Department Project Information

Department Name	System Engineering and Engineering Management	Date Submitted	04/12/2021
Project Title	Transportation Infrastructure Perception Data Fusion and Detection Using AI technology **(UNCC_TRAN2)**	Planned Starting Semester	Fall 2021

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	0	Electrical	1
Computer	1	Systems	3
Other ( )	0		

Project Overview:

Transportation perception technologies, such as LiDAR, Radar, Thermal camera, Stereo camera play a critical role in improving safety and mobility for autonomous vehicles (AV) and advanced transportation systems. Data processing using AI technologies for sensing data fusion, object classification, and tracking, and new mobility (such as Urban Air Mobility (UAM), drone), lay a foundation for intelligent mobility applications and transportation perception from infrastructure and roadside. The project will collect data from multiple devices and conduct data processing using AI technologies and open-source tools.

Project Requirements:

This project will process and analyze the raw data collected from multiple devices and apply AI and machine learning technologies for improving transportation systems and energy estimation by generating better classification, localization, and tracking approaches. The primary tasks include devices (LiDAR, radar, thermal camera, and drone) installation and setup, system test running, data collection, and data processing by using AI technologies. 4-6 students with experience in AI technology will be desired. More specific tasks,

- LiDAR data collection and process for object classification, localization, and tracking
- Radar data collection and process for car and pedestrian detection
- Thermal stream video and image data collection and processing using YOLO
- Stereo stream video and image data collection and process for detection, measuring, localization, and tracking
- Drone operation and data collection/processing

Expected Deliverables/Results:
- A comprehensive transportation sensing platform (e.g., LiDAR and stereo camera) will be established and set up.
- Different types of raw datasets from the perception system will be collected and stored in the computer. And a cleansed dataset for research will be produced by data pre-processing, data fusion, and data analysis.
- LiDAR 3-D data processing using AI technologies
- Thermal, stereo, and RGB image data processing using AI technologies
- Drone operation and energy estimation

Disposition of Deliverables at the End of the Project:
- A database storing all raw and processed data from devices (sensors and drone)
- Reports and instruction manual for explaining data collection, schema, format, and processing
- Research reports and papers about AI technology application on traffic data sensing from all devices for classification, localization, and tracking.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):
- SEGR 2105/3105, knowledge with computer programming (such as python, C++)
- Familiar with or interest in data processing, statistics, and AI technologies (e.g., neural network)
- Self-motivative and good communication skills