ANALYSIS OF DATA WITH POSSIBILE WAYS FORCHARGING THE BATTERY OF ELECTRICALTWO WHEELER

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Abstract
The idea of electric cars is not new to us; the first one is known to have existed in the late 1890s. Nevertheless, due to conventional vehicles dominance in the commercial sector, electric vehicles were long ignored and repressed. Petroleum fuels, which are not renewable and not very environmentally friendly, are used to fuel conventional automobiles. We have reached a point where a brighter future cannot rely on these quickly diminishing non-renewable sources of energy. Hence, we must create and use renewable energy sources that are clean, non-polluting, and never run out. People didn't begin to see the necessity for electric automobiles until the late 1960s. As a superior alternative to traditional automobiles, electric vehicleseco-friendly and more effective.

Keywords: Electric bicycle, electric motorcycle, smart electric bicycle, regenerative motor, and power control unit.

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1. INTRODUCTION

Electric vehicles struggle to remain competitive in the commercial sector due to a shortage of charging stations throughout the nation and a lengthy battery charging process, which makes them a dubious choice for the general public. This issue was resolved by attempting to design, build, and construct a dual-battery electric car prototype that charges itself while being driven, therefore creating a system that makes the most of the power generated by the various sources.Moreover, a battery switcher driven by an Arduino is utilised to alternate between charging one battery and powering the drive motor during operation. A commercially available bicycle's chassis is altered to meet the needs of the system's components. Lithium-ion batteries, a solar panel, a DC drive motor, a motor controller, and an electrical drive control unit make up the system. Our prototype is more effective than the commercially available electric vehicles on the market thanks to the controller unit we built.The created prototype is subsequently put to the test in various scenarios to demonstrate its effectiveness. Every sort of electric vehicle, including bikes, automobiles, trucks, and others, may use this technology. The prototype that was created as an illustration to show how much more efficient electric bike are.

2. DesignandDevelopment

2.1. ElectronicControl Unit(ECU)

The electronically controlled unit, which serves as the brain of the project, decides what to do given the situation. The project's control unit is made up of an Arduino UNO board, three 250V relays, and a voltage metre module. Relays are necessary for this switching because the ECU powers up when the bike is decided to turn on and uses voltmeter features to monitor the voltage in both battery packs. The Arduino then selects to recharge the battery pack with the least voltage while using a different battery to provide power to the motor. When the charge on the running battery reaches 30%, the ECU switches the batteries once more, recharging the operating battery while utilising the required to charge battery to run the motor. Fig 1 displays a circuit schematic for the identical system.

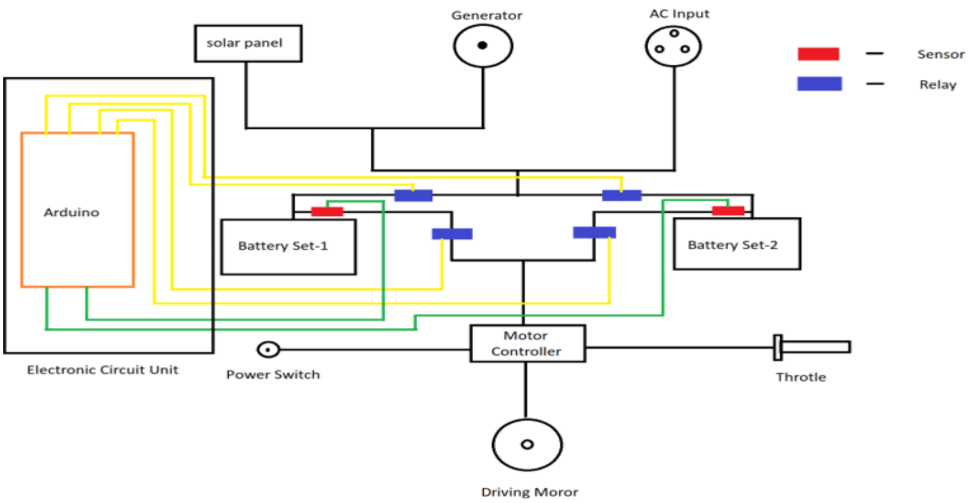

Fig1. Block diagram

Although batteries prefer to heat up when used for both charging and discharging at the same time, this switching aids in the effective use of energy from batteries.

