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ijircce@gmail.com



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Electric Vehicle Charging Using Street Light

Dr.G Amudha¹, Praveen Kumar R², Santhosh Pandiyan R³, Siva Kumar M⁴, Logesh B⁵

Professor, Department of Computer Science and Business System, RMD Engineering College, Chennai, India¹

Student, Department of Computer Science and Business System, RMD Engineering College, Chennai, India²

Student, Department of Computer Science and Business System, RMD Engineering College, Chennai, India³

Student, Department of Computer Science and Business System, RMD Engineering College, Chennai, India⁴

Student, Department of Computer Science and Business System, RMD Engineering College, Chennai, India⁵

ABSTRACT: Electric Vehicle(EV) charging is a critical component of the sustainable transportation ecosystem, enabling the operation and expansion of electric mobility. Charging infrastructure comprises various methods such as AC(Alternating current) charging, each wireless or inductive charging, each catering to different use cases. The technology involves energy transfer from the power grid to the EV's battery, with ongoing advancement aimed at improving efficiency, reducing charging times, and minimizing grid load. Integration with renewable energy sources and smart grids is enhancing the environmental benefits. The expansion of accessible charging stations and standardization of charging protocols are key to supporting the widespread adoption of EV's, ensuring convenience and reliability for users.AC charging is slower and suited for home uses, Expanding charging networks and standardizing technology will play a key role in mass EV adoption.

I. INTRODUCTION

Electric Vehicle(EV) charging is a fundamental aspect of electric mobility, enabling the use and widespread adoption of electric vehicles. It involves replenishing the battery of an EV through external power sources. As EVs have grown in popularity due to their environmental benefits and efficiency, the development of charging infrastructure has become critical to supporting this shift. The primary levels of EV charging are AC Fast charging requires a 240V power sources and delivers significantly faster charging, making it ideal for home installations, workplaces, and public charging stations. The expansion of charging infrastructure is vital for the successful adoption of EVs. While home charging remains the most convenient and cost-efficient option for most EV owners, public charging networks are essential for long trips and for those without access to home charging. Public stations are being installed at workplaces, shopping centers, parking lots, and along highways to alleviate range anxiety-the fear of running out of battery without access to a charging station .Moreover, smart charging systems are being developed to optimize energy use by charging during off-peak times, reducing the load on the electrical grid. As battery technologies improves, charging speeds will continue to increase, further enhancing the practicality of EVs. Overall, the evolution of EV charging infrastructure is essential to accelerating the global shift towards electric mobility.

ADVANTAGES:

- **Clean and Green Energy:** By using solar power, the system supports clean energy, reducing the need for fossil fuels and cutting down harmful pollution. This helps in fighting climate change and keeping the air cleaner.
- **Low Maintenance:** Solar systems need very little upkeep after installation, saving time and money on maintenance. There are fewer repairs compared to traditional electricity systems.
- **Easier Access:** The charging points are placed regular intervals on highways , so it's easier for people to find a charging spot, especially for long-distance travel or in areas where charging stations are rare.
- **Dual Purpose:** These street lights provide both lighting and EV charging, so they serve two purposes without taking up extra space or requiring new structures to be built.
- **Convenient for Users:** The online booking system makes it easy for users to find available charging spots, book them in advance, and check their energy usage. This removes the worry of not finding a charging point when needed.
- **Easily Expandable:** The system can be set up in many places without much difficulty, making it useful for cities,



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highways, and even rural areas where infrastructure is limited.

DISADVANTAGES:

1. **High Installation Costs:** Installing solar panels and batteries on street lights is expensive. While the costs will reduce over time, the initial setup may limit how fast the system can be rolled out in different places.
2. **Slow Charging:** The system only provides Level 1 charging, which is slow and may not be enough for larger vehicles like cars that need more power and faster charging.
3. **Weather Dependent:** Solar power works best when there is a lot of sunlight. On cloudy or rainy days, or at night, the system's ability to charge vehicles will be reduced, making it less reliable in some conditions.
4. **Maintenance Needs:** The system will require regular maintenance to keep the solar panels, batteries, and charging ports working properly. Bad weather or damage could cause problems and affect how well the system works.
5. **Limited Locations:** While the system works well on highways, it may be harder to set up in crowded cities with little sunlight or space. Some areas may not be suitable for solar-powered charging points.

II. RESULT

While EV charging systems offer significant environmental and economic benefits—such as reduced air pollution, lower running costs, and the convenience of home charging—they face several challenges that need addressing. Limited charging infrastructure, slow charging times, high installation costs, and electricity grid demands are key areas of concern. Additionally, inconsistencies in charging standards and the environmental impact of battery production highlight the need for continued innovation and investment in infrastructure and technology. Despite these challenges, the ongoing advancements in EV technology and infrastructure development hold promise for a more sustainable and efficient future for electric vehicles.

III. CONCLUSION

The Landscape of ev charging system is one of the both promise and challenges .The advantages such as significant reduction in air pollution,lower operational cost and the convenience of home charging are notable.How ever the current systema are hampered by limited infrastructure longer charging times compared to conventional fuelling high installation cost and demand on the electricity grid.

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