

FACULTY MENTOR

Sujit Dey

PROJECT TITLE

Driver's State of Mind Detection using Multiple Sensors and Machine Learning

PROJECT DESCRIPTION

Description: In this project, based on machine learning (ML) and deep learning (DL) techniques, we plan to develop a system for driver's state of mind detection such as emotions, distraction, fatigue, etc. Towards this goal, we need to collect data from human subjects in laboratory experiments, using sensors such as 3D and infrared cameras and wearable devices. And ML/DL models will be trained on the collected data. Video sequences and physiological signals will be fed into the model to detect the driver's state of mind. Early detection of negative states of mind would be helpful to improve traffic safety.

INTERNS NEEDED

1 MS

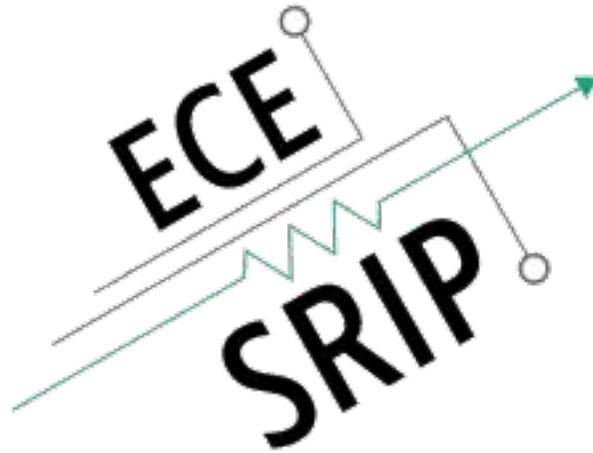
PREREQUISITES

Required Qualifications:

1. Skilled in Python/Matlab/C++

Preferred Qualifications:

1. Experience with RGB-D image processing and computer vision
2. Knowledge of multi-modal data fusion



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PROJECT TITLE

Real-time Augmented Perception of Occluded Objects on moving Vehicular Camera View

PROJECT DESCRIPTION

Description: The goal of the project is to build a system for multi-view projection of occluded objects from a road-side camera to a camera on a moving vehicle. The challenges involve accurately determining the moving object's position, and the heading and position of the moving camera on the vehicle in real-time. The roadside camera will be attached to a computer that can run object detection and notify the objects' bounding boxes to the vehicle's computer in real-time. The end result will show on the captured frame by car's camera, the occluded objects which it can't see otherwise and the object detection of the local object(s) and the augmented occluded object(s).

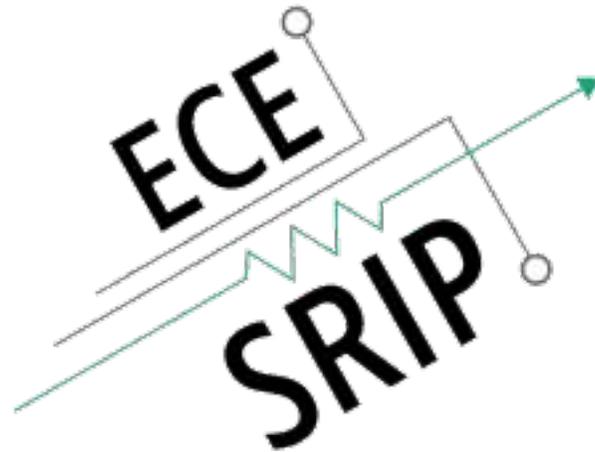
INTERNS NEEDED

1 MS

PREREQUISITES

Preferred Qualifications:

1. Programming knowledge with C/C++/ Python (in Linux environment) with OpenCV
2. Some knowledge in Systems/Network programming is a plus but not required.
3. Masters Students who completed the following two courses are preferred:
 - 1) Sensing and Estimation in Robotics (ECE 276A)
 - 2) Computer Vision (CSE 252A)



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PROJECT TITLE

Sustainable Wireless Communications with Optimal Utilization of Renewable Energy and Storage

PROJECT DESCRIPTION

Description: The aim of this project is to maximize the utilization of harvested renewable energy at the BSs with minimal use of energy storage and enable deployment of a network of small cell BSs that are powered only with renewable energy. Currently, this project is aimed at examining the feasibility of deployment of the renewable energy powered small cell BSs. We will collect data from an outdoor small cell testbed and develop a machine learning model which can predict the energy availability of the renewable energy powered small cell BSs.

