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Review of Static and Dynamic Wireless Electric Vehicle Charging System

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Abstract: Electrified transportation will contribute to the reduction of greenhouse gas emissions and the stabilization of gasoline costs. To promote the adoption of electrified transportation, a diverse network of charging stations must be established in a user-friendly environment. Wireless electric vehicle charging systems (WEVCS) have the potential to be a viable alternative technology for charging electric cars (EVs) that do not need a plug. This article discusses the present state of wireless power transfer technologies for electric vehicles. Additionally, it contains wireless transformer constructions that have been studied using a range of ferrite forms. WEVCS are linked with health and safety concerns, which have been addressed in recent international standard development. Two main applications, static and dynamic WEVCS, are discussed, and current development is documented using features from research labs, universities, and industry. Additionally, future concepts-based WEVCS are evaluated and studied, including "vehicle-to-grid (V2G)" and "in-wheel" wireless charging systems (WCS), with qualitative comparisons to other current technologies
Keywords: Combustion, Diesel Engine, Turmeric Oil, Vibration Analysis, Methyl Ester, and Blends.

I. INTRODUCTION

A. Introduction Static and Dynamic Wireless Electric Vehicle Charging System

When it comes to electric vehicles (EVs) and energy vehicles, wireless charging systems (WCS) have indeed been presented for stand-alone applications (PEVs). When compared to plug-in charge, WCS provides further advantages in terms of convenience, dependability, and use. Convenience issues, such as being limited to usage in parking lots, garages, or on street signs. The vehicle uses less energy storage and travels further on a single charge. Two major obstacles must be addressed before the WCS is commonly agreed upon: a significant air space and coil instabilities. Depending on the coil's orientation as well as the pressure difference between the receiver, power transmission efficiency may be increased or decreased.

This article reviews the fundamental features of WCS for EVs, such as energy transfer techniques. To further improve the efficiency of transmitting power, several wireless transformers topologies are being considered. These innovations in both education and marketing are covered by this paper, as well as the older developments.

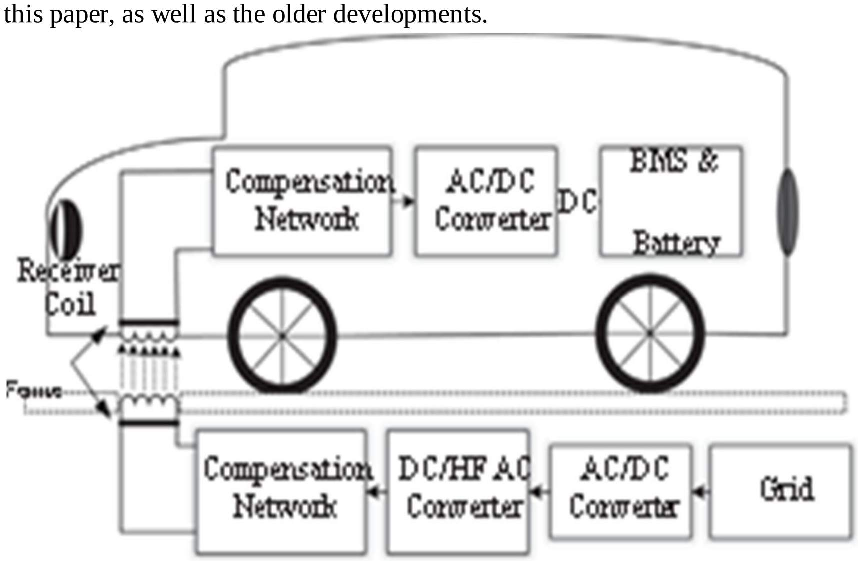

Fig.1.1. Basic block diagram of an electric vehicle wireless charging method

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B. Wireless Charging System for EVs

The static WCS for EVs is shown as a block diagram in Fig. 1.1. To facilitate power transmission from transmitting coils to receiving coils, the grid's alternating current (AC) is converted to high frequency (HF) alternating current (AC) through AC/DC and DC/AC conversions. To increase overall system efficiency, compensating topologies based on series or parallel combinations are used primarily on the transmission and receiving ends. The receiver coil, which is normally positioned underneath the automobile, converts magnetic flux patterns to high-frequency alternating current (HF AC). The high-frequency pulses are converted to a steady direct current source to power the on-site batteries. To prevent any health and safety hazards and to assure stable operation, the power control, communication, and battery management system (BMS) are also integrated. Magnetically planar fluorite plates are utilised on both the transmitter and receiver sides of the system to limit detrimental leakage flux and increase magnetic distribution.

Development in stationary wireless charging systems.

