

USU Technology Highlight:

# WIRELESS INDUCTIVE POWER TRANSFER APPARATUS WITH ACTIVE FIELD CANCELLATION USING MULTIPLE MAGNETIC FLUX SINKS

*The technology is a wireless inductive power transfer pad for charging electric vehicles. The pad includes a central coil for power transfer and auxiliary coils used to reduce leakage magnetic fields.*

## PROBLEM

One important consideration for high-power inductive power transfer is the leakage magnetic field; typically, a portion of the magnetic field(s) generated by the two-coil system is unusable for power transfer. The unusable magnetic fields are called leakage magnetic fields. Higher power transfer typically results in increased leakage magnetic fields. However, leakage magnetic fields reduce efficiency, and must be below a value set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

## SOLUTION

The technology limits the leakage magnetic fields generated by the primary inductor through use of a wireless charging pad in which the primary coil is surrounded by smaller auxiliary coils which act as magnetic flux sinks. Currents in the auxiliary coils flow in the opposite direction as current in the primary coil and thus cancel out a significant portion of the leakage magnetic field. The auxiliary coils are driven with a controlled alternating current source. They can be driven independently and adjusted to account for misalignment between the primary and secondary coils.

## BENEFITS

The technology effectively reduces the unusable and potentially hazardous leakage magnetic fields from primary inductors, increasing the rate of power transfer from pad to vehicle without violating ICNIRP radiation regulations. Moreover, the auxiliary flux sinks of this design can be operated to minimize the leakage magnetic field and maximize efficiency even if the primary and secondary coils are misaligned.

## APPLICATIONS

Charging pads of this design could be used for fast charging of fleet vehicles, such as those used by UPS, Amazon, and Walmart, to cut emissions and expedite shipping operations. When applied to in-road charging pads, this invention could be used at taxi stands and along city bus routes to reduce carbon emissions of public transportation and eliminate time wasted by plug-in charging. If applied to in-road dynamic charging, this technology could enable faster and more efficient charging of cars in motion, especially when cars are not perfectly aligned with the in-road chargers.

## CONTACT

Questions about this technology including licensing availability can be directed to:

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## DEVELOPMENT STAGE

TRL 2

## PATENT STATUS

Patent applied for.

## WEBSITE

<https://engineering.usu.edu/ece/power/>

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