"DYNAMIC POWER SOLUTION FOR EV'S WITH INTEGRATED MONITORING SYSTEM."

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KEYWORDS:

Automatic Electric Vehicles,Dynamic on road charging energy management, wireless charging.

ABSTRACT

Dynamic on-road charging (DORC) for electric vehicles (EVs) represents a transformative approach to address the challenges of limited battery range and the need for frequent charging stations. Unlike conventional stationary charging stations, DORC enables EVs to recharge while in motion, leveraging embedded infrastructure within roadways or via advanced wireless charging technologies. This approach promises uninterrupted travel for EV users, eliminating the anxiety associated with battery depletion during long journeys.The integration of DORC systems necessitates advancements in infrastructure, vehicle design, and energy management algorithms. Key elements include smart road surfaces equipped with induction coils or electromagnetic fields that transfer energy to vehicles, and onboard systems that facilitate seamless energy absorption. These systems utilize real-time data analytics to optimize charging efficiency, adjusting power levels based on vehicle speed, battery status, and road conditions.

Introduction

The global shift towards sustainable transportation has catalyzed significant advancements in the realm of electric vehicles (EVs). As urban centers burgeon and traditional fuel sources wane in sustainability, the on-road charging of electric vehicles emerges as a pivotal solution, redefining mobility, infrastructure, and environmental conservation. At the heart of the system lies a microcontroller, a versatile computing unit that orchestrates the seamless interaction of various components. Integrated with Infrared (IR) sensors, the A At the heart of the EV revolution lies a dual challenge: range anxiety and infrastructure development. On-road charging seeks to address these concerns by offering seamless charging solutions during transit. Unlike traditional charging stations Situated at fixed locations, on-road charging systems integrate directly into existing infrastructure, such as roads, lanes, and highways. This innovative approach not only extends the driving range of EVs but also diminishes the need for extensive battery storage, fostering a more efficient and sustainable ecosystem The implementation of on-road charging is underpinned by groundbreaking technologies. Wireless charging systems, utilizing inductive charging pads embedded beneath road surfaces, enable EVs to replenish their batteries while in motion. Dynamic charging lanes equipped with overhead wires or magnetic fields facilitate continuous energy transfer, allowing vehicles to charge on-road. The dawn of the electric vehicle (EV) era has ushered in transformative changes in transportation, challenging traditional refueling paradigms and necessitating innovative solutions. Central to this paradigm shift is the concept of on road charging, a groundbreaking approach aimed at addressing range anxiety, promoting sustainability, and facilitating seamless urban mobility. This introduction delves into the intricacies of on-road charging, elucidating its significance, technological foundations, and potential implications for the future of transportation.

By incentivizing public-private partnerships, research and development initiatives, and market driven solutions, on-road charging can stimulate economic growth, enhance competitiveness, and drive sustainable development .On road Electric vehicle charging is an exciting development in the world of electric mobility ,with the potential to revolutionize the way we change and use electric vehicles, making them more practical for a wider range of applications and driving habits

METHODOLOGY

The methodology for investigating dynamic wireless power charging for electric vehicles (EVs) involves a comprehensive approach to understand its viability and optimization. The study commences with a thorough review of existing literature on dynamic wireless charging technologies, emphasizing key advancements, challenges, and gaps in current research. Subsequently, the technology is dissected, detailing the components of dynamic wireless charging systems, including ground pads and onboard pads, and exploring the technical specifications and standards associated with these components.

Data collection involves extracting pertinent information from literature, pilot projects, and simulations, utilizing statistical or analytical methods for comprehensive analysis. Acknowledging limitations, the methodology proposes areas for future research and improvement, ensuring a robust and insightful exploration of dynamic wireless power charging for EVs.

Inductive coils serve as the fundamental components for wireless power transfer in the charging

