



ELECTRICAL BICYCLE

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Abstract: The electric bicycle, also known as the e-bike, is a sustainable and ecofriendly mode of transportation that has gained significant popularity in recent years. The project involves the development of a custom electric motor, a high-capacity rechargeable battery system, and an advanced control unit. These components work together to optimize the electric bicycle's performance, providing a smooth and energy-efficient ride. The project aims to contribute to sustainable urban mobility and reduce reliance on fossil fuels by promoting electric bicycles as a clean and efficient mode of transportation. By offering a combination of Eco friendliness, convenience, and smart technology, this project seeks to address the evolving transportation needs of modern cities. In summary, the electric bicycle project represents a significant step towards a cleaner and more sustainable future of urban commuting, combining the benefits of electric propulsion with intelligent features to enhance the overall riding experience.

Keywords: Electrical Bicycle, Electrical Energy, Motor, Controller, Battery etc.

I. INTRODUCTION

Introducing electric bicycles, or e-bikes, represents a significant shift in the world of personal transportation. E-bikes are conventional bicycles equipped with electric motors that provide pedal assistance, making cycling easier and more accessible. They have gained widespread popularity due to their numerous advantages, including reduced environmental impact, improved mobility, and health benefits. E- Bikes offer an eco-friendly alternative to traditional vehicles, contributing to the reduction of air pollution and greenhouse gas emissions. They also help alleviate traffic congestion in urban areas and offer a cost-effective mode of transportation. The electric motor in e-bikes assists riders in pedaling, making it easier to conquer hills, cover longer distances, and arrive at destinations without breaking a sweat. This increased accessibility encourages more people to adopt cycling as a means of transportation and promotes a healthier and more active lifestyle.

II. LITERATURE SURVEY

The bicycle, in its present upright form, called a "safety Bicycle" and introduced by the Rover model in 1885, is a Relatively cheap method of extending the range, increase-Ing the speed, and improving the energy efficiency of Human powered transport. It can coast down hills, roll easily along the flat, and make use of gearing to tackle Steep hills. Many bicycle alternative is exist, ranging from recumbent models to chunky off-road machines, however the "safety bicycle" shape remains most common. Electric bicycles, with more than a century of comma- racial history (the first patents for electric bicycles were Granted in the 1890s), have long been available, and Found adopted in small numbers in many countries. Their Relative lack of popularity until recently may be attire-used to technological or economic factors (explored from Section 2.2 onwards), how waver the fact of their existent means that they are already covered by legislation in most countries (see Section 4).

In terms of personal electro-mobility alternatives, there are a plethora of amazing inventions ranging from the Segway, the Yoke Bike, Ryno, various electric scooters, skateboards, power skates, and electric quad bikes and so on. Ignoring the fossil-fuelled variants, recent alternatives have been released which are powered by compressed air [4], flywheel [5], fuel cell [6] and probably other unusual power sources. However the vast majority of experimen-Tal machines use a combination of electrical motor and battery. Battery solutions tend to be limited to the robust but weighty lead-acid cells in cheaper or older systems, through surprisingly few NiMH variants, to Lithium Ion (predominantly LiFePO₄ or LiMn₂O₄ modern and expensive variants [7]).

III. 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 cycles 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.

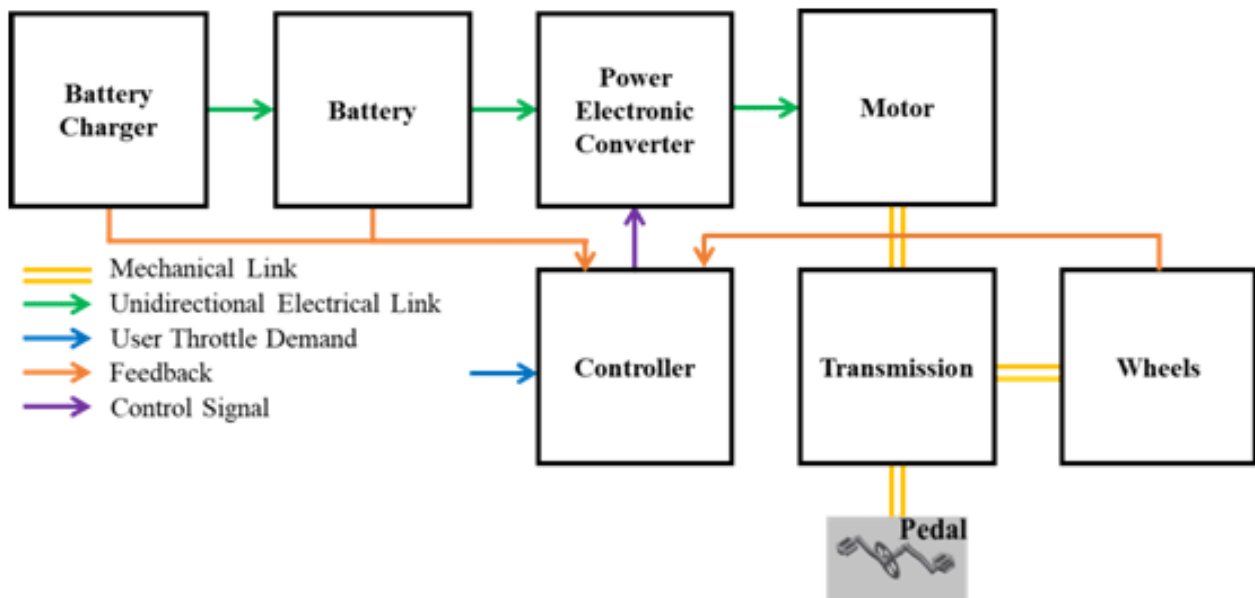


Fig .1 Block Diagram of Electric Bicycle

IV. HARDWARE DESCRIPTION

This project consists of the following components.

- a) Dynamo. b) Charger b)Controller
- b) 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 accommodator. The dynamo is placed on a wheel and the dynamo commutator is connected to the wheel.

Table.1: Specifications of Dynamo

Parameter	Value
Voltage	12V
Output Power	3W

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

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



Parameters	value
Charging voltage	28 V
Current	5A
Maximum input power	80W

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.

V. 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 pedalling is possible when not on power assist mode.
- ✓Normal pedalling may also recharge the battery with the dynamo attached to the wheel of the bicycle.

VI. APPLICATIONS

- ✓THE ELECTRIC BICYCLES CAN BE USED AS 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

VII. 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 15Km/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

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