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Modeling of Smart Electric Vehicle Charging Hub

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ABSTRACT

An electrical vehicle charging hub is a charging power gracefully for electrical vehicles. This paper proposes the structure model for a PV based mechanical electrical vehicle which goes about as a wellspring of electric source to charge Electric vehicles (EV). EVs are viewed as the upcoming methods of transportation by 2030. The key drivers for EVs are their high effectiveness and zero carbon discharges. However, EVs are just reasonable if the power used to charge them originates from inexhaustible sources and not from petroleum product based force plants. It is here that the UV light based charging of EV has picked up enthusiasm for late occasions, as it gives a suitable strategy to charge EVs. The objective of this task is to "Develop a profoundly proficient, automated EV charging station which empowers brilliant charging framework for electric vehicles at working environments that is fueled by Solar Energy".

Index Terms *– Electric Vehicles, Photo Voltaic Cells, Sun, UV light, Solar*

1.0 INTRODUCTION

The growth of Electric Vehicles (EVs) is causing a profound transformation in the automotive industry. The differences in the manufacturing process, additional safety concerns, different requirements for the materials involved, and so on have changed the way the car industry operates. These changes are also reflected in different disciplines, such as energy conversion, because power electronics has a fundamental role in both EV traction and battery recharging processes. Several studies on traction have been con- ducted in order to provide lighter and smaller converters, smoother dynamic response, improve the efficiency and reliability of the equipment, which are not excessively distant from the conventional requirements in most motor drive applications. The fast charging process of the batteries, however, implies fundamental changes with conventional high- power applications because, aside from the vehicle, this process also involves the utility grid. In addition, the low-voltage levels of the battery packs increases the complexity, as typically these applications require medium voltage (MV) levels, hence impose a trade- off between the current stress of the switching devices[3].

Solar Power is effectively bridled in the tropic locales in light of the more drawn out daylight encounters contrasted with non-tropic areas. India is fortunately inside the tropics, this means a preferred position to its populace. Indeed, even with all the luck, the principle issue comes in the crew and preservation of these inexhaustible sources in addition to the high and disallowing introductory expenses of funding to set even a little scope sun based station.

This model of structuring a sun based controlled automated electric vehicle charging hub that uses UV light based force as a vitality source is intended to address various issues that standard interior ignition motor vehicles don't. An electric vehicle with a UV light powered charger will be simpler to utilize. It will minimize those unnecessary trips to the gas station for fill-ups. Simply plug the vehicle into the charging station when not being used and it will be powered and prepared for your drive. Above all, it eliminates interior ignition vehicle which are for the most part answerable for ecological contamination

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and causes the green house gases believed to be responsible for the global warming.

2. EV TECHNOLOGY DEFINITIONS

The term EV is often used to designate different vehicle technologies, even though they have some substantial differences. To clarify the concepts used in this proposal the main types of EVs available today are defined as follows [1]:

Hybrid Electric Vehicles (HEV): This technology uses the electric power of batteries to improve the fuel efficiency of their internal combustion engine. The electric power to charge their batteries does not come from any external source.

Electric Vehicle (EV): These vehicles run on a purely electric motor which is powered by batteries. Refueling is done by plugging in the vehicle to the grid. The term battery EV is also used in the literature for this type.

Plug-in HEV (PHEV): As their name suggests, these vehicles can run on gas- line, similar to the HEVs, and recharge their batteries by plugging in the vehicle to the grid, similar to EVs. The result is increased driving range and reduced fuel usage and emissions.

This dissertation is mainly concerned with EV technology, although the same principles apply to PHEVs. For this reason, the remainder of this study exclusively considers the EV family as in Fig. 1.

