IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 4, March 2024

Design and Fabrication of Electric Bicycle

Sandesh Bandu Gholap[1], Arman Aspak Chaughule[2], Vaibhav Uttam Aher[3], Sanket Madhukar Kadne[4], Prof. Zadokar A.A.[5]
Department of Electrical Engineering[1,2,3,4,5]
Samarth Polytechnic, Belhe, Maharashtra India

Abstract: *The main aim of this review paper is to present the idea of harnessing the various energy and use it in today's existence of human life .Now-a-days there are so many vehicles on road, which consumes more fuel and also hazards our environment. It is our responsibility to reduce the consumption of fuel and its hazardous emission products. Taking this into consideration it is our small step towards reducing the use of more fuel consuming vehicles and attract the eye of people towards its alternatives i.e. Electric bicycle. So we intend to design a cycle which would run on an alternative source and also reducing human efforts called as Battery Operated Cycle. In this paper we design an alternative mode of transport for betterment of social and environment.*

There is growing demand for Electric Motor Bicycle in India as there will be less air pollution, lower maintenance cost and reduced noise using Electric Motor Bicycle. The motive of this research work is to design a simple, cost-effective model of Electric Motor Bicycle with intelligent controller. The Electric Motor Bicycle is consisting of motor, battery and controller. In this BLDC motor is fixed in the rim of the rare wheel. The controller is connected to the motor and battery to control speed of motor and current. The Electric Motor Bicycle can be run with battery charge and also by pedalling. ELECTRIC BIKE SIMULATOR was used to generate the simulation results. The results of the experiments are also shown in a hardware assembly kit

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Keywords: PMDC Motar, Controller, Battery, Charger

I. INTRODUCTION

The electric bicycle is an electrical-assisted device that is designed to deliver the electromagnetic momentums to a present bicycle therefore relieving the user of producing the energy essential to run the bicycle. It contains a strong motor and enough battery power that just needs charging to help in hill climbing, generate greater motoring speeds and provide completely free electric transportation.

Electric vehicles price more and perform poorer than their gasoline counterparts. The aim is that mainly Because gasoline cars have promoted from a century of intensive development; electric cars have been virtually overlooked for several years. Even today, gasoline cars profit from billions of dollars of research every year while electric vehicles receive a small fraction of that quantity of money. The primary principle for the universities" support of the electric-powered over the petrol powered has been towards improving air quality, though air quality alone is not a satisfactory justification to mandate electric bicycles. The single biggest advantage of electric bicycle is that it is cost operative as it mainly only entails building cost as running cost would only require the charging of the battery. An electric bicycle would, however offer other solid benefits that are overlooked by the marketplace. These include the intense reduction in oil consumption that its widespread use would bring about. Much less oil would be needed because only a tiny

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proportion of electricity is generated from oil. The further major non-market benefit would be lower greenhouse gas emissions.

II. PMDC MOTAR

The armature is the moving part of the PMDC motor which consists of winding, core, and commuter, and connects to the output shaft of the motor. In other motors, the rotor generates its own magnetic find by using a DCpower source or induction. In other cases, it is simply made up of a ferromagnetic metal. PMDC motors however feature a different mechanism.

The core of the armature consists of laminations of steel sheets that are slotted circular and varnish insulated.

The seel sheets work to reduce eddy current loss in the rotor.

The armature comprises slots containing armature winding. The commuter of the armature will be supplied withcurrent by the brushes. It will then convert electrical power into motion. The armature is powered by connecting the brushes terminals to the DC supply.

Working Principle:

There is not much difference between the basic operating principle of the PMDC motor. When an electrical conductor is introduced within the magnetic field, the conductor experiences a mechanical force. The direction of this force is governed by Fleming's left-hand rule. In the case of the PMDC motor, the armature is placed within the magnetic field created by the permanent magnets placed inside the stator. The armature will then rotate according to the force generated. The armature has a number of conductors, each of which experiences the force whichis then converted into torque, leading the armature to rotate

Typically, the PMDC motor operates on 6 V, 12 V or 24 Volts DC power which can be provided by rectifiers or batteries. The torque is generated by the interaction between the axial current-carrying rotor conductors and the magnetic flux produced by the permanent magnet.

The position among the stators and the armature can be reduced as the armature rotates due to the torque createdby a magnetic field. Te shift in position can reverse the torque in a 90-degree rotation. The commutator set to the rotor shaft of the PMDC motor maintains the torque performing on the rotor.

The current supply towards the stator is activated by the commuter. This helps maintain a steady 90-degree angle among two fields. As the flow of current is frequently activated among windings like the rotor twists, then the current within every stator winding is truly exchanging at a frequency comparative to the no.of motor magnetic poles aswell as the speed.

