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A Survey on IoT Based Electric Vehicle Charging System

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ABSTRACT

Reducing the availability of non-renewable sources and transitioning to renewable energy, such as solar power, isacrucialsteptowardasustainable future. This shift can help decrease our dependence on fossil fuels and mitigate the environmental impact of energy production. Governments, businesses, andindividualsareincreasinglyinvestinginrenewableenergy technologies likesolar panelsto harnessthepowerofsunlight andreduce carbonemissions. Inthisproject, theconceptbeingdiscussedinvolvesthewirelesstransmissionof electric powerusingrenewableenergysources, specificallysolarpanels.Theglobalpopulation growth and increased vehicle usage contribute to air pollution and environmental concerns. Electric vehicle charging stations play a vital role in mitigating this issue by promoting the adoption of electric vehicles (EVs.)

KEYWORDS : Power Supply, Charging Cable, Connector, Control Panel, User Interface.

I. INTRODUCTION

Transmitting electric power wirelessly to supply electricity to devices and for charging purposes has been considered for a long time, dating back to the era of Nikola Tesla. However, this concept was not achievable during Tesla's time because the necessary technologies and infrastructure required to make wireless powertransmissionpracticalwere not yet developed or available [1]. Breakthrough in wireless power transmission thatoccurred in 2007. Researchers were ableto illuminate a light bulb using a wireless power source located at a distance of two meters.This achievement marked a milestone in the development of wireless power transfer technology [2]. The analysis primarily concentrated on how these models interacted with the powers system, likely referring to how the yimpacted or utilized the electrical power infrastructure. The objective was to draw general and clear semi-quantitative (partially numerical) conclusions,allowing for a better understanding of the implications and differences among these transportation models in terms oftheir energy and power requirements [3].

Electric vehicles (EVs) have seen widespread adoption globally due to their potential to significantly reduce the consumption of fossil fuels. This makes EVs a environmentally friendly mode of transportation compared to

traditional gasoline or diesel-powered vehicles [4].A specific type of transformer known as a two-coil loosely coupled transformer, whichis notable for its ability to transfer power wirelessly with high efficiency even across significant air gaps. It also references four basic topologies used in wireless power transfer systems, which are often categorized based on how compensation capacitors are connected to the transmitting and receiving coils. [5]. Advancement in IOT technology helps us to use sensors technology in day to day life applications [6].

