IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

INDUCTION CHARGING FOR ELECTRICAL VEHICLE'S

1 Lect. NAI VAGESH RAMANBHAI, 2 PATEL BHAVYA H ,3 TIWARI VIVEK S,
4 TAILOR VISHVA D, 5 RANA ARJUN H
1Lecturer, 2 Student, 3 Student, 4 Student,.5 Student.
Department of Mechanical
Bhagwan Mahavir Polytechnic,
Vesu VIP road Surat, Gujrat.

Abstract: **Wireless power transmission (WPT) is popular and gaining technology finding its application in various fields. The power is transferred from a source to an electrical load without the need of interconnections. WPT is useful to power electrical devices where physical wiring is not possible or inconvenient. The technology uses the principle of mutual inductance. One of the future applications finds in automotive sector especially in Electric Vehicles. This paper deals with research and development of wireless charging systems for Electric vehicles using wireless transmission. The main goal is to transmit power using resonance coupling and to build the charging systems. The systems deal with an AC source, transmission coil, reception coil, converter and electric load which are battery.**

Index Terms **– wire less charging, induction charging, wireless charging for electric vehicle**

I. INTRODUCTION

Mankind has been using automotive vehicles for transportation from one place to another. These vehicles use internal combustion (IC) engines to drive it. Due to increased number of vehicles, there is environmental pollution caused by IC engines and reduction in fossil fuels. The latest innovations in the Automotive Industry are helping to improve fuel efficiency and reduce emissions. One such technological advancement is Hybrid vehicles which use both IC engines and electric motors to drive the vehicles or a car in simple words, helping to reduce the number of emissions produced maintaining the performance of the engine. However, in the future, the focus is on clean and green energy producing zero emissions. Design and manufacture of electric vehicles has led to major interest in current industry. Since these vehicles run on battery the main drawbacks are high cost, short distance travel and long charging time. Consumers are constantly looking for a better solution to improve the travel efficiency. Hence wired charging systems were built at every gas station. Wired charging also have some limitations like socket points, spacing occupied by the charging station, limited range of wire, vehicle has to change its orientation to connect to the charger. These can be addressed by wireless charging systems for electric vehicles. This provides flexible and hassle-free charging and also systems can be built at home, parking lot, garage etc. simplified diagram of car and wireless charging system implemented in automotive industry. Many wireless power transfer techniques are used to implement this technology. These methods use coils to transmit power. Coil will produce a short-range magnetic field, when a second coil is placed an electric current will flow through it. The magnetic field has transferred power from one coil to other called Induction. It is necessary to analyse these techniques based on the application to obtain optimum results for the system to function correctly. different techniques with its advantages and disadvantages.

II. CONCEPT OF PROJECT

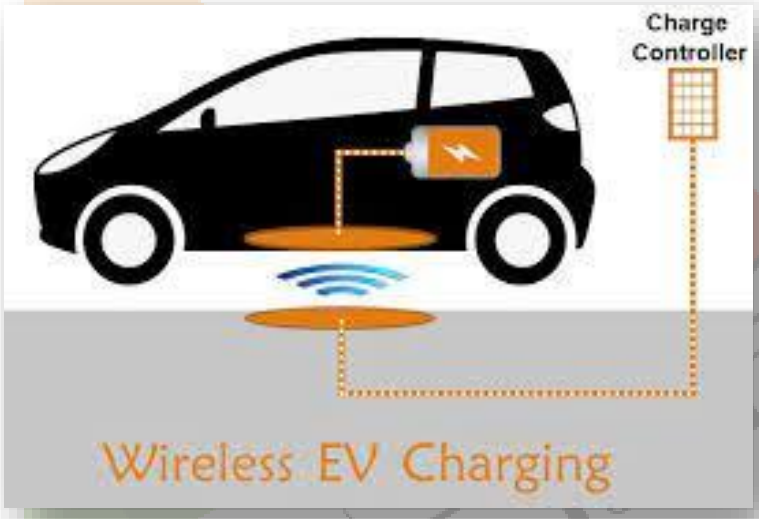
There is a great deal of innovation especially in the idea of making the charging process for electric cars more efficient, more reliable and, above all, faster. While drivers of classic electric vehicles have to drive to an E-charging station, unpack the charger cable, connect the plug, remove it again and pack the charger cable away, with inductive charging the car is simply parked over or against a charging plate. Magnetic field between the coils "The actual charging takes place as a contactless energy transfer in the alternating electromagnetic field between the plate and car", explains Herbert Zimmermann, head of electro-mobility at the ZVEI. The design and method of operation of the energy transfer correspond approximately to the method of operation of a transformer with mechanically separated coils. With inductive charging technology, an alternating current is applied to the primary coil. This in turn generates a magnetic field, which also induces an alternating current in the secondary coil used in the electric car that can be used to charge the car battery after rectification.

