Rudy "Nathan" Reyes

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EDUCATION

Bachelor of Computer Engineering **May 2024**
Virginia Commonwealth University (VCU) *Richmond, VA*

- 3.6/4.0 GPA, 36 months in research (robotics perception, state estimation, autonomous systems), minor in Mathematics

Tools & Platforms: *Linux | NVIDIA Jetson Nano | Docker | Git | FastAPI | WebSockets | VS Code | Fusion 360*
Programming: *C | C++ (ROS, ROS2) | Python (PyTorch, TensorFlow, OpenAI Whisper, Transformers, FastAPI) | Java | JavaScript | Bash | Git | REST APIs | CUDA (optimization)*
Skills: *AI/ML model development | Deep learning | NLP | Real-time audio processing | Model optimization | Scalable system design | Data fusion | CI/CD pipelines | Automated testing | Voice activity detection | Multi-agent systems | Robotics perception | Cross-functional collaboration | Agile/Scrum development | English & Spanish fluent*

WORK EXPERIENCE

Research Engineer **August 2022 – July 2023**
HIVE Lab with Dr. Martin, VCU *Richmond, VA*

- Led data fusion, motion modeling, and cooperative perception for autonomous and connected vehicles as part of the Leidos-funded CARMA project for USDOT. Built ROS-based software for real-time state estimation and sensor fusion.
- Developed C++ Unscented Kalman Filter (UKF) for state estimation of V2X data with <1% error vs. filterPy test cases.
- Implemented data fusion algorithms including Covariance Intersection, Global Nearest Neighbor (GNN), and track-to-track fusion for multi-sensor track association in open-source Cooperative Perception (CDA) software.
- Designed scoring / gating mechanisms using Mahalanobis and Euclidean distance for track-to-detection association.
- Designed motion models, pseudo-data, & test cases for Constant Turn-Rate and Velocity / Acceleration (CTRV, CTRA)

Researcher and Developer **August 2021 – May 2022**
F1tenth - VIP Project HIVE Lab with Dr. Martin, VCU *Richmond, VA*

- Created a ROS2 pipeline to evaluate IMU sensors, driving innovation in sensor integration.
- Developed automated testing workflows using Python and Robot Framework to validate multi-sensor data pipelines.
- Implemented C++ ROS2 packages for data filtering and orientation estimation, with quaternions visualization in Python.

Research Assistant **June – July 2021**
HIVE Lab with Dr. Martin, VCU *Richmond, VA*

- Built 1/10 scale autonomous vehicles using ROS, enabling advanced testing and development.
- Integrated sensors for mapping and navigation in F1Tenth vehicles and designed and 3D printed vehicle sensor mounts.

PROJECT & OTHER WORK EXPERIENCE

Lead Developer, *Discord Bot Translator – Advanced AI Research & Production System* **January 2024 – *Present***

- Designed and deployed a real-time AI voice translation system using OpenAI Whisper and DeepL APIs, with a dual-tier model architecture dynamically balancing speed and accuracy, achieving sub-second inference via CUDA acceleration.
- Engineered robust voice activity detection using adaptive thresholds and layered detection strategies, integrated into a scalable FastAPI + WebSocket infrastructure with session-based concurrency for multi-user support.
- Implemented intelligent audio buffering, session lifecycle management, and automated resource cleanup to ensure enterprise-grade performance, reliability, and uptime.
- Built an intuitive web dashboard with admin/spectator roles, translating complex AI workflows into accessible real-time controls, and maintaining full observability through modular logging and monitoring tools.

Sensors Team Lead, *Capstone Project - Autonomous Nuclear Hazard Inspection Robot, VCU* **August 2022 – May 2023**

- Led sensor integration and system architecture for a ROS-based quadruped robot using Jetson Nano, enabling autonomous radiation detection in nuclear environments.
- Integrated Kromek SIGMA-50, RPLiDAR A2, and Realsense T265 for SLAM navigation and 3D radiation heatmapping with <16% error vs. MCNP benchmarks; designed and fabricated a modular <7 kg ASA 3D-printed "backpack" within Unitree Go1 constraints.
- Conducted MCNP simulations and experimental validation, confirming 39% shielding attenuation and aligning system safety and data protocols with NRC/IAEA standards.

Sensors Team Lead, *HyperLabs at VCU* **August 2023 – March 2024**

- Led sensor integration and software development using ROS for autonomous ground vehicles.
- Spearheaded root cause analysis (RCA) and hardware/software debugging in onboarded computers in Linux
- Designed and optimized CI/CD pipelines using Git and Azure DevOps to automate integration testing of ROS systems.
- Implemented advanced sensor fusion techniques for 3D LiDAR, cameras, IMU, and wheel encoders.

Licensed Insurance Agent, *Cristel Noel - State Farm Agent* **August 2019 – December 2020**

- Managed client relationships and sales, and conducted policy, liability, and risk assessment to provide insurance solutions

INTERESTS

Robotics | DIY Electronics | 3D Printing | Archery | Piano | Guitar | Video Games