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# Green Charge: Wireless EV Charging via Solar Power

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***Abstract—This project is a wireless power transfer system for electric vehicle charging with solar power. The system uses solar panels to collect energy, which is accumulated in a battery and used to wirelessly charge vehicles via inductive coupling. The charging is controlled by an Arduino microcontroller with vehicle presence detected using IR sensors. Voltage sensor and thermal sensors for voltage value monitoring and heat for battery. When a car is sensed, the relay is triggered, starting the wireless power transfer and lighting LEDs to show charging status. The system comes with dual power transfer and receiver coils to transfer energy over a short distance of 1 cm at 5V, perfect for small-scale or model electric cars.***

***IndexTerms—Ship Data Network, Opnet , QOS***

## I. INTRODUCTION

This concept proposes a wireless power transfer (WPT) system that uses solar energy to charge electric cars (EVs). The device uses an inductive coupling to transport energy from solar panels to a battery, which is subsequently used to wirelessly charge automobiles. A microcontroller Arduino governs the charging and uses infrared sensors to detect the vehicle presence, with temperature and voltage sensors monitoring the battery condition. It has a relay to initiate the power transfer and activates LEDs to indicate whether or not the car is charged if it detects a car. Because it utilizes a double power transfer and receiver to transfer energy over a short distance of 1 cm at 5V, it is ideal for model or miniature cars. This project demonstrates a sustainable approach to contactless charging by presenting a Wireless Power Transfer (WPT) system for EV charging powered by solar energy. Through inductive coupling, solar panels wirelessly transfer energy that is stored in a battery to automobiles. The system is controlled by an Arduino microcontroller, which uses infrared sensors to identify cars and temperature and voltage sensors to check the condition of batteries. A relay initiates power transfer when a car is detected, and LEDs show the charging process visually. The system is appropriate for small-scale or model vehicles since it transmits energy over a brief distance of about 1 cm at 5V. The project provides an environmentally friendly, dependable, and low-maintenance charging solution, highlighting the benefits of combining renewable energy with WPT technology

## II. LITERATURE SURVEY

### *A. Solar wireless electric vehicle charging system*

With the popularity of electric vehicles (EVs), which provide a more environmentally responsible option to conventional fuel-powered cars, the automotive industry is changing. However, the limited number of charging outlets prevents EVs from being widely adopted. In order to give EV owners sustainable and reasonably priced charging options, our research offers a novel solution: a wireless EV charging method driven by solar energy. Physical hookups are no longer necessary thanks to the technology, making cordless, secure, and convenient charging possible. It lessens reliance on conventional energy sources by using solar electricity, which has financial and environmental advantages. This technology further improves customer convenience and shortens charge times by enabling charging while the car is moving, in contrast to traditional plug-in techniques.

### *B. Solar Powered Wireless Charging Station for Electric Vehicle*

Based on magnetic induction technology, wireless power transfer, or WPT, may shield people from potentially fatal accidents that arise from the use of cables. The inverter's use of MOSFET switches improves the efficiency of power transfer between the coils by producing an output at a high frequency. Battery charging will be incredibly quick and effective as a result of this higher frequency output generation. It will be continuously charged with the assistance of this solar panel if it is connected to the supply battery.

The obstacles of charging time, range, and cost can be easily managed by incorporating WPT into electric vehicles. In recent years, WPT technology has advanced rapidly. Recommended using a Shared Rendezvous Point Tree (SRPT) for multicast packet delivery. This problem is known as RP selection; the multicast router is the root of the network. The performance of the multicast session and multicast routing strategy is impacted by this problem since it alters the multicast routing tree topology. An NP-complete task is figuring out the optimal RP position. They proposed a novel Parallel GRAS Procedure RP choice algorithm. 2DV-PGRASP-RP selects RP by considering cost, delay, and delay variation functions. It is simple to incorporate into the bootstrap RP protocol that PIM-SM uses.(Baddi, Dafi et al. 2013)][1].

