WALCHAND COLLEGE OF ENGINEERING SANGLI.

(Government Aided An Autonomous Institute)

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DEPARTMENT OF ELECTRONICS

Synopsis of miniproject-2

"Dynamic Wireless Charging System"

Submitted By:

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Title of Project: Dynamic Wireless Charging System for Electric Vehicles

1. Abstract:

Our project focuses on the development and implementation of a dynamic wireless charging system for electric vehicles (EVs). Utilizing innovative technology, including sensor networks and intelligent control systems, we aim to enable seamless charging while vehicles are in motion. By integrating wireless charging capabilities into road infrastructure, we seek to overcome the limitations of traditional charging stations and enhance the convenience and practicality of EVs.

Through real-time monitoring and our system ensures efficient and uninterrupted charging, contributing to a greener and more sustainable transportation ecosystem. This project embodies our commitment to innovation and sustainability, offering a glimpse into the future of electric vehicle technology.

2. Introduction:

In the landscape of contemporary transportation, the demand for sustainable and efficient energy solutions has never been more pressing. Amidst this backdrop, the advent of wireless charging technology heralds a paradigm shift in how we power electric vehicles (EVs). Our project on dynamic wireless charging represents a pioneering endeavour at the intersection of innovation and sustainability. By seamlessly integrating wireless charging capabilities into road infrastructure, we aim to redefine the EV charging experience.

The Dynamic Wireless Charging System for Electric Vehicles is a pioneering project aimed at revolutionizing the way electric vehicles are powered and charged on the go. The system utilizes innovative technology to wirelessly charge electric vehicles while they are in motion, eliminating the need for conventional charging stations and enabling seamless integration with existing road infrastructure.

Through the utilization of advanced sensor networks and intelligent control systems, our project seeks to enable uninterrupted charging on the move, eliminating the constraints of conventional charging stations. This project not only promises to enhance the convenience and usability of electric vehicles but also embodies our commitment to fostering a greener and more sustainable future for transportation. Join us as we embark on a journey towards revolutionizing the way we power our vehicles, one dynamic wireless charge at a time.

3. Objectives:

1. Develop Dynamic Wireless Charging System: Create a prototype to wirelessly charge electric vehicles in motion on roadways.
2. Integrate Sensor Networks and Control Systems: Combine IR sensors and LED indicators with control systems for automatic charging initiation and monitoring.
3. Design User-friendly Interface: Implement an 16X2 LCD interface for easy monitoring and interaction with the system.

4. Plan of action:

1. Initial Research and Requirements Gathering:

Conduct comprehensive research on wireless charging technology and its applications in electric vehicles. Identify key components, including transmitter and receiver coils, control systems, and sensor networks required for dynamic wireless charging. Define project objectives, scope, and requirements.

2. Component Selection and Procurement:

Identify and select suitable components for the wireless charging system, such as Arduino Uno, transmitter and receiver coils, IR sensors, and LED indicators. Procure necessary components from reliable suppliers.

3. System Design and Integration:

Design the overall system architecture, including the connection between Arduino Uno and the transmitter coil, as well as the receiver coil on the electric vehicle. Integrate IR sensors for vehicle detection and LED indicators for battery charging level indication. Develop algorithms to control the charging process based on predefined thresholds and sensor data.

4. Prototype Development:

Build a prototype of the wireless charging system incorporating the selected components and system design. Test the functionality of individual components and their integration within the system. Refine the prototype based on test results and feedback.

5. Testing and Optimization:

Conduct comprehensive testing of the wireless charging system prototype under various conditions, including different vehicle speeds and environmental factors. Optimize the system performance by fine-tuning control algorithms and adjusting sensor thresholds. Ensure reliability, efficiency, and safety of the wireless charging process.

6. User Interface Development:

Design and develop a user-friendly interface using suitable components such as 16X2 LCD to display real-time information, including temperature, battery charging level, and system status.Implement user interaction features for manual control or monitoring purposes.

7. Documentation and Presentation:

Document the entire development process, including system design, component selection, testing results, and user interface details. Prepare a comprehensive presentation highlighting the project objectives, methodology, key findings, and future prospects.

8.Deployment and Demonstration:

Deploy the wireless charging system prototype in a controlled environment for demonstration purposes.Conduct a live demonstration showcasing the functionality and benefits of the system.Gather feedback from stakeholders and potential users for further refinement and improvement.

9. Evaluation and Conclusion:

Evaluate the performance and effectiveness of the wireless charging system prototype against predefined criteria and objectives.

Draw conclusions regarding the feasibility, scalability, and potential impact of the project.

Identify future research directions and areas for further development.

10. Finalization and Reporting:

Finalize the project documentation, including a detailed report summarizing the entire development process, challenges faced, lessons learned, and future recommendations.

