

FACULTY MENTOR

Patrick Mercier

PROJECT TITLE

Magnetic Human Body Communication Systems for Next-Generation Wearables

PROJECT DESCRIPTION

Description: The power consumption of Bluetooth Low Energy, despite "Low Energy" being in the title, is still too high for many applications (e.g., Apple airpods only have 5 hours of battery life). Our group has invented a new technique called magnetic human body communication (mHBC) that utilizes the human body as a conduit for magnetic energy. This is up to 1,000,000x more energy-efficient than 2.4GHz wireless links, and thus represents a dramatic shift in how we could potentially design new wearable devices. We are looking for students who can help contribute to laboratory experiments and/or, if the students have more experience, to integrated circuit design or electromagnetic simulations.

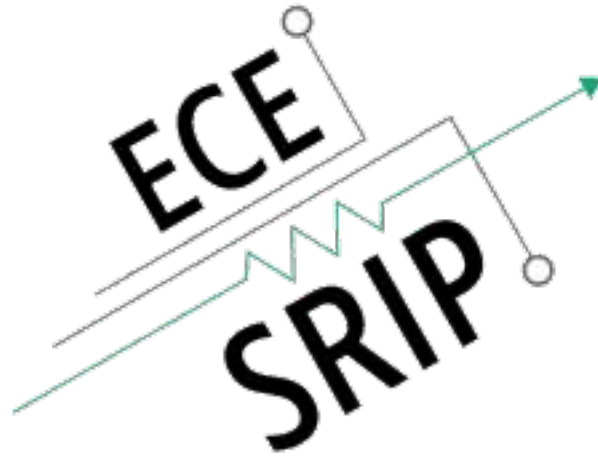
INTERNS NEEDED

2 BS or MS

PREREQUISITES

Required Qualifications:

1. Student must have taken EE 164 for integrated circuits work or ECE 222 for EM work



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PROJECT TITLE

Power management integrated circuits for microrobotics

PROJECT DESCRIPTION

Description: Microrobots are small devices that use actuators to move around in their environment. These actuators typically requires 100s of volts to operate, which must be derived from a Li-ion battery, whose voltage is typically around $\sim 4V$. This is accomplished via a step-up boost converter. However, the size of such a converter using conventional techniques can be rather large. This project will explore new design techniques to miniaturize the size of such converters, thereby helping enable next-generation microrobotic applications.

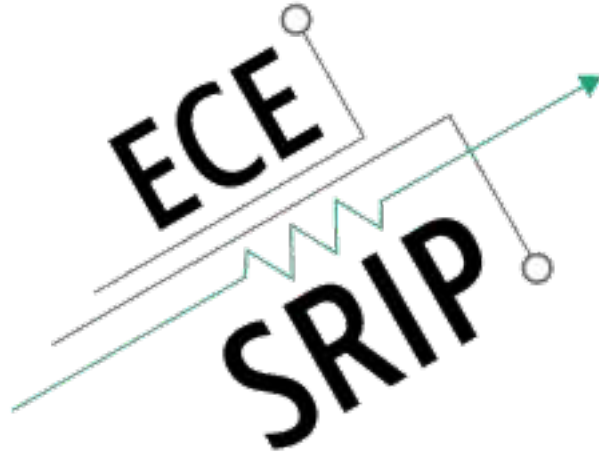
INTERNS NEEDED

1 MS

PREREQUISITES

Required Qualifications:

1. Student must have taken ECE 164 and/or power electronics courses



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PROJECT TITLE

Low-power wireless receivers for IoT applications

PROJECT DESCRIPTION

Description: There are emerging needs to reduce the power consumption of RF integrated circuits to support next-generation internet of things devices. This project will explore various low-power techniques and architectures towards accommodating these needs.

INTERNS NEEDED

1 MS

PREREQUISITES

Required Qualifications:

1. Student must have taken ECE 265