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Design and Implementation of a Vehicle-to-Vehicle (V2V) Charging System

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Abstract*: Electric vehicles (EVs) are rapidly gaining popularity due to their environmental benefits and efficient energy utilization. However, the current EV infrastructure faces challenges in ensuring convenient access to charging stations, particularly in remote areas or during emergencies. To address these issues, this project introduces a novel approach for vehicle-to-vehicle (V2V) energy transfer using on-board converters. The proposed system integrates a battery with a two-switch bidirectional DC-DC converter, a four-switch bidirectional isolated converter, and additional two-switch and four-switch isolated converters. These components enable controlled, bidirectional energy transfer between vehicles while ensuring electrical isolation and high efficiency. This innovative design allows EVs to safely and efficiently share energy, optimizing power transfer and reducing dependence on external charging infrastructures.*
The system operates in two modes:
• Mode 0: EV1 is charging while EV2 is discharging.
• Mode 1: EV1 is discharging while EV2 is charging.
In both modes, the state of charge (SOC) is regulated by maintaining a constant voltage of 350 V. When charging, the current becomes negative (drops below 0), indicating energy inflow. Conversely, during discharging, the current becomes positive (rises above 0), reflecting energy outflow. The flexibility and scalability of the proposed system make it suitable for diverse EV configurations, enhancing energy resilience and supporting sustainable transportation networks. This approach represents a significant step toward addressing the limitations of existing EV infrastructures and fostering a more robust and interconnected energy ecosystem.

Keywords: Electric Vehicles (EVs), Vehicle-to-Vehicle (V2V) Energy Transfer, On-Board Converters, Bidirectional DC-DC Converter, Isolated Converters, State of Charge (SOC) etc.

I. INTRODUCTION

Electric Vehicles (EVs) have emerged as a sustainable alternative to traditional internal combustion engine (ICE) vehicles due to their lower carbon footprint, energy efficiency, and reduced dependence on fossil fuels. The growing adoption of EVs is driven by advancements in battery technology, power electronics, and charging infrastructure. However, the widespread deployment of EVs is hindered by challenges such as limited charging stations, long charging times, and concerns about battery range and energy availability in critical situations [1][3][6].

To address these challenges, researchers have explored various charging solutions, including grid-based charging stations, battery swapping systems, and wireless charging technologies [2][4][5]. Among these, Vehicle-to-Vehicle (V2V) energy transfer has gained attention as a promising solution to enhance energy resilience and mitigate range anxiety. V2V energy transfer allows an EV with surplus battery energy to charge another EV in need, reducing dependency on stationary charging stations and offering a decentralized energy-sharing approach [7][8][10].

Despite advancements in charging technologies, several challenges remain in achieving an efficient and practical V2V energy transfer system:

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1. Inefficient Power Conversion – Many existing bidirectional charging systems suffer from high conversion losses, leading to reduced overall efficiency in energy transfer [1][3].
2. Lack of Standardized Control Strategies – The absence of a universal control mechanism for bidirectional energy transfer affects system stability and interoperability between different EV models [4][5][11].
3. Voltage and Current Fluctuations – Traditional bidirectional converters often experience fluctuations in voltage and current during energy transfer, leading to instability and potential battery degradation [6][8][13].
4. Limited Electrical Isolation – Several V2V energy transfer systems fail to ensure adequate electrical isolation, which poses safety risks and affects power quality [12][14].
5. Scalability and Flexibility Issues – Most V2V energy-sharing models are not designed to support diverse EV configurations, limiting their widespread adoption [9][15].

These limitations highlight the need for a more efficient, safe, and scalable V2V energy transfer system.

The motivation behind this study is to develop a robust and efficient on-board converter-based V2V energy transfer system that addresses the above challenges. Unlike conventional charging methods that rely solely on external charging infrastructure, V2V energy sharing enables peer-to-peer energy exchange, allowing EVs to assist each other in remote or emergency situations. By integrating advanced bidirectional converters, the proposed system ensures high efficiency, controlled energy transfer, and improved system reliability.

