Abstract

The aim of this Project to reduce pollution emissions created by non-renewable fossil fuel vehicles, the world is transitioning towards electrified mobility. As a result, the electric vehicle was born. Charging an electric vehicle's battery through charger and wire is costly, dangerous, and inconvenient. Another disadvantage of wire charging technology is the need to wait for hours at charging stations.

So now, wireless charging allows us to power our vehicle simply by putting it in a parking slot, or we may charge our electric vehicle while driving. If we are already comfortable with wireless transmission of data, audio, and video signals, why not transfer power over the air? The fundamental advantage of wireless charging is its ability to deliver electricity via an electromagnetic field.

This will enhance the adoption of electric vehicles while also making them more reliable and efficient over long distances.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

Wireless charging technology has emerged as a promising solution for the electric vehicle (EV) industry, providing a convenient and efficient method of recharging EV batteries without the need for physical cables or plugs. By leveraging the principles of electromagnetic induction or resonance, wireless charging enables EVs to receive power simply by parking over a charging pad or driving on a specially equipped roadway. This groundbreaking technology has the potential to revolutionize the way we charge our EVs, offering numerous benefits in terms of user convenience, infrastructure flexibility, and enhanced driving experiences. In this article, we will explore the concept of wireless charging for electric vehicles, its underlying principles, advantages, current advancements, and the challenges that lie ahead in its widespread adoption.

CHAPTER 2

INTRODUCTION OF ELECTRIC VEHICLE

The car industry has seen a tremendous movement recently towards environmentally friendly and sustainable transportation options. With its many benefits in terms of lower emissions, increased energy efficiency, and technical innovation, electric vehicles (EVs) have gained popularity as a possible replacement for conventional internal combustion engine (ICE) vehicles. Electric vehicles have received a lot of attention and are changing how we view personal mobility as the world works to address the problems caused by climate change and move to a low-carbon future.

Instead of relying on fossil fuels, electric vehicles use electric motors that are powered by rechargeable batteries. There are a number of compelling advantages to this change in propulsion technology. First off, EVs have zero tailpipe emissions, lowering greenhouse gas emissions that fuel climate change and reducing air pollution. Electric vehicles can function with almost no direct carbon emissions by relying on electricity produced from renewable resources, including solar or wind power, further boosting their environmental credentials.

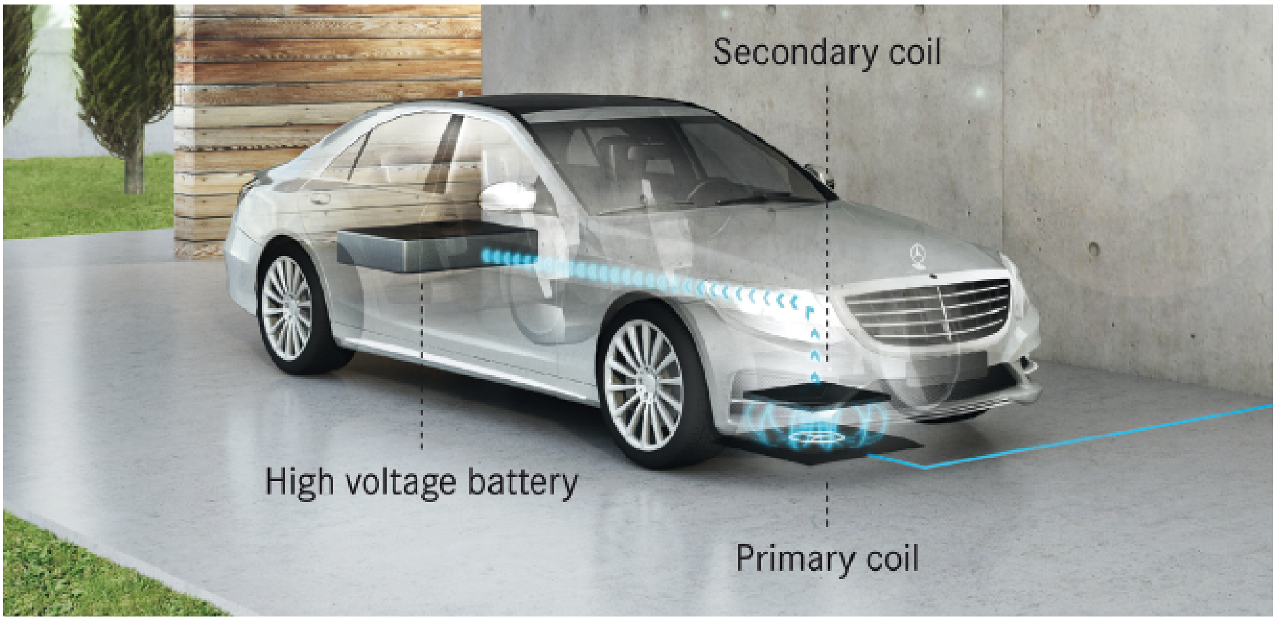
Furthermore, compared to conventional automobiles, electric vehicles are exceptionally energy-efficient. The electric motor improves overall efficiency and reduces energy waste by converting a higher proportion of the battery's energy to power the wheels. In addition to lowering operating costs, this efficiency advantage increases the range of electric vehicles, enabling drivers to cover longer distances between charges.

The broad acceptance of electric vehicles has been significantly influenced by the growth of the charging infrastructure. An extensive network of charging stations has been built thanks to significant investment from both public and private organisations, making it easier than ever for EV owners to recharge their vehicles while on the road. The time needed to recharge the battery has substantially decreased thanks to the development of fast-charging technology, which has further sped up the charging procedure.

Electric vehicles provide a fascinating driving experience in addition to environmental and energy efficiency benefits. Electric motors provide fast torque, allowing for quick acceleration and silent operation. The lack of traditional engine noise improves the comfort and serenity of the driving experience, while enhanced technology capabilities and connectivity choices make EVs an appealing option for tech-savvy consumers.

The electric car market has grown dramatically in recent years, thanks to breakthroughs in battery technology, lower pricing, and favourable government legislation. Major automakers have made significant investments in electrification, with an increasing selection of electric vehicles offered to consumers. The barriers to mainstream EV adoption are steadily lessening as battery technology evolves, delivering higher energy density and longer ranges.

Despite progress, hurdles remain on the path to electrification. Concerns with limited charging infrastructure in some areas, range anxiety, and the environmental impact of battery manufacturing and disposal need constant innovation and collaboration. However, with the combined efforts of industry stakeholders, governments, and consumers, electric vehicles are positioned to play a crucial role in building a sustainable and cleaner transportation picture.



