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RFID Based EV Charging Station

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Abstract*:*
An electric vehicle is a new and upcoming technology in the transportation and power sector that have many benefits in terms of economic and environmental. A comprehensive review and evaluation of various types of electric vehicles and its associated equipment in particular battery charger and charging station is presented. A comparison is made on the commercial and prototype electric vehicles in terms of electric range, battery size, charger power and charging time. The various types of charging stations and standards used for charging electric vehicles have been outlined and the impact of electric vehicle charging on utility distribution system is also discussed. This project explains the system which is capable of automatically deducing the dispensed amount to charge a vehicle battery from user prepaid card (i.e., RFID card) and that deduced amount information and remaining balance of the card is send to the Google sheet of costumers laptop or mobile IOT technology and even that deduced amount information is send to the web server using Wi-Fi technology.
Keywords*: Battery charger, charging station, electric vehicle, RFID, Google sheet*

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I. INTRODUCTION

An electric vehicle charging station is equipment that connects an electric vehicle (EV) to a source of electricity to recharge electric cars, neighborhood electric vehicles and plug-in hybrids. Some charging stations have advanced features such as smart metering, cellular capability and network connectivity, while others are more basic. Charging stations are also called electric vehicle supply equipment (EVSE) and are provided in municipal parking locations by electric utility companies or at retail shopping centers by private companies. These stations provide special connectors that conform to the variety of electric charging connector standards. Fees for using EVSE vary from monthly or yearly flat rates to per-kWh to hourly rates. Charging stations can be free and are usually subsidized by the local government. Different types of EVSE provide different speeds of charging. Level 1 charging stations use a 120 volt (V), alternating-current (AC) plug and require a dedicated circuit, offering about 5 miles of range for every hour of charging. Level 2 stations charge through a 240V, AC plug and require home charging or public charging equipment to be installed. Level 2 stations provide 10 to 20 miles of range for every hour of charging. Level 2 chargers are the most common and charge at approximately the same rate as a home system. Level 3 chargers are also known as DC fast chargers. Level 3 uses a 480V, direct-current (DC) plug. They bypass the onboard charger and provide DC electricity to the battery via a special charging port. DC Fast Chargers provide up to 40 miles of range for every 10 minutes of charging but are not compatible with all vehicles. Additionally, some propriety charging stations, such as the Tesla Supercharger, are designed for significantly higher-speed charging. As demand grows for more publicly accessible charging stations, there is a greater need for equipment that supports faster charging at higher voltages and currents that are not currently available from residential ESVE. Globally, the number of electric vehicle networks is increasing to provide a system of publicly accessible charging stations for EV recharging. Governments, automakers and charging infrastructure providers have forged agreements to create these networks.

III. LITERATURE SURVEY

In recent years, Electric vehicles (EV) are receiving significant attention as an environmental-sustainable and cost-effective substitute of vehicles with internal combustion engine (ICE), for the solution of the dependence from fossil fuels and for the saving of Green-House Gasses (GHG) emission. In this framework, different standards for EVs charging systems have been explored by several organizations around the world. For defining them, organizations consider the safety, the reliability, the durability, the rated power and the cost of the different charging methods. The charging equipment for EVs plays a critical role in their development, grid

integration and daily use: a charging station generally includes charge cord, charge stand, attachment plug, and power outlet and vehicle connector and protection system. The configuration of the charging station can vary from Country to Country depending on frequency, voltage, electrical grid connection and standards. In any case, charging time and lifetime of an EV's battery are linked to the characteristics of the charger that first must guarantee a suitable charge of the battery. Then a good charger should be efficient and reliable, with high power density, low cost and low volume and weight. After a complete overview on different types of EV charging stations and a comparison between the related European and American Standards, the paper includes a summary on possible types of Energy Storage Systems (ESSs) and possible layout of charging stations including them. ESSs can become fundamental for the integration in smart grids of EV fast charging stations of the last generation: in this case the storage can have peak shaving and power quality functions and also to make the charge time shorter. From this brief analysis, it is possible to conclude that a good ESS for the coupling fast EV charging stations can be considered a system including batteries and ultra-capacitors: the first are suitable for their high energy densities and the second for their high power density. About the integration of ESSs, another important issue investigated is the way of integration in terms of electrical scheme. Two possibilities have been found in literature, based on an AC-bus configuration and DC-bus configuration. The AC-bus scheme is generally preferred, because the AC 13 components have well defined standards, and AC technologies and products are already available in the market. However, DC-bus based system provides a more convenient way to integrate renewable energy sources and also higher energy efficiency thanks the inferior number of conversion stages.[1]

V. PROPOSED SYSTEM

Energy in the form of electricity plays a very important role in our day to day life. Electricity is one of the greatest wonders of science. Next to man, it is the most important and revolutionary creation in this world of ours. The gradual but excessive use of electricity has come to bring about remarkable changes in industry. Computers as calculators sum up totals and make other calculations with the utmost accuracy. Newspapers and books are printed in millions overnight. There is not a single phase of human life that is not indebted to electricity for its progress. The modern age has, therefore, been truly called the "age of electricity."