The primary objectives of this paper are:

1. To design and implement a bidirectional V2V energy transfer system using a combination of two-switch and four-switch isolated converters for improved power efficiency and electrical isolation.
2. To develop a control strategy that ensures stable voltage regulation and mitigates current fluctuations during charging and discharging cycles.
3. To evaluate the system's performance under different operational modes and analyze its feasibility for real-world EV applications.
4. To compare the proposed system with existing bidirectional charging solutions in terms of efficiency, safety, and scalability.

The key contributions of this paper are:

- Novel On-Board Converter Design: The integration of two-switch bidirectional DC-DC converters and four-switch bidirectional isolated converters for improved power transfer efficiency and electrical isolation.
- Enhanced Stability and Control: A constant voltage regulation mechanism to maintain a stable 350V during charging and discharging, ensuring system reliability.
- Dual-Mode Operation: The system operates in Mode 0 (EV1 charging, EV2 discharging) and Mode 1 (EV1 discharging, EV2 charging), allowing dynamic energy exchange between vehicles.
- Improved Safety and Scalability: The proposed system ensures safe energy transfer while being adaptable to different EV configurations, promoting sustainable EV networks.
- Paper Organization

The rest of the paper is organized as follows: Section 2 provides a comprehensive review of existing V2V energy transfer systems and bidirectional converter technologies. Section 3 details the proposed system architecture, including the converter design and control strategies. Section 4 Implementation of the proposed method. Section 5 presents simulation results. Section 6 concludes the paper and outlines future research directions.

II. RELATED WORKS

J. Yuan et al. [1] provide a comprehensive review of bidirectional on-board chargers, highlighting their importance in facilitating efficient energy transfer and supporting functionalities like vehicle-to-grid (V2G) and vehicle-to-vehicle (V2V) energy exchange. The study emphasizes advancements in power topologies and control strategies, aiming to enhance energy efficiency and reliability.

M. Y. Metwly et al. [2] discuss integrated on-board chargers with advanced topologies. The work focuses on optimizing slot/pole combinations for enhanced performance. It also addresses challenges in achieving compact, efficient, and cost-effective designs for modern EV applications.

A. Khaligh and M. D'Antonio [3] explore the trends in high-power on-board chargers, emphasizing the need for higher efficiency, faster charging capabilities, and global standardization. The paper provides insights into the market demands and technical challenges in high-power charging systems.

V. T. Tran et al. [4] provide a detailed overview of battery charging infrastructure, examining topologies, power control strategies, and future trends. This paper underscores the importance of V2V and V2G energy exchange to address infrastructure limitations and improve EV adoption rates.

M. R. Khalid et al. [5] offer a comprehensive review of structural topologies, power levels, energy storage systems, and standards for EV charging stations. The study discusses their impact on grid stability and outlines strategies to mitigate potential challenges.

M. Yilmaz and P. T. Krein [6] review various charger topologies, power levels, and infrastructure requirements for plug-in and hybrid EVs. Their analysis highlights the evolution of charging technologies to meet the growing demand for faster and more reliable solutions.

G. Li et al. [7] propose a direct V2V charging strategy within vehicular ad-hoc networks, presenting a decentralized approach for energy exchange. The study demonstrates the feasibility of V2V energy transfer without relying on fixed infrastructure.

R. Q. Zhang et al. [8] develop a flexible energy management protocol for cooperative V2V charging. The proposed protocol ensures optimal energy utilization and maintains system stability during energy exchange.

Performance Analysis of V2V Communications

D. M. Mughal et al. [9] analyze V2V communication performance, proposing novel scheduling and data transmission schemes to enhance the reliability of energy-sharing systems.

E. Bulut and M. C. Kisacikoglu [10] introduce a social charging system for mitigating range anxiety. This system leverages V2V energy sharing to provide assistance in emergencies.

P. You and Z. Yang [11] explore optimal scheduling strategies for charging stations serving multiple EVs, integrating V2V energy transfer for improved efficiency.

A.-M. Koufakis et al. [12] propose an optimal EV charging scheme incorporating V2G and V2V energy transfer, enhancing the overall efficiency of energy management systems.

E. Ucer et al. [13] discuss the integration of a flexible V2V charger as part of a broader vehicle-gridintegration framework, demonstrating its potential to enhance energy resilience.

C. Liu et al. [14] review the opportunities and challenges associated with V2V, vehicle-to-home (V2H), and V2G technologies, highlighting their role in the evolving EV ecosystem.