Need of EV's

Transport is an essential part of modern life, yet the typical combustion engine is rapidly becoming obsolete. Petrol and diesel vehicles emit a lot of pollution and are being phased out in favour of all-electric vehicles. Fully electric cars (EV) emit no exhaust emissions and are therefore significantly better for the environment.

- **Lower running costs :** An electric vehicle has substantially lower operating costs than a comparable gasoline or diesel vehicle. Electric vehicles charge their batteries with electricity rather than using fossil fuels such as gasoline or diesel. Electric vehicles are more efficient, and when combined with the cost of power, charging an electric vehicle is less expensive than filling up with gas or diesel for your travel needs.

- **Low maintenance cost :** Because electric vehicles have fewer moving parts than internal combustion vehicles, they require less maintenance. Electric automobiles require less maintenance than conventional gasoline or diesel vehicles. As a result, the annual cost of operating an electric car is much lower.

- **Zero Tailpipe Emissions :** Because there are no exhaust emissions, driving an electric vehicle can help you minimise the carbon footprint. You can further lessen the environmental impact of charging your vehicle by using renewable energy for household electricity.

- **Petrol and Diesel use is destroying our Planet :** Our planet's supply of fossil fuels is limited, and their consumption is destroying it. Toxic emissions from gasoline and diesel automobiles have long-term negative consequences for public health. Electric automobiles emit far less pollution than gasoline and diesel vehicles. Electric vehicles can convert roughly 60% of the electrical energy from the grid to power the wheels, but gasoline and diesel engines can only convert 17%-21% of the energy contained in the fuel to the wheels. That is a waste of almost 80%. Although fully electric vehicles release no tailpipe emissions, even when power production is considered, gasoline and diesel vehicles emit nearly three times as much carbon dioxide as the average EV.

Disadvantages of wired charging over wireless charging in EV's

When comparing wired charging to wireless charging for electric vehicles (EVs), there are a few disadvantages of wired charging:

1. Physical connection requirement: Wired charging necessitates a physical connection between the charging station and the EV, usually through a charging cable. This connection requires proper alignment and manual plugging in, which can be inconvenient, especially in poor weather conditions or for individuals with limited mobility.
2. Potential cable wear and tear: The charging cables used in wired charging are subject to wear and tear over time due to repeated use and exposure to various environmental factors. Fraying, kinking, or damage to the cables can impact their efficiency and safety. Regular maintenance and replacement may be required to ensure reliable charging.
3. Cable management and storage: Managing and storing charging cables can be a hassle. They can be bulky, heavy, and messy, especially when they get tangled or dirty. Properly coiling and storing cables can take up space and require additional effort, which might be inconvenient for users, particularly in public charging stations.
4. Compatibility with charging standards: Wired charging relies on standardized connectors and charging protocols. However, different EV models may use different connector types, requiring adapters or specific charging stations. This compatibility issue can limit the flexibility and ease of charging, especially in areas where charging infrastructure is not uniformly standardized.
5. Limited mobility during charging: With wired charging, EVs must remain stationary while connected to the charging station. This limitation can be inconvenient for individuals who rely on their vehicles frequently or need to charge on the go. It may restrict the flexibility of using the EV while it is charging.
6. Potential for damage and vandalism: Wired charging infrastructure, including charging stations and cables, can be vulnerable to damage or vandalism. Accidental damage from vehicles or deliberate acts of destruction can disrupt charging services and require repairs or replacements, causing inconvenience and potential downtime for EV owners.

It's important to note that wireless charging for EVs is still in the early stages of development and deployment. While it offers certain advantages, such as convenience and ease of use, it also has its own set of limitations and challenges that need to be addressed, including lower efficiency and higher costs compared to wired charging. Both wired and wireless charging technologies are continuously evolving, and future advancements may help overcome these disadvantages.

Wireless Charging

Concept of wireless charging and its potential advantages

Wireless charging is a method of charging electronic devices without the need for a physical cable. Instead, the device is placed on a charging pad or mat that uses electromagnetic induction to transfer power to the device's battery.

The potential advantages of wireless charging include:

1. Convenience: Wireless charging eliminates the need for cables, making it more convenient to charge devices. Users can simply place their devices on a charging pad or mat without having to plug in a cable.
2. Durability: Over time, cables can become frayed or damaged, leading to charging issues. Wireless charging eliminates this problem, as there is no cable to wear out.
3. Safety: Wireless charging reduces the risk of electrical shock, as there are no exposed charging ports or cables. This can be particularly important for devices that are used in wet environments, such as bathrooms or kitchens.
4. Multiple devices: Wireless charging pads can charge multiple devices at the same time, making it easier to keep multiple devices charged without needing multiple charging cables.
5. Aesthetics: Wireless charging eliminates the need for charging cables, which can make a device look cluttered. This can be particularly important for businesses that want to create a clean and professional appearance.

Overall, wireless charging has the potential to simplify the charging process and make it more convenient and efficient for users. As technology continues to advance, we can expect to see more devices adopting wireless charging technology, leading to a more seamless and hassle-free charging experience for users.

Project objective of designing and building a wireless charging station

The project objective of designing and building a wireless charging station for electric vehicles (EVs) is to create a convenient, efficient, and sustainable charging solution for EV drivers. The goal is to design and build a charging station that uses wireless charging technology to eliminate the need for physical cables and make the charging process more convenient for users.

The project will involve several key tasks, including:

1. **Designing the charging station:** This will involve determining the optimal size, shape, and materials for the charging station, as well as determining the power requirements and compatibility with different types of EVs.
2. **Developing the wireless charging technology:** This will involve researching and developing the wireless charging technology that will be used in the charging station. This will include determining the frequency, power, and efficiency of the charging system.
3. **Building the charging station:** Once the design and technology have been finalized, the charging station will be built, including the construction of the charging pad and the installation of the charging electronics.
4. **Testing and validation:** The charging station will be tested to ensure that it meets the necessary safety and performance requirements. This will include testing the charging time, efficiency, and compatibility with different types of EVs.

The ultimate objective of this project is to provide a charging solution that is both convenient and sustainable for EV drivers, while also promoting the adoption of EVs as a more environmentally-friendly mode of transportation. If successful, this project could have significant implications for the future of transportation and energy usage.

Background and Literature Review

Review existing research and development on wireless charging for EVs

Wireless charging for electric vehicles (EVs) is a rapidly evolving technology, with significant research and development efforts currently underway. Many companies, academic institutions, and research organizations are working on developing wireless charging solutions for EVs, with the aim of making EV charging more convenient, efficient, and sustainable.

