"SOLAR WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM''

[1]Mr.Yash Mahaling Harge, [2] Mr.Suraj Sanjay Patil, [3] Mr.Rohit Vasant Sukum[1] Mrs.Shagufta M. Mestri
Diploma Electrical Engg.
Sanjay Bhokare Group Of Institutes,Sangli.

I. ABSTRACT

This paper details the planning and design of a solar-powered charging for electric vehicles, a solution to the dual problems of expensive gasoline and harmful emissions. The number of countries with electric. vehicles on the road is steadily rising. In addition to helping the environment, electric vehicles have proven useful in cutting down on transportation costs by substituting expensive fuel with much more affordable power. Here, we create a novel and effective answer to this problem by designing an electric vehicle charging infrastructure. There is no need to stop for charging because the EV can do so while it is in motion; the system is powered by solar energy; and there is no need for an additional power source. For its construction, the system employs a solar panel, battery, transformer, regulator circuitry, copper coils, AC to DC converter, Atmega controller, and LCD display. This technology follows the ideology that charging electric vehicles can be done without having to pull over to a charging station. So, the technology proves the viability of a road-integrated, solar-powered wireless charging system for EVs.

Keywords- Solar Panel, battery, transformer, regulator circuitry, AC to DC converter, Atmega controller, LCD display

II. INTRODUCTION

In the field of transportation, electric vehicles (EVs) represent a novel concept. Electric vehicles (EVs) are predicted to take over the automobile market in the near future. The charging procedure for electric vehicles (EVs) must be regulated in this context in order to preserve the quality of the power networks. In spite of this, with the growth of electric vehicles (EVs), there will be a significant quantity of energy stored in the batteries, which will allow for the opposite effect. EV interactivity will be important technology in future smart grids, contributing to the autonomy of the power grid. Due to decreasing carbon dioxide emissions and rising fossil fuels, the electric vehicle has become more competitive than the conventional

internal combustion engine vehicle. In spite of these drawbacks, the EV was not generally adopted in the market because of its high vehicle cost. There is a dearth of fast-charging stations and a paucity of all-electric vehicles. There are two types of electric vehicles: those that are powered entirely by electric power and those that are partially powered by electric power. In addition to their low operating costs and little impact on the environment, electric vehicles utilize little or no fossil fuels at all. Electric vehicles will be the primary means of transportation in the future to enhance charging station efficiency [1]. When it comes to acquiring an electric vehicle, the absence of charging infrastructure is the most common argument given for not doing so. The portable EV charger was tested by lowering charging time with renewable energy. A hybrid power system is used in this study to provide a unique service to long-distance EV drivers. Between major highways, there aren't any places for these drivers to refuel their automobiles with electricity. The wireless EV charger is a great choice for people who want to use electricity to charge their electric vehicles [2]. Because of rising fossil fuel prices and declining CO2 emissions, electric vehicles are now more cost-competitive than traditional Considered as a continuous vehicles Electric vehicles were not extensively adopted because of restrictions such as high car costs [2]. There is a dearth of fast-charging stations and a paucity of all-electric vehicles. It is possible for EVs to be powered entirely or in part by electricity. Due to their lack of moving parts and little impact on the environment, electric cars have lower operating expenses than gasoline-powered counterparts [3]. Our project system uses a solar panel, battery, transformer, regulator circuits, copper coils, AC to DC converter, Atmega controller, and LCD display to build the system. There is no need to stop for recharging with this system because electric vehicles may be charged while travelling. A charge controller connects the battery to the solar panel. de electricity is being stored in the battery. Now, in order to send the DC power, it must be converted to AC power. A transformer is used here to accomplish this task.

III. OBJECTIVE

THE OBJECTIVE OF DESIGNING AND IMPLEMENTING AN "SOLAR WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM'' TO IMPROVE ENERGY MANAGEMENT AND COST-SAVING STRATEGIES FOR BOTH CUSTOMERS AND UTILITY COMPANIES. HERE ARE SOME BENEFITS OF SOLAR WIRELESS ELECTRIC VEHICLE SYSTEM :

reduced reliance on fossil fuels, environmental benefits, and cost savings by utilizing renewable energy, while also enhancing convenience and potentially enabling charging while moving.

