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Design Power Converter to Change Hybrid Electrical Vehicle in Green Charging Station

K.Durga[1], K.Lakshmi Narayanan[2], S.Saravanan[3], A.Syed Gaffar[4],

Assistant Professor, Dept. of EEE, K.S.K College of Engineering and Technology, Kumbakonam, Tamilnadu, India[1]

UG Student, Dept. of EEE, K.S.K College of Engineering and Technology, Kumbakonam, Tamilnadu, India [2 3 4]

ABSTRACT: Electric vehicles (EV) are the future medium of transportation system due to the heightening of conventional fuel costs of petrol or diesel-based vehicles. Hence the energy demand will be higher when EVs are brought into the public transportation system. In this review paper, the solar-powered charging station for an electric vehicle is evaluated by tilting the solar panel at a different angle, then the maximum efficiency and power that can be obtained from the solar light depending on the wavelength of the sunlight are analyzed. Photovoltaic (PV) panels can be able to charge electric vehicles (EVs) sustainably. Then using the solar potential in office buildings for EV charging at work, as well as it takes the long parking time at work, open the route for the deployment of vehicle-to-grid (V2G) technology. Various types of system architectures for an EV-PV charger are researched and compared in this paper. A comparison of power converters that integrate the EV and PV for V2G operation is done and based mainly on the system architecture, converter topology, isolation, and bidirectional power capability. The fundamental terminologies of charging stations, such as charging station types and levels, are reviewed in this paper. To tackle these issues, a variety of technologies are reviewed, as well as a brief overview of lithium-ion type battery for charging methodologies and the Battery Management energy System (BMS). The advantages of the EV over fuel vehicles have been outlined and the impact of the coil design and coil detection system for EV is also discussed here. Prospects and challenges involved in recent technologies for efficient systems in wireless charging systems are also emphasized in this article.

KEYWORDS: Electric vehicles, Photovoltaic (PV) panels, Battery Management energy System (BMS).

I.INTRODUCTION

Solar energy and electric vehicle charging combine and reduce the usage of fossil fuel dependence. The electric vehicle charging station will form a crucial role in the improvement of EVs in the market. The lack of charging facility infrastructure is a major argument not for purchasing an electric vehicle (EV). By enhancing solar energy, the most dependable of using the charging station is to be reduced and the charging facilities can be made at home, offices, hospitals, parking, etc. The facility that improves the energy to reload the electric vehicles is called the E-vehicle refilling charging station or Electric vehicle charging station, electric vehicle energy supplier (EVSE). The hybrid buses or electric buses, electric cars are charged by the plug-in charging method. Using solar energy, the best way is to obtain the maximum amount of energy intensity from the solar panel and the angle of rotation can be changed accordingly in feedback to the force of light that will shatter the solar panel. In this way, we can capture more amount of energy received from the solar panel and on the different ways of angles of the slope present [1]. The tilt angle of the solar panel can be found by the sunlight present. Meanwhile, the tracking of several energy produced by the solar panel and then, the number of loads utilized by the electric vehicle charging station. By using different projection angles, we can get the maximum intensity from the solar panel, the intensity generated by the PV solar panel is higher than that if the PV solar panel is based rigidly. An electric car or an electric vehicle can be charged where the vehicle can be set in a particular circle is strained on every electric vehicle for charging. If we want to monitor the charging of the electric vehicle means we can use the technique called the internet of things. Then the different types of charging channels are going to the usual partition area and to produce the people realm can be freely attainable. Normal cars having gasoline engines can draw the fuel consumption at a gas station only.

II.SYSTEM MODEL AND ASSUMPTIONS

Batteries typically have a low energy density, making them heavy, expensive, and bulky. Furthermore, it is sluggish to charge and has a limited lifespan. Mostly, batteries like Lithium-ions are now employed in electric vehicles. The cruising range is limited by battery capacity. Adding the batteries will extend the cruising range, but it will also raise the vehicle's weight and cost. Some writers [3], [6] proposed quick battery charging solutions that reduce complete

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charging time to less than 30 minutes. Fast charging solutions are now available, however, they are expensive and difficult to operate. Still, the time it takes to charge a battery is longer than the time it takes to refill a car that runs on fossil fuel. Another option is to employ "swapping stations," where the drained batteries of EVs are swapped for completely charged [3]. Charging systems are critical to the advancement of electric vehicles.