Research & Development Institute/Corporation	Vehicle Type	Receiver Pad Location	Air-gap distance (mm)	Operating frequency (kHz)	Power Range (kW)	Efficiency (%)
Companies and Start-up Industries						
Plugless Power [71,72] (Evatran Group) (2016–17)	Passenger car	Front	102	20	3.3 3.6 7.2	90
WiTricy Corporation [73,74] (2009–17)	Passenger cars and SUVs	ANY	100–250	85	3.6 7.7 11	>90
Qualcomm Halo [75] (2010–17)	Passenger, sport and race car	Center	160–220	85	3.6 6.6 7 20	>90
Hevo Power [76] (2017–18)	Passenger car	ANY	TBA	TBA	10	90
Bombardier Primove [77] (2015–17)	Passenger car to SUVs	ANY	10–30	TBA	3.6 7.2 22	>85
	E-bus	Center			200	
Momentum Dynamic Corporation [76] (2015–17)	Commercial fleet and Bus	Front or Rear	300	TBA	30	TBA
Conductix-Wampfler [76] (2002–03)	Industry fleet and Bus	ANY	TBA	20	up to 20	TBA
Siemens and BMW [77,78]	Passenger car	Front	80–150	TBA	3.6	>90
Delphi[79] (2011–17)	Passenger car	Front	200	TBA	3.3	TBA
Research Groups and Universities						
Wuhan University, China [80] (2017)	Lab Exp.	N/A	300	100	6–16	~81
Korea Institute of Industrial Technology (KITECH) [81] (2016)	Lab Exp.	N/A	150	85	4	93
Michigan State University [82] (2016)	Lab Exp.	N/A	200	60	1	~82
KAIST University [83] (2016)	Lab Exp.	N/A	200	90	3.3	95.96
Oak Ridge National Lab (ORNL) [72,84,85] (2013–17)	Lab & Real Prot.	Rear	100–160	19.5	3.3 6.6 10	~89–90
			125–175	22	20	90
University of Michigan-Dearborn [33,86] (2014)	Lab Exp.	N/A	200	TBA	8	95.7
University of Auckland [6,7] (1997–17)	Car	TBA	100–300	10–40	2–5	>85
The University of Georgia [66,87–89](2014–17)	Lab Prot.	N/A	160	20	3	>80
Energy Dynamics Laboratory (EDL) and Utah State University [90] (2012)	Lab Exp.	N/A	152–167	20	5	>90
KAIST University [17,28] (2010–14)	Car and SUVs	Center	10 120–200	20	3 15	72–80 74–83

C. Capacitive Wireless Power Transfer

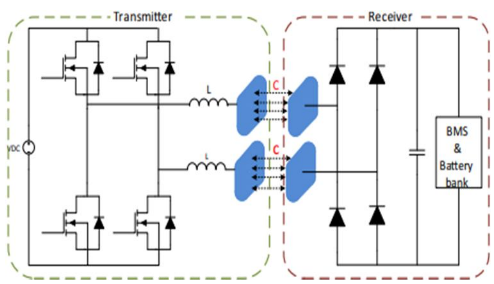

Fig.1.2 Schematic for Wireless Capacitive Power Transfer

Coupling capacitors are used in the CWPT to transfer energy from the power to the receiver. In exchange for a small air gap, CWPT offers better performance and more accurate field limitations between plates. A fixed lab prototype of >1 kW running at 540 kHz has an efficiency of approximately 83 per cent from the Dc power supply to the lithium battery. Static WEVCS may replace the plug-in charger and eliminate trip risks and electric shock. Extra power converters and electronics are placed with the main coil below the road or ground. The standard separation distance between light-duty vehicles is 150–300 millimetres. Different attachment positions for receiving pads on the underside of the car's chassis have been shown in different prototypes.

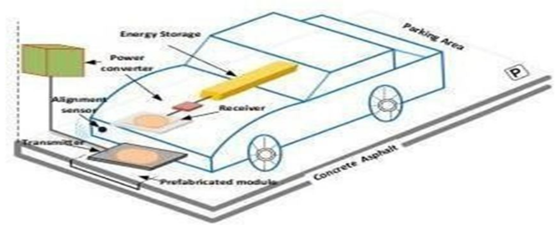

Fig.1.3. Static wireless electric car charging system schematic diagram

Table 1 Development in a stationary wireless charging system.

Development in stationary wireless charging systems.

Research & Development Institute/Corporation	Vehicle Type	Receiver Pad Location	Air-gap distance (mm)	Operating frequency (kHz)	Power Range (kW)	Efficiency (%)
Companies and Start-up Industries						
Plugless Power [71,72] (Evatran Group) (2016–17)	Passenger car	Front	102	20	3.3 3.6 7.2	90
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Bombardier Primove [77] (2015–17)	Passenger car to SUVs E-bus	ANY Center	10–30	TBA	3.6 7.2 22 200	>85
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KAIST University [17,28] (2010–14)	Car and SUVs	Center	10 120–200	20	3 15	72–80 74–83

Electric vehicles (EVs) need to be charged more often or have a bigger rechargeable battery installed if they want to go further on a single battery charge. Compared to existing EVs, charging stations for electric vehicles decrease their total battery need by around 20%. The transmitter pads with power system segments for dynamic-WEVCS must be placed in specified places and pre-defined pathways.

