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Grid Integrated Charging Dock System for Electric Vehicles

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Abstract: Electric Vehicles (EV) are already becoming a mainstream preference for vehicle commutators, it is the future mode of powering the current fuel consuming vehicles due to its numerous advantages over them. Only challenge keeping the EV from wide acceptance is the limitations of EV battery charging infrastructure availability alongside the roads. Current public charging docks installed employ a plug in system, wherein the person needs to manually plug in the charging wire to and from the charging dock. These unattended charging docks involve risk factors like improper skills to select the correct mode , person safety, external weather conditions, etc. With this project we plan to introduce an automatic charging docks system, which will involve smart detection between the V2G and G2V mode of charging while in case of plug in system and interconnect it with the national electricity grid of 50 Hz frequency.

Keywords: EV, charging dock, risk, smart detection, V2G, G2V.

I. INTRODUCTION

Vehicles are one of the most indispensable parts of today's human life. Moreover it has become a basic amenity for humans after food, clothing and shelter. Vehicles can come in various forms like two wheels bikes, four wheels cars, multi-wheels bus, truck, etc. Currently the vehicles are operated with the help of fuels like petrol, diesel, etc. However the fuels are getting depleted rapidly due to high demand. Also this fossil fuel takes too much time for its formation again. These all factors lead to ecological imbalance of earth.

Recently a rapid advancement has taken place in the automobile sector for development of electric vehicles, plug-in hybrid vehicles, etc. They need batteries or battery-fuel combinations to operate. The charging of these vehicles is done with the help of charging outlets from the power grid. This electricity provided to the charging dock largely comes from the conventional sources of coal and other fossil fuels. They are also a contributor to the ecological imbalance due to limited availability and pollution. Hence, solutions need to be find an alternative sources of power. Renewable energy sources can be used in order to curb this problem. Apart from this vehicles also can be used as electricity generating utilities.

In this project we proposed a working model representation of a Grid tied smart parking. This type of parking will help generate electricity through various renewable energy sources like solar and wind. Also, the vehicle's batteries can act as an energy storage option for the load. This is popularly termed as Vehicle to Grid (V2G) or Grid to Vehicle (G2V).

II. PROBLEM STATEMENT

There would be a large amount of electric vehicles in the market in the near future. However the current electrical sector is not yet completely ready to fulfil the needs for electric vehicles. Current electric power generation is largely dependent on conventional sources like coal and fossil fuels, which are on the verge of extinction. Most vehicles are parked idle in parking places for a maximum number of times of day. No emphasis is given on producing electric power from renewable energy sources like solar and wind.

III. OBJECTIVE

To make maximum utilization of electric vehicles being parked idle, without any extra use. Generate electrical power from renewable sources like solar and wind in parking space sheds and light poles. Store this power in a battery bank and make it available to electric vehicles which will need charging. Further inter-connecting this power to the electrical grid. Similarly implementing the concept of vehicle to grid V2G and grid to vehicle G2V. Make a portable Charging dock model.

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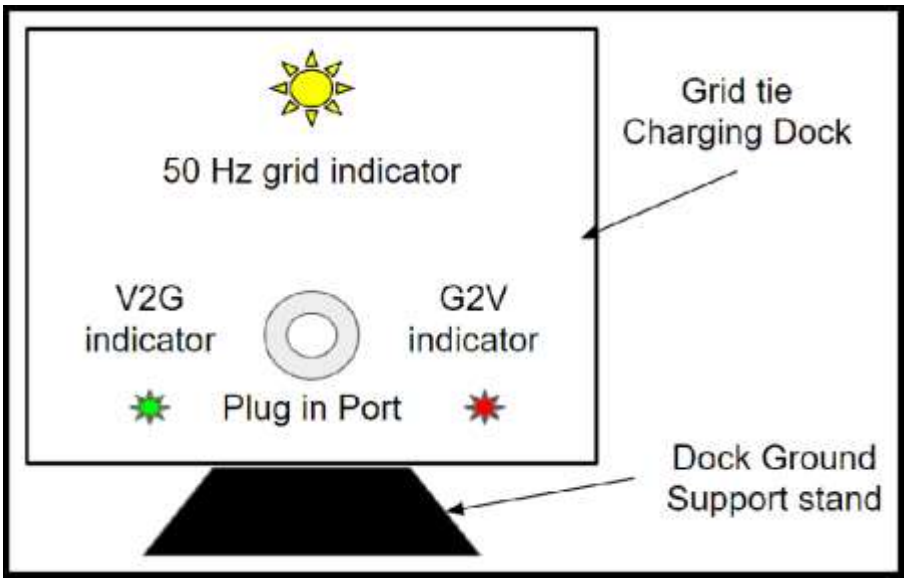
IV. SCOPE

Can be implemented in all the parking lots available around the world. Can integrate the necessary system in all the vehicles coming in the near future. With some modifications, we can also implement this site in the existing vehicles in the market. This concept can really solve the problem of electricity production around the world on a largely effective scale.

V. METHODOLOGY

First of all the problems pertaining to the society like vehicles parking, electricity shortage, etc. were identified. Then the topic on Electric vehicles was selected. More research was done on the topic through field visits and expert guidance along with internet data and books. Then a rough draft was prepared in order to calculate the amount of material needed to complete the project. Assembling was carried out one by one in stages. Various tests were carried out to confirm the working of the project model.

VI. CONSTRUCTION



As shown in the figure above, the charging dock would stand on the support stand on the ground. The charging dock would display 3 indicators namely, V2G and G2V mode Selection and the third one for the grid co nnected frequency indicator. A hanger for a multimeter would be provided to facilitate measuring the battery voltage of the vehicle being parked. A plug in port will provide the plug in charging system for the Electric Vehicle.

VII. WORKING

Vehicle - Grid stage

When the vehicle enters the campus after an outside run, it will check its battery voltage. The ideal voltage required for starting or igniting a vehicle is 11.8v -12.2v. If the measured battery voltage of a vehicle is below the ideal voltage value, then the vehicle needs charging. So, the person needs to plug in the vehicles from the charging dock, in order to charge the vehicle. If the vehicle supports wireless charging, then the vehicle needs to be parked at a wireless charging port. On the other hand if the vehicle battery voltage is above the ideal voltage value, then the vehicle has extra voltage, which hardly comes in use for daily running vehicles. So, we curb this extra voltage from the vehicle battery and give it to the grid battery. Thus, we need to plug in the charging dock from the vehicle.

ACKNOWLEDGEMENT

We are pleased to present “Grid Integrated Charging Dock System for Electric Vehicles” as our project and take this opportunity to express our profound gratitude to all those people who helped us in completion of this project. We would like to thank **Prof. Dilip D Gaikwad** for providing guidance and support, patience and faith

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