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Wireless Charging Station for Electric Vehicle Using Sun Tracking Solar Tree

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▪ ABSTRACT :

The rapid-fire growth of electric vehicles(EVs) has stressed the need for effective and sustainable charging structure. This abstract presents a new approach to address this challenge by introducing a wireless charging station for EVs that utilizes a sun tracking solar tree. The proposed system harnesses solar energy through an innovative sun tracking solar tree, which consists of multiple solar panels arranged on branches that move according to the sun's position. The sun shadowing medium optimizes solar energy collection throughout the day, maximizing the charging effectiveness and reducing reliance on the grid. The wireless charging technology incorporated in the station enables accessible and flawless charging for EVs. It eliminates the need for physical connections, allowing for royal charging without mortal intervention. This technology is grounded on electromagnetic induction, where power is transferred wirelessly between the charging station and the EV through a charging pad and a entering coil integrated into the vehicle.The sun tracking solar tree charging station offers several benefits. originally, it provides a sustainable and environmentally friendly result by exercising clean solar energy to power EVs. Secondly, the wireless charging capability eliminates the vexation and hazards associated with traditional draw- in dishes, enhancing stoner experience and safety. likewise, the sun shadowing medium enhances the overall effectiveness of the charging process, performing in reduced charging time and increased vacuity of charging stations.The perpetration of such a charging station structure would bear a network of sun tracking solar trees strategically placed in areas with high EV business. Integration with being electric grids and smart grid technologies can enable effective operation of power distribution and cargo balancing. In conclusion, the wireless charging station using a sun tracking solar tree represents an innovative and sustainable approach to address the charging structure requirements of electric vehicles. This abstract highlights the implicit benefits of this system, including enhanced charging effectiveness, convenience, and reduced environmental impact. farther exploration and development are necessary to optimize the design, cost- effectiveness, and scalability of this result to meet the growing demand for electric vehicle charging structure.

▪ INTRODUCTION :

Electric vehicles represent a new concept in the world of transportation. The market share of EVs is projected to grow exponentially, accounting for 24% of US light vehicle owners by 2030 and 64% of light vehicle sales this year. Electric vehicles are becoming competitive with internal combustion engines due to lower CO2 emissions and increased fossil fuel use.Due to many limitations such as high car price, low payment and low power consumption, electric car is not widely used in the market. Electric cars are cars that use electricity partially or completely. Electric cars are cheap to run because they require less movement to maintain and are good for the environment as they

use little or no fossil fuels. In the last two or three years, wireless communication has been one of the fastest growing forms of wireless communication. Using wires to transmit electricity loses 25% to 30% of the energy, and there are many situations where electrical wires are used to transmit electricity, but without electricity, electrical transmission is safer for people and the environment than old cars. The exact amount of time before fuels are completely depleted is difficult to determine due to a number of factors. These include the discovery of new deposits, technological advances, changes in energy consumption, and the development of alternative energy sources. In addition, the availability of different fuel sources varies widely depending on the type of fuel. However, I can provide a general overview of the estimated remaining reserves for some major fuel sources:

How Wireless Charging Station Is Sustainable

- **Increased efficiency**

Wireless charging technology will continue to improve, resulting in higher charging efficiency. This means shorter charging times and less energy lost during the charging process.

- **Standardization**

Efforts will be made to establish global standards for wireless charging that will allow different EV models to be charged seamlessly at any compatible charging station. Standardization would increase convenience for EV owners and promote interoperability among charging infrastructure providers.

- **Extended range and power levels**

Future wireless charging systems could offer extended range, allowing e-vehicles to be charged wirelessly on specially equipped roads. In addition, higher power levels will enable faster charging, reducing the time required to charge an e-vehicle.

- **Infrastructure integration**

Wireless charging technology will likely be integrated into various infrastructure elements such as parking lots, highways, and public transit systems. This integration will provide greater convenience and accessibility to e-vehicle owners, who will be able to charge their vehicles at various locations without the need for physical connections.

- **Dynamic charging**

Advanced wireless charging systems may include dynamic charging features that allow vehicles to charge while they're moving. This technology could be particularly useful for electric busses, cabs, or delivery vehicles, as they can be continuously charged during their regular routes or while waiting at traffic lights.