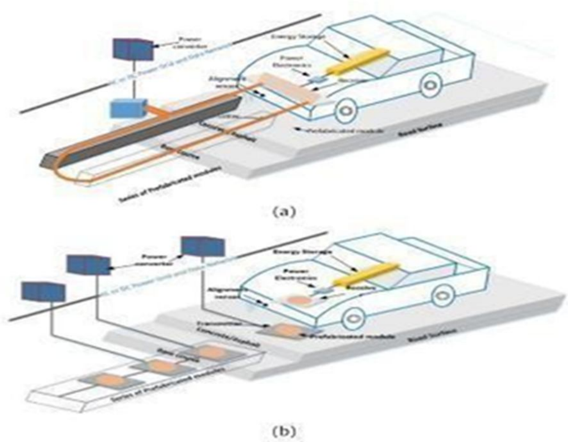

Fig.1.4. Basic diagram of a dynamic wireless electric vehicle charging system

Summary of research and development of Dynamic WEVCS.

Research and Development	Pick-up Power (kW)	Operating Frequency (kHz)	Air-gap (mm)	Efficiency (%)
Oak Ridge National Laboratory (ORNL) [85]	20	22–23	125–175	90
University of Auckland, New Zealand [6,7,98]	20–30	12.9	500	85
Japan Railway Technical Research Institute [99]	50	10	7.5	TBA
KAIST University, Korea [100–110]	3	20	10	72–80
	6		170	71
	15		120–200	74–83
	25–100		200	85
Flanders Drive with industries and universities [111]	80	20	100	88–90
EV System Lab & Nissan Research Centre [112]	1	90	100	>90
North Carolina State University, USA [8,113,114]	0.3	100	170	77–90

Table 2Summary of research and development of dynamic WEVCS.

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D. Future Application Concepts of WEVCS

1) *Wireless vehicle to grid (W-V2G):* Because of the rapid growth of plug-in electric vehicles (PEVs), there is a pressing need for charge and power transfer technologies that are both quick and efficient. As the number of plug-in electric vehicles (PEVs) grows, so do the power demands on distribution networks, which has a negative effect. Renewable energy sources (RES) have already been added to the micro-grid to make up for the lost power, but their support infrastructure is severely lacking.

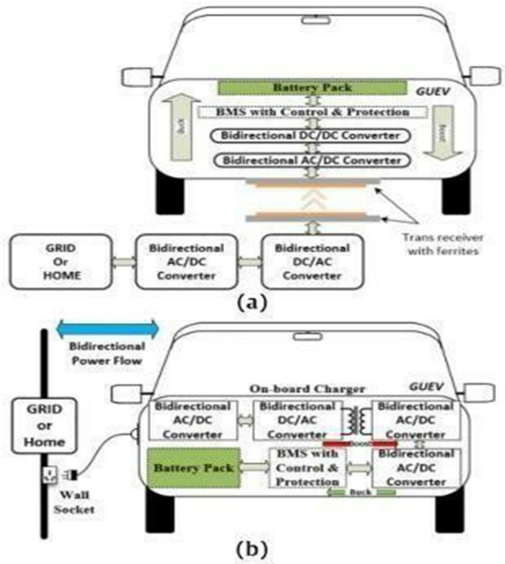


Fig.1.5. Bidirectional power transfer applications (a) wireless V2G (b) plug-In V2G

The vehicle-to-grid (V2G) idea may provide an answer to the problem of schedule for charge-discharge to the distributed generation. To take advantage of V2G, drivers of electric vehicles equipped with bi-directional chargers may connect their vehicles to the grids or their own homes when use is highest. The design enables surplus energy to be transferred to PEVs to reduce stress or receive energy to rectify peak demand energy in static or dynamic modes.

2) *In Wheel WCS*

a) *Configuration of IW-WCS:* Using stationary WEVCS has its drawbacks, such as restricted power transmission, bulkier constructions, and greater efficiency. Coil orientation and the air gap distance between both the sending and receiving have an impact on the efficiency of power transfer. Small passenger cars have an average air-gap distance of 150 to 300 mm, while bigger cars may have a greater one. Using sensing technologies or parking assistance may help the driver locate the coil's centre, which will help them fix the alignment. Before being extensively used, Dynamic-WEVCS technology must overcome two major obstacles: a significant air gap and coil misalignment. The misalignment issue may be addressed to some degree thanks to the high number of source coils. In-wheel WCS (IW-WCS) have indeed been established for stationary and dynamic operations to address WEVCS air-gap issues. It's also less reliant on research papers' suggestions for standardizing the form and placement of receiving coils. EVs and PHEVs will be able to be charged in the future using dynamic and static IW-WCS systems. IWWCS offers considerable benefits over existing quasi- dynamic or dynamic-WCS due to smaller air gaps and better coupling efficiency between both the transmitter and receiver. Multiple main or source coils in WEVCS are often placed beneath the road surface like other WEVCS. Fig. 1.6 shows the basic IW-WCS schematic design for both stationary and dynamic applications. The primary grid power supply is transformed into a high-frequency alternating current (AC) source and linked via a compensating circuit to the main windings. In contrast to conventional WEVCS, the IW-WCS uses secondary coils that are built into the tyre construction. When comparing IW-WCS to existing static or dynamic WEVCS, the spacing between the sources and receiver coils is less in the former. The wireless transformers coils, source of power, and tyre internal structure are the 3 major structural components of IW-WCS that must be properly constructed to create an effective static and dynamic IW-WCS. Figure 1.7 shows the exact interior location of the receiver coils. A series of receiver coils are arranged in a parallel manner within the tyre to collect signals. Only the receiver coil in touch with both the transmitters is active in this configuration, which is advantageous. Multiple receiver coils may be triggered