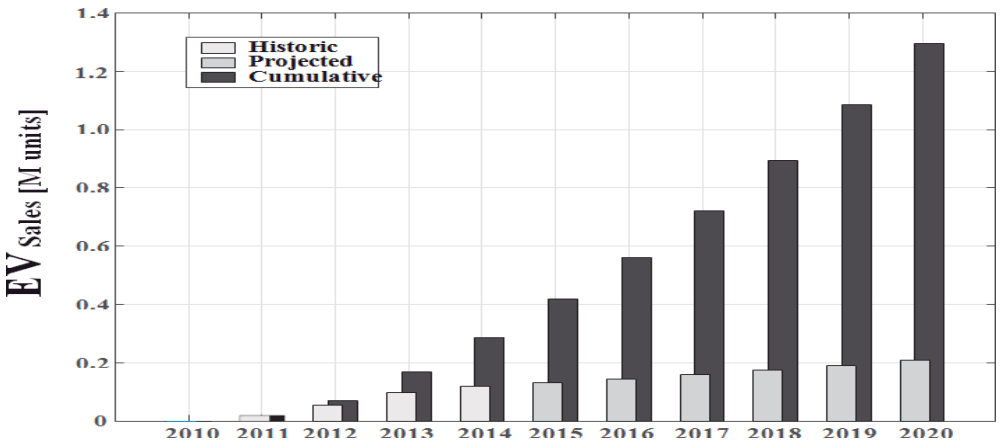

Figure 1 Cumulative and annual historical-projected EV sales across the globe

3. EVS BATTER PACK CHARGING

A significant piece of the activity of the EVs is the reviving of their battery pack. This procedure can be completed in two unique manners: conductively or inductively. The first charging technique utilizes electrical

The subsequent technique utilizes remote power through electromagnetic field coupling, taking out the module rope [2, 3]. This kind of charger has been investigated for Level I and II devices and still a work in progress and would not be talked about in detail here.

On the other hand, conductive charging has just been received by the EV Start-up, including standard EV makers. Contingent upon the rate at which the EV battery is charged, conductive chargers can be commonly ordered into moderate chargers and quick chargers. The customary chargers can revive the battery in 8 hours, while the quick chargers can do this procedure in 30 minutes. More particulars on the power levels, charging times for the accessible charging strategies can be found in some of the existing charging standards.

To control and normalize the conductive chargers a few associations, for example, the Institute of Electrical and Electronics Engineers (IEEE), the Society of Automotive Engineers (SAE), the International Electro technical Commission (IEC), are preparing to manage the utility/client interface.

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4. ELECTRIC VEHICLE

Both, EVs and PHEVs have risen as the most probable replacement to ordinary inward ignition motor vehicles. From the ages, sales of these vehicles have been continually hiking, as appeared in Figure 1 and this expanding pattern is relied upon to proceed in future. The inadequacies of these vehicles must be tackled before they can turn into a genuine option in contrast to transportation.

Figure 2 Proposed PV base Robotic Charging Station Model

The paper intends to create a machine which would diminish individuals from a normal undertaking of charging electric vehicles. An electrical vehicle charging station is a charging power flexibly for electrical vehicles. This paper proposes structure of a model for a Photovoltaic (PV) based electrical vehicle that estimates complete force yield under specific conditions. The connection to MV AC grids of EV RCS it is not a straightforward task because of the particularities involved. Unlike conventional multilevel converter applications, the loads in the system are volatile and present a stochastic behavior, therefore, the control scheme and the balancing techniques need careful designing. To develop a robotic charging station using PV through common bipolar dc bus fast charging architecture that allows the grid integration of several high- power fast charging units. To provide simulation results those verify the proposed architecture and control schemes. To complete the validation of the topics, the implementation of a low-voltage prototype of PV based RCS will for the experimental validation shown in figure 2.

These reasons justify using the concept of the charging station as an enabling alternative for EV fast charging. These stations are similar to petrol stations, meaning that are commercial facilities composed by several off-board high-power chargers located in public places throughout the city (e.g., parking lots, shopping locations or rest stops along highway). In this way, the load is concentrated in strategic points, which can be coordinated with the utility operator (i.e., retrofit distribution and transmission equipment, discourage the demand in congested nodes, medium voltage (MV) connection, and so on). This concept allows the driver to choose its preferred charging method for his vehicle. An additional charging possibility alleviates range anxiety, maximizes the use of EV batteries, and most importantly, provides the EV user a regimen equivalent to that of conventional cars.

5. PROPOSED SYSTEM

This proposed model of designing solar robotic electric charge vehicle for generating energy and charge electric vehicle as portable mode by using Arduino microcontroller we execute this design [2].
It is extrapolated from existing innovation this segment looks at the structure of charging foundation for an electric vehicle with the assistance of PV boards. The proposed framework can be adjusted for neighborhoods and working environments to charge electric vehicles according to the accommodation of the EV client. The significant goal here is to expand the utilization of PV vitality for EV charging by using vitality stockpiling frameworks and limit the vitality trade with the matrix[8].