FIVE REASONS FOR SELECTING PROJECT

- More convenient to use
- The interface durability is better
- Fewer chances of damaging the wires
- Newer trends in wireless charging technology are making available more efficient and compact charging systems.
-

III. Literature Review

Inductive charging, or wireless charging, is when the induction technology is used to charge devices. When it comes to inductive charging of an electric vehicle, basically, one component will be placed separated from the car and one attached to the car. The component that will be separated from the car could for instance be placed on the ground, or where it best will connect to the other component wirelessly. However, the development of the inductive charging system indicates a trend of placing it somewhere below the vehicle. This component is the transmitting component which is also known as the ground assembly (GA). The component attached to the vehicle is the receiving device which is known as the vehicle assembly (VA). The GA is connected to a power source which provides alternating current (AC). This is in some cases called the wall box, which is a power supply box installed on the wall in, for instance, the garage. The GA consists of a coil, and when current is flowing through the coil, a magnetic field is generated. Due to an alternating current, the magnetic field will fluctuate, meaning it changes. When the VA is placed at a sufficient near distance from the GA, the magnetic field will induce current in the receiving coil. This current will then charge the battery which is powering the vehicle. However, the battery is driven on direct current (DC). Therefore, an inverter that transforms AC to DC is needed. Fossil fuels are finite resource and india has plans to make a major shift to electric vehicles by 2030. Development of electric mobility and sustainable energy will result in new technologies that require electric vehicles that are low cost and fully autonomous. These attributes can be realized through wireless charging.



An electric car is an automobile that uses an electric motor as its primary source of propulsion. Electric vehicles (evs) use electrical energy which is stored in rechargeable batteries. Plug-in based electric vehicles are suffering due to two major obstacles-cost and range. In order to increase range, evs are required to charge either quite frequently or to install a larger battery pack which results additional problems such cost and weight. In addition, it is not economical to charge a vehicle frequently. The existing gasoline and petrol engine technology vehicles are responsible for air, noise pollution as well as for greenhouse gases. Hence a wireless charging system for electric vehicles by inductive coupling method is proposed which can reduce the problems associated with range and cost of evs. It is the only solution for future automation EV.The eco-friendly vehicle is the global trend in the automobile industry. The electrical vehicle (EV) is the most suitable alternative of petroleum vehicles. The large capacity, weight, expensive price, short life time, and charging time of battery obstruct the commercialization of EV. To solve these problems, wireless charging of electric vehicle is introduced. Wireless charging systems can be employed in high power applications consisting of electric vehicles as well as plug in electric vehicles in stationary conditions. Wireless charging system has more simplicity, reliability and user friendliness, when compared with plug in charging systems.

PROBLEM STATEMENT

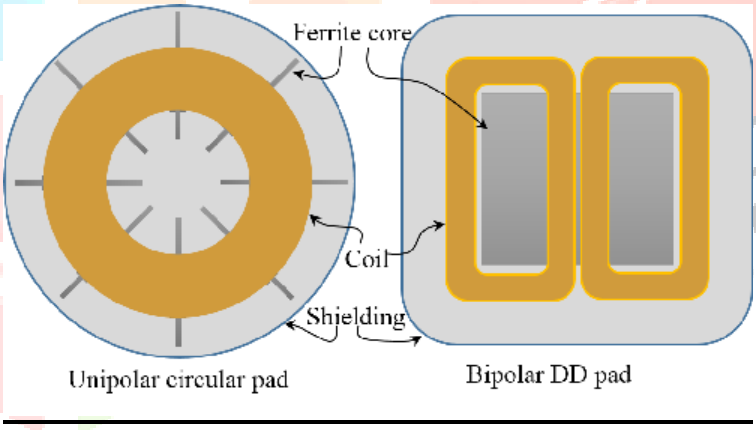
- Standardization of charging system
- The difficulty of installation of a wireless charging system
- The vehicle has to park on the exact location where charger coils installed to charge the batter .