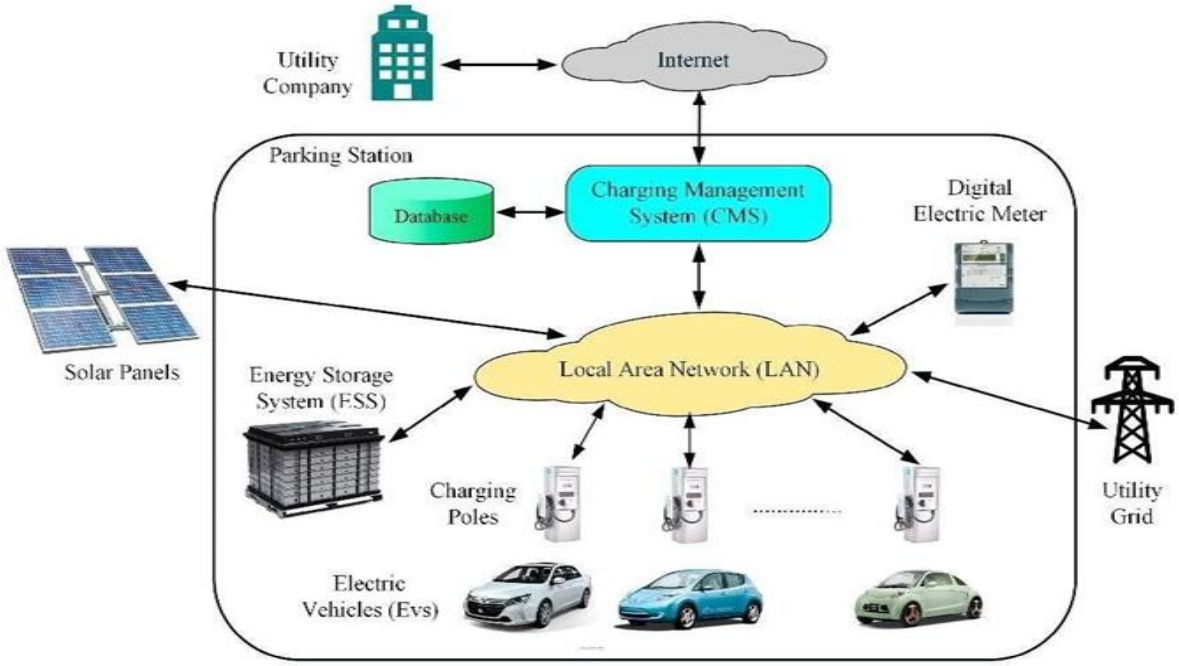

Fig. 1 Reference–Optimal charging and electric vehicle charging

II. LITERATURESURVEY

Sr.No:	1
PaperTitle	Wireless Charging System For Electric Vehicle
Author	Muhammad, Amjad, Muhammad Farooq-i-Azam,QiangNi,Mianxiong Don
Year	2022
Problemsolved in thispaper:Existing ProblemStatement	The wireless charging system for electric vehicles is to develop a reliable andefficient chargingsystemthat utilizesrenewableenergysources,such as solar panels, to wirelesslytransfer power to the electric vehicle.
Technique used to solve problem: Existing Problem Solution	Thetechniqueusedtosolvetheproblemofwirelesschargingforelectric vehicles is inductive power transfer through electromagnetic coupling between the primary and secondary coils.
Whatwillbefuture work: Future Scope	Improving Power Transfer Efficiency: Further research can be conducted to optimize the power transfer efficiency between the primary and secondary coils. This can involve exploring different coil designs, materials,andconfigurationstominimize powerlossesduring wireless charging.
Sr.No:	2
PaperTitle	WhyweneedbatteryswappingTechnology
Author	ValleraA.M,NunesP.M,BritoM.C.

Year	2021
Problem solved in thispaper:Existing ProblemStatement	Theproblemstatement forbatteryswappingtechnologyistodevelopa reliable and efficient systemthat allows for the quick and convenient exchangeofdepleted EVbatterieswithfullychargedones.
Techniqueusedto solve Problem: Existing Problem Solution	Thetechniqueusedto solvetheproblemofbatteryswappingtechnology for electric vehicles is the development of automated battery swapping stations.
What willbe futurework: FutureScope	One of the future works is to establish industry standards and compatibilityprotocolsforbatteryswappingsystems.Thiswillensure interoperabilitybetween different electric vehicle models and battery swappingstations,allowingforseamlessanduniversalbattery swappingcapabilities.
Sr.No:	3
PaperTitle	Thekeyissuesofelectricvehiclechargingviahybridpowersources: Technoeconomic viability, analysis, and recommendation
Author	Eltoumi,FouadM.,Becherif, Mohamed,Djerdir, Abdesslem, Ramadan, Haitham.S.
Year	2021
Problem solved in thispaper:Existing ProblemStatement	Thepaperaimstoidentifyandanalyzethekeyissuesrelatedtocharging electric vehiclesusing hybrid power sources, considering the economic feasibility and technological aspects. The goal is to provide recommendations for improving the efficiency, cost effectiveness, and sustainability of electric vehicle charging systemsusinghybridpowersources.
Techniqueusedto solve problem: Existing Problem Solution	The technique used to solve the problem of electric vehicle charging via hybrid power sources in the paper. The Key Issues of Electric Vehicle Charging via Hybrid Power Sources: Technoeconomic Viability, Analysis,and Recommendations"isnotexplicitlymentioned.
What willbe futurework: FutureScope	Future work can involve the development of policy and regulatory frameworks to support the deployment and operation of electric vehicle charging infrastructure powered by hybrid power sources.
Sr.No:	4
PaperTitle	ASinglePhaseWirelessPowerTransferSystemwithaHighFrequency AC Link ConverterintheSecondaryforThreePhaseApplications.
Author	AlirezaJafari,Amirbabaki,Alizakerian.
Year	2021
Problem solved in thispaper:Existing ProblemStatement	Theexistingproblemstatementisaboutdevelopingawirelesspower transfer system that uses a high frequency AC link converter in the secondaryside.Thissystemaimstobeusedinthree-phaseapplications.
Techniqueusedto solve problem: Existing Problem Solution	Implementresonantinductivecouplingtechniquesinthewirelesspower transfer system. Resonant circuitscan improve powertransfer efficiencyby ensuringthattheprimaryandsecondarycoilsareinresonance,reducing energylosses.

