

Technology: **Wireless Data Communication and Energy Delivery to Medical and Non-Medical Devices**

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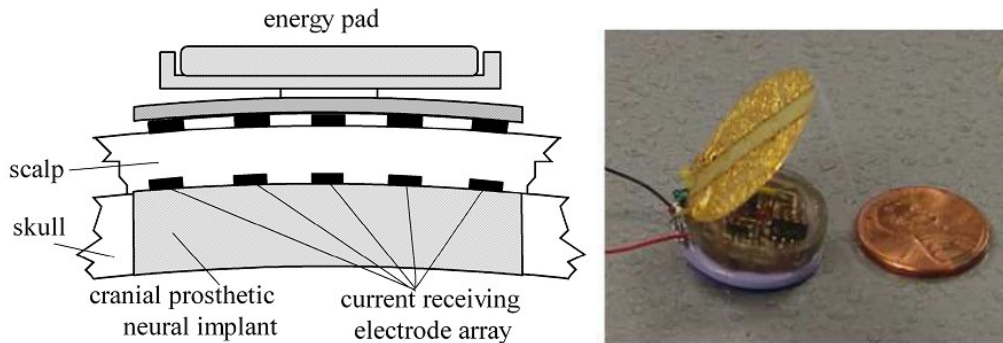
Stage of Research: Phases I & II SBIR; Proof of Concept and Prototypes

Funding Source: US Army SBIR A2-2094, Phase I and II.

IP Protection: Two patents issued; Two patents pending

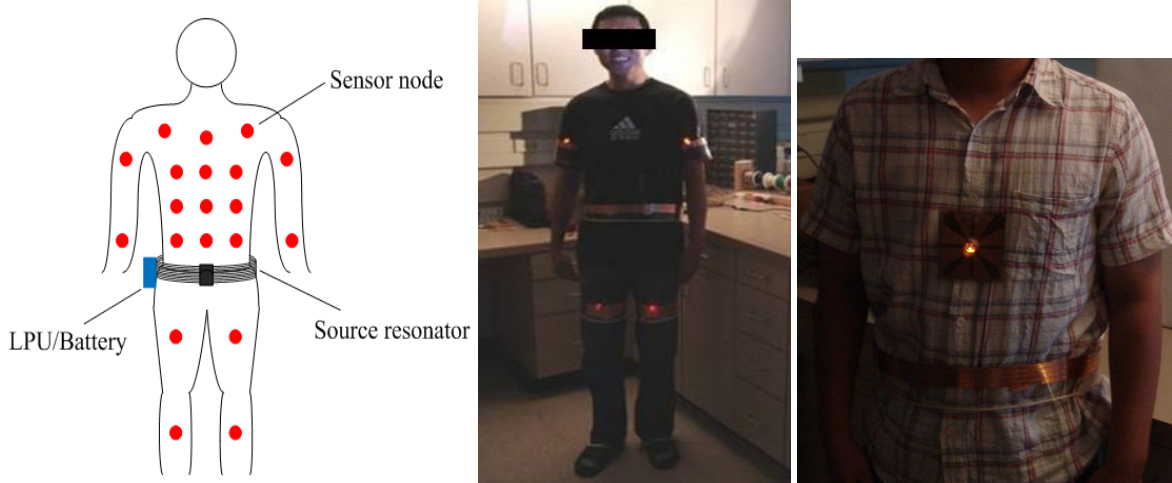
Executive Summary: In spite of the rapid developments of electronic devices to be worn or implanted, providing both wireless information link and electrical power to these devices is an unsolved problem. Currently, the uses of short-range radio coupling (e.g., Bluetooth or ZigBee) and batteries are common approaches. However, these approaches are often unsuitable in many systems because of special constraints. We have conducted research on wireless data communication and power delivery using the volume conduction property of biological tissue. We have also studied magnetic resonance to solve the same problem.

Transcutaneous Data Communication and Energy Delivery by Volume Conduction:



Left: We have designed an implantable system called *energy pad*. An external device adhered to the skin surface provides both information connection and electric power to an implanted device. **Right:** Prototype implantable device with volume conduction electrodes. This device has been evaluated in laboratory pigs for duplex communication and power delivery.

Whole-Body Wireless Power and Information System (Body Sensor Network):



Left: The red dots are wireless sensor/device nodes which do not need batteries. A single battery for the sensors/devices of the entire body is within a local processing unit (LPU) which is connected to a source magnetic resonator. Energy and information are transmitted to sensors/devices by strongly coupled magnetic resonance (a theory recently published on Science); **Middle and Right:** Results of wireless energy transfer indicated by LED lights (input power at the waist belt P 400mW).