

Electric Powered Cycle

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Abstract- An electric bicycle uses an electric motor for the purpose of moving. On this bicycle, people do not have to use their muscular force to move. It uses electrical energy for motion. They are also known as e-bikes. There are many varieties of electric bicycles. Some of these bikes have a rechargeable battery. This makes it easy to power the bike whenever you want. They make use of stored electrical energy in some or the other form. Due to this form of energy, the bikes have more power and speed. These bikes are more convenient than regular ones. Brushed and brushless are the two important types of motors used in these bikes. An electric power assist system is also added to these bikes to make them more functional. E-bikes use rechargeable batteries and the lighter varieties can travel up to 25 to 32 km/h (16 to 20 mph), depending on the laws of the country in which they are sold, while the more high-powered varieties can often do in excess of 45 km/h (28 mph). Batteries used in this vehicle are lithium-ion batteries, nickel-cadmium batteries and lead acid battery. The parameters of the battery vary according to the voltage and capacity required for the vehicle. There are two types of controllers used in this vehicle. The type of controllers depends upon the motors used in the vehicle. The design of the bike is also very important. One of the most interesting designs is the folding bike.

I. INTRODUCTION

An electric bicycle uses an electric motor for the purpose of moving. On this bicycle, people do not have to use their muscular force to move. It uses electrical energy for motion. They are also known as e-bikes. There are many varieties of electric bicycles. Some of these bikes have a rechargeable battery. This makes it easy to power the bike whenever you want. They make use of stored electrical energy in some or the other form. Due to this form of energy, the bikes have more power and speed. These bikes are more convenient than regular ones. There is growing demand for Electric Bikes in India as there will be less air pollution, lower maintenance cost and reduced noise using Electric-Bikes. Structural Analysis is carried out to support the product development team in validating the designs and improving the existing designs. Approach using beam Finite model is developed to quickly analyze the structure. Detailed analysis using shell elements is done to accurately predict the stresses.

FEA results are validated with Component level testing and Strain gauge measurement. The frame is strengthened in the improved design at the critical locations. Vibrational characteristics are studied by carrying out the modal analysis with specific emphasis on handle bar modes and battery box modes.

II. LITERATURE SURVEY

There is growing demand for Electric Bikes in India as there will be less air pollution, lower maintenance cost and reduced noise using Electric-Bikes. Structural Analysis is carried out to support the product development team in validating the designs and improving the existing designs. Approach using beam Finite model is developed to quickly analyze the structure. Detailed analysis using shell elements is done to accurately predict the stresses. FEA results are validated with Component level testing and Strain gauge measurement. The frame is strengthened in the improved design at the critical locations. Vibrational characteristics are studied by carrying out the modal analysis with specific emphasis on handle bar modes and battery box mode



Figure 1. Electric- Bikes

III. PROPOSED SYSTEM

E-bikes use rechargeable batteries that can travel up to 25 to 45 km/h, much faster than most people would cycle, getting you to your destination quicker and in better shape. In

a nutshell they offer low cost, energy efficient and emission-free transportation which also has physical and health benefits.

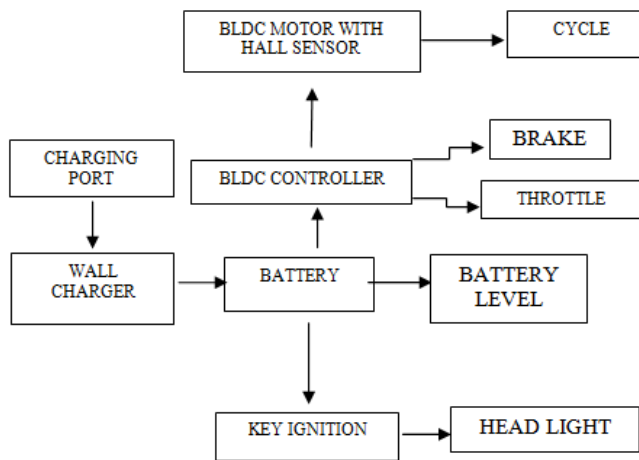


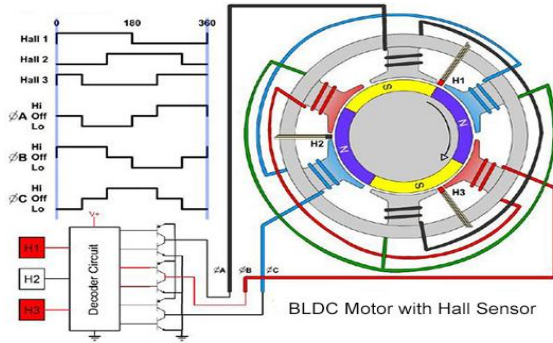
Figure 2. Electric- Bikes Block diagram

IV. ELECTRICAL REQUIREMENTS

A brushed DC motor has permanent magnets on the outside of its structure, with a spinning armature on the inside. ... In brushless DC motors, the permanent magnets are on the rotor, and the electromagnets are on the stator. A computer then charges the electromagnets in the stator to rotate the rotor a full 360-degrees. While they have been successfully applied in the automotive, HVAC, electronic, computer, semiconductor and medical industries, BLDC motors have long been used in industrial applications such as actuators, feed drives for CNC machines, industrial robots, extruder drives, among others. There are three classifications of the BLDC motor: single-phase, two-phase and three-phase. This discussion assumes that the stator for each type has the same number of windings. The single-phase and three-phase motors are the most widely used. At the same time, BLDC motors are considered more energy efficient than brushed DC-motors. A BLDC motor, for the same mechanical work output, will usually be smaller than a brushed DC motor, and always smaller than an AC induction motor. The BLDC motor is smaller because its body has less heat to dissipate.

