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Hybrid Electric Vehicle Charging Station

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Abstract- *Electric Transportation Is increasing rapidly and instead of that the number of electric charging stations are inadequate. Deficiency of energy conservation technologies which is the crucial reason to inspire the consumers to shift towards the Electric Vehicles. This will Highly effect on the electric grid due to Higher increasing values of those vehicles. By giving look on such issues, given research paper discusses the brief idea about hybrid -based electric vehicle charging station with a combination of solar power supply and wind turbine as well as grid as a backup supply. In this research. Simultaneously, the trouble on electrical grid is also gets deducted by giving remaining power supply to the electric grid. This technique is essential to control the highly increasing burden on the fossil fuels as well as on the grid stations. Therefore, the paper provides the renewable energy conservation ideas.*

Keywords— Electric vehicles, Photo Voltaic power generation, Charging station,wind Generator, Lead-acid battery, etc.

I –INTRODUCTION

Day by day Electric vehicles becomes more affordable which leads investmentin charging stations by the investors due to increasing demand of them. Now a days renewableenergy sources are less responsible for electric charging and more on grids which are highly depended upon the fossil fuels. Because of this scarcity and increasing pollution, electric vehicles are arriving instead of the internal combustion engines. In this situation the photovoltaic solar (PV) and Wind power generation are using in all over the renewable energy

sources. To reduce the environmental pollution and to make the safe atmosphere the combination of a solar photovoltaic and Wind systemgives a proper result. To reduce the crucial effect on the electric grid such type of combinations is used which gives an efficient output. This Aims to model a multiple port based electric vehicle charging station. There are three different output and input ports to charge multiple electric vehicles at a time for example, car, scooters, bikes, etc. The primary power supply is photovoltaic system after that wind and grid are used. Wind and grid are involved as an addition to solar power supply in this system at the time when PV is unable to meet the demand power it is a mutual benefit of the charging station. When the charging stations needs are fulfilled and battery is fully charged the remaining power is goes back to the grid. It results in, to prevents and remove stress on the grid by giving different options of the power supply which gives higher efficiency towards the systems stability and reliability. The main Aim of the project is to improve environment quality and to give a good pollution free nature which leads to the energy conservation.

LITERATURE SURVEY

Even though number of electric vehicles growing rapidly these days, the technologies associated with them are still evolving. In present time, the number of electric vehicles using renewable energy sources is increasing. By combining solar PV panel systems and wind turbine with

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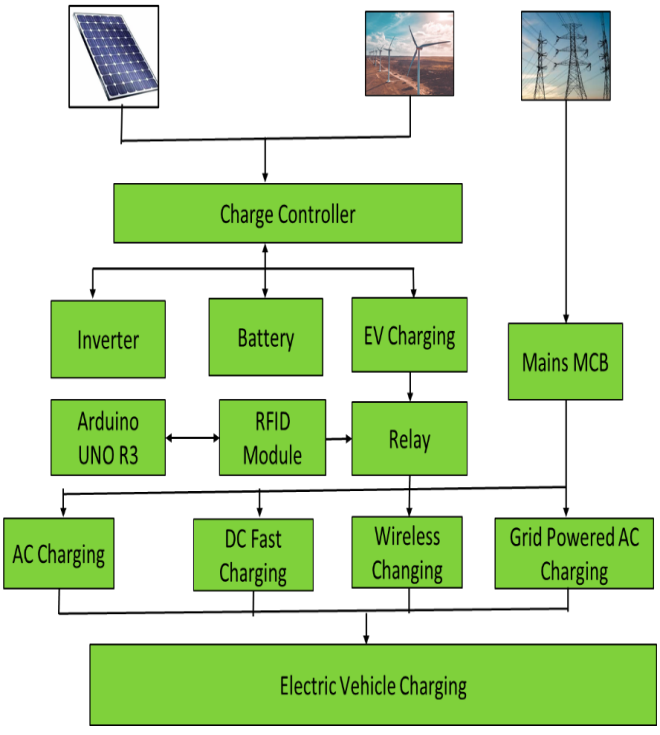
grid as a primary energy source and batteries are used to store the energy, which results in the raising performance and improving efficiency of charging stations for electric vehicles. Soo many research papers are proposed related to wind and Photo Voltaic based charging stations. Ref no. [1] By using unique decentralized method, fast-charging technique is proposed for electric Vehicles combined by renewable sources of Energy supply. The arrangement consists of a solar powered generation side, and power storage unit, with the coupling to a grid supply. The given arrangement was a benefit as the fast-charging system, with local grid power support. Ref no.

