

# Electric Bicycle

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## ABSTRACT

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An Electrical Bicycle is a traditional bicycle propelled by an electrical motor. It has a dynamo and 220V wall charge facility. The voltage generated by the dynamo is used to run the bicycle. The electric bicycle is designed in such a way that the rider can have two modes of operation. The rider can choose the bicycle to be driven by an electric motor or it can be driven manually by pedaling. This can also be used in the recent road condition with existing charging facilities.

**Keywords :** Dynamo, Charge Controller, Mechanical Pedaling.

## I. INTRODUCTION

An electrical bicycle is a traditional bicycle which uses an electrical motor to propel it. The electric bicycle is less polluting means of transport and a compact ultra light personal mobility vehicle. It is an ecological and urban means of transport and it uses the source of energy in electrical which is stored in a battery. The electrical bicycles play an important role because they are economical and simple option for urban transport problems and had environmental advantages especially in high populated places. The e-bikes can be operated electrically and manually. The battery can be stored by dual power sources such as home supply and with dynamo fixed in the wheel of

the cycle. The bicycle can travel at the speed of 10-20 km/hr.

## II. PROPOSED SYSTEM

The proposed electric bicycle project consists of dynamo, charge controller, home supply charger, battery throttle, motor voltage regulator, motor, mechanical pedaling, bicycle wheels and brake. Dynamo is a small DC generator which is fixed along with hub motor which converts mechanical energy into electrical energy.

Charge controller is used to appropriately charge the battery from dynamo. Home supply charger is also

used to charge the battery from home when the cycle is not used. The batteries of the electric bicycles can be recharged by connecting the plug from home supply system or when pedaling in some gears. Throttle is used to drive the motor voltage regulator which delivers the DC voltage to hub motor so that the motors speed can be controlled. The hub motor is fitted with the bicycle wheel which drives the cycle. Hub motor is a DC motor. In the absence of battery power, mechanical pedaling is done by suitably disconnecting the hub motor. Mechanical braking system is used.

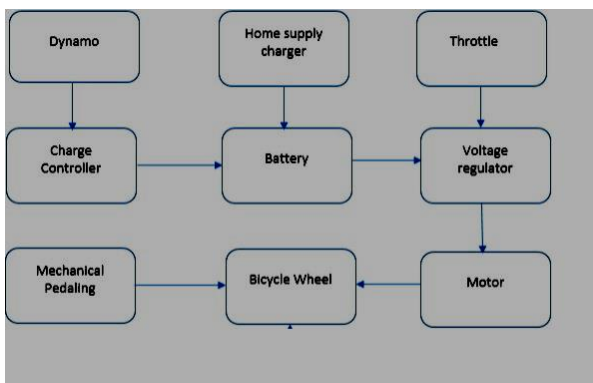
- c) Home Supply Charger.
- d) Motor Voltage
- e) regulator.
- f) Throttle.
- g) Motor.

**a) Dynamo**

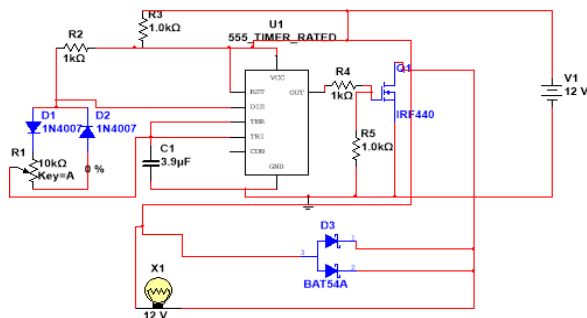
A dynamo is an electric generator that converts mechanical energy into electrical energy. It is an electric generator that produces electric power with the use of a commutator. The dynamo is placed on a wheel and the dynamo commutator is connected to the wheel.

**Table.1** : Specifications of Dynamo

Parameters	Value
Voltage	12 V
Output power	3 W



**Fig.1:** Block Diagram of Electric Bicycle



**Fig.2:** Circuit Diagram of Electric Bicycle

**III. HARDWARE DESCRIPTION**

This project consists of the following components.

- a) Dynamo.
- b) Charge Controller.

**b) Charge Controller**

It is essential to regulate the voltage output from the dynamo before it is supplied to the battery.

A charge controller is a power converter which has a greater output DC voltage than the input DC voltage. This is used to regulate an input voltage to a higher regulated output voltage above rated voltage of battery for charging purpose.

**Table.2** : Specification of Charge Controller

Parameters	Value
Rating of Controller	4A, 12V
Max. Solar Panel Voltage	25V
Low Voltage Disconnect	11.6V
Boost Voltage	14.3V
Battery Type -Lead Acid	12V
Self Consumption	<20mA
Efficiency	>96%

**c) Home Supply Charger**

It is used to charge the battery of the electric bicycle. The charger used here converts AC to DC. Charging voltage of the charger is higher than the battery.

**Table 3 :** Specifications of Home Supply Charger

Parameters	Value
Charging Voltage	28V
Current	5A
Maximum Input Power	80 W

**d) Motor Voltage Regulator**

The voltage regulator outputs a constant voltage which is to be given to the motor. The voltage regulator acts as tapping switch. It receives the input signal from the throttle and regulates the voltage and runs the motor.

**e) Throttle**

The throttle is easy to use and great for those that want to keep the original handle bar grip. Typically the thumb throttle is used on bikes that twist gear changing system. It is used to control the speed of the motor. The throttle is used for acceleration purposes in the electric bicycle.

**f) Motor**

This project uses a motor hub which is fixed in the bicycle wheel. It also has the dynamo either fixed in it or fixed along the bicycle wheel separately. It receives the input voltage from the voltage regulator and runs according to the amount of signal received from the throttle through the voltage regulator.

**Table.4 :** Testing of Battery

S.No.	Supply Voltage (V)	Time Taken for charging (minutes)
1	24.9	0
2	17.43	36
3.	9.96	72
4.	3.73	108

**Table.5 :** Testing of PMDC Motor

S.NO	Speed (RPM)	Given Load(Kg)
1	13	50
2	17	45
3	19	40
4	23	35

**IV. ADVANTAGES**

- ✓ It is environmental friendly with no use of any fuels or release of toxic fumes that may cause global warming.
- ✓ Lesser maintenance cost.
- ✓ Detachable Battery that can be taken inside the house for charging.
- ✓ Throttle is simple to operate and less strain on hands.
- ✓ Normal pedaling is possible when not on power insist mode.
- ✓ Normal pedaling may also recharge the battery with the dynamo attached to the wheel of the bicycle.

**V. APPLICATIONS**

- ✓ The electric bicycles can be used as a transportation vehicle in cities instead of petrol vehicles. Because of small in size, it can avoid traffic jam.
- ✓ Young aged physically challenged people can use it for short distance travelling.
- ✓ Any bicycle can be modified as an electric bicycle.
- ✓ For children small electric bicycles can be used as kid’s e-bikes.

**VI. CONCLUSION**

The electric bicycle can travel at plain road for maximum 22Km with full storage in battery. The electric bicycle can attain a maximum speed of 15 Km/hr. Compared to the existing electric bicycles, the traveling distance and maximum speed is less due to

dual charging method .i.e. through dynamo or a home charger. The electric power capacity can be increased by replacing existing motor and battery with higher ratings as per need. The manual pedaling is the similar thing that can be compared to a normal bicycle.

## VII. REFERENCES

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