

# ELECTRIC AIR BICYCLE

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## ABSTRACT:

This paper on Electric Air Bicycle mainly focuses on energy conservation. One of the major problems most developing countries facing today is air pollution the major source of which is automobiles. As fuel prices especially the petrol is rising steadily day by day. It appears that pedal power alone has not been sufficient to supplant the use of petrol and diesel vehicles. To overcome these problems, an effort is being made to search some other alternative sources of energy for the vehicles to overcome through the availability of public use electric bicycles.

**Key Words:** *Bicycle, Electric Motor, Battery, Propellers, MCB, Charger*

## INTRODUCTION:

In the modern days, the increasing needs of mobility means sometimes increasing the number of vehicles which leads to increase in pollution. So to overcome these problems, an effort is being made to search some other alternative sources of energy for the vehicles to overcome through the availability of public use electric bicycles. Research world has been conducted on the solutions for these problems, especially during recent years due to awareness of CO<sub>2</sub> emissions. Due to low cost of bicycles any one can use at any where for short distance transport. This means that there is a potential for efficiency and air-quality improvement by switching to more energy efficient and less polluting modes of transport that can replace these short distance trips. One alternative is to increase bicycling which could reduce the need for taking car or public transport short distances as well as reduce congestion. One of the methods to increase bicycling in cities is to set up Bicycle Sharing Systems (BICYCLE) that can be accessed by locals or tourists for a fee. There are currently more than 600 cities with BICYCLE globally. The number of Bicycles in those systems exceeds 700 000. By providing a large network of stations with shared bicycles, it is possible to supply an efficient, convenient and cheap mode of transport.

The solution proposes the use of propellers for the forward movement of bicycle. For this dc series motor, battery, propellers, MCB and charger is used. The proposed topology uses the

charging and discharging of batteries during its working. Once the battery charges which is fixed to bicycle is used for moving the bicycle whenever requires. DC series motors are driven by using supply in and propeller the battery.

A propeller is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is produced between the forward and rear surfaces of the airfoil-shaped blade, and a fluid (such as air or water) is accelerated behind the blade. Propeller dynamics, like those of aircraft wings, can be modelled by Bernoulli's principle and Newton's Second law.

### PROPOSED METHODOLOGY:

Circuit consists of Six batteries, four dc series motors, a DPDT switch in that each and every two batteries are connected in series and these series combination are grouped in parallel which is shown in figure.1.

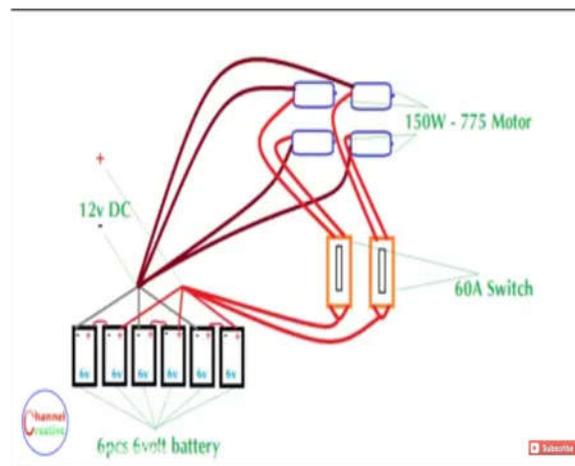


Fig.1.Circuit diagram of proposed method

It works on the principle that if the by closing DPDT switch the bicycle starts automatically and moves forward because of propellers at the backside of bicycle. The force of the propellers moves the bicycle in the forward direction. We can control it by using controllers after the switch.

E-Bicycle's power and energy uses Newton's second law of motion, which states that,

$$F=m*a$$

Where ,m is the total mass of the rider and E-Bicycle (kg);

$a$  is the acceleration ( $m/s^2$ ) and ;

$F$  is all the different forces (N) that affects the E-Bicycle.

When riding in constant speed there are three forces counteracting the input forces that needs to taken into account: Air-drag, rolling resistance and climbing force. The sum of the forces for an E-Bicycle in constant speed is,

$$F_{\text{human}} + F_{\text{motor}} = F_{\text{air}} + F_{\text{roll}} + F_{\text{climb}}$$

where;  $F_{\text{human}}$  is the force provided by pedaling ,

$F_{\text{motor}}$  the force provided by the electrical motor ;

$F_{\text{air}}$  the air drag;

$F_{\text{roll}}$  the rolling resistance and

$F_{\text{climb}}$  the force when climbing up or downhill.

The power (W) is given as

$$P = F \cdot v$$

Where  $v$  is the ground relative speed (m/s).

If the input power is larger than the total losses, the Bicycle will accelerate until the equation is balanced.

### Specifications of DC Series Motor:

Speed: 22000 – 25000 rpm

Voltage: 12 volts

Torque: 775 torque

### Propellers Dimensions:

Length : 8 cm

Diameter :4.5 mm

## EXPERIMENTAL SETUP :

Figure2. Shows the Model of electric air bicycle after fixing the components.



Fig.2.Model of electric air bicycle after fixing the components

## RESULTS:

E-Bicycle are more than thirty times as energy efficient as cars. It runs at an average speed of 20-30Kmph. As a transport mode they have great potential to decrease emissions and congestion. They enable ride in high speed despite strong headwind or hilly conditions where regular cyclists would decrease their speed significantly. Due to the decreased human force needed for propulsion, longer rides are also easier making it an alternative to replace for example car commuting. Combining E- Bicycles with Bicycle pools also opens up their use to a broader audience as the initial cost decreases. The lack of ownership also means that the users do not have to worry about getting their E- Bicycle stolen or to pay for maintenance. E-Bicycles can also be a natural extension to public transport. For commuters there might be a reduction in walking and waiting time to or between public transport . E-Bicycle stations would also increase the transport network size. Say that an E-Bicycle station is placed at a bus station; the area covered by 10 minutes of E-Bicycle ride from that spot is about fifteen times as large as if the person would walk as seen in. Another benefit with E-Bicycle station is that they can be placed more closely to where people start and end their journeys, such as homes or workplaces.

**CONCLUSION:**

This paper on electric air bicycle is an alternative source to automobiles for short and medium distances. When bicycle is charged by using ac supply and is converted into dc which is used to store electric energy in battery. The stored energy is used while cycling at a speed of 20-30 Kmph at minimum weight of 70-80 kg . Pedaling of cycle is also used whenever required. It is available at low cost ,it is very useful for rural people for short distance travelling. In future we also need to look for implementing without using external supply or charging i.e while pedaling battery gets charged and this cycle repeats once it is charged.

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