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A Review on Electric Vehicle Battery Charging Station Using IOT

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ABSTRACT:

We are seeing the increasing use of Electric Vehicles (EVs) now a days which is connected to the power grid generates challenges in the EV charging coordination and operation cost management. An EV Charging Station (EVCS), with time-variant prices and customers who have different charging time preferences, presents challenges for scheduling all requests information recording and exchange for network management, and data privacy and security. We shoulduse EVSEs with at least basic control and management functions, for all charging purposes.

In our study, we haveused the Internet of Things (IoT) model to managing electric vehicle (EV) charging in shared spaces. The mobile application manages the user authentication mechanism to initiate the electric vehicle charging process, where a sensor is used to measure the current and voltage based on the microcontroller,the device makes a communication with data with the mobile application. A user interface has been developed to visualize this process happening, which show the various sensor data to the user and also send alerts messages. And after charging user see the charging status on their phone. Their data will remain safe and secure as data will be stored on cloud.

Keywords- EVSE, IOT, GSM module, sensor.

1. Introduction:

Whether you as of now drive an electric vehicle (EV) or are considering getting one, charging assumes a basic part in driving an EV.

With the mass reception of electric vehicles not too far off, the significance of brilliant electric vehicle charging will become fundamental for both the charging point network administrators, and the public power matrix.

One of the significant difficulties while entering the electric vehicle (EV) market is the charging system, where the primary issues are connected with the absence of appropriate framework in private (high rises) because of their ineptness for this new reality. The loft has a common power issue, which doesn't meet the prerequisites of EV proprietors. In light of new advances in the Web of Things (IoT) and related sensors and correspondence stages, frameworks can possibly make new answers for these issues. One more part of this challenge is connected with rental lodging and the chance of requiring electric vehicle charging help with these conditions. In condos, sadly, there is an overall hesitance to introduce EV charging stations, which might be utilized by a couple of proprietors. Furthermore, there is likewise an issue connected with the security of the electrical frameworks, as they are not effectively worked to help EV charging stations, and the change of the electrical foundation of the loft won't just requires agreement among a greater part of proprietors, which can be troublesome, yet can likewise be hard to get, from government building wellbeing specialists. Taking into account the way that most private structures have normal spaces with shared electrical establishments and are not ready for the establishment of new EV charging frameworks, this is a boundary to reception. A review recognized four key trouble spots with regards to sharing electric vehicle charging arrangement structures, charging framework inaccessible, building limits, administrative issues, and accessibility of the parking garage.

2. Methodology:

In this undertaking we proposed another IOT based approach wherewe utilized various parts like sensors. We added two sensors like ACS712 CURRENT SENSOR which measure how much current getting utilized by the associated load. Likewise, we involved an air conditioner Voltage Sensor with the end goal of the Do-It-Yourself project, where we expected to quantify the exact AC voltage with a voltage transformer. This is an optimal decision to gauge the air conditioner voltage utilizing Arduino/ESP8266/Raspberry Pi like an opensource stage.

We use GSM MODULE to GSM condenses worldwide framework for portable correspondence, this isa second era (2G) versatile organization. This is broadly involved all around the world for versatile correspondence. This GSM gadget comprises of a sim opening in which a sim can be embedded which has a one kind of number, this extraordinary number is utilized for contact. ESP32 ESPREIF the ESP-WROOM-32 ESP32 ESP-32S Advancement Board 2.4GHz Double Mode WIFI + Bluetooth Double Centers Microcontroller. The ESP32 is incorporated with Radio wire switches, RF Balun, power enhancers, low-clamor intensifiers, channels, and the executive modules, and the whole arrangement possesses minimal area of PCB. what's more,

Transfer was utilized for which is electrically worked switch Transfers are utilized where it is important to control a circuit by a different low-power sign, or where a few circuits should be constrained by one sign. We associated WIFI ESP8266 which serves to independent SOC with coordinated TCP/IP convention stack that can give any microcontroller admittance to your Wi-Fi organization. The ESP8266 is able to do either facilitating an application or offloading all Wi-Fi organizing capabilities for another application processor.

