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Portable Electric Vehicle by Using Mid Drive BLDC Motor with Intelligent Controller

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ABSTRACT: In India, the demand for electric motor bicyclesis rising since they use less energy, produce less noise,and require less maintenance. The goal of this researchproject is to provide a straightforward. An electric bicycle with an intelligent controller that is affordable. The motor, battery, and controller are the three components of the electric motor bicycle. This BLDC motor is mounted inside the unique wheel's rim. To regulate the motor's speedand current, the controller is connected to the battery and motor. Batteries that have been charged can powerthe electric motor bicycle. The simulation results wereproduced using the MATLAB SIMULATOR for electric bikes. In a hardware assembly kit, the experiment results are also displayed. In the market of Electric Vehicles, there are huge numbers of models of different variations in size, speed, shape, etc. At present Portable transportation is playing a prominent role in both internal and externalusages. In the future there will not be Gasoline enginesbecause of scarcity and availability of fuels. The compactness in driving is also difficult compared withthe Electrical Vehicles. Therefore, the peoples are interested in Electrical Vehicles with rated Speed andSize.

KEYWORD: Electric Scooter, Foldable Bike, Battery ElectricVehicle (BEV), Catia.

I.INTRODUCTION

The Electric bike is a bike which is driven with the help of battery which is coupled to electric motor.Energy crisis is one of the major concerns in today's world due to fast depleting resources of petrol, diesel and natural gas. In combination with this, environmental decay is an additional factor which is contributing to the depletion of resources which is an alarming notification. Our project has the solution for this above perilous problems. Charging to help in hill climbing, generate great 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 billionsof dollars of research every year while electric vehicles receive a small fraction of that quantity of money. The Foldable Electric Scooter is easy to fold and unfold. This can be easily Rechargeable and is easily to transport in both internal and external usages.This Foldable type is easy to transport from one placeto another place with less space occupancy. Foldable Electric Scooter which can be foldable, works effectively requires less maintenance, having more life and also with low price compared to any other product in the market 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. Brian (2007) created a model in MATLAB and ADAMS to demonstrate its fuel economy over the conventional vehicle. He used the Honda IMA (Integrated Motor Assistant) architecture, where the electric motor acts as a supplement to the engine torque.He showed that the motor unit acts as generator during the regenerative braking. He used a simple power management algorithm in the power managementcontroller he designed for the vehicle. Cuddy and Keith (2007) performed a parallel.

The simulation results are verified in a PDM series configured hybrid vehicles likely feasible in next decadeare defined and evaluated using a flexible. Advanced Vehicle Simulator (ADVISOR). Fuel economies of twodiesel powered hybrid vehicles are compared to a comparable technology diesel powered internal combustion engine vehicle Mission Planner

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is an open-source software for control Plane, Copter, and Rover. Mission Planner can beused as a configuration utility or as a dynamic control supplement for an autonomous. The fuel economy of the parallel hybrid defined is 24 percent better than the internal combustion engine vehicle and 4 percent better than the series hybrid. They explained the simulation approach. They concluded with some of the simulation resultsemphasizing the simulation importance. The main blocksof the proposed system are the motor, the DC-DC converter, the battery, the super capacitors, the controller and the decision. About the decision circuit, distinct conceptions andstrategies are possible and acceptable. Here, the super capacitors supply the system when high current peaks are demanded. So, a current level was defined (Ia-sc) imposing the super capacitors supplying the system or the batteries.

The control strategy should, first of all, control thestates of the switches S2 and S3 in order to prolong the autonomy of the electrical vehicle and improve the efficiency of the circuit. On the other hand, it should avoidsimultaneous operation of the battery and the super capacitors. In this case, a fast discharge of both energy storage systems would be observed. The performance of the proposed hybrid powertrainis studied using the developed model under four driving cycles. The simulation results verify the operational capabilities of the proposed hybrid. Kuenbao described the mathematical modelling, analysis and simulation of a novel hybrid power train usedin a scooter. The primary feature of the proposed hybrid power train is the use of a split power-system that consistsof a one degree of freedom DOF planetary gear-train (PGT) and a two DOF PGT to combine the power of twosources, a gasoline engine and an electric motor.