2.2. Designing

The purpose of this study is to build an E-bike that's able to be recharged from various energy sources and to switch the batteries in an intelligent manner to increase their efficiency and lifespan. The following are the components utilised in this electric bike:

1. D/CMotor drive(36V,350W)
2. E bike Controller
3. Power source(3no,12V,10Ah)
4. ArduinoBoard
5. 2 Channel250V ArduinoRelays
6. Hub generator
7. PVCPanel

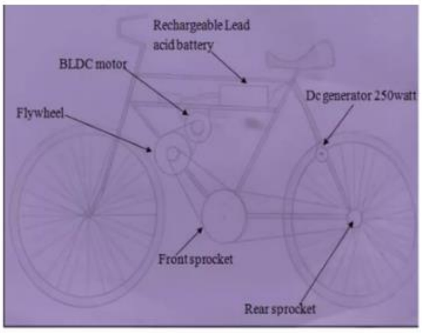

Fig2. Model Diagram

The project's brain, the electronic control unit, makes decisions based on the environment. The project's control unit is made up of an Arduino UNO board, three 250V relays, and a voltage metre module. Relays are crucial in this switching because the ECU uses voltmeter modules to check the voltages in both batteries when the bike is switched on, which requires power from the relays. The Arduino then selects to charge the battery with the lowest voltage while using a different battery to power the motor. When the charge on the running battery reaches 35%, the ECU switches the batteries once more, charging the running battery while utilising the charging battery to power the motor.

3. Results& Discussions

For best results, a number of experiments were run. To get the best output, the solar panel's placement is necessary. Nevertheless, putting the solar panel at a set position and angle is impractical because the prototype will be moving. By maintaining a consistent speed, we were able to determine the batteries' discharge rate. Because excessive usage shortens a battery's lifespan, it is not advised to deplete a battery below 30%. We obtained the following findings by setting the battery's minimum charge level at 30% for safety reasons.

Fig3. DevelopedModel

3.1 Testing usingonly single Setof Batteries

- The system was powered by a single set of batteries for the duration of the first test run (30%).
- When the charge level hit 30%, the batteries' connection was allowed to be shut off using a relay in an Arduino circuit.
- One pair of batteries was found to totally drain (30%) in around 28minutes.

Table1Resultsfor singlesetofBatteries

Seq No	PeakVolt	Nominal Volt	DistanceTravelled	MaxSpeed	AvgSpeed
1	38.2	35.8	9.5	20	17
2	38.1	35.8	7.55	17	15
3	38.2	35.8	6.9	15	14

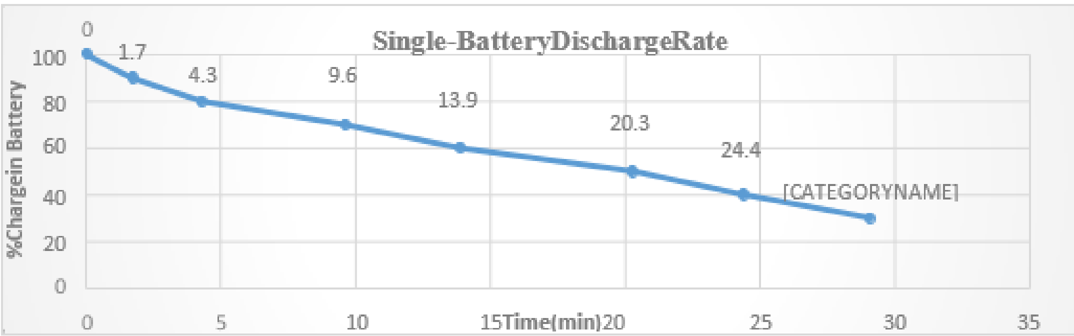

Figure4. Time(Min)Vs%OfBatteryCharge

3.2 TestRunusingTwoset ofBatteries(continuousdischarge)

- The system is powered by one set of batteries after the other set has been entirely depleted (30%) during the subsequent test run.
- The Arduino was designed such that first set of power packs would energy the system while the other remained inactive until the initial set of battery packs had entirely depleted (30%). At that point, the second set of battery packs would take over and energy the system until it had completely discharged (30%).
- It was discovered that both batteries took about 59 minutes to drain.

