DOI - 10.68648/ijte-q-2026-49-03-015

Dynamic Wireless Electric Vehicle Charging with Seamless LCC-S Pad Handover Control

Suganthi. J.
Professor
Department of Electrical and Electronics Engineering
Government College of Engineering,
Tirunelveli, Tamil Nadu
✉ suganthi@gcetly.ac.in

ABSTRACT

The demand for efficient and user-friendly charging infrastructure has led to the growth of electric vehicles. Wireless power transfer technology offers a compelling alternative; however, existing dynamic wireless power transfer implementations often rely on complex vehicle positioning systems, inter-pad communication protocols, and real-time adaptive control algorithms, all of which contribute to system complexity and reduced reliability. This paper presents a simplified dynamic wireless charging architecture design for vehicles in motion, employing LCC-S compensation topology. In the proposed system, the transmitter pads are sequentially activated in a defined time domain frame and they are characterized with distinct mutual inductance values. A front-end AC-DC converter rectifies a 230V RMS supply to a 325V DC, which is subsequently elevated to 600V DC through a boost converter incorporating power factor correction. The LCC-S network with high-frequency inverter operating at 85-92 kHz is tuned to resonance so as to suppress reactive power. The simulation result confirms stable output characteristics, with the battery terminal voltage of 60V and an average current of 10A sustained throughout the pad transition intervals. The proposed system maintains an uninterrupted power supply without detectable discontinuity during pad handover events.

KEYWORDS *: Dynamic Wireless Power Transfer, LCC-S Compensation, CC-CV Charging, Sequential Pad Activation, Pad Handover Control.*

INTRODUCTION

Worldwide, the development of transportation systems is undergoing a fundamental shift. There is an urgency to reduce the carbon emissions, which, combined with falling battery costs and improving vehicle range, has pushed electric vehicles from an experimental category onto everyday roads. In many continents the governments have announced phased bans on internal combustion engine vehicles, and major automotive manufacturers have committed to all-electric lineups within the next decade. In practice, the main obstacle keeping it slow is charging. The way most electric vehicles are charged today is not fundamentally different from how a mobile phone is charged. We have to stop the vehicle and then plug in the charger, and then we have to wait until it is getting charged. For short urban commutes, this is manageable. But for highway travel, logistics fleets, or emergency vehicles, it becomes a real operational problem. A long truck cannot afford to sit idle for forty minutes every few hours. A city bus running a tight schedule cannot pull over for a charging stop. The top reason people hesitate before buying an EV is that for private car owners, the fear of running out of charge before reaching a station. Even if we increase the number of fixed charging stations, it helps, but it does not eliminate the fundamental limitation: the vehicle must stop [1].

Wireless power transfer technology offers a different starting point. Instead of a cable connecting the vehicle to a power source, energy is transferred across an air gap through magnetic coupling between a transmitter coil embedded in the ground and a receiver coil

mounted beneath the vehicle [2]. Stationary wireless charging, where the vehicle parks over a charging pad, has already reached commercial deployment in some markets. But the more ambitious version of this idea is dynamic wireless charging, where power transfer happens while the vehicle is moving [3]. If dynamic wireless power transfer is implemented successfully, it could allow an electric vehicle to charge continuously along a dedicated road segment, reducing the battery size needed for long trips and potentially eliminating range anxiety altogether. Dynamic wireless power transfer is not a new technology. Since the 2010 many research groups have been exploring it, and several road trials have been conducted in South Korea, Sweden, Germany, and the United Kingdom. What those projects have consistently revealed, however, is that the control side of the system is surprisingly difficult to get right. If the vehicle moves over a series of transmitter pads then the coupling between the active pad and the vehicle receiver changes continuously. When the vehicle approaches the pad directly overhead, the mutual inductance rises and falls as it moves away. To manage this charging coupling without disrupting the power delivery to the battery requires either very fast real-time control or some form of coordination between pads to ensure a smooth handover.