A study published in the Journal of Power Sources in 2017 analyzed the state of the art of wireless charging technology for EVs. The study found that wireless charging technology was advancing rapidly, and that many different approaches were being explored, including resonant, inductive, and capacitive coupling. The study also identified several key challenges that still needed to be addressed, including power transfer efficiency, alignment of the charging pad with the EV, and compatibility with different types of EVs.

Another study published in the International Journal of Electrical Power and Energy Systems in 2019 examined the efficiency of wireless charging systems for EVs. The study found that wireless charging systems had lower efficiency compared to wired charging systems, due to losses in power transfer and thermal management. However, the study also noted that efficiency could be improved through the use of advanced control systems and optimized design.

Several companies are also actively working on developing wireless charging solutions for EVs. For example, BMW and Qualcomm have partnered to develop a wireless charging system for the BMW i8 hybrid sports car, and Daimler has developed a wireless charging system for its Mercedes-Benz S 500 e plug-in hybrid. Other companies, such as WiTricity and Plugless, are also working on developing wireless charging systems for EVs.

In conclusion, research and development on wireless charging for EVs is ongoing, with many different approaches being explored. While there are still some challenges to be addressed, such as efficiency and compatibility, the potential benefits of wireless charging for EVs are significant, and many companies and organizations are actively working on developing this technology.

Current state of the art in wireless charging Technology

The current state of the art in wireless charging technology is rapidly advancing, with many companies and organizations investing in research and development to improve the efficiency and convenience of wireless charging.

Currently, most wireless charging solutions use magnetic induction or magnetic resonance to transfer power wirelessly. Magnetic induction uses a coil in the charging pad to create a magnetic field, which induces an electric current in a coil in the device being charged. Magnetic resonance works similarly, but uses a more complex system of coils to improve the efficiency of power transfer.

In recent years, significant progress has been made in improving the power transfer efficiency of wireless charging systems, with some systems achieving efficiencies of over 90%. This has been achieved through the use of advanced control systems, optimized design, and improved materials.

There has also been progress in developing wireless charging solutions for high-power applications, such as electric vehicles (EVs). Several companies have developed wireless charging systems for EVs, including BMW and Daimler. These systems typically use higher-power charging pads and more advanced power electronics to transfer power wirelessly. Another area of research and development is the integration of wireless charging into infrastructure, such as roads and parking lots. This would enable EVs to charge wirelessly while driving or parked, eliminating the need for dedicated charging stations.

Overall, the current state of the art in wireless charging technology is advancing rapidly, with many promising developments on the horizon. As this technology continues to evolve, it has the potential to make charging more convenient and efficient, and to accelerate the adoption of electric vehicles and other wireless charging-enabled devices.

Potential challenges and Limitations

While wireless charging for electric vehicles (EVs) has many potential advantages, there are also some challenges and limitations that need to be addressed. Some of the key challenges and limitations include:

1. **Efficiency :** Wireless charging systems typically have lower efficiency than wired charging systems, due to losses in power transfer and thermal management. This can result in longer charging times and higher costs for the same amount of energy.

2. **Range:** Wireless charging systems are typically limited in range, which means that EVs must be parked in close proximity to the charging pad. This can limit the convenience of wireless charging, particularly in public spaces.
3. **Power output:** Wireless charging systems typically have lower power output than wired charging systems, which can limit the suitability of wireless charging for high-power EVs or applications that require fast charging.
4. **Cost:** Wireless charging systems are typically more expensive than wired charging systems, due to the additional electronics and materials required.
5. **Standards:** The lack of standardization in wireless charging technology can lead to interoperability issues and hinder widespread adoption.
6. **Safety:** The safety of wireless charging systems, particularly in terms of electromagnetic radiation, is still a topic of active research and debate.
7. **Deployment:** The installation and deployment of wireless charging infrastructure can be challenging, particularly in public spaces, due to the need for power and communications infrastructure.

While wireless charging for EVs has many potential benefits, there are still some challenges and limitations that need to be addressed through further research and development.

CHAPTER 3

COMPONENT DESCRIPTION

What is Arduino ?

Arduino is an open-source electronics platform that consists of both hardware and software components. It provides a flexible and accessible way for hobbyists, students, artists, and professionals to create and develop interactive electronic projects. The heart of the Arduino platform is the Arduino board, which is a small microcontroller board with various input and output pins.
The Arduino board can be programmed using the Arduino programming language, which is based on C/C++. The programming environment, called the Arduino IDE (Integrated Development Environment), simplifies the process of writing code and uploading it to the Arduino board.

Arduino boards come in different variations, offering various features and capabilities. They are equipped with input and output pins, such as digital input/output pins, analog input pins, and communication ports like USB or serial ports. These pins allow users to connect and control a wide range of electronic components, such as sensors, actuators, displays, and more.
One of the main strengths of Arduino is its versatility and ease of use, making it a popular choice for beginners and experienced users alike. It has a large community of users and developers who contribute to a vast library of pre-written code and project examples, enabling users to quickly start their own projects or learn from existing ones.

Arduino has found applications in various domains, including home automation, robotics, Internet of Things (IoT), wearable technology, and interactive art installations. It has played a significant role in enabling creative experimentation and innovation in the field of electronics and programming.

Arduino Uno

The Arduino Uno is a type of microcontroller board based on the ATmega328, and Uno is an Italian phrase for one. The Arduino Uno is named after the imminent release of a microcontroller board, the Arduino Uno Board 1.0. This board has 14 digital I/O pins, a power jack, 6 analogue I/Ps, an A16 MHz ceramic resonator, a USB connection, a RST button, and an ICSP header. By connecting this board to the computer, all of these can support the microcontroller for future functioning. This board's power supply can be accomplished via an AC to DC adapter, a USB cable, or a battery.