A brushless DC (BLDC) motor is a rotating electric machine where the stator is a classic three-phase stator, like that of an induction motor, and the rotor has surface-mounted permanent magnets. Using the three-phase motor shown in Figure 7, the process starts when current flows through one of the three stator windings and generates a magnetic pole that attracts the closest permanent magnet of the opposite pole. The rotor will move if the current shifts to an adjacent winding. A Hall effect sensor is a transducer that varies its

output voltage in response to a magnetic field. Hall effect sensors are used for proximity switching, positioning, speed detection, and current sensing applications. A Hall effect sensor is a transducer that varies its output voltage in response to a magnetic field. Hall effect sensors are used for proximity switching, positioning, speed detection, and current sensing applications. Brushless DC Motor (BLDC), is next version of conventional DC motor.



A Hall effect sensor is a device that is used to measure the magnitude of a magnetic field. Its output voltage is directly proportional to the magnetic field strength through it, Hall effect sensors are used for proximity sensing, positioning, speed detection, and current sensing applications. A Hall effect sensor is a device that is used to measure the magnitude of a magnetic field. Its output voltage is directly proportional to the magnetic field strength through it. Frequently, a Hall sensor is combined with threshold detection so that it acts as and is called a switch.

Chain Driver- Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. Chain drive was the main feature which differentiated the safety bicycle introduced in 1885, with its two equal-sized wheels, from the direct-drive penny-farthing or "high wheeler" type of bicycle. The popularity of the chain-driven safety bicycle brought about the demise of the penny-farthing, and is still a basic feature of bicycle design today.



Bldc Controller: A brushless DC electric motor (BLDC motor or BL motor), also known as electronically commutated motor (ECM or EC motor) and synchronous DC motors, are synchronous motors powered by direct current (DC) electricity via an inverter or supply which produces electricity in the form of alternating current (AC) to drive each phase of the motor via a closed loop controller. The controller provides pulses of current to the motor windings that control the speed and torque of the motor.

V. MECHANICAL REQUIREMENTS

A mechanical requirement needs the physical function of operation can be made by the driving a motor for using acceleration by freewheeling and throttle sewing from low to high speed changing, it can be controlled by the motor braking and mechanical braking using cables and brake liner & levers. Bldc motor can be run by the controller controlling throttle raising by revolving the motor direction by the anticlockwise direction in the originality of the motor direction rotating. Then 43 tooth chain sprockets are used to drive fixed wheel it could be loaded continuously .In this right thread freewheeling can be fixed to the right side of the cycle wheel to drive a chain driving for rotation.



(i) Electronic throttle control (ETC) is an automobile technology which electronically "connects" the accelerator pedal to the throttle, replacing a mechanical linkage.^[1] A typical ETC system consists of three major components: (I) an accelerator pedal module (ideally with two or more independent sensors),

(ii) a throttle valve that can be opened and closed by an electric motor (sometimes referred to as an electric or electronic throttle body (ETB)), and (iii) a powertrain or engine control module (PCM or ECM).^[2] The ECM is a type of electronic control unit (ECU), which is an embedded system that employs software to determine the required throttle position by calculations from data measured by other sensors, including the accelerator pedal position sensors, engine speed sensor, vehicle speed sensor, and cruise control switches. The electric motor is then used to open the throttle valve to the desired angle via a closed-loop control algorithm within the ECM.

The benefits of electronic throttle control are largely unnoticed by most drivers because the aim is to make the vehicle power-train characteristics seamlessly consistent irrespective of prevailing conditions, such as engine temperature, altitude, and accessory loads. Electronic throttle control is also working 'behind the scenes' to dramatically improve the ease with which the driver can execute gear changes and deal with the dramatic torque changes associated with rapid accelerations and decelerations. A Bowden cable is a type of flexible cable used to transmit mechanical force or energy by the movement of an inner cable relative to a hollow outer cable housing. The housing is generally of composite construction, consisting of an inner lining, a longitudinally incompressible layer such as a helical winding or a sheaf of steel wire, and a protective outer covering.

The linear movement of the inner cable is most often used to transmit a pulling force, although push/pull cables have gained popularity in recent years e.g. as gear shift cables. Many light aircraft use a push/pull Bowden cable for the throttle control, and here it is normal for the inner element to be a solid wire, rather than a multi-strand cable. Usually, provision is made for adjusting the cable tension using an inline hollow bolt (often called a "barrel adjuster"), which lengthens or shortens the cable housing relative to a fixed anchor point. Lengthening the housing (turning the barrel adjuster out) tightens the cable; shortening the housing (turning the barrel adjuster in) loosens the cable.

VI. CONCLUSION

There has never been a more exciting time than now to become an electric bike owner. Having established itself as a hugely popular, effective, and important mode of transportation in countries around the world—most notably China and several nations throughout Europe—the electric bike is beginning to take off in the United States as well. The primary appeal of an electric bike is its unique ability to combine pedal power with motor power, giving riders an unprecedented level of control over their riding experiences. By allowing riders to choose precisely how much power the motor will provide, ebikes have quickly become some of the most flexible and accessible vehicles in the world. Whether it's used to go on recreational rides with family or friends, as a way to get back into shape, or as a vehicle for completing your daily commutes, an electric bike is the key to easy, comfortable, and convenient travel.

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