



A Review On Regenerative E-Bicycle

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Abstract: This Paper present review on regenerative E-bicycle. Regenerative E-bicycle system will help to solve the major problems of fuel and pollution of vehicle driven from conventional fossil fuels. E-bicycle is the advance way of transportation because it is a green and clean mode of transport. The main aim of this paper is to make regenerative E- bicycle and study about its components which are needed for making the regenerative E- bicycle and design the system for it. Regenerative e bicycle works on the principle of closed loop theorem in which BLDC motor is used to provide high starting torque and coupled to the wheel through gear pulley and chain mechanism . The charging of the battery can be done through the regenerative mechanism of the alternator which is coupled directly to the paddle so that it can gain mechanical energy from the peddle.

Index Terms - Electrical Bicycle, Electrical Vehicle, Brushless D.C Motor, Nickel Cadmium, Lithium ion

1. INTRODUCTION

Aim of this paper is to make more reliable and cheaper transportation for everyone. As we all know the fuel prices specially the petrol is raising steadily day by day. Again the pollution due to vehicles in metro cities and in urban areas is increasing continuously to overcome these problem and efforts is being made to search some other alternative sources of energy for vehicles. Again, it is also not affordable to purchase vehicle (mopeds, scooters or motorcycles) for all the class of society. Keeping this in mind is search for some way to cater these economically poor people as well as to provide a solution for the environmental pollution was in progress. A Regenerative Electrical bicycle also known as E-bicycle, power bicycle or boost bicycle i.e., E bicycle with an integrated electrical motor (Brush less D.C. motor).

Regenerative E-bicycle is the modification of existing bicycle and driven by the battery and human beings. It is suitable for both city and country roads, that are made of cement, asphalt or mud. This regenerative e-bicycle cheaper, simple in construction and can be widely used for short distance travelling especially by school children, college students, and villagers, postman etc. The most important feature of this bicycle that it does not consume valuable fossil fuels thereby saving crores of money. It is eco friendly and pollution free, as it does not have any emission that pollutes or harm the environment.

In this paper the method used to transform on e form of energy into another is studied. The use of mechanical and electrical energy to drive the bicycle is discussed the components used in making the regenerative e-bicycle and system designed for it also studied. E-bicycle use rechargeable batteries and lighter varieties can travel up to 25 Km per hr and can hold the maximum up to 80 Kg, it do not harm the environment as well as people and other species living on the planet it is cheaper mode of transportation and reduce the depending conventional sources like petrol, diesel etc. This technology further can be used in cars, buses, aircraft etc. It also helps us in achieving the energy security of the country

2. BLOCK DIAGRAM

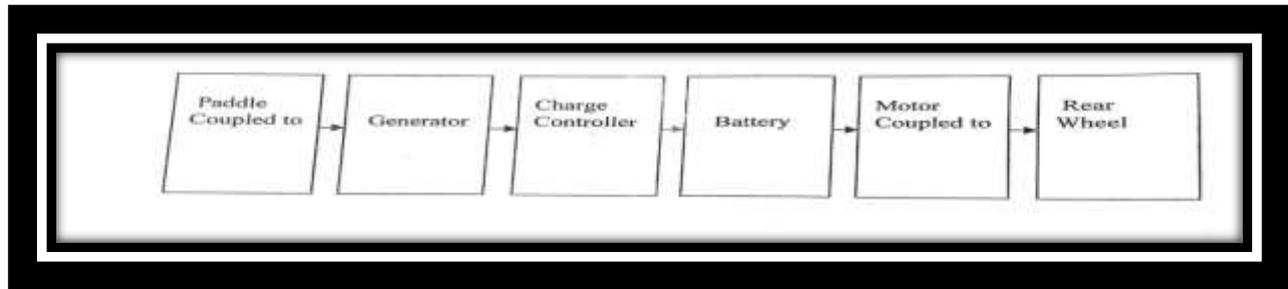


Figure 2.1: Block diagram of Regenerative E- bicycle

3. WORKING PRINCIPLE

A regenerative E bicycle works on the principle of closed loop theorem, by using the peddle of a bicycle the bicycle moves and generates the power from alternator/generator in the form of D.C in this process mechanical input given to the generator in the form of peddling which convert into electrical energy by the generator. This generated power is stored by the battery. Battery supplies the energy to the motor and motor is coupled to the rear wheel, the chaining system is used to couple all the mechanical parts and helps to reduce the frictional losses. The throttle is used to control the speed of bicycle.