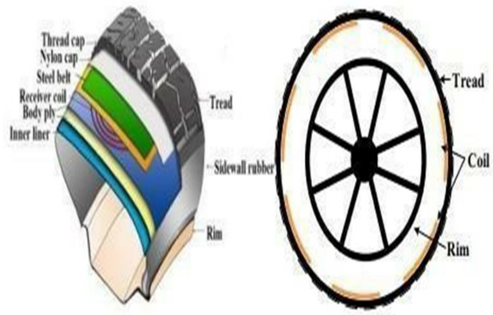


Fig.1.6. In-Wheel WCS (a) internal coil placement (b) coil arrangement

when the horizontal alignment is off. Battery banks and loads can be powered by these devices. A resonance capacitance, rectifier, and filtering circuits are all built into each receiver coil. The array of receiver coils should be placed between both the steel belts and the body ply, as seen in the illustration.

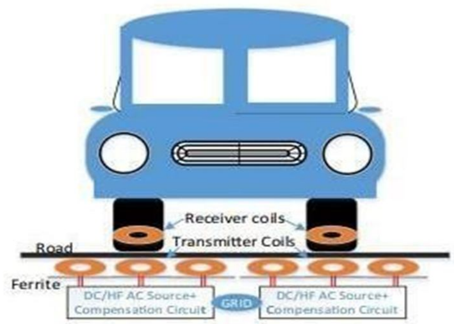


Fig.1.7. Schematic diagram of Static and Dynamic In-Wheel WCS

b) *Computational Analysis:* The static and dynamic IW-WCS strong magnetic distributions and leakage flux were investigated using FEM modelling on an axially symmetric model with a 10 mm in-built steel belt (IBSB) rubber tyre and 7 mm and 17 mm of air gaps with a secondary winding, as illustrated in Fig. 1.8. The magnetic penetration of the tyre was determined by creating the density and starting concentration of the main and secondary windings at 100 kHz using planar ferrite cores (because the rubber tyre has the same permeability as air in the magnetic field). Certain magnetic fluxes are attracted to the steel mesh due to its conducting composition. As a result, the leakage magnetic force in wirelessly transformers is somewhat enhanced. The mutual inductance between the two windings decreases for a 10 mm thick tyre with a 7 mm air gap, dropping the coupling coefficient (k) from 0.52 to 0.46. The impacts of the rim were also investigated in the model, with an aluminium rim placed roughly 40 mm from the secondary coil inside the tyre. By decreasing the short circuit inductance (Ls) from 45 mH to 35 mH, the aluminium rim decreases leakage fluxes and improves couplings. Overall, it contributes to the design of WEVCS by reducing the risk of health and safety issues.

II. LITERATURE REVIEW

1) *Huan Ngo, et.al., "Optimal positioning of dynamic wireless charging infrastructure in a road network for battery electric vehicles" [2020].*

Battery Electric Vehicles' operating range may be extended with dynamic charging technology (DWC) (BEVs). Because DWC is a costly technology to set up, its locations need to be carefully considered. When this comes to spending on infrastructure, finding the best location for DWC facilities inside a network poses a frequent problem. Our approach of serial multiple management takes into consideration the objectives between the infrastructure creating national and BEV users inside this essay. Total system travel time and net energy consumption are evaluated as separate planner objectives. Beyond these objectives, planners are constrained by factors like governmental finances, range assurance, and the need for equitable resource allocation. BEV drivers respond to the planner's provision of DWC facilities by choosing their favourite route for each objective. We use a time- and cost-effective solution approach for dealing with actual networks of a reasonably big size. DWC infrastructure should be located in such a way that it reduces both societal costs and the amount of energy used.

2) *Muhammad Adil, et.al., "A Reliable Sensor Network Infrastructure for Electric Vehicles to Enable Dynamic Wireless Charging Based on Machine Learning Technique" [2020].*

This article offers a hybrid version of the dynamic charger (DWC) for hybrid cars as a solution to this issue in a topological network architecture (s). To allow DWC in EVs, the hybrid system described here makes use of many different variables. An enhanced version of the destination sequential dsdv (Enhanced-DSDV) protocol was used to build the network infrastructure for the contributing EVs. As a machine learning technique, the Charge Status Estimate (CSE) was used to comprehend each EV's collection period state through a magnetic connection. In the same way, CSE material is sent via the network's wireless connectivity nodes to improve the DSDV routing technology. As an added benefit, in a DWC setting, any connected EV will be able to convert fuel from one node in the network to another. We fitted each participating EV with a cockpit screen so drivers could keep an eye on the other EVs in the area and see your actual recharge status, location, and distance. EVs also include a converter to create an electric field that allows wireless magnetic connection between EVs that are close to one another. The feasibility of the proposed paradigm was thoroughly tested in the physical situation of DWC. DWC testing has shown both dynamic and static dependability of the proposed system. DSDV proposed protocol also outperforms existing techniques in terms of bandwidth, outage probability, and delay elevated network.