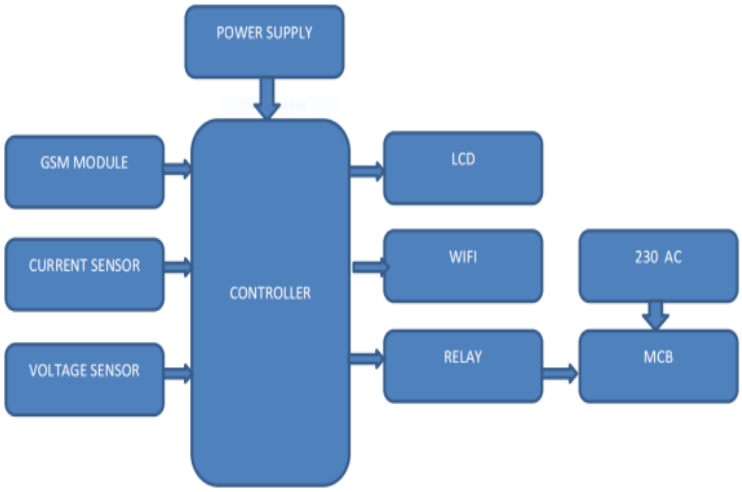

Fig no.1: electric vehicle battery charging station using iot diagram

3. Hardware details:

3.1 GSM MODULE:

GSM abbreviates global system for mobile communication, this isa second generation (2G) mobile network. This is widely used all over the world for mobile communication. This GSM device consists of a sim slot in which a sim can be inserted which has a unique number, this unique number is used for contact. This GSM device consists of a unique number called imei number and this is different for each and every hardware kit. In our project the device is used for transmitting data. The data from GPS is transmitted to a given mobile through this GSM itself.

Fig no.2: GSM module

3.2 ARDUINO UNO:

The Arduino Uno is a microcontroller board dependent on the ATmega328 (datasheet). The microcontroller in Arduino is Microchip ATmega328P and the Operating Voltage is 5 volts. The Input Voltage ranges from 7 to 20 Volts and the Digital I/O Pins are 14 of which 6 provide PWM output. The analog Input Pins are 6and DC Current per I/O Pin is 20 mA. The Uno differ from each single going before board in that it doesn't use the FTDI USB-to-sequential driver chip. Rather, it includes the Atmega16U2 (Atmega8U2 up to make R2) modified as a USB-to-sequential device.

Fig no.3: Arduino uno

3.3 ACS 712 CURRENT SENSOR:

ATTENUATOR CIRCUIT A full-wave rectifier converts the whole of the input waveform to one of constant polarity (positive or negative) at its output. Resistors R1 and R2 form a voltage divider that scales down the AC voltage. 3.3 CURRENT MEASUREMENT For current measurement we are using a CT sensor. The current sensor module is a device that is used for making current measurements. ACS 712 allows measurement of current direct or alternating current flowing in a conductor. The measured current generates a magnetic field which is the sensor converts to a proportional output voltage using the hall effect. The voltage in turn is read by a microcontroller system to an A/D converter to calculate its peak value and the corresponding RMS value of the load current.

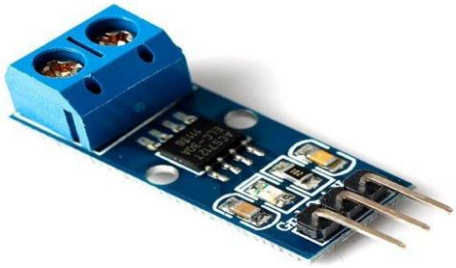

Fig no.4: ACS 712 CURRENT SENSOR

3.4 RELAY:

A relay is an electricaloperated switch. It uses electromagnet to operate a switch mechanically, but other operating principles are also used, such as solid-state relays. Relays are used where it is needed to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. Early, relays were used in long distance telegraph circuits to amplify: they repeated the signal coming in from one circuit and re-transmitted it to another circuit. It is used extensively in telephone exchanges and early computers to perform logical computation.

3.5 WIFI ESP8266:

WI-FI MODULE ESP8266 WI-FI module is a self-contained SOC with integrated TCP/IP stack that can give microcontroller access to the Wi-Fi. ESP8266 module is a cost-effective board with a hugecommunity.

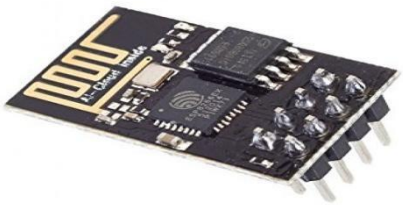

Fig no.5: WI-FI MODULE ESP8266

4. Literature review:

1.topic: Efficient Coordination among Electrical Vehicles: An IoT-Assisted Approach

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Date: 20 June 2022

Higher refueling time of the Electric-Vehicles (EVs) is one of the major concerns in their wide-spread use for transportation. A well-planned charge scheduling of the EVs, hence, is extremely important for proper utilization of the limited charging infrastructure and also limit the size of the waiting queue in the Charging Stations (CSs). Almost all the existing works on this topic are theoretical and assume the availability of global data of the EVs and the CSs. In this work, we take an endeavor to derive a practically useful solution to this problem through efficient EV-CS coordination.