The major issue faced in this dynamic WPT, however, is more nuanced than simply embedding coils in a road [4]. The magnetic coupling between the active transmitter and the vehicle receiver charges continuously, when a vehicle moves over a series of transmitter pads. The power delivered to the battery varies when there is a change in coupling variation, and it is a major issue. If the charging system fails to respond properly, variations in output voltage and current can occur, which may disturb the charging process and prevent the battery from receiving a stable and controlled charge. Modern EVs require a specific two-stage profile used for battery charging, particularly for lithium-based cells. In the first stage, the vehicle charges in Constant Current (CC) charging mode regardless of the battery's terminal voltage, allowing the cell to absorb energy rapidly. In the second stage, when the voltage reaches a defined threshold, the system shifts to Constant Voltage (CV) charging, where the voltage is held constant while the current gradually tapers. This CC-CV profile is not simply a performance preference – it is a fundamental requirement for battery safety and longevity [5]. Deviating from it, even temporarily, can accelerate cell degradation or trigger protective shutdowns. It is harder in a dynamic wireless system to maintain a CC-CV charging profile than a stationary one. The power delivered through the coils varies continuously. When the vehicle moves across the pads and without active compensation, the output seen by the battery will not follow the required profile. Most existing dynamic WPT research has focused on achieving power transfer continuity during pad transitions, but far fewer studies have explicitly addressed the problem of maintaining a well-regulated CC-CV profile throughout the entire period of vehicle movement [6].

In existing approaches the output regulation typically relies on vehicle position feedback to anticipate coupling changes and adjust inverter parameters accordingly. Others use communication between pads to coordinate switching and prevent output drops during handover. These strategies can achieve reasonable regulation, but they introduce system complexity that works against practical deployment. Position sensing hardware must be installed and maintained. In addition to this, the communication between system components should be fast and dependable, and the control mechanism needs to be adjusted according to factors like vehicle speed and the spacing between transmitter pads. Each of these dependencies increases cost and reduces robustness [7].

The work presented in this paper takes a fundamentally different approach. The objective is to maintain a stable CC-CV charging output at the battery terminals throughout the vehicle's passage over multi-pad communication. To achieve this, an LCC-S compensation topology is employed on this transmitter side. The LCC-S network is known for its ability to present a near-constant current source characteristic to the receiver, making it inherently more tolerant of coupling variation than simpler series or parallel compensation schemes [8]. For simulation purposes, vehicle movement is represented through a time-domain model in which three transmitter pads with distinct mutual inductance values are activated sequentially across defined time intervals. This approach replicates the coupling variation of a moving vehicle. In hardware implementation the time-based switching would be

replaced by position-triggered activation, but the compensation network and output regulation principle remain the same [9].

SYSTEM OVERVIEW

The proposed dynamic wireless EV charging system is built with the layered architecture that separates the power conditioning functions from the wireless energy transfer functions as shown in Fig. 1. The overall system easier to analyze and validate through simulation, and hence, this separation is intentional, and it allows each stage to be designed and optimized independently. The signal flows from the AC mains supply on the ground side through to the battery terminals on the vehicle side as shown in the block diagram. The block diagram represents the complete architecture of dynamic wireless power transfer [10, 11].

The ground-level infrastructure can be understood in two parts. The first part is the shared power conditioning chain, which takes energy from the grid and prepares it for high-frequency transmission. The second part is the pad array, where three independent transmitter units are arranged along the charging lane, each capable of coupling energy into the vehicle receiver as the vehicle passes overhead. These two parts are connected in a common bus arrangement, meaning all three pads draw from the same rectified and boosted DC supply.

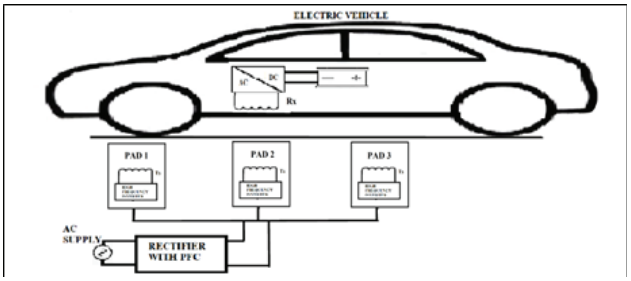


Fig. 1: Block Diagram of Proposed Dynamic Wireless Power Transfer

At any instant, only one transmitter pad is active, and its operation is governed by a simple sequential switching approach. This switching logic decides which pad should be energized based on the vehicle's movement along the charging path, allowing the system to transfer power in a controlled and continuous manner. The proposed system runs on the standard 230V AC power supply that is available for our home or office, which means the system, can be plugged in with the existing electrical setups, and there is no need for any extra wiring or high voltage requirement. Initially the AC power supply passes through a rectifier, which converts the alternating current into a more usable DC form with the peak values of 325V. However, this DC is not perfectly smooth. It fluctuates, and the path of power from the supply can cause electrical noise and inefficiencies that may affect other devices on the same network [12].

