Electric Vehicle Charging Station with Solar Power

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Abstract- - The transportation sector of the world is in the transformation stage ,shifting from conventional fossil fuel -powered vehicles to zero or ultra low tail pipe emission vehicles. To support this transformation ,a proper charging station (cs) infrastructure in combination with information technology ,smart distributed energy generating units ,and favorable government policies are required. The motive of this project is to adjust the key aspects to be taken care of while planning FOR the charging station infrastructure for electric vehicles. The project specially provides a critical review on the research and developments in the charging stations infrastructure, problems associated with it, and the efforts that are going on for its standardization to help the researchers address the problems.

Keywords: Electric vehicle; Charging station; EV charging Station; Smart charging; Charging infrastructure.

1. INTRODUCTION

In the present scenario, global warming and climate change are the major concerns that can severely affect the environment and life on earth. Greenhouse gases (GHGs) are the prime factors that are responsible for climate change Air pollution and GHG emissions from the fossil fuel-based transportation sector in recent years have received the greatest ever attention, especially in large, dense cities.

Globally, in 2016, 7.87 billion tonnes of carbon dioxide-equivalents of GHG emissions were from the transportation sector and it increased to 8.04 billion tonnes of carbon dioxide-equivalents of GHG emission in the year 2017. According to an estimate, 24 percent of the world's CO emissions are due to the

transportation sector in which 3/4th of these emissions account for road transportation.

In India, 291 Mt of CO equivalent emission was from the transportation sector in the year 2017 and it accounts for 18% of total energy consumption.

The use of electric vehicles plays an important role in improving the traffic and helps in maintaining a healthier living environment by zero or ultra-low tailpipe emissions and much lower noise.

Thus, the global automotive industry is shifting towards zero-emission vehicles. In 2019, globally, almost 4.8 million battery electric vehicles (BEV) were in use and about 1.5 million new BEVs were added to the worldwide fleet. The development of an electric vehicle charging station and its optimal location is very important for easier adoption of electrically-propelled vehicles and the use of cheap and clean electrical energy from grid and renewable energy resources. A proper charging station network will help in alleviating the range anxiety of owners of electric vehicles (EVs), assuring the similar performance of EVs compared to that of the internal combustion engine vehicles. To lay more emphasis on continuous improvement in recharging technology, the share of electric vehicles in the market must be increased. The present problem with the adoption of EVs can be related to the "chicken or egg" theory. The consumers are waiting for proper charging infrastructure to get full assurance of

successful trip completion with no or minimum delay in charging time.

Moreover, the investors of charging infrastructure are waiting for enough EVs on the road to make the business profitable. The stakeholders also differ in opinion on the choice between fast charging or smart charging (SC) for EV charging stations.

To solve all these issues, government policies also play a very important role. Another important factor that plays an important role in the adoption of EVs is the lack of suitable batteries that can deliver a sufficient amount of energy for a longer duration of time to enhance the range of EVs.

At present, the transportation sector is going through three revolutions, i.e.,

autonomous driving, shared mobility, and electrification. So, when planning for the charging infrastructure for the electric vehicles, it is crucial to take into account the synergies and potential interactions among these three emerging revolutions. With the increase in the adoption of electric vehicles, a new emerging significant electrical load is introduced to the power grid, which will require changes in the infrastructure. The transfer of electrical energy is done only via the distribution grid, which limits the energy that is flowing in the transmission lines.

The large-scale reconstruction of the distributions grid to meet the EV's charging requirement is difficult.

Methodology

In this Project, we are focusing on developing an Electric Vehicle Charging System which will take the power from AC Supply and will convert the charge to DC according to the Battery.

In this system, we also focus on some points like monitoring the Voltage and current of the Battery charged by the system. For better performance and sustainability, we are using a low power Solar panel that will power up the controller circuit i.e., Microcontroller, Sensors, Relays etc.