Plug-in type charging (conductive charging or wired type charging) and wireless type charging (contactless method) are the two types of EV battery charging technologies now available. Based on charging platforms, plug charging systems are further divided into Off-Board and On-Board chargers. It shows a general charging concept for a conductive charging system. High-power cables, which are used to plug-in electric vehicles, are one of the key concerns with conductive charging. Damaged wires or improper handling might pose a threat. Furthermore, conductive charging techniques are vulnerable to theft and vandalism. WPT is an alternative new technology that was first offered by Nikola Tesla in the nineteenth century and has now evolved into a competitive option for charging stations that are connected wired. This type of technique has the potential to substitute transmitters and receivers with plug-in interfaces, allowing electricity to propagate in the manner of electromagnetic or static waves without making a connection, as shown in Fig. 2. WPT systems utilize the power electronic converters to transfer power from the receiver towards the batteries or driving device. The usage of battery systems is widely used in many manufacturing industries, production, export, and import, for energy storage devices, etc. for millions and millions of years. Plug-in charging system block diagram. The applications of the battery storage devices that are analyzed for permissive automation for conveying rectification and for a smart/micro grid application and the structure present in the battery management can more activate the intensity among electric vehicles (EVs) and the electric grid.

III.EFFICIENT COMMUNICATION

The plug-in hybrid electric vehicle (PHEVs or EVs) gives the battery storage operations and the energies are passed over the bidirectional dc-dc chargers combined with a system called conventional PV such consists of a very high-voltage dc bus among the sub-combinations present and the inverter part. The combination of dc-dc electric vehicle chargers provides the convenient point in the DC bus and it takes the input of the before inverter values for the grid connection. The connected grid and the islanding modes are used as a switch in the signaling medium in the dc bus. The combination of the PV and the charger gives a huge amount of power convenience that contains the potential and powerful dc charging from a renewable source or the network. The ability for the cost reduction in the PV and Charger function is likely related to the bi-directional inverter . In this review paper, the author looks at the problem domain of finding the location and determining the size of solar-powered Electric vehicle charging stations in urban and rural areas. In the face of the aforementioned issues, the goal is to improve revenue by using renewable electricity in charging points to satisfy charging needs. In this paper, the author explains a method for jointly deciding the locations of the area and sizes of charging stations, as well as developing the architectural style of the EV-PVs system and conducting comparative analyses. This paper provides a brief overview of recent work in the field of PV solar array DC charging stations for EVs. There is a brief discussion part and a study available of the various charging station components. To conclude, grid operators and carmakers will give more importance to and invest in PV-EV chargers that use V2G technology in the future. To summarize, as even more operations are incorporated into the process, the photovoltaic- voltaic charging configuration becomes much more complicated, requiring smart controlling methods.

The main aspects such as low graphite, power consumption, evergreen, natural conservation, and pure zero radiation by using the solar electric vehicle (SEV) and by using the solar electric battery (SEB) for the upcoming prospects. In a solar electric vehicle (SEV) the dual-mode battery can be used for power saving and the solar panels are to be used. They could be attained by applying photovoltaic (PV)-driven and battery-driven separately. The solar electric vehicle (SEV) has the components such as solar Photovoltaic panels, electric motor, battery, motor (vehicle) controller, and motor (vehicle) body. Solar Photovoltaic panels are panels that can be attached to the sides of the vehicle and on the top of the vehicle. The batteries and the solar PV panels are linked over the controller of the vehicle body. Solar PV panels do not charge the batteries directly but they can give energy flow to the motor. The major function of the vehicle controller is to keep the vehicle running the electricity.

IV.PROPOSED SYSTEM

With the main motivation of charging the EV directly from PV electricity, the PV system, the supply of electric vehicle equipment (EVSE), and the network grid are all incorporated into an EV-PV charger. DC link charging system passing through CHAdeMO systems and hereby the standard like Combined Charging Standard (CCS) will be used in Europe in the future to provide dynamic charging, rapid charging, and V2X compatibility Using changeable charging power, or adjusting the charging power range over a long time duration, is referred to as dynamic charging. As a result, EV charging will be able to precisely track fluctuating PV power generation. Two distinct system configurations are

