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EV SMART CHARGING STATION

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Abstract : As electric vehicles become more popular, reliable charging stations are necessary. Integrating IoT technology into these stations improves capableness. IoT allows stations to communicate with each other, adjust charging rates based on real-time data, and identify high-demand areas. This optimizes energy use and planning maintenance. It also offers customized services and new business models for Electric Vehicle charging. Overall, Internet Of Things integration\ increases the dependability and efficiency of Electric Vehicle charging infrastructure, holding up the shift to maintainable transportation.

IndexTerms **- Wireless charging Pads, Infrared(IR)Sensors, Microcontroller(ESP32), Blynk IoT Platform.**

1.INTRODUCTION

Our wireless Electric Vehicle stations, coupled with IoT integration, epitomize the cutting edge of wireless technology. This innovative approach aims to change charging systems by integrating technology that ensures simplicity and reliability. At the heart of this initiative lies a wireless charging pad, eliminating the need for cumbersome cables and enabling contactless charging. These pads are integrated with IR sensors that detect vehicles on the charging pad. An ESP32-powered microcontroller serves as the controller of the charging station, overseeing input from the infrared sensors and managing the operation of the charging pad. Continues communication between the ESP32 and the Blynk IoT platform empowers users with remote monitoring and control capabilities. Beyond individual users, the project holds diverse potential applications, benefiting public toll booths in urban areas, private toll booths in residential neighbor's, and commercial establishments such as hotels or shops

Fig 1: IR Sensor, Wireless Coil, ESP32 Microcontroller.

2.LITERATURE SURVEY

2.1 : Charging Station of Electric Vehicle Based on IoT: A Review

Currently, humans are grappling with the dual challenges of fuel scarcity and environmental pollution, necessitating a shift towards electric vehicles to mitigate both issues. However, the adoption of EVs remains hindered by the scarcity of charging infrastructure and their high initial costs. This paper examines significant research on IoT-enabled charging stations and the charging technologies employed therein, conducting an analysis between them. It also explores the energy sources powering these stations, which may vary from renewable to non-renewable. The integration of IoT technology streamlines the process for users, eliminating the search for charging stations manually. Through mobile app, users can get the locate charging stations, facilitating their placement in public areas and parking lots, thereby promoting the EV transition.

2.2 : Smart Electric Vehicle Charging System

This study introduces a system design aimed at facilitating procedures of charging EVs through intelligent processes. Recognising the limitations of the absence of smart meters and the power distribution network, the charging of EV needs to be balanced. This involves leveraging past experiences, weather data got by data mining, and simulation techniques. Additionally, a smart phone app has been designed to assist EV drivers in navigating these processes and facilitating information exchange. The proposed system incorporates Vehicle-to-Grid (V2G) technology to establish connections between Electric Vehicles and eco friendly sources with Smart Grids (SG). Furthermore, it explores the emerging concept of Electrical Markets, characterised by the deregulation of electricity production and consumption, with the aim to optimise the commercialization of electrical energy.

2.3 : Smart EV Charging: A Global Review of Promising Practices

The change to electric transportation across Europe marks the early stages of a transformative shift that holds the promise of significantly reducing emissions in both the transportation and energy sectors, with broader societal benefits. Research supporting this study indicates that the optimal integration of EVs into the power grid can yield the greatest value by aligning charging with the needs of system, while ensuring affordability and meeting consumers' mobility requirements. While much research focuses on modelling the costs of integration in various scenarios, there's a gap in examining existing successful practices driven by current policy tools. This study undertakes a qualitative review of policies for EV grid integration in both EU and U.S. markets.

