

# ELECTRIC BICYCLE

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**Abstract**— Now a days, there are so many vehicles are present on road. Which consumes fuels like petrol, diesel and gas. That hazards environment. Therefore, we have decided to design battery-operated cycle that is Electric Bicycle. In this paper we design battery operated system for attract the eye of people towards its alternatives that is Electric bicycle have been gaining attentions worldwide.

**Keywords**—EV-Electric Vehicle, BLDC- Brushless DC Motor

## I. INTRODUCTION

Electric bicycle is a bicycle, which has integrated electric motor. E- bike contains motor and battery power that just needs charging to help for fast operation then system will work fast and generate greater speed of motor and provide completely free electric transportation. This system is budget friendly and also environment friendly. This system includes the reduction in fuel consumption. This bike is built up with controller, rechargeable battery, speed sensor, and speedometer. Riding this e-bike will result in reducing your weight loss, lowers your stress level, increases energy and vitality, and make you feel younger.

## II. PROPOSED PROJECT WORK

The basic configuration of an electric bicycle drive consists of a controller that controls the power flow from the battery to the electric motor. This power flow acts in parallel with the power delivered by the rider via the pedal of the bike.

The Rider of an E-bike choose to –

Relay on the motor completely.

Pedals and use the motor at the same time.

Pedal only (use as a conventional bicycle).

Aspects favouring the Use of Electric Bicycles

Distance travelled (1–2% of going by car when going by electric bicycle) for a single rider; savings in other costs such as insurance, licenses, registration, parking, improvement of the traffic flow; environmental friendliness; and the health benefit for the rider.

## III. AIMS AND OBJECTIVES

**Aim:** To implement fast and flexible E-Bicycle.

**Objectives:**

1. To offer cheap and affordable mobility while the maintenance cost is also reduced with fewer moving parts.
2. To allow a person to ride more swiftly to work, school, distant, trails, and everywhere else, you would like to visit.

3. To show that it is possible and relatively simple, to build an electric bicycle by oneself.
4. To help in rider with greater power and precision than regular bike.
5. To analyse how much this e-bike can contribute to environmental safety and can be reliable solution to the alternative transport.
6. To understand complete functioning of e-bike, especially the controller system, various components used, and the role of controller to control the motor system.

## IV. METHODOLOGY USED FOR PROJECT WORK

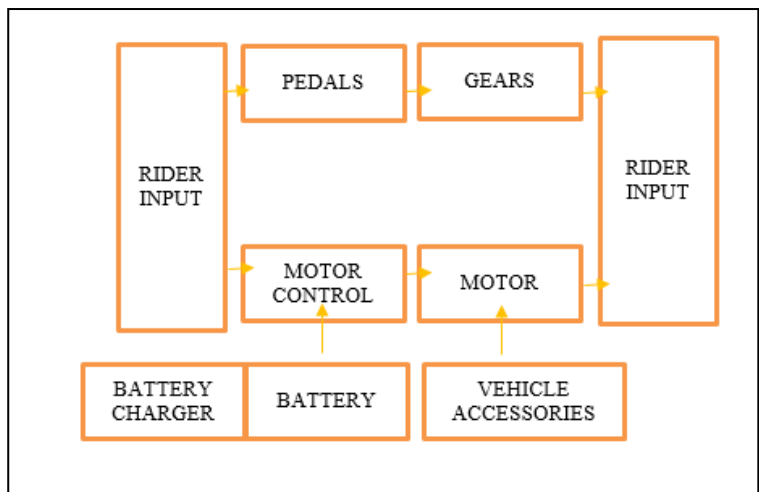


Fig: Block Diagram

**Motors :**

The two most common types of hub motors used in electric bicycles are brushed and brushless. There are many possible types of electric motorized bicycles with several technologies available, varying in cost and complexity direct-drive and geared motor units both are used.

**Batteries :**

E-Bikes use rechargeable batteries, electric motors and some form of control battery systems in use include sealed-lead-acid (SLA), nickel-cadmium (NiCad), nickel-metal hybrid (NiMH) or Lithium-ion polymer (Li-on).

Batteries vary according to the voltage, total charge capacity (amp hours), weight, the number of charging cycles before performance degrades, and ability to handle over-voltage charging condition.

## Controller

There are two distinct types of controllers designed to match either a brushed motor or brushless motor, controllers for brushless motors; brushless motors typically have hall sensor commutation for speed measurement. The controllers generally provide potentiometer-adjustable motor speed, closed-loop speed control for precious speed regulation protection logic for over-voltage, over-current and thermal protection. The controller uses pulse width modulation to regulate the power to the motor.

### V. DETAILS OF COMPONENTS

#### 1. DC Motor(BLDC Motor):

The motor is having 250 watt. Capacity with maximum 2100 rpm.