P. Mahure et al. [15] analyze bidirectional conductive charging systems for V2V energy exchange, emphasizing their efficiency and potential to reduce dependency on external charging infrastructure.

Reports from Andromeda Power [16] and Hyundai [17] highlight the commercial adoption of V2V charging facilities, showcasing real-world implementations and their impact on EV usability.

S. Taghizadeh et al. [18] present a multifunctional single-phase on-board charger with V2V charging assistance capability, offering a compact and efficient solution for energy sharing.

T. J. C. Sousa et al. [19] explore innovative approaches to V2V power transfer, emphasizing system flexibility and efficiency improvements.

R. W. Erickson and D. Maksimovic [20] provide foundational insights into power electronics, serving as a theoretical basis for designing efficient V2V energy transfer systems.

III. PROPOSED METHOD

The proposed method introduces a novel Vehicle-to-Vehicle (V2V) energy transfer system utilizing an on-board converter-based architecture to enable bidirectional power exchange between EVs. The system comprises a two-switch bidirectional DC-DC converter, a four-switch bidirectional isolated converter, and additional isolated converters to

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ensure efficient and controlled power transfer while maintaining electrical isolation. This setup allows seamless energy exchange between two EVs, operating in two distinct modes: Mode 0, where EV1 is charging and EV2 is discharging, and Mode 1, where EV1 is discharging and EV2 is charging. During both modes, the system maintains a constant voltage of 350V, ensuring a stable charging and discharging process.

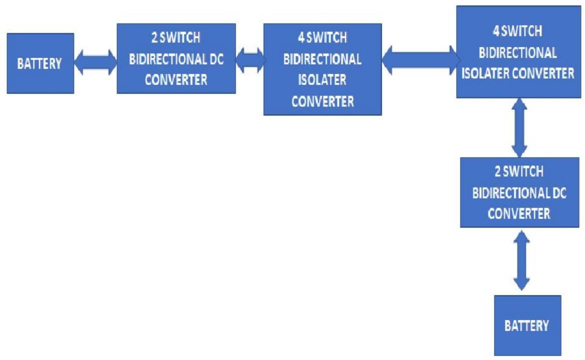

Figure 1: Proposed Block Diagram

The proposed method integrates advanced power control mechanisms to regulate voltage and mitigate current fluctuations, ensuring safe and efficient energy transfer. By leveraging bidirectional isolated converters, the system enhances power efficiency, reduces losses, and improves reliability, making it suitable for real-world EV applications. Additionally, the scalable and flexible nature of the proposed architecture allows integration with different EV configurations, supporting sustainable and resilient transportation networks The block diagram of the proposed method shown in figure 1 that Vehicle-to-Vehicle (V2V) energy transfer system consists of a structured energy flow pathway ensuring efficient and controlled bidirectional power exchange between Vehicle 1 (EV1) and Vehicle 2 (EV2). The system begins with Vehicle 1's battery, which is connected to a two-switch bidirectional DC-DC converter. This converter regulates the voltage and current flow, enabling smooth bidirectional energy transfer while minimizing power losses. The output of this DC-DC converter is then fed into a four-switch bidirectional isolated converter, which provides electrical isolation and enhances energy transfer efficiency. This isolated converter ensures stable operation and protects both vehicle batteries from unwanted electrical interactions. The power is then transmitted to Vehicle 2, where it first passes through another four-switch bidirectional isolated converter, ensuring that the energy transfer remains isolated and efficient. Finally, a two-switch bidirectional DC-DC converter in Vehicle 2 further regulates the power before delivering it to the battery of Vehicle 2. The reverse energy flow is also possible, allowing Vehicle 2 to charge Vehicle 1 when required. This design ensures a safe, reliable, and efficient energy exchange mechanism with proper electrical isolation, optimized power conversion, and minimal losses, making it ideal for real-world V2V charging applications.

