Performance Assessment of Self Charging E-Cycle

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Abstract. Self-charging electric cycle is to reintroduce the bicycle with more environmental friendly and low cost feature. The introduction of self-charging electric cycle leads to tackle both pollution and rising fuel cost. The self charging electric cycle is integrated with electric motor, can be used for momentum and battery is charged using mechanical pedal. If we utilize the self-charging electric cycle for local coverage and also large amount of money can be saved and pollution free environment is created to contribute national economy. Hence the bicycle with integrated electric motor and the electric cycle can be peddled and seems to be suitable choice to solve the problems. It is the cost effective and flexible mode of transport.

Keywords: E – Cycle, Self-Charging, DC Motor, Spur gear, Battery, Dynamo, Throttle

1 Introduction

Battery is only charged at e charging stations or home, as the e bikes requires heavy batteries for long distance travel. To get survival in planet, energy is most important. Hence there is in need of converting one mode of energy or additional alternative source of energy to fulfil our desires. Alternative energy sources include fossil fuels. We use many forms of energy generation, vehicle transportation, and so on. However, the disadvantage of the fossil fuels are unfriendly to the environment and that they are finite. To address the difficulties with fossil fuels, we must consider non-conventional energy sources. E-Bike energy requirements are influenced by a number of issues that will have an impact. E-bikes' energy consumption the vehicle's energy requirements are met by the distance, total weight, and distance. A survey of the literature was used to determine the system design of the following parameters. Because this report is exploratory in nature, some effects cannot be firmed with certainty based on the simulation results from the available resource and to meet energy requirements'. Some of the results may not applicable to a real-world problem. To address this issue, it was attempted throughout the report to carefully evaluate the system in order to ensure that the conclusions obtained in the end will be appropriate for a real instance, despite changes in, for example, the system's application of the system Petroleum fuel is used in all automotive two-wheeler engines. Other sources of energy are required to operate the vehicle due to the demand for fuel

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and the expense of fuel. As a result, we are turning to new sources of energy, such as electric power. The self-charging E-cycle is a pedal-powered electric cycle that charges itself. The dynamo is a device that generates electric power. A battery, dynamo, chain drive, spur gear, roller, cycle, and motor make up the model.

2 Literature Survey

ChetanMahadik, SumitMahindrakar, Prof. JayashreeDeka, [1] discuss the improvement of a partner diploma e bicycle with a modern technique. The goal of this work is to reveal the everyday bi-cycle may be upgraded to electric powered with the aid of using a few means– that consisting of the improvement of braking system and BLDC motor control – however additionally makes use of actual sensing and powers of crowd sourcing to enhance the biking enjoy

SrivatsaRaghunath, [2] discuss the information a Self-Charging E - bicycle contains batteries that supply electric powered electricity to a motor this is coupled to both wheel. In maximum electric powered bicycles the rider can selected to apply electricity to supply all, part, or not one of the propulsion electricity required to preserve a followed tour speed. Some fashions even experience pedal strain and command the motor to supply extra electricity every time the rider pedals harder.

D. M. Sousa, P. J. Costa Branco, J. A. Dente, [3] discuss a traction gadget beneficial of a self-reliant e vehicle. The evolved gadget is a primary technique with the aid of using unique electricity sources: one is constituted with the aid of using batteries or with the aid of using gasoline cells and the opposite with the aid of using top notch capacitors. This paper describes a technical answer becoming a member of and undertaking the use of strength garage structures with inside the identical traction gadget. In the evolved gadget, the top notch capacitors run as detail that shop strength quickly and that may be used to retrieve strength

3 Problem Statement

Infrastructure for electric vehicles. The infrastructure support for the electric vehicle are the very most important and discussed among nation and there is need of charging point for the convenient use of electrical vehicles. Electric vehicles are not recommended at highways because of the absence of charging point in highways and less number of charging available at cities in our country.

Charging time. The electric vehicles take more time to charge it is seen as main disadvantage for our people although fast charging is available it also consume an hour but only 80% of charging is done at interval of period.

Service of electric vehicles. The electric vehicles are new to our usage and correctness of the service charges are not know for the people. There may be chance to forging people at service center by billing extra charges for the problem which may be in normal condition. Electric vehicle Have very low torque, so that speed is very low and existing models has lithium ion batteries which has very high maintenance cost. Full charged electrical vehicle can cover only a small distance of 50 to 60 kilometer.

