WIRELESS SOLAR CHARGING AND SOLAR TRACKING SYSTEM FOR ELECTRIC VEHICLE

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Abstract - The wireless solar charging and solar tracking system for electric vehicles is a novel technology that aims to overcome the limitations of conventional charging systems. The system is designed to provide a reliable and efficient means of charging electric vehicles with solar energy, while incorporating a solar tracking system to maximize energy output. The system consists of a solar panel, a system for tracking solar movement, a wireless charging pad and an electric vehicle. The solar panel captures the sun's energy, and the solar tracking system guarantees that the panels are always positioned in line with the sun to maximize energy output. The captured solar energy is then wirelessly transmitted to the charging coils, which are installed on the ground. The electric vehicle can be charged directly from the charging coils, allowing the battery to be charged wirelessly.

The benefits of this technology are numerous. First and foremost, it reduces the need for traditional charging infrastructure, which can be costly and difficult to install. It also provides sources of sustainable energy that reduces dependence on fossil fuels. In addition, the wireless charging pad eliminates the need for physical plugs, which reduces wear and tear on the vehicle and simplifies the charging process. Overall, the wireless solar charging and tracking system for electric vehicles represents an important advance in the field of sustainable transportation by providing a reliable and efficient means of charging electric vehicles with sources of sustainable energy.

Index Terms - WPT-wireless power transmission, EV-electric vehicle.

I. INTRODUCTION

The increasing popularity of electric vehicles (EVs) has led to a need for more efficient and sustainable charging systems. Traditional charging infrastructure, such as electrical outlets, can be expensive and difficult to install, especially in areas where power grids are not well developed.

To address these challenges, a wireless solar charging and solar tracking system for electric vehicles has been developed. This system harnesses the power of the sun to provide a reliable and sustainable means of charging electric vehicles.

The system is implemented to work with an array of solar array of cells that capture sunlight and a solar tracking system that ensures maximum energy output. The captured solar energy is then wirelessly transmitted to a charging pad installed on the ground in such a way that the electric vehicle can be parked directly above it and wirelessly charged.

In summary, the wireless solar charging and solar tracking system for electric vehicles is an innovative and sustainable solution that has the potential to revolutionize the way electric vehicles are charged in the future.

II. ITERATURE SURVEY

Wireless charging of electric vehicles with solar radiation is a relatively new and rapidly developing technology. Consequently, there is a growing body of literature that addresses the potential benefits, challenges, and future prospects of this technology. In this literature review, we will examine some of the key studies and publications on solar wireless charging for electric vehicles.

One of the initial studies on wireless charging of electric vehicles with solar radiation was conducted in 2013 by researchers at the Korea Advanced Institute of Science and Technology (KAIST). The study demonstrated the

feasibility of magnetic resonance-based wireless power transfer coupling and highlighted the potential benefits of using solar panels to generate electricity for wireless charging.

The researchers at the University of California, Riverside, published a study on optimizing wireless energy transmission for electric vehicles using solar energy [5]. The study proposed a novel method to maximize wireless charging efficiency by adjusting the frequency and spacing of the electromagnetic field.

In the International Journal of Electrical Power & Energy Systems examined the potential economic and environmental benefits of wireless charging for electric vehicles [7]. The study found that wireless charging could significantly reduce the overall cost and carbon footprint of electric vehicles, especially when combined with solar power.

Recent studies are looking at the development and implementation of wireless solar charging systems in real-world environments. For example, a 2020 study by researchers at the University of Warwick demonstrated the successful installation and operation of a wireless solar charging system for electric vehicles in a parking lot [6].The idea of wireless charging of electric vehicles using solar cells and solar tracking systems has gained attention in recent years. Several studies and research papers have been published on the subject, highlighting the potential of this technology with regard to efficiency, convenience and sustainability.

A study conducted by researchers at the University of California, Davis, showed that a solar-powered wireless charging is possible for the system to up to 40% more efficient than traditional plug-in charging systems [4]. The study also found that the inclusion of a tracking system for solar could further increase charging efficiency.

