

FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

Human-Inspired Camera Platform

PROJECT DESCRIPTION

Description: Camera system is typically set up at a fixed location or mounted on a moving platform (robot, car) and is used in many computer vision applications such as scene/crowd understanding, surveillance, pedestrian/car detection, etc. Computer vision algorithms rely on image intensity, color, texture, motion, disparity, context, etc., to achieve reliable and accurate results. This project has two phases. First phase consists of designing a camera system that mimics human's eye motion and the second phase involves the development of computer vision algorithms for object detection and scene understanding.

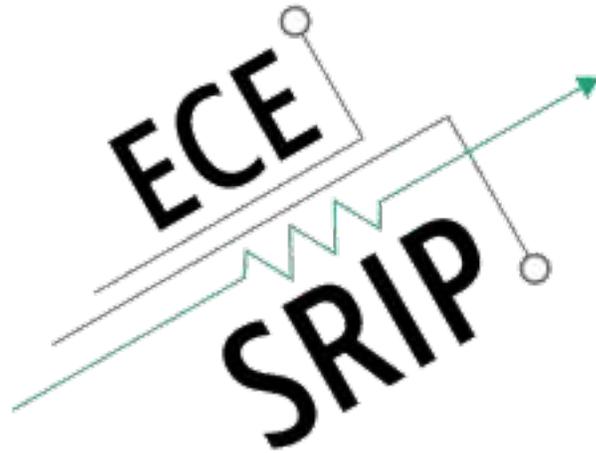
INTERNS NEEDED

3 MS or BS

PREREQUISITES

Preferred Qualifications:

1. Hardware/system development, and/or hands-on project building, and/or computer vision



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

New Feature Matching Algorithm and Applications

PROJECT DESCRIPTION

Description: Feature matching lies in the heart of many computer vision applications, such as structure from motion, image retrieval, object detection and classification, and disparity estimation. Achieving high matching accuracy is challenging when a significant geometric difference exists between the source and target images. We recently proposed a new feature matching algorithm that is robust to geometric distortion such as shearing and rotation. The new algorithm yields excellent matching results on multiple datasets.

In this project, we plan to apply the new feature matching algorithm to several computer vision applications and compare its performance with state-of-the-art algorithms. We will also investigate various methods to optimize the current algorithm and improve its efficiency.

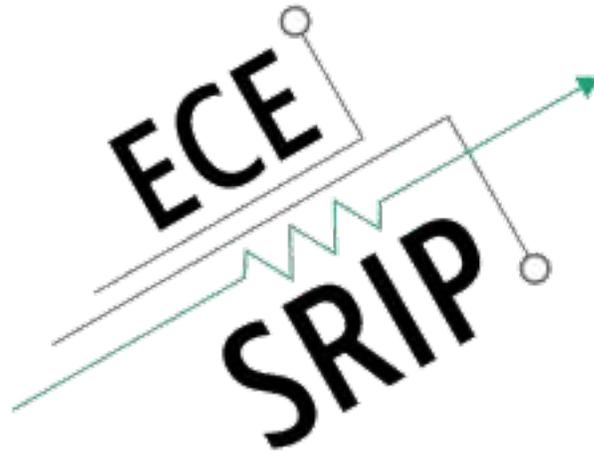
INTERNS NEEDED

2 MS or BS

PREREQUISITES

Preferred Qualifications:

1. Experience/background in computer vision and machine learning.
2. Experience with Matlab, Python as well as Deep Learning libraries (pytorch, tensorflow, caffe, etc) are preferred.



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

Collaborative machine vision for autonomous vehicle

PROJECT DESCRIPTION

Description: Current Advanced Driver Assistance Systems (ADAS) system is based on cameras/sensors from a single vehicle, thus limits the range and accuracy of object detection and classification. This project involves data collection, system integration and algorithm development based on stereo RGB+depth camera/videos from two cars. Algorithm development includes real-time object detection and tracking, enhanced depth estimation based on multiple cameras, enhanced object detection based on results from multiple cameras and the corresponding depth estimation. Deep learning based approaches will be investigated.