FIG. WORKING OF PMDC MOTAR

III. CONTROLLER

Speed Control Basics

The speed controller of an electric bike is an electronic circuit that not only controls the speed of an electric motor but also serves as a dynamic brake. This controller unit uses power from the battery box and drives it to the motor. Different

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forms of controllers are used for brushed and brushless motors. For adaptive e-bikes, a conversion kit is used and the controller is the core component of that kit

Function

The electric bike speed controller sends signals to the bike's motor in many voltages. These signals detect the directionof a rotor relative to the starter coil. The suitable function of a speed control depends on the employment of various mechanisms. In a purpose-built electric bike, Hall effect sensors help detects the location of the rotor. If your speed controller does not include such sensors and the speed controller on an adaptive bike may not the electromotive force of the un-driven coil is calculated to get the rotor orientation.

The mechanism of an electric speed controller differs depending on whether you own an adaptive or purpose- build electric bike. An adaptive bike includes an electric drive system installed on an normal bicycle. A purpose- built bike, more expensive than an adaptive bike, provides easier acceleration and affords extra features.

Fig. Controller Device

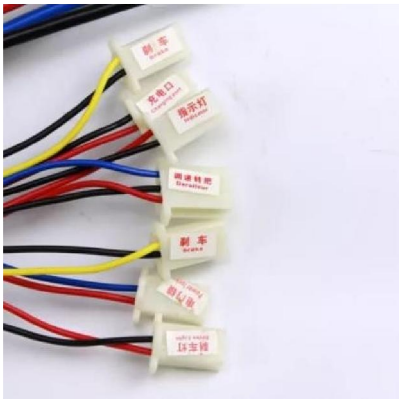

Fig. Function of Pins

Plug

Red & Black (large cable): Battery connections
Yellow & Blue: Motor connections
Red & Blue: Key Switch(power lock) (If there is no power door locks, red connection to blue)
Yellow & black: brake
Red & Yellow: Brake light
Red&Black(small cable): indicator light
Red, Black & Blue: Speed Regulator 1-4 V Throttle (Red: +5v, Black, Blue: Signal Wire)
Red & Black (small cable): Charger

Working

The working of our project basically explain by using the five blocks as follows

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Battery.
Motor Controller Circuitry.
Electric motor.
Chain and Sprocket.
Bicycle speed Rotation.

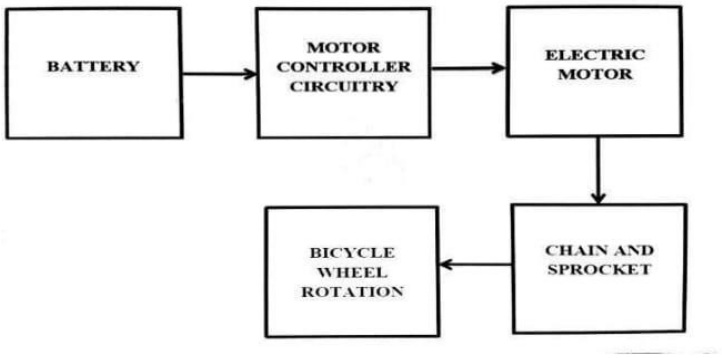

Fig. Block Dig. Of Electric Bicycle Construction

Battery

Two lead acid rechargeable batteries of 12v, 9 amp are used which are connected in parallel position. It basically storesthe electrical energy generated and utilise it to run the motor. A battery has a positive terminal called cathode and negative terminal called anode. The terminal marked positive is at higher electric potential energy and the terminal marked negative is source of electrons when connected to external circuit will flow and deliver energy to external device Rechargeable batteries are recharged multiple times.

Motor Controller Circuitry:-

It used to control all the working of cycle.

Electric Motor

Use the specific motor having suitable power and torque according to design.

Chain and Sprocket:-

Take the suitable material & no. of teeth according to center distance.

Bicycle Wheel Rotation:-

Provide the torque and speed to the wheel through out sprocket

IV. CONCLUSION

The issues associated with electric bicycles may be addressed by custom-designed drives that are most efficient over a given operating cycle. These include city bicycles, hill bicycles, distance bicycles, and speedy bicycles.

The results of the studies listed here can serve as a platform to improve electric bicycle performance if new drive systems are designed around key parameters that will result in improvement of the system performance. Furthermore, they can be used for comparison of existing drives in asystematical, comprehensive, and technical way.

REFERENCES

[1]. Design and Experimental Study of Solar Hybrid Bicycle: 6th National Conference RDME 2017, 17th-18th March2017

[2]. Chetan Mahadik, Sumit Mahindraka, Prof. Jayashree Deka, "An Improved & Efficient Electric Bicycle system withthe Power of Real-time Information Sharing", 2014.

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[3]. D. M. Sousa, P. J. Costa Branco, J. A. Dente, Electric bicycle using batteries and Supercapacitors, 2007.
[4]. Arun Eldho Alias1, Geo Mathew2, Manu G3, Melvin Thomas4, Praveen V Paul5, Energy Efficient Hybrid ElectricBike with Multi -Transmission System, 2015.
[5]. R. Krishnan, Electric Motor Drives, Prentice Hall, Englewood Ciffs, NJ, 20012.
[6]. T. Hägglund and K. J. Åström, "Revisiting the Ziegler Nichols Tunig Rules for PI Control - Part II," Asian Journalof Control, Vol. 6, No. 4, pp. 469-482, December 2004