3) *Altynay Smagulova, et.al., "Simulation Analysis of PI and Fuzzy Controller for Dynamic Wireless Charging of Electric Vehicle" [2020].*

PI and Fuzzy computers are being compared for the edge network cost of electric cars as part of this study. The output voltage is kept constant at 12 V by two controllers using a DC-DC buck-boost converter. Simulators in a dynamically typed environment were used to verify the proposed dynamic WPT designs in detail. Output current, temperature, and power signals from the controllers under study are rather smooth. Ripple-free outputs are produced by the PI controller's current, voltages, and power output. However, the process of settling is more time-consuming. Although it has a small steady-state inaccuracy, the Fuzzy controller quickly condenses the quality characteristics to match the reference parameters. The ripple ratio was reduced from 40% to nearly 0% and 5% using PI and fuzzy regulators in this study. A ripple-free battery will not overheat and degrade prematurely, thus eliminating them is essential. This means that no matter how fast or how slow the input signal changes, the system continues to operate normally thanks to both controllers.

4) *Partha Sarathi Subudhi, et.al., "Wireless Power Transfer Topologies used for Static and Dynamic Charging of EV Battery: A Review" [2020].*

Many different WPT recharge architectures are analyzed in this section, including one for charging an electric vehicle's battery. Inductive power transfer for stable recharge of electric vehicle batteries is extensively covered with a focus on different types of cores, topologies, converters and controllers in this paper. The ICPT technique is perhaps the most economical in terms of process design of all static resonant wireless EV fast-charging topologies. We'll also talk about the design characteristics and circuit analysis of ICPT-based WPT systems. It is assessed in terms of correction architectures and the number of plates employed in the system's construction in terms of inductive wireless charging for static filling of an electric car battery When comparing topologies, the CPT approach without six LCL compensatory plates is superior. For example, the article discusses the primary charging pad architecture as well as compensatory topologies and numerous core types that go into dynamical rechargeable batteries. To help researchers create a reliable way of wirelessly charging an electric vehicle cell, the article analyses the WPT system's difficulties and possible improvements on this page.

5) *Aqueel Ahmad, et.al., "A Comprehensive Review of Wireless Charging Technologies for Electric Vehicles" [2017].*

We've reviewed every recharging technology for electric vehicles (EVs) out there, including their features and guidelines, or the long-term consequences of security precautions that may have been taken. A comparative review of ferromagnetic going to charge and wireless connectivity is based on a detailed summary of Static Wireless Power transfer, Dynamic Charger, and Quasi Dynamic Charger. Unpredictable obstacles, such as mismatch or coils development of energy pads, are listed along with possible fixes. After the benchmarks have been tallied, a comprehensive picture of where we are now is presented, along with a discussion of where these criteria are all about. After then, it's time to consider the need for and gains made in standardizing wireless charging methods. An outline of electromagnetic charging's potential from a V2G (Vehicle to Grid) perspective is given before looking at the commercial viability of wireless power transfer from a cultural-financial perspective.

Researchers and industry alike will benefit greatly from this effort. Workers, and industry professionals as a reference guide for the electric vehicle (EV) wireless power system, providing information about the key features and standards.

6) *Kantipudi VVSR Chowdary, et.al., "Overview and Analysis of Various Coil Structures for Dynamic Wireless Charging of Electric Vehicles" [2020].*

Coil constructions utilized in DWC are discussed in detail in this article. A novel shape for a coil is established in this study after looking at different coil construction options previously unexplored. The DWC coil frameworks' Analysis is shown, and the impact of changing physicochemical characteristics is carefully examined. Discoveries in the suggested shear centre are also contrasted with those found in existing coil layouts, and comparable data are given that show the recommended coil architecture provides greater field strength than any other trailing edges now in use. For the sake of accuracy, actual simulated results back up the theory.

III. METHODOLOGY

A. Flowchart

Chart.1. Flowchart

B. Materials Properties

With the advent of the Proximity sensors Signal Integrity (CPT) system, there is now a viable substitute for conventional capacitive transmission line technology. In part, this may be attributed to the CPT's advantages in terms of topological simplicity, constituent reduction, and improved immunity to electromagnetic interference (EMI). The use of wireless charging (WPT) for charging electric vehicles is becoming more feasible. A hydrophobic (bending and compressed) foam transmitting bumper achieves high capacitance values by moulding and contouring itself with the car after fueling to reduce the air gap.

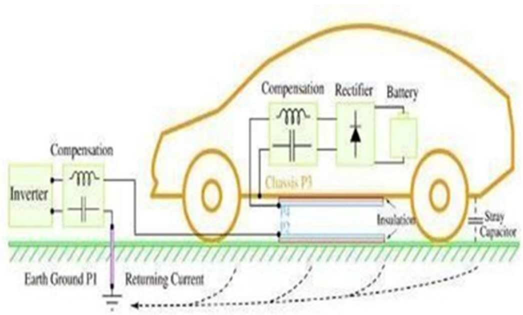


Fig. 3.1: Design of a reactive Power system with a wide air gap for the use in charging stations.