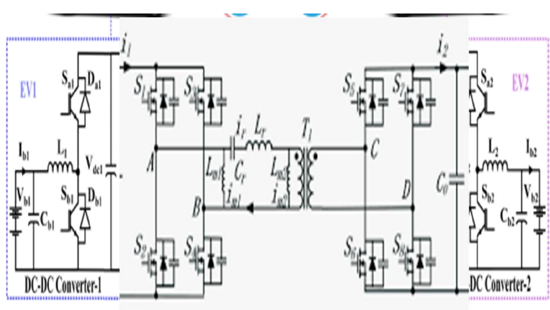

Figure 2: Circuit Diagram of proposed method

The circuit diagram of the proposed Vehicle-to-Vehicle (V2V) energy transfer system consists of interconnected power electronic converters that facilitate bidirectional energy flow between two electric vehicles while ensuring efficient

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power conversion and electrical isolation. The system incorporates a two-switch bidirectional DC-DC converter, a four-switch bidirectional isolated converter, and additional filtering components to regulate power flow.

On Vehicle 1 (EV1), the battery serves as the primary energy source, supplying power to a two-switch bidirectional DC-DC converter, which controls voltage and current, ensuring smooth energy exchange. This converter is followed by a four-switch bidirectional isolated converter, which enhances energy transfer efficiency while maintaining electrical isolation between the vehicles. The high-frequency transformer within the isolated converter prevents direct electrical contact, improving safety and system reliability. The output of this converter is then transmitted through power transmission lines to Vehicle 2 (EV2).

On Vehicle 2 (EV2), the incoming power first passes through another four-switch bidirectional isolated converter, which continues to regulate energy transfer while maintaining electrical isolation. The processed power is then supplied to a two-switch bidirectional DC-DC converter, which ensures a controlled voltage and current output before delivering the power to the battery of EV2.

The system operates in two modes: Mode 0, where EV1 is charging and EV2 is discharging, and Mode 1, where EV1 is discharging and EV2 is charging. In both modes, the system maintains a constant voltage of 350V during charging, while current direction determines the charging or discharging status. The use of bidirectional converters ensures that power flow can be reversed as needed, optimizing energy utilization and reducing dependency on external charging infrastructure. This design enhances energy resilience, scalability, and safety, making it an ideal solution for real-world V2V charging applications

Modes of Operation

S. No	**Modes of Operation**		
	Modes	***EV1***	***EV2***
1	Mode 0	Charging	Discharging
2	Mode 1	Discharging	Charging

Table I: Modes of Operation outlines the two operational modes of the proposed Vehicle-to-Vehicle (V2V) energy transfer system, which govern the energy flow between Vehicle 1 (EV1) and Vehicle 2 (EV2). In Mode 0, EV1 is in the charging state, where it supplies power to EV2, which is in the discharging state. In this mode, EV1 provides energy from its battery to recharge EV2's battery, making this mode useful when EV2 needs additional energy to continue its journey. The bidirectional converters facilitate the energy transfer, ensuring that the voltage and current are properly regulated to maintain safe and efficient charging. In Mode 1, the energy flow is reversed: EV1 is in the discharging state, supplying energy to EV2, which is now in the charging state. In this configuration, EV2 is recharged by EV1's battery. This mode allows EV2 to receive power when it is low on charge, helping to extend its range without needing access to an external charging station. These two modes ensure that the energy exchange between the vehicles is flexible and can adapt to various real-world scenarios, such as when one vehicle has surplus energy and the other requires it. The system's ability to switch between these modes efficiently allows for optimized energy distribution and greater flexibility in managing the vehicles' batteries.

SOC , Voltage and Current

S. No	**Operation**			
	Modes	***SOC (%)***	***Voltage (V)***	***Current (A)***
1	Mode 0	Charging	350V	-50
2	Mode 0	Discharging	350V	5

Table II: SOC, Voltage, and Current provides details on the key electrical parameters, including State of Charge (SOC), voltage, and current, during the two modes of operation of the Vehicle-to-Vehicle (V2V) energy transfer system. In Mode 0 (Charging), the SOC indicates that the battery of EV1 is charging, which occurs at a constant voltage of 350V. The current during this operation is negative (-50A), indicating that EV1 is supplying power to EV2. The negative current signifies a flow of energy from EV1 to EV2, where EV2 is in a discharging state and receiving energy to recharge its battery. In the Mode 0 (Discharging) state, EV2 is discharging and the current becomes positive (5A), indicating that EV2's battery is providing power to EV1. The voltage remains constant at 350V, ensuring that the

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energy transfer continues at a stable voltage level. This positive current implies that energy is flowing from EV2 to EV1, where EV1's battery is recharged.

