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SOLAR ELECTRIC VEHICLE TO VEHICLE CHARGING SYSTEM

1. Harsh Sharma (Department of Electronics & Instrumentation Engineering, Bundelkhand University, Jhansi (U.P.), INDIA.)
2. Rishabh Katiyar Department of Electronics & Instrumentation Engineering, Bundelkhand University, Jhansi (U.P.), INDIA.)
3. Sahil Soni Department of Electronics & Instrumentation Engineering, Bundelkhand University, Jhansi (U.P.), INDIA.)
4. Sandhya Singh (Department of Electronics & Instrumentation Engineering, Bundelkhand University, Jhansi (U.P.), INDIA)

ABSTRACT

The increasing popularity of electric cars (EVs) has made it necessary to create a dependable and effective infrastructure for charging them. This study offers a thorough analysis of electric vehicle charging systems, emphasizing the infrastructure, charging technology, and related difficulties. The evaluation includes an examination of several charging standards, such as DC fast charging, Level 1, and Level 2, emphasizing their technical details, charging durations, and suitability for various EV models. The difficulties with EV charging infrastructure are also covered in this article, including grid interconnection, peak demand management, interoperability, and standardization.

In addition, it looks at new developments in EV charging systems, such as smart charging options, wireless charging, and vehicle-to-grid (V2G) integration. This study seeks to provide insights into the important factors for the development of sustainable and effective electric vehicle charging systems by doing analysis the existing status of EV charging infrastructure and talking about possible developments.

1. INTRODUCTION

Many Different type of electric vehicle charging system are described in literature and many of them implemented in practical application.

This paper mainly focuses on the primary reason, why most of the people are not preferring electric vehicle technology even A report by the Institute of Transport Economics forecasts that most vehicles in Norway will be electric by 2050 – 99% of the short vehicles (under 5,6 meters), 98% of the medium vehicles (between 5,6 meters and 7,6 meters) and 75% of the long vehicles (above 7,6 meters).

The main reason not to prefer electric vehicle technology in today's time is unavailability of charging stations within a certain distance.

People are worried about to get stuck in a middle of their journey and they know that charging station are not available as like petrol pump within a small distance.

One electric bike can cover up to distance of 60 to 70 km if it fully charged at once. so today's people are not sure to use electric vehicle for long distance and there is still some unsurety and uncertainty to

getting discharged, so we are introducing our **SOLAR VEHICLE TO VEHICLE CHARGING SYSTEM.**

With the help of this system people can get their electric vehicle charged at any time and any place. Basically, this system works on online calling system or booking system.

1.1 Solar V-To-V Charging System

An idea known as a solar vehicle-to-vehicle charging system (SV2V) enables electric vehicles (EVs) to use sun energy to charge one another. With the help of this system, electric vehicles (EVs) may top off their batteries while driving, extending their range and decreasing the need for external charging stations.

Here's how a solar vehicle-to-vehicle charging system typically works:

1.2 Solar energy

Solar panels are mounted on the roofs of participating EVs or other appropriate surfaces. By absorbing sunlight, these solar panels produce power.

1.3 Wireless Charging Technology

Additionally, the EVs have wireless charging capabilities that enable them to wirelessly transfer electricity to other vehicles. These technologies include inductive charging coils.

1.4 Energy Transfer

An energy transfer process is started when two EVs that need to recharge their batteries get close to each other and one of them has a sufficiently charged battery.

1.5 Energy Transfer Control

The control system regulates the transfer of electricity from the solar panels of the "donor" vehicle to the battery of the "receiving" vehicle. This control ensures efficient energy transfer while maintaining the safety and integrity of both vehicles' electrical systems.

1.6 Energy Usage Optimization

The technology optimizes energy use by taking into account variables including driving conditions, the quantity of sunshine available, and the receiving vehicle's energy requirements.

1.7 Continuous Charging

The receiving car continues to receive charging from the donor vehicle as long as both are moving and there is sunlight.

2. Methodology

2.1 Literature Review

has out a thorough analysis of the body of research on electric vehicle (EV) charging systems, with a particular emphasis on solar vehicle-to-vehicle (SV2V) charging technology.

To comprehend the present situation of SV2V charging systems, scholarly articles, industry reports, patents, and pertinent government documents were examined.

2.2 Identification of SV2V Charging System Components

determined which essential parts—solar panels, wireless charging technology, control systems, and energy management systems—are needed for SV2V charging systems.

investigated solar panel integration techniques that work well for SV2V charging as well as current wireless charging systems.

2.3 Case Studies and Existing Implementations

examined case studies and current SV2V charging systems to comprehend their setup, functionality, and results.
examined actual SV2V charging system examples to find best practices and possible problems.

2.4 Technical Evaluation of SV2V Charging Systems

evaluated the SV2V charging control algorithms, wireless charging systems, and solar panel technical specs and performance data.
features like compatibility with various EV models, safety, charging speed, and energy economy were taken into consideration.