C. Capacitive WPT Architecture

Fig. 3.1 depicts the design of a capacitor WPT EV charging station. One pair of transmitting sheets is implanted in the ground, the other on the chassis' bottom, with a wide air difference between the two couples. This method transfers electricity wirelessly. It is a resonate perfectly matched networks that raise the voltage after an inverter transforms the converter to high-frequency ac. There is thus output energy generated on the coupling plates' roadside, allowing high power transmission with low displace currents and therefore low stray fields. To charge the electric car's battery, a separate resonating collaboration skill is installed on the connection plates' vehicle side. This network increases current while decreasing voltage. Further, both matching nets compensate reactively for the capacitor voltage of the coupled plates. The battery of the EV is connected to the system through a greater transformer. Linking plates, a converter and rectifier with frequency, matching networks to give voltage level gain, and dynamic corrections make up the system.

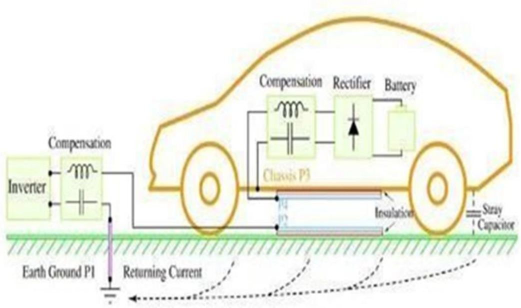


Fig. 3.2. Structure of a CPT system in the electric vehicle charging application

To excite the frequency response on the consumed in large quantities, and converter is needed. A compensatory network may then create resonant frequencies also with an inductive isolator, which includes two metal rods. When transferring power, the chassis & lower are also included, and circuit specifications are set such that values on the suspension are kept to a minimum for safe handling.

D. Modular Capacitive Wireless Power Transfer System

Fig. 3.3 depicts the design of an EV charging system with a high air-gap sub capacitive WPT technology. There are two sets of contacting panels used in this technology, one in the vehicle the other in the road, to transmit wireless power between the various modules. For each module, there is a converter plus rectifier with a high frequency as well as two light networks that allow efficient power transmission by offering power and/or current increase with reactive compensation. Using an inverter, the module's dc supply may be transformed to an AC single pulse. The circuit boosts this ac voltage, resulting in a greater amperage upon that coupling plates' roadside. After a second mating system is installed on the coupler tiles, a rectifier is installed on the vehicular side of the system to convert ac power (or polarity) to direct current (and vice versa).

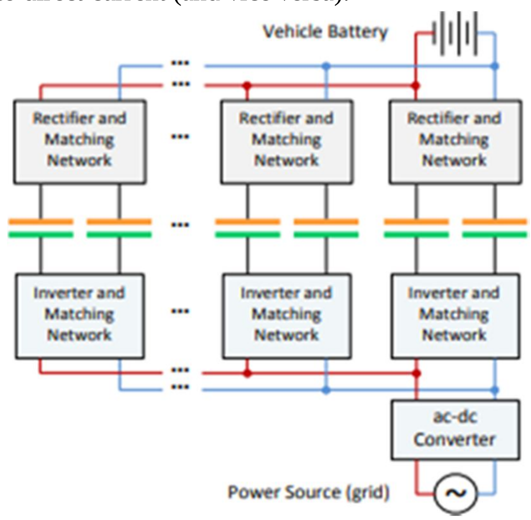


Fig.3.3. The architecture of a modular capacitive WPT system

1) Cost-effective, it's possible to decrease the number of batteries used by using fast download capacity with efficient active inductive charging transfers (WPT).
2) An array of metal pads in the road and metal plates on-board vehicles.
3) Adjacent plate-pairs can be phase-shifted with respect to one another using modular power electronics.
4) Phase-shifting reduces electric field strength in safety-critical regions by cancelling fringing fields generated by adjacent modules.

E. *Objectives of the Study*

1) Study and review different charging techniques of electrical vehicles.
2) To develop an electric vehicle using MATLAB Simulink.
3) To develop a road for charging an electric vehicle.

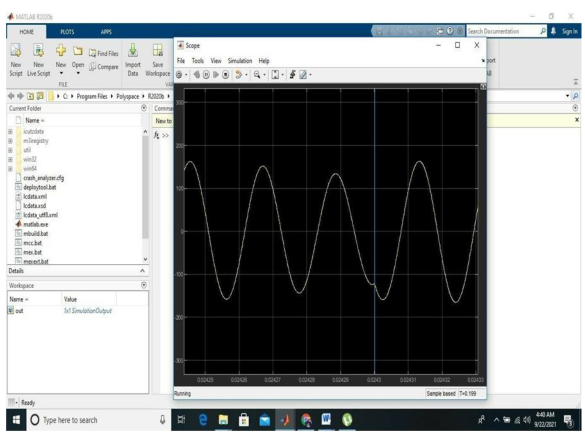
F. *Limitations of the Study*

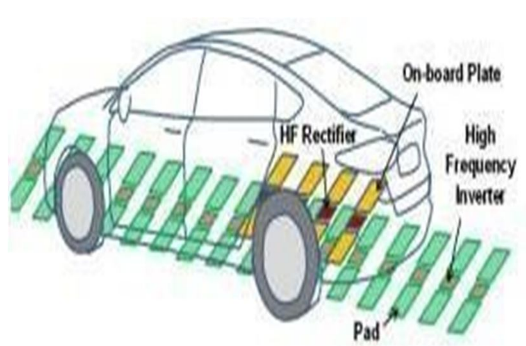
Dynamic wireless charging (DWC) of electric vehicles (EV) in the current era is one of the hot research areas for the research community. The literature section of the paper comprehensively overviews the existing scheme of DWC. However, due to the development of technologies, system flaws are always identified with time. Similarly, these flaws are addressed with a possible solution to achieve better results.

