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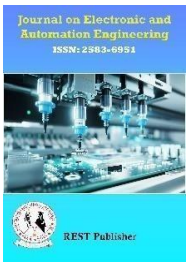

Self-Rechargeable E Bike Using Dynamo

***Amruta More, Anjani Parmar, Sonali Rajendra Nagpure, Rutuja Rajendra Bhalerao, Akriti Ajay Biswas**

ABMSP's Anantrao Pawar College of Engineering and Research, Pune, India.

*Corresponding author Email: amruta.more@abmspcoerpune.org

Abstract: *One of the greatest and most urgent needs of this world is to develop technology in the transport industry that can help to reduce the fossil fuel consumption exponentially. Our world is facing the danger of over exploitation of fossil fuels which in turns contributing a lot of pollution and global warming. Thus, working on a solution to reduce pollution and global warming, Electric bicycle is the perfect solution to reduce the causes. In E bicycle we use Lead acid battery, it is fast being recognized as a sustainable battery option because of its superior performance and life cycle. Therefore, lead acid battery based electric bikes can be major breakthrough in the transport industry. In the present work, we focus to enhance battery life while running, the Dynamo used in this setup to recycle the power for production and consumption simultaneously.*

Keywords: *Battery, Dynamo, Self-charging, Controller, E-Bike, Battery capacity.*

1. INTRODUCTION

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 fulfill our desires. Alternative energy sources include fossil fuels. We use a variety of energy-generating methods, drive cars, and so forth. However, the disadvantage of the fossilfuels is unfriendly to the environment. We need to think about non-conventional energy sources in order to solve the problems associated with fossil fuels. E-Bicycles energy requirements are influenced by a number of issues that will have an impact. E-bicycles energy consumption the vehicle's energy requirements are met by the distance, total weight, and distance. In order to ensure that the final findings drawn from the report will be appropriate for a genuine instance, a thorough evaluation of the system was attempted throughout. As an illustration, the system's application All two-wheeler engines in automobiles run on petroleum fuel. Because fuel is expensive and in high demand, the car needs additional energy sources to run. As a result, we are turning to new sources of energy, such as electric power The self-charging E-Bicycle is a self- chargeable electric cycle that charges itself while running using dynamo. The dynamo is a device that generates electric power.

2. LITERATURE SURVEY

Vaibhav Rajesh et al., stated that he electrical vehicle is not a new concept to us .the electrical vehicle first introduce in 1890.the petrol vehicle need fuel to drive it but as we now that fuel is not renewable source in future we cannot be depend on petrol vehicle .hence we have to developed electrical vehicle .we go to make electrical vehicle which runs on renewable energy source .we use electricity as fuel in our two wheeler bike by the help generator or alternator we charge batteries In 2020 Nagaraj Sindagi et al , provides a design and analysis of the e-bike that can recharge itself. Electric motors and electrochemical batteries power electrical vehicles. The two biggest problems with e-bikes are their short range and longer recharge times. India's infrastructure for E-bike charging stations is still underdeveloped. In 2021, Ilyas Hussain et al they have used a DC motor/generator attached to the rear wheel of the bicycle. Two sets of batteries are connected to the setup. Another battery will supply the necessary power when the first one runs out. In that time, the wheel's rotation turns the dc motor/generator's shaft, producing a voltage output. The electric bike's range is increased by this voltage, which aids in battery charging. In 2021, Mr. koli Abhijit Uttam et al., developed a self-charging electric vehicle which

generates the electric power required to drive the bike during the running condition by the means of auxiliary power sources. The electrical generator, which is directly connected to the electrical bike's front wheel, provides the power. A current regulator controls these power sources so that the battery is charged concurrently. The other is an external plugging system that can be used to charge an electrical bike while it is stationary. In 2023, Dr. Venu Murali jagannati, states where the batteries can be charged continuously while the bicycle in running condition, so that E-bicycle can travels longer distance. The main drawback of limited range of conventional E-bikes is solved by our project. Overall, the project was successful in demonstrating the feasibility of a self-chargeable electric bicycle using a dynamo. The findings of this project can be applied to further develop sustainable modes of transportation. In 2022, Mohamed Ibrahim et al, states that the Self-charging electric cycle leads are an effective way to combat rising fuel prices and pollution. The electric cycle that charges itself automatically has a built-in electric motor for propulsion and a mechanical pedal for battery charging. Self-charging electric cycles can save a significant amount of money and create a pollution-free environment, both of which benefit the national economy when used for local coverage. Therefore, the electric cycle and bicycle with built-in electric motors can be sold and appear to be a good option to address the issues. It is the most economical and adaptable mode.

