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Solar Charging Wireless Electric Vehicle System

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ABSTRACT: This paper describes the planning and design of an electric vehicle charging system that uses solar electricity to offset the costs associated with fuel and reduce pollution. The number of nations using electric cars on their roads is continuously increasing. Electric vehicles not only benefit the environment but also reduce transportation expenses by using considerably less expensive power instead of costly fuel. Here, by developing an infrastructure for charging electric vehicles, we provide a fresh and practical solution to this issue. Since the EV can charge while traveling and the system is fueled by solar energy, there is no need for a second power source, there is no need to stop for charging. The system's construction makes use of A solar panel, battery, transformer, regulator, copper coils, atmega controller, AC to DC converter, and LCD display are among the components. This method is based on the idea that charging electric cars can be done without stopping to use a station. So, technology validates the feasibility of an EV wireless charging system that is embedded into the road and powered by solar energy.

I. INTRODUCTION

Overture

Within the transportation domain, electric vehicles (EVs) are a new idea. It's expected that electric cars, or EVs, will soon dominate the auto industry. In this case, regulation of the electric vehicle (EV) charging process is necessary to maintain the integrity of the power networks. Despite this, as the number of electric cars (EVs) increases, a sizable amount of energy will be retained in the batteries, enabling the opposite effect. In the future, electric vehicle (EV) interaction will play a significant role in smart grid technologies, enhancing the grid's independence. As fossil fuel prices rise and carbon dioxide emissions decline, electric vehicles are now more competitively priced than vehicles with traditional internal combustion engines. Despite

Despite these disadvantages, the EV's high sticker price prevented it from being widely embraced by consumers. Both all-electric cars and fast-charging facilities are hard to come across. Electric vehicles can be classified into two categories: fully electric vehicles and partially electric vehicles. Electric vehicles not only have little environmental impact and cheap operating costs, but they also use very little or no fossil fuels. In order to improve the efficiency of charging stations, electric vehicles will be the main form of transportation in the future [1]. The most frequent justification offered for not purchasing an electric vehicle is the lack of infrastructure for charging them. Examining the portable EV charger was using renewable energy to shorten the charging time. In this project, a hybrid power system is used to offer long-distance electric vehicle drivers a special service. There are no locations for these drivers to refill their cars with power in between major roadways. If you wish to charge your electric car using electricity, the wireless EV charger is a fantastic option [2]. As the price of fossil fuels rises and CO₂ emissions decrease, electric vehicles are becoming more affordable than conventional seen as an ongoing vehicle. Restrictions like high car expenses prevented the widespread adoption of electric vehicles [2]. Both all-electric cars and fast-charging facilities are hard to come across. Electric vehicles (EVs) can be powered wholly or partially by electricity. Electric automobiles have cheaper running costs than their gasoline-powered counterparts because they have fewer moving components and have a smaller environmental effect [3]. A solar panel, battery, transformer, and regulator are used in our project system. circuits, copper coils, AC to DC converter, atmega controller, and LCD display to build the system. There is no need to

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stop for recharging with this system because electric vehicles may be charged while travelling. A charge controller connects the battery to the solar panel. dc electricity is being stored in the battery. Now, in order to send the DC power, it must be converted to AC power. A transformer is used here to accomplish this task.

Engineering Problem Statement

An electric vehicle (EV) is propelled by one or more traction motors, often known as electric motors. A battery, solar panels, fuel cells, or an electric generator that transforms gasoline into energy to be fuelled by an off-vehicle collector system can all be used to make an electric car self-sufficient. Electric vehicles come in a variety of forms, including trucks, ships, planes, spacecraft, and hybrid and all-electric automobiles and trains. During this historical period, electricity was a common kind of vehicle propulsion because it offered a level of comfort and operational convenience that was not feasible with gasoline-powered cars at the time. Electric power is still frequently utilized in trains and other small vehicles, despite the fact that internal combustion engines have dominated the automotive industry for more than a century.

II. PROJECT MANAGEMENT

Introduction

One popular technique for ensuring a project's success is project management. In project management, it is essential to have a clear understanding of the project's goals, the resources required to accomplish them, and how to get there. The focus of this chapter is getting down to business. Planning and carrying out a project in a way that ensures the achievement of its objectives and deliverables is the aim of project management. It also involves cross-organizational communication, a comprehensive budgeting process, and the identification and management of possible hazards. The Gantt chart can be useful for project schedules. Data manipulation can result in equipment costs for the project being reduced. Project management is an essential managerial skill. Organizing, arranging, and Process includes controlling actions to accomplish a goal within a specified budget and time frame. Many businesses can achieve the goals by completing projects that support the project's objectives. Most projects have predetermined parameters, such as a start and finish date, number of participants, amount of resources, and budget. The group leader plans, oversees, and modifies this as necessary.