II.BASIC MODEL OF ELECTRIC SCOOTERCOMPONENS

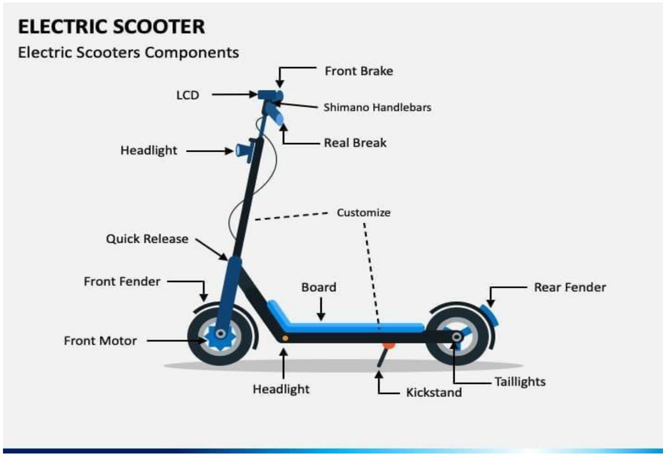

Figure.1. Basic Components

Battery source required is depends on discharge rate The results show that the fuel consumption can be effectively reduced by using the designed PEACS with thestate-of-charge of the battery maintaining in a certainscope. Converters is usually employed to improve the converter performance and also to partially reduce the input current, output voltage and inductor current ripple and step down the converter size effectively.

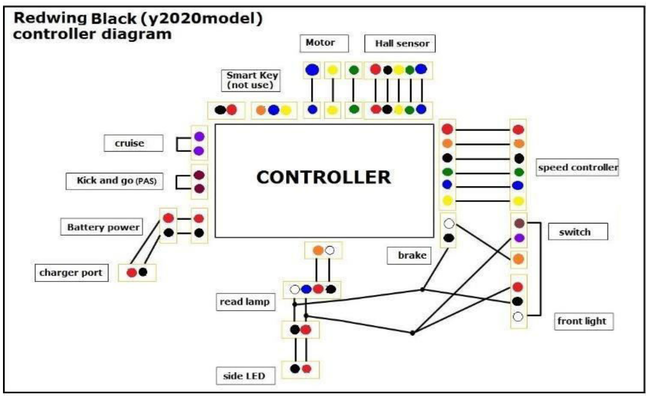

Figure.2. Controller Output Diagram

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MID DRIVE MOTOR

The fuel economy of the parallel hybrid defined is 24 percent better than the internal combustion engine vehicleand 4 percent better than the series hybrid. Bauml and Simic (2008) discussed the importance of vehicle simulations in designing the hybrid electric vehicles. A series hybrid electric vehicle simulation with the simulation language Modelica was developed. They explained the simulation approach. They concluded with some of the simulation results emphasizing the simulation importance. Zhou and Chang (2008) established powertrain dynamic simulation model of an integrated starter/generator (ISG) hybrid electric vehicle (HEV) using Simulink. The wheel hub motor (also called wheel motor, wheel hub drive, hub motor or in- wheel motor) is an electricmotor that is incorporated into a hub of a wheel and drives itdirectly. A purported advantage of this design is that noadditional transmission system is needed, thereby increasingthe efficiency of the drive system. However, because electricmotors are most efficient at high rates of revolution, direct drive hub motors tend to be inefficient. Integrated planetary gear drive trains are sometimes included, but re-introduce transmission losses.

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ENERGY EFFICIENCY.

Energy efficiency is one of the biggest advantages of direct drive in-wheel motors. A conventional vehicle uses mechanical means to transmit power from mounted engine/motor to the wheels. With an ICE (Internal Combustion Engine) vehicle this mechanical transmission must have multiple gear ratios to compensate for an ICE having no usable power at engine speeds lower than about 1000 rpm. An electric motor mounted directly inside a wheel without any mechanicaltransmission will avoid all such losses. A long the horizontal axis you'll see several blue circles, these data points were recorded during a no-loadmotor test. As you can see, when the motor is spinning freely with no load (i.e. no propeller), no torque is generated. An increase in voltage increases the motor's speed along the horizontal axis, but the mechanical wattage remains at zero

TORQUE-SPEED PLOT AND ELECTRICALPOWER

Electrical power can be determined experimentally or theoretically, and it can be a fun exercise to compare your test results to your theoretical calculations. When calculating electrical power we can use formula 3, where electrical power is the product of currentand voltage. We can also calculate electrical power using formula 4, where it is the sum of mechanical power (RPM*torque) and heat losses. Electrical power relates to torque and RPM. The data points represent the test result from motors equipped with propellers of different sizes and pitch. Similarly to the3D display of mechanical power in figure, the electrical power is proportional to the motor's torque.

