SMART WAY OF ELECTRIC VEHICLES CHARGING USING SOLAR SYSTEM

Mr. Channa Venkata Narasimhulu M.Tech[1], Ms. Yalam Bhavani Yadav [2], Ms. Kata Yamini [3]
[1]Assistant Professor , Electrical Department, CBIT, Andhra Pradesh, India.
[2]Wipro Enterprises Private Limited Manikonda Village Hyderbad, India.
[3]Wipro Enterprises Private Limited Manikonda Village Hyderbad, India.
Author Emails
humanlionc@gmail.com
Yalam980@gmail.com
Katayamini00@gmail.com

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Abstract: -

As the Global resources are diminishing, government agencies and the non-government agencies are pushing greenery, pollution free solution through the use of renewable energy's sources, as electric power must become less dependent on fossil fuels and transportation must become more electric to diminish carbon emission, pollution and mitigate climate change. Hence to lessen the pollution through the motor vehicles, the electric vehicles are being manufacture and in order to run the electric vehicle the fuel required is the electricity which can be storable through the use of solar energy and run these electric vehicles through the Electric vehicle smart charging station which is the promising alternative and environmentally supportable solution to meet up the energy crisis.

Keywords — sunlight-solar panel-charge controller-battery-charging point.

Introduction- In olden days electric vehicles were invented in India to compress the excess use of fossil fuel and to downscale the harmful emissions emitted from the electric vehicles. But in order to work the electric vehicles fuel required for running vehicles was electric energy which is acquire from grid but the grid energy is also limited and it is not easily available and the speed is also limited hence these was the main disadvantage but due to the development of the charging stations this effect was also negotiate hence the charging station is very efficient. Fast charging stations will be needed to ease longer EV travel distances, including inter-regional trips. They could be placed in larger cities where there is a thick population of EV drivers so stations can also be used by local areas. The planning for fast charging stations should be bring together at the State level and experiment to align with general routes for government or private fleets of EVs.

Electric vehicle smart charging location which is the promising alternative and environmentally sustainable solution to meet up the energy crisis. As worlds resources are diminishing, government agencies and nongovernment agencies are pushing greenery, pollution free solution through the usage of renewable energy sources, as electric power become small amount of dependent on fossil fuels and transportation should become more electric to downscale carbon emission, pollution and mitigate climate change. Hence in order to mitigate the pollution through the motor vehicles, electric vehicles are being invented and in order to run the electric vehicle the fuel necessary for the electricity which can be storable through the use of solar energy and run these electric vehicles through the electric vehicle smart charging station which is the encouraging alternative and environmentally supportable solution to meet up to the energy crisis.

Literature- Survey: -

With the development of the global economy, the demand and utilization of energy in various

countries have been growing continuously. Environmental pollution and the energy crisis have also influenced attention. According to a survey from the World Bank, Carbon Dioxide emissions in 2013 and 2014 were 4.988 and 4.97 metric tons per capita, respectively. The high Carbo Dioxide emissions are mainly a result of the coal-based energy structure [A].

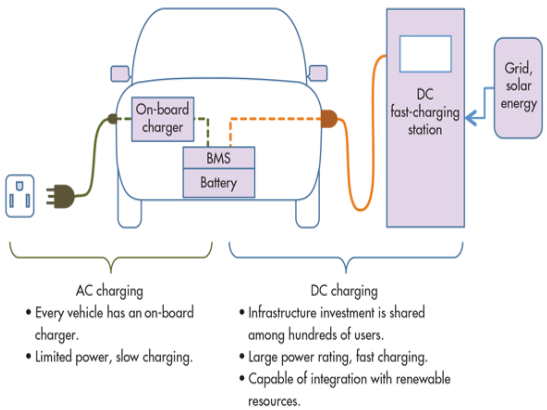
Maximum amount of petroleum is used in transportation. Fuel vehicles be responsible for the largest proportion of the transportation sector. At the meanwhile, the automobile dissipate is one of the main sources of environmental pollution. The development of the electric vehicle (EV) organization is an important measure to diminish the greenhouse gas emissions and deminish dependence on fossil fuels [B].