Flowchart

Objectives

1. To Design and Develop the Electric Charging Station which includes Power Electronics Components as well as Embedded Circuits.
2. One of the Main Application of the Project is providing the Charging Service to the User.
3. The Design of the Charger has a Variable Output Power Source that can be Adjusted according to the Vehicle and the Power Requirements.
4. The System consists of an additional Solar Panel that provides power to the Embedded Circuitry.
5. In this Project, we are trying to address the Realtime Problem of Electric vehicle Charging in the Public Places that can prove Beneficial for User as well as Service Provider.
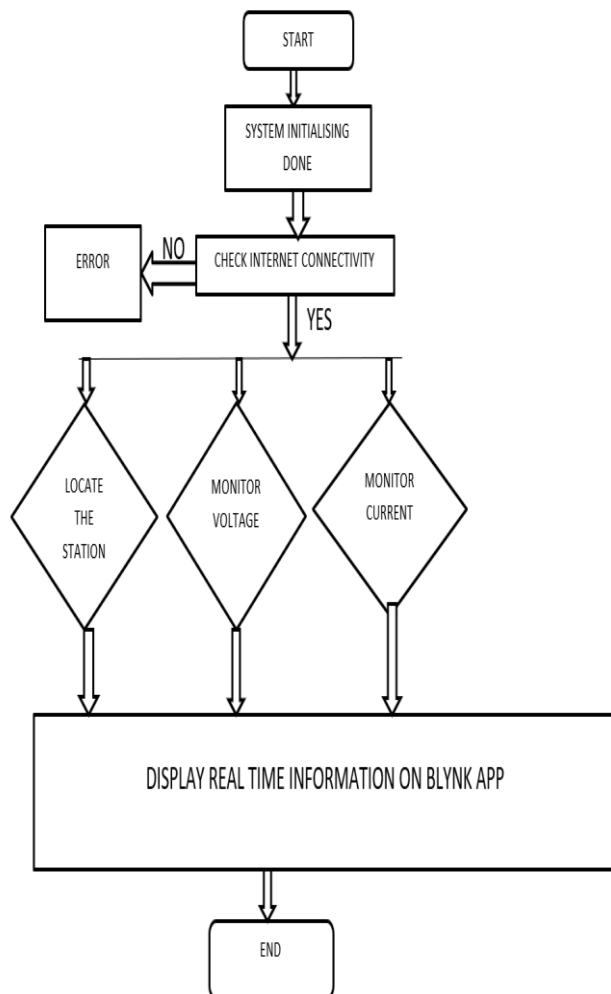
Future Scopes

Though we have tried to target a lot of real time problems, we have a large future scope in this Project some of which are mentioned Below-

1) Adding Payment Gateway to the System can accept any payment including GPay, Mobile Banking, PhonePay, Paytm etc.

2) Using a GPS Module to the System can prove beneficial in locating the Charger and will be easily accessible to the People.

3) The concept of Battery Swapping can also be implemented in another scope of this Charging Station as the time taken for Charging is more in level 1 and level 2 charging stations.

4) Use of AI and Deep Learning Modules can prove beneficial in storing the identity of the individuals who have used the charger.

5) Biometric, RFID based System also can be implemented along with the Memory card provision which will save the customer data.

6) IoT System can be optimized to send alerts to the existing customers to generate the Sales and revenue of the System provide

Blynk App. Test Results-
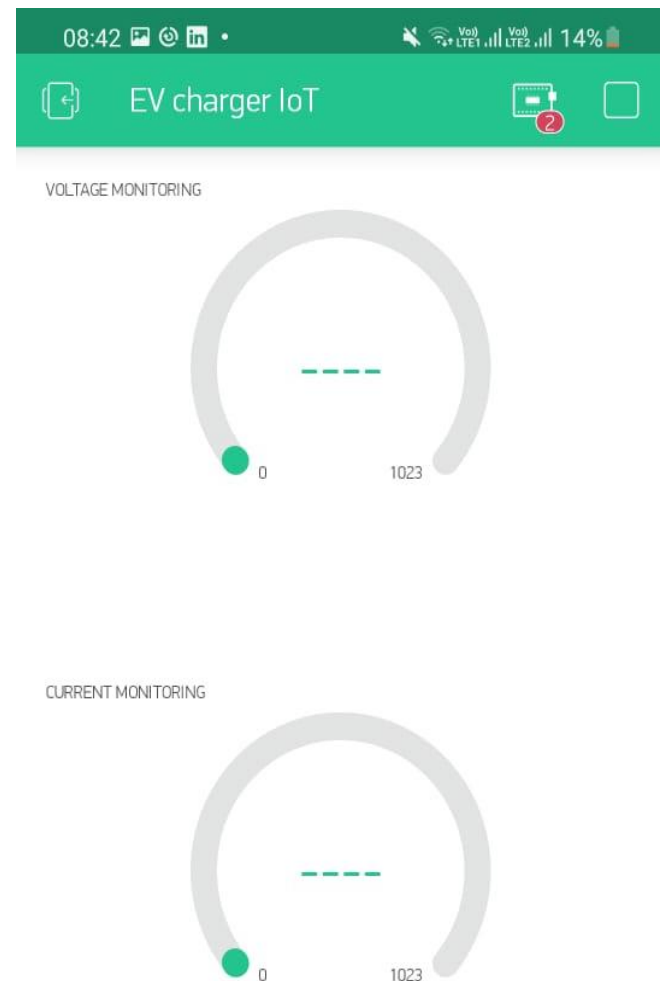
2. CONCLUSION

The conclusion of this project is that we can use ESP Controller to control the system with out human interference and can even monitor the system on mobile app.

The power supply can be made variable so that it can charge a range of 24v to 48v batteries.

The parameters like voltage, current can be monitored and displayed on the screen.

Various functions can be added to make the system more advanced and reliance for commercial use.

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