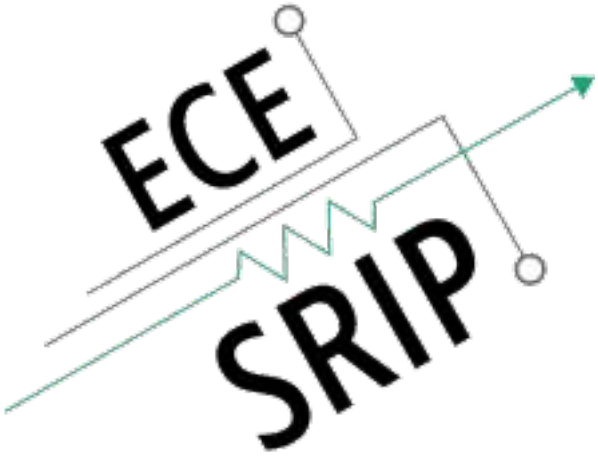


FACULTY MENTOR
Truong Nguyen

PROJECT TITLE
Analysis of Corticobasal Degeneration Using Machine Learning

PROJECT DESCRIPTION
Description: Corticobasal degeneration and progressive supranuclear palsy are atypical Parkinsonian disorders, that can have similar clinical presentations leading to a misdiagnosis at the clinical setting. Currently, the diagnosis can only be confirmed after autopsy, and the clinical misdiagnosis for both disorders are very high. Both have various symptoms that overlap, and both are rare progressive disorders with a significant burden on the affected individual's life as well as those around the individual. The misdiagnosis limits our ability to develop effective treatments and currently we do not have any effective strategies to prevent, delay, slow down or cure these disorders. Differentiation of these two pathologies at a clinical setting has important implications for the development of effective treatments to aid individuals affected by either disorder. Using the available clinical data of those with corticobasal degeneration or progressive supranuclear palsy pathology, we are seeking to identify clinical signs to differentiate these pathologies at a clinical setting. The data comes from the Mayo Clinic Registry which includes individuals evaluated at different centers in the U.S. by different clinicians. The goal is to use machine learning approaches to group the available clinical variables and determine which group of clinical variables are the most helpful to differentiate the different pathologies at a clinical setting.

This project can accommodate both remote and in-person students.

INTERNS NEEDED
1 Student

PREREQUISITES
1. Familiar with Python
2. Knowledge in Machine learning (or willingness to learn)

FACULTY MENTOR
Truong Nguyen

PROJECT TITLE
Lightweight Human Digitization System

PROJECT DESCRIPTION
Description: In the vision of tomorrow's metaverse application, immersive 3D digital human

animation will play the most vital role. However, the solution to capture and obtain high-fidelity 3D human models is still far from satisfying. The existing systems lack both efficiency and mobility. The animation industry conventionally adopts very complicated procedures involving hundreds of capture devices and extensive labor work to model every detail of the characters and then uses motion capture systems to generate human movements. However, it is impossible to adapt these equipment-intensive solutions to consumer-oriented scenarios in the XR era, where content creators will no longer be limited to professional artists, and the applications will be so broad that lightweight and low-cost designs should be more preferred even if they sacrifice certain quality.

In this project, we aim to build an innovative system that is capable of creating temporal-consistent and visually appealing human models with consumer-level cameras in combination with a light-weight computing unit. Instead of tracking the sparse surface dots in the motion capture solutions, we directly generate ready-to-use meshes using image-based reconstruction methods. The resulting human model will be used in several applications including virtual reality, and 3D video compression.

This project can accommodate both remote and in-person students

INTERNS NEEDED
2 Students

PREREQUISITES
1. Familiar with Python
2. Knowledge in Machine learning or willingness to learn

FACULTY MENTOR
Truong Nguyen

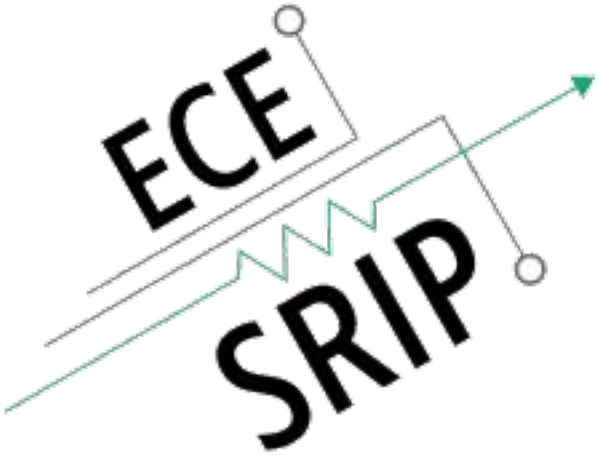
PROJECT TITLE
Detection of Defects in Tire

PROJECT DESCRIPTION
Description: Detecting defects in tire is a challenging problem due to the large number of defect types (100+ types), the variation in defect levels and limited data samples. In this project, we partner with a tire manufacturer to collect tire data (both in 2D and 3D), annotate the tire data (normal area vs. defective area) and develop real-time algorithm to detect various defects.

This project can accommodate both remote and in-person students

INTERNS NEEDED
1 Student

PREREQUISITES
1. Experience with Python and Deep Learning
2. Experience in Computer Vision and Object Detection are helpful



FACULTY MENTOR
Truong Nguyen

PROJECT TITLE
RGB-Based Face Anti-Spoofing with Spoof Hint Detection

PROJECT DESCRIPTION
Description: Face anti-spoofing (presentation attack detection) is the task of preventing false facial verification using a fake image of an authorized person's face. CNN-based deep learning networks for anti-spoofing detection achieve remarkable performance compared to the methods using handcrafted features. However, these methods tend to suffer poor generalizability to new presentation attack patterns and environments. Instead of detecting face live or spoofing from the images or videos directly, the network can first learn spoofing associated areas (gaze directions, lip motions, etc) and based on these learned areas, the network can have more reliable results. The goal of the project is to develop an efficient (low complexity) deep neural network to detect spoofing related areas and achieve RGB-based face anti-spoofing goals.

This project can accommodate both remote and in-person students

INTERNS NEEDED
1 Student

PREREQUISITES
1. Experience with Pytorch and deep learning networks