

# Real-Time Hand Gesture Recognition with GPU Acceleration and Neural Networks

## UAH Spring 2025 ECE Senior Design Project

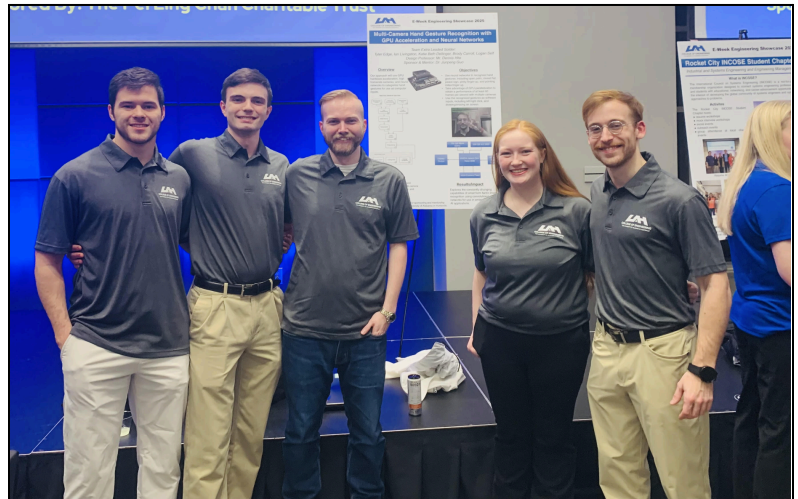
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### Project Overview

This project was completed over the course of a single semester and included the proposal, design, troubleshooting, implementation, and finalization of a GPU accelerated gesture recognition device. The device uses a NVIDIA Jetson Orin Nano GPU along with a high frame rate camera to recognize hand gestures via a neural network and use them as software inputs.

### Extra Leaded Solder

Our team was Extra Leaded Solder. The team members from left to right are **Logan Self** (Research Lead), **Brody Carroll** (Hardware Co-Lead), **Tyler Edge** (Project Lead), **Katie Beth Dellinger** (Hardware Co-Lead), and **Ian Livingston** (Software Lead)



### Technical Specs

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The core of this project is the Nvidia Jetson Orin Nano GPU which runs an algorithm called YOLO, a convolutional neural network capable of real-time object detection. The algorithm is fed a live image stream of user hand gestures from a custom mounted Arducam 1MP camera and processed by YOLOv10n using the Hagridv2 hand dataset composed of 20,000 images for comparison. ONNX framework and TensorRT were used for optimization and FP16 precision was used to reduce latency to an average of 5.5ms per inference. The processed image was then sent to a 7in display on the front of the device for the user to interact with.