Ryan Simpson

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EDUCATION

California State Polytechnic University, Pomona - Expected June 2028 B.S. Computer Science | GPA: 3.6
Relevant Coursework: Data Structures & Algorithms, Systems Programming, Computer Organization

RESEARCH EXPERIENCE

Research Assistant: July 2025 – Present
Autonomous Systems Laboratory: Cal Poly Pomona Foundation

- Developed custom Velodyne VLP-16 LiDAR decoder and real-time perception pipeline processing 300,000+ points/second at 15+ FPS using Python, Open3D, and ROS 2 Jazzy
- Implemented occupancy grid mapping system for local navigation and obstacle avoidance on a go-kart-based autonomous platform
- Built Pure Pursuit path tracking controller and Dynamic Window Approach (DWA) local planner for autonomous navigation testing
- Integrated multi-sensor fusion across Velodyne VLP-16 LiDAR, Intel RealSense D455 stereo camera, RTK-GPS, and Xsens IMU
- Deployed YOLOPv2 neural network for real-time lane detection and drivable area segmentation with Inverse Perspective Mapping
- Researching digital twin creation methods for photorealistic reconstruction of campus driving environments

Onboarding Director: Dec 2025 – Present
Autonomous Vehicle Laboratory: Cal Poly Pomona Club

- Led technical onboarding for 8+ new lab members across five engineering disciplines, creating documentation and training materials
- Designed and deployed the official AVL website (autovehiclelab.com) as the lab's primary recruitment and documentation platform

PROJECTS

RTAB-Map SLAM Integration for Campus Mapping: 2025 – Present
Python, ROS 2 Humble, RTAB-Map, Velodyne VLP-16, Intel RealSense D455, Xsens IMU

- Configured and deployed RTAB-Map SLAM on an autonomous go-kart platform for large-scale 3D campus mapping using LiDAR-inertial odometry
- Developed ROS 2 sensor wrappers to bridge custom Python drivers with RTAB-Map, enabling multi-sensor fusion across LiDAR, stereo camera, and IMU

AVL Lab Website – autovehiclelab.com: 2025
HTML, CSS, JavaScript, Cloudflare

- Designed and deployed a responsive static website serving as the lab's primary recruitment, documentation, and outreach platform

Autonomous Robot – Science Olympiad (6th Place): July 2022

- Designed and programmed an autonomous robot to navigate a predefined course using sensor feedback and control algorithms
- Integrated Arduino microcontroller with ultrasonic and infrared sensors for real-time obstacle detection and path correction

TECHNICAL SKILLS

Languages: Python, C++, C, JavaScript, HTML/CSS, Bash
Robotics & Perception: ROS 2 Jazzy, Open3D, OpenCV, LiDAR processing, occupancy grid mapping, sensor fusion, SLAM, digital twin development
Computer Vision & ML: YOLOPv2, PyTorch, camera calibration, Inverse Perspective Mapping
Hardware: Velodyne VLP-16, Intel RealSense D455, RTK-GPS, Xsens IMU, CAN bus, Arduino
Tools: Git, Linux/Ubuntu, NVIDIA CUDA/GPU (RTX 5090), VS Code