### *C. Wireless Power Transfer in Electrical Vehicle by Using Solar Energy*

This review explores the various sensors used in IoT-based healthcare systems for monitoring vital health parameters. The study highlights the significance of sensors such as heartbeat sensors, pulse oximeters, and

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respiratory sensors in collecting critical physiological data for continuous health monitoring. The paper discusses the integration of these sensors with IoT platforms, emphasizing their role in tracking vital signs, detecting abnormal patterns, and alerting healthcare providers about potential issues. Additionally, the review examines the importance of environmental sensors like the DHT22 (temperature and humidity) and MEMS (Micro-Electromechanical Systems) sensors for monitoring conditions affecting patient health, including fall detection and posture changes.(Banu, Arunkumar et al. 2018)[2]

## III. PROPOSED METHOD

The method suggested employs wireless power transfer (WPT) technology and solar energy to design a contactless, eco-friendly EV charging mechanism. Voltage sensor and temperature sensors for voltage value monitoring and battery heat. The system harvests and stores power using solar panels and supplies the battery, subsequently wirelessly charging the vehicle with a set of coils powered by IR sensors. When the car is found in a 1cm radius, the system charges up via inductive coupling and alerts by means of LEDs. This design does away with plug-in connections since there are no connectors to wear out, making the solution easier to use, and environmentally friendly, off-grid charging possible. The wireless application of this system using a renewable power source illustrates an innovative and green substitute for the conventional EV chargers.

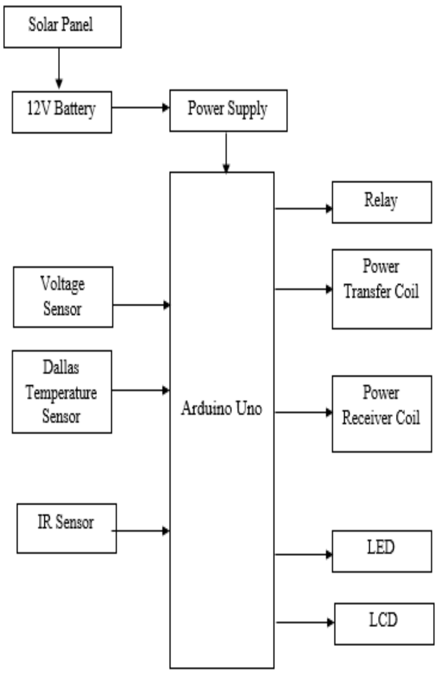


Fig1: Proposed Block diagram

### A. Arduino:

The Arduino Uno microcontroller board was developed by Arduino.cc, an open-source hardware platform mostly based on the Atmega328 AVR microprocessor. The first Arduino project was started in the Interaction Plan. David Cuartielles and Massimo Banzi founded Ivrea in 2003 with the intention of providing students and professionals with an affordable and flexible method of operating a variety of devices in the real world. In order to interact with external electrical circuits, the Arduino Uno's present version has 14 I/O computerized ports, 6 analog input pins, and a USB interface. Six of the fourteen I/O ports' pins can be used for PWM output

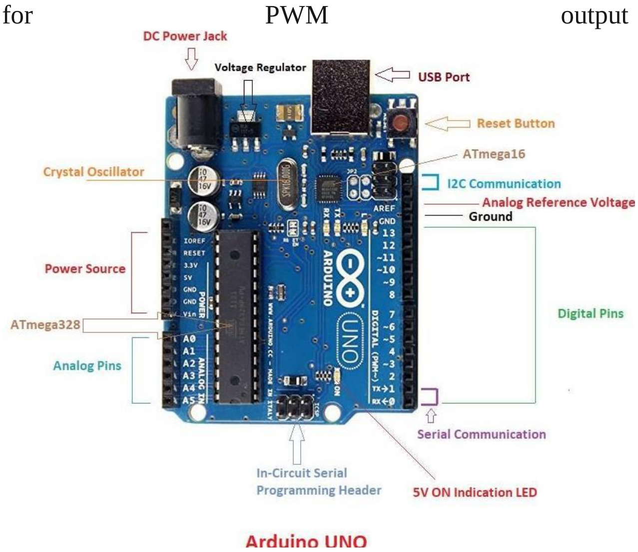


Fig 2: Arduino UNO

### A. $T_x$ and $R_x$ coils:

This 5V 2A Large Current Wireless Charger Module Transmitter Receiver Charging Coil Module is ideal for a variety of small electronic devices, wireless charging, power supply design and development, small volume, ease of use, high efficiency, and affordability. It is used mostly in mobile electronic devices, such as wireless charging for cell phones, gaming consoles, MP3 and MP4 players, adult products, digital cameras, electric shavers, machine learning, and medical devices. Contactless charging power supplies are used to seal objects, making them dustproof and waterproof and extending their service life.