Another study, published in the journal Renewable Energy, examined the feasibility of deploying wireless charging technology for electric buses [2]. The study concluded that a wireless charging system powered by a solar array could be a viable option for public transit, providing a convenient and sustainable way to charge electric buses without requiring extensive infrastructure.

In addition to research studies, several companies are working to develop commercial wireless solar charging infrastructure for electric vehicles. Qualcomm, for example, has developed a wireless charging system for electric vehicles that uses magnetic resonance induction to transmit power from a charging station to the vehicle's battery. The network is designed to be easy to use and provide a convenient and efficient alternative to traditional charging methods.

Overall, the literature on wireless solar charging and tracking systems for electric vehicles this technology shows promising potential to provide a sustainable and efficient means of charging e-vehicles that reduces dependence on fossil fuels and improves the overall user experience.

III. DESIGN AND IMPLEMENTATION

In this paper, we use a solar panel that collects solar energy and converts it into electrical energy. The energy collected by the solar panel is then stored in a battery. For wireless transmission of energy, we use a coil array. The coils were placed on the roads that are known has the transmitting coils as a reference these coils transmits the energy continuously and a coil that was placed on the vehicle that is known as the receiving coil. Whenever the prototype of the vehicle passes over the transmitting coil, the phenomenon of WPT occurs.

In this method, the receiving coil takes the current and stores it in the vehicle battery. Here we also use a step-down converter and an Arduino Uno to indicate the state of the battery, i.e., whether it is charging or not. In transmitting solar energy, we found that we need to increase the power of the solar panel to transmit it wirelessly. To achieve this, we use a system that tracks the movement of the sun for solar energy generation with LDRs. Here we use 3 LDRs to ensure that the solar panel is always facing the sun, resulting in a 30% energy gain compared to traditional methods.