- **Smart grid integration**

Wireless charging stations will be integrated with smart grid technology so that they can communicate with the grid and optimize charging based on energy demand and availability. This integration enables load management that balances the energy demand of vehicles with the overall capacity of the power grid and minimizes peak demand.

- **Improved usability**

Future wireless charging stations will likely have improved user interfaces, better communication

with e-vehicles, and improved payment systems. This will streamline the charging process, provide real-time charging status updates, and offer convenient payment options, making e-vehicle charging more user-friendly.

➢ LITERATURE REVIEW :

Nikola Tesla was the first to invent the technology of wireless power transmission in 1890. He wanted to create a supply system without cables, so he invented an inductive and capacitive coupling system for WPT. He invented a coil known as Tesla coil. Erhuvwu Ayisire came up with the idea for a charging system for electric vehicles.

N. Uthaya Banu, U. Arunkumar, A. Gokulakannan, M. K. Hari Prasad and A. B. Shathish Sharma have provided the knowledge about charging batteries using solar energy and also analyzed the primary and secondary side in detail. The most difficult and important part in designing a wireless charging system is the design of the coil. This paper provides knowledge about wireless charging of electric vehicles using solar energy.

➢ METHODOLOGY :

The system consists of a solar panel, battery, transformer, regulator, copper coils, AC to DC converter, Atmega controller and LCD display. The system demonstrates how electric vehicles can be charged wirelessly.

The solar tree, which tracks the sun, is used to supply power to the battery via a charge controller. The battery is charged and stores direct current. The DC electricity must now be converted to AC for transmission.

The current is converted to AC using a converter and regulated using a controller. This current is now used to supply the copper coils used for wireless power transmission.

A copper coil is also placed under the electric vehicle, when the vehicle stops, the energy from the coil is transferred from the transmitting coil to the EV coil. Now we convert this energy back to DC so that it can be used to charge the battery of the electric vehicle.

We use a AC to DC conversion circuit to convert it back to DC current. We also measure the input voltage with an Atmega microcontroller and display it on a LCD display. Thus, the system demonstrates a solar-powered wireless charging system for electric vehicles that can be integrated into electric vehicle charging stations.

➢ PROBLEM STATEMENT:

Issue That We Want To Address

Poor Charging Infrastructure

Agreements between grid operators, charging station manufacturers and property owners. This means that building a charging network with installation costs of 2 liters for a slow charger and 3 liters for a fast charger is expensive.Building charging networks for home or office use can be difficult. For example, it can be difficult to find the best charging infrastructure for a densely populated area.

Vehicle - Grid Interoperability

The necessary communication and agreements between the electric grid, utilities, and charging station manufacturers are currently limited due to a lack of communication to agree on widespread adoption of an affordable, reliable, and safe charging network for electric vehicles.

Vehicle-to-grid infrastructure is now possible, and the government or utilities are withholding information that is simply not being made available to charging network providers. This often slows

down development time and makes the project less viable.

If you want to recharge electricity and stay plugged in for no more than 10 to 20 minutes, modern e-vehicles can charge up to 300 kW, although most chargers do not fully utilize this power. Sometimes the power from the grid is not available, and in other cases the charger may overheat if it is operated at peak power for too long.

Power Issues While Charging

If you want to recharge electricity and stay plugged in for no more than 10 to 20 minutes, modern e-vehicles can charge up to 300 kW, although most chargers do not fully utilize this power. Sometimes the power from the grid is not available, and in other cases the charger may overheat if it is operated at peak power for too long.

Issues That Need To Address

- Reduce the emissions that add to environmental change and smog
- Improving public health
- Reducing ecological damage
- Cheaper than the fuel

How The Project Can Solve The Issue

- The project consists of a method of self-generation of electricity, which means that there is no reliability of external sources.
- The wireless charging mechanism is very helpful compared to charging by wall socket and reduces the failure of charging adapters.
- The solar tree tracking the sun moves according to the solar radiation and generates more to more electricity.

Who Get Benefits Of The Project

- The installation cost is higher, but once the system is installed, it will be profitable after a certain time.
- No agreement is required between the grid operators, so the time to install the station is reduced.
- Due to the self-generation method, the customer receives a certain discount.

