

FACULTY MENTOR

Cheolhong An

PROJECT TITLE

Retinal Feature Extraction and Tracking

PROJECT DESCRIPTION

Description: The retinal vessel is a key feature to register and track multimodal images. In this project, we will develop an unsupervised vessel segmentation algorithm for multimodal retina images such as color fundus photography, infrared reflectance (IR), fluorescein angiography (FA), wide-view imaging and so on. The extracted feature will be applied to track and align retina images of one patient over time.

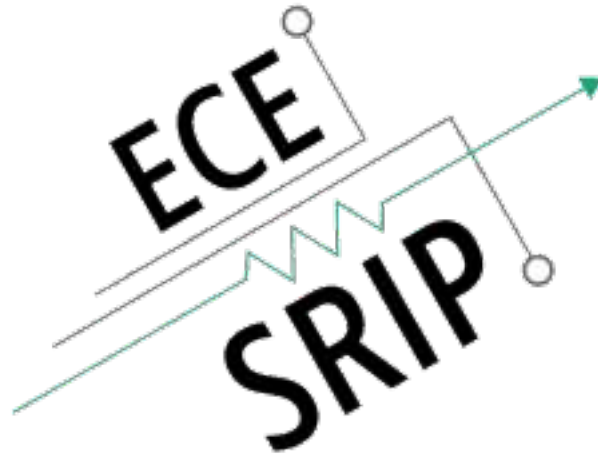
INTERNS NEEDED

1 MS Student

PREREQUISITES

Preferred Qualifications:

1. Must be familiar with machine learning
2. Knowledge in signal and image processing
3. Knowledge in C++, python.



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PROJECT TITLE

OCT-Angiography processing for disease detection and classification

PROJECT DESCRIPTION

Description: Retina is known as an extension of the central nervous system to offer a window to study brain changes (e.g. earlier Alzheimer's disease). Thus, the eye shares a lot of common features with the brain. Particularly, the blood vessel changes which can be estimated by blood flow and vessel density, are correlated with the levels of neurodegenerative damage in the brain. Besides, the vessel information is highly related to many retinal diseases such as vascular diseases, AMD, and glaucoma, etc.

OCT-Optical Coherence Tomography Angiography is a non-invasive imaging modality to produce 3-D representations of retinal and choroidal vessels. In this project, we will gather OCT-Angiography data, and develop a machine learning algorithm to extract microvasculature information.

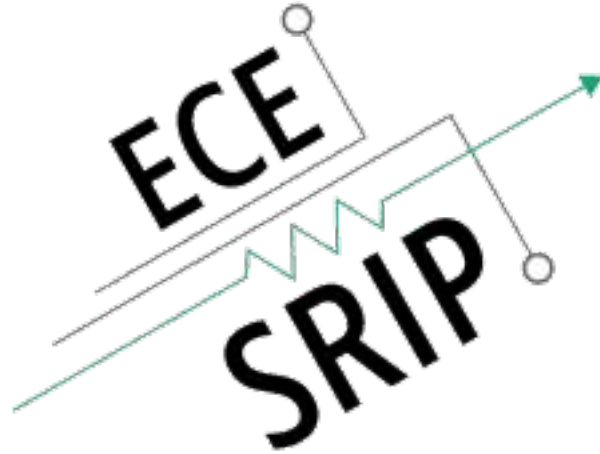
INTERNS NEEDED

1 MS

PREREQUISITES

Preferred Qualifications:

1. Knowledge in image processing and machine learning
2. Ability to program algorithms on Pytorch, python



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PROJECT TITLE

Real-time cell classification for the flow cytometry

PROJECT DESCRIPTION

Description: Flow cytometry is a real-time cell analysis technique to capture single-cell images and sort cells. Since the size of target objects (cells) is very small, and the objects are moving under low light condition, classifying captured images is quite challenging. Thus, we will develop a machine learning algorithm and test it on an embedded system.

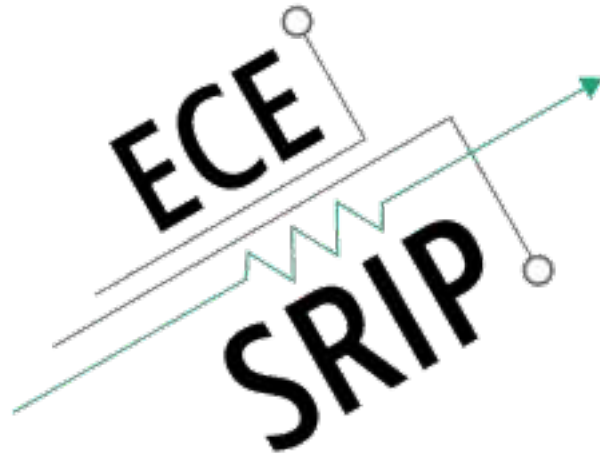
INTERNS NEEDED

1 MS

PREREQUISITES

Preferred Qualifications:

1. Must be familiar with machine learning
2. Knowledge in Pytorch frontends (C++, Python)
3. Knowledge in Pytorch backend (CUDA)
4. Knowledge in CUDA programming



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PROJECT TITLE

Lensless Camera: Simultaneous Depth and Scene Reconstruction

PROJECT DESCRIPTION

Description: A camera is ubiquitous nowadays for machine vision as well as human vision. Lensless camera, which can take photos and videos without a lens, will remove the last barrier to build a thin camera. As a result of the last year's SRIP, a Lensless camera model was set up on GPU. This year, we are aiming to develop a machine learning algorithm to reconstruct depth and scene simultaneously from captured sensor images in the simulation environment.

INTERNS NEEDED

1 MS

PREREQUISITES

Preferred Qualifications:

1. Must be familiar with machine learning
2. Knowledge in Pytorch frontends (C++, Python) and backend (CUDA)
3. Knowledge in CUDA programming
4. Background in image processing