IV. **IMPLIMENTATION**

- Basic component of Induction charging for EV's is given below.

1) The Coil: It works like this: A magnetic loop antenna (copper coil) is used to create an oscillating magnetic field, which can create a current in one or more receiver antennas. If the appropriate capacitance is added so that the loops resonate at the same frequency, the amount of induced current in the receivers increases.

2) The Core: In ferrite-based WPT systems, the ferrite plate suppresses the interference between the antenna pad and the metal housing. In this way, the flow of magnetic flux is retained between the transmitter and receiver antennas to enhance the charging efficiency.



3) The Sensor:

A sensor is a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomena

V. AUTOCAD DRAWING

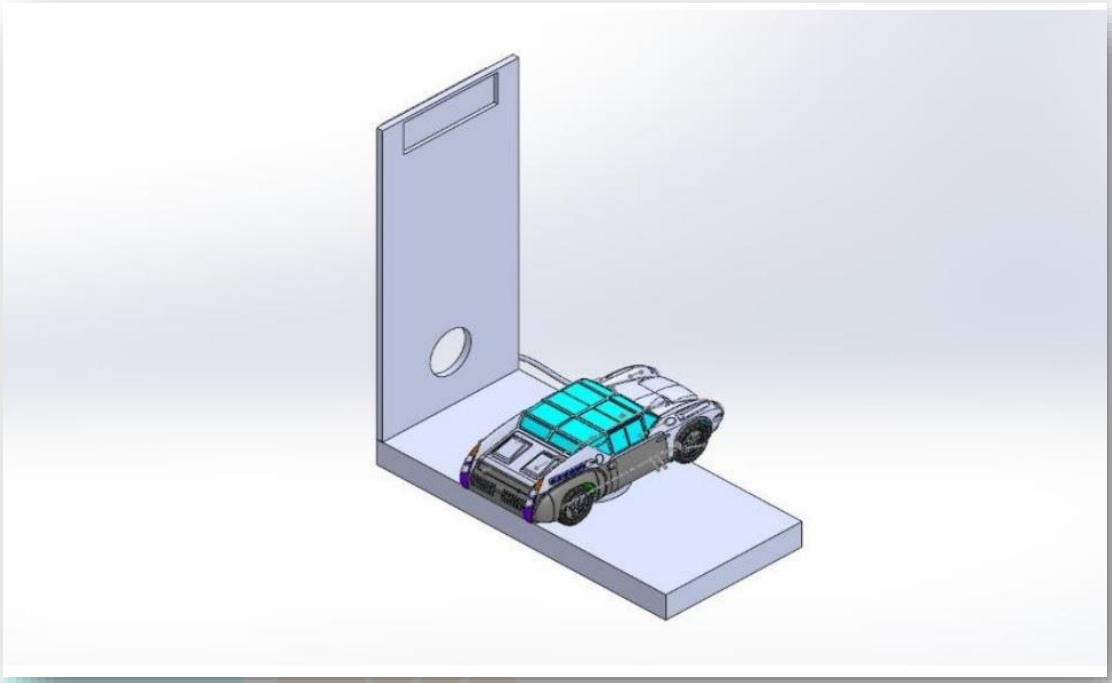


Fig:- assembly drawing

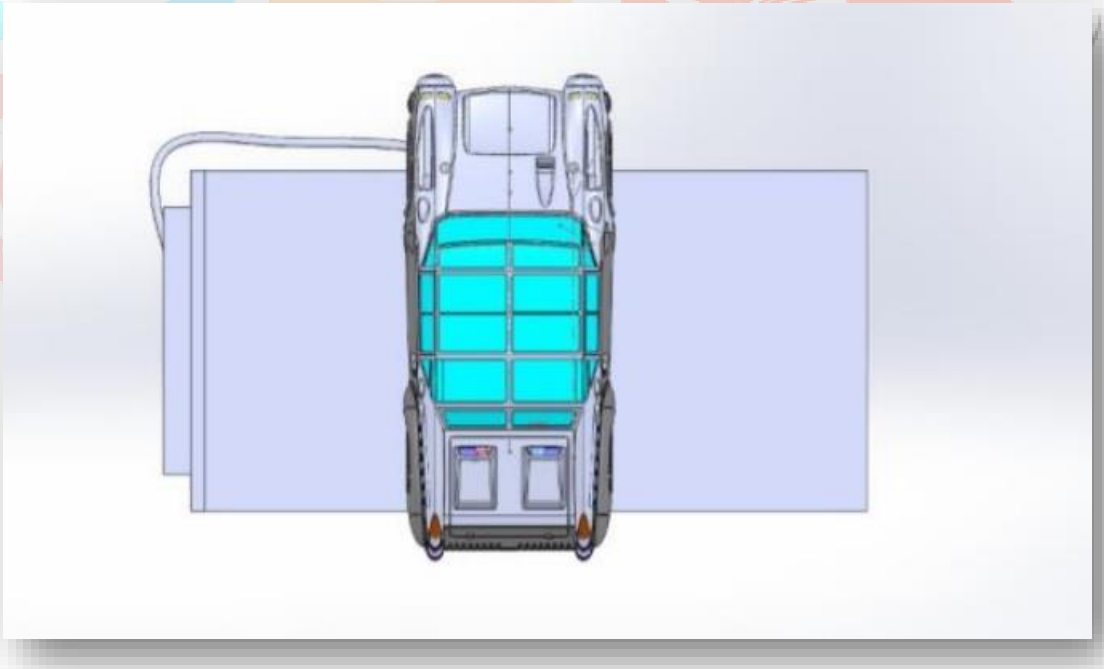


Fig:- assembly drawing (top view)

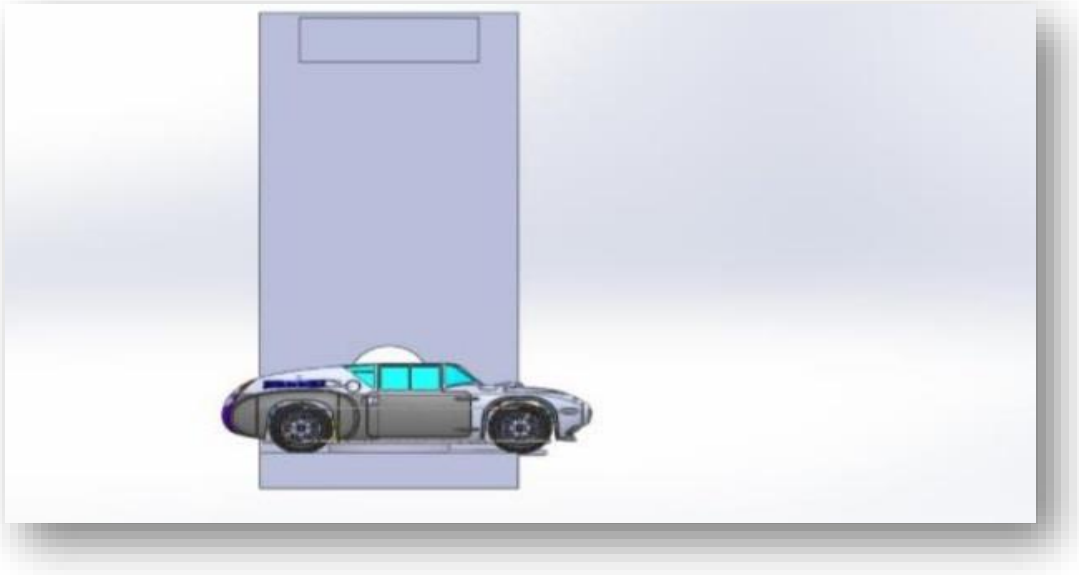


Fig:- assembly drawing (front view)