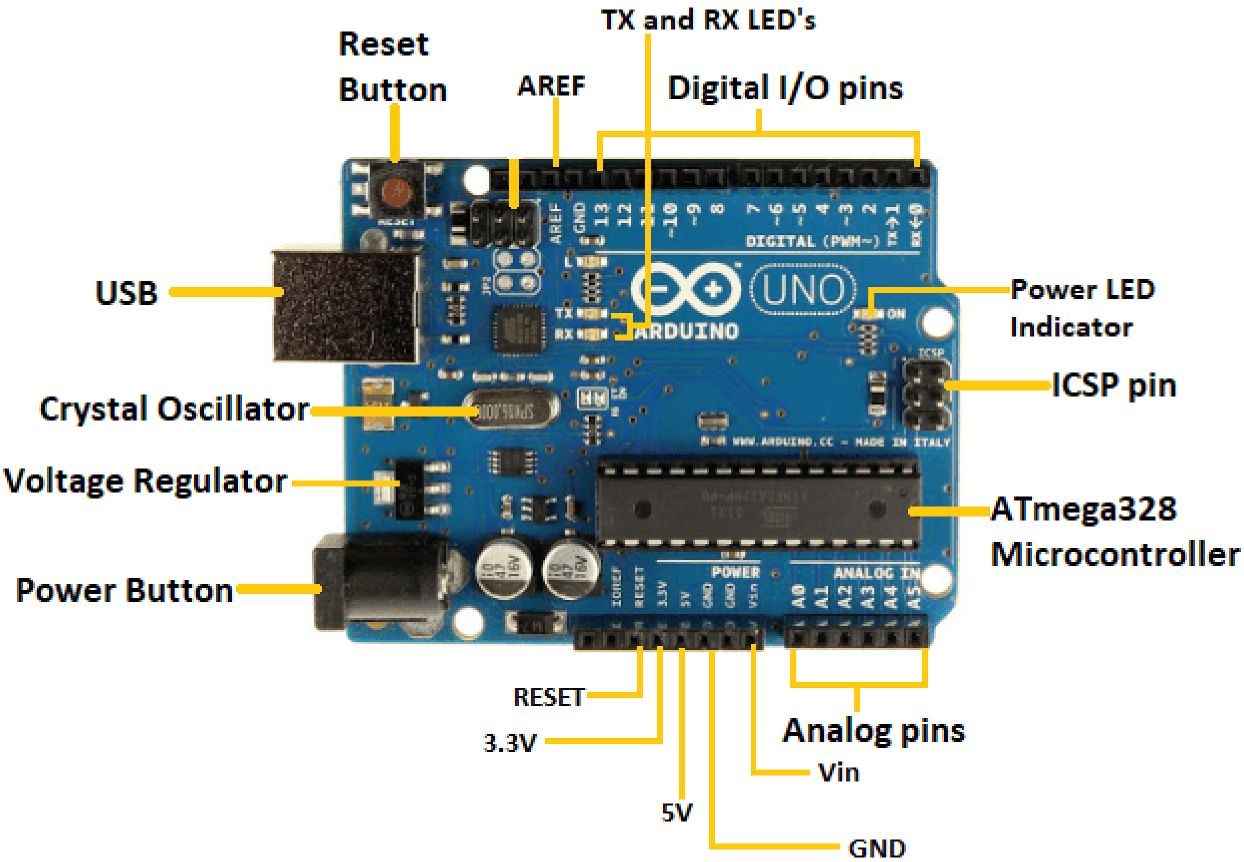


Figure 2: Arduino Detailing

Board Breakdown

Here are the components that make up an arduino board and what each of their functions are :-

1. AREF - Stands for "Analog Reference" and is used to set an external reference voltage.

2. Ground Pin - There are few ground pins on the Arduino and they all works the same.

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4. PWM - The pins marked with the (~) symbol can be simulated analog output.
5. Reset Button - This will restart any code that is loaded to the Arduino Board.

6. USB Connection - Used for powering up your Arduino and uploading sketches.
7. TX/RX - Transmit and Receive data indication LED's.

8. ATmega Microcontroller - This is the brain and where the programs are stored.
9. Power LED Indicator - This LED lights up anytime the board is plugged in a power source.

10. Voltage Regulator - This controls the amount of voltage going into the Arduino Board.
11. DC Power Barel Jack - This is used for powering your Arduino with a power supply.

12. 5V Pin - This pin supplies 5 volts of power to your project.

13. Analog Pins - These pins can read the signal from an analog sensor and convert it to digital.

14. Digital I/O - Pins 0-13 can be used for digital input or output

Figure 3 : Arduino Adapter

Arduino Breadboard

A solderless breadboard is also essential when dealing with Arduino. This device enables you to test your Arduino project without permanently soldering the circuit together. We can make a temporary prototype and experiment with alternative circuit designs by using a breadboard. Metal clips are connected to each other via strips of conductive material inside the holes (tie points) of the plastic housing.

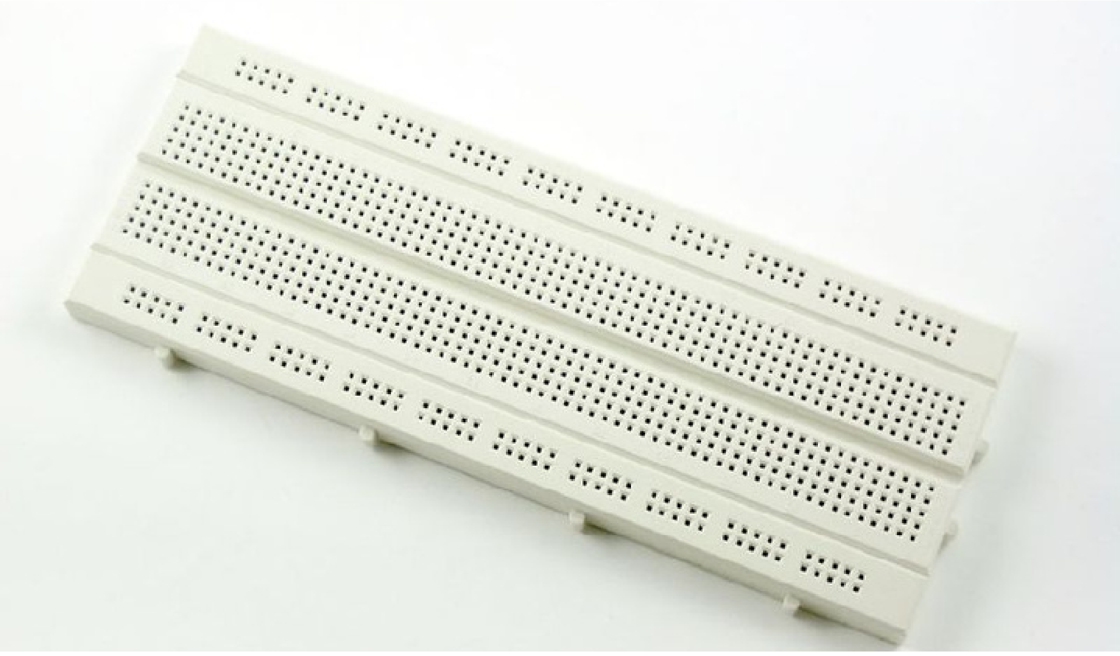


Figure 4: Bread Board

On a side note, the breadboard is not self-powered and requires electricity from the Arduino board through jumper wires. These wires are also required to link resistors, switches, and other components to form the circuit.