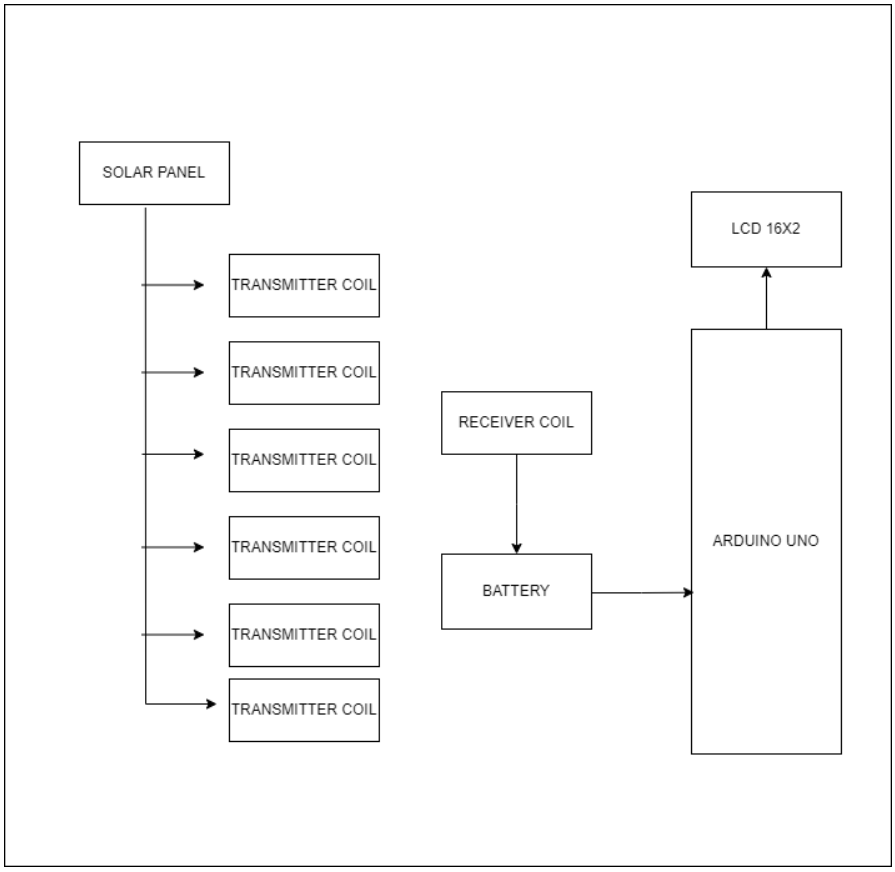
Present the final project report to stakeholders, academic advisors, and relevant industry professionals for review and feedback.

5. Methodology:

In our project, the primary focus is to develop a dynamic wireless charging system for electric vehicles that can operate seamlessly while the vehicles are in motion. We start by setting up the Arduino Uno with various sensors like IR sensors for vehicle detection and control components such as LED indicators and relay modules. Once the setup is complete, we proceed to calibrate the sensors and establish optimal thresholds for parameters like temperature, humidity, and vehicle presence. With this foundation in place, we then develop the Arduino code to read sensor data and implement the necessary control logic using if-else statements. This code allows us to make real-time decisions during the charging process based on the sensor inputs and predefined thresholds. Additionally, we integrate automated control mechanisms to regulate the charging power and manage the charging duration effectively. As part of ensuring safety and efficiency, we implement features like overcharge protection and temperature monitoring. Furthermore, we develop a user-friendly interface for remote monitoring and control of the wireless charging system, providing real-time

status updates and enabling user interaction. Throughout the project, thorough documentation and regular maintenance checks are conducted to ensure sustained and efficient operation of the system.

6. Block Diagram:



(Figure.Block Diagram of wireless charging system)

Operation:

1.When a vehicle enters the designated road area, the IR sensor detects its presence and signals the Arduino.

2.The Arduino activates the transmitter coil, initiating the wireless charging process.

3.Energy is transferred from the transmitter coil to the receiving coil on the vehicle, charging its onboard battery.

4.The LED indicator displays the current battery charging level, keeping the driver informed of the charging progress.

7. Components:

Component	Price
Arduino Uno (with Cable) [2]	285
12V Transformer(step up) [1]	99
16X2 LCD [1]	136
Enamelled Copperwire(0.4-0.6mm) [20meter]	179
Voltage sensor module 25V [1]	113
12V power adapter [1]	209
Dual shaft BO motor with wheels [4]	215
Rechargeable Li-ion cell 3.7V [2]	48
Transistor(2N2222A) [10]	82
Resister 27k [10]	75
battery 12V [1]	450
Led(red,green) [4(2 each)]	8
Battery holder with wire 18650X2 (9V) [1]	82
Switch [2]	20
4 channel relay [1]	135
Ultrasonic sensor [2]	155
Total Price =	**2291**

8. Conclusion:

The implementation of the Dynamic Wireless Charging System for Electric Vehicles marks a crucial step towards the widespread adoption of electric vehicles in the transportation sector. By addressing key challenges such as range anxiety and the limited availability of charging infrastructure, this innovative system opens up new possibilities for electric mobility.

Furthermore, the integration of smart technologies such as Arduino control and sensor networks enhances the efficiency and safety of the charging process, ensuring optimal performance and reliability in real-world scenarios.

Overall, the Dynamic Wireless Charging System for Electric Vehicles represents a transformative solution that not only addresses current challenges but also paves the way for a future where electric mobility is accessible, convenient, and environmentally responsible. Its successful implementation holds the potential to revolutionize the way we think about transportation and energy consumption, ultimately leading towards a cleaner, greener, and more sustainable future.

9. references:

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