To solve both of these issues, a power factor correction stage is integrated in the system. The PFC circuit, implemented as a boost-type converter operating in continuous conduction mode, serves a dual purpose. First, it shapes the input current waveform to follow the sinusoidal voltage waveform, bringing the power factor close to unity and reducing harmonic injection into the grid. The rectified DC is boosted and maintained at a steady state at around 600V. . This stable voltage supplies the rest of the system, protecting it from any fluctuations or changes while the vehicle is drawing the power at any given moment. Each of the three charging pads has its own dedicated inverter, essentially its own power controller. This inverter takes that steady DC voltage and converts it into a rapidly alternating AC signal, cycling between 85 and 92 kHz. This high-frequency signal is then passed through a specially designed filtering network before reaching the transmitter coil, where it's ready to wirelessly transfer power to the vehicle. Operating at this frequency range is a deliberate choice; higher frequencies allow smaller coil geometries and compensation components for a given power level, and the 85 to 92 kHz band falls within the range recommended by international standards for inductive power transfer systems, specifically SAE J2954 and IEC 61980.

The three transmitter pads labeled Pad 1, Pad 2, and Pad 3 in the block diagram are physically spaced along the road surface beneath the vehicle travel path. Each pad consists of a transmitter coil wound to a specified inductance, paired with an LCC compensation network tuned to the operating frequency. The mutual inductance between each transmitter and the vehicle receiver varies depending on the vehicle's lateral and longitudinal position relative to that pad [13]. In this study, the

mutual inductance values are distinct for three pads. A higher mutual inductance value is assigned to Pad 2, as this represents the condition when the vehicle is directly aligned with the transmitter pad, resulting in stronger coupling. In contrast, Pads 1 and 3 are assigned lower values to represent the reduced coupling that occurs when the vehicle is entering or leaving the charging region. This asymmetric but realistic distribution of coupling values allows the simulation to test the system's ability to maintain CC-CV output across genuinely different operating conditions, not just a uniform worst-case scenario.

On the vehicle side, a single receiver coil mounted beneath the chassis picks up the magnetic flux generated by whichever transmitter pad is currently active. The receiver coil is part of the series compensation network on the secondary side of the LCC-S topology, which resonates at the same operating frequency as the transmitter. Maintaining resonance on the receiver side allows the induced voltage to be transferred more effectively to the output stage. This reduces unnecessary reactive power circulation and improves the overall efficiency of the power transfer process. Once the wireless power reaches the vehicle's receiver coil, it's still in AC form, so it gets converted back into DC on the spot before being sent to the battery.

In the proposed work it is designed to charge the battery at a nominal voltage of 60V, which keeps it practical for simulation and testing purposes. This charging is maintained constant by maintaining a steady current of around 10A, and the voltage is maintained at 60V to avoid overcharging. Upholding this profile continuously is the primary performance objective of the entire system even as the active pad changes and the mutual inductance shifts. The block diagram captures this end-to-end flow clearly, from the grid connection at the bottom left to the battery terminals at the top right, with the wireless air gap between the road surface and the vehicle underside forming the critical link in the middle [14].

SYSTEM DESIGN

The proposed dynamic wireless EV charging system consists of three interconnected design stages: a boost converter with power factor correction, an LCC-S compensation network, and a multi-pad transmitter array with defined coupling characteristics [15]. Each stage is designed independently and integrated into a unified power chain that delivers a regulated CC-CV output to the vehicle battery. The design parameters for each stage are presented in the following subsections.

