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WIRELESS CHARGING WITH ENERGY MONITORING IN E-VEHICLES THROUGH IOT WITH AUTO PARKING ASSITANCE

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ABSTRACT

The primary goals of the suggested system are wireless charging, battery level monitoring, and automatic parking assistance. There are two sections: one for parking and one for vehicles. There are 2 spots available in the parking section. An IR proximity sensor and a Wireless Power Transmitter coil are present in every slot. The coils receive an AC supply. When a car is in the slot, IR sensors detect it and send the LED driver the appropriate signal. The front gate LED panel's LEDs are driven by the driver. The vehicle owner or driver can use this panel to check whether parking spaces are available. As a result, the owner or driver of the vehicle is given assistance with parking. A Node MCU is used in the vehicle section to manage the system. The transmitted power from the transmitter coil is received by a wireless power receiver coil. The battery of the electric vehicle is charged by a voltage regulator, which controls the received voltage. The voltage from the battery is sensed by a voltage sensing circuit, which then sends the data as an analogue input to the Node MCU. IOT is used to monitor the vehicle's energy using the ESP Wi-Fi module. The battery information is sent to the cloud and is accessible from a computer or mobile device.

Keywords: IOT; LED; Wireless power

I. INTRODUCTION

Electrical vehicles are currently a hot topic and an essential component of this intelligent world. Electric vehicles' limited cruising range is a drawback. Thus, it needs to be recharged frequently. In addition to electric vehicles, the population is growing exponentially, which is a problem because it leads to more traffic. We must switch to a different energy source because we have a finite amount of fuel on Earth. Electricity is the best option for this, and electric vehicles are an example of it. The most popular charging method for electric vehicles today is plug-in charging, which requires connecting a plug to the vehicle in order to begin charging. There is no need to turn the plug on and off when using wireless charging. As a result, there will be less interaction between people, which lowers the risk of electric shock from wired connections. Plug-in electric vehicles (EVs) have a short range and require large, heavy batteries. The main benefits of wireless charging include longer travel distances, smaller batteries, and a reduction in waiting times for charging a vehicle. These benefits will boost EV adoption rates as well as the economic and environmental advantages.

It is efficient to combine both the charging and parking systems that are based on IoT technology, which makes the system user-friendly. Electrical vehicles require a charging station similar to how current fuel cars require a petrol pump, and obviously charging takes some time so it is better to charge the car when it is parked. Information can be simultaneously uploaded to smart phones and the cloud. One of the problems people encounter is car safety when parking. The internet of things (IoT), which can offer greater exibility, modified sensing, and wider connectivity, is the best platform for tracking the status of WPT systems. Therefore, synchronised parking can be achieved by using IoT to monitor vehicle parking as well as charging of vehicles when they are parked at the same time. The ability to store data on the cloud, which we can access from any location and at any time, is another significant benefit of using IoT. This feature makes life much simpler. To give you an idea, we need a station where the car can be charged in order to use it. Therefore, we can combine the idea of parking with an electric station so that the car can be parked and charged at the same time. Thus, this system has a lot of benefits.

II. LITERATURE SURVEY

The amount of vehicles on the road exceeds the capacity of the transportation system and parking facilities, causing significant ecological and economic damage, such as wasted time looking for parking spaces. Thus, strategies that can make the best use of parking and charging infrastructures are required to support electric vehicles and their charging requirements [1]. For parking lots, a centralised system for scheduling electrical vehicle (EV) recharges is created. This system is based on a realistic pattern of vehicle parking that emphasises individual parking spaces. Based on mobility, it takes into account two different types of EV. Regular EVs and irregular EVs are the two types. Electrical vehicles need enough time to charge. This paper proposes a PLRS system that tracks a vehicle's arrival and departure times, EV battery level, and distance travelled. The system then creates its own EV charging schedule. This system is functional both during the day and at night. This system helps to raise parking lot revenues and the number of electrical vehicles that are recharged. The proposed system uses a two-layered PLRS system to recharge EVs based on their parking habits [2]. A cloud-integrated smart parking system with an IoT foundation is presented. This suggested smart parking system is an on-site IoT module development. One of the most useful concepts in a smart city is IoT. This Internet of Things (IoT) model is used to track and provide data about parking space availability [3]. This Internet of Things-based parking platform can connect and analyse current events. This system performs intelligent parking and automatically generates data. Ultrasonic sensors are used to find available space. The sensor is attached to an Arduino module with a Wi-Fi network interface [4]. This study introduces and simulates an intelligent WPT system for charging EVs. Misalignment limits the charging process; therefore, creative thinking is needed to increase the flexibility of EV wireless charging. This method automatically aligns the transmitting and receiving coils using the finger print method. The suggested system can minimise human error, reduce energy consumption, and save necessary time. It can also charge a car based on real-time system information [5]. This system tracks and evaluates parking space availability. This system is known as the ideal platform for IoT because all of the data generated by it is stored on the cloud. Because of the cloud's flexibility, it can add or remove data from an IoT system in real time. Microcontroller, IR sensor, mobile application, buzzer, LED, and LCD display make up the suggested system [6]. This essay investigates a charging issue that involves complete time use beneath a parking garage. When an EV approaches the garage entrance, it collects data such as the arrival time, recommended departure time, the current and required battery SOCs, and the charging management system of the garage (CMS). This CMS is capable of making a decision regarding whether to accept or reject the customers' charging requirements [7].

