



Industrial Consultancy & Sponsored Research (IC&SR)

A Sensing System for Aiding Vehicle Alignment for Power Charging and A Method thereof

IITM Technology Available for Licensing

PROBLEM STATEMENT

- ❑ The **Automobile Industry** is transitioning to **Electric Vehicles (EVs)** to reduce fuel consumption, but **charging should be facilitated for uninterrupted operation**, despite the smooth operation of these vehicles.
- ❑ **Charging points** are now installed in **parking areas to ensure smoother, longer-lasting electric vehicle (EV) charging.**
- ❑ An **Inductive Power Transfer System** is one option, but for **optimal efficiency, the primary coil should align with the secondary coil** attached to the vehicle pad.
- ❑ EV alignment schemes **use radio or magnetic positioning**, but **radio-based methods increase system complexity.**
- ❑ **Magnetic positioning-based** schemes are **less complex**, requiring lower power level excitement.
- ❑ There is a **need** for the sensing system for aiding vehicle alignment.

TECHNOLOGY CATEGORY MARKET

Technology: Vehicle Alignment during power charging

Category: Assistive, Test Equipment & Design Manufacturing

Industry: Automotive/Transportation

Application: Electric Vehicle

Market: The global market size was reached **USD 255.54 billion in 2023** and is projected to hit around **USD 2,108.80 billion by 2033** with a notable **CAGR of 23.42% from 2024 to 2033.**

INTELLECTUAL PROPERTY

IITM IDF Ref. 1710

Patent No: IN 508487

TRL (Technology Readiness Level)

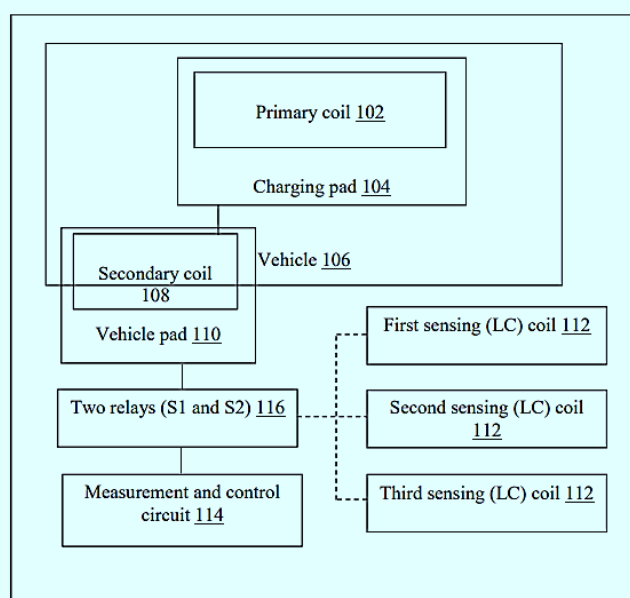
TRL-3, Experimental proof of concept;

Research Lab

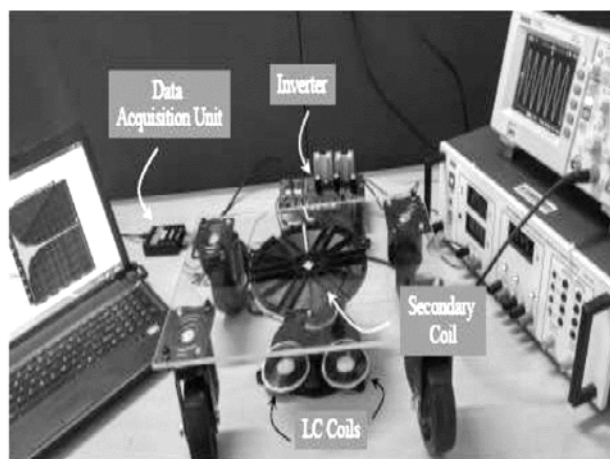
Prof. Boby George,
Dept. of Electrical Engineering.

TECHNOLOGY

Configuration



Experimental Setup



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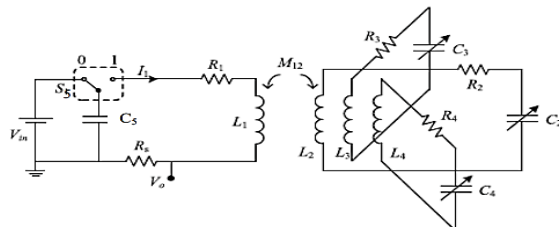
Method

Primary coil is configured in a charging pad of the vehicle, for enabling charging of the vehicle 202

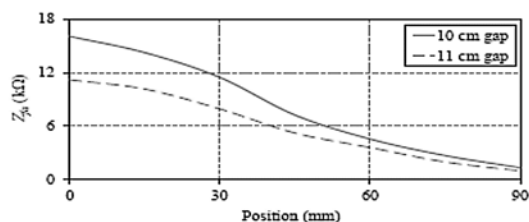
Secondary coil is configured in a vehicle pad placed at a predefined position in the vehicle and is magnetically coupled to the primary coil 204

Plurality of sensing coils forming a circuit are configured and circuit is formed according to an arrangement of each sensing coil of the plurality of the sensing coils around the primary coil in a predefined position 206

Measurement and control circuit connected to each of the secondary coil and the at least three sensing coils detects a position of the charging pad with respect to the vehicle pad according to one or more parameters determined between the secondary coil and the plurality of sensing coils 208

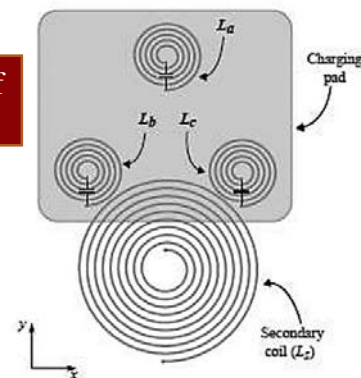


The diagram shown above illustrates a readout circuit for LC tank circuit formed by plurality of sensing coils in the sensing system



The above graph shows plot value of Z_{fa} vs position of the LC coil along the y-axis

Arrangement of Coils



Key Features / Value Proposition

❖ Techniques

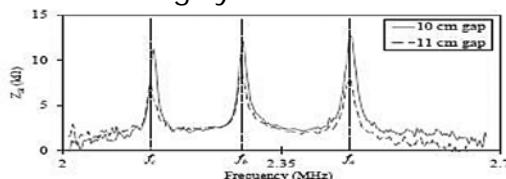
- ✓ Measurement and control circuit connected to secondary coil and three sensing coils via at least two relays.
- ✓ Uses Single Pole Double Throw (SPDT) relays.
- ✓ Relays change position to predefined position.

❖ Effect of Vertical Gap during alignment

- ✓ Unaffected by vertical gap changes between charging pad and vehicle pad.

❖ Performance & Cost

- ✓ Performance unaffected by metallic vehicle parts.
- ✓ Low-cost, dust-resistant sensing system.



The above graph shows a plot value of Z_{iK} obtained from the experimental setup when primary and secondary coil are completely aligned

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