Table2 TrailRunusing bothset of Batteries

eqNo	Peak Volt of Source 1	Peak Volt of Source2	Nominal Volt	KM Travelled	Max Speed
1	38.1	38.2	36.2	17	19
2	38.1	38.2	36.1	15	16
3	37.8	38.1	36.1	14	15

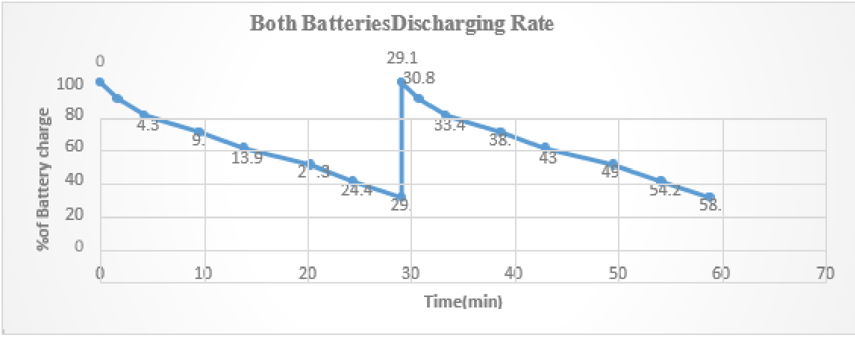

Fig5. Minutes versus Battery Charge

3.3 Do a test run with both sets of batteries. (UsingECU+ Charging)

- The system was powered by both batteries for the final test run, which was carried out as instructed.
- The Arduino was configured such that the first set of batteries powers the system until its level of charge reaches 32% and as soon as it reaches 40%. Both sets of batteries were linked to the Arduino using two sets of relays.
- The first set of batteries are charged utilising the various sources indicated earlier while the second set of batteries are used to power the system at the threshold. Until both battery sets reach their threshold, this cycle is repeated.
- It was discovered that both batteries took about 74.1 minutes to drain.

Table3Trail Run using both the set of Batteries

eqNo	Peak Volt ofSource 1	Peak Volt ofSource2	Nominal Volt	KM Travelled	MaxSpeed	Avg Speed
1	38.2	38.2	36.2	20.1	17	15
2	38.1	38.2	35.9	18.2	16	14
3	38.1	37.9	36.1	17.52	17	15

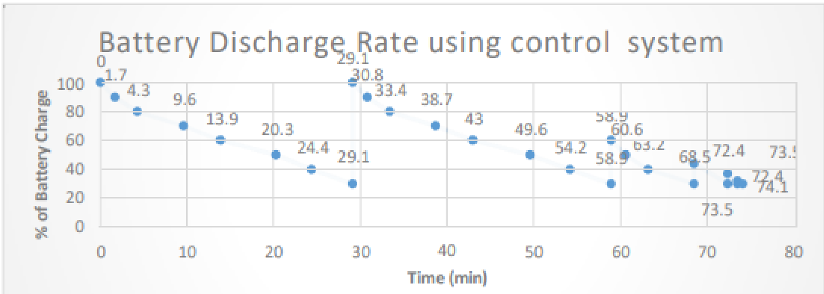

Figure6. Time (Min) vs. Battery Charge as a Percentage

From the aforementioned test runs, it is evident that the method utilised to charge both sets of batteries while a vehicle was moving had a significant influence on how long and how far it could travel in comparison to any other current sort of ways. The comparison of the results shows that our model delivered results with a 20.5% higher efficiency.

4.Conclusion

An electric car is more efficient than those that are readily accessible commercially thanks tothe controller unit. To demonstrate its effectiveness, we created a prototype and tested it under various conditions. The components were chosen with the bare minimum of requirements due to cost restraints, affordability, and availability. Higher standard components will improve the vehicle's economy and performance. The analysis of the test data demonstrates a 23% improvement in our prototype model's efficiency. By using components with better standards, this efficiency may be raised even more. It will also assist to increase efficiency to use super- or ultra-capacitors as a battery Support unit.

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