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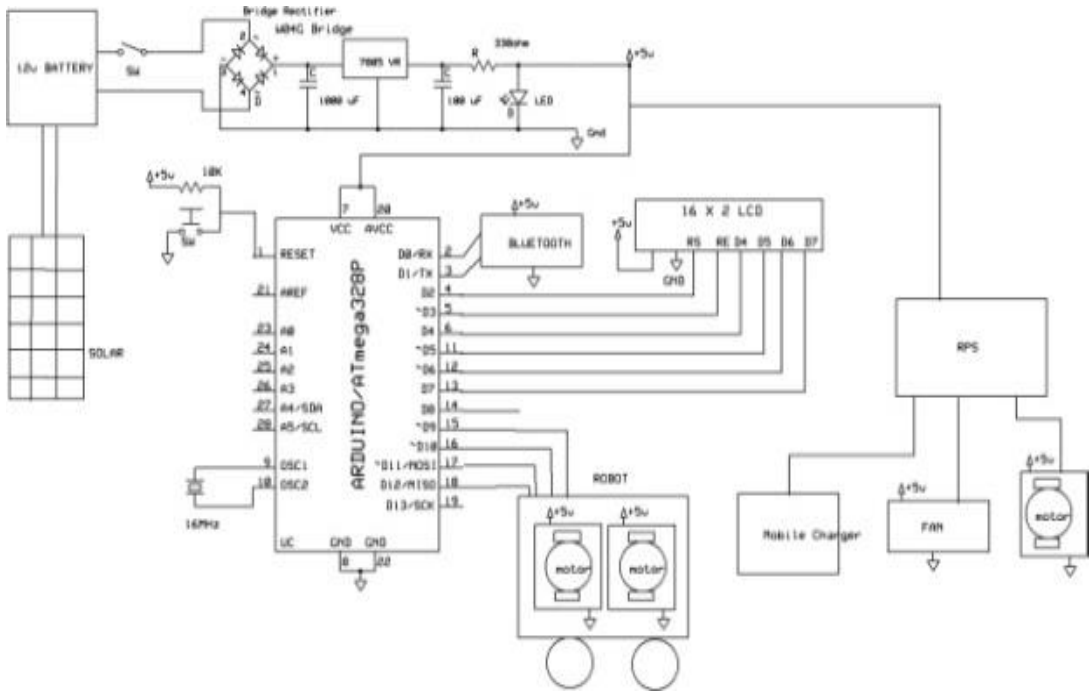

Figure 3 Block Diagram of propose system.

Sun based controlled vehicles have been made accessible to the overall population for more than 30 years; its far reaching or open use then again has been constrained fundamentally because of the current expenses of such gadgets. As sustainable power source is the fate of intensity age, it is essential that it is considered for electric vehicle charging also. PV board based EV charging station is being set up in numerous nations. For understanding the sun based controlled EV charging foundation [4], it is important to understand the current EV−PV framework, which is being used as of now by the businesses or are in the improvement stage by an alternate scholastic establishment. The proposed framework can be adjusted for neighborhoods and working environments to charge electric vehicles according to the accommodation of the EV client. The significant target here is to expand the utilization of PV vitality for EV charging by using vitality stockpiling frameworks and limit the vitality trade with the lattice.

6. ARCHITECTURE

The below picture is the architecture of the proposed system. It shows the connection of each and every part in the circuit and assembly of components in the design. It also shows the model number of the components used in the circuit.

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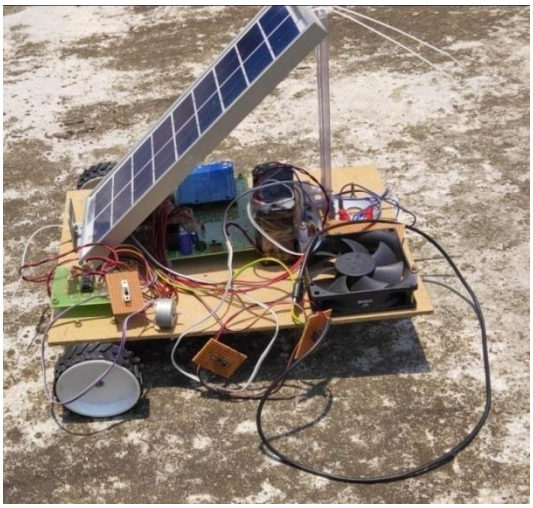

Figure 4 Architecture of proposed system

The below are the different types of hub designs for the proposed system.