INTERNS NEEDED

1 MS

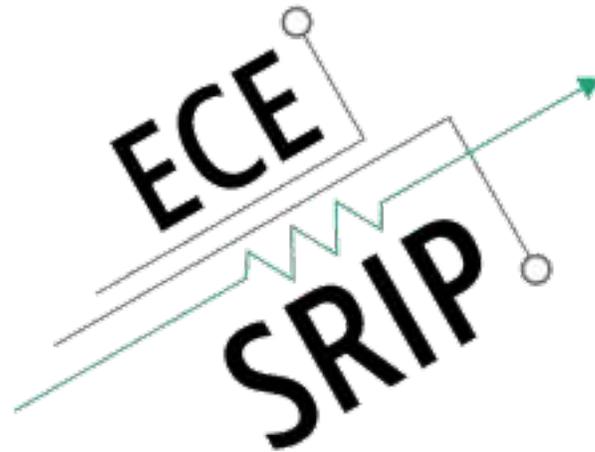
PREREQUISITES

Required Qualifications:

1. Skilled in Python/C++/Matlab

Preferred Qualifications:

1. Experience with wireless communication system and machine learning



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PROJECT TITLE

Personalized Effect of Health Behavior on Blood Pressure: Machine Learning Based Prediction and Recommendation

PROJECT DESCRIPTION

Description: The aim of project is to investigate the relationship between blood pressure and health behavior (e.g. sleep and exercise) and to develop personalized health analytics and recommendation. Using off-the-shelf wearable devices (which provide detailed health behavior like walking, exercise, stress, heart rate and sleep) and wireless blood pressure monitors, we will collect data from volunteers and use machine learning models (e.g. linear regression, ensemble models, neural networks) and other data science techniques to tackle the problems.

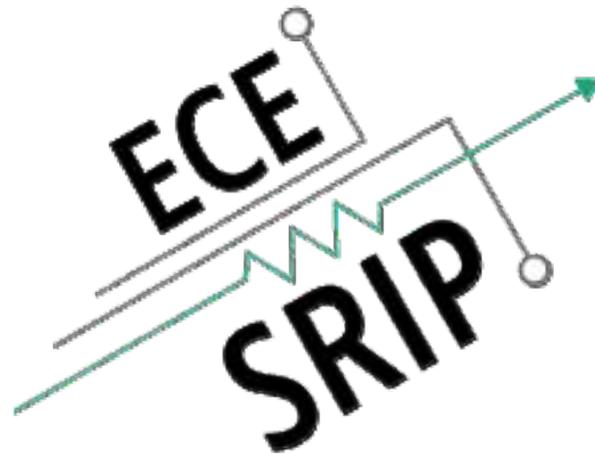
INTERNS NEEDED

2 MS

PREREQUISITES

Preferred Qualifications:

1. Expected to be skilled in Python/C++/Matlab
2. experience with machine learning/data science projects is preferred



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PROJECT TITLE

Matching objects with large viewpoint differences

PROJECT DESCRIPTION

Description: The goal of this project is to create an object identification system that could be used match objects detected by one vehicle's camera with that of other vehicles on the road. The biggest challenge to overcome that is not addressed in many object matching works up to this point is the extreme viewpoint changes that can be observed by different vehicles (i.e. one camera views the rear of a vehicle while another camera views the front of a vehicle). As such, the standard method of visual feature matching will not be sufficient and new techniques must be developed. Object attributes such as color, 3-d position, velocity, and object class will be explored to create a viewpoint invariant object descriptor. State of the art machine learning methods will also be explored.

INTERNS NEEDED

1 MS

PREREQUISITES

Preferred Qualifications: Required to be experienced in python and its major ML libraries (numpy, scipy, pandas, TensorFlow or Pytorch)