Here's a more detailed breakdown of the advantages:

- Reduced Carbon Footprint: Solar energy is a clean and renewable source, leading to a significant reduction in carbon emissions compared to traditional grid electricity.

- Lower Emissions: By using solar power, these systems contribute to cleaner air and reduce the environmental impact of EV charging.
- Reduced Electricity Costs: Solar energy can significantly lower the cost of charging EVs, as it reduces reliance on grid electricity.
- Sustainability: Solar wireless charging promotes sustainable energy consumption and reduces dependence on fossil fuels.
- Long-Term Savings: While the initial investment might be higher, the long-term operational costs of solar-powered charging are lower than traditional methods.

IV. LITURATURE SURVEY

A article of solar wireless charging system for electric vehicles based on inductive power transfer is presented by:

1 Chen, Y., Zhang, and Jiang in their article titled "A Novel Solar Wireless Charging System for Electric Vehicles Based on Inductive Power Transfer" (2021). In this paper, published in the IEEE Transactions on Vehicular Technology, the authors describe the system's architecture, control methods, and performance evaluation. By utilizing inductive power transfer technology, the authors demonstrate the system's efficiency and practicality. Their research makes a notable contribution to the growing field of wireless EV charging systems, particularly those powered by solar energy. The system's design, control strategies, and performance assessments highlight the feasibility and effectiveness of this innovative solar wireless charging solution for electric vehicles.

2 In the book titled "Wireless Power Transfer for Electric Vehicles and Mobile Devices," edited by Salous, S., Gavrilovska, L., Matolak, D. W., and Sousa, E. (2020), a comprehensive examination of wireless power transfer technologies is provided. The book covers various aspects of wireless power transmission, including solar-powered charging systems for electric vehicles. It delves into topics such as electromagnetic theory, system design, implementation, and potential advancements in the field. This book is an excellent resource for both scholars and professionals interested in the emerging technology of wireless power transfer. It offers in-depth coverage of the theory, design, and implementation of these systems, with a specific focus on solar-based systems and future trends.

3 In 2018, Tan, K., Wang, Q., and Wang, X. published an article in the International Journal of Electrical Power & Energy Systems, titled "Solar-powered wireless charging system for electric vehicles: design and implementation." In this work, the authors describe the development of a solar-powered wireless EV charging system. They provide insights into the system design, control algorithms, and share experimental results to showcase the efficiency and potential of their proposed system. This study advances the understanding of solar-powered EV infrastructure, demonstrating its practicality and usefulness in real-world applications.

4 Although not specifically focused on solar wireless EV charging systems, Gubbi, J., Buyya, R., Marusic, and Palaniswami discuss the Internet of Things (IoT) in their 2013 article, "Internet of Things (IoT): A vision, architectural elements, and future directions" in the journal Future Generation Computer Systems. The article explores the role of IoT and its potential impact on several applications, including the integration of smart grid technology and EV charging systems. As EVs become more integrated with smart grids, understanding IoT and its influence on electric vehicle charging systems becomes essential. This paper offers a broader perspective on IoT and its implications for applications such as smart grids and EV charging, even though it is not solely focused on solar wireless systems.