With the advance of EV technology, particularly the ongoing of battery technology, and the strong policy support in few countries, EVs have developed rapidly over the past decade [C].

Many EVs increase the load in power grids, which will have a negative impact on the safe and continuous operation of power systems. However, except for these negative effects, EVs can bring considerable economic merits to the distribution system through optimal planning, such as vehicle-to-grid (V2G) technology [D]

According to statistics, the driving period of 80% of vehicles is about 1 h per day, and they are stand still for 95% of the day. The energy stored in EVs is significant [E].

Flow Chart of Charging Station:



Recharging EVs is accomplished through connections to electric vehicle charging Product, also referred to as Electric Vehicle Supply Product (EVSP). This is a protective system which communicates with the vehicle and observe electrical activity to ensure safe charging. While the actual "charger" is contained in the vehicle, the appliance commonly referred to as a charging station or EVSEP is the conduit, control, and observing device which connect the vehicle to the electric grid. Figure 1 is a diagram of the overall charging energy flow from the power grid, through the EVSP and into the vehicle through the industry standard J1772 port connector. With alternating current (AC) EVSP, charger electronics within the vehicle invert the AC power supplied by the EVSP into direct current (DC) to storage in the battery. Rapid charging DC delivers high voltage (nearly 400 V) direct current straight to an electric vehicle's battery system.

Analysis of Solar panel: -

Solar panels and electric vehicles are a match made by the god – when you establish a solar energy system on your home, you can use it to both power your house and charge your electric vehicle for emissions-free transportation. The cost of solar is diminishing rapidly, and companies from Tesla to Nissan are manufacturing electric vehicles for your daily use. Now, the ability to establish a solar PV system large enough to power both your house and your vehicles is an option within reach. But even with incentives and rebates available for both technologies, most of the houseowners still can't afford to establish solar and buy an electric vehicles at the same time. Luckily, it's easy to establish a solar energy system today that takes your future electricity consumption into account, if you take a little additional factor into consideration.

Charge Controller: -

The Charge Controller is a switching device that can connect and disconnect the charger to the battery and it will take control over charging and to break charging at the correct voltage. This will save the batteries from damage, over- charging

and regulate the power going from the solar panels to the batteries. A microcontroller in the circuit will read the level of the batteries and then cut off the source of the solar panels to the batteries, once it sees the battery is at the fully charged state. If this was not in place, the solar panels would keep feeding the batteries energy and the batteries would become overheated and damage the internal components.

The advantage to have a microcontroller in the system is that it will open a variety of features to add to the system. For example, the microcontroller will be programmed to control and display the battery level of the system. It will ensure that there is enough power to charge devices by displaying the gauge on a 7 segment LCD. If there is insufficient power, it will prevent the system from being used until sufficient power has been reached. The microcontroller will also be used in aiding solar efficiency by controlling the solar tracker, as mentioned previously.

Battery: -

The team has selected two deep cycle batteries to power station. Each battery is a 12V and has a 35 Amp hour capacity. Batteries for PV system batteries normally have to discharge a smaller current for a longer period of time, such as power will drop in night time, while being charged during the day time. Deep cycle batteries are designed for the purpose of discharging to a lower capacity, between 45% and 85%, than a conventional battery. The most commonly used batteries are lead-acid batteries and nickel-cadmium batteries, both of which have merits and demerits. These batteries are able to be easily charged and discharged many times and can last for many years due to the thicker plate materials utilized. Batteries in PV systems are very harmful because of the energy they store and the acidic electrolytes they contain, so you'll need a well-ventilated, nonmetallic enclosure for it.

