IoT-Based E-Vehicle Wireless Charging Station

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Abstract: *The increasing adoption of Electric Vehicles (EVs) has created a strong demand for advanced, safe, and user-friendly charging solutions. Conventional plug-in charging methods require physical connectors, which may result in inconvenience, mechanical wear, electrical hazards, and maintenance issues. To overcome these limitations, this project proposes a Smart IoT-Based EV Wireless Charging Station that enables contactless power transfer using wireless charging technology based on electromagnetic induction.*

The proposed system consists of a wireless power transmitter embedded in the charging station and a receiver coil mounted on the EV. When the vehicle is properly aligned over the charging pad, electrical energy is transferred wirelessly to charge the EV battery. An ESP32 microcontroller is used for system control, monitoring, and communication. Charging parameters such as voltage, current, temperature, and charging status are continuously monitored and displayed locally on an LCD screen.

The system is integrated with an IoT platform that allows users and administrators to remotely monitor charging status in real time through a web or mobile dashboard. Alerts are generated when abnormal conditions such as overheating, misalignment, or overcurrent are detected. The proposed system is cost-effective, safe, efficient, and suitable for smart city and future EV infrastructure applications.

Keywords: EV Wireless Charging, Inductive Power Transfer, IoT, Smart Charging Station, Contactless Charging, ESP32