A Highly-Efficient Near-Field Wireless Power Transfer System That Is Immune To Distance And/Or Coupling-Coefficient Variations

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SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed a novel design for a ***wireless power transfer system.*** This new design is optimized to function stably over a *greater* and *variable distance* than current systems and to function with a higher efficiency.

INNOVATION

In contrast to current systems of wireless power transfer, this technology provides stable power delivery over a varying distance up to 2.5 cm. By using a self-tuning oscillator as the driver, the transmitter tunes its frequency in concert with the receiver and maintains stable energy transfer, with fluctuations of only 4%.

This system also corrects for power loss during transfer and is designed to maximize receiver efficiency. Particularly for smaller devices, the heat associated with energy loss in the receiver is undesirable. The technology described here maximizes the receiver efficiency (80-90%) and allows the transmitter to dissipate the (still fairly low) energy loss.

ADVANTAGES

- The proposed system is able to keep power delivery stable over a relatively larger distance than the current technology. Increased distance then reduces the need for specific placement and alignment of the transmitter and receiver, which is particularly a problem with implanted medical devices. No specific design requirements, like magnets or plastic plugs, would be necessary for alignment.

- The technology described here focuses on maximizing the efficiency of the receiver (80-90%), as the transmitter is usually larger and more able to dissipate the heat. This design component is essential to make wireless power transfer feasible for small electronics and implanted medical devices.

STATE OF DEVELOPMENT

A prototype of the proposed design was constructed and tested to determine efficiency rates, measure the range of efficacy, and to monitor the stability of power delivery. In all measurements taken, the prototype performs as designed.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,547,200	01/28/2020	2016-390

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OTHER INFORMATION

KEYWORDS

Near-field, wireless power transfer, wireless charging, inductive charging, wireless energy transfer, plugless power, consumer electronics, electric vehicles, high-efficiency energy transfer, mobile

CATEGORIZED AS

- **Energy**
  - Other
  - Storage/Battery
  - Transmission
- **Engineering**
  - Engineering
- **Medical**
  - Devices

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