system. Their design and arrangement determine the efficiency of power transfer between the transmitter and receiver coils. By utilizing electromagnetic principles, inductive coils facilitate the creation of a magnetic field that enables energy transfer without direct physical contact.
The rectifier and converter components play a crucial role in converting the alternating current (AC) induced in the coils into a direct current (DC) suitable for charging the electric vehicle's battery. The rectifier ensures the conversion of AC to DC, while the converter further regulates the voltage and current to align with the requirements of the battery, optimizing the overall charging process. Sensors are integrated into the charging system to monitor and gather crucial data during the charging .
These sensors may include temperature sensors, current sensors, and voltage sensors. The information collected helps in maintaining optimal operating conditions, ensures safety, and contributes to the overall efficiency of the charging system.
The relay serves as a critical control component in the charging system. It manages the switching mechanism, enabling or interrupting the flow of electrical current. This functionality ensures secure and efficient charging by controlling the connection between the power source and the electric vehicle. Relays play a vital role in safeguarding the system against overloads and other potential risks.
The battery is the energy storage unit within the electric vehicle. The involves incorporating a battery management system (BMS) to oversee the charging integration with the existing power infrastructure, and ensuring that it operates effectively in real-world conditions. process, manage cell balancing, and monitor the overall health of the battery. The BMS ensures the safety and longevity of the battery during the dynamic wireless charging process.
Wireless transmitter and receiver coils establish the communication link for power transfer between the charging infrastructure and the electric vehicle. Their design focuses on achieving efficient electromagnetic coupling, ensuring a robust and reliable wireless power transfer connection. The alignment mechanism ofthesec oils is essential for maintaining optimal power transfer efficiency.
In conclusion, each component within the dynamic wireless power charging system plays a distinct and crucial role. The methodology for developing these components involves meticulous design, testing, and integration to create a comprehensive system that addresses the specific challenges of dynamic wireless charging for electric vehicles.

Design

The dynamic wireless power charging system for electric vehicles (EVs) is designed to revolutionize the charging experience by deploying inductive charging pads along roadways and key routes. EVs are equipped with dedicated receiving coils and user-friendly interfaces, enabling seamless alignment with charging pads. The communication system facilitates secure data exchange between vehicles and infrastructure, ensuring a smooth and reliable charging process. Emphasis is placed on industry collaboration to establish universal standards, integrate safety protocols, and promote the use of renewable energy sources. User experience is enhanced through intuitive mobile apps providing real-time charging information. Rigorous testing, pilot programs, and proactive maintenance, including remote monitoring, contribute to the system's reliability and successful deployment in diverse real world scenarios.
Eelectromagnetic induction is a fundamental principle in the interaction between two conductors. As described in literature mutual inductive coupling takes place when two devices are configured in a way that a change in current flowing through one conductor induces a voltage across the ends of another conductor. This occurs due

to the magnetic field generated by the first circuit interacting with the second circuit. In the wireless power transfer, a portion of the magnetic flux created by one circuit interacts with the second circuit, establishing a magnetic coupling between the two. This coupling facilitates the transfer of energy from one circuit to the other without need for direct physical connections. Essentially, the change in current in one conductor induces a voltage in the other, illustrating the core principle of electromagnetic induction that underlies wireless energy transfer technologies.

Equipment used

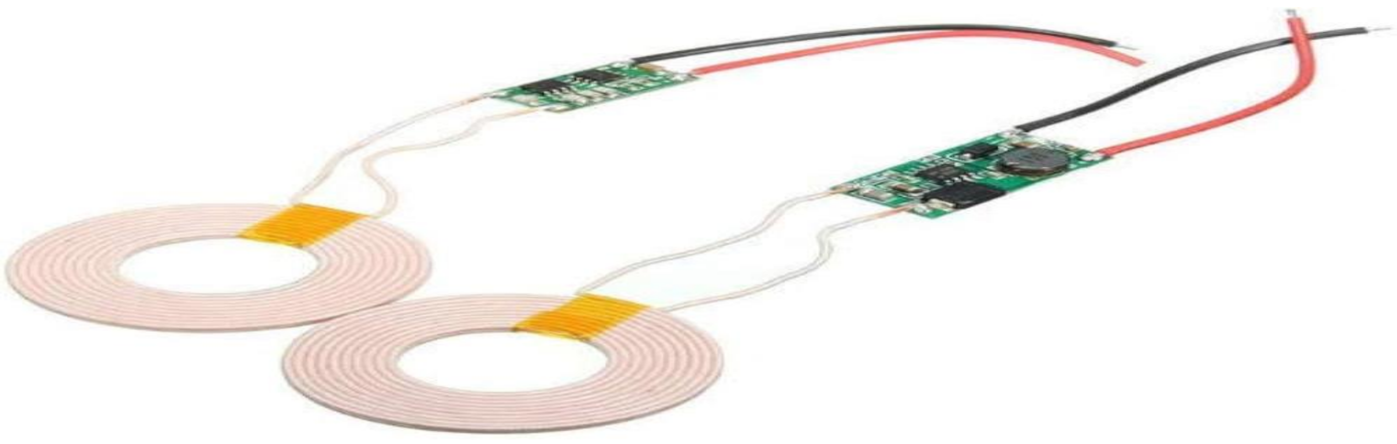
Receive coil

A receive coil, also known as a receiver coil or pickup coil, is a crucial component in various applications, including:

