Design and Implementation of Chainless Electric Bike

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ABSTRACT- The Chainless Electric Bicycle Project aims to revolutionize traditional bicycle design by eliminating the conventional chain and integrating an innovative, efficient, and maintenance-free alternative. This project addresses the limitations and drawbacks associated with traditional chain-driven bicycles, such as wear, noise, lubrication requirements, and the need for regular adjustments .The proposed solution involves the implementation of a direct-drive electric motor integrated into the bicycle's rear hub, eliminating the need for a traditional chain and derailleur system. The objective of this project is not only simplifies the bicycle's mechanical structure but also enhances overall performance, efficiency, and user experience.

Keywords: Chainless Electric Bicycle, Innovation, Maintenance-free, Direct-drive electric motor, Bicycle design

I. INTRODUCTION

The essence of this book isn't tied in with building an electric vehicle (EV) without any preparation, rather it's tied in with changing over a utilized pickup or a little economy vehicle with an (IC) motor to a module EV[1].

A savvy approach utilizing MATLAB was utilized to foster a drive-by-wire Electronic Control Unit (ECU) for electric vehicle change (EVC). This directed the advancement of EVC programming and equipment capabilities for further developed drivability.advancement of EVC programming and equipment capabilities for further developed drivability.[2]

Bosch Designing GmbH (Ask) in the Powertrain Frameworks unit underlines cost-proficient and productive test conditions for motor control units (ECUs). Because of cost pressures and tight advancement plans for the field of motor, cross breed, and electric vehicles, options like equipment in the know (HIL) frameworks are looked to renact vehicle testing. A minimal expense arrangement, µLabCar, with a 8-digit microcontroller offers essential CAN usefulness and both manual and mechanized testing. This methodology, while diminishing expenses, upgrades testing hardware accessibility and obliges conveyed improvement groups. The paper investigates when and under what conditions such minimal expense test frameworks can be financially and subjectively serious with full HIL frameworks.[3].

A revolutionary drive-by-wire Electronic Control Unit (ECU) for electric vehicle conversion is developed through a cost-effective model-based process using MATLAB. This innovative approach utilizes vehicle data and modified SFUD for driving simulations, predicting EVC characteristics and design parameters. The simulation outputs become crucial design criteria for implementing drive- by-wire software and ECU hardware functions. These functions, spanning driving modes and criteria for implementing drive-by-wire software and ECU hardware functions. These functions, spanning driving modes and torque set points in all quadrants, are finely tuned for optimal performance. Beyond technical prowess, the EVC functions enhance vehicle drivability, catering to individual driver preferences.

In the realm of environmental awareness, Electric Vehicle (EV) technology takes the lead with its zero-emission approach. Vehicle conversion, extending beyond factory-made EVs, offers an eco-friendly alternative, aligning with individual transportation needs. Key factors such as trip distance and speed drive the design of optimal battery capacity, influencing the overall cost-effectiveness of the conversion process. The pivotal role of the battery, constituting 20-50% of the total cost, underscores its significance in shaping electric vehicle performance.

No more chains. This makes it more straightforward to get around and is better for the climate. In this project, the emphasis is on how the pack was created, its effectiveness, and what it implies for individuals who want to get around in a more eco-friendly way. The project also explores how the technology could be improved in the future.

II. COMPONENTS

Figure 1 Show the 250W Controller The 250W regulator is a basic part in our chainless electric bike unit project. This regulator fills in as the focal mind of the unit, dealing with the power stream between the 24V

lithium-particle battery and the alternator/engine. It manages the power yield, guaranteeing that the electric engine works effectively and securely. Clients can communicate with the regulator through our UI, permitting them to change power settings and control the degree of engine help while riding the bicycle. This tweaked control framework improves the bicycle's convenience and execution, giving a smooth and charming riding experience. The 250W regulator assumes a critical part in streamlining power conveyance, making it a fundamental part for our electric bike change unit, and offering an eco- accommodating and proficient option for metropolitan driving.

III. PROPOSED SYSTEM

Our project aims to make it simple for individuals to transform their ordinary bicycles into electric bicycles without the requirement for a chain. The goal is to ensure that it is affordable and environmentally friendly. To design and test the ideas, a computer program called MATLAB is employed. With MATLAB, the electric bicycle kit's functionality can be simulated without the need for physical construction. This process assists in determining the most efficient way to design and set up the kit, saving time and money. The simulation ensures that the kit will be suitable for everyone who wants to enjoy electric biking.Figure 2 shows the brakes Drum brakes are a well known decision for chainless bikes, offering productive and low-support slowing down arrangements. These encased slowing mechanisms are appropriate for all- atmospheric conditions and give reliable halting power. Their plan limits openness to soil and dampness, adding to solidness. Chainless bikes regularly highlight drum brakes on both the front and back tires, guaranteeing dependable slowing down execution. This decision lines up fully intent on making cleaner and less support serious bike plans.

