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E-Bike Charging Dock with RFID Access Control

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Abstract: *Electric vehicles (EVs) are surging in popularity globally, offering a greener and more energy-efficient alternative to traditional cars. The proliferation of electric bicycles (e-bikes) as a sustainable mode of transportation necessitates the development of secure and efficient charging infrastructures. This project introduces an E-Bike Charging Dock integrated with RFID (Radio Frequency Identification) Access Control, aiming to provide authenticated charging services to registered users [1]. The system employs an RFID reader to scan user-specific RFID tags, granting access to the charging facility upon successful verification [1].*

A microcontroller, such as the Arduino UNO, coordinates the authentication process, controls the charging mechanism via a relay module, and communicates status updates through an LCD display. Additionally, the GSM module monitors the battery's charge level, sending an SMS notification to the user when the charge falls below 15%, prompting timely retrieval of the vehicle [2]. This setup ensures that only authorized users can access the charging dock, thereby enhancing security and preventing unauthorized usage. The implementation of such a system is particularly beneficial in urban settings, campuses, and public transportation hubs, promoting organized and secure e-bike charging solutions [3].

Keywords: RFID, Microcontroller, GSM

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