What willbe futurework: FutureScope	Single-PhaseWirelessPowerTransferSystemwithaHighFrequencyAC Link Converter in the Secondary.
Sr.No:	5
PaperTitle	OntheAsymptoticBehaviorandParameterEstimationofaDoubleSided LCC CompensatedWirelessPowerTransferSystem.
Author	Feng-RungHuJiaShengHu.
Year	2021
Problem solved in this paper: Existing Problem Statement	The existing problem statement is about developing a wireless power transfer system that uses a high frequency AC link converter in the secondaryside.Thissystemaimstobeused inthree-phaseapplications.
Technique used to solve problem Existing Problem Solution	Thisresearchpaperdiscussestheconceptofawirelesschargingstationfor electricvehiclesusingrenewableenergysources,specificallysolarpanels.
What will be future work: Future Scope	Additionally, thereispotentialfordevelopingadvancedcontrol algorithms and optimizationtechniques to enhancethe efficiencyand reliabilityofthewirelesspowertransfersystem.
Sr.No:	6
PaperTitle	WirelessPowerTransferusingDominoResonatorfor110kVPower Grid OnlineMonitoring Equipment
Author	QU.J,HE.L,TangN,LeeCK
Year	2020
Problem solved in this paper: Existing Problem Statement	Thedevelopmentofawirelesspowertransfersystemforonlinemonitoring equipment in a 110 kV power grid. The paper aims to overcome the limitations of traditional wired power supply methods by proposing a domino resonator-based wireless power transfer system.
Technique used to solve problem: Existing Problem Solution	This technique involves the use ofresonant magnetic coupling between a transmitter coil (primary coil) and a receiver coil (secondary coil) to transfer electric power wirelessly to the monitoring equipment.
What will be future work: Future Scope	Wirelesspowertransferusingadominoresonatorfor110kVpowergrid online monitoring equipment includes several potential areas of development.
Sr.No:	7
PaperTitle	Vehicleto-vehiclechargingsystemfundamentalanddesigncomparison.
Author	Mou.X,Zhao.R,andGladwi
Year	2019
Problem solved in this paper : ExistingStatement	The development and implementation of Vehicle-to-Vehicle (V2V) charging systems present a multifaceted set ofchallenges encompassing fundamental principles and design considerations.
Techniqueusedto solve problem: Existing Problem Solution	Collaboratewithinternationalorganizations,automakers,andtechnology providers to develop standardized V2V communication protocols and charging connectors.

	Encourage industry-wide adoption of these standards to ensure interoperability between different EV makes and models.
What willbe future work: Future Scope	Therecouldalsobeadvancementsinwirelesschargingtechnology, allowing for longer-range and more efficient power transfer.
Sr.No	8
PaperTitle	AComprehensiveReviewofWirelessChargingTechnologiesfor ElectricVehicle
Author	AqueelAhmad,MohammadsaadAlam.
Year	2018
Problemsolvedinthis paper: Existing ProblemStatement	In this paper electric vehicles (EVs) continues to grow, the demand for efficientandconvenientchargingsolutionsbecomesincreasinglycrucial for mainstream acceptance. While conventional plug-in charging methods have been prevalent, there is a pressing need to evaluate and understandthestate-of-the-artinwirelesschargingtechnologiesfor electricvehicles.
Techniqueused to solveproblem:Existing ProblemSolution	Provide clear and data-driven recommendations for the most suitable wirelesschargingtechnologybasedonspecificuse cases, suchashome charging, public charging, and fast-charging networks. Encourage standardizationbodiestoconsiderthefindingsandpotentiallyconverge towardthemost effectivewirelesschargingsolutions.
What willbe futurework: FutureScope	Wirelesschargingtechnologiesforelectricvehiclesisquite promising! Astechnology continuestoadvance,wecanexpecttoseefurther improvements in efficiency, charging speed, and convenience.
Sr.No:	9
PaperTitle	OptimizingtheEnergyTransfer,WithaHighSystemEfficiencyin Dynamic Inductive Charging of EVs.
Author	Karakitsios,IoannisPalaiogiannis,FoivosMarkou,Achilleas Hatziargyriou,Nikos.
Year	2018
Problemsolvedinthis paper : Existing ProblemStatement	One problem is the energy losses during the wireless power transfer process, which can reduce overall efficiency. Another issue is maintaining a stable connection and alignment between the charging infrastructureandthevehiclewhileinmotion,whichcanimpactthe chargingefficiency.
Techniqueusedtosolve problem: Existing ProblemSolution	Specific information or solutions regarding optimizing energy transfer and achieving high system efficiency in dynamic inductive charging of electric vehicles.One solutioncould beto focusonimprovingthedesign andengineeringofthechargininfrastructureandthevehicles themselves.
What willbe futurework: FutureScope	The future scope of optimizing energy transfer with high system efficiency in dynamic inductive charging of electric vehicles (EVs) is promisingandholdssignificant potentialforadvancingthefieldofEV charging.
Sr.No:	10
PaperTitle	Economicanalysisontheuseofwiredandwirelessrechargingsystems
Author	M.Longo,D.Zaninelli,G.Cipriani.