Figure 5: Jumper wires

Tesla Coils

Charging Pad or Platform: The charging pad or platform is the physical component that the EV parks on top of to receive a charge. It includes a transmitter coil that generates an alternating magnetic field, which induces a current in the receiver coil on the EV.

Figure 6: Transmitter Coil

Receiver Coil: The receiver coil is a component of the EV that is responsible for receiving the magnetic field generated by the charging pad and converting it into electrical energy to charge the battery.

Figure 7: Receiver Coil

16 X 2 LCD Display

LCD stands for liquid crystal display. It is a type of electronic display module that is used in a wide range of applications such as various circuits and devices such as mobile phones, calculators, computers, TV sets, and so on. These displays are mostly used for light-emitting diodes with multiple segments and seven segments. The main advantages of adopting this module are that it is inexpensive, easily configurable, has no constraints for displaying unique characters, special and even animations, and so on.

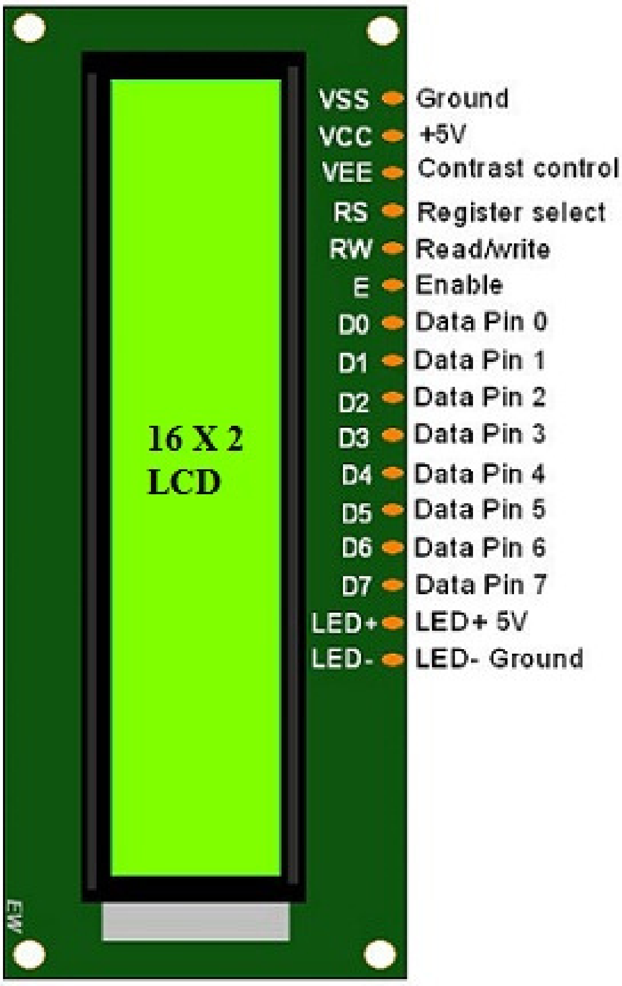


Figure 8: 16X2 LCD Display

LCD uses liquid crystals for the production of visible image. 16 x 2 liquid crystal display is a basic LCD module. In this LCD module, there are two rows every row consists of sixteen numbers. With the two rows in this module, there are sixteen columns. We used this LCD for displaying the data of charging satiation

Sensor

A sensor is a device that detects and reacts to input from the physical world. Light, heat, motion, wetness, pressure, or any number of other natural phenomena can be used as input. In general, the output is a signal that is transformed to a human-readable display at the sensor location or electronically transmitted via a network for reading or additional processing.

Figure 9: Types of sensors

UltraSonic Sensor

Ultrasonic sensors operate by emitting sound waves with frequencies that are too high for humans to hear. The distance is then calculated based on the time it takes for the sound to be reflected back to them. This is similar to how radar measures how long it takes a radio signal to return after striking with an object.

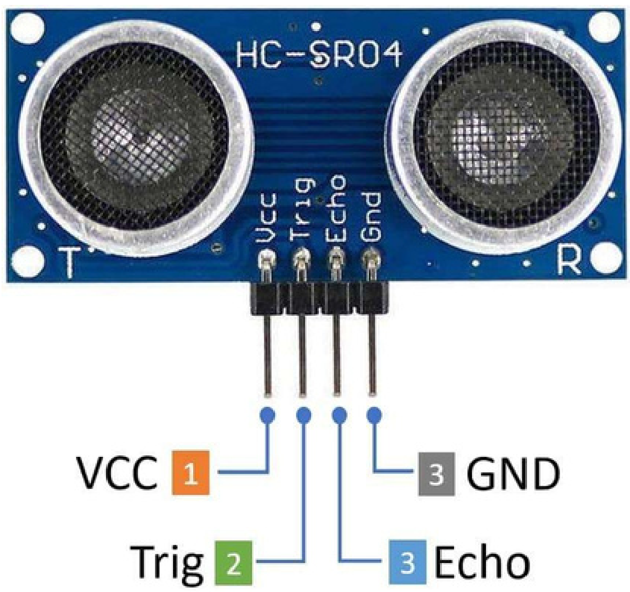


Figure 10: Ultrasonic sensor

Charging Management Software

Charging management software is in charge of controlling the charging process, including scheduling and logging charging sessions, monitoring energy usage, and identifying any problems.

The user interface is the software component that enables EV drivers to interact with the charging system, such as starting a charging session, monitoring the charging progress, and getting notifications.

Security and authentication software ensures that the charging system is secure and that only authorised users have access to it. User authentication, encryption, and firewalls are examples of such functionality.

The hardware and software components required for a wireless charging system for EVs are diverse and complex, requiring expertise in a range of areas, including electrical engineering, software development, and cybersecurity.