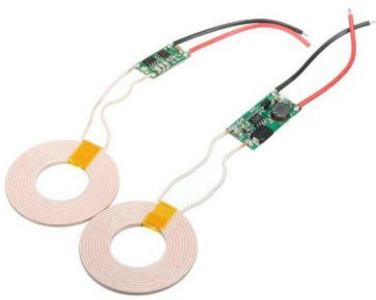

Fig 3: Tx and Rx coils

### B. Node MCU:

Node MCU is an open-source firmware and development tool that is essential to creating your own Internet of Things device with several Lua script lines. The board's numerous GPIO legs enable you to link it to other peripherals and can generate periodic communications via PWM, I2C, SPI, and UART. The module's interface is essentially separated into two

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sections: the hardware and firmware. The hardware is based on the ESP-12 module, while the firmware is based on the ESP8266 Wi-Fi SoC. The firmware is based on Lua, an easy-to-learn scripting language that offers a straightforward programming environment focused on a quick scripting language that links you to a renowned inventor community. Furthermore, open source firmware gives you the flexibility to rebuild, modify, and replace the entire interface as well as the being module till you can tailor it to your requirements.

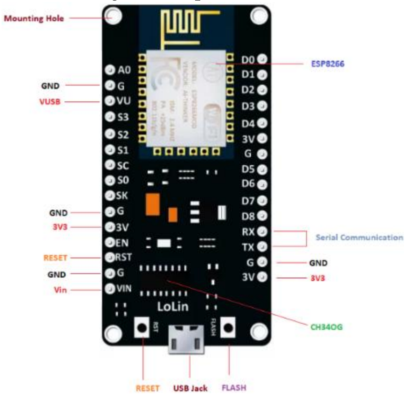


Fig 4: NodeMCU

C. IR sensors:

An infrared detector is an electrical device that emits to identify specific environmental components. An infrared detector can measure the heat of an object in addition to detecting agitation. Because they just measure infrared radiation rather than emitting it, these detectors are known as unresisting infrared detectors. Every object in the infrared spectrum usually radiates heat in some form. These radiations are undetectable to the human eye, but they can be detected using an infrared detector. An IR photodiode, which is sensitive to infrared light with the same wavelength as the IR LED, acts as the sensor, while a basic IR LED (Light Emitting Diode) acts as the emitter. As IR light strikes the photodiode, the resistances and these voltages vary proportionately to the amount of IR light that enters.


Fig 5: IR sensor

E.LCD:

The technology used in scratch pad screens and other tiny PCs is called liquid crystal display, or LCD. More thin presentations are possible with LCDs than with cathode beam tubes (CRTs), because to advancements in gas-plasma and light-producing diodes (LEDs). LCDs consume a lot less electricity than gas and LED displays because they block light instead of emitting it. To develop an LCD, either a showcasing network for dynamic framework display or an uninvolved lattice is utilized. The term LCD dynamic framework is occasionally used to describe a meager film transistor (TFT).

The uninvolved LCD lattice has a matrix of conductors at each pixel-to-pixel intersection. Any pixel's light is controlled by a current sent by two conductors on the lattice. A transistor located at each pixel crossing point in a functional framework uses less current to regulate a pixel's brightness.


Fig 6: LCD

## IV. PROPOSED ALGORITHM

Convergence of software and hardware components within an embedded system:

To facilitate the software operation on embedded systems, software and hardware components are required to be coupled. In order to couple software and hardware components, source code must be programmed or downloaded to the microprocessor or microcontroller, which is a hardware component for running operations according to the defined code.

Usually, embedded system source codes are in assembly language but execution is done by a processor only on resultant binary files. Three separate steps are involved in the conversion of embedded software source code representation into an executable binary image.

