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Battery Operated Two Wheeler Vehicle

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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**.**

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

II. LITERATURE

(i) Wenhua Du, Dawie Zhang, Xing Zhao (2009)

Based on multi-body dynamics theory and vibration theory, the dynamic performance of electrical bicycle is simulated. Firstly, a two-dimensional mathematical model for the motion of a driver-electric bicycle coupled system was developed. The motive force model is established and also the electrical bicycle model is made by virtual prototyping technology mistreatment the computer code. Secondly, associate degree experiment check is taken to validate the feasibleness of the model. Finally, the influence of the mass and installation location of battery to ride comfort was mentioned. The result shows that the ride comfort is healthier because the mass of battery increased. Once the mass of battery is lower, the installation location will very little influence to ride comfort, however because it is greater, the influence is exceptional. Thought each the values of weighted accelerations RMS at the seat and hand, to the paradigm electrical bicycle, battery put in beneath the seat-tube has the higher ride comfort.

(ii) Alan A. Parker (2006)

There is a necessity to alter Australia to survive the anticipated depletion of the world's standard oil reserves (cheap oil) between 2010 and 2020. victimization bicycles, electrical PAB sand

E-bikes, rather than several 'drive alone automobile journeys' is one in all several measures needed to conserve oil in traveler transport. dynamic the Australian and states road rules to encourage inexperienced merchandise just like the electrical PABs can cut back automobile and oil dependence and gas emissions by tiny however vital quantity. Legislation permitting a most power output of three hundred watts for the ready bodied is needed and to reinforce the quality of the old the lame and also the disabled a most power output of 600 watts is needed.

(iii) Sen Lin, Min He, Yonglu Tan, Mingwei He (2008)

This paper surveys the in-operation speeds of e-bicycles and bicycles on nonmotorized lanes on eight avenues in Kunming, China. A comparison study of the in-operation speed and its distribution between e-bicycles and bicycles is given. Applied mathematics analysis indicates that the mean in operation speed of e-bicycles is twenty-one.86 km/h, which is 7.05 km/h quicker, or 47.6% higher, than that of bicycles. The influence of riders' gender and age on in operation speed distribution is additionally mentioned. This paper presents a subjective analysis of safety from the riders' perspective by measure 552 e-bicycle riders and 232 bicycle riders.

(iv) Xiang Liu, Mian Li, Chengbin Ma, Min Xu (2012)

Torque is one in every of the foremost necessary management factors for a vehicle's motion. Compared with burning engine, electrical motors will have a lot of correct force feedback. In electrical vehicles, direct force management of the magnet electric motor has been studied. However, thanks to non-ideal back electromotive force} phenomenon, direct force management of brushless DC motors has not been wide used. During this paper, a replacement technique victimization kriging to calculate back electromotive force during a period on-line fashion is conferred. Kriging prediction is employed to approximate the rear electromotive force of the motor supported data from sampled points. With motor speed and rotor position as inputs, kriging predicts back electromotive force because the output that's accustomed calculate the motor force with 3 section currents victimization this novel technique, motor force may be accurately calculated and implement in small management units of vehicles, even once facing extraordinarily high/low temperature and aging conditions.

(v) VidyadharGulhane, Mr. Tarambale, YP Nerkar (2006)

There square measure some common problems associated with electrical vehicle technology. These embrace choice of batteries, choice of electrical motors for specific capability vehicles, style of controllers, style of battery chargers with specific applications to electrical vehicles, development of testing facility for testing of electrical motors, controllers and battery chargers. This paper emphasizes basic details concerning characteristics of varied motors and controllers used for battery operated electrical vehicles.

(vi) Thiyagaranjan, V. Sekar (2012)

A dynamic model of the vehicle has been realised, and therefore the characteristics of the european are individuated. A basic electrical bicycle runs on a BLDC motor, is powered by batteries and controlled from an eu. The BLDC motor for the electrical bicycle is of the quality 3 section tetragon kind, usually rated at some hundred watts and therefore the battery voltage is typically 36V or 48V counting on the circuit current.

(vii) Dainis Berjoza, InaraJurgena (2014)

Research should be conducted so as to settle on a correct charging device, to optimally load the electrical wiring network likewise on opt for power and alternative parameters for energy devices so as to confirm the charging method. The current analysis involves 5 varied electrical bicycles. The analysis additionally involves battery systems with a complete voltage of twenty-four V, 36 V, forty-eight V and sixty V. For the analysis, each a knowledge assortment system and electric battery discharging system were developed.

III. COMPONENTS OF E-BICYCLE

1. Motor.

DC motor is one of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most mutual types rely on the forces created by magnetic fields. Nearly all types of DC motors have specific internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in portion of the motor.

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Figure 1. Motor.

DC motors were the first type commonly used, since they could be powered from present direct-current lighting power distribution systems. A DC motor's speed can be controlled over a extensive range, using either a variable supply voltage or by changing the strength of current in its field windings. Tiny DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for convenient power tools and appliances. Bigger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The arrival of power electronics has made replacement of DC motors with AC motors possible in many

2. Battery.

The battery on an electric bike can be located in varying places on the bike, which depends on frame. Each battery makes, model and type mean that they will need to charge for different times, an average charging time is 6-8 hours. Charging your battery is easy, just like a mobile phone you plug it into the wall. As we are using 48v 750w motor to run the cycle, we are required to supply a voltage of 48v, a rated current of 15.6A and to make the e-bike r

Figure 2. Battery.

un more efficiently for a long duration of time, we have connected 4 batteries (each 12v) and with a capacity of 18ah in series to get the supply enough power to run the motor.