2.4 : Joint Planning of Smart EV Charging Stations and DGs in Eco-Friendly Remote Hybrid Microgrids

A highly efficient planning algorithm designed for placement of smart electric vehicle charging stations in remote communities. The algorithm addresses the challenge of balancing the supply and demand of regular loads and EV charging by jointly allocating and sizing a set of distributed generators (DGs) alongside the EV charging stations. It aims to minimise both deployment and operation costs, and also reduction of emissions of greenhouse gas, while adhering to micro-grid technical constraints. This is accomplished through an iterative process involving a multi-objective mixed integer nonlinear program. In the outer sub-problem, a non-dominated sorting genetic algorithm is employed to determine the optimal locations and sizes of the DG units and charging stations. Subsequently, an inner sub-problem ensures the smart, reliable, and eco-friendly operation of the micro-grid by solving a nonlinear scheduling problem. The proposed algorithm yields a Pareto frontier that illustrates the tradeoff between the conflicting planning objectives. Simulation studies are conducted to evaluate the performance of the proposed planning algorithm and derive a compromise planning solution.

3. PROPOSED SYSTEM :

3.2. Problem Statement.

The focal point of the project is to tackle the demand for EV charging solutions that are efficient and user-friendly. Conventional charging stations typically come with unwieldy cables and offer limited user control. Our objective is to confront these issues by developing a Wireless EV Charging Station equipped with intelligent features. We aspire to eradicate the inconvenience associated with cables, elevate user convenience, and deliver a charging experience that is seamless.

3.2. High Level Design

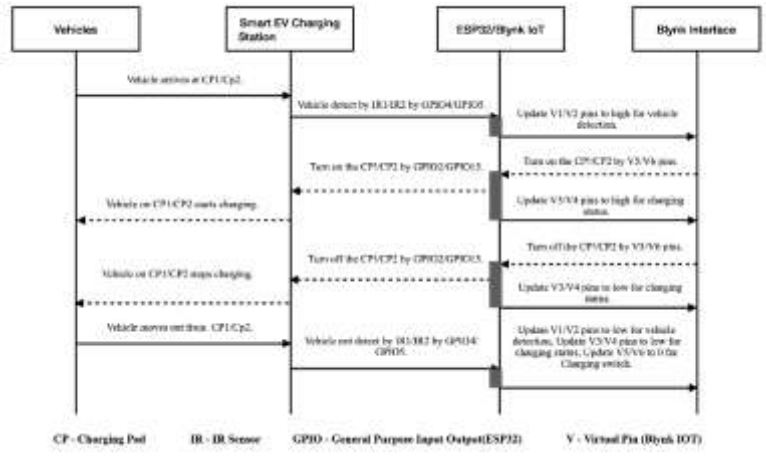

Fig 2: High Level Design.

4. RESULTS AND DISCUSSION :

The implementation of our wireless EV charging stations, coupled with IoT integration, marks a significant advancement in the field of electric vehicle technology. The integration of Lot represents the latest evolution in wireless charging, promising simplicity, reliability, and contactless convenience for users. The key features of our charging stations include wireless charging pads equipped

with IR sensors for intelligent vehicle detection and a microcontroller powered by ESP32, acting as the central nervous system for seamless operation. The integration with the Blynk IoT platform enables remote monitoring and control for users via the Blynk app. Users can conveniently check payment status, receive notifications, and manage payments from anywhere, enhancing the overall user experience.

5.CONCLUSION :

In conclusion, our wireless electric vehicle charging station project embodies a significant leap forward in the realm of sustainable transportation solutions. By integrating cutting-edge technology such as IoT and wireless charging pads with intelligent features like remote monitoring capabilities sensors and we have redefined the EV charging experience. The culmination of our efforts not only addresses the current demand for transportation solutions but also lays the groundwork for a more sustainable future. Our charging stations offer a range of benefits, including convenience, reliability, and environmental friendliness, making them an attractive option for individual users and various stakeholders such as public toll booths, residential areas, and commercial establishments. Moving forward, we remain committed to further enhancing the accessibility and usability of electric vehicles through continuous innovation and user-centric design. By providing advanced features like remote charging and centralized control systems, we aim to streamline the EV charging process and accelerate the transition to cleaner transportation alternatives. Ultimately, our project signifies a step towards a more sustainable and eco-friendly transportation ecosystem. With a focus on convenience, support, we are dedicated to empowering users and contributing to a greener future for transportation worldwide.

6.ACKNOWLEDGMENT

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