1. Wireless charging: Receive coils are used to receive electromagnetic energy transmitted from a transmitter coil, converting it into electrical energy to charge devices.
2. RFID (Radio-Frequency Identification): Receive coils are used to detect and read RFID tags.
3. Inductive sensing: Receive coils are used to detect changes in inductance, often used in proximity sensing or position sensing.

Key characteristics of receive coils include:

1. Design and geometry
2. Material selection (e.g., copper, ferrite)
3. Inductance and resonance frequency
4. Quality factor (Q-factor)



LCD

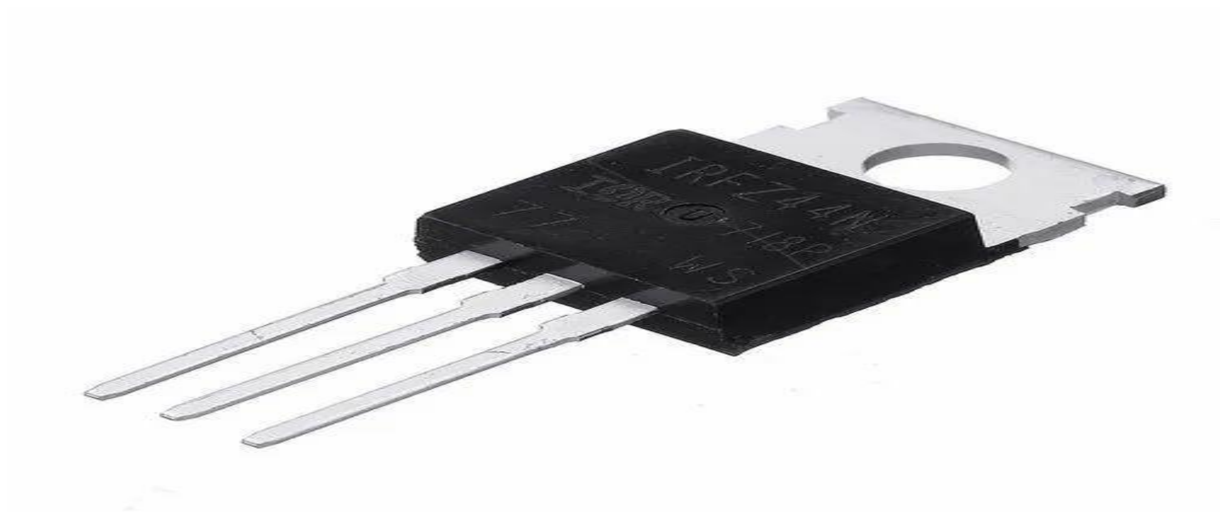
LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

LCDs were a big leap in terms of the technology they replaced, which include light-emitting diode (LED) and gas-plasma displays. LCDs allowed displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it. Where an LED emits light, the liquid crystals in an LCD produces an image using a backlight.

As LCDs have replaced older display technologies, LCDs have begun being replaced by new display technologies such as OLEDs

Battery

An electric battery is a source of electric power consisting of one or more electrochemical cells with external connections for powering electrical devices. When a battery is supplying power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons. When a battery is connected to an external electric load, those negatively charged electrons flow through the circuit and reach the positive terminal, thus causing a redox reaction by attracting positively charged ions, or cations. Thus, higher energy reactants are converted to lower energy products, and the free-energy difference is delivered to the external circuit as electrical energy. Historically the term "battery" specifically referred to a device composed of multiple cells; however, the usage has evolved to include devices composed of a single cell.