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available to incorporate EV, PV, and the are all integrated into a single multiport converter (MPC). 2. Grid Network, PV, and EV power converters that are interconnected through a shared DC bus. The common type shared bus is employed to distribute the solar PV electricity among EVs and to interchange power between EVs and the grid. The system's design may be one of the 4 versions available depending yet if the interconnecting bus is AC (1 230V 50Hz or 3 400V, 50Hz grid) or DC using the two Solar photovoltaic panels and EV charging/discharging are handled by using separate converters. The PV converter is like a type of maximum power point tracking (MPPT) DC/AC inverter, whereas the Electric Vehicle charger is a type of AC/DC converter. This type of architecture's backbone is the current 50Hz AC grid, via which all electricity is routed. The downside is that the PV electricity cannot be utilized to charge the EV directly in DC form. This mandates the PV inverter's unneeded transformation from DC charging to AC charging, in the same way, as the EV charger's conversion from AC to DC employs a Grid (micro) DC to connect the EV, Photovoltaic panels, and the grid. Both the Photovoltaic and Evs converters are DC/DC converters that seem to have MPPT technique and charging management. The DC bus link allows for the usage in a direct mode of PV DC electricity for the EV DC charging, resulting in increased performance of efficiency The (optional) mid inverter that links the grid of AC and DC enables the operation of V2G and the energy differential among PV systems and EV consumption is fed/drawn.

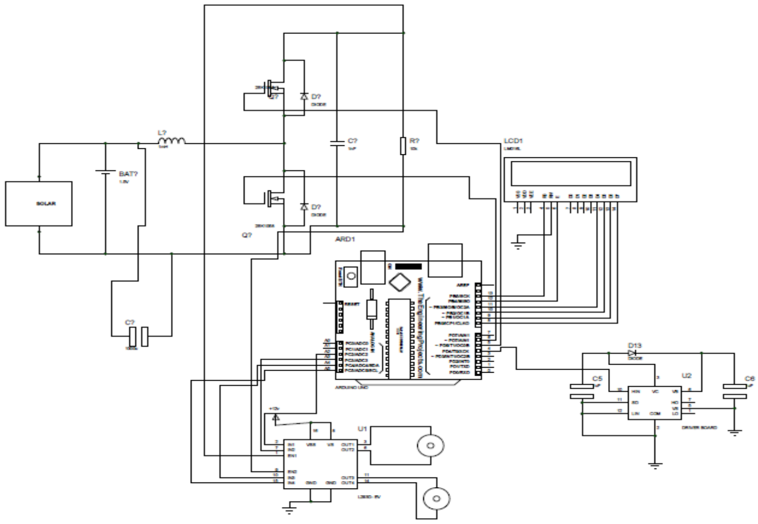

Figure: Circuit Diagram for Proposed System

Several researches have been carried out to investigate the benefits of a Photovoltaic EV charging station. Source [38] shows the benefits of using PV to start charging the EV and how much it contributes to increased infiltration between both Photovoltaic and Electric cars. Vehicles can also help to mitigate the negative consequences of excess PV generation contributes to a better understanding of European explorers, the United States, where it is illustrated that charging an EV from the grid is feasible. PV is much less expensive and has a lower carbon footprint lower Carbon footprint than charging EVs from the power system. Particular instance research equates EV charging mechanisms: only grid architecture, just PV with energy storage, and grid-connected system PV and reveals that grid-connected system PV performed best commercially than some other two methods. The researchers of explain the use of Solar PV and Electric cars as a storage technology system is to reduce maximum grid load capacity. This research shows that PV-based EV charging is superior to grid-based Electric vehicle charging. There is a plethora of literature on various charging methodologies or accomplishing numerous financial, analytical, or socioeconomic goals in addition to Photovoltaic- voltaic EV charging.

V. RESULT AND DISCUSSION

One of the most difficult aspects of EV technology is charging time. In ICE automobiles, the battery recharging time is longer than the oil refilling period. There are primarily five aspects that determine the rapid charging of a system that may be used to minimize charging time. Battery Size is the capacity or size measured in kWh improves, so does the charging time. A larger battery will take longer to charge because it takes longer to charge a smaller battery. State of Charge (SOC) vehicle battery's SOC indicates whether it is fully charged or discharged, partially charged or

