FACULTY MENTOR
Vincent Leung

PROJECT TITLE
Wireless Power Transfer for Intra-cortical Miniaturized Distributed Brain Implant ICs
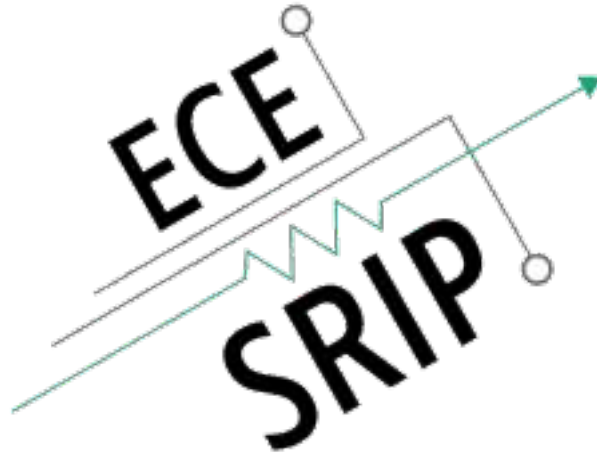
PROJECT DESCRIPTION
We have recently designed and demonstrated CMOS ICs for Brain-Machine Interface applications. On the cortical surface (ECoG), these chips successfully harvest RF energy and perform a variety of neural recording/ stimulation functions. For future intra-cortical (1-4mm deep) applications, the chip size needs to be substantially reduced to minimize tissue displacement. This research aims to derive novel near-field inductive coupling and RF/ analog circuit techniques as implants get deeper and smaller.

INTERNS NEEDED
2 MS

PREREQUISITES
ECE 166, 265A/B is strongly recommended. Working knowledge of Cadence Design Environment required. ECE 222A, knowledge of HFSS is a plus.

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PROJECT TITLE
Design and Test of CMOS ICs for Adaptive, Energy-Optimized Wireless Brain Implant Network
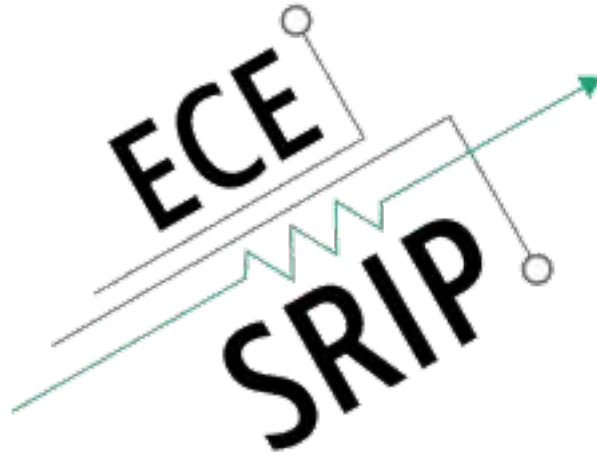
PROJECT DESCRIPTION
This project aims to enable wireless network testing of brain implant ICs. The work involves programming of Software-defined Radio (SDR) and/ or Vector Signal Analyzer (VSA). For next-generation network with up to 10,000 nodes, we will derive a wireless protocol to achieve optimized energy distribution and adaptive communication channel allocation. The techniques are to be designed into future ICs.

INTERNS NEEDED
1 MS and 1 BS

PREREQUISITES
ECE 154, 157 or 166 preferred. Matlab/ LabView highly recommended.

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Vincent Leung

PROJECT TITLE
Circuit Design for Ultra-Low-Power Radio and Ambient RF Energy Harvesting for IoT Applications

PROJECT DESCRIPTION
This project aims to develop critical circuit building blocks for flexible, batteryless IoT (Internet-Of-Things) sensor applications. The CMOS IC design will target the 2.4GHz WiFi standard optimized for low-power, low bit-rate applications.

INTERNS NEEDED
2 MS

PREREQUISITES
ECE 166, 265A/B. Working knowledge of Cadence Design Environment required