THEORETICAL APPROACH

To calculate a motor's electrical power theoretically we use formula 4. To allow us to input values into theformula, we replace 'mechanical power' with the right side offormula 2, and 'heat losses' with the right side of formula 5, to give formula 6. Here, R represents the resistance in the circuit generated by the motor (inversely proportional to thetorque). The theoretical model assumes that the Kv does not change, which is not exactly true due to the electronic speed controller (ESC)

CONTROLLER

Bike is a motor and a battery, but it's not that simple. You also need something in the middle called a controllerto dose the power to the motor. Most motors these days have hall sensors to make them run smoother, and also require a complex controller to dish out the power. The controller makes sure everything runs smoothly. Yourthrottle, motor, and battery all connect to your controller. The electric bike speed controller sends signals to the bike'smotor hub in various voltages. These signals detect the direction of a rotor relative to the starter coil.

ACCELERATOR/THROTTLE

The throttle mode is similar to how a motorcycle orscooter operates. When the throttle is engaged the motor provides power and propels you and the bike forward. A throttle allows you to pedal or just kick back andenjoy a "free" ride! Most throttles can be fine like a volume dial between low and full power. The dispenser tube is horizontally aligned inside the hopper tube. As the motor rotates the hole in the tube displaces.

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Mid Drive Motor

Your electrical scooter bottom bracket is home to a mid-drive motor. Put otherwise, it's essentially at the centre of your bike. Your crank bolt straight onto theengine. Although they are more costly and complicated, mid-drive motors have a tendency to reliable.

Accelerator

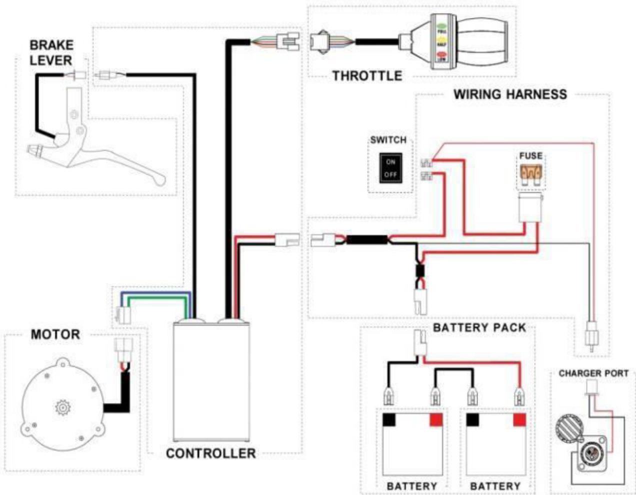
Finger trigger throttles are typical on the majorityof high performance scooters because they allow the user to access and modify performance settings, which include things like torque/acceleration strength, regenerative braking strength, cruise control, odometer, and display brightness.

ON / OFF operation

Your electric scooter has probably blown a fuse or tripped the circuit breaker if it keeps turning off orcutting out while you're riding. Usually, over loading ridingthrough muck or up steep inclines causes this.

Intelligent Controller

A family of control methods known as "intelligent control" makes use of a variety of artificial intelligence computer techniques, including genetic algorithms, neural networks, Bayesian probability, fuzzy logic, machine learning, reinforcement learning, and evolutionary computation.



III.MANUFACTURING PROCESSES

Manufacturing processes are shaft, Frame, Rotavator hopper and plough. Manufacturing processes are the stepsthrough which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during OR after the manufacturing, and planning the production process prior to manufacturing.

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CHARGING REGIMES

Charging event information was used to highlight individual driver behaviour. Charging events were bounded by periods of zero current draw, consistent with the scooter being either disconnected from the mains or thebattery being full. Charging information included event start and end time, duration and energy drawn

The final charging point meter readings at the two charging stations with visible meters were 56 kWh, servicing up to four scooters, and 28 kWh for a single scooter, respectively. A charging probability distribution over 24-h was created, using5-min intervals, in a manner similar to that of the driving probability distribution

SCOOTER OPERATING COSTS AND EMISSIONS

The operating costs of the trial electric scooter werecompared to those of the bestselling car and the bestselling125 cc petrol motorcycle in the UK in 2008 and normalizedto distance travelled. The use of a scooter may be considered a modal downshift from using a car. The switch from internal combustion engine in thebest-selling petrol motorcycle to the electric motor of the trial scooter indicates a technology shift, without any loss in drivability. Owner-ship of motorcycles is highest at 3.4% in households which own one or more cars. Therefore, a supposition was made that the total annual distance travelled per person may be split across a two- and four-wheeler, justifying the inclusion of car performance results for comparison.

