



# Multi-Resonant Systems for Wireless Inductive Power Transfer

*Technology #13158*

*NCSU is seeking an industry partner to commercialize a novel technology of Wireless Power Transfer*

## **Abstract**

Wireless power transfer (WPT) based on magnetic coupling is becoming a widely accepted method of transferring power over small to medium distances. Selection of an optimal signal frequency is an important aspect of system design that affects system performance. It would appear that high frequency operation would lead to increased power transfer, due to the higher induced voltage in the receiver, but there are two main problems with this. First, high-frequency high-power converters are limited by the semiconductor device performance, in terms of switching speed and efficiency. Second, converters generate substantial unwanted harmonic content that needs to be filtered out, resulting in additional losses or suboptimal utilization of the converter Volt-Amp rating.

Researchers in the Department of Electrical and Computer Engineering have developed a multi-resonant WPT system which solves both of these problems. By redesigning the WPT system to transmit and receive power at multiple frequencies simultaneously, power multiplexing can be incorporated into the system. As a result, low frequency power converters can be used to transmit power at multiple frequencies in the spectrum, while optimally utilizing the available Volt-Amp rating of the inverter.

## **Advantages:**

- Higher power transfer efficiency as a result of spreading the power transfer throughout the spectrum.
- Satisfaction of EMC rules and regulations by reducing the magnitude of the resulting emitted field for a given transferred power.
- High frequency switching devices are not needed, leading to higher operational efficiency.
- This new WPT system could be used for charging electric vehicles and small electronic devices such as smart phones, eReaders and tablet PCs

## **Related Patent Application:**

- Issued PCT patent: WO 2014127036 A1 "Systems and methods for wireless power transfer "



**About the inventors:**

Dr. Srdjan Lukic is a professor of electrical and computer engineering at North Carolina State University. He obtained his doctoral degree at the Illinois Institute of Technology in Chicago. His primary research interests are power electronics and power systems, particularly electric vehicle systems, power management ICs and power semiconductor devices.

Zeliko Pantic is a doctoral candidate in the department of electrical and computer engineering and co-inventor of this technology. Mr. Pantic was a researcher at the University of Belgrade in Serbia before moving to North Carolina. His research interests include designing electromechanical systems, electric vehicle systems, power management integrated circuits and power electronics.

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