[5] Suggest an integrated Photo Voltaic panel utilizing a multiport converter. however, the charger's performance is better, it is not ideal for freestanding application because it is not able to charge electric vehicles when grid is not available. ref no. [6] includes an improved analysis of physical scheduling about the charging stations of electric vehicle. Ref.no. [7] is define about the Charging Station with an energy storage system to control the system whenever peak load is occurs.ref.no. [8] was introduced a distinctive energy management for small electric vehicles, ref no. [14] shows a backup power source which includes to suggest the substitution of old batteries with an endless lithium-ion system which will help to improve the efficiency of the system. This method is used to lower dependence on battery and depend Electric Vehicle Charging more on solar and wind energy.

III- BLOCK DIAGRAM



EQUIPMENTS USED IN CHARGING STATION

There are some major equipment's which are used in Hybrid Electric Vehicles Charging Station. Such as, Solar panels, Wind Generators, Battery, DC Controller, DC-AC Inverter, and Grid power Supply, etc. All the equipment's used in the project are of specific ratings and with a good working condition and reliability. In given technique Arduino Uno R3 plays an important role to give a quick working operation and it operate with the help of RFID card. Similarly, Solar and wind are giving beneficial way of use and responsible to improve environmental condition.

1. Electric vehicles

Electric vehicles are those which runs on electric power supply instead of fossil fuels. In the **paper** given electric vehicles such as electric car, electric bike, electric scooters etc., are taken as a load respectively. and which will charged by using Solar and Wind turbine with a backup grid supply to proceed a step towards green and renewable energy. An electric vehicle draws an electricity from an external source and to utilize it for charging.

2. Solar Panel

Solar Panel is used to generate electricity by absorbing Sun's rays as an input source by using photovoltaic (PV) cells. In the given research paper A poly crystalline solar panel is used because of its good conductivity and lower cost with a ratings of maximum voltage 12 Volts and maximum power 20 Watts and with a dimension of 28L x 38W x 2H cm. Solar Panels are usually used in commercial and industrial use, similarly in the paper solar panel is used for public purpose.

3. Battery storage bank

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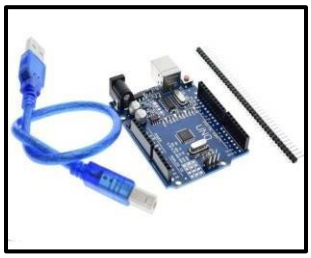
At the time of power shortage, the battery storage bank is used to store the power as a backup supply in case of emergency. In this paper, lead– acid battery is used to store the power. The battery specifications are 12 v, 7 Ah used in the project.

4. Arduino Uno R3



This is an electronic controlled board which is used to communicate between Human and Machines by using Coding. In the paper Arduino Uno R3 is used to give directions to the RFID Module i.e. This will scan card by RFID and if card is valid then it will start charging the vehicles otherwise this will ring an indicating buzzer. Therefore, Arduino is used to defined the identity of the electric vehicles.

IV-OPERATION OF THE CHARGING STATION:

The electric vehicle charging station is consist of Three different incoming supply sources i.e. Solar, wind and Grid power.

The flow of operation is as follows:

a. **Supply From Solar to EV:** The solar panels generate a DC energy from Sunlight and it stored in battery storage bank. Here, Inverter is used to control DC power Into the AC supply as input of electric vehicles is AC.

b. **Supply From Wind to EV:** Whenever the solar power is not sufficient to charge Electric vehicles or solar and Grid supply is not provided. In such case Wind Turbines are used to generate electricity and to charge the EV's.

From battery to EV: In some cases when both Solar power supply, Grid and Wind are unable to achieve the fulfilment of the power demand of electric vehicles, then energy stored in a Battery is used to powered the vehicles. It is used as an emergency backup in case of shortage of power supply in the charging station.

V-CONCLUSION

In this project we have used solar, wind and grid power to charge electric vehicles. This work is being done in consideration of the upcoming challenges about lack of EV charging stations. By using Arduino Uno this system is made more flexible and handier to use. Here, when the solar power supply is insufficient to fulfill the power demand of vehicles at that time wind power is use to charge the vehicles and when both solar and wind are unable to supply then grid is use as a back-up source. Access of power is being stored in Battery and it will utilize when more power is needed.

FUTURE SCOPE

Better enhancement of opportunities for Electric vehicle can be achieved by utilizing various optimization techniques. Implementation of fast charging stations can be done with the help of quick response storage systems. Adopting machine learning techniques greatly help in reducing the stress at EV charging stations. Utilization of hybrid charging stations that makes use of more than one renewable energy sources can improve the reliability andstability of the system.

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