IV.HARDWARE RESULT

Figure.3.Hardware Model

V.CONCLUSION

Our project may provide a solution for this existing problem since charging of the battery is done as the vehicle runs. It is very much suitable for young, aged people and caters the need of economically poor class of society. The most important feature of this e-bike is that it does not consume valuable fossil fuels thereby saving the money.

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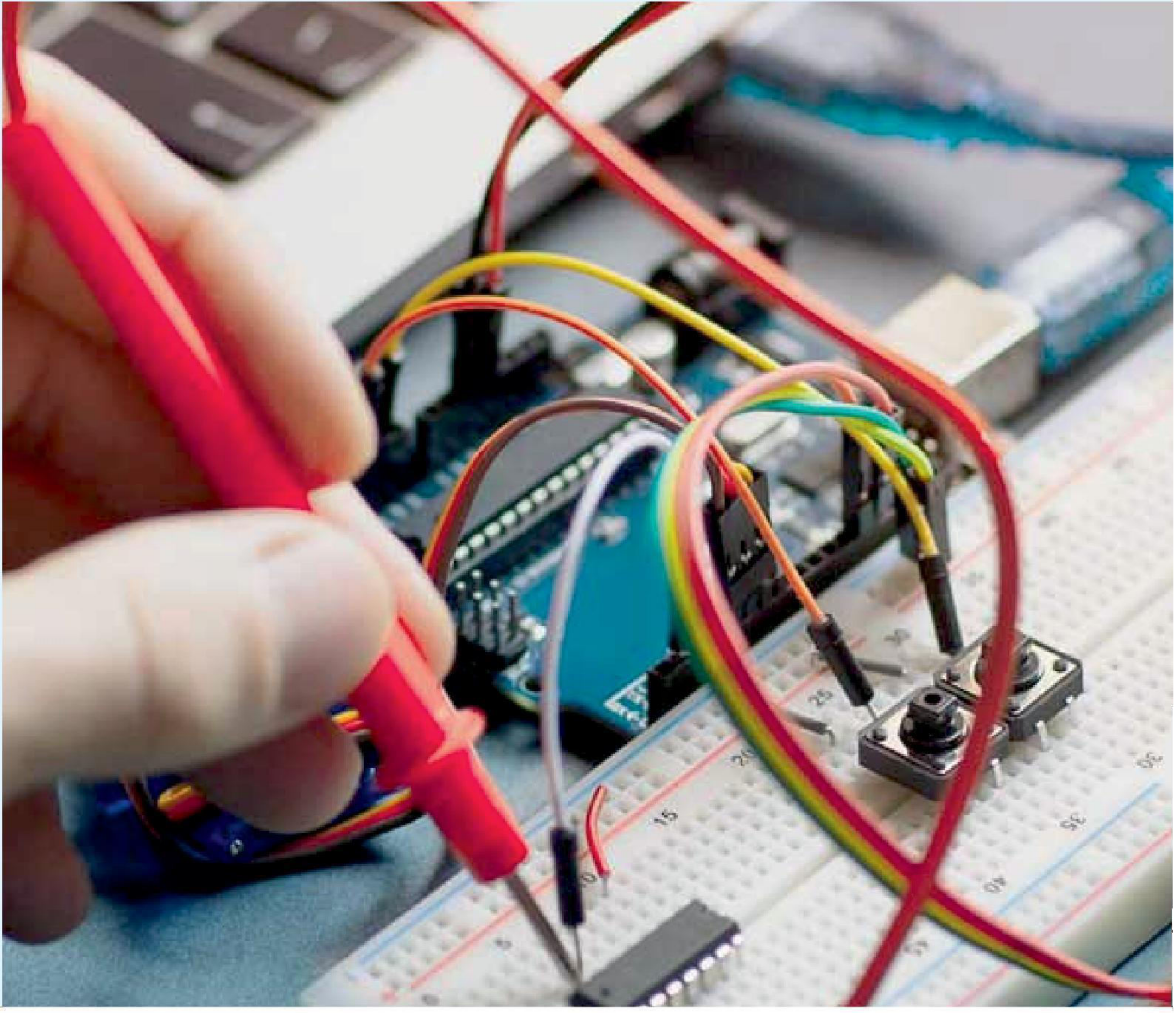

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