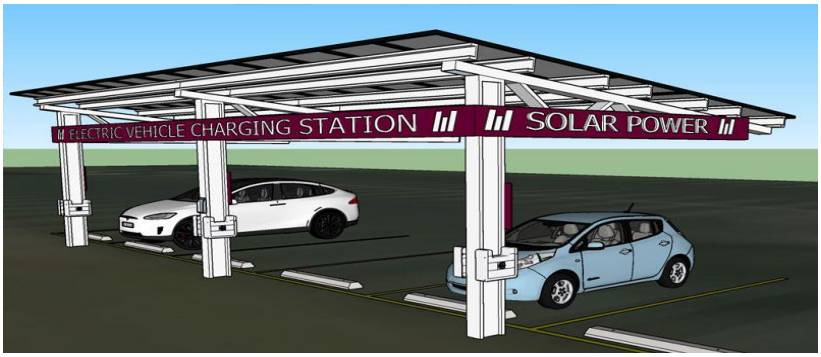

Figure 5 Shelter type HUB

In figure 5 it shows the design of shelter type hub for charging the vehicles. This design can be used as a shelter for the vehicles and also for charging the vehicles.

Figure 6 (a) Demo kit (from one Side)

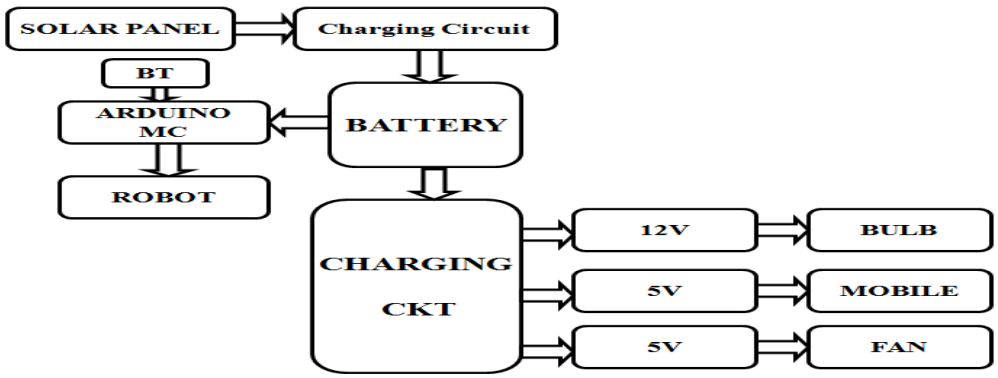

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Figure 6 (b) Demo kit (from another Side)

Figure 7 Filling station type hubs

In figure 7 it shows the design of filling station type. In this design it is like a filling station here we have to charge our vehicle as how we fill fuel.

7. CONCLUSION

As a result of limited oil unique assets, sustainable power sources got basic for our everyday life vitality request. In this viewpoint this venture is proposed to give a productive, appropriate and savvy model of PV based EV charging station. This investigation demonstrates that it is conceivable to execute and advertise Solar PV based EV charging station without framework association in Mode-1. In understanding accessible irradiance and temperature esteems, it can create adequate vitality while battery utilized as reinforcement. Rather than utilizing the matrix power as reinforcement source, vitality stockpiling framework (ESS) batteries are picked so that at whatever point sun oriented force is lacking to gracefully control for charging of EV, ESS takes the control and infuses the important vitality to the charging framework. The introduced model of sunlight based force vitality can be a decent activity for the future apparatuses and usage to be completed around there.

There are a few applications for keen charging like charging from renewable, diminishing charging costs or postponing conveyance organizes redesign. The focal point of existing exploration in this area is to discover better and effective calculations for every one of these applications thinking about them as discrete improvement issues. Decrease in the net expense of EV charging from PV utilizing charging calculations that consolidate sun powered figure, vitality costs, guideline administrations are suggested as expansion of the work conveyed in this proposal.

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