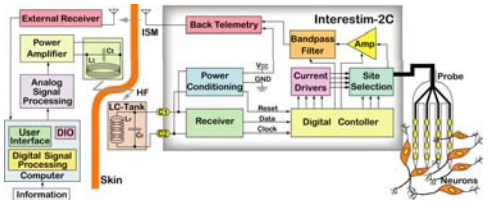
GT-Bionics Laboratory

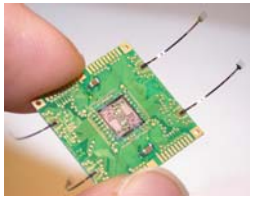
www.gtbionics.org

Developing new technologies to better and more effectively **aid people with disabilities** is one of the major challenges that scientists and engineers aspire to undertake in the 21st century.

Significant advancements in low-power electronic circuits, microfabrication technology, wireless communications, biocompatible materials, and neurosciences have made possible the development of a new generation of **neuroprosthetic devices** that are aimed at **restoring sensory, motor, and cognitive functions** lost through injury or disease.

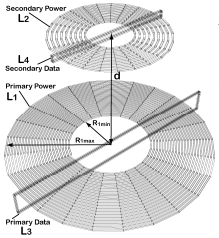
At the Georgia Tech Bionics Laboratory (**GT-Bionics**) our goal is to enhance this technology by developing state-of-the-art **Implantable Microelectronic Devices (IMDs)**. These are some of the current and previous projects at the GT-Bionics Lab:





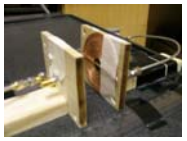
Multichannel Wireless Integrated Microstimulating System

Interestim-2B is a 64-site System-on-a-Chip (SoC) wireless stimulator designed for visual or auditory prostheses. The modular architecture of this system allows addressing up to 2048 sites using 32 identical chips in a 3D structure.



A Multi-Carrier Inductive Link for Efficient Power and Wideband Data Transmission to Implantable Microelectronic Devices

Three carriers at different frequency ranges are dedicated to power, forward data, and back telemetry. The inductive link is designed to maximize the direct coupling between associated coils, while minimizing the cross coupling.



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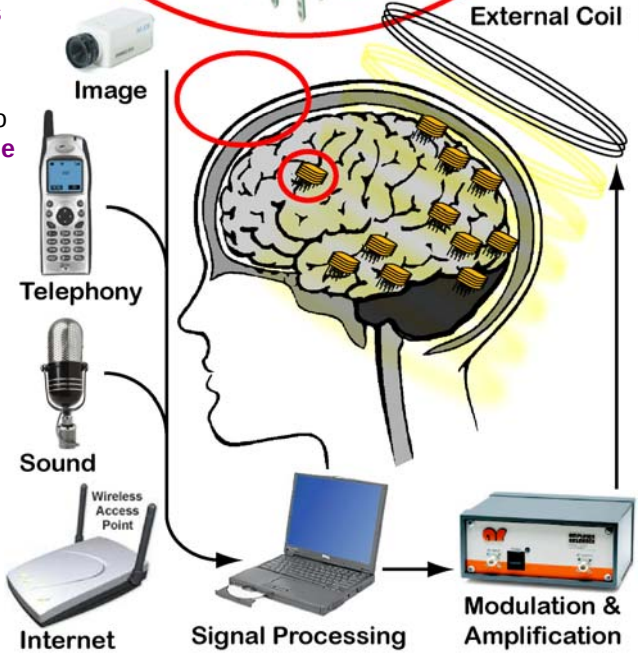
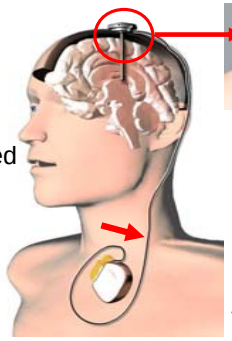
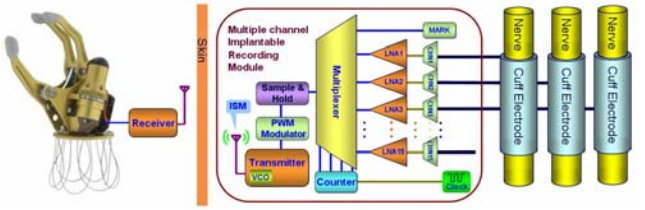




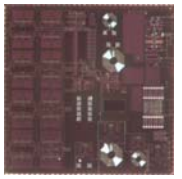
Switched-Capacitor Based Head-Mounted Deep Brain Stimulating (DBS) System

DBS is an effective treatment for Parkinson's disease. Today's DBS devices are implanted in the chest area even though the electrodes are in the head. We are developing a smaller, more efficient DBS system that can be implanted on a burr hole under the scalp, thus eliminating the subcutaneous cable.



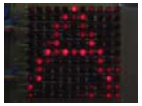
Wireless Implantable Neural Recording System

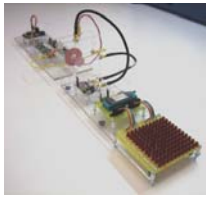
WINeR is a 15-channel SoC neural recording system for Brain-Machine Interfacing (BMI) and control of robotic prosthetic limbs. It also helps neuroscientists to learn how the brain works by wirelessly recording brain signals from freely behaving animals.



Demonstrational Visual Prosthesis System (DVPS)

DVPS is developed to demonstrate the operation of a visual prosthesis system for educational purposes. It is also used for testing prototype devices and image processing algorithms. An array of LEDs that represent stimulating sites are wirelessly driven by Interestim-2B to show a pixelized image acquired by a webcam.





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