IOT BASED HYBRID SELF FUEL DISPENSE SYSTEM FOR EV AND PETROL VEHICLE

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ABSTRACT

In this project, we present a working model of an IOT-based EV Charging Slot Booking System. The increasing adoption of electric vehicles (EVs) is straining existing charging infrastructure, leading to challenges in finding available slots. This project presents a novel EV charging slot booking block utilizing the capabilities of the Internet of Things (IoT) and a Raspberry Pi Pico microcontroller. The system features real-time slot availability monitoring, secure booking and reservation management, user authentication, and integrated charging control. Implemented using IOT, Arduino microcontroller, GSM, keypad, RPS, RTC, LCD, buzzer, Arduino IDE tool, and embedded c language, the system successfully demonstrates the booking of slot using IOT application, RTC gets activated and sends an activation code to the registered user using GSM module, after entering the code and required amount of charging the microcontroller activates the charging station, with this project the user will benefits with the reduced waiting time for charging slots. This approach has the potential to significantly improve charging efficiency, reduce waiting times, and enhance user convenience, contributing to the advancement of smart grid management and sustainable transportation.

Keywords: Self Fuel Dispense, EV, Petrol.

1. INTRODUCTION

A charging station, also known as an electric powered automobile charging station, an electric powered recharging factor, a charging factor, a price point, a digital charging station (ECS), or an electric powered automobile supply equipment (EVSE), is a device that supplies electric power to charge plug-in electric vehicles such as cars,neighborhood electric vehicles, vans, buses, and other types of vehicles. On-board converters in certain electric vehicles hook into a conventional electric socket or a higher voltage outlet.Others rely on their own charging stations.Others rely on their own charging stationsConnectors that meet a variety of specifications are available at charging stations. Chargers are provided with a handful of adaptors, including blended Charging Machine (CCS), and AC fast charging, for typical direct current fast charging. Avenueaspect charging stations, as well as retail shopping centers, government offices, and parking lots, are common places to find public charging stations. Multiple charging era standards have been established to allow interoperability among carriers. Nomenclature, energy, and connectors all have standards. Tesla has evolved proprietary technology in these areas, which is significant. AC Type 1 / Type 2 plugs are utilized even when charging.A vehicle that transports the charger to the car is required for cell charging. Inductive charging mats that rate without a connected connection are used in Wi-Fi charging and can be implanted in parking stalls or even on motorways. A

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battery switching station allows cars to replace a drained battery for a charged one, removing the cost of the c programme language period. A battery switching station is a location where an electric car may drive over and an automatic (or perhaps even manual) system can open up the bottom of the vehicle, remove the exhausted battery, and replace it with a fully charged battery. To implement this era, the car must be made so that it can be stretched out usinga chamber on the bottom and by unexpectedly starting up the bolts beneath the car. The following advantages are claimed: battery swapping takes less than five minutes, refueling takes less than five minutes, the driver can stay in the car while the battery is switched, and spare batteries could participate in vehicle to grid electricity transfers. Car charging cables, like cellphone charging cords, usually have two connectors: one that goes into the carsocket and the other that plugs into the fee element itself. The type of connector you'll require depends on the vehicle and the rate point's strength score ("speed").A type 2 socket is found in the majority of the slow/fast rate factors. As an alternative, they will occasionally have a cable connected. A cable with a CHAdeMO and a CCS connector is commonly attached to all DC rapid charging stationsThe vehicle will send the driver to the slot booking webpage, which will list all available slots. As the world's supply of fossil fuels runs out, every country is turning to green energy sources that are sustainable, acceptable, reliable, and efficient. The technology that supports Electric Vehicles (EVs) is rapidly improving as the cost of EV components falls. Electric cars (EVs) are becoming more popular as traditional vehicles have a negative impact on the environment. The State of Charge (SoC) of the EVs battery is constantly presented in the suggested work, as well as the nearest charging stations on the screen. The screen in the construct an efficient slot booking system from a list of proposed charging stations closest to the EV driver, as the charging procedure can be time consuming and the demand for more stations would be high. The proposed booking system paradigm is intended to be both cost-effective and efficient.Now-a-days Electrical vehicle is a trending topic and it is also an important part of this smart world. Drawback of electric vehicles is cruising range is typically limited. So, it requires frequent recharging. Not only for electric vehicle but Population is increasing exponentially and the problem is due to this is, increasing traffic volume. All we know that we have limited stock of the fuel on our earth so it is need of time that we must switch to another way and electricity is the best option for it and electric vehicle is example of it. For charging the electric vehicles, Now-a-days mostly used charging method is plug in charging, this method consists of a plug which needs to be connected to the vehicle for start charging. In wireless charging there is no need to ON-OFF the plug. Hence there will be less human interaction; it reduces risk of electric shock due to wired connections. Plug-in EVs have limited travel range and need large and heavy batteries. The wireless charging technology has main advantages is, it increases the traveling range, reduces the battery size and waiting time for charging the vehicle will mitigate. Such advantages will increase the economic and environmental benefits as well as the adoption rates of EVs [16].Electrical vehicles require a charging station similar to current fuel car require a petrol pump and obviously chargingtakes some time so it is better to charge the car when it is parked, therefore it is efficient to combine both the charging and parking system which is based on the IoT technology which makes the system user friendly. One can upload information on cloud and simultaneously on smart phones. Car safety while parking is one of the issues faced by people. The internet of things (IoT) is best platform for monitoring the status of WPT system which is able to provide the wider connectivity, modified sensing, information processing and greater exibility [17]. So, With the help of IoT, it is easy to monitor vehicle parking as well as charging of vehicles when they are parked at the same time that means it helps in synchronized parking. Another important factor of using IoT is we can store data on cloud that we can access anytime from anywhere, which makes life easy and simple. [15] Give an idea about, for charging the car we will need some station