III. METHODOLOGY

Customers accept electrical vehicles because they are simple to use. It has a lot of requirements, one of which is a comfortable charging and parking area. The suggested model combines these two systems to provide an effective solution. The design of a system that can handle free parking spaces and charging schedules is discussed in this paper. The parking systems in place today are not capable of handling all kinds of vehicles. There must be parking and a charging station for electric vehicles. The suggested model offers the ability to reserve a charging station via smartphone. The system then controls all associated activities based on data such as the arrival time of the vehicle, battery life, etc. Customer manager, vehicle manager, map manager, and lot manager are the key elements. Java Platform and Enterprise Edition is the programme in use (Java EE). Security concept is another thing to consider. User ID, which is also used for the billing process, is necessary for this. Figure 1 and Figure 2 shows the Parking and vehicle section.

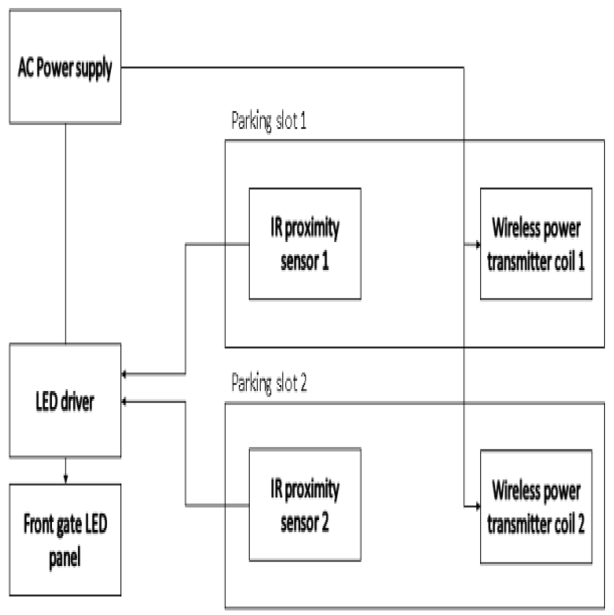

Fig 1 parking section

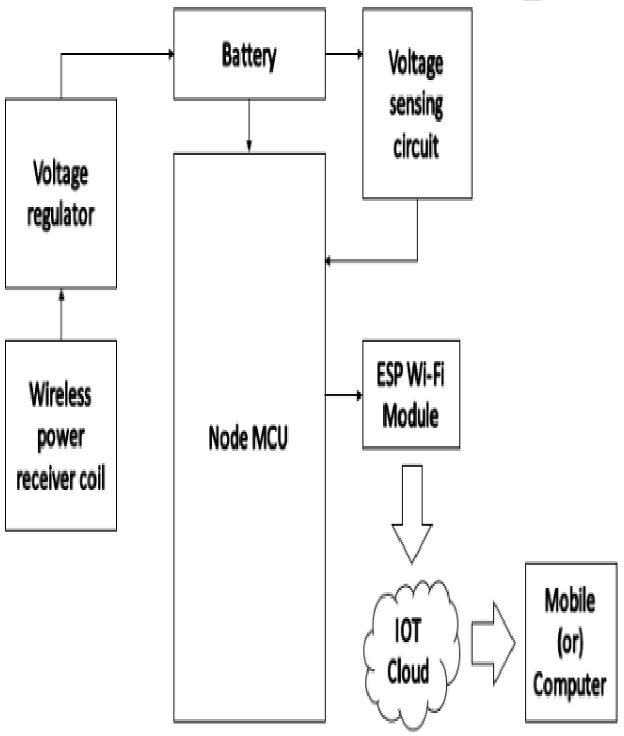

Fig 2 vehicle section

3.1. Microcontroller

A microcontroller is a tiny computer on a single VLSI integrated circuit (IC) chip, also known as an MCU (microcontroller unit). One or more CPUs (processor cores), memory, and programmable input/output peripherals are all included in a microcontroller. Along with a small amount of RAM, on-chip programme memory frequently also includes ferroelectric RAM, NOR flash, or OTP ROM. In contrast to the microprocessors used in personal computers or other general-purpose applications made up of various discrete chips, microcontrollers are intended for embedded applications. A system on a chip is similar to a microcontroller in modern parlance, but it is less complex (SoC). However, a SoC typically integrates cutting-edge peripherals like a graphics processing unit (GPU) and a Wi-Fi interface controller as its internal microcontroller unit circuits. An SoC may connect external microcontroller chips as motherboard components.

Automotive engine control systems, implantable medical devices, remote controls, office equipment, appliances, power tools, toys, and other embedded systems are just a few examples of the automatically controlled goods and gadgets that use microcontrollers. Microcontrollers make it affordable to digitally control even more devices and processes because they are smaller and less expensive than designs that use separate microprocessors, memories, and input/output devices. In order to control non-digital electronic systems, mixed signal microcontrollers are frequently used. Microcontrollers are a popular and affordable method of data collection, sensing, and controlling the physical world as edge devices in the context of the internet of things.

3.2. Power supply

An electronic circuit's power source is an essential part. A voltage regulator is required to keep the +5 V supply constant for this circuit. In this project, an IC7805 voltage regulator was utilised. A voltage regulator generates a fixed output voltage of a predetermined magnitude that remains constant regardless of changes to its input voltage or load conditions. There are two types of voltage regulators: switching and linear. Here, we use a linear regulator that uses a strong differential amplifier to control an active pass device (shunt or series). By comparing the output voltage to a passive reference voltage with a precise reference voltage, it modifies the pass device to maintain the output voltage constant.

3.3. IOT