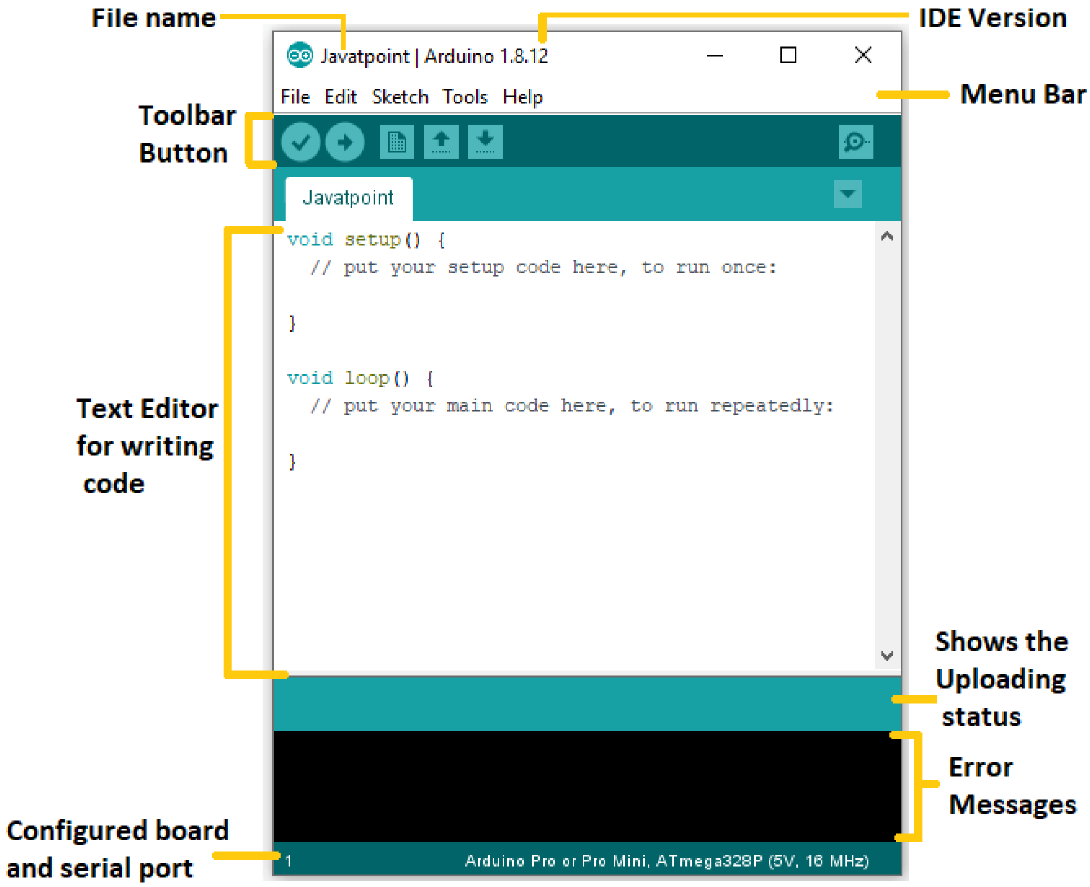


Figure 11: Arduino code application layout

CHAPTER 4

METHODOLOGY

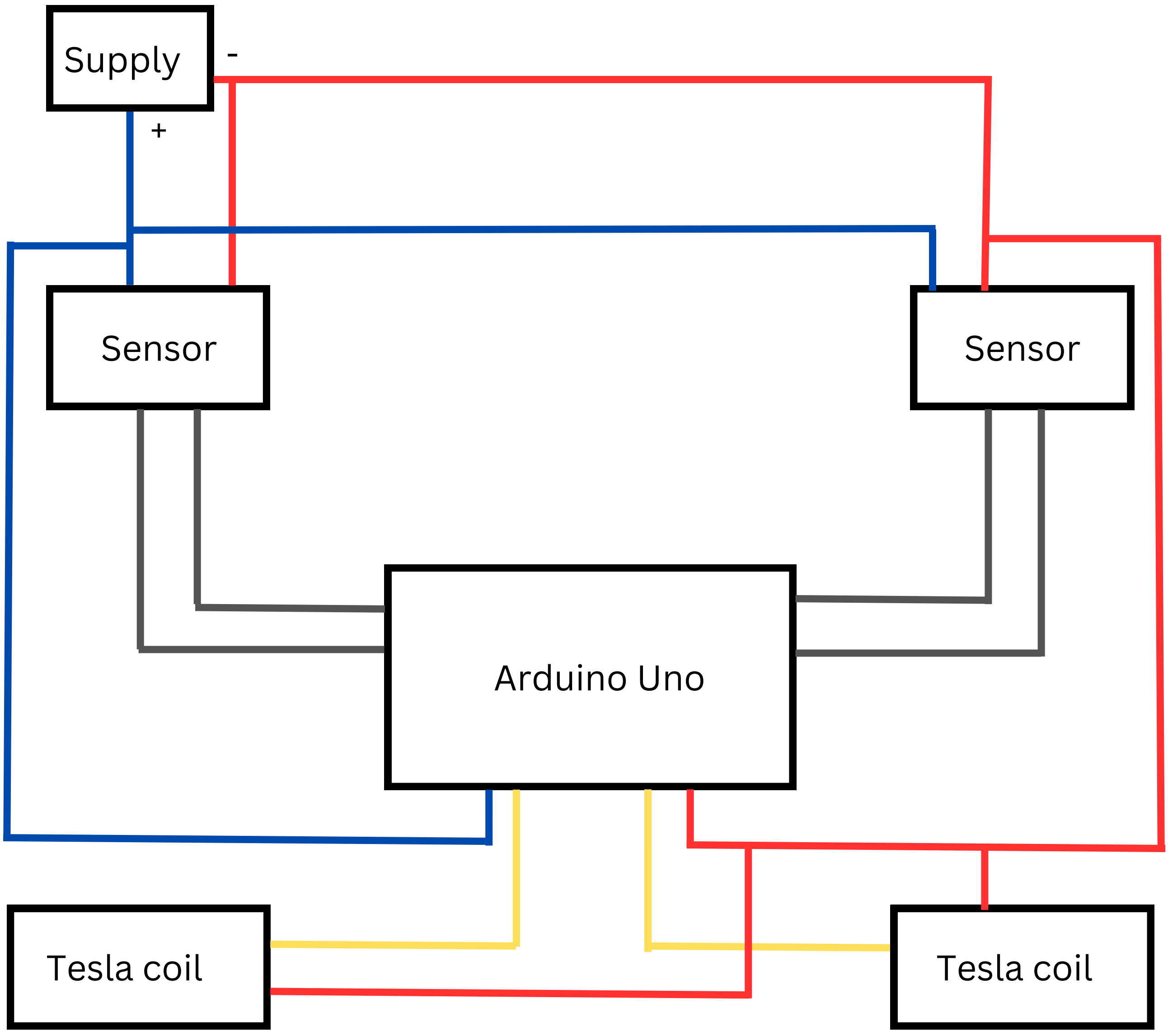


Figure 12: Block Diagram of Wireless Charging Station

PROCEDURE OF THE WORKING OF WIRELESS CHARGING STATION FOR ELECTRIC VEHICLES THAT CAN CHARGE THE ELECTRIC VEHICLES WITHOUT WIRES WITH THE HELP OF TRANSMITTING AND RECEIVING COIL