This table highlights how the voltage is maintained constant at 350V in both charging and discharging operations, and the current direction changes based on the mode of operation, reflecting the direction of energy transfer between the two vehicles. The SOC of both batteries plays a key role in determining whether a vehicle is charging or discharging, ensuring that the energy exchange is regulated properly based on the vehicle's battery state.

IV. IMPLEMENTATION

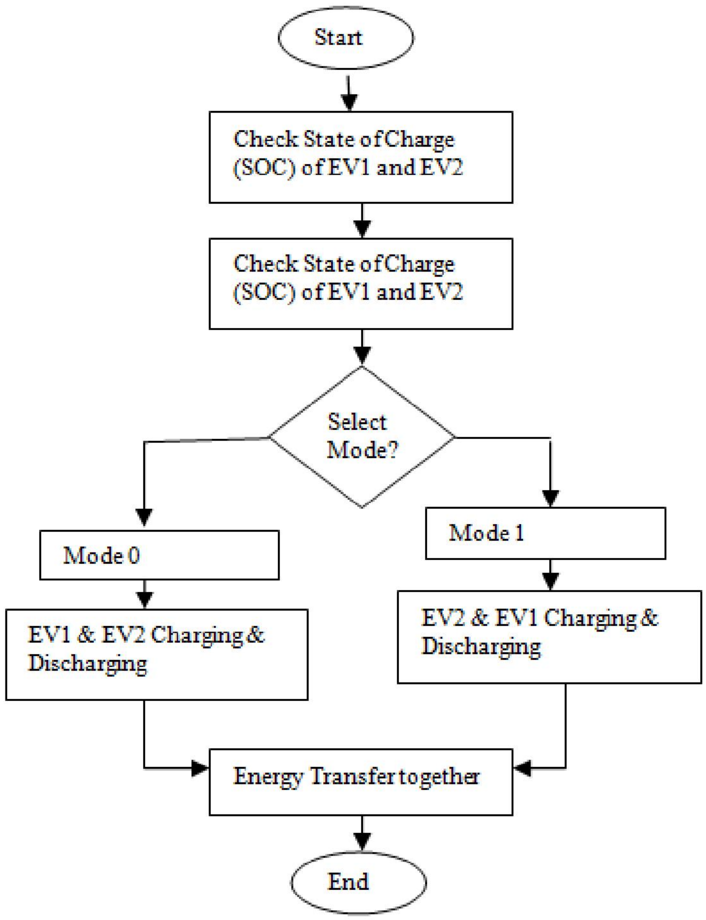

Figure 5: Implementation Flow chart of Proposed method

V. SIMULATION RESULTS

The simulation results were obtained by implementing the Vehicle-to-Vehicle (V2V) energy transfer system in MATLAB 2021a using Simulink for both Mode 0 and Mode 1 operations. The following sections describe the simulation results and their corresponding figures.

This figure 4 illustrates the Simulink model of the system operating in Mode 0 (where EV1 is charging and EV2 is discharging). The Simulink circuit consists of the two-switch bidirectional DC-DC converter and the four-switch bidirectional isolated converter for both EV1 and EV2. The circuit is designed to transfer energy from EV1's battery to EV2's battery while maintaining proper voltage and current regulation. The voltage and current control blocks are included to ensure the system operates at a constant 350V, and the current remains negative (-50A) when charging.

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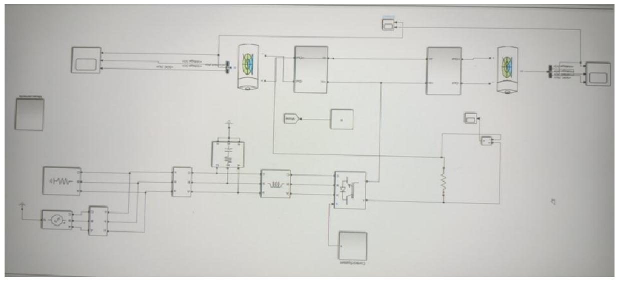

Figure 6: Simulink Circuit in Mode 0

This figure 5 shows the simulation waveform for EV1's status in Mode 0. It illustrates the voltage and current waveforms of EV1 during the charging operation. The voltage is constant at 350V, and the current is negative (-50A), which indicates that EV1 is supplying power to EV2. The waveform shows a smooth transition in the current flow as energy is transferred from EV1's battery to EV2.

