

Synopsis

1. Title of the Project: DESIGN AND FABRICATION OF QUAD BIKE FOR PHYSICALLY CHALLENGED

Project Proposal Reference No: 46S_BE_0001

2. Name of the College & Department:

Department of Electrical and Electronics Engineering,
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4. Keywords: Electric vehicles, BMS, Quad Bike, BLDC motor.

5. Introduction/ background

Quad bike is an attempt to make an electric wheelchair for the physically challenged people who make up almost 6% of the world population, estimating approximately 200 million. These people face challenges to drive speedy vehicles on roads that are damaged or have uneven surfaces. Our project aims to provide them with a convenient way to travel faster, save time and reduce their dependency on other individuals in boarding public transports or travelling from one place to another.

We designed the quad bike with the intentions of providing high speed, high safety, reliability and environmentally friendly features. It can be partially or fully automated depending on an individual's degree of impairment and needs. We use a brushless direct current (BLDC) motor in this project. The motor is powered by a Lithium-ion battery pack that can provide rapid and safe charging with the help of a battery management system (BMS).

We also use a controller to control the quad bike. The controller is the bike control unit that connects to the motor; it also connects to the battery pack and the throttle. The rider controls the speed of the quad bike by rotating the throttle handle. The more the rider rotates the handle, the faster the quad bike goes. We also equip the quad bike with spokeless wheels and a stylish, lightweight body frame.

6. Objective

Our objective is to develop an electric adaptive quad bike having low cost, greater range, an ideal motor.

7. Methodology

The materials used for this project are:

- BLDC Motor
- Motor Controller
- Throttle
- Lithium-ion battery
- Quadrature Frame

Figure.1. shows the basic knowledge we have researched regarding working of an e-bike and its background equations that is required.

We designed the system to work on a simple and easy mechanism that does not need any expertise. The only maintenance we need to do is charging the batteries, cleaning and performance checkup. We use a controller to control the BLDC motor. The controller connects to the throttle, speedometer, voltmeter, brakes, power switch and forward/reverse switch. We also connect the controller to the BLDC motor and fit the whole motor set to the vehicle (load) to mobilize it. The e-bike faces four resistive forces that oppose its forward movement: rolling resistance, acceleration force, gradient force, and aerodynamic resistance. To overcome these forces, we use a 46-volt and 1000-watt BLDC motor powered by a Lithium-ion battery pack. The rider controls the speed of the e-bike by rotating the throttle handle. The more the rider rotates the handle, the faster the e-bike goes. The battery pack has a voltage of 48 volts and a capacity of 24 ampere-hours. It can power the motor for 80 kilometers. The battery pack also has a Battery-Management System (BMS) that helps in efficient battery usage.

The controller is the control unit of the e-bike. It sends and receives signals from all the units on the e-bike. It receives signals from the throttle handle and transfers them to the motor; it also regulates the power supply from the battery pack to the motor and the auxiliary systems. The auxiliary systems include: the key lock, lights, speedometer, and theft alarm.

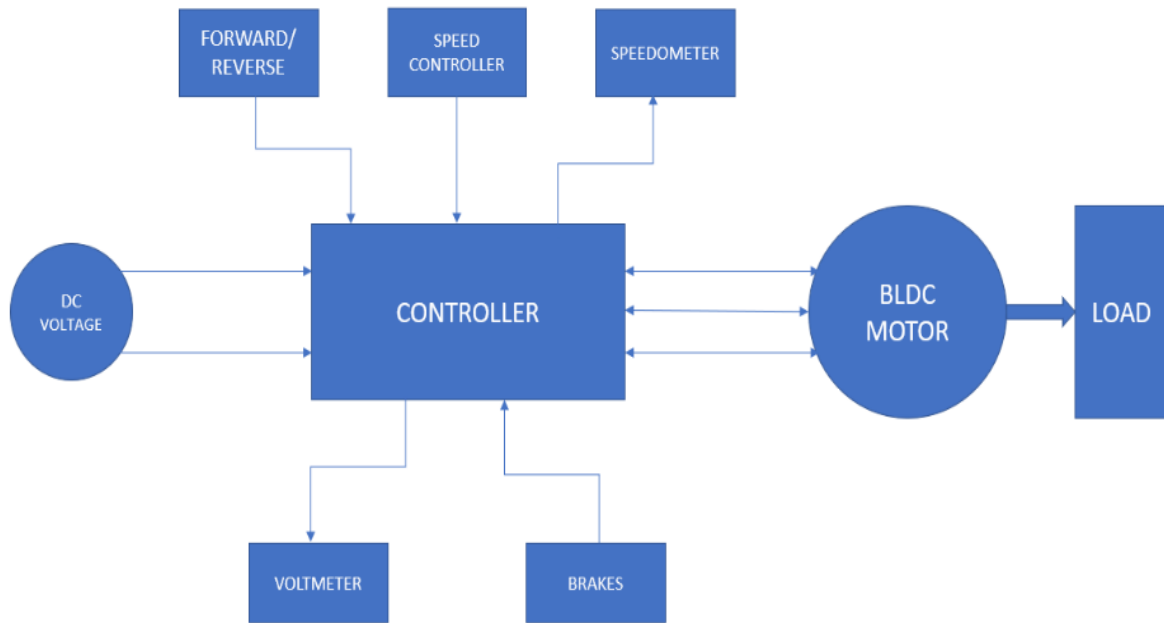


Figure.1. Block Diagram

8. Results and Conclusion



Figure.2. Hardware Implementation

Figure.2. shows the hardware implementation. Connections are given as per circuit diagram.


9. Conclusion

When compared to normal wheelchairs, electric wheelchairs have superior performance and are more environmentally friendly. The goal is for every physically challenged person to experience the normal life, to travel in all-terrain and the air to be clean and pure. Therefore, both the physically challenged and normal people can use this product in daily life for transportation. However, the gasoline and diesel fuels that are typically used in quad-bikes are non-renewable resources that are rapidly decreasing. Countries with a large middle class population, such as India, have the purchasing power for petrol and diesel, yet the price of fuel has climbed thirteen times in the last few years. This necessitates a shift in automotive technology and PWD sector, such as the use of electric vehicles. An electric vehicle is any vehicle that is powered by batteries and uses one or more motors, specifically electric motors for its movement. These vehicles can be powered by different ways; it could either be using a battery. Based on the simulations conducted, we found out the torque and speed required to propel the electric quad bike forward. In addition, based on this torque and speed, we can buy the appropriate motor to fulfil the requirements as per the resistive forces. This helps in the further construction of our desired Quad Bike.

10. Scope for future work

The future implementation includes worldwide growth in the various design structures and modifications for the same in this field as it is for the physically challenged people with dreams and aspirations. This invention is going to be a thrilling factor as it is not only used for primary transport, but also for having fun. This vehicle can be used in t. As a result, it makes a way for further development in this field in terms of customization resulting in various models which will be available in the market and they get to choose from a large number of options. This is an efficient project which can be upgraded in many ways. Electric vehicles are the future of our world with the increasing consumption of non-renewable resources such as petroleum and diesel which leads us to step our way towards the renewable sources such as solar, hydroelectric power and battery. There are alternative ways by which we can save energy. One of such ways is electric bike; it is also the new way of transport which provides us an easy way of transport for physically challenged people and it is a cheap source of transport and affordable to anyone.

Synopsis Report approved by


Signature of the Project Guide

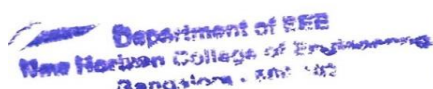
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