IV. BLOCK DIAGRAM

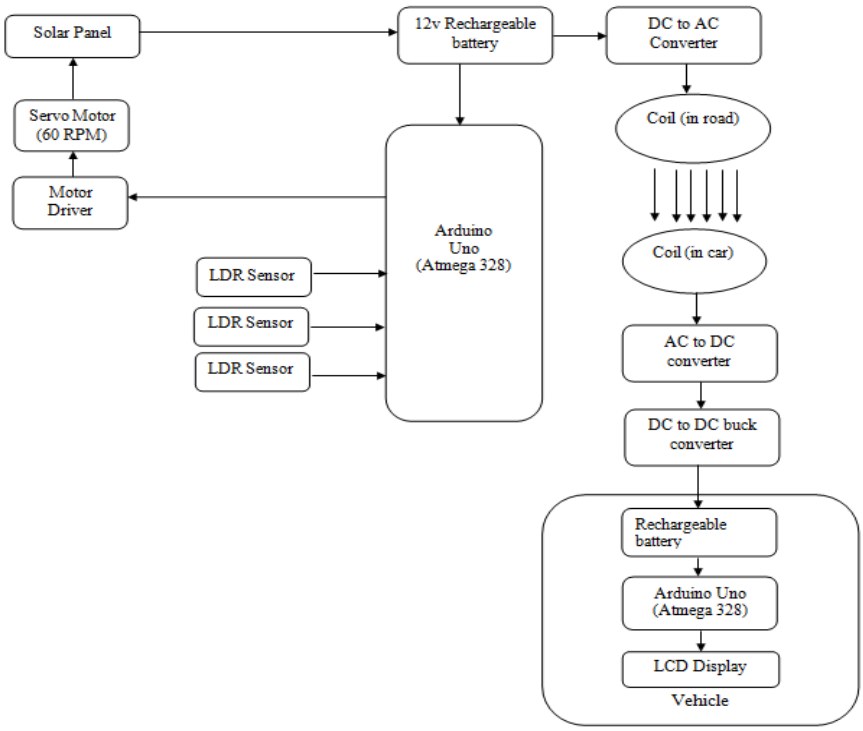


Fig. Block diagram of wireless charging system prototype

V. RESULTS

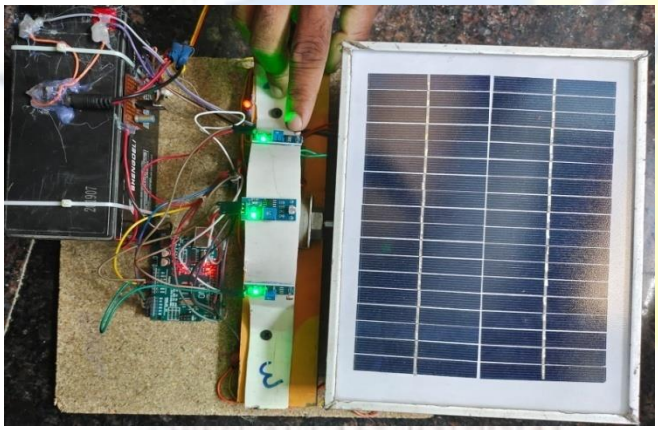
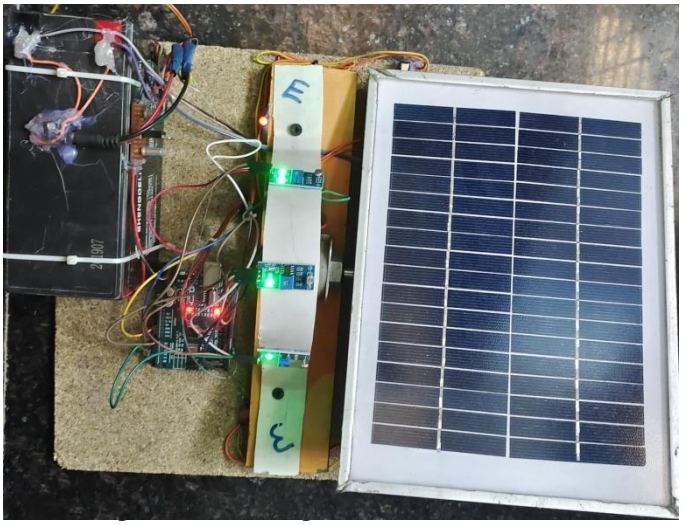


Fig 1: Setup for the wireless solar charging and solar tracking for electric vehicle.