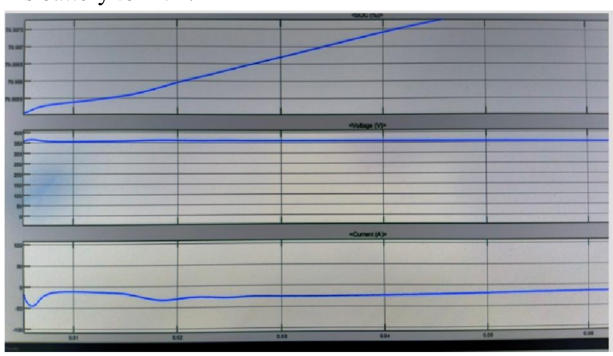

Figure 7: Simulation Waveform for EV1 Status at Mode 0

This figure 6 presents the simulation waveform for EV2's status in Mode 0. The waveform shows the voltage and current characteristics of EV2 as it receives energy from EV1. The voltage remains constant at 350V, and the current is positive (5A), indicating that EV2 is charging. The waveform confirms that EV2's battery is receiving the required power for recharging.

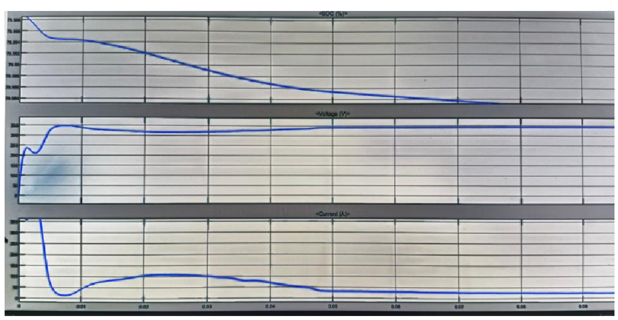

Figure 8: Simulation Waveform for EV2 Status at Mode 0

This figure 7 shows the Simulink model of the system operating in Mode 1 (where EV1 is discharging and EV2 is charging). Similar to Mode 0, the system consists of the same bidirectional DC-DC converters and isolated converters, but the operation is reversed, with EV1 discharging energy into EV2. The voltage control remains at 350V, and the current direction is now positive (5A) for EV1, indicating that it is providing energy to EV2.

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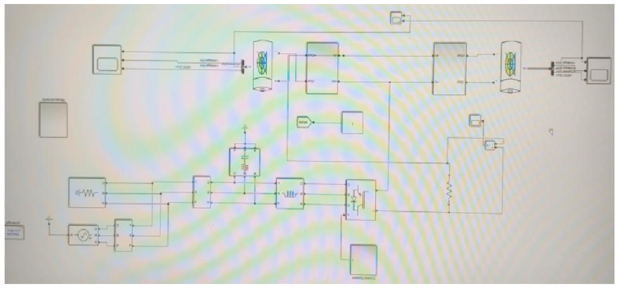

Figure 9: Simulink Circuit in Mode 1

This figure 8 illustrates the simulation waveform for EV1's status in Mode 1. The voltage is maintained at 350V, and the current is positive (5A), indicating that EV1 is discharging power into EV2. This waveform shows the steady transition in the current as energy flows from EV1 to EV2.

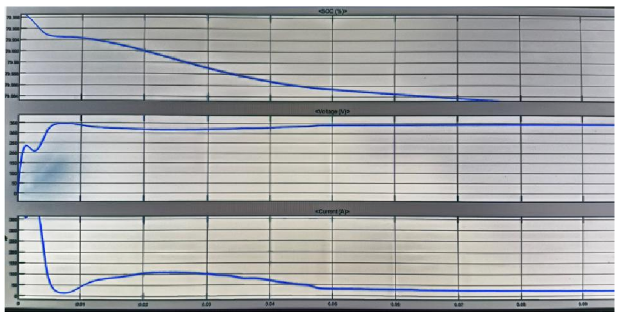

Figure 10: Simulation Waveform for EV1 Status at Mode 1

This figure 9 shows the simulation waveform for EV2's status in Mode 1. In this mode, EV2 is charging, and the voltage is again held constant at 350V. The current becomes negative (-50A), indicating that EV2 is receiving power from EV1. The waveform confirms that EV2 is efficiently receiving the necessary power for charging.