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discharged, and the time taken to charge the battery changes accordingly. The maximum charging rate of the vehicle The electric vehicle may only be charging up to a certain amount before it must be turned off. A battery with a maximum amount of charge of 22kW, for example, cannot be charged up to a 50kW charging station. The maximum charging rate of the charge point and The charging time duration is determined mainly by the wattage of the outlet to which the vehicle battery is attached. When a 7kW outlet is used to charge a 22kW battery, it will charge at the same pace as a 7kW battery, increasing the charging time [53]. When the vehicle's battery is charged by using a charger in the range of 7kW, the charging period is typically 8 hours, and the battery may be utilized for up to 60 kilometers. Table 5 shows the time it takes to charge a battery in various corporate vehicles using various charger rates. Model I is the Nisan Leaf 2018, Model II is the Tesla Model S 2019, and Model III is the Mitsubishi Outlander PHEV 2018. Inductive charging, often known as wireless charging, is a novel developing idea in which there is no physical touch or interaction between the car and the charger. It operates on the same concept as transformers, which is electromagnetic induction. The wireless transmission charging is calculated using the spacing between the primary and secondary coils. Energy is transferred through thin air using a magnetic field. The sole disadvantage is that it has a minimum efficiency and energy density when compared to the conductive charging, as well as in the case of maximum cost. However, it is handy in the sense that charging may be done without having to deal with the inconveniences of plugging and removing the plug while in charging. Automobiles may be charged regardless due to the size of the connectors or sustainability.

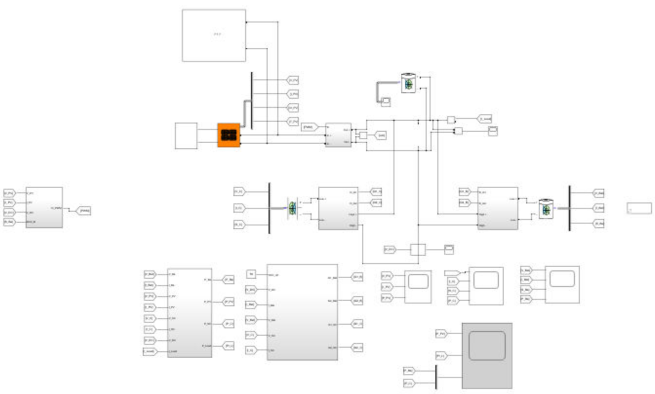

Figure: Simulation Circuit Diagram

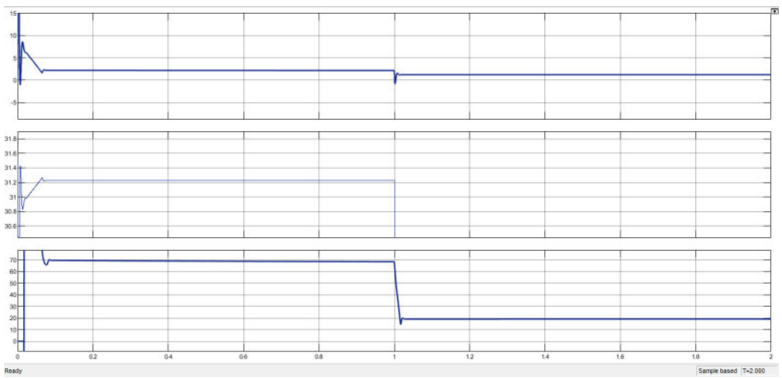

Figure: Simulation Output Waveform

VI.CONCLUSION

For a solar-powered charging station in EV, several system designs and the power converter topologies are evaluated and analyzed. In the system Architecture 3, the system uses three different types of the port converter to interconnect the electric vehicle, PV panel, and smart grid has many advantages when compared to the other architectures, including the need for Photovoltaic DC power for charging the EV in direct mode, the easiest way of controlling and needs

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maximum energy density is attained by using an integration of the converter, and thus, the usage of the existing type AC grid for connecting the multiple chargers of EV-PV. EV charging in the country of Europe will be assisted in the need of future by the use of DC charging via the CHAdeMO and the available Combination of the Charging Standard, which allows for dynamic wireless charging, rapid fast charging, and compatibility of V2X. An examination did base on the published research article based on the subject of electric vehicles and photovoltaic charging reveals that most studies overlook the EV charger's isolation and bidirectional capabilities. The focus has been on designs 1 and 2, which employ individual converters for both the PV and EV. The obstacles of implementing a charging station are examined in this study in terms of grid overloading, battery charging time, and traffic congestion caused by longer wait times at EVCS. Various technologies are discussed to overcome these obstacles. The entire electrical system for transportation may be needed for more dependable and effective with the planned usage of these technologies. This page also discusses several charging procedures, as the vehicle's battery is the most important element of an electric vehicle and must be able to be charged effectively without making any internal damages. This study provides an in-depth look at the most important aspects of WPT systems for EV charging. This article provides a quick overview of the coil detecting method, coil design, and several coil types utilized in electric cars. An enormous difference in the environment may be witnessed by adopting a 100 percent electric vehicle. This will make a significant contribution to a more sustainable future. However, before they are used, authorities must construct more charging stations that can charge the batteries more quickly and use renewable energy sources. There is now a lot of research being done to improve the overall system's reliability.