➢ COMPOMEMTS FOR WIRELESS CHARGING STATION :

- ATmega32 Micro Controller
- Battery Bank Setup
- Voltage Sensor
- Transformer (AC To DC Converter)
- Regulator Circuitry
- Transmitter And Receiver Coil
- Switches
- LEDs
- PCB Board
- Resistor, Capacitor, Transistor
- Wires And Connectors
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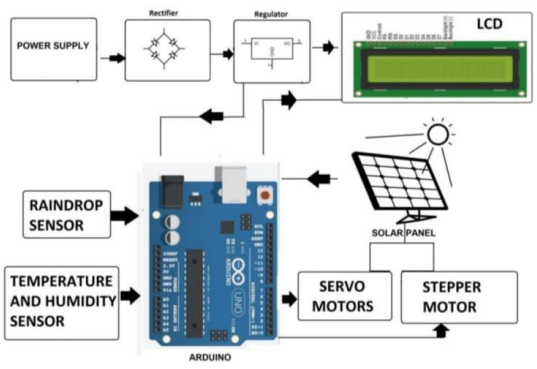
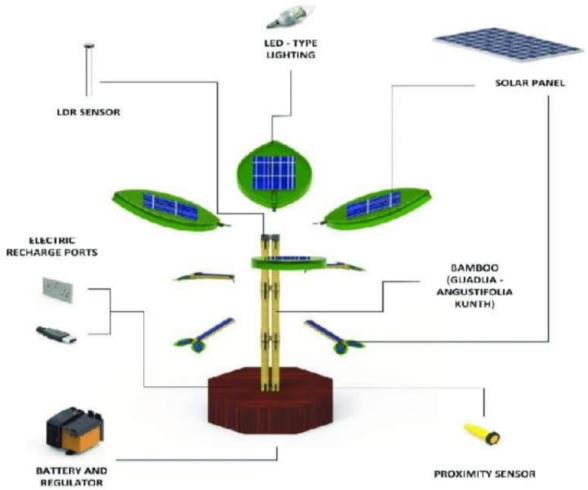
➢ CIRCUIT DIAGRAM :



➢ COMPONENTS FOR SUN TRACKING SOLAR TREE :

- Solar panel 5 watt
- ATmega328 Micro Controller
- Light Dependent Resistor (LDR) x 2
- 10 KΩ x 3
- Battery Bank Setup
- Servo Motor
- 22pF Ceramic Capacitors x 2
- Push Button
- PCB Board
- Switches
- Wires And Connectors

➢ DIAGRAM OF SOLAR TREE :



➢ FUTURE SCOPE AND RESULT :

The idea of global solar charging stations is spreading more and more, such as Tesla Motors, who have placed their solar-powered charging stations in many places, providing free energy to many people.

Countries such as the Netherlands, Macau and Romania have widely adopted solar charging stations, but so far only 2-wheeled vehicles or smaller electric vehicles are charged at such charging stations because solar energy is sufficient.

Wireless charging technology for electric vehicles is interoperable, convenient, and less prone to vandalism compared to traditional public charging stations. Users no longer have to get out of the vehicle to fuss with various plugs and heavy cables, or deal with a less than user-friendly interface to make payments. The entire process of charging an electric vehicle is simplified and provides a much better experience for the end user. The driver simply points the car at the transmission pad on the ground and the charging process begins automatically.

The technology is especially useful for electric cars, busses and other four-wheeled electric vehicles. These are the key drivers for electrification. Wireless charging lowers operating costs, leads to more affordable electric vehicles with smaller batteries, and extends battery life.

➢ CONCLUSION :

Wireless Charging Station For Electric Vehicles

The wireless charging method is more efficient than plug-in charging and also reduces the risk of tripping problems caused by plug-in charging. It has higher efficiency in charging electric vehicles by reducing the hazards caused by the plug-in method. By ensuring efficient and cost-effective charging, it ensures better air quality, resulting in fewer health problems due to air pollution, high performance, safety, and cost-effectiveness. Static charging of electric vehicles has the potential to revolutionize road transport.

Sun Tracking Solar Tree

The suntracking solar tree is an innovative and effective result for employing solar energy. Its design, inspired by nature, allows for optimal solar panel exposure throughout the day, maximizing energy generation. By automatically tracking the sun's movement, the solar tree increases energy affair compared to fixed solar panels. This technology offers significant benefits, including increased electricity product, bettered effectiveness, and reduced reliance onnon-renewable energy sources. With its aesthetic appeal and space- saving design, the suntracking solar tree has the implicit to revise the solar energy assiduity and contribute to a further sustainable future.

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