where the car can be charged, so we can merge the parking concept as an electric station where the car can be parked as well as it will get charged. Thus, there are many advantages of this system. [1] also mentioned that, the current transportation infrastructure and parking facilities are unable to cope with the inux of vehicles on the road, leading to high ecological and economic damage caused due to time spend in searching for parking spots, for instance. Thus, approaches to support electric vehicles and their charging demands are needed which should be able to use parking and charging infrastructures as efficiently as possible.

2. LITERATURE REVIEW

To understand the establishment of proposed work it is necessary to examine the existing literature and to determine how the parameters are monitored. In addition, it is important to validate how efficiency of other integrated algorithms is improved.

2.1 A Review on IoT based Electric Vehicle Charging and Parking System, International Journal of Engineering Research & Technology (IJERT) Vol. 9 Issue 08 (S. Phadtare , S.S. Wadkar , S.S. Thorat , A.S. Ghorpade, Mr.A.B. Jadav)

Electrical vehicles require a charging station similar to current fuel car require a petrol pump and obviously charging takes some time so it is better to charge the car when it is parked, therefore it is efficient to combine both the charging and parking system which is based on the IoT technology which makes the system user friendly [1]. One can upload information on cloud and simultaneously on smart phones. Car safety while parking is one of the issues faced by people. The internet of things (IoT) is best platform for monitoring the status of WPT system which is able to provide the wider connectivity, modified sensing, information processing and greater flexibility. [1] talksabout "Wireless charging system" and "Inductive Power Transfer". Under wireless charging system, this paper covers various aspects of wireless charging of electric vehicles, fundamental operation of wireless charging system including inductive wireless charging technique. It compares the inductive power transfer for different charging systems. Overall, this paper compares various smart parking, charging and combined chargingparking system, which can help to solve various issues related with it. Also, it contains a table of comparison of various research papers. Various types of methods and techniques used for parking and charging are discussed. Various sensors, controllers, software and cloud servers are available at market which will help to make system automatic, reliable and user friendly along with development of efficient IoT platform [1].

2.2 IoT based Smart Car Parking with Wireless Charging Feature for Electric Car, International Research Journal of Engineering and Technology (IRJET) Volume:07 Issue:08 (Ms. Lekshmi M, Mr. Mayur P, Mr. Manjunatha B , Ms. Kavya U, Mr. Anil Kumar J H)

The problem of finding a parking space in metro cities is a herculean task in the fast moving world. The need of the hour is an IoT backed solution wherein the availability is based on the reservation management facility[2]. This paper talks of employing an app based IoT smart parking system. In order to prevent long waits at the EV charging station, the parking system is equipped with wireless charging scheme for electric vehicles. This serves dual advantage of parking vehicles as well as charging of electric vehicles[2]. The Wireless charger designed is a Resonant Inductive Power Transfer System employed due to its consumer suitability and its effect onbattery performance. The coil coupling and power electronics infrastructure decide the efficiency of the charging system and hence facilitates the charging of Electric Vehicles at the same speed as that of standard AC plug-in chargers.