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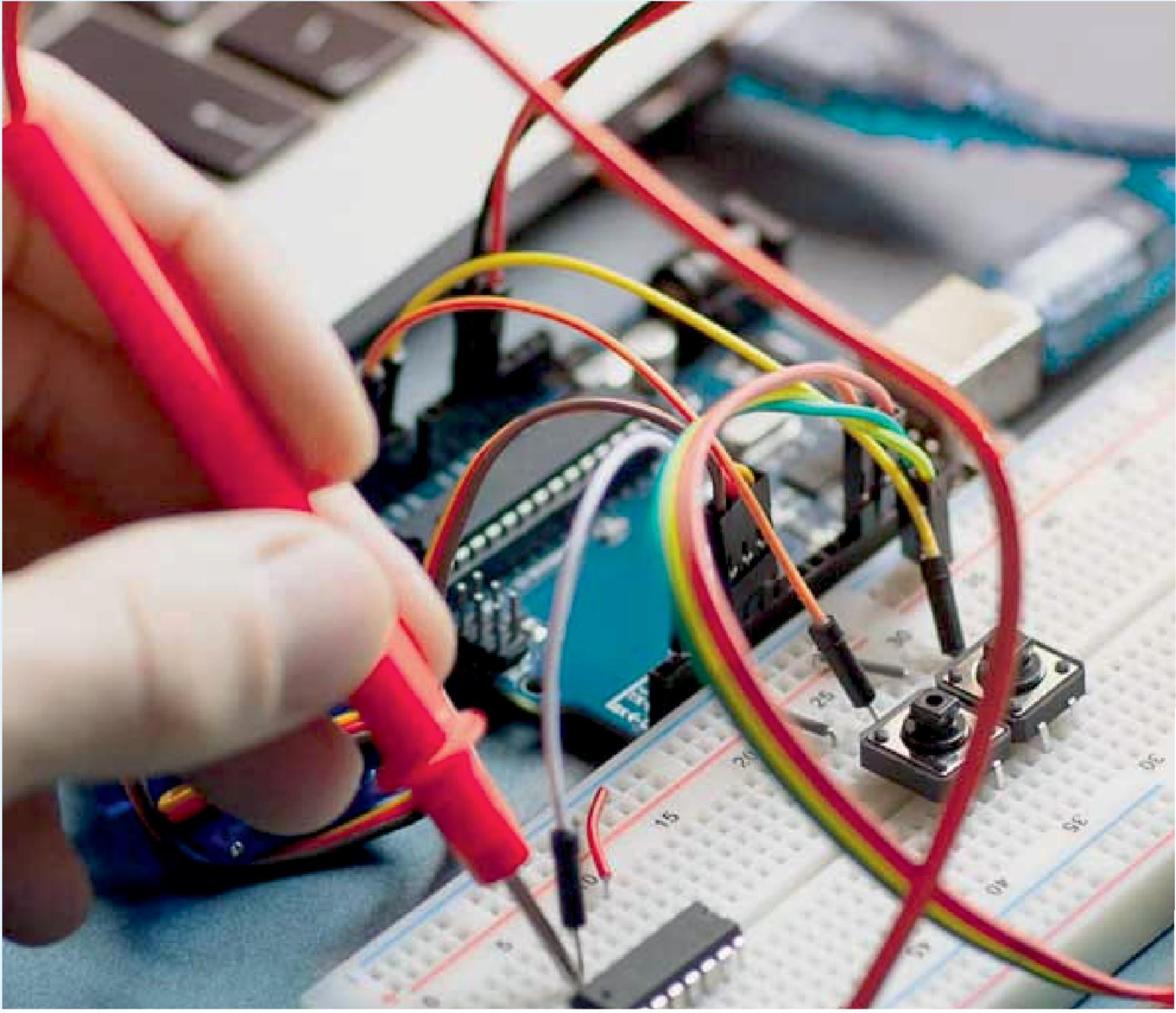

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