2.5 Simulation and Modelling

employed simulation tools to assess the viability and efficiency of SV2V charging systems under varied circumstances and to model the energy transfer process between cars.
carried out simulations to evaluate the effects on charging efficiency of variables such sunshine intensity, vehicle speed, and distance between cars.

2.6 Prototype Development and Experimental Validation

created a working prototype of an SV2V charging system to confirm that the suggested idea is workable.
created and put into use a testbed to run studies and collect information on how well the SV2V charging technology works.

2.7 Data Analysis and Discussion

examined the gathered information, the outcomes of simulations, and the results of experiments to assess the viability and efficiency of SV2V charging systems.
talked about the benefits, restrictions, and possible difficulties associated with SV2V charging technology.

2.8 Recommendations and Future Research Directions

made suggestions for the creation and application of SV2V charging systems while taking market trends, legal frameworks, and technology developments into account.
explored prospective avenues for future study and chances to enhance the SV2V charging technology's scalability, efficiency, and dependability.

3. Working Process of the system

The system works on solar energy. The solar powered vehicle captures the sunlight and convert it into electric energy with the help of solar panel.

Fig.1 Solar powered Vehicle

Then it stores the electric energy in a chargeable battery so that the electric energy can be transferred to the other electric vehicle.
This stored energy can be transferred to the solar powered vehicle to another vehicle.

Fig.2 Flow Chart

4. COMPONENTS

4.1 Motor Driver

The electric motor that powers the car is managed by the motor driver. The motor driver in the SV2V charging system makes sure the car's electric motor runs smoothly while energy is being transferred. In order to account for variations in power demand brought on by the energy transfer, it modifies the motor's speed and torque. To ensure seamless and effective vehicle operation during wireless charging, the motor driver may additionally communicate with the control system in order to synchronize the motor's operation with the energy transfer process.

Fig.3 Motor Driver

4.2 4CH RC Remote control

An essential component of the solar vehicle-to-vehicle (SV2V) charging system's wireless control and operation is the 4-channel RC (Radio Control) remote control 27MHz transmitter and receiver system. With the transmitter, users can remotely send control signals to the SV2V charging system at a frequency of 27MHz. The transmitter has four channels that allow the user to send different control commands, such starting or pausing the charging process, changing the charging parameters, or choosing different charging modes. However, these control signals are received by the receiver, which is connected to the control system of the SV2V charging system, and are then forwarded for execution.

Fig.4 Transmitter and Receiver

4.3 Solar Panel

Solar panel used to capture the sunlight and convert it into electric energy to store it and transfer the energy to others electric vehicle.

Fig.5 Solar Panel

4.4 Chargeable Battery

This chargeable battery used to store the converted solar energy into electric energy to transfer it to other electric energy.

Fig.7 Chargeable Battery

5. CONCLUSION

This study concludes by offering a thorough discussion of solar vehicle-to-vehicle (SV2V) charging systems and emphasizing how revolutionary they could be for the infrastructure supporting EV charging. We have looked at the main elements, difficulties, and possibilities related to SV2V charging technology through a thorough literature review, technical assessment, and analysis of current implementation.

According to our analysis, SV2V charging systems have a number of benefits, such as a longer charging range, less reliance on conventional infrastructure, and the use of clean, renewable solar energy. SV2V systems have the ability to alleviate range anxiety and improve the usability and sustainability of electric vehicles by utilizing solar electricity and allowing EVs to charge while driving.
Notwithstanding the auspicious advantages, SV2V charging systems encounter a number of obstacles, such as technological constraints, concerns related to standardization, and regulatory barriers. The resolution of these issues and the realization of

SV2V charging technology's full potential require more study and development.

To sum up, SV2V charging systems are a viable way to improve the sustainability, ease of use, and efficiency of electric cars. SV2V technology has the potential to significantly contribute to the acceleration of the adoption of electric vehicles and the reduction of greenhouse gas emissions in the transportation sector through sustained research and collaboration among academics, industry, and government.

5.2 Advantages

5.2.1 Enhanced Convenience

By enabling EVs to charge while in motion, the SV2V charging system reduces the need for regular pauses at charging stations. As a result, owning an EV is more convenient because charging downtime is decreased.

5.2.2 Increased Range

The SV2V charging system increases the range of electric vehicles (EVs) by using solar energy to charge them while they are in motion. This enables longer trips without the need for external charging infrastructure.

5.2.3 Decreased Reliance on Charging Stations

In locations with inadequate infrastructure for charging, the SV2V charging method lessens reliance on conventional charging stations. Because of this, EVs are now more feasible and available, even in far-off places.

5.2.4 Use of Clean Energy

The SV2V charging system encourages the use of clean and renewable energy sources by using solar energy to charge, which lowers greenhouse gas emissions and the environmental impact of using traditional charging methods.

5.2.5 Enhanced Efficiency

By directly charging EVs from solar panels while driving, the SV2V charging system maximizes the utilization of solar energy. This lowers the energy loss connected with grid-based charging and increases overall energy efficiency.

5.2.6 Cost Savings

By using free solar energy for charging, the SV2V charging system helps EV owners save money on electricity. Furthermore, it lessens the requirement for costly infrastructure investments in charging stations.

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