Its specifications are as follows:

Current Rating: 5.2 amp

Voltage Rating: 36 Volts

Cooling: Air-cooled

Bearing: Single row ball



Fig :BLDC motor

#### 2. Frame:

The Frame is made up of M.S. along with some additional light weight components. The frame is designed to sustain the weight of the person driving the unit, the weight of load to be conveyed and also to hold the accessories like motor. Also, it should be design to bear and overcome the stresses which may arise able to due to different driving and braking torques and impact loading across the obstacles. It is drilled and tapped enough to hold the support plates.

#### 3. Battery

The battery also acts as a condenser in a way that it stores the electrical energy produced by the generator due to electrochemical transformation and supply it on demand. Battery is also known as an accumulator of electric charge.

Specification: Voltage rating- 36 v Current rating- 5.2 A

Power rating- 180 watt hour



Fig: Battery

#### 4. Sprockets:

The chain with engaging with the sprocket converts rotational power in to rotary power and vice versa. The sprocket which looks like a gear may differ in three aspects: Sprockets have many engaging teeth but gears have only one or two. The teeth of a gear touch and slip against each other but there is basically no slip page in case of sprocket. The shape of the teeth are different in gears and sprockets.

#### 5. Controller Feature:

1)Rated voltage: DC 24V/36V

2)Rated power: 250W

3)Anti-coaster features,

4)Overcurrent protection,

5)Automatic identification the 24V and 36V

6)Automatic identification the Hall sensor

7)Automatic identification the Phase angle of 60 degrees and 120 degrees

8)Low level/E-ABS brake,

9)High level/E-ABS brake,

10)3 - variable speed,

11)Pedal assist,

12)Power assist

13)Applicable model: electric bicycle, electric scooter,

14)Size: 9 x 5 x 3 cm



Fig 5: Controller

### Headlight With Horn features:

It has a button for your Horn, Left and Right turn signals, and an ON/OFF button for your lights. This switch is small in size, does not take up much room on your handlebars. It can be easily mounted over your existing clutch lever perch to save space. Perfect for any e-scooter, e- bike/scooter or ATVs and much more

Overall Wire Length: approx. 96cm / 37.79 " Main material: ABS Plastic

Main colour: black Headlight Features:

E-bike headlight

1. High power 70 lux, bright enough for city and road cycling
2. Wide voltage input: fits most bike.
3. With 4 high-quality LED lamp beads, the illumination area is larger. 4.Size: 60\*60\*50mm



Fig: Headlight W/ Horn

### VI. FUTURE POSSIBILITIES

This thesis is in a way defining e-bikes, trying to analyse the basic functions of various mechanisms which are available only in such e-bikes. Besides the aim is to highlight its importance in general, to promote the possibility for global Welfare, where Clean Climate plays a role. Having this basic purpose in place, it is also be said that this subject contains simple to advanced features containing all three departments, therefore very useful Thesis for Bachelor level students, just because in e-bikes all three variations of engineering is associated. Such as electronics in controller, mechanical in motor, and electrical in batteries. Therefore, it can be a very resourceful work if it is possibly done using equipped labs, and somehow by using the same level of possibilities in advanced simulation software to analyse e-bike's properties better. The study of e-bikes can be done extensively, and it has been left for those interested researchers for exploring in depth of its possibilities in defining it.

### VII. ADVANTAGES OF E-BICYCLE

1. Compensating the Power:

The main advantage of e - bike is that it brings external power, to make our task easier.

2. Speed:

As there is already assisted power coming from the motor to help the movement of the e - bike forward, and when we add our own power through the pedalling, then the total power applied to the system doubles up, accordingly the speed will rise.

3. Accessibility:

In general situations, the people living in the hilly areas cannot access the bikes because it is impractical to carry the bikes to those heights, where it needs external power to support this.

4. Effort:

The effort that is required in riding e - bike is much lower than riding any ordinary bikes we can see, is just because in e - bikes motor is supplying the additional force to propel the wheels. Accordingly, the rider needs very less efforts on the pedal as is required in normal bikes. That is why riding becomes fun and easy with e-bikes.

5. Distance:

The basic advantage of e - bike is that, in combination with less fatigue, easy riding and greater speed possibilities, even a long distance looks quite simple. But speaking in general, it is a best alternative for within city drive.

6. Environmental friendly:

In energy efficient criteria, e-bike topples up the chart, they emit 30 times less CO<sub>2</sub> than a small car, emit zero emissions, a quiet means. If we introduce 100000 e-bikes, it can help to reduce 12000 tons of CO<sub>2</sub> per month.

7. Climbing Hills:

A well-functioning e - bike has a noticeable effect on climbing hilly roads, by the increased average speed achieved with them, thereby eliminating the 'groan' issue when gradient factor comes in. When users supply enough push, he can climb maximum gradient even, which is only achievable through cars or motorbikes.

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