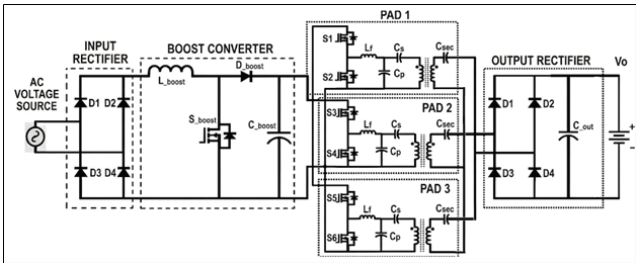


Fig. 2 Circuit Diagram

Boost Converter Design

The boost converter's job is to take the rectified voltage and push it up to a higher, stable DC level that the inverter can reliably work with. Duty cycle determines how long the switch stays in the on condition as indicated by equation (1). The voltage conversion ratio is governed by:

$$\frac{Vout}{Vin} = \frac{1}{(1-D)} \quad (1)$$

To determine the inductor value L, the switching frequency fsw and the allowable current ripple Δi_L are the two primary factors considered. A higher switching frequency naturally reduces the required inductance, while a tighter ripple limit demands a larger inductor. This relationship is captured as in equation(2):

$$L = \frac{(Vin \times D)}{(fsw \times \Delta iL)} \quad (2)$$

The selection of the capacitor is indicated in Equation (3) is done based on the output voltage ripple ΔVout to an acceptable level:

$$C = \frac{(Iout \times D)}{(fsw \times \Delta Vout)} \quad (3)$$

Where Iout is the average output current and ΔVout is the peak-to-peak voltage ripple.

A larger capacitor is selected beyond the minimum requirement to attenuate voltage disturbances caused by pad switching transients on the load side. The complete

set of boost converter design parameters is listed in Table 1.

Table. 1. Boost Converter Design Parameters

Parameter	Symbol	Value
Duty Cycle	D	0.45
Input Voltage	Vin	325 V
Output Voltage	Vout	600 V
Inductor Current Ripple	ΔiL	20%
Output Voltage Ripple	ΔVout	5%
Boost Inductor	L	0.8 mH
Output Capacitor	C	680 µF
Switching Frequency	fsw	65kHz

LCC-S Compensation Network Design

The LCC-S topology is employed on the transmitter side to achieve a near-constant current source characteristic at the output of the transmitter coil [16]. This behaviour arises from the resonance condition of the series branch formed by the filter inductor Lf and the series capacitor Cs, which forces the transmitter coil current to be determined primarily by the inverter voltage and Lf rather than by the reflected impedance from the receiver. As a result, moderate changes in mutual inductance as encountered when the vehicle moves between pad positions do not significantly disturb the transmitter coil current, reducing the burden placed on the output regulation stage [17].

The resonance condition for the transmitter series branch is indicated by the equation(4).

$$\omega_1 = \frac{1}{\sqrt{(Lf \cdot Cs)}} \quad (4)$$

where ω = 2πf is the angular operating frequency. To determine the value of parallel capacitor Cp, is indicated in equation(5), it is selected to resonate with the transmitter coil inductance L at the same frequency:

$$\omega_1 = \frac{1}{\sqrt{(L_1 \cdot Cp)}} \quad (5)$$

On the receiver side, the series compensation capacitor Csec is tuned as indicated in equation (6) to resonate with the receiver coil inductance L_2 at ω_1:

$$\omega_1 = \frac{1}{\sqrt{(L_2 \cdot Csec)}} \quad (6)$$

At resonance, the transmitter coil current, ITx, is given by:

$$ITx = \frac{Vinv}{(j\omega_1 \cdot Lf)} \quad (7)$$

Where, Vinv is the fundamental component of the inverter output voltage. Equation (7) confirms that ITx is independent of the load reflected from the receiver, which is the key property exploited in this design to maintain stable power delivery across varying coupling conditions [18]. The LCC-S network parameters are summarized in Table 2.

