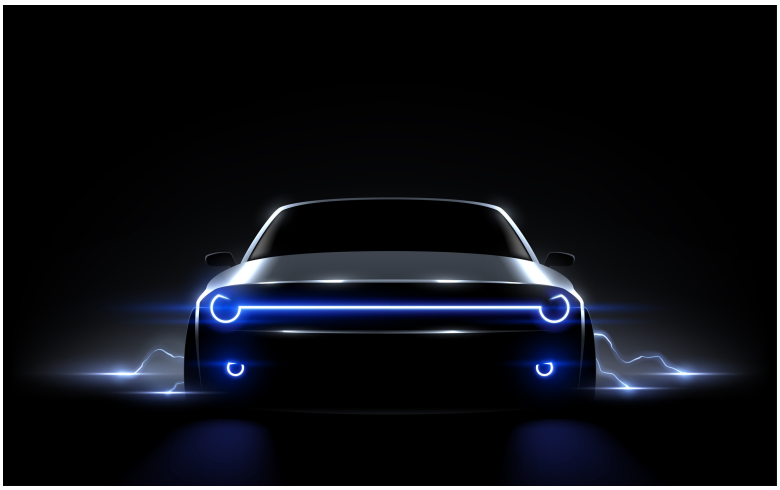
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Method for Fair and Accurate Metering for Wireless Power Transfer

TECHNOLOGY NUMBER: 7514



OVERVIEW

Equitable and accurate metering for wireless electric vehicle charging

- Accurate measurement of real transfer power, reducing consumer overcharges
- Electric vehicle charging, wireless power transfer systems, consumer billing systems

BACKGROUND

In the realm of wireless power transfer, measuring the exact energy transfer between provider and consumer remains a challenge. Historically, electric vehicle (EV) charging relied on plug-in methods, permitting the use of utility-type meters to precisely assess energy consumption directly at electrical terminal outlets. However, the rise of wireless power transfer (WPT) technologies has made this task significantly more complex. Traditionally, power is measured at either the transmitter (Tx) or receiver (Rx) side, aggregating all losses like coil inefficiencies and power electronic discrepancies without specifying each party's contribution. This results in inequitable billing practices, where customers may be overcharged due to transmitter side losses, or providers might suffer financial losses if receiver inefficiencies are overlooked. The need for a non-contact, unbiased method to ensure fair billing and improve transparency between parties involved in wireless EV charging is evident.

Technology ID

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Category

Hardware

Engineering & Physical Sciences

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INNOVATION

Researchers at the University of Michigan have developed Transfer-Power Measurement (TPM), a breakthrough approach for non-contact power metering that focuses on accurately gauging the real power transferred in wireless EV charging. TPM utilizes sensing elements to capture the magnetic field through induced voltages, a process inspired by the Poynting vector concept, allowing the measurement of energy without interfering with the power transfer itself. This method ensures fairness by separately delineating the efficiencies of the transmitter and receiver, leading to equitable billing. The process also has potential applications in broader wireless power transfer contexts, such as calibrating EV charging stations globally to standardize and ensure accuracy. In addition, TPM can become a critical component in developing consumer trust in WPT systems and might be applied to manage power in various wireless energy domains.

ADDTIONAL INFORMATION

REFERENCES

S. Y. Chu and A. -T. Avestruz, "Transfer-power measurement: A non-contact method for fair and accurate metering of wireless power transfer in electric vehicles," 2017 IEEE 18th Workshop on Control and Modeling for Power Electronics (COMPEL), Stanford, CA, USA, 2017, pp. 1-8, doi: 10.1109/COMPEL.2017.8013344

INTELLECTUAL PROPERTY

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