2.3 IoT Based Electric Vehicle Application Using Boosting Algorithm for Smart Cities (Shabana Urooj, Fadwa Alrowais, Yuvaraja Teekaraman, Hariprasath Manoharan, Ramya Kuppusamy)

To overcome all issues in existing vehicles and for protecting the environment, electric vehicles should be introduced by integrating an intellectual device called sensor all over the body of electric vehicle with less cost [3]. Therefore, this paper confers the need and importance of introducing electric vehicles with IoT based technology which monitors the battery life of electric vehicles. An online monitoring system which is called Things Speak has been used for monitoring all the vehicles in a continuous manner (day-by-day). These online results will then be visualized in MATLAB after an effective boosting algorithm is integrated with objective function [3]. It was observed [3] that cost of implementation is lesser and capacity of electric vehicle is increased to about 74.3% after continuous monitoring with sensors.

2.4 IoT Enabled Smart Charging Stations for Electrical Vehicles,Journal of Telecommunication Study Volume: 4 Issue: 2 (Esha Sharma, Bharath S, Adarsh Devaramani, Deepti Sr, Saravana Kumar)

[4] This paper makes a smart application to know the different tariff rates of the grid by connecting to the grid. The tariff rates include both, the power intake rate and also the outgoing power rate. When the user comes tothe grid, the application also displays the battery SOC. The main agenda of this paper[4] is to optimize low carbon technologies through one connected platform using rule based algorithms, helping to decarbonize both the production and consumption of energy. The status of the battery is computed by the Arduino uno (microcontroller), then the computed data is stored in cloud, where the ESP8266 acts as intermediate device between the microcontroller and the network. [4] The stored data is accessed by the cloud using certain applications like Ad fruit, MQTT dash board etc. Hence the user will get to know about their car's battery status and also they can provide excess amount of charge to any other applications, by knowing the status of the battery.

2.5 An article on "PARKPLUS Electric Vehicle Charging for Automated Parking" PARKPLUS Electric Vehicle Charging[5] is an integrated solution to provide project-specific EV charging capacity to PARKPLUS Automated and Semi-Automated Parking Systems. The PPEVC solution is designed for pallet-based parking systems and parking platforms that include power for manual connection when parking. In this, charging power is connected upon manual connection, or when the parking platform arrives at designated parking.

3. PROPOSED SYSTEM

In this project, we present a working model of an IOT-based EV Charging Slot Booking System. The increasing adoption of electric vehicles (EVs) is straining existing charging infrastructure, leading to challenges in finding available slots. This project presents a novel EV charging slot booking block utilizing the capabilities of the Internet of Things (IoT) and a Raspberry Pi Pico microcontroller. The system features real-time slot availability monitoring, secure booking and reservation management, user authentication, and integrated charging control.

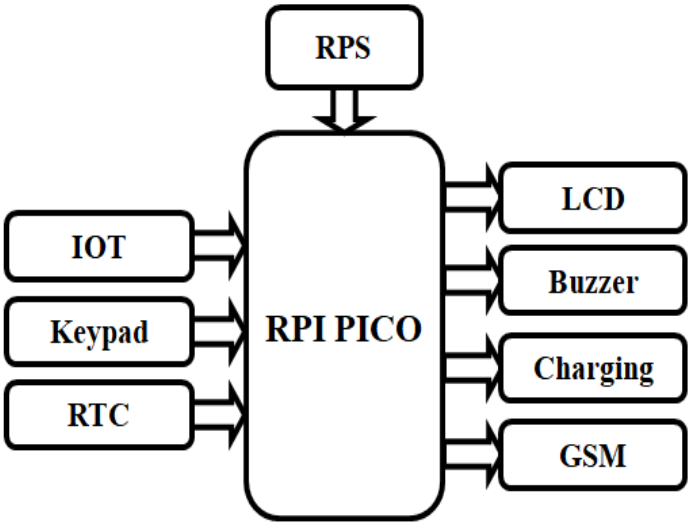

Figure.1: Block Diagram

Implemented using IOT, Arduino microcontroller, GSM, keypad, RPS, RTC, LCD, buzzer, Arduino IDE tool, and embedded c language, the system successfully demonstrates the booking of slot using IOT application, RTC gets activated and sends an activation code to the registered user using GSM module, after entering the code and required amount of charging the microcontroller activates the charging station, with this project the user will benefits with the reduced waiting time for charging slots. This approach has the potential to significantly improve charging efficiency, reduce waiting times, and enhance user convenience, contributing to the advancement of smart grid management and sustainable transportation.