2.topic: Solar Powered Off-board Electric Vehicle Charger with Reconfigurable Power Electronic Interface

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The growth and usage of the electric vehicle is on the rise over the past few years. Demerits of conventional IC engine vehicles like depletion of fossil fuel, increase in fuel price and negative impacts on the environment made us to shift to electric vehicles. The fuel for electric vehicle is electrical energy which is extracted from the power grid through charging station. In the power grid, the energy share from conventional energy sources are high, that too coal, which again leads to the same negative impacts as like IC engine vehicles.

3.topic: IoT Based Hybrid EV Charging System with Data Processing

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The evolution of transportation with non-renewable resources is playing a vital role in increasing pollution which leads to global warming. The alarming state of global warming necessitates the complete adoption of renewable energy-based transportation infrastructure. This led to the adoption of new primary energy sources. The evolution of transportation and the increasing number of Electric Vehicles (EVs) will also affect the charging status. This research paper provides a solution to overcome the problem of charging EVs by the use of renewable energy sources.

4.topic: Remote Electric Vehicle Battery Monitoring & Life Cycle Management System

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The Internet of things (IoT) is one of the most revolutionary technologies leading experts have created today. The ever-increasing number of devices and embedded systems has made it a necessity for IoT to be implemented in every corner of the world. The latest technology for electric vehicles uses IoT monitoring and life cycle management. Even though there is a sophisticated battery management system in the present Electric Vehicles, there is always a chance of battery damage due to numerous instances caused by battery overcharge and exposure to high/low temperatures.

5.topic: Ransomware Detection Using Deep Learning in the SCADA System of Electric Vehicle Charging Station

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The Supervisory control and data acquisition (SCADA) systems have been continuously leveraging the evolution of network architecture, communication protocols, next-generation communication techniques (5G, 6G, Wi-Fi 6), and the internet of things (IoT). However, SCADA system has become the most profitable and alluring target for ransomware attackers. This paper proposes the deep learning-based novel ransomware detection framework in the SCADA controlled electric vehicle charging station (EVCS) with the performance analysis of three deep learning algorithms, namely deep neural network (DNN), 1D convolution neural network (CNN), and long short-term memory (LSTM) recurrent neural network.

6.topic: An IoT-based Smart Charging Algorithm Considering Local Distributed Energy Resources and V2G Technology

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The integration of distributed energy resources (DERs), such as electric vehicle charging stations (EVCSs), photovoltaic units (PVs), and battery energy storage systems (BESSs) is a key component towards decarbonization. In this context, the development of smart charging control strategies to encourage

the usage of renewable energy sources (RESs) for EV charging has become a topical research subject. This paper proposes a smart charging algorithm executed through an internet of things (IoT) platform to control DERs, locally integrated through an aggregated system.

5. Conclusion & Future Scope:

As far as the issue of absence of fuel and ecological contamination to decrease contamination as well as fuel utilization, we need to utilize electric vehicles to add to the spread of the utilization of electric vehicles. Charging stations should be given so the client has simple admittance to the charging station, particularly presently when the Web access is free and Web of things innovation is utilized to show the areas of the accessible charging stations, which decreases an opportunity to contact them. The condition of charge (SOC) of a battery pack should be precisely assessed web-based by the battery the executive framework (BMS). This computation is troublesome, particularly after an extensive stretch of battery use. To beat this issue, an Information Driven assessing way to deal with gauge the SOC is utilized and conventional AI methods are usually utilized, for example, support vector machine (SVM), fluffy regulator, and fake brain organization (ANN). Since SOC addresses how much energy accessible inside the battery, the SOC is shown by utilizing an application to decrease power utilization and expand battery duration. Charging the battery needs time to diminish the deficiency of time in the charging system. It is proposed to put stations inside the recreation area to exploit the shopping season of charging the electric vehicles. Different wellsprings of charging inside the charging stations, for example, sun powered energy and wind energy can likewise be utilized as the principal power lattice.

6. Results:

Fig: Vehicle battery charging

Fig: Charging start message display on LED

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