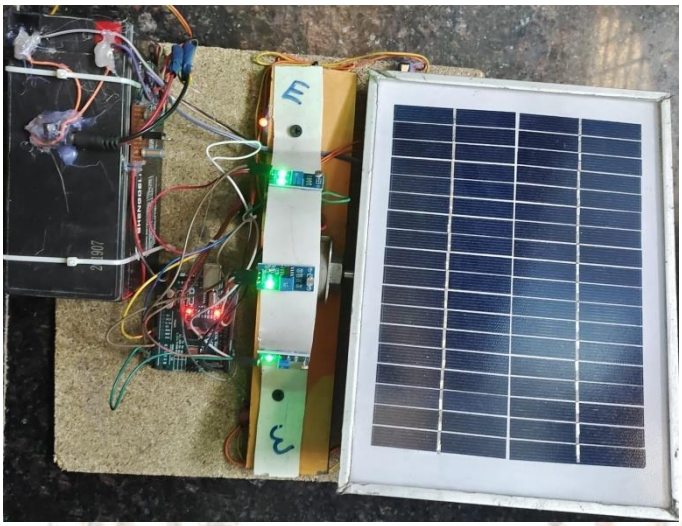


Fig 3: Solar tracking at afternoon

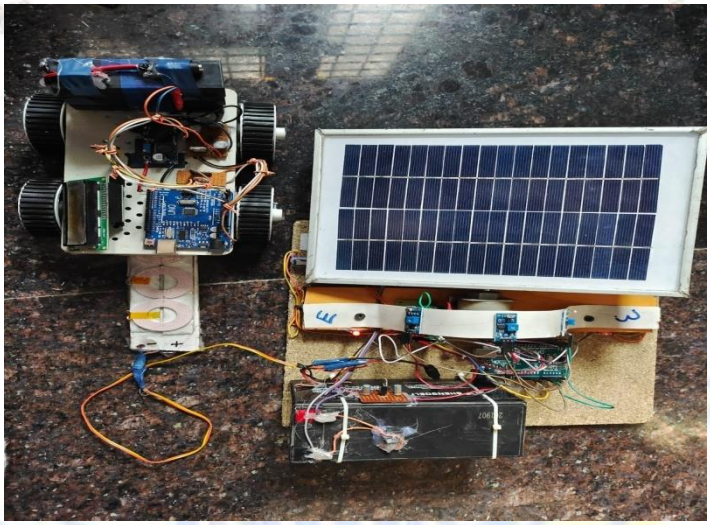


Fig 4: Solar tracking when sun is at west side

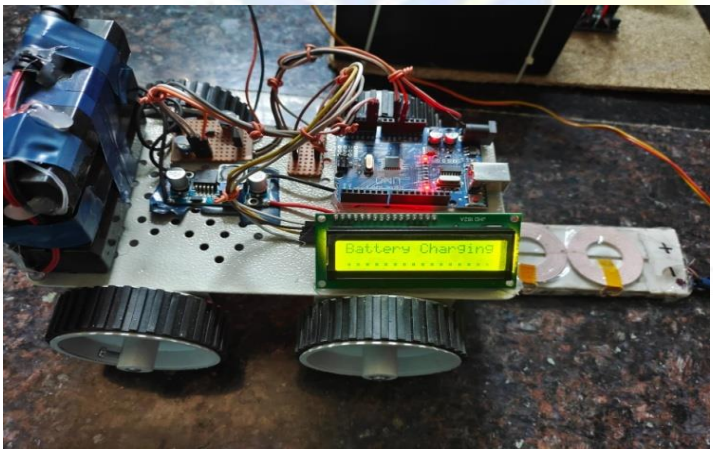


Fig 5: Charging of vehicle

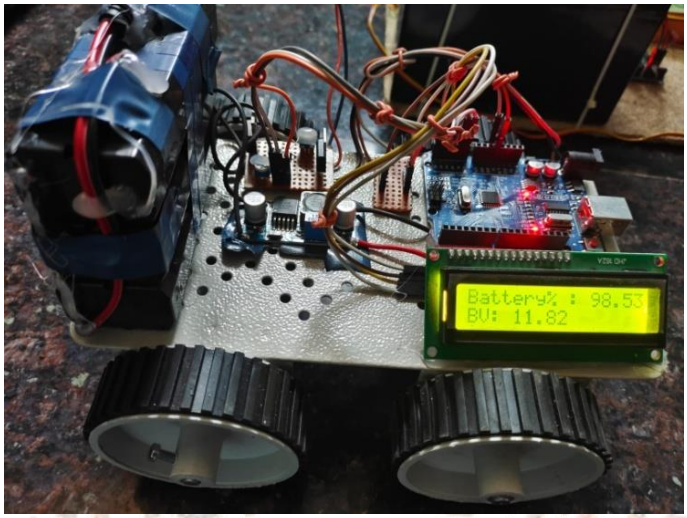


Fig 6: Vehicle battery voltage and percentage

VI. CONCLUSION

In summary, the development of wireless solar charging and a system that tracks the movement of the sun for solar energy generation for electric vehicles holds tremendous promise for the future of sustainable transportation. As the demand for electric vehicles rises, finding ways to charge them with sources of energy that are renewable is critical to reducing carbon emissions and dependence on non-renewable energy sources.

Nevertheless, there remain a few challenges to overcome in deploying such systems, such as the cost of the technology and ensuring compatibility with different electric vehicle models. Nonetheless, with further research and development, wireless solar charging and solar tracking systems for electric vehicles have the possibility of having the ability to revolutionize the way we charge our vehicles and handout to a greener future.

VII. FUTURE SCOPE

Smart Charging Road - Smart EV charging works based on the back-end solution. When charging station locations are connected to the cloud, it is possible for them to be controlled on the basis of various signals, such as local energy consumption. With the help of smart charging stations, we can find readily available charging points and get fast charging that is safer, saves money, and protects the environment.

VIII. REFERENCES

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