V. DESIGN AND IMPLIMENTATION OF SOLAR WIRELESS ELECTRIC VEHICLE CHARGING SYSTEM

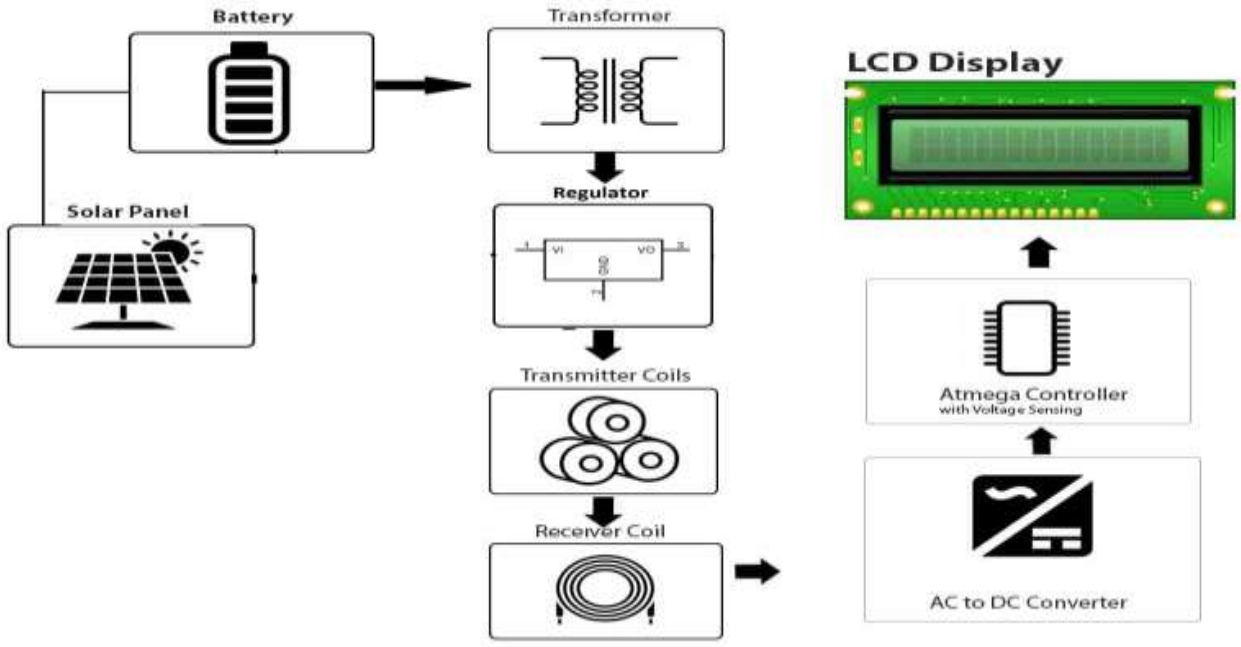
- The system makes use of a solar panel, battery, transformer, regulator circuitry, copper coils, AC to DC converter, atmega controller and LCD display to develop the system. The system demonstrates how electric vehicles can be charged while moving on the road, eliminating the need stop for draging .
- The solar panel is used to power the battery through a charge controller.
- The battery is charged and stores de power. The DC power now needs to be converted to AC for transmission. For this purpose we here use a transformer.
- power is converted to AC using a transformer and regulated using regulator circuit This power is now used to power the copper coils that are used for wireless energy transmission.
- A copper coil is also mounted underneath the electric vehicle.When the vehicle is driven over the coils energy is transmitted from the transmitter coil to EV coil. Please note the energy is still DC current that is induced into this coil . Now The we convert this to DC again so that it can be used to charge the EV battery.

• We use AC to DC conversion circuitry to convert it back to DC current. Now we also measure the input voltage using an atmega microcontroller and display this on an LCD display. Thus the system demonstrates a solar powered wireless charging system for electric vehicles that can be integrated in the road.

VI. PROPOSED SYSTEM

Below is the architecture of Solar Wireless Electric Vehicle Charging System.this is the architecture and simplified diagram of our project .This is used to learn the diagram easily. In this architecture there are following blocks are used as follows:

- Main Supply
- Atmega Controller
- Voltage Sensor
- LCD Display
- Transformer
- Regulator Circuitry
- Transmitter and Receiver Coils
- Vehicle Body
- Wheels
- Switches
- LED's
- PCB Board
- Resistors
- Capacitors
- Transistors
- Cables and Connectors