4 Components

The “fabrication of self-charging electric bicycle” is consists of the following components are DC Gear Motor, Cycle, Spur gear, Battery, Dynamo, Bearing, Throttle

Table 1. Components and Specifications.

Components	Specifications
Cycle	Hercules turbo
Lead acid battery	Geekay 12 V, 7.5Ah
DC gear motor	24 V, 250W
Throttle	Robodo M63
Other parts	Wires,cables,water proofing, chain,free wheel.

DC Gear Motor. A Direct Current (DC) motor is a device that converts electrical into mechanical energy. The magnetic field is produced by Inductor coil inside DC motor which produces rotatory motion as when DC source is supplied to its terminal shown in below figure 1.

Fig. 1. DC Gear Motor.

Cycle. A light weight bicycle made up of steel carbon fiber is used to mount the required component on it.

Spur gear. Spur gear used to increase or decrease speed of the devices mechanically. It also multiple torque transmitting motion and power from one shaft to another through a series of matted gears by mechanical applications shown in below figure 2.

Fig. 2. Spur gear.

Battery. Rechargeable lead-acid batteries are used. It consists of a sponge and a cathode made of porous lead. Lead is porous because it is easy to form and dissolve lead. The anode is made of lead oxide. Both electrodes are immersed in an electrolyte of sulfuric acid and water shown in below figure 3.

Fig. 3. Battery.

Dynamo. Dynamo is an energy production unit which is produced by the coils and magnetic fields which converts the mechanical to electrical energy. Dynamo generates DC using commutator shown in below figure 4.

Fig. 4. Dynamo.

Bearing. Bearing is the mechanical device that only focus on the specific or fixed motion and it reduces the friction between the moving parts shown in below figure 5.

Fig. 5. Bearing.

Throttle. A throttle is a device used to control the speed of electric bicycle. Instead of mechanical acceleration, we use Electronic Throttle Control (ETC), which is used to link the accelerator pedal to the throttle shown in below figure 6.

Fig. 6. Throttle.

5 Hardware Module Description

Figure 7 show the hardware module description of self-charging electric cycle andit is powered by 250W Dc gear motor which runs at the speed of 200 rpm and dc gear motor operates at 24voltage and the lead acid battery has the capacity of 7.5Ah. Both pedal assist and motor drives are supported by the chain drive.

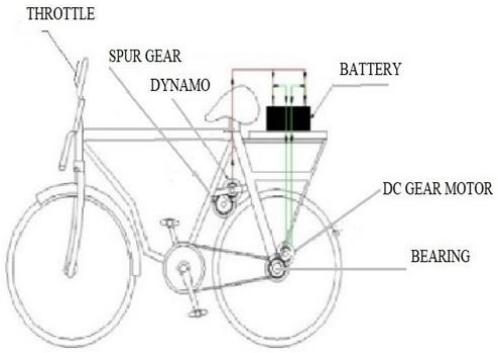

Fig. 7. Hardware Module.

6 Working Principle

The dynamo is arranged such that it can generate power while the vehicle runs. When we starting pedaling the cycle the bearing structure connected to the chain rotatesthe moment of wheel. Electricity is generated and stored in a lead-acid battery throughthe above process. The E-cycle operates when the dc gear motor gets supply from the lead acid battery. The motor operates the cycle of the motor and another setup of spur gear arrangement are coupled for motor

to dynamo. The cycle runs at same time electricenergy generation from dynamo and the energy is saved to the battery. You must manually control the direction of the vehicle. The lead acid battery is located at the rearside of electric cycle thus the energy production is done and stored and used for mobilityof E-cycle as shown in below figure 8