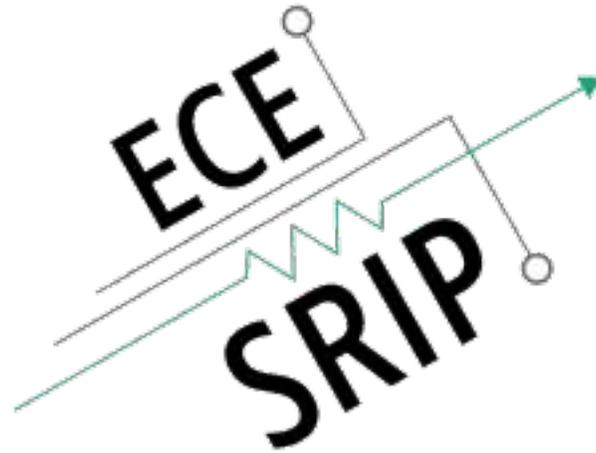
INTERNS NEEDED

2 MS, 2 freshmen, 2 BS

PREREQUISITES

Preferred Qualifications:

1. Sophomore, Junior or Senior – Matlab, Python, computer vision
2. MS - Matlab, Python, computer vision, machine learning, deep learning libraries (Pytorch, tensorflow, caffe)



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

Gaze Estimation using Multiple Sensors and Machine Learning

PROJECT DESCRIPTION

Description: Gaze estimation is an essential first step in determining the driver intent and state-of-mind. In this project, we will collect data and develop machine learning methods for head pose and gaze estimation, based on RGB, NIR and Depth information. Preprocessing techniques will be developed to improve algorithm's accuracy and performance.

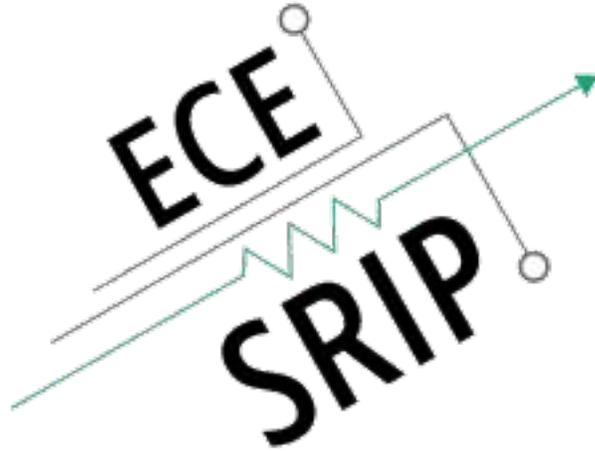
INTERNS NEEDED

1 MS and 2 BS

PREREQUISITES

Preferred Qualifications:

1. B.S. - Matlab, Python, computer vision
2. MS - Matlab, Python, computer vision, machine learning, deep learning libraries (Pytorch, tensorflow, caffe)



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

Remote Sensing Technology to Improve Community-Based Fall Risk Assessment

PROJECT DESCRIPTION

Description: Falls and fall-related injuries are a major public health concern. Falls lead to decreased quality of life, loss of independence, disability, and mortality rates as high as 1:4 within the first year after a fall. Standard clinical tests of balance stability and gait speed include direct observation of functioning by a specialist while patients complete a series of challenging physical tasks. These tests require expensive laboratory equipment which requires calibration before each assessment, the assessment period is time consuming, and they require face-to-face time with a specialist. Standard methods also require the specialist to make some subjective ratings, which may be influenced by several factors. In this project, we will develop a camera-based machine-learning algorithms to match the standardly administered assessments, based on collected video, the Fried Gait Speed Test and postural balance evaluation using force plates.

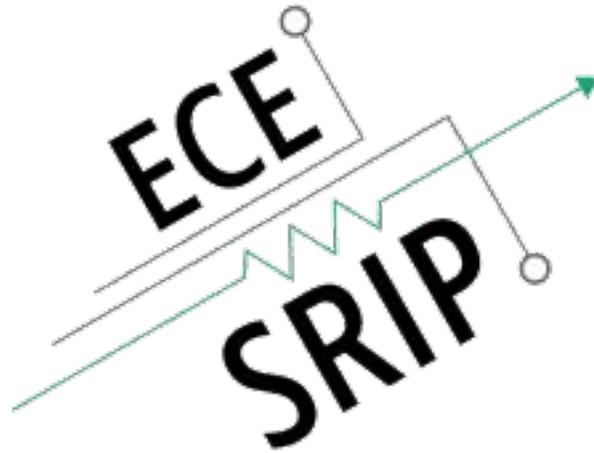
INTERNS NEEDED

1 MS and 1 BS

PREREQUISITES

Preferred Qualifications:

1. B.S. - Matlab, Python, computer vision
2. MS - Matlab, Python, computer vision, machine learning, deep learning libraries (Pytorch, tensorflow, caffe)



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

Vision-based Human Biometrics Estimation

PROJECT DESCRIPTION

Description: Biometric reflects health status of human body and is important for clinical studies such as balance control evaluation, cognitive test, and specific disease analysis. Conventional methods to measure biometrics rely on skilled operators working on various devices. A vision-based estimation method will benefit the study of free-living biometrics estimation, boosting the development of future Internet-of-Things health status monitoring system.

In this project, we plan to set-up a camera system to collect new datasets designed for specific application scenarios and apply the vision-based biometric estimation algorithms on them. We will also investigate various methods to optimize the current algorithm and system design.

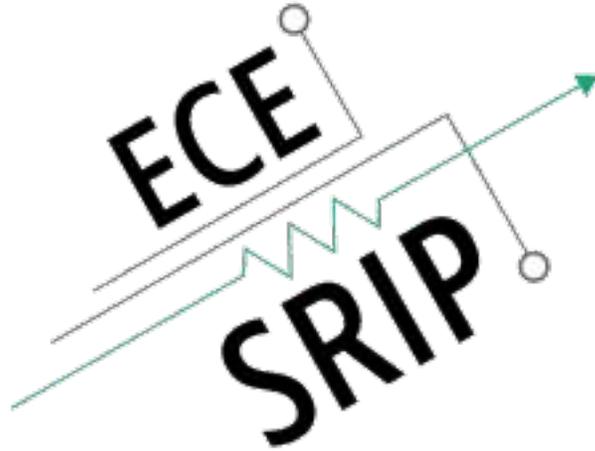
INTERNS NEEDED

1 MS and 1 BS

PREREQUISITES

Preferred Qualifications:

1. Experience in machine learning, computer vision, and image processing.
2. Experience with Python, C++, Matlab, as well as deep learning libraries is preferred.



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

ECE-centric hands-on projects demonstrating Mathematics concepts

PROJECT DESCRIPTION

Description: Math 18 and Math 20 sequence are required for ECE students. They are mostly taught without any examples or references to ECE applications/systems. We will explore and develop ECE-centric, hands-on demo in hardware/software to demonstrate key concepts learned in these undergraduate mathematics courses. In addition to UCSD students, these modules will be available to high-school students as well as students at other universities.

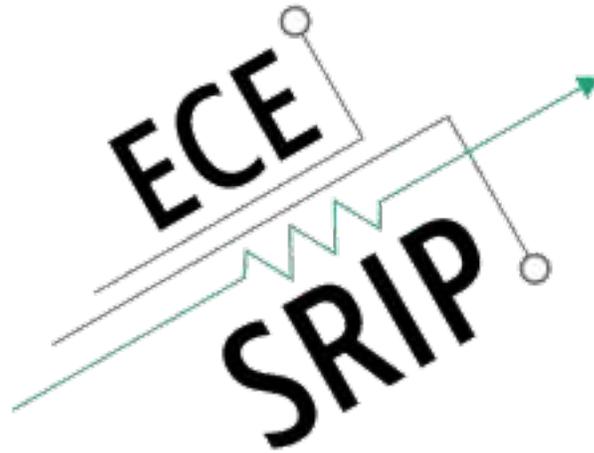
INTERNS NEEDED

4 BS

PREREQUISITES

Preferred Qualifications:

1. Experience in hands-on project building, app development, strong mathematics background.



FACULTY MENTOR

Truong Nguyen

PROJECT TITLE

Human Pose and Activity Recognition

PROJECT DESCRIPTION

Description: Human pose and activity recognition has been an active research field for a long time. With deep learning revisiting this problem, we will most likely to witness a boost of recognizing accuracy. In this project, you will mainly explore different deep learning based algorithms on human pose and activity recognition, including two-stream network with optical flow and LSTM with body joints. You will be asked to utilize/reimplement existing algorithms and improve them to work better on our own human activity dataset

Responsibilities:

1. Learn existing algorithms on human pose and activity recognition
2. Implement and run codes for existing algorithms
3. Modify and improve these algorithms to work better with our dataset

INTERNS NEEDED

2 BS or MS

PREREQUISITES

Preferred Qualifications:

1. Experience on Python
2. Experience on deep learning libraries like TensorFlow, Caffe, Pytorch
3. Background of computer vision
4. Preferred: Experience on human activity recognition