MOSFET

The main advantage of a MOSFET is that it requires almost no input current to control the load current under steady-state or low-frequency conditions, especially compared to bipolar junction transistors (BJTs). However, at high frequencies or when switching rapidly, a MOSFET may require significant current to charge and discharge its gate capacitance. In an enhancement mode MOSFET, voltage applied to the gate terminal increases the conductivity of the device. In depletion mode transistors, voltage applied at the gate reduces the conductivity

Key characteristics:

1. High input impedance
2. Low power consumption
3. Fast switching times
4. High current handling capability

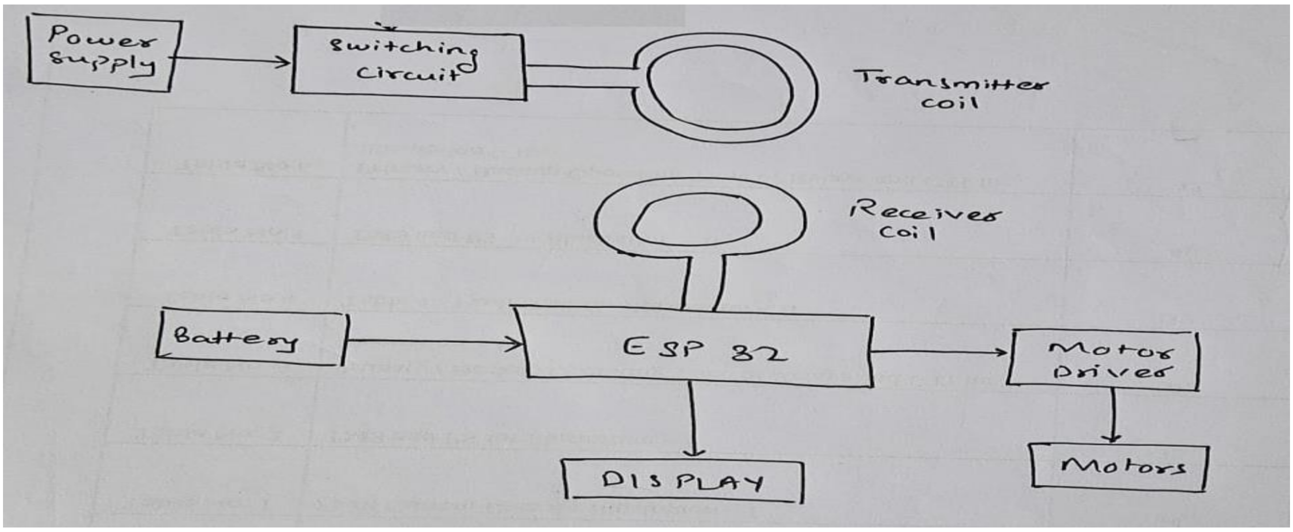
Advantages:

1. High efficiency: MOSFETs can switch on and off quickly, reducing power losses.
2. Low power consumption: MOSFETs require minimal power to control the gate.
3. High current handling: MOSFETs can handle high currents, making them suitable for power applications.

Applications:

1. Power supplies: MOSFETs are used in switching power supplies to regulate output voltage.
2. Motor control: MOSFETs are used to control DC motors, stepper motors, and other types of motors.
3. Lighting: MOSFETs are used in LED drivers and other lighting applications.
4. Automotive: MOSFETs are used in automotive systems, such as power windows, door locks, and engine control units.

Block Diagram



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Conclusions

In conclusion, Various wireless power transfer (WPT) approaches are presented along with their advantages and drawbacks. The paper presents an adequate in brief review of recent EV wireless power charging researches. It has also an experimental small-scale-model for a better understanding of the wireless concept. The power transfer efficiency of the inductive power transfer is much greater than that of the round coil and helps create a better overall wireless power transfer system. Although the square coils are much more efficient than the round coils, the efficiency is still very low. There are various scenarios that could possibly improve this. A recommendation could be made to use a thicker wire that creates a bigger length in the coil as well. Having a bigger coil length could also help increase the inductance and magnetic field, which would, in turn, could possibly create a higher transfer efficiency. Inductive wireless power transfer prototypes are experimentally implemented for round and rectangular coils. In addition, another model is implemented for better conceptual understanding. The work at all emphasis on the promising future and growing market for the wireless electric vehicles charging technology. Its Efficiency is about 97% so it will minimize the heat losses during charging and battery life and efficiency will get increased. Size of the battery will also get reduced and as a result of it cost will also get decrease.the dynamic power solution for electric vehicles (EVs) with an integrated monitoring system offers a cutting-edge approach to optimizing battery performance, range, and overall vehicle efficiency. By leveraging advanced power electronics, real-time monitoring, and predictive analytics, this solution enables EVs to:

1. Maximize energy efficiency and extend driving range
2. Enhance battery health and longevity
3. Improve safety and reliability
4. Support smart charging and grid integration

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