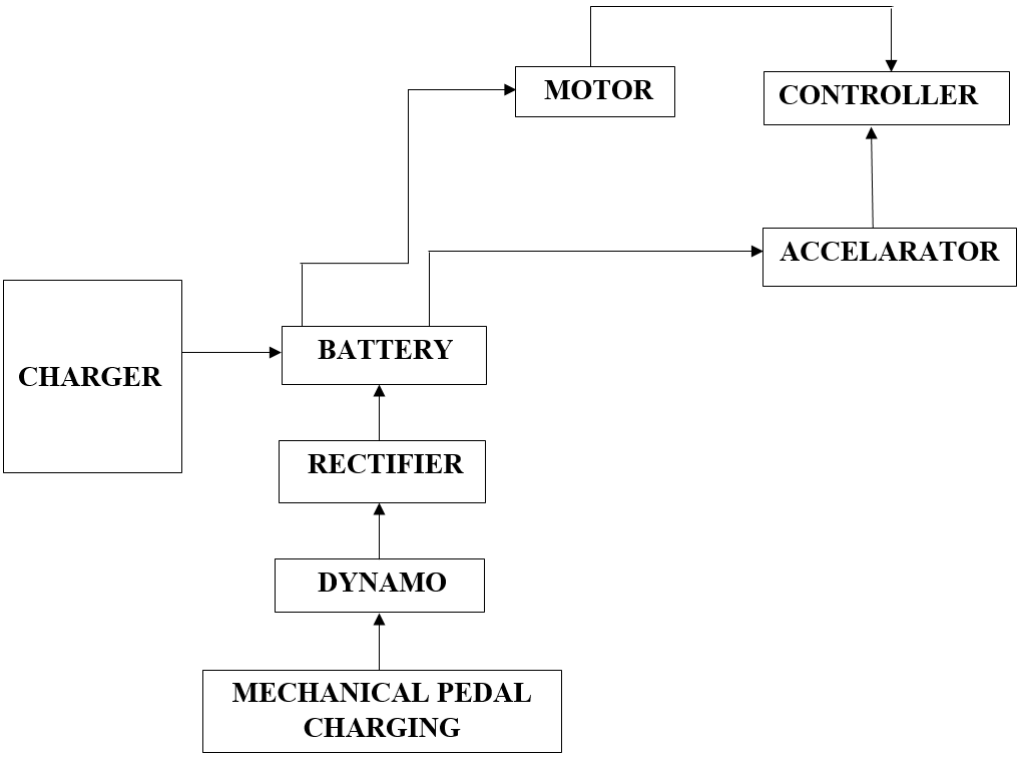

Fig. 8. Block Diagram.

7 Future Scope

We are living in the updated world all the other technology has been improved ourlife style and changed some of our natural habits. That affect our natural health is one of the main reason that affect our natural health condition is main breakthrough of medicines, the only way to keep our self-healthy is to increase our physical and mentalhealth active and also increase the usage of non-conventional source of energy to stay longer and increase our life span the above recommendation should be followed. We can invent many innovative strategies by giving intro to new change in the improvementof non-conventional source of energy and also spend some valuable time on different sport techniques to make us fit and healthy one of the massive thing to make alternate is a self-charging electric cycle which is the innovative form of E-cycle. It may be the best alternate option for the non-conventional source of mobility of the cycle in this century.

8 Results

The usage of cycle is already considered as the non-conventional source of energyand some people may think using it is the best replacement rather than the usage of petrol or diesel vehicle it is much more effective and smarter than normal vehicles. The E-cycles are similar to normal cycle but it's loaded with lead acid batteries connected to the throttle and bearing of the cycle which can be charged and can be travelled insteadof normal vehicles. The rechargeable cycle can travel at the minimum speed of 10km/hand maximum at the speed of 30 to 40 km/h. While compare to the normal cycle this E-cycle may be smart and faster than the cycle and arrive to destination as soon as you think. It is also has the capacity to recharge when we pedal the cycle and the energy isstored at so we call as smart electric cycle.

Table 2. High Gradient.

Speed	Power[W]	Gradient	Output Voltage[V]	OutputPower[W]
10	87	0	14	25
	130	3	14	25
	170	6	14	25
15	100	0	20	60
	155	3	20	60
	200	6	20	60
20	130	0	25	75
	185	3	25	75
	220	6	25	75
25	150	0	27	89
	200	3	27	89
	250	6	27	89