In this, we have RPS, GSM module, Raspberry Pi Pico microcontroller, keypad, RTC module, LCD, buzzer and IOT module. Here the user selects the slot and time for charging his EV, when the selected time comes RTC gets activated and sends an activation code to the user's mobile using GSM, when the user arrives at the slot he needs to enter the code to authenticate and verify and he needs to enter the amount of charging he needs and pay the amount, as soon as payment is done, EV starts charging when it charges up to the paid amount if automatically turns off. Throughout the process, all details will be displayed in the LCD display.

Figure.2: LCD Display the EV Charging Slot

RESULTS

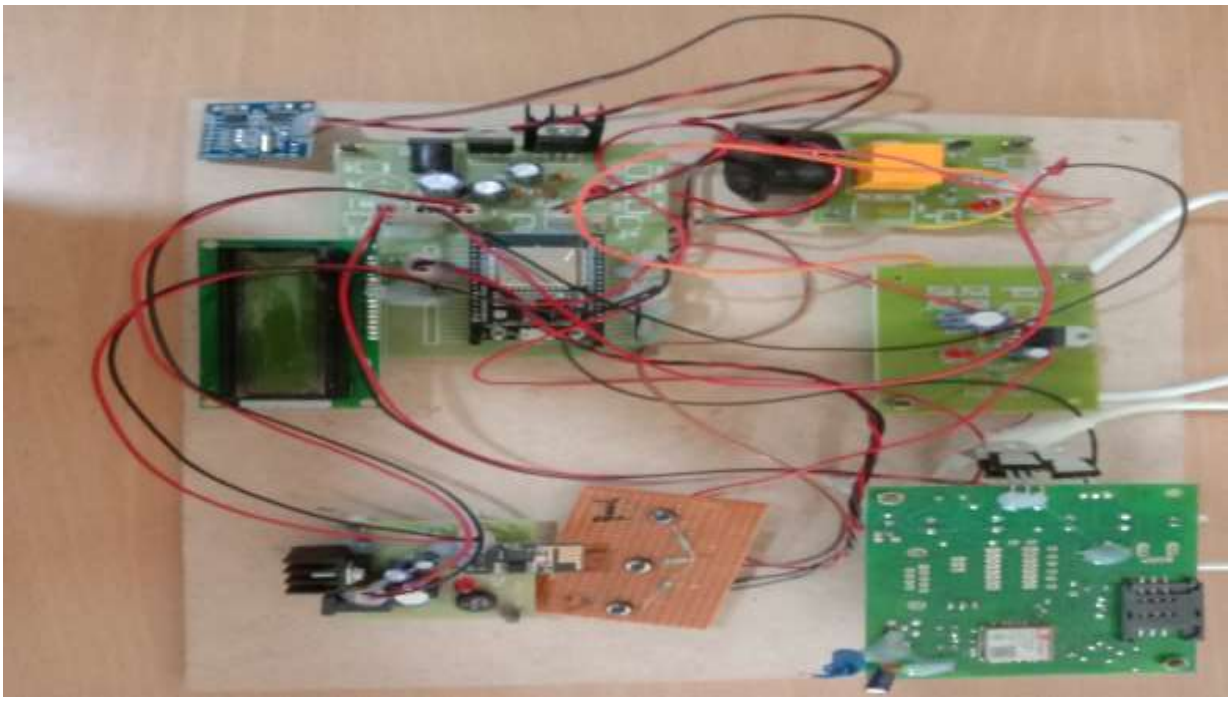

Figure.3: So by using this prototype, we can easily charge our electrical vehicle by booking our slot.

5. CONCLUSION

In conclusion, this project introduces a practical model of an Internet of Things (IoT)-based EV Charging Slot Booking System to address the challenges posed by the growing adoption of electric vehicles (EVs). The escalating demand for EV charging spots has strained existing infrastructure, necessitating innovative solutions. By leveraging IoT and a Raspberry Pi Pico microcontroller, the system effectively addresses these challenges.

Key features of the system include real-time monitoring of slot availability, secure booking and reservation management, user authentication, and integrated charging control. The implementation involves the use of IoT, Arduino microcontroller, GSM, keypad, RPS, RTC, LCD, buzzer, Arduino IDE tool, and embedded C language. The system demonstrates the seamless booking of slots through an IoT application, where the Real-Time Clock (RTC) activates and sends an activation code to the registered user via the GSM module. After entering the code and specifying the required charging duration, the microcontroller activates the charging station.

This project significantly contributes to reducing waiting times for EV charging slots, offering tangible benefits to users. The proposed approach has the potential to enhance charging efficiency, minimize waiting times, and improve overall user convenience. By doing so, it plays a pivotal role in advancing smart grid management and promoting sustainable transportation, aligning with the evolving needs of the electric vehicle ecosystem.

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