UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description

Company Name	Internal ECE Dept.	**Date Submitted**	May 09, 2020
Project Title	Artificial Intelligence for powered augmented reality f workers **(UNCC_WORK)**	**Planned Semester**	Fall 2020, Spring 2021

Personnel

We expect 250 hours per person.

Discipline	**Number**	**Discipline**	**Number**
Mechanical		Electrical	2
Computer	3	Systems	
Other ( )			

Project Overview:

The objective of this project is to leverage the recent advances in machine learning and real-time data analytics and edge computing combined with smart glasses to enhance the safety of short-duration highway workzones. This project proposes a worker-in-the-loop safety system which relies on the real-time data analytic and smart glasses for detecting hazardous behaviors in highway workzones, and proactively alarming (through visualization and/or voice) workers in the field. The worker in this context is a broad term that stands for individuals involved in short-duration work zones (e.g. road inspectors, law enforcement, emergency responders).

The students will create a network of embedded devices for vehicles detection, tracking and action recognition across multiple cameras. The students will work with multiple boards including Google Coral development board with Edge TPU. At the same time, the students will create synthetic data set with the label information to enable the learning of Artificial Intelligence (AI), and machine learnings used in this project. At the same time, students will work with augmented reality glasses to provide proper visualization to human workers based on the information processed by AI engine on Google Coral board.

Learning opportunities in this project are many! Overall, accepted student candidates will have a chance to work with Google Coral Development board with edge TPU processing unit, and learn the basics of Artificial Intelligence and computer vision in a very practical way based on Tensor Flow APIs.

Initial Project Requirements:

The students will work with Google Coral GPUs, embedded cameras, augmented reality glasses, and wireless modems. The equipment's would be available in TeCSAR research lab. The students also can use the space available in TeCSAR research lab to conduct their research. Also, students will able to use the lab servers and computers for development and simulation.

Expected Deliverables/Results:

The students will deliver an implementation of real-time edge processing for real-time vehicle detection coupled with augmented reality. In addition, the students will deliver the created and labeled video dataset for vehicle detection, tracking and trajectory analysis.

Disposition of Deliverables at the End of the Project:

A prototyped model of the proposed AI-powered augmented reality system based on google coral development board.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

Basic knowledge of C++is a MUST. The students must take the computer architecture course (ECGR 4181) **as co-requisite or pre-requisite**. Also, the basic understanding of OpenCV, Python programming, embedded systems, Linux operating systems, and computer networks will be beneficial.