3. Controller.

The speed controller of an electrical bike is Associate in Nursing electronic circuit. This controller unit uses power from the battery pack and drives it to the motor. Differing types of controller's area unit used for brushed and brushless motors. For adaptive e-bikes, a conversion kit is employed and therefore the controller is that the main part of that kit. the electrical bike speed controller sends signals to the bike's motor in varied voltages. These signals sight the direction of a rotor relative to the starter coil. the correct perform of a speed management depends on the use of assorted mechanisms.

Figure 3. Controller.

4. Throttle.

The throttle is connected to the controller through wiring whose function is to regulate or control the speed of the motor.

Figure 4. Throttle.

5. Battery charger.

The battery charger is a device which is used to put energy into a rechargeable battery by forcing an electric current through it. This charger takes the electric current from the main supply and is connected to a charger plug of a controller which supplies the flow of current to the battery. This wall charger can charge the pack of 4 batteries connected in series in 5-7 hours.

Figure 5. Throttle.

6. key switch.

Key switch is the component which channels the power flow from battery to motor, when ON condition.

Figure 6. Key switch

7. Design of e-Bicycle

Here we have used brushless dc motor with 750watt power and 450rpm as rated and 540rpm as practically observed. The motor runs on 48volts and 15.6amps power source. As for the operating purpose, dc controller is required for the BLDC motor. And these whole needs a battery power source for running the motor. Therefore, here we have used 4 batteries (each of 12volts) connected in series to get the desired output of 48volts.

8. Implementation.

In this project we had fabricated the bicycle with all electric components. After then, we have used reverse engineering mechanism to calculate speed and torque on different inclination in load condition.

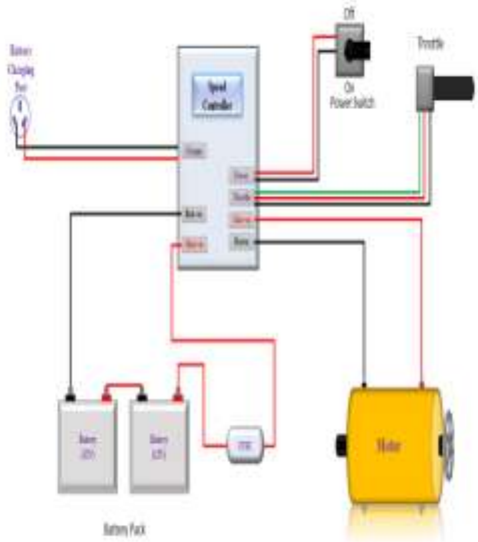

Figure 8. Circuit representation.

Calculation:-

Speed calculation-

Given value:

Radius of tire = 33cm or 0.33m

Centre to Centre distance = 56cm

Weight of cycle = 52kg

Weight of passenger = 62kg

Under no load condition:

Motor rpm = 540rpm

Rear wheel rpm = 296rpm

Speed of bicycle:
Circumference = 2πr
= 2×3.14×0.33
= 2.0727m
Surface speed = circumference × rpm
= 2.0727×296
= 613.4304m/min
Surface speed (km/min) = 613.4304/1000
= 0.6134Km/min
Surface speed (km/h) = 0.6134×60
= 36.8Km/h
Velocity ratio:
V.R. = w2 w1

Where,
w1 = 2πN 60
= (2×3.14×540)/60
= 56.52 rad/sec
w2 = 2πN 60
= (2×3.14×296)/60
= 30.98 rad/sec
Therefore,
V.R. = 30.98/56.52
V.R. = 0.520
Torque:
T =(P × 60)(2 ×π× N)
T =(750 × 60)(2 × 3.14 × 296)
T = 24.20Nm.
Under load condition on different inclination:
Surface speed (practically observed) at 0^0 inclinations
Surface speed = 2πr × rpm
30.53km/h = 2×3.14×0.33×rpm
rpm = 4.8/ (0.00033×60)
rpm = 242
Torque:
T =(P × 60) 2πN
T =(750× 60) 2 × 3.14 × 242
T = 29.60Nm.
Surface speed (practically observed) at 15^0 inclinations
Surface speed = 2πr×rpm
22km/h = 2×3.14×0.33×rpm
rpm = 22/ (2×3.14×0.00033×60)
rpm = 176
Torque:
T =(P × 60) 2πN
T =(750× 60) 2 × 3.14 ×176
T = 40Nm
Surface speed (practically observed) at 25^0 inclinations
Surface speed = 2πr×rpm
14.74km/h = 2×3.14×0.33×rpm
rpm = 14.74/ (2×3.14×0.00033)
rpm = 118
Torque:
T =(P × 60) 2πN
T =(750× 60) 2 × 3.14 ×118
T = 60.72Nm.

IV. CONCLUSION

After we have completed our research project, we have conducted a lot of results regarding our project. First, we have learned a lot about the local market, compared parts, dimensions, decision making, and finally installation and fabrication. Second, our project works effectively, we had a minor problem with the motor it kept getting heated when working. The problem was due to the extra load on the motor because we were starting the motor while the bicycle is not moving. One of the major challenges that we faced was the battery until finally, we solved that problem as mentioned before.

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