Table. 2. LCC-S Compensation Network Parameters

Parameter	Symbol	Value	Unit
Series Filter Inductor	Lf	60	µH
Series Capacitor (Tx side)	Cs	58	nF
Parallel Capacitor (Tx side)	Cp	150	nF
Series Capacitor			
(Rx side)	Csec	99	nF
Transmitter Coil Resistance	Rp	0.2	Ω
Receiver Coil Resistance	Rs	0.1	Ω
Operating Frequency	f_1	85	kHz

Mutual Inductance and Coupling Coefficient

The magnetic coupling between each transmitter pad and the vehicle-side receiver is characterized by the values of mutual inductance M, as indicated by the equation (8) which is related to the transmitter coil inductance L_1, the receiver coil inductance L_2, and the coupling coefficient k by:

$$M = k \cdot \sqrt{(L_1 \cdot L_2)} \quad (8)$$

Table. 3. Coupling Coefficient Ranges for Dynamic Operation

Alignment Condition	Coupling Coefficient (k)	Physical Scenario
Perfect alignment	0.25 – 0.30	Receiver centered above Tx pad
Partial alignment	0.15 – 0.20	Receiver partially offset from pad

Weak coupling	0.05 – 0.10	Receiver at pad entry or exit region

The coupling coefficient k is a dimensionless quantity that ranges between 0 and 1 and is determined by the geometry, separation, and lateral alignment between the transmitter and receiver coils. In dynamic WPT applications, k varies continuously as the vehicle moves relative to each pad [19]. Three alignment conditions are defined for this study, as listed in Table 3.

In this study, vehicle movement along the charging lane is represented through a time-domain model in which each pad is assigned a fixed mutual inductance value corresponding to its coupling condition during the simulation interval. The design of three pads in the proposed system is such that Pad 2 is placed close to the centre alignment which is assigned with the highest mutual inductance [20]. The positions of pads 1 and 3 are assigned with weak mutual inductance to represent during the vehicle entry and exit phases, respectively. These values represent the partial alignment condition and reflect the reduced coupling at the periphery of the charging lane. The pad activation sequence and corresponding mutual inductance values are given in Table 4.

TABLE 4: Pad Activation Sequence and Mutual Inductance Values

Pad	Coupling Coefficient (k)	Mutual Inductance (M)	Condition
Pad 1	0.15	30 µH	Partial / Entry
Pad 2	0.20	40 µH	Moderate / Centre
Pad 3	0.15	30 µH	Partial / Exit

The variation in mutual inductance across the three pads creates a realistic test scenario for evaluating the robustness of the LCC-S compensation and the CC-CV output regulation under dynamic coupling conditions [21, 22]. In a physical implementation, the time-based switching used in this simulation would be replaced by position-triggered pad activation, while the compensation network design and regulation principle would remain unchanged.

SIMULATION RESULTS AND DISCUSSION

The waveform of input voltage represents that the system is supplied from the standard single-phase supply, which corresponds to an RMS value of 230V as shown in Fig. 3. The waveform is smooth and continuous, representing continuous power flow without any distortion. The input current waveform confirms that the boost converter and its control loop have been successfully implemented in the system as shown in Fig. 4. The waveform remains uniform and periodic, and the input current is in phase with the input voltage. The control loop successfully implemented the power factor correction on the input side to reduce the effect of harmonics due to the high-frequency inverter.

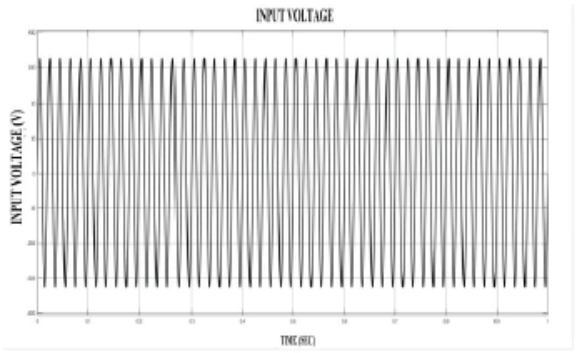


Fig. 3 Input Voltage

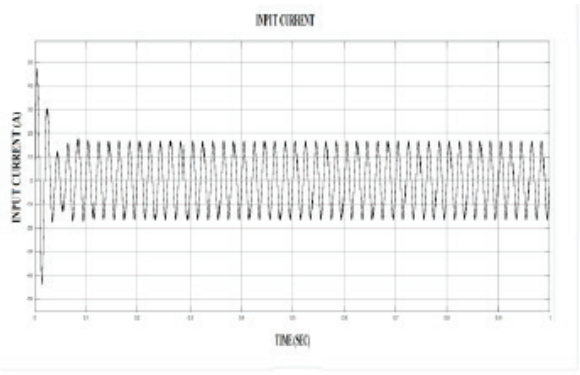


Fig. 4 Input Current

The switching signals S1 through S6 represent the gate pulses delivered to the six switches of the three dedicated high-frequency inverters, with each inverter serving one transmitter pad. The signals are organized as square pulses that alternate between logic high and