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. A thing in the internet of things can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tyre pressure is low or any other natural or man-made object that can be assigned an Internet Protocol (IP) address and is able to transfer data over a network. Increasingly, organisations in a variety of industries are using IoT to operate more efficiently, better understand customers to deliver enhanced customer service, improve decision-making and increase the value of the business.

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analysed or analysed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devices do most of the work without human intervention, although people can interact with the devices — for instance, to set them up, give them instructions or access the data.

IV. RESULTS

New charging infrastructure must be built as the number of electrical vehicles (EVs) rises. Wireless charging is more effective than plugs and wire. This essay explores the fundamentals of resonant inductive power transfer, a technique frequently employed in wireless charging. It is necessary to address issues associated to these EVs as their number grows. Battery swapping, conductive charging, and wireless charging transfer are the three main types of charging techniques. Today's business for electrical vehicles is expanding quickly throughout the world, bringing a variety of charging facilities to the market. However, there are still some issues with wireless power transfer because there aren't any comprehensive and detailed standards.

The proposed system has a smart parking system in place, which entails the deployment of slot models on-site for the purpose of tracking available spaces and scheduling parking. Smart parking can boost the economy by lowering city pollution and fuel use. One example of an Internet of Things application is smart parking. It also offers the ability to reserve timeslots. After entering the slot, the time period will begin; when the user exits, he must pay the fee for the time his automobile was in the slot. According to this paper, EVs will cause electricity to play a significant role in transportation. While wireless charging plays an important role in facilitating EV charging because it offers an effective.

Using AC/DC and DC/AC converters, the grid's AC mains supply is transformed into high frequency AC to facilitate power transfer from the transmission coil to the reception coil. In order to increase system efficiency, series and parallel combination-based compensation networks should be used on both the transmitting and receiving sides. Through a compensation network, high frequency AC is delivered to the transmitting coil, which is attached on the ground or concrete. Underneath the car, a receiving coil transforms magnetic flux fields that are fluctuating into high frequency AC, which is subsequently transformed into a steady DC supply. The onboard batteries make use of this DC supply. This system also comprises a battery management system (BMS), power control, and communication in order to prevent health and safety hazards and guarantee steady operation.

V. CONCLUSION

This essay compares different smart parking, charging, and combined charging-parking systems, which can assist in resolving a number of related problems. Additionally, a table of comparisons between various research papers is included. There are several different kinds of parking and charging methods and techniques that are discussed. The market is filled with a variety of sensors, controllers, software, and cloud servers that can be used to develop an effective IoT platform while also making systems automatic, dependable, and user-friendly.

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