STAGES OF THE PROJECT

STAGE 1 :
A SETUP OF ARDUINO AND OTHER COMPONENTS
STAGE 2 :
DISTANCE RECOUGNITION PROGRAM
MAKE AND SAVE THE PROGRAM IN TE ARDUINO WHICH CAN READ THE INPUT OF THE CHARGING STATION AND CAN RECOUGNISE THE DISTANCE BETWEEN EV'S AND SENSOR
STAGE 3 :
CONNECT THE ULTRASONIC SENSOR FOR MEASURING THE DISTANCE
STAGE 4 :
UPGRADE THE PROGRAM FOR DIFFERENT PARAMETERS
IF DISTANCE IS MORE THAN THE GIVEN INPUT BY SOFTWARE THEN THE CHARGING WILL NOT START
STAGE 5 :
GIVE POWER SOURCE
STAGE 6 :
UPGRADE THE SYSTEM FOR ADVANCE STAGE (ADDING DIFFERENT FEATURES)

Requirements for the wireless charging station

Designing a wireless charging station for electric vehicles (EVs) requires careful consideration of several design requirements.

1. Power Output: The power output of the charging station is a crucial factor to consider. It should be high enough to provide fast and efficient charging while being safe for the vehicle's battery. The charging station should be designed to deliver enough power to charge the vehicle's battery in a reasonable amount of time.

2. Compatibility with various EV models: The wireless charging station should be compatible with different EV models and various charging standards and protocols used by different EV manufacturers. This will ensure that the charging station can be used with the most popular EV models and future EV models.

3. Safety and Durability: The charging station should be designed to be safe and durable enough to handle different environmental conditions and constant use. It should be built to withstand various weather conditions and physical impacts. A reference website to learn more about safety and durability requirements for charging stations is Charge Point.

4. Convenience and Ease of Use: The charging station should be designed to be easy to find, access, and use. It should be located in convenient locations and have an intuitive user interface to minimize the time required for charging. A reference website to learn more about convenience and ease of use requirements for charging stations is Electrify America.

5. Scalability and Future-Proofing: The charging station should be designed to be scalable and future-proof. It should be able to accommodate future upgrades and new technologies as they emerge. A reference website to learn more about future-proofing requirements for charging stations is Tesla Superchargers.

Conceptual design for the wireless charging station

A conceptual design for a wireless charging station for electric vehicles could include the following features:

1. A sleek and modern design with clean lines and a minimalist aesthetic. The charging station should blend in well with its surroundings and be visually appealing.
2. A charging pad or platform that is compatible with different types of electric vehicles, including both sedans and SUVs.
3. Multiple charging pads or platforms to accommodate multiple vehicles at the same time, making it more convenient for drivers.
4. The charging station could include a digital display that provides information on the charging status and estimated charging time.
5. The charging station could be designed to be installed in different locations, such as in parking garages, parking lots, and public areas.
6. The charging station could be designed to be weather-resistant and durable, able to withstand different environmental conditions.
7. The charging station could include a security feature, such as a camera or alarm system, to prevent theft or vandalism.
8. The charging station could be designed to be powered by renewable energy sources, such as solar panels or wind turbines, to promote sustainability.
9. The charging station could also include an app or software that allows drivers to locate and reserve charging stations, as well as monitor their charging status remotely.

Construction and Installation of the wireless charging station prototype

constructing and installing a wireless charging station prototype requires careful planning, design, procurement, assembly, testing, and installation. It is essential to ensure that the charging station prototype meets the design requirements and specifications and functions correctly before installation to ensure that it is safe and reliable for use by EV owners.

Constructing and installing a wireless charging station prototype involves several steps, which include:

Design and Engineering: The first step is to design and engineer the charging station prototype. This involves determining the power output, compatibility with various EV models, and other design requirements. It also involves designing the charging pad, receiver coil, power electronics, and communication system.

Procurement of Components: Once the design is complete, the next step is to procure the components required for the charging station prototype. This includes the charging pad, receiver coil, power electronics, communication system, and other necessary components.

Assembly: The next step is to assemble the charging station prototype. This involves connecting the charging pad, receiver coil, power electronics, and communication system. It also involves mounting the charging station on a suitable structure, such as a pole or wall.

Testing: Once the charging station prototype is assembled, the next step is to test it to ensure that it functions correctly. This involves conducting unit testing, integration testing, functional testing, performance testing, safety testing, and user acceptance testing. The testing process helps to identify any issues or defects that need to be addressed.

I**nstallation:** Once the charging station prototype has been tested and validated, the final step is to install it at the desired location. This involves mounting the charging station on a suitable structure and connecting it to a power source. The charging station also needs to be configured for use with different EV models, which may require installing software updates and other modifications.

CHAPTER 5

FUTURE ENHANCEMENT

The world is rapidly going wireless. Within a span of a few decades, phones and internet became wireless, and now charging has become wireless. Even though wireless charging is still pretty much in its early stages, the technology is anticipated to evolve dramatically over the next few years. The technology has now found its way into a wide array of practical applications ranging from smartphones and laptops to wearables, kitchen appliances, and even electric vehicles. There are several wireless charging technologies in use today, all aimed at cutting cables. Automotive, healthcare, and manufacturing industries are increasingly embracing the technology as wireless charging promises improved mobility and advances that could enable Internet of Things (IoT) devices to be powered from a distance. The global wireless charging market size is estimated to be worth more than $30 billion by 2026. It offers ultimate convenience to users and ensures safe charging in hazardous environments where an electrical spark could lead to an explosion.