low. The three pairs of switches are spaced uniformly, such that the first pad is activated by S1 and S2, the second pad is activated by S3 and S4, and the third pad is activated by S5 and S6. All three pads are activated in a controlled and coordinated manner to avoid any simultaneous switching conflicts. The battery voltage waveform shows a flat, stable line held firmly at 60 V as shown in Fig. 5. There is virtually no visible fluctuation or deviation from this target level, which demonstrates that the constant voltage stage of the CC-CV charging controller is working effectively. The clean and stable 60 V output confirms that the LCC-S compensation network and the receiver-side rectifier together are delivering well-conditioned power to the battery terminals.

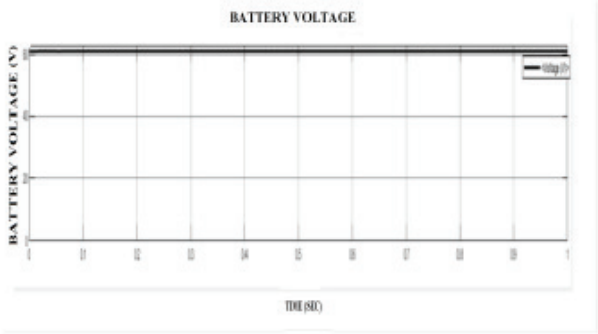


Fig. 5 Battery Voltage

An output current of 10A is flowing as an average current into the battery. The waveform has a discernible ripple, but the average current remains constant as shown in Fig. 6. The current fluctuation seen in the waveform is a direct result of the high-frequency switching taking place on the inverter side, combined with the nature of wireless power transfer itself both of which naturally introduce some degree of variation into the current profile. That said, the controller handles this well, holding the charging current consistently close to the 10 A mark throughout the constant current phase, and at no point does the current drift outside the safe and expected operating range. This behavior is in line with the CC-CV charging profile.

The SOC waveform is steady and increases gradually. The consistent and regulated flow of charging current reflects the battery's progress during the charging procedure, which is almost smooth and linear. The consistent increase confirms that the entire system from the AC supply to the rectifier, boost converter, inverter, wireless link, and receiver is operating as planned and charging the battery.