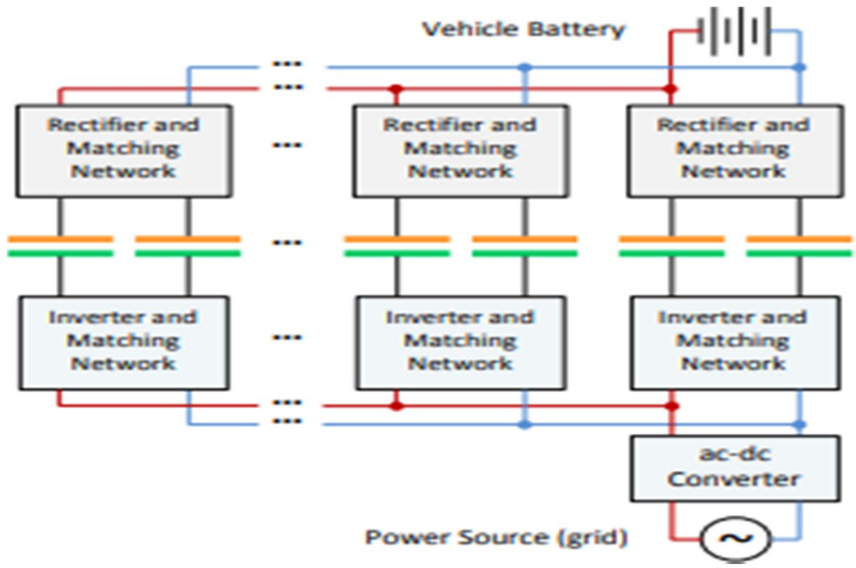
The limitations observed in the existing literature are as follows

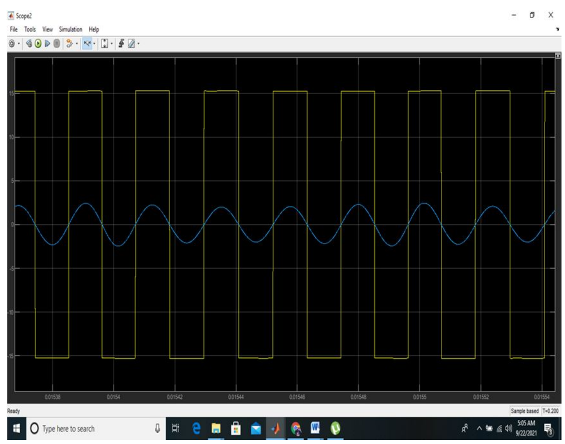
1) Road build-in pads are very expensive to develop.
2) Road build-in pads need high maintenance costs with sufficient manpower.
3) Specific roads, which minimize the use of EVs.
4) Health-related issues for pedestal people walking in the vicinity.
5) Specific DWC environments such as opportunistic DWC.