3. EXISTING METHOD

In the current setup Limited mileage is one of the primary issues with self-charging electric bicycles. There was very little maintenance time. The On-Boarding Self-Charging System is absent. such as Dynamo Existing odels 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. Hub Dynamo: Hub dynamos are integrated into the wheel hub and generate electricity as the wheel turns. This electricity is then sent to the battery for recharging. Hub dynamos are efficient and low-maintenance. Bottom Bracket Dynamo: Some e-bikes use dynamos integrated into the bottom bracket (the part of the bike frame where the pedal crank is attached). As the pedals turn, the dynamo generates electricity, which is then used to recharge the battery. Friction Dynamo: Friction dynamos make contact with the tire's sidewall, usually through a small roller or brush, and generate electricity through friction as the wheel turns. While not as efficient as hub dynamos, they can still provide a charging source. Regenerative Braking: In addition to using a dynamo to generate electricity while riding, some e-bikes incorporate regenerative braking systems. When braking, the motor switches to generator mode, converting kinetic energy back into electrical energy to recharge the battery.

4. PROPOSED METHOD

The dynamo arranged in a bicycle will generate electricity when the vehicle is in running condition. Typically, the bicycle begins with the free wheel rotating while it is in contact with the chain. The dynamo, which produces electricity when attached to the back of the bicycle close to the back wheel. Electricity generated by the dynamo as above said process is stored in a lead acid battery, which is further will be used to the Hub motor connected at the front part of the bicycle over the front wheel. In this instance, the hub motor propels the bicycle forward and aids in its continuous running. The electricity generated by the dynamo, the consumption of electricity by the Hub motor occurred simultaneously, thereby the life of the battery also enhances slightly when compared with bicycle without dynamo.

Block diagram:

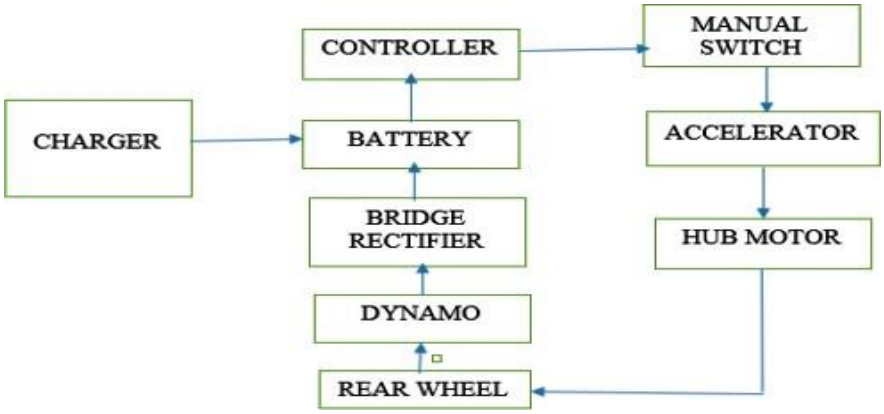

FIGURE 1. Block Diagram

5. COMPONENTS

Bicycle: a bicycle is a two-wheeled, steerable vehicle that is propelled by the rider's feet. It is also referred to as a bike. A standard bicycle has its wheels positioned in a straight line within a metal frame, with a rotatable fork supporting the front wheel. The rider steers by leaning and rotating handlebars that are fixed to the fork while seated on a saddle.

Battery: the lead-acid battery is one of the oldest types of rechargeable batteries. During the year 1859, french physicist gaston plante invented these batteries. Its capacity to deliver high surge contents indicates that the cells have a relatively large power-to-weight ratio, despite having a small energy-to-volume ratio and a very low energy-to-weight ratio. Lead-acid batteries can be classified as secondary batteries. In secondary cells, chemical reactions can be reversed. Batteries =

Controller: the primary job of the controller is to process inputs from every component of the e-bike, including the throttle, battery, speed sensor, display, motor, etc., and output the appropriate signal. The controller design has multiple protections that are: low-voltage protection, over-voltage protection, over-temperature protection, over- current protection, brake protection. Controller used in this project is 24 volts.

Hub motor: 1the most prevalent kind of motor found in less expensive e-bikes is the hub drive motor, which is built into either the front or rear wheel. The later is more common, but a few e-bikes even have motors on both wheels.

2. A hub drive functions without relying on your bike's gears to directly apply torque to the wheel. E-bike hub motor, that can't run on dc directly, it needs a controller. The controller transforms the dc into a three-phase ac with a variable frequency. This project uses a 36-volt hub motor.

Dynamo: this project the dynamo act as a power generator from the rotation of rear wheel while it is running, because the rear wheel and dynamo are coupled due to friction between threads provided on both dynamo wheel and rear tyre thread. The amount of power generated in the dynamo by the revolutions made by rear wheel is supplied to the rechargeable battery. The range of dynamo is 12v.

Bridge rectifier: we can define bridge rectifiers as a type of full-wave rectifier that uses four or more diodes in a bridge circuit configuration to efficiently convert alternating (ac) current to a direct (dc) current.

Throttle and lcd display: an electric bike's throttle mode functions similarly to that of a motorbike or electric scooter in that it engages the motor to provide power and move the bike forward. It gives you full power on demand with no automatic pedal assistance involved.

2. Use the lcd battery display to see how much electricity is left. You can recharge your e-bike on time, and it also display the speed of the e-bike.