To create an object file, each source file must be combined or compiled. To create a single object file known as the re-locatable program, all of the object files created in the first phase must be connected. Relative offsets in the re-locatable application are converted into physical memory addresses during relocation. A file consisting of a binary image that can be run directly on the embedded system is the result of this last stage.

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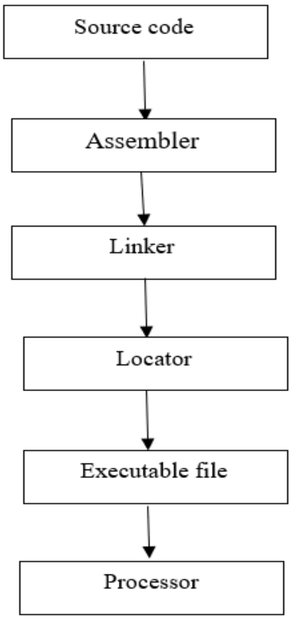


Fig 7: Transfer of ignited source code to the processor

Stage 1: By considering the essential requirements for our suggested system, our solution provides a solution to the drawbacks of the existing approaches.

Stage 2: Considering the hardware requirements of the intended system, it is essential to choose the following parts:

1. A microcontroller
2. Inputs that are necessary for the suggested system, such as sensors, drivers, etc.
3. Outputs (such as loads and relays)

Step 3: After the hardware requirements have been assessed, it is necessary to look at the related software requirements. Different software tools are available for coding, compiling, and debugging, depending on the microcontroller selected. The following stage entails writing the proposed system's source code in compliance with the requirements, then compiling and debugging the code using the assigned.

## V. SIMULATION RESULTS

The results are directly observed from the project and we are using thing speak website to observe the various conditions like temperature of the battery, voltage levels and status of the charging stations.

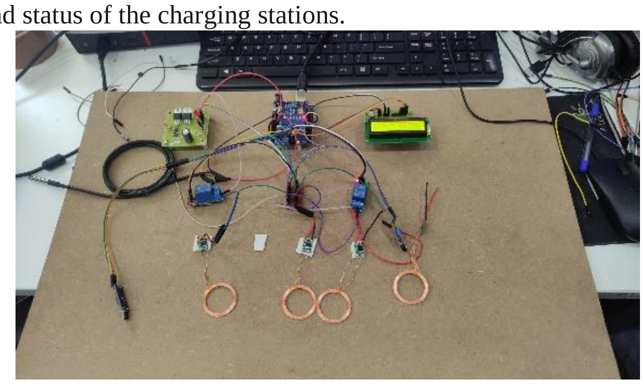

Fig 8: Project during design

Fig 9: completed project.