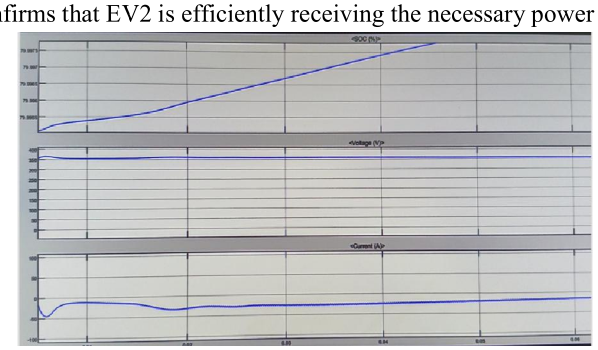

Figure 11: Simulation Waveform for EV2 Status at Mode 1

The simulation waveforms for both Mode 0 and Mode 1 indicate the stable and efficient transfer of energy between the two vehicles, with voltage maintained at a constant value of 350V and current values fluctuating in accordance with the charging and discharging states of the vehicles. The negative current in Mode 0 (when EV1 is charging) and the positive current in Mode 1 (when EV1 is discharging) demonstrate the bidirectional nature of energy transfer, where the direction of power flow is controlled according to the operational mode. The results also verify that the two-switch bidirectional DC-DC converters and four-switch bidirectional isolated converters maintain voltage regulation and safe current flow, ensuring the system operates efficiently and safely. These simulation results validate the functionality of the proposed V2V energy transfer system, ensuring that energy can be transferred effectively between vehicles while maintaining the required safety, voltage, and current parameters.

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VI. CONCLUSION AND FUTURE SCOPE

This paper presented a Vehicle-to-Vehicle (V2V) energy transfer system utilizing on-board bidirectional converters to enable energy exchange between two Electric Vehicles (EVs). The proposed system consists of a combination of two-switch bidirectional DC-DC converters and four-switch bidirectional isolated converters, which ensure safe and efficient energy transfer while maintaining electrical isolation between the two vehicles.The simulation results obtained using MATLAB 2021a and Simulink successfully validated the functionality of the system in two operational modes: Mode 0 (EV1 charging and EV2 discharging) and Mode 1 (EV1 discharging and EV2 charging). The system was shown to operate efficiently, with constant voltage (350V) and proper regulation of current for both charging and discharging operations. The proposed method helps mitigate the dependency on external charging stations, making it a promising solution for range anxiety and energy sharing between vehicles, especially in remote areas or emergency situations.In conclusion, the proposed system enhances the energy resilience of EVs and supports the development of sustainable transportation networks, aligning with global efforts to promote clean and efficient energy usage.

Future work can focus on advanced control algorithms (e.g., Model Predictive Control (MPC) or Fuzzy Logic Controllers) could further enhance the performance of the system by improving the energy management and optimization between the vehicles, ensuring more efficient and adaptive power distribution

REFERENCES

[1]. J. Yuan, L. Dorn-Gomba, A. D. Callegaro, J. Reimers, and A. Emadi, "A review of bidirectional on-board chargers for electric vehicles," IEEE Access, vol. 9, pp. 51501–51518, 2021.

[2]. M. Y. Metwly, M. S. Abdel-Majeed, A. S. Abdel-Khalik, R. A. Hamdy, M. S. Hamad, and S. Ahmed, "A review of integrated on-board EV battery chargers: Advanced topologies, recent developments and optimal selection of FSCW slot/pole combination," IEEE Access, vol. 8, pp. 85216–85242, 2020.

[3]. A Khaligh and M. D'Antonio, "Global trends in high-power on-board chargers for electric vehicles," IEEE Trans. Veh. Technol., vol. 68, no. 4, pp. 3306–3324, Apr. 2019.

[4]. V. T. Tran, D. Sutanto, and K. M. Muttaqi, "The state of the art of battery charging infrastructure for electrical vehicles: Topologies, power control strategies, and future trend," in Proc. Australas. Universities Power Eng. Conf. (AUPEC), Nov. 2017, pp. 1–6.

