        | 24W           | 14,600 |
| 3.   | ALTERNATOR             | 48V 7Ah       | 6,000  |
| 4.   | CHAIN SPROCKET         |               | 500    |
| 5.   | BICYCLE                |               | 4,000  |
| 6.   | WIRES                  | AS REQUIRED   | 100    |
|      |                        | TOTAL         | 27,400 |

#### VI. RECOMMENDATION

- A. We hope that we can take this to advance by fixing a solar panel for cost effectiveness.
- B. Afterwards, we hope to design for all the household purpose.
- C. Pollution free can be clear by using certain respective material but it should be withstand on required and respective process.



## VII. RESULT

It is clearly seen that the electrical bicycle gives clean and more economical solution to the energy crisis faced by the world. People use bikes and fuelled vehicles for even travelling shorter distances without making use of bicycles and other non fuelled compact vehicles. Many people from the list have been those which think driving a cycle is equivalent to providing extra effort for cycling. In order to avoid these problems, electric assistance has been provided to the cycle that will ease the user to ride the unit with the help of a motor. Even the hardships of climbing slopes and riding on rough terrains have been reduced to a great extent. All these aspects are completely available keeping in mind the factor of pollution being affected at all.

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