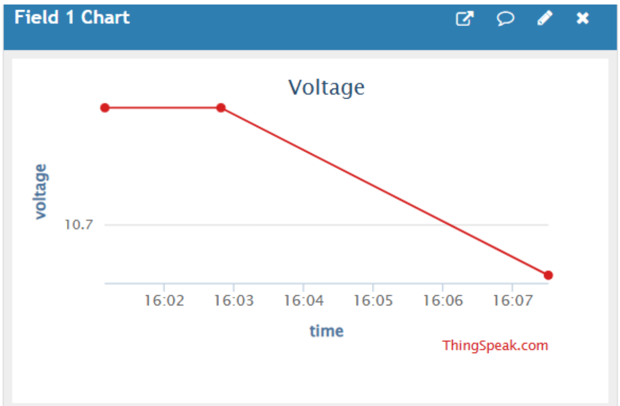


Fig 10: Voltage vs Time of battery output

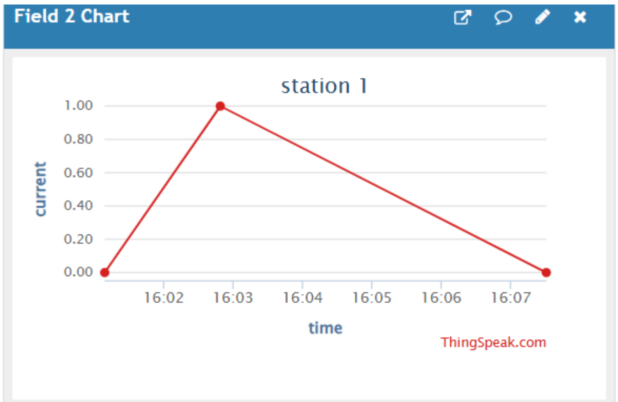


Fig 11: current vs Time of station 1

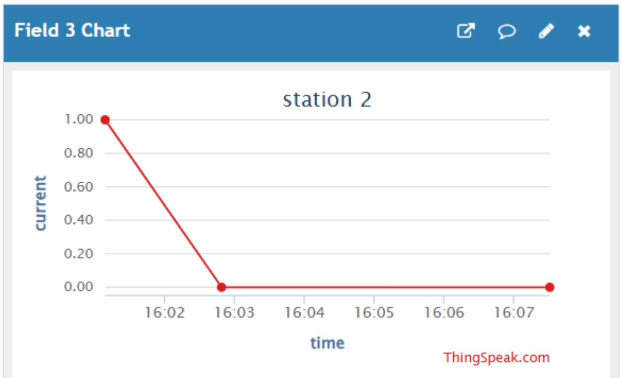


Fig 12: Current vs Time of station 2

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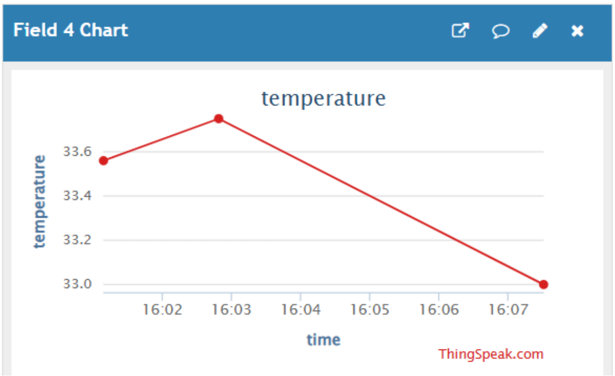

Fig 13: Temperature vs Time of battery

The thing speak is a website which is used to transfer data through node MCU. The node MCU had to connect to the Wi-Fi so that it can upload the data to the channel created on the website.

## VI. CONCLUSION

To sum up, this project effectively illustrates the feasibility of an electric vehicle charging wireless power transfer (WPT) (Alshleem and M.Faraj 2025)[1]system that uses solar energy as a renewable and sustainable power source. Because there are no physical connectors required, the combination of solar panels, battery storage, and inductive coupling offers an environmentally friendly, contactless charging solution that improves user convenience and safety. The system's design demonstrates the possibility of scaling up to full-sized electric vehicles, and the use of sensors and an Arduino microcontroller guarantees dependable and effective operation. In summary, this creative strategy not only meets the increasing demand for convenient and sustainable EV charging options, but it also opens the door for further developments in green transportation infrastructure.

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## REFERENCES

[1] Baddi, Y., et al. (2013). Parallel Greedy Randomized Adaptive Search Procedure with Delay and Delay Variation for RP Selection in PIM-SM Multicast Routing.

[2] Banu, N., et al. (2018). "Wireless Power Transfer in Electrical Vehicle by Using Solar Energy." Asian Journal of Electrical Sciences7: 6-9.

[3] Pinto, J. G. Bidirectional battery charger with Grid-to-vehicle, Vehicle -to-Grid and Vehicle-to -Home technologies, IEEE 2020.

[4] X. Zhou, S. Lukic, S. Bhattacharya, and A. Huang, “Design and control of grid-connected converter in bidirectional battery charger for plug-in hybrid electric vehicle application,” in Proc. IEEE Vehicle Power and Propulsion Conference (VPPC), 2019, pp. 1716.

[5] Bugatha Ram Vara prasad Deepthi n. Satyavati v. Satish Varma r. hema Kumar, “Solar charging station for electric vehicles,” Int. J. Adv. Res. Sci. Commun. Technol., vol. 7, no. 2, pp. 316–325, 2021, Doi: 10.48175/IJARSCT-1752.