[5]. M. R. Khalid, I. A. Khan, S. Hameed, M. S. J. Asghar, and J.-S. Ro, "A comprehensive review on structural topologies, power levels, energy storage systems, and standards for electric vehicle charging stations and their impacts on grid," IEEE Access, vol. 9, pp. 128069–128094, 2021.

[6]. M. Yilmaz and P. T. Krein, "Review of battery charger topologies, charging power levels, and infrastructure for plug-in electric and hybrid vehicles," IEEE Trans. Power Electron., vol. 28, no. 5, pp. 2151–2169, May.

[7]. G. Li, L. Boukhatem, L. Zhao, and J. Wu, "Direct vehicle-to-vehicle charging strategy in vehicular Ad-Hoc networks," in Proc. 9th IFIP Int. Conf. New Technol., Mobility Secur. (NTMS), Jan. 2018, pp. 1–5.

[8]. R. Q. Zhang, X. Cheng, and L. Q. Yang, "Flexible energy management protocol for cooperative EV-to-EV charging," IEEE Trans. Intell. Transp. Syst., vol. 20, no. 1, pp. 172–184, Jan. 2019.

[9]. D. M. Mughal, J. S. Kim, H. Lee, and M. Y. Chung, "Performance analysis of V2V communications: A novel scheduling assignment and data transmission scheme," IEEE Trans. Veh. Technol., vol. 68, no. 7, pp. 7045–7056, Jul. 2019.

[10]. E. Bulut and M. C. Kisacikoglu, "Mitigating range anxiety via vehicleto- vehicle social charging system," in Proc. IEEE 85th Veh. Technol. Conf. (VTC Spring), Jun. 2017, pp. 1–5.

[11]. P. You and Z. Yang, "Efficient optimal scheduling of charging station with multiple electric vehicles via V2V," in Proc. IEEE Int. Conf. Smart Grid Commun. (SmartGridComm), Nov. 2014, pp. 716–721.

[12]. A.-M. Koufakis, E. S. Rigas, N. Bassiliades, and S. D. Ramchurn, "Towards an optimal EV charging scheduling scheme with V2G and V2V energy transfer," in Proc. IEEE Int. Conf. Smart Grid Commun. (SmartGridComm), Nov. 2016, pp. 302–307.

[13]. E. Ucer et al., "A flexible V2V charger as a new layer of vehicle-grid integration framework," in Proc. IEEE Transp. Electrific. Conf. Expo (ITEC), Jun. 2019, pp. 1–7.

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Impact Factor: 7.67

[14]. C. Liu, K. T. Chau, D. Wu, and S. Gao, "Opportunities and challenges of vehicle-to-home, vehicle-to-vehicle, and vehicle-to-grid technologies," Proc. IEEE, vol. 101, no. 11, pp. 2409–2427, Nov. 2013.

[15]. P. Mahure, R. K. Keshri, R. Abhyankar, and G. Buja, "Bidirectional conductive charging of electric vehicles for V2V energy exchange," in Proc. 46th Annu. Conf. IEEE Ind. Electron. Soc. (IECON), Oct. 2020, pp. 2011–2016.

[16]. Andromeda Power. Accessed: Nov. 2021. [Online]. Available: https:// www.andromedapower.com

[17]. Dec. 2019. Hyundai introduces vehicle to vehicle charging facility. Accessed: Nov. 2021. [Online]. Available: https://www.autocarindia. com/car-news/hyundai-introduces-vehicle-to-vehicle-charging- acility-415144

[18]. S. Taghizadeh, M. J. Hossain, N. Poursafar, J. Lu, and G. Konstantinou, "A multifunctional single-phase EV on-board charger with a new V2V charging assistance capability," IEEE Access, vol. 8, pp. 116812–116823, 2020.

[19]. T. J. C. Sousa, V. Monteiro, J. C. A. Fernandes, C. Couto, A. A. N. Meléndez, and J. L. Afonso, "New perspectives for vehicleto- vehicle (V2V) power transfer," in Proc. 44th Annu. Conf. IEEE Ind. Electron. Soc., Oct. 2018, pp. 5183–5188.

[20]. R. W. Erickson and D. Maksimovic, Fundamentals of Power Electronics, 2nd ed. Norwell, MA, USA: Springer, 2007.

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