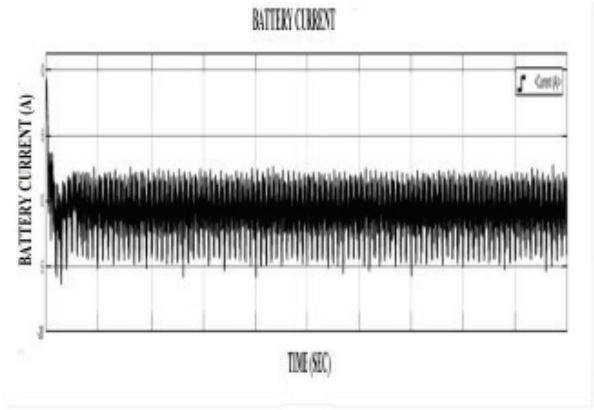


Fig. 6 Battery Current

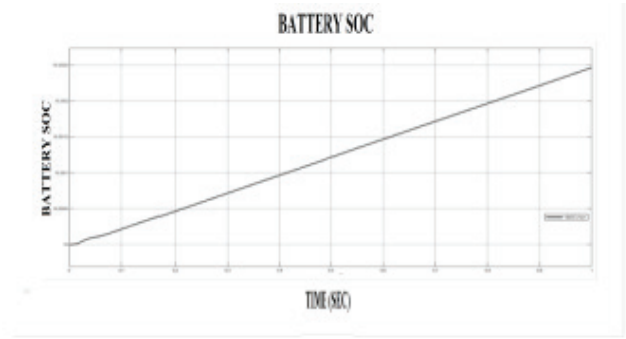


Fig. 7 Battery SOC

CONCLUSION

This paper presented a dynamic wireless power transfer system for electric vehicle charging, designed around an LCC-S compensation topology with sequential time-domain pad activation. The central objective was to maintain a stable CC-CV charging profile at the battery terminals throughout the vehicle's passage over a multi-pad charging lane, under conditions of varying mutual inductance that arise from changes in alignment between the transmitter pads and the vehicle receiver. The proposed architecture addresses a well-recognized limitation of existing dynamic WPT systems namely, their dependence on vehicle position sensing, inter-pad communication, and real-time adaptive control by replacing these mechanisms with a fixed sequential switching scheme and a compensation network that is inherently tolerant of coupling variation. The LCC-S

network presents a near-constant current source at the transmitter output, ensuring that shifts in mutual inductance between pads do not produce significant disturbances in the power delivered to the receiver. Three transmitter pads with distinct mutual inductance values were activated sequentially across defined time intervals to represent vehicle movement through the charging lane.

The result obtained from MATLAB confirmed that the battery terminal voltage remained stable at 60V and the average charging current was sustained at 10A throughout all pad transition events, without any discontinuity in the output during the handover. The increase in state of charge validates that uninterrupted CC-CV charging was achieved across all three coupling conditions without any real-time control intervention. The findings demonstrate that a simplified time-domain sequential activation strategy, combined with careful LCC-S parameter selection, is sufficient to maintain the output regulation required for practical EV battery charging. Future work will focus on extending the validation to hardware implementation, incorporating position-triggered pad activation, and evaluating system performance under lateral misalignment and variable vehicle speeds.

ACKNOWLEDGEMENT

I am very much thankful to the Department of Electrical and Electronics Engineering for providing me facilities to conduct the experiments in the Department's laboratory and PG scholars for their support to prepare this paper.

REFERENCES

1. A.Mahesh, B. Chokkalingam, and L. Mihet-Popa, "Load independent CC and CV static wireless charging system with half bridge multi leg converter topology," IEEE Access, vol. 13, pp. 10234-10247, Jan. 2025.
2. S. R. Hui, Y. Yang, and C. Zhang, "Wireless power transfer: A paradigm shift for the next generation," IEEE J. Emerg. Sel. Topics Power Electron.,vol. 11, no. 3, pp. 2412–2427, Jun. 2023.
3. J. Lu, G. Zhu, D. Lin, Y. Zhang, J. Jiang, and C. C. Mi, "Unified load independent ZPA analysis and design in CC and CV modes of higher order resonant circuits for WPT systems," IEEE Trans. Transport. Electrific. , vol. 5, no. 4, pp. 977–987, Dec. 2019..
4. A. Mahesh, B. Chokkalingam, and L. Mihet-Popa, "Inductive wireless power transfer charging for electric vehicles—A review," IEEE Access, vol. 9, pp. 137667–137713, 2021.
5. I. U. Castillo-Zamora, P. S. Huynh, D. Vincent, F. J. Perez-Pinal, M. A. Rodriguez-Licea, and S. S. Williamson, "Hexagonal geometry coil for a WPT high-power fast charging application," IEEE Trans. Transport. Electrific., vol. 5, no. 4, pp. 946–956, Dec. 2019.
6. V. Cirimele, M. Diana, F. Freschi, and M. Mitolo, "Inductive power transfer for automotive applications: State-of-the-art and future trends," IEEE Trans. Ind. Appl., vol. 54, no. 5, pp. 4069–4079, Sep. 2018.
7. J. Huh,W. Lee, G. Cho, B. Lee, and C. T. Rim, "Characterization of novel inductive power transfer systems for on-line electric vehicles," in Proc. 26th Annu. IEEE Appl. Power Electron. Conf. Expo. (APEC), Fort Worth, TX, USA, Mar. 2011, pp. 1975–1979.
8. S. Li, L. Wang, Y. Guo, and Z. Liu, "Flexible energy-transfer control of dynamic wireless power transfer system based on estimation of load and mutual inductance," IEEE Trans. Ind. Appl., vol. 58, no. 1, pp. 1157–1167, Jan. 2022.
9. S. Jeong, Y. J. Jang, and D. Kum, "Economic analysis of the dynamic charging electric vehicle," IEEE Trans. Power Electron., vol. 30, no. 11, pp. 6368–6377, Nov. 2015.
10. A. Babaki, S. Vaez-Zadeh, A. Zakerian, and G. A. Covic, "Variable frequency retuned WPT system for power transfer and efficiency improvement in dynamic EV charging with fixed voltage characteristic," IEEE Trans. Energy Convers., vol. 36, no. 3, pp. 2141–2151, Sep. 2021.
11. H. Li, J. Li, K. Wang, W. Chen, and X. Yang, "A maximum efficiency point tracking control scheme for wireless power transfer systems using magnetic resonant coupling," IEEE Trans. Power Electron., vol. 30, no. 7, pp. 3998–4008, Jul. 2015.
12. E. Gati, G. Kampitsis, and S. Manias, "Variable frequency controller for inductive power transfer in dynamic conditions," IEEE Trans. Power Electron., vol. 32, no. 2, pp. 1684–1696, Feb. 2017.

