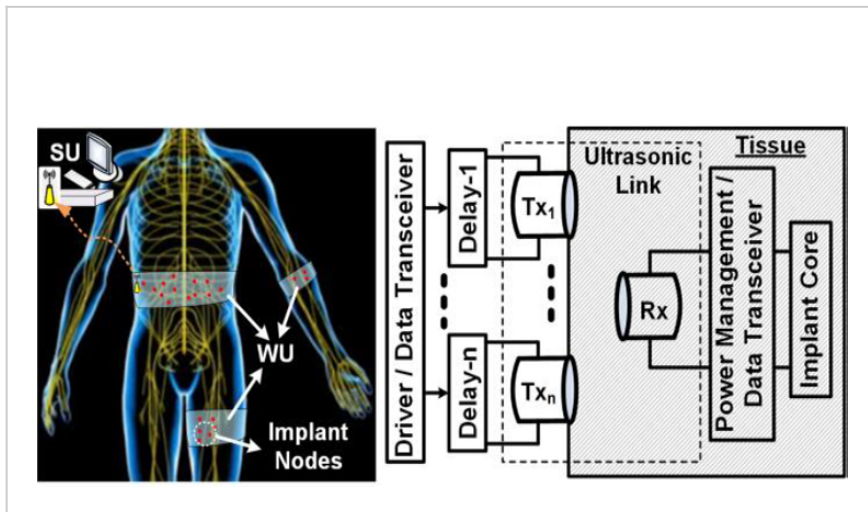


Self-Image-Guided Ultrasonic Wireless Power Transmission

ID# 2018-4836



SIG-US system diagram

Technology Summary

This invention utilizes self-image-guided ultrasonic (SIG-US) wireless power transmission (WPT) to power millimeter-sized biomedical implants distributed inside the body. In SIG-US WPT, a sharp pulse is transmitted periodically by the implant to create short ringing with relatively various delays across an array of external (wearable) ultrasonic transducers. These relative delays are used to drive the external array as in phased-array beamforming, generating a highly focused ultrasound intensity at the implant's location due to the reciprocity. Therefore, regardless of the implant's misalignment, orientation, and medium (i.e., without any prior knowledge), optimal parameters for beamforming is found by the SIG-US technique without the need for a conventional imaging system, suffering from high power consumption, size, cost, and complexity.

Application & Market Utility

Wireless power transmission (WPT) is vital in current implantable medical devices. WPT can eliminate the need for bulky batteries with limited lifetime, and reduce the implant size to even millimeter (mm) scale and below. However, achieving robust, efficient, and safe WPT, particularly to mm-sized implants located deep inside the body is quite challenging. The proposed SIG-US technique can automatically adapt to the varying environment, such as an implant's location and surrounding tissue medium, without having any prior knowledge, leading to robust, highly focused (efficient) beamforming for ultrasonic WPT.

Next Steps

The research team is seeking opportunities for collaboration to further develop this technology.

TECHNOLOGY READINESS LEVEL

4-7

Seeking

Licensing | Research

Keywords

- Image guided
- Wireless power transmission
- Ultrasound
- Beamforming
- Biomedical implants

Researchers

Mehdi Kiani

Professor of Electrical Engineering

[Online Bio](#)

Other Researchers

Originating College

College of Engineering

Office of Technology Management Contact

Joseph Rokita

jjr152@psu.edu

814-863-6336