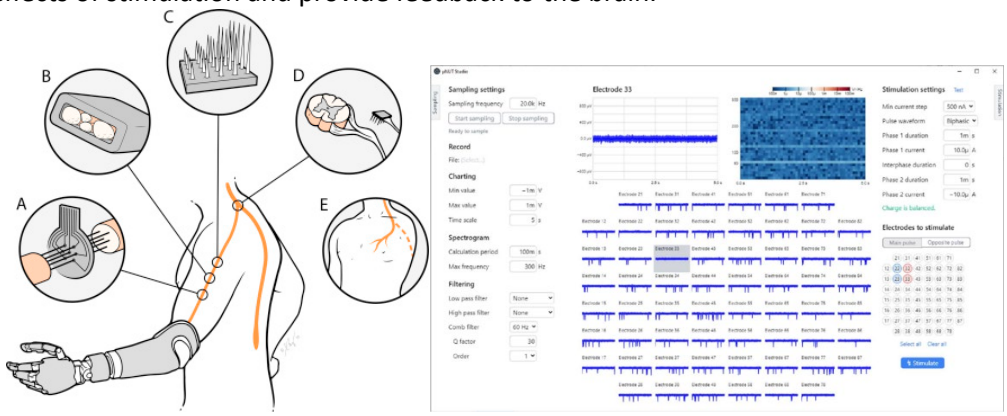
Project Proposed By:	Intelligent Sensory Microsystems Laboratory, Electrical and Computer Engineering, University of Toronto
Supervisor:	Professor Roman Genov
Project Title:	Neural Recording and Stimulating System
Project Description:	Peripheral nerves are the wires that connect the brain and spinal cord to the rest of the body. They carry information about sensations, movements, and functions of various organs and muscles. By recording from and stimulating these nerves, we can monitor and modulate the activity of the body and create artificial sensations. This technique can have various applications in bioelectronic medicine, neural prosthetics, and sensory restoration. One of the most challenging and impactful applications is spinal cord injury. Spinal cord injury is a devastating condition that affects millions of people worldwide. It causes paralysis, loss of sensation, and impaired function of various organs and muscles. Our system aims to explore different paradigms for electrical stimulation of peripheral nerves. By stimulating specific nerve fibers, we can activate the muscles and organs that are controlled by the spinal cord. By recording the neural signals from the peripheral nerves, we can monitor the effects of stimulation and provide feedback to the brain.  Figure: Left: Use case for peripheral nerve interface [1]. Right: GUI to display recorded signals and control stimulation parameters [2] For this project, we are looking for motivated and talented students who have a background in ECE, CompEng, or EngSci and are interested in creating Hardware and/or Software for neuroscience applications. You will have the opportunity to work on one of the following aspects of our existing hardware setup for neural recording and stimulation: • Redesigning the software GUI to display recorded signals and provide interface to control the stimulation parameters. (1 position) • Redesigning and testing the PCB that connects the hardware components of the device to the electrodes, and improving the FPGA implementation (1 position) The Candidate(s) should have the following competencies (min. GPA: 3.5) • **Software Role:** Proficiency with Python Knowledge of TypeScript, Electron app, React and Tailwind CSS • **Hardware Role:** Proficiency with Altium for PCB Knowledge of Verilog and experience with Xilinx FPGA programming • Self-driven attitude, pre-emptive in finding solutions, and interested
Contact Person:	Kindly reach out to Mustafa Kanchwala at (mustafaa.kanchwala@mail.utoronto.ca) and copy to Prof. Roman Genov (roman@eecg.utoronto.ca). Please include your cover letter, resume and transcript (unofficial is ok)

[1] Hannes P. et al., Biomimetic approaches to bionic touch through a peripheral nerve interface (2015) [2] O'Leary, G. et. al., OpenMEA: Open-Source Microelectrode Array Platform for Bioelectronic Interfacing. (2022).