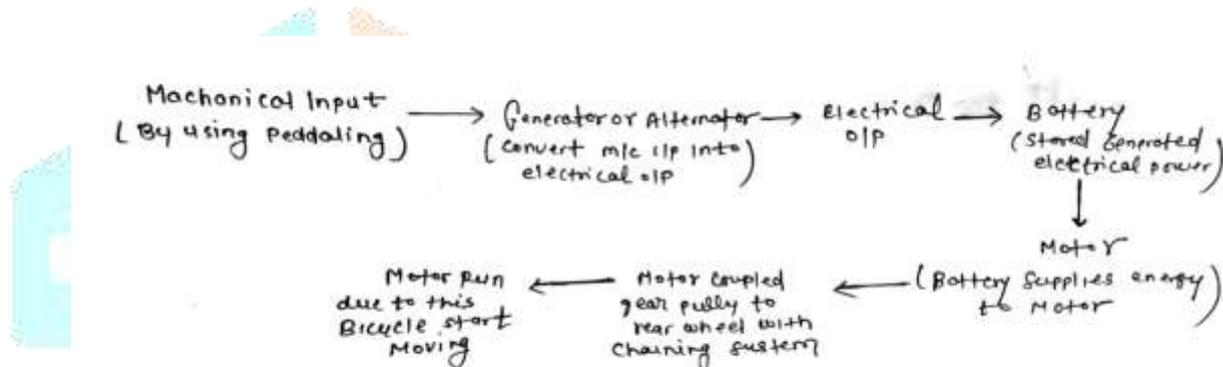


Figure: 3.1 Working Principle block diagram

4. COMPONENTS OF REGENERATIVE E-BICYCLE-

4.1 ALTERNATOR

A dynamo produce less power around 3w compare to an alternator which produce power in the range of 50W to 100W depending on the rate of peddling. It is found that alternator though it take more space , it is heavy but it is capable of generating more energy than dynamo. Alternator produces D.C power by using peddling when mechanical input is given, generator present at the middle of the frame and mounted on the carriage and coupled to the paddle with the help of free wheel and all mechanical parts is coupled from the chaining system

4.2 BATTERY

Battery is a D.C electrical power storage device which stores the generated power from the alternator. Mainly lid acid and lithium ion batteries are used in EV/EHV due to this higher energy density, high charging and discharging cycle, high strength, low cost etc. In current market lead acid is only viable battery technology for electric vehicle due to its cost effectiveness .At first Ni-Cd (nickel cadmium) batteries are used but later word changed to Ni-MH (nickel metal hydride) since it had added advantages.



Fig: - 4.2.1 Dry Battery

4.4 BLDC MOTOR

The brushless D.C (BLDC) motor that is capable of providing large amount of torque over a vast speed range. The BLDC motor is the idle choice for application that require high reliability, high performance and high power to volume issue. Battery supply the energy to the motor which is present at the back of the bicycle and is coupled to rear wheel, all mechanical parts is coupled to gear pulley and chaining system



Fig: - 4.4.1 BLDC Motor

4.5 CHARGE CONTROLLER

Charge controllers work as a voltage regulator or as a energy transduction it also control reverse flow of energy from battery to generator. Here D.C to D.C charge controller is used which is placed between generator and battery.

4.6 THROTTLE

Throttle is used to control the speed of BLDC motor.



Fig: - 4.6.1 Throttle

4.7 CHAINING SYSTEM

Chaining System is used to couple all the mechanical parts and helps to reduce the frictional losses. Chaining system is used for providing mechanical input from pedals to generator

5. ADVANTAGES

- Cheaper and reliable mode of transportation.
- No Noise pollution.
- No Flue gas emission.
- Environment Friendly.
- Less maintenance required as compared to conventional vehicles.
- Operating cost per km is very less
- It can be used for shorter distance by people of any age.
- Easy to access.
- Easy starting
- No pollution & No fuel residue.

6. APPLICATION

- Use of renewable energy sources.
- It will run both the conditions (Manual pedalling, SOLAR running).
- Dual powered bike is cost effective compared to normal petrol bikes.
- 80% of carbon monoxide emission can be Reduce.
- In case of low battery we can run the bike in solar panel or generator power.
- In case of petrol dry we can run the bike in electric motor.
- It is suitable for both city and country roads that are made of cement, asphalt, mud.
- It is widely used for short distance travelling.

7. FUTURE SCOPE

The pollution due to automobiles is increasing day by day hence the pollution level at cities and urban areas are at dangerous levels due to use of automobiles. The use of electrical vehicles for short distance travelling will help to reduce the pollution to some extent. Conventional vehicle like cars, motorcycle, buses etc are dependent on petrol and diesel, due to this environment get polluted and many diseases are occur which affect the human being therefore the requirement of the present and future for a alternative sources like electrical vehicle/HEV.

- The Govt. of India has launched **Nation Electric Mobility Mission (NEMM)** in April 2015 with a target of 6-7 million **Electric Vehicles** by 2022.
- **Renewable Energy Targets** has set by GoI. Integration of renewable energy will require energy storage technologies to achieve these Renewable Energy Targets.

8. CONCLUSION

This paper is not only for prototype purpose, it has an practical application. We have done implantation of the alternator/generator, battery, BLDC motor and charge controller etc. The depletion of fossil fuels and increasing level of pollution leads to find out the other alternatives, from a future energy perspective, it is important to identify new way of transport and generation of electricity. Regenerative electrical bicycle are an order of magnitude more energy efficient than car, buses, other heavy transport mode. By this application of the regenerative e-bicycle we can create eco friendly and green climate due to no noise and no emission.

- The regenerative E-bicycle can be useful application of renewable energy which will reduce pollution and can be useful device for villagers, where the provision of electricity is not adequate.
- It can be used in the absence of sunlight since it has an alternate source of power generation.
- It is a combination of both non polluting and an equipment of maintaining health.

Many researches is going on with reduction in use of material thus making it a cheaper, reliable and cleaner form of energy

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