

## Hyper Resonance Wireless Power Transmission (#6291)

### *Magnetic hyper-resonant coupling among multiple inductive-capacitive resonators*

Inventors at Georgia Tech have enhanced the inductive power and data transmission using magnetic hyper-resonant coupling among multiple inductive-capacitive resonators. This technology can provide high power transfer efficiency (PTE) and increase the signal to noise and interference ratio (SNIR) of the wireless transponders. This enables lower power consumption, higher power conversion efficiency, and extended reading range for radio frequency identification devices (RFID). Unlike conventional wireless power/data transmission technologies that use identical resonant frequencies for the transmit and receive coils, the hyper resonance technology uses multiple resonators that are adjusted to frequencies higher than the power/data carrier frequency. The additional resonators increase the effective inductance and permeability of the transmitter, which is similar to the characteristics demonstrated by magnetic metamaterials with positive-permeability. This phenomenon amplifies the magnetic resonance of the transmitter and consequently the overall power transfer efficiency (PTE) of the wireless power transmission link.

### **Benefits/Advantages**

- Increases power transfer efficiency for wireless devices
- Reduces power consumption
- Improves signal-to-noise ratio

### **Potential Commercial Applications**

- Wide applications in with implantable microelectronic devices (IMD) — retinal and cochlear implants, brain computer interfaces (BCI), wirelessly powered or rechargeable mobile devices, contactless smartcards, wireless microelectromechanical systems (MEMS) and electric vehicles.
- Can be used in a wide range of implantable medical devices, radio frequency identification devices, contactless smart cards, wireless microelectronic mechanical devices and wireless electric chargers.

### **Background/Context for This Invention**

Inductive power transmission links that utilize a pair of mutually coupled coils have been used for decades to power up radio frequency identification (RFID) transponders and cochlear implants with power consumption in the range of sub-microwatts ( $\mu$ W) to milliwatts (mW). The use of this technique to transfer energy wirelessly across a short distance is expected to grow in the near future in a much broader range of

applications, which may have higher levels of power consumption on the order of hundreds of milliwatts (mW) to kilowatts (kW).

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**More Information**

**Publications**

**For more information about this technology, please visit:**

<https://licensing.research.gatech.edu/technology/hyper-resonance-wireless-power-transmission>

Images: