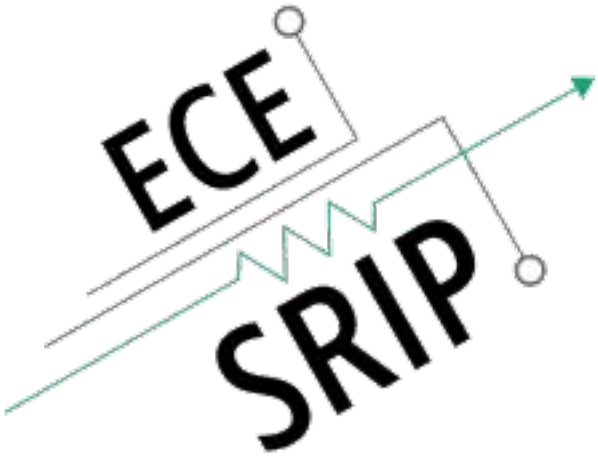



## FACULTY MENTOR
Vikash Gilja

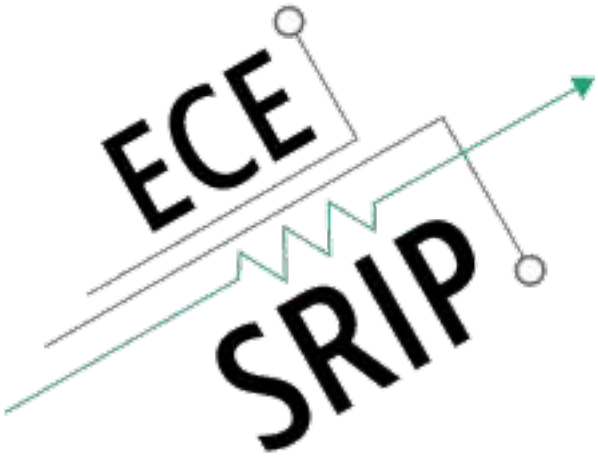
## PROJECT TITLE
Robust neural prostheses using non-volitional activity

## PROJECT DESCRIPTION
Description: Current high-performance prostheses map signals recorded from intracranial electrodes to volitional movement intentions such as limb articulation or computer cursor movement. These systems work well under specific control contexts, but do not generalize well to complex interactions with the physical world. Leveraging neural data collected from intracranial depth electrodes implanted for clinical monitoring, this project will explore approaches for decoding non-volitional neural correlates to advance the development of high-performance prostheses that are capable of complex behavior in unconstrained environments.

## INTERNS NEEDED
2 BS

## PREREQUISITES
Required Qualifications:

1. Experience programming in Python or C++
2. Experience with signal processing and machine learning



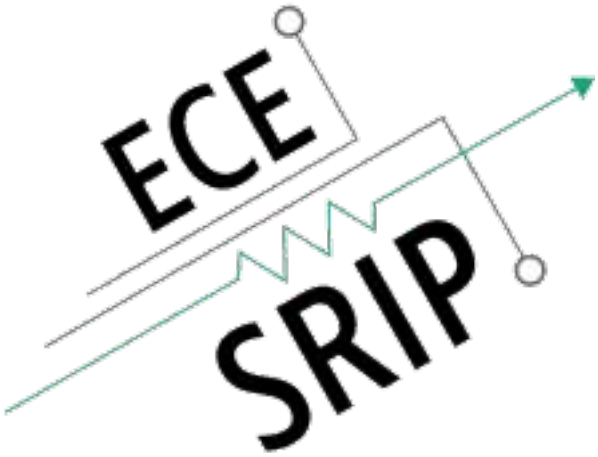

## FACULTY MENTOR
Vikash Gilija

## PROJECT TITLE
Integration of depth sensing to track hand movements for neural prosthesis experiments

## PROJECT DESCRIPTION
Description: Accurate tracking of motor movement along with neural activity from motor areas of the brain enables the development of neural prostheses. Increased tracking accuracy facilitates learning how motor cortex neural signals associate with those movements. Our current motor task records finger movement based on position as reported by a touchpad while collecting data from micro-scale electrodes placed on the surface of the brain. Our goal is to enhance tracking accuracy by utilizing an existing packaged stereo infrared camera for hand tracking (Leap Motion device). System designs will be integrated into our experimental platform for deployment in a clinical setting for data collection.

## INTERNS NEEDED
2 BS or 1 MS

## PREREQUISITES
Required Qualifications:
1. Experience programming with Python
2. Experience programming in C/C++
3. Previously worked with image data



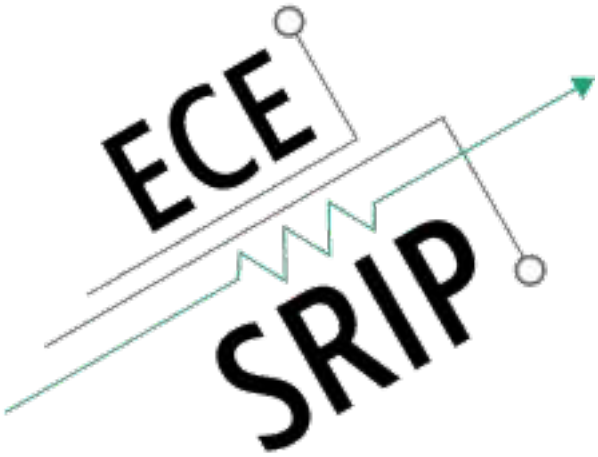

## FACULTY MENTOR
Vikash Gilija

## PROJECT TITLE
Automation of Language Processing and Audio Classification

## PROJECT DESCRIPTION
Description: In the development of a real-time speech prosthesis, one of the main challenges involves discerning periods of vocal production intended for communication from other forms of vocalization (intense breathing, sneezing etc). Towards the development of a speech prosthesis, we work with singing birds with the aim of being able to robustly decode their song from neural activity recorded from the brain. Vocalization behavior is spontaneous, and thus periods of song must be extracted from continuous recordings that include noise and periods of silence. The goal of this project is the automation of acoustic event detection and acoustic segmentation during vocal recordings. Furthermore, automatic parsing and labeling of vocal segments is necessary to construct a dictionary of bird vocalization. Students will have a chance to work on different supervised and unsupervised methods for clustering, quantification and parametrization of animal communication signals.

## INTERNS NEEDED
2 BS or 1 MS

## PREREQUISITES
Required Qualifications:
1. Prior signal processing experience in Python on Matlab
2. Prior experience with source localization and/or machine learning methods (e.g. classification and clustering)




## FACULTY MENTOR
Vikash Gilija

## PROJECT TITLE
Neurally Driven Vocal Prosthesis: Vocal Production Decoding from Neural Activity

## PROJECT DESCRIPTION
Description: Assistive neural prostheses hold the promise of restoring lost function for individuals with motor and speech deficits due to injury and neurodegenerative disease. Our goal is to accelerate the development of this type of brain machine interface by building a neural prosthesis that can predict vocal production in real-time from brain recordings in birds. Students working on this project will develop state-of-the-art machine learning models that can predict birdsong from recordings of the activity of populations of individual neurons.

## INTERNS NEEDED
2 MS

## PREREQUISITES
Required Qualifications:
1. Prior data science/machine learning experience and deep learning frameworks (Pytorch, Tensorflow etc.)
2. Worked with time series data and machine learning algorithms (e.g. HMMs, LSTMs, GRUs, Auto Encoders) and/or with computer vision methods