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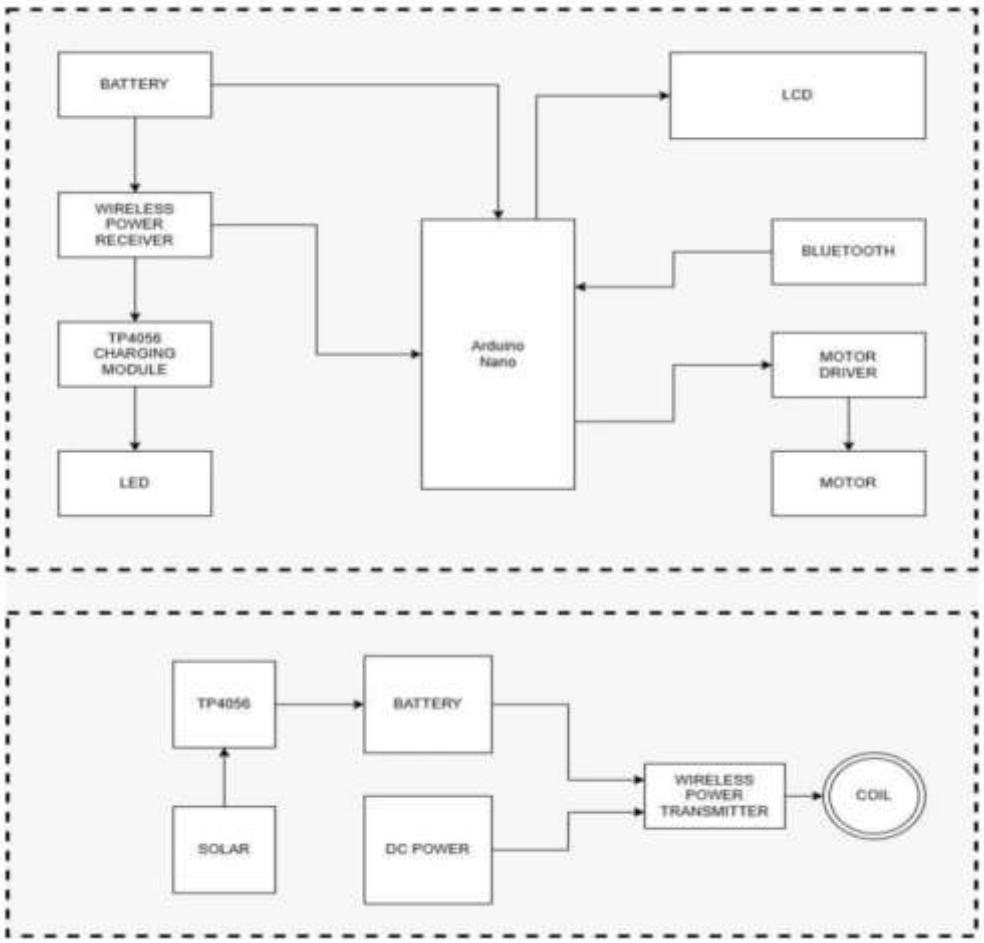
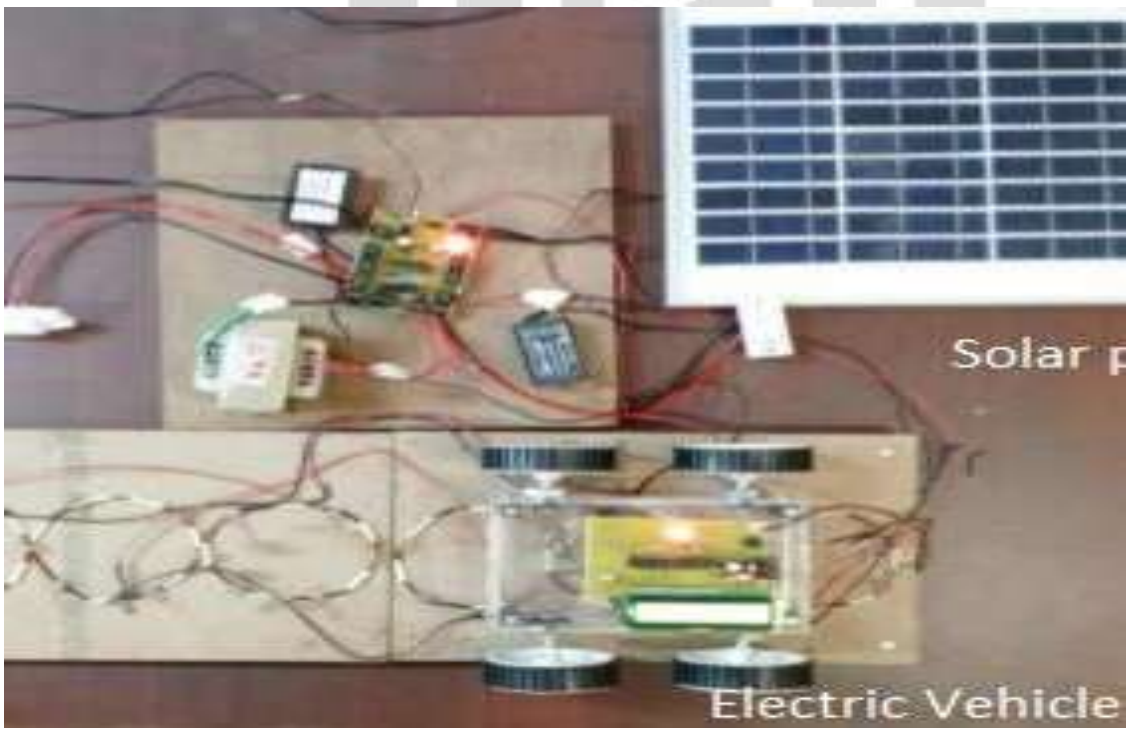