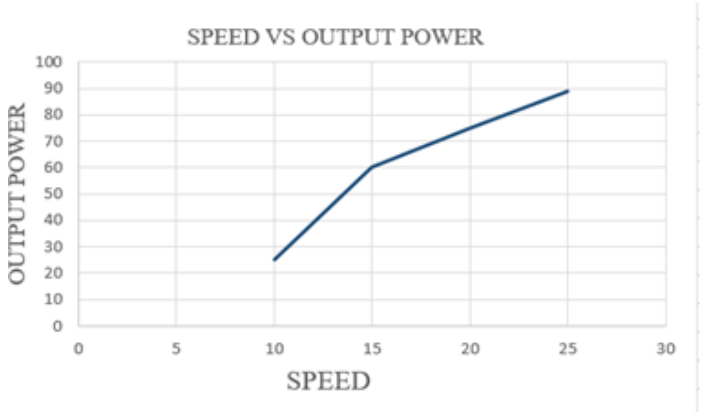

Fig. 9. Speed vs Output Power of High Gradient

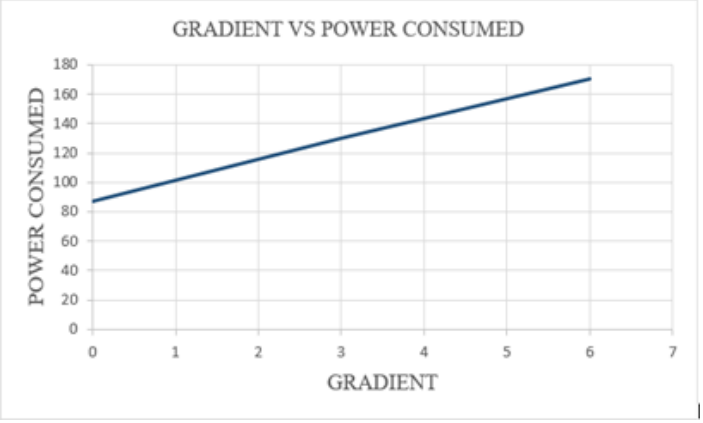

Fig. 10. Gradient vs Power Consumed of High Gradient

Table 3. Low Gradient.

Speed	Power[W]	Gradient	Output Voltage[V]	OutputPower[W]
10	86	0	14	25
	50	3	14	25
	35	6	14	25
15	100	0	20	60
	75	3	20	60
	45	6	20	60
20	130	0	25	75
	80	3	25	75
	65	6	25	75
25	150	0	27	89
	100	3	27	89
	70	6	27	89

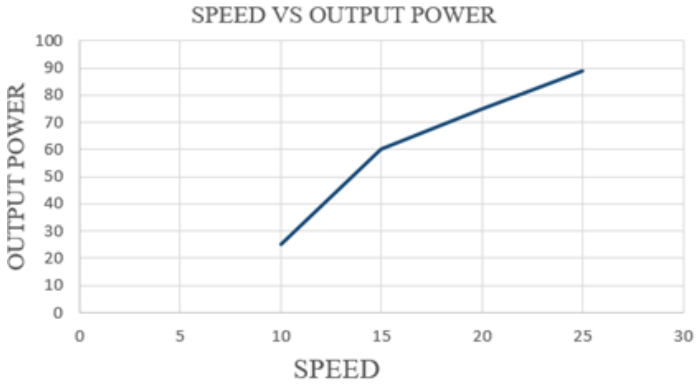

Fig. 11. Speed vs Output Power of Low Gradient

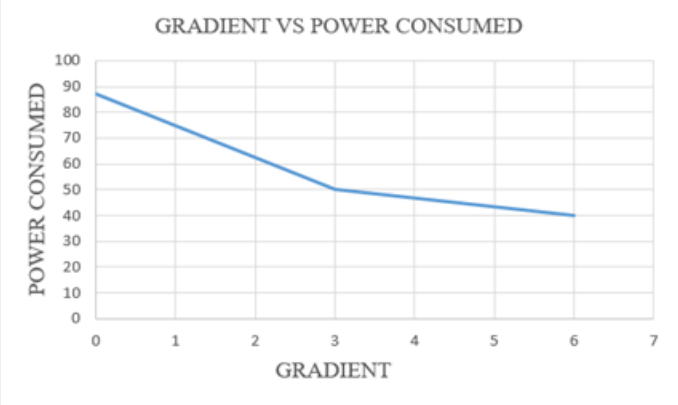

Fig. 12. Gradient vs Power Consumed of Low Gradient

9 Conclusion

The job that we completed was an impressive task in the realm of automobiles. It is highly beneficial to have a two-wheeler because they do not have to spend a lot of money on fuel. The expense of the concern will be reduced as a result of this initiative.The project was created with the goal of completing the complete requirement task in the shortest amount of time possible.

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