IV. RESULTS AND DISCUSSION









V. CONCLUSIONS

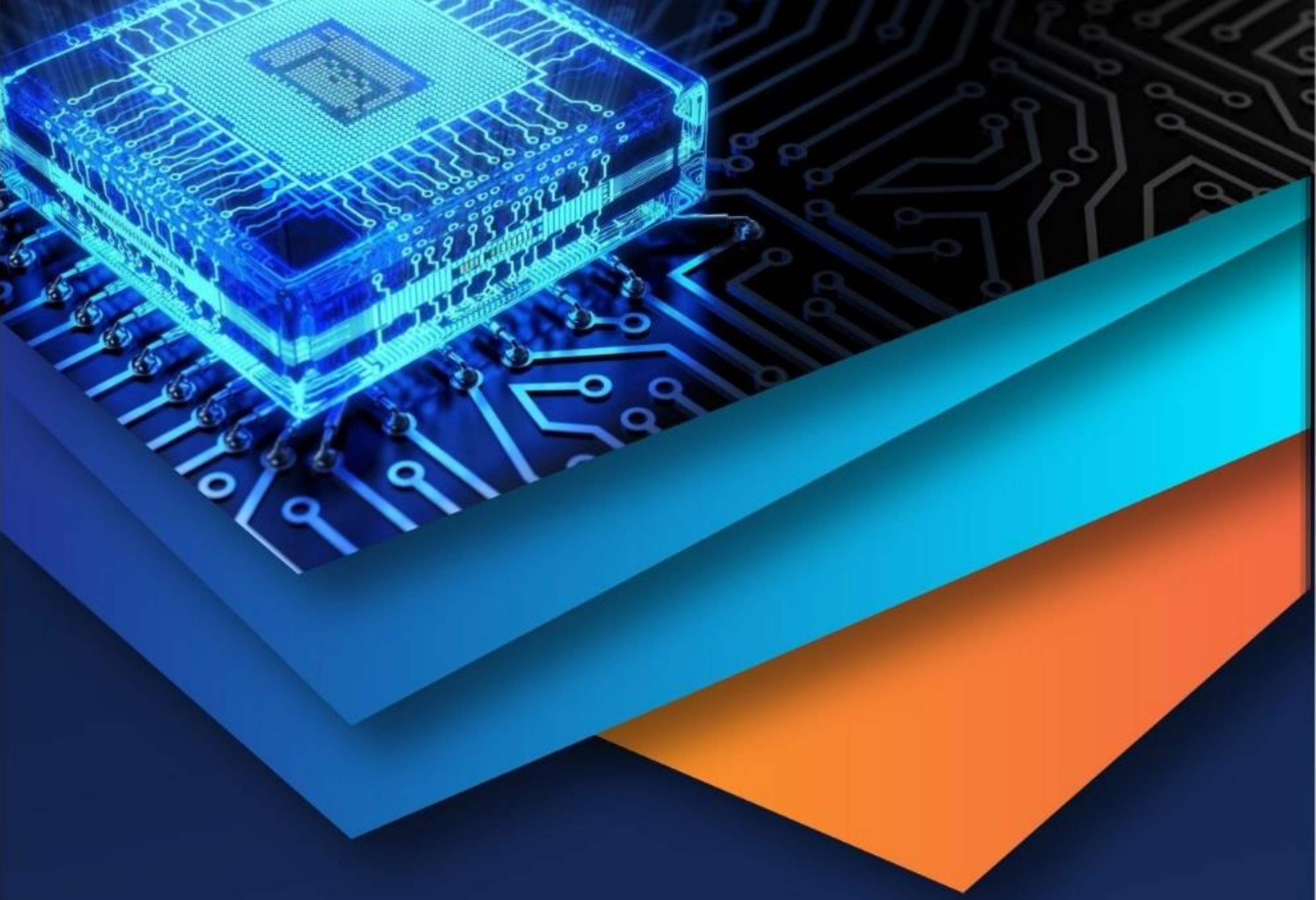
This article discusses the WEVCS and its most current research methodologies for both permanent and dynamic applications. The current wireless power pad was created utilising several cores and ferromagnetic forms, all of which were shown. In the recent past, health and safety concerns have been raised, as have adjustments to global WEVCS legislation. Current technical innovation from various governmental and commercial organisations has been used to investigate and evaluate the most recent stationary and dynamic WEVCS. FEM may be used to study and model emerging future technologies. This page summarises the most recent advances in WEVCS.

VI. FUTURE SCOPE

Providing power while also acting as a driver On-street/dynamic control of EVs is a precondition for future progress in EV charging workmanship. The limited range of EVs may be compensated for by swapping capacity with other cars at traffic signals (semi-dynamic charging)/while moving. The charge-cushion is repeated across a significant portion of the roads and energy is interchanged for a period of time when cars are over it. Circulated IPT structures, on the other hand, recommend using inverter-powered tracks outside, and such structures have usually been used in program guided vehicles (AGVs) and a Road Charge material handling framework based on conveyed IPT structures. A further advantage of on-street charge is the ability to power EVs from nearby, cost-effective power sources of life force. IPT frameworks have been widely used to reproduce highway driving cycles with power outputs ranging from 10–60kW and inclusion rates of 10–100%, with many studies having been carried out on these models. Figure 10 shows how much power may be achieved by driving at half the roadway participation or 50kW at 20 per cent inclusion. Furthermore, a particularly large driving extent may be achieved for power significant than 20 kW for inclusion greater than half.

REFERENCES

[1] Huan Ngo, et.al., “Optimal positioning of dynamic wireless charging infrastructure in a road network for battery electric vehicles”, 2020.
[2] Muhammad Adil, et.al., “A Reliable Sensor Network Infrastructure For Electric Vehicles to Enable Dynamic Wireless Charging Based on Machine Learning Technique”, 2020.
[3] Altynay Smagulova, et.al., “Simulation Analysis of PI and Fuzzy Controller for Dynamic Wireless Charging of Electric Vehicle”, 2020.
[4] Partha Sarathi Subudhi, et.al., “Wireless Power Transfer Topologies used for Static and Dynamic Charging of EV Battery: A Review”, 2020.
[5] Aqueel Ahmad, et.al., “A Comprehensive Review of Wireless Charging Technologies for Electric Vehicles”, 2017.
[6] Kantipudi VVSR Chowdary, et.al., “Overview and Analysis of Various Coil Structures for Dynamic Wireless Charging of Electric Vehicles”, 2020.
[7] Eiman A. ElGhanam, et.al., “Deployment Optimization of Dynamic Wireless Electric Vehicle Charging Systems: A Review”, 2020.
[8] ElGhanam, et.al., “Design of a High Power, LCC-Compensated, Dynamic, Wireless Electric Vehicle Charging System with Improved Misalignment Tolerance”, 2020.
[9] Tian, et.al., “Electric Vehicle Charger Static and Dynamic Modelling for Power System Studies”, 2021.
[10] Zhang Qiang, et.al., “Analysis and Control of Dynamic Wireless Charging Output Power for Electric Vehicle, 2017.



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