S.W.O.T. Analysis

The SWOT framework can be used to examine a project's strengths, weaknesses, opportunities, and threats. The internal analysis, which employs a functional approach, identifies the project's vulnerabilities and growth opportunities while also highlighting its overall strengths and weaknesses (finance, management, infrastructure, procurement, production, distribution, marketing, reputational factors, and innovation). Analyzing the competitive advantage's source inside is necessary. By doing this, it pinpoints areas where money should be spent creating tools that will sustain team motivation. Research on the external environment—the industry, the competitors, and the overall economy—reveals potential benefits and drawbacks in the field. The competitive landscape is formed by an analysis of each competitor's strengths and weaknesses. competition, fresh arrivals.

III. METHODOLOGY AND MODELING

Introduction

In terms of intricacy, the suggested car is straightforward. In terms of construction, it's far easier than gas-powered vehicles. the layout of an electric vehicle. The basic parts are a solar photovoltaic (PV) module with a charge controller, two motors and their controllers, a reversing circuit, a battery pack, and a speed controller. Both controllers share an

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accelerator to trigger. The brake switches cause the motors to halt when the brakes are engaged. A motor will cut off when you turn the vehicle in the other direction. Two control and two phase wires are exchanged in order to achieve this while the car is moving. Conveniently, the steering column has the reverse button. In order to do away with bulky wires, magnetic resonance technology enables the transfer of wireless power (WPT). Actually, inductive power transfer—which has been researched and improved for at least thirty years—uses the same basic idea as the WPT. WPT has advanced remarkably as a field in recent years. milliwatts of power

At a higher load efficiency, the power transfer distance increases from a few millimeters to a few hundred millimeters in kilowatts. These enhancements make the WPT a more compelling option for both dynamic and stationary EV charging applications. The Wide Power Transmission (WPT) domain contains the technologies covered in this session that can be applied to EV wireless charging. With the adoption of EVs, the issues of their short range, high cost, and awkward charging can be easily resolved. of WPT. The critical mass of electric cars (EVs) has been reached, and the technology of batteries is no longer a barrier. The state-of-the-art results should motivate researchers, who will then use this drive to further WPT and EV.

Block Diagram and Working Principle

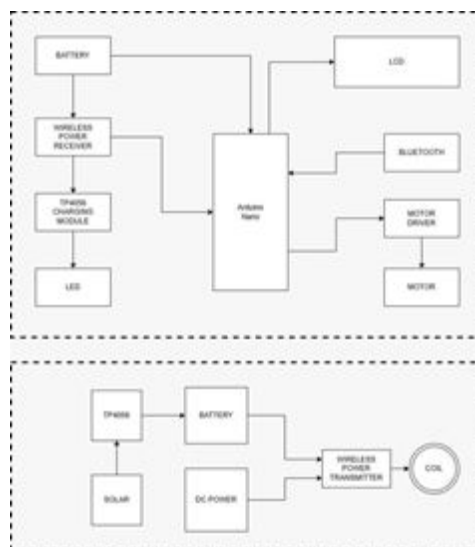


Figure 3.1: Block Diagram of the project

A solar panel charges the transmitter coils, which in turn charges the battery that is kept in reserve within the regulator. A transformer's primary and secondary coils are connected by a magnetic field that needs to be directed by the transformer's core in order to prevent energy waste. In response to oscillations in the net magnetic flux from the stimulated spin system, the receiver coil records an induced electric current. The receiver coil is wirelessly charged as a result. After the ac power has been converted, the DC power produced by the AC to DC converter powers the atmega controller. An LCD panel that has been integrated into the system can show the initials of the car. That is the nature of the system.

International Journal of Innovative Research in Science, Engineering and Technology

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Required Tools and Components



Figure 4.1: Arduino Uno [22]

The Arduino Uno is the ideal board to use while beginning to program embedded systems. If you're new to this field, this Arduino Uno board is excellent for tinkering. For this open-source Arduino platform, the whole schematic and PCB layout are accessible online. A Google search may also yield a lengthy lecture on an Arduino Uno Internet of Things and home automation project. All Arduino boards can be programmed using the free Arduino Software Development Environment (IDE). You can download the Arduino Software Development Kit (IDE) for Mac, Linux, and Windows operating systems. Rumor has it that third-party smartphone apps are available for Arduino Board programming. I'm glad to hear this.