Year	2017
Problemsolvedinthis paper: Existing ProblemStatement	Theuseofwiredandwirelessrechargingsystemsistocomparethecosts and benefits of implementing wired and wireless charging systems for electric vehicles (EVs). The analysis aims to assess the economic feasibilityand potentialadvantages of eachcharging method interms of installationcosts,operationalcosts,efficiency,anduserconvenience.
Techniqueused to solveproblem:Existing ProblemSolution	Thetechniqueusedtosolvetheproblemofcomparingthe economicanalysisofwiredandwirelessrechargingsystemsfor electric vehicles (EVs) is a comparative cost analysis.
What willbe futurework: FutureScope	The future scopeofeconomic analysisonthe use ofwired and wireless recharging systems is significant, asthe electric vehicle (EV) charging infrastructure continues to evolve. Here are some key areas of future developmentandopportunitiesineconomicanalysisforbothwiredand wireless recharging systems.

III.LIMITATIONS OF EXISTING SYSTEM

- Limited Charging Infrastructure: The existing system may rely on outdated or biased data or algorithms that may data or algorithms that may lead to erroneous or unfair predictions andecisions. For example, some predictive policing tools that use machine learning to forecast where and when crimes are likely to occur based on historical data have been criticized for being biased and in accurate.
- SlowChargingSpeed: Thechargingprocesscanbetime-consuming, especiallywith traditional charging methods, which may discourage potential users from adopting electric vehicles.The existing systemmay not be acceptedortrustedbythe public or the police,affecting its legitimacy and effectiveness.For example,some people may oppose or resist the use of facial recognition cameras .
- Compatibility Issues: Different electric vehicle models may have different charging requirements and connectortypes, leading to compatibilityissues and inconvenience for users.
- Limited Grid Capacity: The existing power grid may not have enough capacity to handle the increased demand from widespread electric vehicle charging, leading to potential strain on the grid and power outages.
- Lack of Standardization: There is a lack of standardization in terms of charging protocols, payment methods, and interoperability between charging networks, which can create confusion and inconvenience for electric vehicle owners.

IV.CONCLUSION

Theconclusionregardinganelectric vehiclechargingsystemisthat it offersefficient and convenient charging solutions for electric vehicles (EVs). This means that such systems aredesigned to effectively and conveniently provide the necessary electricity to charge EVs, making it easier and more practical for usersto keeptheir electric vehicles powered up. Indeed, the statement emphasizesthat electric vehicle charging systemsoffer multiple benefits. Firstly, they aid in reducing carbon emissions, which is crucial for environmentalsustainability. Secondly, these systems promote sustainable transportation by encouraging the use of electric vehicles, which

produce fewer emissions compared to traditional gasoline or diesel vehicles. Furthermore, the statement underscores the convenience aspect of these charging systems. They provide an easy and user-friendly method for charging electric vehicles, making it convenient for EV owners to maintain their vehicles' power levels. This convenience factor can significantly contribute to the adoption of electric vehicles as a practical and accessible mode of transportation.

V. REFERENCES

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