

Company Name	<i>Internal ECE department</i>	Date Submitted	<i>July 10, 2019</i>
Project Title	<i>Artificial Intelligence for Smart Cities</i> UNCC_CITY	Planned Semester	<i>Fall 2019, Spring 2020</i>

Fund to support the project:

Single Team (\$6,000) from Dr. Tabkhi grant from NSF fund

Faculty Mentor

Faculty Mentor: **Dr. Hamed Tabkhi** email htabkhiv@uncc.edu

Technical Contact(s)*

*This can be one or more at the option of the Supporter

Senior Design Project Description

Company Name	Internal ECE Dept.	Date Submitted	July 10, 2019
Project Title	Artificial Intelligence for Smart Cities	Planned Semester	Fall 2019, Spring 2020

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

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

Project Overview:

With the expansion of Internet of Things (IoT), computer engineering and science is moving toward the era of IoT-based distributed computing. At the same time, Embedded computer vision is considered one top-tier, fast-growing area. Embedded vision refers to the deployment of visual capabilities to embedded systems for



The WILLIAM STATES LEE COLLEGE of ENGINEERING

a better understanding of 2D/3D visual scenes. By augmenting the IoT devices with vision processing capabilities many new opportunities and interesting application will be emerged which can elevate the impact of technology in our modern society to the next level.

The aim of this project is to create a distributed IoT system with capabilities to run distributed vision processing across multiple IoT devices. The students will create a network of embedded devices for pedestrian detection, tracking and action recognition across multiple cameras. The students will work with multiple boards including Nvidia Jetson Xavier as the IoT devices with the capability of running embedded vision applications. 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.

Learning opportunities in this project are many! Overall, accepted student candidates will have a chance to work with Nvidia Jetson platforms, and GPUs platform and learn the basics of Artificial Intelligence and computer vision in a very practical way. The results of this project can be magnificent used for a diverse set of applications required distributed vision processing in a large geographical area. Application examples are video surveillance, smart manufacturing and smart and connected communities.

Initial Project Requirements:

The students will work with Nvidia Jetson Xavier boards, embedded cameras, and wireless routers and modems. The equipment's would be available in my research lab. The students also can use the space available in my 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 a implementation of a distributed vision processing over multiple IoT devices. In addition, the students will deliver the created and labeled video dataset for multiple pedestrian detection, tracking and action detection / recognition.

Disposition of Deliverables at the End of the Project:

A prototyped model of the proposed IoT system with multiple embedded vision devices (Nvidia Jetson Xavier) with capability of distributed pedestrian detection and tracking will be demonstrated.

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

Basic knowledge of computer architecture is a MUST. The students encourage to take the computer architecture course (ECGR 4181). Also, the basic understanding of C/C++ programming, embedded systems, Linux operating systems, and computer networks will be required.