IV. RESULTS ANALYSIS & CRITICAL DESIGN REVIEW

Introduction

The term "conductive charging" describes the more popular connected or plug-in power supply techniques. These hardwired charging techniques do have certain drawbacks, though. For example, they require large plugs and charging cables. Furthermore, the device being charged and the power supply need to be manually connected to the charger. Moreover, neither users nor the environment like the tethered charging method. If the insulation on the charging line degrades due to elements like high temperatures, contact with the ground, or the charging device itself, there is a possibility of a fatal electric shock. Using a lot of batteries or replacing depleted ones with new ones will reduce the amount of time needed for charging and the related dangers. Increasing the number of batteries in an automobile will increase its range if that vehicle can travel a given distance on a single charge. Alternatively, the vehicle's batteries can be replaced with fully charged ones at charging stations along the way. However, the batteries are not without problems. The batteries only last a short while before needing to be replenished, which makes them costly to purchase and heavy to transport. Because of their weight, it might not be feasible to move more batteries than a certain amount.

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Perhaps these problems can be resolved if energy storage devices are enhanced in the future. WPT, on the other hand, provides an additional choice for dealing with battery-related problems. Making use of the dynamic For example, a wireless power charging system can reduce the entry cost of the entire system by doing away with the requirement for big, bulky batteries. The WPT approach is incredibly practical and easy to use because it eliminates the mess of cables and connectors that are usually present in manually plugged-in charging systems. Extensive study has been conducted on WPT and its practical applications due to its potential utility in various industrial and engineering contexts. Electronic devices and electric vehicles (EVs) are two application areas for WPT.

Summary of Findings

Given how drastically the environment has become worse, electric vehicles, or EVs, are becoming increasingly necessary. By 2030, the government intends to phase out diesel vehicles entirely. Rapid charging technology and charging stations are prerequisites for the broad adoption of electric vehicles (EVs), since waiting for an EV to charge is the largest barrier to EV adoption. A stable network of charging stations will be necessary for this transition to be successful. The widespread use of electric vehicles (EVs) has the potential to seriously impair the grid's dependability. At the core of the "solar-based wireless EV charging" proposal is a renewable energy infrastructure. A lead-acid battery is used to store solar electricity. The establishment of an entirely wireless charging infrastructure is made possible by the BMU.

Novelty of the work

When fully adopted, remote charging will offer several advantages. Real liberty: Since self-driving cars are still in the early stages of development, not everyone has accepted their use yet. The flow of traffic is allowed to continue until there is an urgent need to stop it in order to charge individual cars. Their usefulness and applicability might therefore rise. How to do without a charging station: There isn't a compelling reason to combine a link with remote charging, indicating that this approach is simpler. The car will now take care of the charging on its own, so you can go about your day without worrying. tiny battery packs: Given that there are more

Cultural and Societal Factors and Impacts

Developing nations should lower their goals and create solar roads instead of executing the higher ambitions of building new roads every day in order to bolster their economies through infrastructure. An

Utilizing wireless dynamic charging technology while driving can greatly extend the range of electric vehicles. Drivers of electric vehicles (EVs) won't have to worry about running out of gas and won't need to find a charging station. It is the responsibility of solar highways to create and conceptualize solar road technology. Examining and implementing solar energy systems need a lot of labor. Glass with the necessary traction and impact resistance, transparency, and self-cleaning properties In order to stop flux leakage and cable-related short circuits, numerous Systems for wireless power transmission have been developed. This data will be helpful to researchers studying wireless power transmission. Thanks to wireless power transmission, cars may now be run with higher quality standards and greater efficiency. The present goal of this initiative is to generate electricity using renewable resources.

Future Scopes

in view of the newly developed laws and technologies. This section's goal is to make predictions about the WEVC of the future. Global inventories of electric vehicles are now expanding quickly.

Two possible directions in WEVC under the trend of industrial prosperity are how to ensure a sustainable increase in EV ownership and how to permit full play of scalable development. Furthermore, WEVC can increase its competitiveness by inventing new materials, theories, and technologies. Power electronics can also benefit from the use

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of contemporary materials. For starters, switching loss—along with flux leakage—is a major contributor to energy waste in a WEVC system. Static WEVC can reduce operator strain, but it doesn't make charging stations more versatile.

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