

## EECE 401: Senior Design I and EECE 404: Senior Design II

There are eight teams from EE and CpE programs in Senior Design courses. The project/team name and the corresponding project description are described below.

Team 1:

**Project/Team Name:** Signal Classification

**Team Members:** Jalen A. Royall (Lead), Promise J. Achi, Griffin A. Laney, Cody Jaden Walkes

**Description:** This project focused on developing a real-time RF signal classification system optimized for edge deployment using an Intel NUC. A custom Python-based signal generator was created to produce synthetic RF signals with varying frequencies, amplitudes, and noise levels, which were processed in both time and frequency (FFT) domains. Multiple machine learning models, including CNNs, RNNs, and Random Forest, were trained and evaluated for accuracy, inference speed, and robustness in noisy environments. The system was further optimized using Intel OpenVINO, achieving approximately 15% faster inference performance on edge hardware. This work demonstrates a scalable, low-SWaP-C solution applicable to defense, aerospace, and autonomous systems.

Team 2:

**Project/Team Name:** HU Waystone

**Team Members:** Cameron David Robinson (Lead), Olusegun Olakunle Afolabi, T. Isaac Davis Jr, Chinaza confidence Okereke

**Description:** Current students have issues such as academic advising, finding building and office locations, as well as information on people of interest for their needs. This team is creating a chatbot that acts as a localized hub of college related information that is accessible to all students. This will allow students to have quick and easy access to guidance on any questions they may have that will be consistent and accurate. This will aim to alleviate the current issues students face with academic advising with a personalized solution that is efficient and effective.

Team 3:

**Project/Team Name:** NextVision

**Team Members:** Adeoluwa Samuel Adekanmbi, Oluwaseun Noah Adeyeye, Odia Gerrard Ubhimhinye

**Description:** In coordination with the sister team, AgriSight, this project involves an automated vegetation monitoring system. This system is designed to help NextEra Energy Inc, monitor vegetation growth around the solar panels on their solar farms.

Team 4:

**Project/Team Name:** Q-Crew

**Team Members:** Shane Jaden Alexandre, Sheridan A. Burke, Narissa Hill, Isioma Pearl Nwansoh

**Description:** This project focuses on the practical, goal-oriented application of the Quanser QArm to support individuals who can no longer use their limbs as they once did. Everyday tasks can be challenging for the elderly and those with physical impairments, and the QArm offers a

means to perform essential pick-and-place operations with greater ease. In addition, the team aims to implement trajectory mapping and integrate a high-precision camera to further enhance the arm's capabilities.

Team 5:

**Project/Team Name:** LLM Accelerate

**Team Members:** Chase Adams, Bishesh Adhikari, Jeff Mofor Allo, Aayush Jha

Description: Complex computations made by Large Language Models (LLMs) take too long and are power-intensive. Using custom hardware (FPGA) that specializes in performing these calculations will allow for faster inferences, as well as reduce power consumption. This project focuses on the design of a high-performance hardware accelerator for Large Language Models (LLMs) to achieve significantly higher throughput and lower latency than traditional software-based inference. The architecture utilizes custom RTL modules, including 128-bit data streamers and custom attention + matrix multiplication blocks - to facilitate direct, high-speed communication with external memory paired with fast computations.

Team 6:

**Project/Team Name:** Bison Vision

**Team Members:** Kennedy C Mensah, Emmanuel Onchweri Mokua, Bijaya Poudel, Naresh Rawal

**Description:** Representing Howard University in the 2526 Raytheon Autonomous Vehicle Competition, this team is developing Bison Vision, a collaborative system-of-systems designed for GPS-denied environments. The project requires an Unmanned Aerial Vehicle (UAV) to autonomously launch from an Unmanned Ground Vehicle (UGV), scout the field using BrainChip Akida edge learning to identify a destination ArUco marker, and communicate that location directly to the ground system. While the UGV navigates toward the target and avoids stationary obstacles, the UAV must autonomously land back onto the moving UGV. This mission mimics real-world planetary exploration and defense scenarios, requiring advanced integration of computer vision, embedded development, and collaborative autonomy.

Team 7:

**Project/Team Name:** AgriSight

**Team Members:** Ibukunoluwa Joanna Adeloye, Itunuoluwa Oluwatunbi Akarakiri, Jahmelia Monica Mccarthy, Jessica Jolie Rubin

AgriSight is a vegetation management software system developed in partnership with NextEra Energy to monitor and manage overgrowth across solar panel fields. The team is responsible for the cloud integration layer that collects and stores field data, as well as the web platform that presents this information in a clear and actionable format for engineers. The system periodically analyzes vegetation growth and alerts engineers when overgrowth reaches levels that could impact solar panel efficiency, allowing teams to respond proactively and minimize energy loss. By combining scalable cloud storage with an intuitive dashboard, AgriSight gives NextEra Energy engineers the visibility they need to keep their fields operating at peak performance.

Team 8:

**Project/Team Name:** Water Bottle Filtration Network

**Team Members:** Godfred Asamoah, Corlie Jackson McCormick

**Description:** This team is working on a portable water bottle which can filter water quickly and provide drinkable water to its users. In addition, the team plans on creating a network that will collect this data from the bottle via Bluetooth to a mobile app. By doing this, this project is properly building an understanding on the status of an ecosystem's water supply.