INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	_Oxit_	Date Submitted	_05/13/2022_
Project Title	_Design of a LoRaWAN Gunshot Detection System_ **(OXIT_DETECT)**	Planned Starting Semester	_Fall 2022_

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		Electrical	2
Computer	3	Systems	

Company and Project Overview:

Launched in 2014 by UNC Charlotte ECE alumni, Oxit has continually focused on true innovation in IoT services through the creation of solutions and products for an adaptive global business marketplace. Our diverse list of clientele, ranging across a multitude of industries, has grown to recognize and trust Oxit in partnering in all aspects of Smart Technology capabilities from designing to prototyping, development and carefully launching their ideas. With each client, our goal is to improve necessary success-focused metrics, assist in building revenue and commercial growth, expand possibilities for customer service and experience, and create immersion that strengthens the foundations of brand positions. This project will utilize LoRaWAN technology. The LoRaWAN® specification is a Low Power, Wide Area (LPWA) networking protocol designed to wirelessly connect battery operated 'things' to the internet in regional, national or global networks, and targets key Internet of Things (IoT) requirements such as bidirectional communication, end-to-end security, mobility and location services.

Project Requirements:

Utilizing the power of LoRaWAN connectivity protocol and power of IoT, create a prototype for a connected "Gunshot detection system". The Gunshot detectors/sensors will be low power and low cost devices that can send alerts through LoRaWAN to the internet for a public safety

application. The sensors will be triggered to send alerts to the server when gunshot audio signature is detected. Along with the alert, the location of the sensor, weapon type, number of shots fired, etc. can also be sent to the server in order to reduce the response time from the law enforcement and emergency services.

Expected Deliverables/Results:

Working prototype of a network of multiple devices operating over a LoRaWAN network
● All electrical schematics, BOM's, drawings and code
● Must be able to perform edge(on-device) gunshot detection
● Determine the feasibility of a buzzer or audible alert tone when triggered
● A notification on a desktop for Windows/Linux based PC is required
● The devices must be battery powered
● The devices must operate as standalone devices to detect gunshots
● The device enclosure must be robust to stand the harsh outdoor climatic conditions
● The system must be flexible to include other audio signature detection
● The system must be able to resolve the location of the sensor and possibly the location of the shooter
● Feasibility of weapon identification and number of rounds fired
● Feasibility of integration with "Live Safe" App

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

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

● Interest in Internet of Things, LoraWAN and wireless communications Students should have skills and interest in schematic design as well as C/C++ coding.

● Course prerequisite: ECGR-3123 Data Communication and Networking I, ECGR-3101 Embedded systems. We do encourage students to take (in fall 2022) or have taken a course on Internet of Things (such as ECGR-4105 or ECGR-4127) or should have interest to take ECGR-4187 course (Data Communication and Networking II) in fall 2022.

● Desire at least two students on the team have ECGR 4124 as a co or pre-requisite