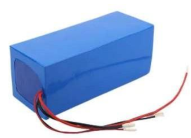
Fig 2) BRAKES

Figure 3 showns the alternator. In the chainless electric bike pack project, an alternator is repurposed as an electric motor to provide additional power to the bike. This modified alternator generates power, which is used to assist the bicycle in moving forward. The alternator is strategically positioned, connected to the 24V lithium-ion battery, and its power output is regulated by a 250W controller. Users can interact with the system through a user interface (UI) to adjust power settings, and a focus is placed on safety features to ensure secure operation.

This alternator modification enhances the bike's performance, making it easier to ride and reducing the physical effort required by the cyclist.

IV. ALTERNATOR/MOTOR

Figure 4 shows The 24V/7.5A lithium-particle battery is a vital part in our chainless electric bike pack project. This battery fills in as the essential power source, providing electrical energy to drive the electric engine and give impetus to the bike. It stores and deliveries power productively, permitting the bicycle to work in electric mode and expand the scope of movement. The battery's voltage and current details are painstakingly chosen to give the vital energy to the engine and regulator, guaranteeing a smooth and solid ride. Easy to use highlights empower simple charging and support, making it a viable and eco-accommodating decision for feasible transportation. The battery upgrades the bicycle's presentation as well as assumes a huge part in diminishing



discharges and advancing eco-cognizant metropolitan versatility.

Fig 4) 24 V / 7.5 A LITHIUM ION BATTERY

Figure 5 shows the Crankset In a chainless electric bike, the crankset stays an essential part of the bike's impetus framework. The crankset comprises of the pedals, wrench arms, and a shaft that interfaces the pedals. Its essential capability is to change over the rider's accelerating movement into rotational power, which is then communicated to the electric engine or the wheel center, contingent upon the particular plan of the chainless electric bike .Not at all like customary chain- driven bikes, where the crankset is associated with the chain, a chainless electric bike ordinarily consolidates an alternate system for power transmission. For instance, in certain plans, the crankset interfaces with a driveshaft, which moves the accelerating force straightforwardly to the wheel center, frequently utilizing gears, slant gears, or other transmission parts.The productivity and viability of the crankset in a chainless electric bike are pivotal in guaranteeing a smooth and responsive ride. These parts should be intended to work flawlessly with the picked power transmission framework, whether it's a driveshaft, direct joining of the engine into the wheel center, or other inventive arrangements.Chainless electric bikes plan to lessen support and further develop the general riding experience. The plan of the crankset in such bikes is a fundamental component in accomplishing these objectives, as it straightforwardly influences how power is moved from the rider to the wheel without the requirement for a customary chain or belt drive.

V. HARDWARE RESULT

To acquire precise results for the chainless electric bike pack, a series of physical tests and real assessments were conducted using the assembled components, including the alternator/engine, 24V lithium-ion battery, 250W regulator, connecting wires, brake switch with auto cut-off, lights, switch, and horn. These tests involved installing the kit onto a bike and closely monitoring its actual performance. Furthermore, authentic tests were performed on the lighting system and horn to evaluate their functionality and their influence on power consumption. Data, encompassing measurements of speed, range, and energy consumption, were meticulously recorded and collected during these tests, providing critical insights for subsequent data analysis. This comprehensive hardware testing facilitated an assessment of the actual, real-world performance of the electric bike kit, offering essential insights into its functionality, safety, and usability while affirming the success of the project

VI. CONCLUSION

All in all, the idea of chainless electric bikes presents a convincing answer for a significant number of the difficulties related with conventional chain-driven bicycles, offering a cleaner, more proficient, and practical method of metropolitan transportation. This imaginative innovation, be that as it may, accompanies its own arrangement of difficulties and valuable open doors.To address these difficulties and outfit the maximum capacity of chainless electric bicycles, a multi-layered approach is required. This includes partner joint effort, strategy advancement, instruction, framework enhancements, and experimental runs programs. By cooperating, legislatures, producers, and metropolitan organizers can make a steady environment for these bicycles, making them more reasonable and open to a more extensive scope of clients. Normalization and wellbeing guidelines guarantee capable use, while framework improvement makes it advantageous for riders to involve these bicycles in metropolitan conditions.Experimental runs programs act as proving grounds, giving important information and bits of knowledge to refining reconciliation systems. The continuous observing and assessment of the effect of these bicycles on metropolitan portability are imperative for consistent improvement and transformation.The consequence of these endeavors is a positive shift toward cleaner, more supportable, and productive metropolitan transportation. Chainless electric bicycles offer not just an eco-accommodating and low-support choice yet in addition a valuable chance to lessen discharges and further develop air quality. They upgrade security through normalized preparing and guidelines, and the financial advantages of neighborhood assembling and creation make occupations and advance monetary turn of events. Notwithstanding, this excursion is dynamic and developing. Challenges, like the requirement for continuous approach changes, the improvement of significantly more reasonable models, and proceeded with foundation extension, should be met. The fate of chainless electric bicycles guarantees a more reasonable and easy to use metropolitan transportation scene, adding to cleaner air, diminished emanations, and a more brilliant, more eco-cognizant future.

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