Led head light and built-in horn: 1. LED Head lights are used in low light conditions or after dark for better visibility of user.

2. Electric circuits produce warning signals, which are produced by horns.

6. OVERVIEW OF THE COMPLETE PROJECT

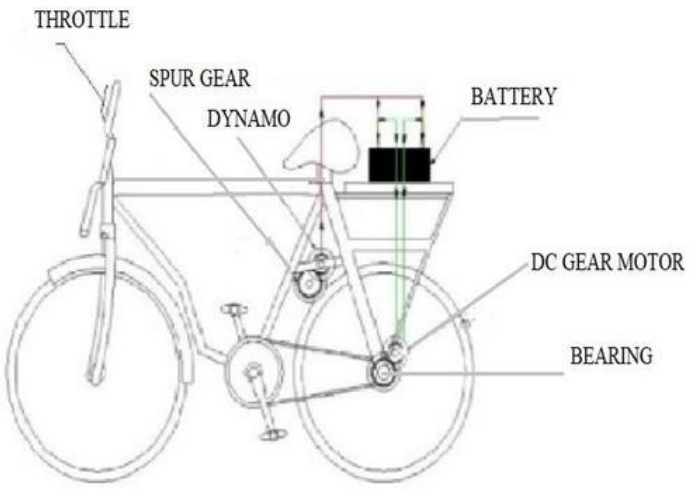

FIGURE 2. Prototype of self-chargeable E-Bicycle using Dynamo

Figure 2 show the hardware module description of self-charging electric cycle and it is powered by 250W Dc gear motor which runs at the speed of 200 rpm and dc gear motor operates at the lead acid battery has a 7.5Ah capacity and operates at 24 volts. Both pedal assist and motor drives are supported by the chain drive.

7. RESULTS AND DISCUSSIONS

The Components which are Procured individually and they are arranged in a systematic way to the E-Bicycle and each part it is performing its function and we are getting good output that dynamo meter which is connected to the rear wheel of a bicycle it is integrated to the rechargeable battery, when the rear wheel is making revolutions for some distance simultaneously the dynamo meter which is coupled to the rear wheel is rotating and generating a power and it is supplied to the rechargeable battery. The self-chargeable electric bicycle using a dynamo produced a consistent electrical output throughout the testing period. The dynamo was able to generate an average of 12 volts and 2 amps of electricity when the bike was in motion. During a 30-minute ride, the dynamo was able to generate enough electricity to charge the battery by 10%. The charging rate was found to be proportional to the speed of the bike, with higher speeds resulting in greater electrical output. We found that the amount of electricity generated varied depending on the speed of the bicycle, with higher speeds resulting in more electricity generated. The use of the dynamo did not affect the performance of the bike or cause any noticeable drag. With the dynamo running, the bike was still able to move quickly and maneuver.. Overall, the results suggest that the use of a dynamo is a viable method for self-charging an electric bicycle. The electricity generated by the dynamo is sufficient to supplement the battery and extend the range of the bike. Further research could explore the use of more efficient dynamos or the integration of multiple dynamos to increase theelectrical output. The results of our testing indicate that a self- charging electric bicycle using a dynamo is a viable option for generating electricity on the go. However, it should be noted that the amount of electricity generated is relatively small and may not be sufficient for longer rides or for powering larger devices. Additionally, the speed at which the bicycle needs to be ridden to generate electricity may not be practical for all riders. Further research could explore ways to increase the efficiency of the dynamo or to integrate other methods of generating electricity into the bicycle design. Our designed “Self-Chargeable E-bicycle Using Dynamo” where the batteries can be charged continuously while the bicycle in running condition, so that E-bicycle can travels longer distance. The main drawback of limited range of conventional E-bikes is solved by our project. Overall, the project was successful in demonstrating the feasibility of a self- chargeable electric bicycle using a dynamo. The findings of this project can be applied to further develop sustainable modes of transportation.

8. CONCLUSION AND FUTURE SCOPE

From the project titled “Self chargeable E-Bicycle using Dynamo” it has been arranged that the dynamometer which is connected to the rear wheel of bicycle. The bicycle is runned by the help of rechargeable battery to some distance, the power utilization from the battery has been observed is recharged by the arrangement of dynamometer. In this project the dynamometer act as a power generator from the rotation of rear wheel while it is running, because the rear wheel and dynamo are coupled due to friction between threads provided on both dynamometer wheel and rear tyre thread. The amount of power generated in the dynamometer by the revolutions made by rear wheel is supplied to the rechargeable battery. Hence the dynamometer works like double engine seen in the case of automobiles when the first engine giving input to the vehicle it will consumes its fuel and then comes to rest position after some time, later the second engine will start to probe the vehicle and it is known to be hybrid mechanism in general in case of long journey vehicles. In the similar way the dynamometer arranged in this project supplies the energy to the rechargeable battery simultaneously and the amount of power supplied by the dynamometer will give additional power to the rechargeable battery and it improves the life of the battery. For the future aspects instead of using a single dynamometer we can increase it's number for both the wheels to obtain more output of the E-Bicycle.

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