The infrastructure element that provides the crucial link between an Electric Vehicle (EV) with a depleted battery and the electrical source that will recharge those batteries is the Electric Vehicle Supply Equipment or EVSE.

VII. SYSTEM ARCHITECTURE

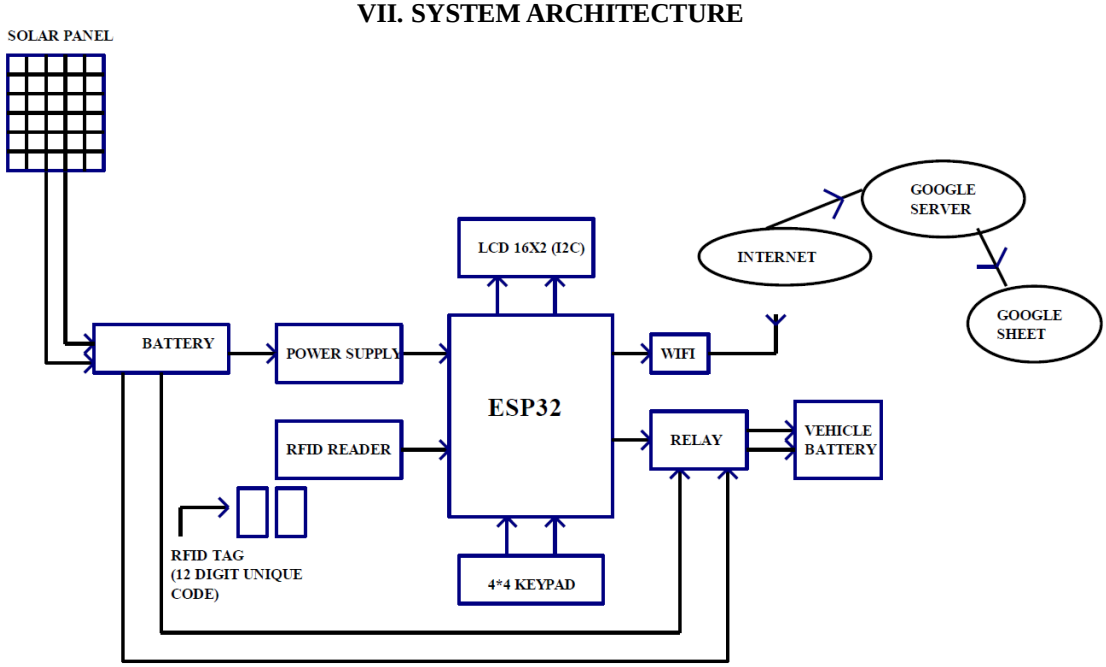

Fig. System Architecture

VIII. METHODOLOGY:

The prototype of EV charging station is proposed such that it uses the renewable energy (Solar Energy). An electrical vehicle battery recharging system composed of photovoltaic solar panel connected to the electrical power grid. With the help of Solar panel, energy will be stored into the battery. Here we are providing RFID card to each customer with which customer can access petrol at the charging stations. Before using this card we have to recharge it like a prepaid card. Whenever we want to charge the vehicle battery, just we have to enter required amount and place the RFID card near the RFID reader. Then microcontroller reads the data from the RFID reader and performs the action according to the customer. This system also provides the security for the customers for vehicle battery charging at the EV charging stations by avoiding the involvement of human beings, so to avoid the risk of carrying money every time and charge the battery on hours basis as well whenever required. All the data is display on OLED and saved in Google sheet. When vehicle is parked at the charging station, vehicle battery will be charged by charging station battery

X. CONCLUSION

THE PROTOTYPE OF EV CHARGING STATION WITH RENEWABLE ENERGY SOURCE IS SUCCESSFULLY IMPLEMENTED. THE PROJECT SHOWS HOW WE CAN HAVE THE ACCOUNTING FACILITY FOR EV CHARGING STATION WITH GOOGLE SHEETS. THE USAGE OF MICROCONTROLLER WITH RFID MODULE HELPS THE ACCOUNTING PROCESS FOR SMOOTHER OPERATION. THE TAKE AWAY PART OF THE PROJECT IS MICROCONTROLLER PROGRAMMING, POWER SUPPLY DESIGN AND THE PCB DESIGN. THE OPERATION OF THE OPTO-COUPLER IN THE HIGH AND LOW VOLTAGE SEPARATION CAN BE EASILY UNDERSTOOD BY THIS PROCESS. HENCE USING THE REGULAR COMPONENTS, THE PROTOTYPE OF EV CHARGING STATION IS IMPLEMENTED THROUGH THIS PROJECT.

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