Charging Socket: -

Europeans works at 220V 50Hz and the Americans works at 110V 60Hz the EVs also have different types of charging connectors based on the country it is designed form. This has led to confusion among ESVP manufacturers as they cannot be made globally easily for all EVs. The main classifications of Connectors for AC chargers and DC chargers.

Inverter circuit: -

An inverter is an integral component circuit in the solar station design. It will convert the DC voltage generated from the solar system to an AC voltage. The team will be testing two designs by using special ICs or several pairs of power electronic devices.

An inverter can produce square wave, modified sine wave, pulsed sine wave, or sine wave depending on integral circuit design, demonstrated in Figure 2. The two dominant commercialized waveform types of converters as of 2007 are modified sine wave and sine wave. There are two essential designs for producing household plug-in voltage from a less voltage DC source, the first of which uses a switching boost converter to produce a high-voltage DC and then converts to AC. The other method converts DC to AC at battery level and use a line frequency transformer to create an output voltage.

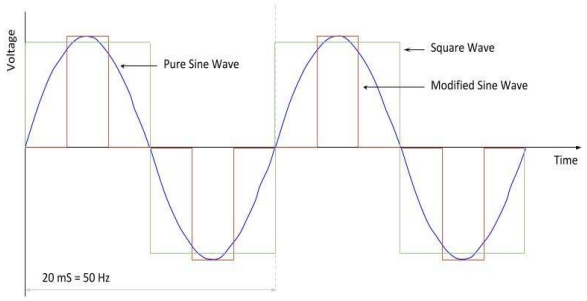


Fig. Sample inverter outputs

Inverter circuits have a power dissipation of 15 % or even up to 20%. The team forcast for a larger power inverted based on our maximum expected result and that the largest result will be required when two laptops are plugged into the system. Regularly, laptops can draw anywhere between 70-95 Watts. For two laptops rated at 95 Watts, the inverter will be required to invoke 190 Watts. From our methodalogy, we determined a 210-Watt inverter will enough. At a 85% efficiency (15% power loss), the inverter will bring about 190 Watts we required.

CONCLUSION: -

This project has budgetary limitations at first presented. Maximum Senior Design projects use industry financed projects as a way to launch the student to working under real time industry guidelines and also for organizations to be inaugurated to the next generation of potential employees. This solar system concept came from students; no industry finance was requiring the thought process of the design. Our team has contacted several organizations to give finance and is in the works of negotiating a sponsor. Having an organization sponsor gives the students a technical supervisor and collaborator to guide with any research and design problems that may arise in addition to financial support. Giving independence on fossil fuels and limited sources while making an eco friendly, self-sustainable, outdoor energy resource is the aim for the solar powered charging system. The team's research specifies an advantage to the campus for such a creation and also place for development on other existing charging systems. The other systems the team observed to exist were moderate cost to build. As well, rapidly upcoming solar innovations and designs could provide themselves to creating the more efficient charging system.

REFERENCES: -

A. Canadian Standards Association, 2010. Québec Construction Code, Chapter V– Electricity. Canadian Electrical Code, Part One with Québec Amendments(C 22.10-10), 21st edition, Section 86.

B. Kissel, Grey. August 2011. Presentation of Standard J 1772 at the Infrastructure Working Council Conference.

C. CHAdeMO, Technical Specifications of Quick Charger for the Electric Vehicle. Rev. 0.9, p. 76.

D. A E International, January 2010 SAE Electric Vehicle and Plug in Hybrid Vehicle Conductive Charge Coupler. S A E Standard J 1772-2010.

E. CHAdeMO, Technical Specifications of Quick Charger for the Electric Vehicle. Rev. 0.9.

F. Online: [http://chademo.com/01_CHAdeMO_Chargers.html] (Accessed on August 18, 2011).

G. Online: Add Énergie Technologies, Technical data sheet for the SmarTwo™ charging station.

[http://addenergietechnologies.com/_en/Documents/smarttwo-addenergie-spec-smartwo-v1-1-2012-01-01.pdf]