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SMART E-BIKE WITH SAFETY SYSTEM

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Abstract

The present work is carried out to design and implementation of a smart e-bike system with the focus on safety features. This system includes three main units named Controller unit, Bike Safety Unit and Helmet Safety Unit. The controller unit incorporates a customized and compactly designed 24V speed controller to control the 24V, 250RPM BLDC Hub motor of the e-bike. This unit will be essentials for maintaining the bike's speed and ensures that the motor functions optimally. The bike's safety unit is responsible for ensuring the safety of the bike. This unit includes Neo 6M GPS module to monitor and track the vehicle. This enables to monitor the location of the vehicle in case of theft, or other emergencies. Additionally, this unit includes Overload Detection System using a HX711 sensor and a load cell with the Node MCU. Overloading an e-bike can cause various problems including reduced performances and range, over-heating, braking issues and might also lead to accidents. This overload detection system ensures the safe handling of the vehicle, by alerting the rider, to ensure the safe handling of the vehicle. The helmet safety system is responsible for ensuring the safety of the rider. This unit includes an IR sensor and Node MCU to detect, whether the rider is wearing a helmet or not. If the rider is not wearing a helmet, an indication will be displayed, remaining the rider to wear a helmet, for the safety of the rider. Additionally, this unit includes an alcohol detection system using MQ3 sensor and Node MCU. This feature is essentials for ensuring that the rider is not under the influence of alcohol, while riding the e-bike. This could prevent the rider from road accident because ofthe drunk and drive. Finally, the accident detection unit in this system includes MPU6050 with the Node MCU. This system detection detects the accident based on the sudden change in the velocity, acceleration and the orientation of the helmet, and notifies the emergency contact with the bike's location using Neo 6M GPS module. This feature is crucial for ensuring that the rider can receive immediate help in case of accident

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