Wireless IoT-Enabled EV Charging System: Solving EV Charging Inconvenience through Inductive Power Transfer and Smart Monitoring

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Abstract*: The rapid transformation of the automobile industry from internal combustion engines to electric vehicles (EVs) has created an urgent need for efficient, convenient, and accessible charging infrastructure. Traditional plug-in charging systems present several challenges including cable handling, safety risks from exposed connectors, mechanical wear and tear, and limited accessibility. This paper presents an IoT-Based Wireless Vehicle Charging System developed to eliminate these limitations by enabling contactless power transfer through inductive coupling. The system utilizes wireless power transmission (WPT) technology where electrical energy is transferred from a transmitter coil embedded in a charging pad to a receiver coil installed in the vehicle. Integration of Internet of Things (IoT) capabilities using NodeMCU ESP8266 microcontroller enables real-time monitoring of charging parameters including voltage, current, battery status, and temperature through the Blynk IoT platform. The system automatically detects vehicle presence using infrared sensors and initiates charging only when a compatible vehicle is correctly positioned. Experimental results demonstrate successful wireless power transfer with efficiency up to 90% at optimal alignment, along with reliable IoT communication for remote monitoring. The proposed system provides decision support for EV users, charging station operators, and urban planners, demonstrating the practical application of combining wireless power transfer and artificial intelligence in developing sustainable transportation infrastructure.*

Keywords: Wireless Power Transfer, Electric Vehicle Charging, Inductive Coupling, Internet of Things, NodeMCU ESP8266, Smart Monitoring, Blynk IoT Platform, Contactless Charging

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