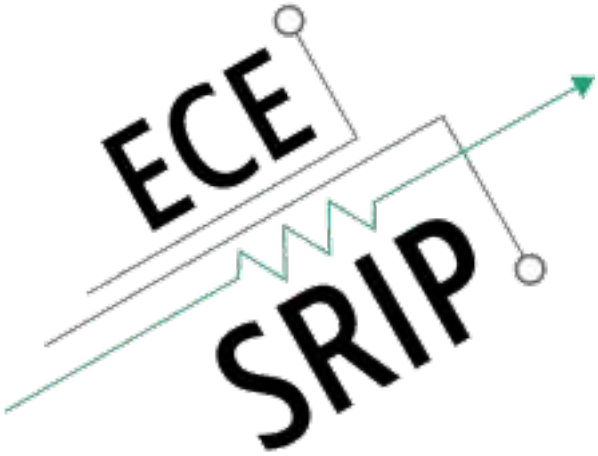


FACULTY MENTOR
Carl Taswell

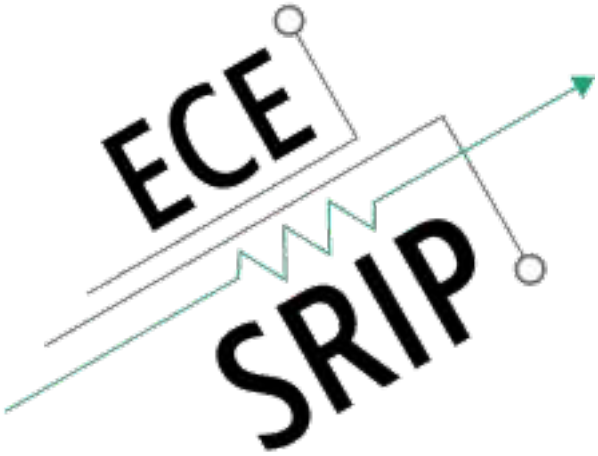
PROJECT TITLE
Rendering, Region-Segmenting and Path-Following Algorithms for BrainWatch VR Software

PROJECT DESCRIPTION
Description: Several visualization scenarios for viewing brain scans in 3D virtual reality environments with BrainWatch VR Software were described in Taswell et al 2017 EMBC. This project aims to improve software for interactively exploring brain scans with available consumer hardware including the Oculus Rift, PlayStation VR, and MetaVision Meta 2. For rendering algorithms, we will prioritize computational efficiency for responsive visualization of the virtual environment in real time without jitter or other artifacts. For region-segmenting and path-following algorithms, we will prioritize computational accuracy with respect to correct identification of anatomical structures and neural pathways in the brain. Algorithm design will be guided by its application to the study of neurodegenerative disorders and dementias. See http://www.brainhealthalliance.org/STEMM/Papers for further information on research projects at Brain Health Alliance.

This project will be remote.

INTERNS NEEDED
2 Students

PREREQUISITES
1. Coursework or experience with computational software engineering for graphics and visual displays.



FACULTY MENTOR
Carl Taswell

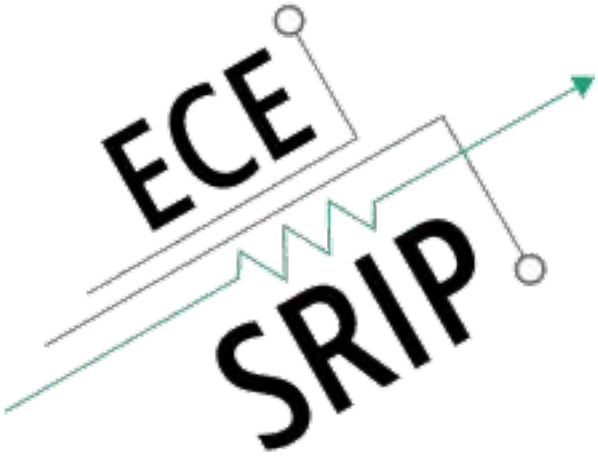
PROJECT TITLE
Effect of Neurodegenerative Disease Status on Co-Registration Accuracy of PET and MRI Brain Scans

PROJECT DESCRIPTION
Description: Does the clinical status of patients with a neurodegenerative disorder when compared with the normal healthy status of control subjects have an effect on the co-registration accuracy of the participants' PET and MRI brain scans? Previous studies have suggested that coregistration worsens as neurodegeneration worsens. This project will develop improved computational algorithms based on wavelet transform image processing with wavelet shrinkage denoising that remain as robust as possible to the noise inherent in the process. These algorithms will then be used to perform co-registrations on brain scan data sets in order to estimate the rate of decline of co-registration accuracy for different kinds of dementias. See http://www.brainhealthalliance.org/STEMM/Papers for further information on research projects at Brain Health Alliance.

This project will be remote.

INTERNS NEEDED
2 Students

PREREQUISITES
1. Course work or experience with computational software engineering for mathematical image processing.



FACULTY MENTOR
Carl Taswell

PROJECT TITLE
Automated Meta-Analyses of Dementia Literature with the SOLOMON Ontology and Nexus-PORTAL-DOORS-Scribe

PROJECT DESCRIPTION
Description: The Nexus-PORTAL-DOORS Scribe (NPDS) cyberinfrastructure has been designed as a resource metadata management system intended to support applications such as automated searches of online resources and meta-analyses of published literature. The SOLOMON ontology has been introduced as an NPDS-compliant concept-validating and hypothesis-exploring ontology that organizes focal-onset dementias including Sensory-Onset, Language-Onset and Motor-ONset dementias with classifying and relating concepts related to neurodegeneration. This project will apply the SOLOMON ontology within the framework of NPDS along with additional language parsers and statistical analysis components to build a complete system that can perform automated meta-analyses of the dementia literature. See http://www.brainhealthalliance.org/STEMM/Papers for further information on research projects at Brain Health Alliance.

This project will be remote.

INTERNS NEEDED
2 Students

PREREQUISITES
1. Coursework or experience with meta-analysis statistics, artificial intelligence, knowledge engineering or the semantic web stack including XML, RDF, OWL and SPARQL.