VII. HARDWARE OUTPUT



VIII. RESULT

A solar wireless EV charging system project aims to revolutionize EV charging by leveraging solar power and wireless technology, offering a sustainable and convenient charging solution. This approach eliminates the need for charging cables, allows for charging while driving, and promotes renewable energy use.

IX. ADVANTAGES

In order to reduce air pollution, we need to move towards an alternate source of transport from convention ICE vehicles and EVs can act as an alternate source of transportation giving plenty of advantages to the consumers which are mentioned below:

A. EVs are envirnment friendly

Compared to ICE vehicles EVs does not produce smoke resulting in no pollution. EVs don't even have an exhaust system, meaning they have zero emissions. And since gas- powered vehicles are large contributors to greenhouse-gas making the switch to an EVs can help in making the planet healthy.

B. Electricity is the cheaper than gasoline

Per kilometer cost to EVs is cheaper compared to ICE vehicles. The fact cannot be denied that many EVs run at one-third of the cost, given that electricity is significantly less expensive than gasoline. And since consumer charge there EVs in garage most of the time, installing solar panels at home can save even more money.

C. Low maintanance

Due to absence of internal combustion engine in EVs its maintenance requirement becomes less.

D. Environmental benefits

EVs don't emit pollutants, which helps reduce air pollution and greenhouse gas emissions.

X. CONCLUSION

- Based on our review of reference papers in the field, we have identified the existing knowledge in the research area.

- By examining these papers, we have formulated a concise and clear problem statement that outlines the specific issue that needs to be addressed.

- In conclusion, our literature survey has enabled me to identify the problem at hand and provides a foundation for future research in the field.

- Electric vehicles are poised to shape the future of transportation by enhancing the efficiency of charging stations. As the demand for EVs grows, addressing a critical obstacle to their adoption—the insufficient availability of public charging stations—becomes increasingly important. This study highlights the potential of portable electric car chargers that harness renewable energy to accelerate the charging process. We propose an innovative service tailored for long-distance travelers with electric vehicles, incorporating hybrid drive systems into charging stations. However, a significant gap remains in accessible charging infrastructure for EV drivers on highways. In this context, wireless electric car chargers represent the most effective solution for recharging electric vehicles.

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