# Casey Knox

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**ENGINEERING TEAM LEAD**, MatrixSpace Jan 2020 - Jun 2021

**Drone Autonomy**

- Led software team in developing autonomous solution for custom drone with mavROS from scratch
- Utilized combined millimeter wave radar and RGB camera data to perform object detection and tracking in real time with Yolov5
- Implemented software on Jetson GPU with CUDA to detect persons, estimate distance, and follow them using Pixhawk 4 flight controller
- Integrated solution into software stack with self-healing mesh network supporting multiple drones and other devices including an Android tablet app

**Threat Detection Using a Compressive Reflector Antenna and Millimeter Wave Phased Array**

- Designed a full stack client-server software solution to organize and synchronize 50 computers with 200 Tx and 250 Rx millimeter wave antenna communicating over a self-healing mesh network
- Generated micro doppler, pointcloud, and range-velocity graphs from the data using fast fourier transform techniques
- Looped solution into ROS software stack and mesh network displaying combined data on an Android tablet in real time using Matplotlib
- Performed foreground detection, frame subtraction, and image filtering on the resulting images to detect hidden metallic pipes under clothing using transfer learning on AlexNet

**Advanced Drone with Sensor Fusion**

- Integrated and synchronized multiple advanced sensors such as LiDAR, IR Camera, HD Camera, Millimeter wave sensor, software defined radio, thermal camera, multispectral camera, and 360 degree camera onto a single drone
- Developed an Android Tablet application to control and view the sensors on the drone in a mesh network
- Replayed combined data from one drone, two ground units, and one compressive reflector antenna (200Tx, 250Rx) in the mesh network using Gazebo

## TECHNICAL KNOWLEDGE

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| **Algorithms**: | SLAM, Transfer Learning, Foreground Detection with GMM |
| **Packages:** | ROS, OpenCV, PyTorch, Docker, Yolov5, Gazebo, MavROS |
| **Systems**: | Linux, Windows, Nvidia Jetpack 4.x, Android Studio, CUDA |

## EDUCATION

**Seminary Studies**, Washington DC Aug 2021 - May 2023
*Pontifical Faculty of the Immaculate Conception*

**Northeastern University**, Boston, MA Sept 2018 - May 2021
*Master of Science in Computer Science*, GPA 3.76/4.0

**Ave Maria University**, Ave Maria, FL Aug 2014 - May 2018
*Bachelor of Arts in Mathematics* GPA: 3.74/4.0
*Bachelor of Arts in Theology*