Wireless Electric vehicle charging(WEVC)

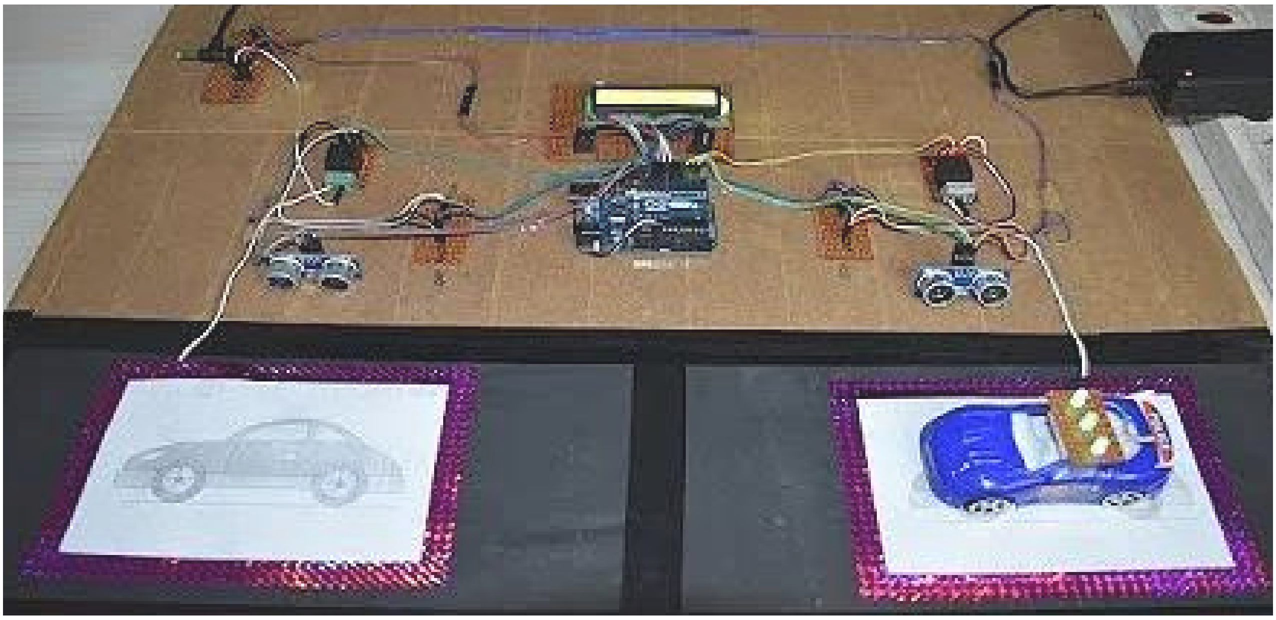
The eventual fate of metropolitan versatility is electric, independent, associated, and remote. With armadas of electric and mixture vehicles raising a ruckus around town in significant towns and urban communities around the world, the business is dealing with the following huge thing in electric portability — remote electric vehicle charging. The advancement of remote charging frameworks for vehicles has gathered critical energy as of late. Coordinating the tech into electric vehicles and key establishment of charging cushions around urban areas too as at proprietor's homes could take out the need to connect vehicles for charging somewhat.

In January this year, the U.K. Transport Secretary declared plans to put £3.4 million in preliminaries for remote charging of electric cabs in Nottingham. Following this declaration, the nation is ready to see an unrest in electric portability. Remote charging of cabs will act as a successful option in contrast to plugs and charging focuses. The innovation might permit different cabs to re-energize all the while, permitting drivers to energize all the more effectively and all the more advantageously. It could likewise limit mess in the city.

With the developing effect of fuel-driven vehicles on the climate, electric taxi armadas in clogged metropolitan roads is basic in cutting vehicle outflows and tidying up the air. With additional individuals selecting electric portability, the new innovation can likewise be carried out comprehensively for public use. This thus would help regular drivers of electric vehicles more charge all the more advantageously in a hurry. Notwithstanding, the time taken to charge remotely could lessen a cabbie's procuring potential, an issue which is known and being worked upon.

Future patterns in remote charging are expected to be based around dynamic electric vehicle charging (DEVC), which permits vehicles to get charged while moving. The innovation could radically further develop the voyaging range for electric vehicles as the EV battery can be charged while driving on streets and expressways. Furthermore, DEVC dispenses with the requirement for enormous energy stockpiling, making vehicles more lightweight and smaller.

Project Image



CHAPTER 6

RESULT AND CONCLUSION

The deployment and use of wireless charging stations for electric vehicles (EVs) has produced positive outcomes and had a number of positive effects. Because there are no physical cables or plugs required, wireless charging is convenient for EV owners who can just park their cars over a charging pad or drive on a route that has been particularly designed for it. High-power wireless charging systems give comparable charging rates to conventional cable chargers, increasing charging efficiency and reducing charging time.

Electric vehicles are expected to enter the world market such that by 2030, 10% of the vehicles will be of EV type. To have a better understanding on EV technology, this study outlines the various types of EV, battery chargers and charging stations. A comprehensive review has also been made on the standards currently adopted for charging EV worldwide. For better understanding on the state of the art EV technology, a comparison is made on the commercial and prototype electric vehicles in terms of electric range, battery size, charger power and charging time.

CHAPTER 7

CODES

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 // Arduino Ultrasoninc Sensor HC-SR04
// Re-writed by Arbi Abdul Jabbaar
// Using Arduino IDE 1.8.7
// Using HC-SR04 Module
// Tested on 17 September 2019

// ------------------------------------------------------------------ //

#define echoPin 2 // attach pin D2 Arduino to pin Echo of HC-SR04
#define trigPin 3 //attach pin D3 Arduino to pin Trig of HC-SR04
#define SENSOR1 4 //attach pin D4 Arduino to pin ref of motor
#define SENSOR2 7 //attach pin D7 Arduino to pin ref of motor

// defines variables

long duration; // variable for the duration of sound wave travel
int distance; // variable for the distance measurement
void setup()

{

 pinMode(trigPin, OUTPUT); // Sets the trigPin as an OUTPUT
 pinMode(echoPin, INPUT); // Sets the echoPin as an INPUT
 pinMode(MOTOR1, OUTPUT);
 pinMode(MOTOR2, OUTPUT);
```

```
Serial.begin(9600); // // Serial Communication is starting with 9600 of
baudrate speed

Serial.println("Ultrasonic Sensor HC-SR04 Test"); // print some text in
Serial Monitor
 Serial.println("with Arduino UNO R3");

}
void loop()
{
 ultra();
 digitalWrite(SENSOR1, LOW);
 digitalWrite(SENSOR2, LOW);
 if(distance >= 30)
 {
 digitalWrite(SENSOR1, HIGH);
 digitalWrite(SENSOR2, HIGH);
 }

 }
void ultra()
{

 // Clears the trigPin condition
 digitalWrite(trigPin, LOW);
 delayMicroseconds(2);
 // Sets the trigPin HIGH (ACTIVE) for 10 microseconds
 digitalWrite(trigPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin, LOW);
 // Reads the echoPin, returns the sound wave travel time in
microseconds
 duration = pulseIn(echoPin, HIGH);
 // Calculating the distance
 distance = duration * 0.034 / 2; // Speed of sound wave divided by 2
(go and back)
 // Displays the distance on the Serial Monitor}
```

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