VI. WORKING :-

Magnetic induction charging uses the energy exchange between two pads, one located on the ground and one underneath the vehicle. The charging pad (on the ground) is approximately 1 m2, while the receiving pad (on the car) is enclosed in a small device. In addition to the pad optionally mounted on the vehicle, the infrastructure consists of an induction charging station. A receiver (receiving coil) is placed on the bottom of the vehicle, while several coils acting as transmitters are embedded in the road surface. The latter is supplied with electrical energy. This works as follows: The coils in the pavement produce a magnetic field by means of current. The magnetic field ensures that the coil on the vehicle receives this and can transform it back into electrical energy. This produced energy is used to charge the battery that runs the motor. Moreover, the high voltage and high power necessary for EV charging bring additional challenges regarding the safety and the cost of wireless charging systems. "Wireless charging also requires an additional charger to be integrated into the vehicle, which increases the vehicle cost," said Rosina. "The installation of EV wireless chargers in public places is also associated with many challenges. The upgrade of a wireless charger by a newer generation is more complex than in the case of a wired charger. Autonomous charging is often presented as a kind of convenient or even automated charging. Indeed, autonomous vehicles would optimally use a kind of automated charging, and wireless charging seems to be a promising option here. But several companies have also developed automated solutions, such as battery swap, robotic arm charging, or automated movable charging systems. Such solutions will compete with wireless charging once the demand for automated solutions becomes pressing."

VII. RESULTS AND DISCUSSION: -

To improve the efficiency of the wireless charging system, we need to increase the frequency in the transmitter part, but there is a maximum limit for this phase. For this reason and based on [25,26], these simulation results show us the maximum allowable limit of the frequency. These were used to begin the simulation stage. The transmitter power is 10 kW for 500 V as an alternative input signal. The transmitter and receiver parameters are given in Table 1. The marge of switching frequencies started by 10 kHz, 30 kHz,50 kHz, and 65 kHz for the first, second, third, and fourth cases. We simulated this system for 3 susing the Simulink platform. For the control in the wireless charge system, we previously carried out some research about this subject and found that generally, the control will only be on the transmitter part. The receiver must always have the maximum flux possible and its control is related to the battery state of charge. For the transmitter part, the control has two sides. Firstly, this element will be controlled according to the reactive power value if it is acceptable or not by the grid to assure the overall grid stability. From the other side, the control of the transmitter can be made by controlling the final inverter frequency if it is on the allowed region or not. Because there is a specific region of frequency pulsation that must be guaranteed to optimize the transmitter function block.

FUTURE SCOPE

- It will be more convenient
- Beneficial in a first growing market of EV's
- It will develop a new market for business
- The days of charging your electrical gadgets through cables and cords are passé. It's been more than a century that the wireless charging technology has become popular. The magnetic resonant coupling, invented by Tesla, permits the energy to be sent over the air via two circuits-a transmitter and a receiver. This technique was not used in the real world for about hundred years. However, there are numerous wireless charging methods available today that reduce the need for cords on everything from mobile phones to wearable smart gadgets, laptops, household appliances, and automobiles ➢ According to Allied Market Research, the worldwide wireless charging market was valued at $6.51 billion in 2018, and is expected to reach $40.24 billion by 2027, growing at a CAGR of 22.2 per cent between 2020 and 2027

VIII. ACKNOWLEDGMENT

We would like to take this opportunity and express our gratitude and thanks to all the supporters, who helped and guided us during the completion of our project work. We also thankful to Lect. NITESH PATEL H.O.D. of Mechanical department, for his support and give us such good platform for our project required for 6th semester completion in Mechanical engineering. We would also like to express our sincere thanks to our guide Lect. VAGESH NAI for exposing us to such kind of field experience and supporting and guiding us during the project work... We also thank our Principal Dr HITESH JOSHI without whose guideline and motivation we would have not completed our project. We also thankful those people who give their precious time for filling the questionnaire. And at last, we would like to thank all who have directly or indirectly help us to develop our project

IX. REFERENCES

- https://www.powerelectronicsnews.com/wireless-charging-technology-for-evs/
- https://www.zvei.org/en/subjects/mobility/contactless-to-the-socket-inductivecharging-of-electric-cars
- https://www.zvei.org/en/subjects/mobility/contactless-to-the-socket-inductivecharging-of-electric-cars