13. Z. Huang, S.-C.Wong, and C. K. Tse, "Design of a single-stage inductive power-transfer converter for efficient EV battery charging," IEEE Trans. Veh. Technol., vol. 66, no. 7, pp. 5808–5821, Jul. 2017.

14. X. Qu, Y. Jing, H. Han, S.-C. Wong, and C. K. Tse, "Higher order compensation for inductive-power-transfer converters with constant-voltage or constant-current output combating transformer parameter constraints," IEEE Trans. Power Electron., vol. 32, no. 1, pp. 394–405, Jan. 2017.

15. J. Hou, Q. Chen, Z. Zhang, S.-C.Wong, and C. K. Tse, "Analysis of output current characteristics for higher order primary compensation in inductive power transfer systems," IEEE Trans. Power Electron., vol. 33, no. 8, pp. 6807–6821, Aug. 2018.

16. S. Li, W. Li, J. Deng, T. D. Nguyen, and C. C. Mi, "A double-sided LCC compensation network and its tuning method for wireless power transfer," IEEE Trans. Veh. Technol., vol. 64, no. 6, pp. 2261–2273, Jun. 2015.

17. X. Qu, H. Han, S.-C. Wong, C. K. Tse, and W. Chen, "Hybrid IPT topologies with constant current or constant voltage output for battery charging applications," IEEE Trans. Power Electron., vol. 30, no. 11, pp. 6329–6337, Nov. 2015.

18. J. Hou, Q. Chen, S.-C.Wong, C. K. Tse, and X. Ruan, "Analysis and control of series/series-parallel compensated resonant converter for contactless power transfer," IEEE J. Emerg. Sel. Topics Power Electron., vol. 3, no. 1, pp. 124–136, Mar. 2015.

19. V.-B. Vu, D.-H. Tran, and W. Choi, "Implementation of the constant current and constant voltage charge of inductive power transfer systems with the double-sided LCC compensation topology for electric vehicle battery charge applications," IEEE Trans. Power Electron., vol. 33, no. 9, pp. 7398–7410, Sep. 2018.

20. D. Wang, C. Fu, X. Bei, and Q. Zhao, "A reconfigurable half-bridge compensation topology-based WPT system with constant current and constant voltage outputs," IEEE Trans. Circuits Syst. II, Exp. Briefs, vol. 70, no. 1, pp. 256–260, Jan. 2023.

21. X. Wang, M. Leng, X. Zhang, Q. Tian, X. Zhou, B. Guo, and H. Ma, "Multi output wireless charger for drone swarms with reduced switch requirements and independent regulation capability," IEEE Trans. Ind. Electron., vol. 71, no. 5, pp. 4883–4895, May 2023.

22. J. Yang, X. Zhang, K. Zhang, X. Cui, C. Jiao, and X. Yang, "Design of LCC-S compensation topology and optimization of misalignment tolerance for inductive power transfer," IEEE Access, vol. 8, pp. 191309–191318, 2020.