Alejandro Arteaga

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EDUCATION

University of Southern California, Viterbi School of Engineering **Los Angeles, CA | Dec 2026**
Master of Science in Computer Science, Intelligent Robotics
GPA: 3.7/4.0 | **Awards**: University GEM Fellow, Hispanic Scholarship Fund (HSF) Scholar
Relevant Coursework: Robotics, Machine Learning, Cyber Physical Systems, 3D Graphics & Rendering, Analysis of Algorithms

Carnegie Mellon University, Mellon College of Science **Pittsburgh, PA | May 2024**
Bachelor of Science in Physics/Astrophysics, Minor in Computer Science
Relevant Coursework: Artificial Intelligence, Data Structures & Algorithms, Computer Systems, High Performance Computing

SKILLS

Python, C/C++, Linux, ROS, NVIDIA JetPack, Foxglove, Arduino, Raspberry Pi, OpenCV, PyTorch, UV, Docker, K3s Kubernetes, Jenkins, MongoDB, MySQL, PostgreSQL, SQLite, Apache Spark, OpenMPI, OpenMP, OpenACC

EXPERIENCE

Senior Robotics Software Engineer **Los Angeles, CA | Sep 2024- Present**
USC Autonomous Underwater Vehicle Design Team, RobosubSC

- Deployed lightweight K3s Kubernetes cluster across Jetson-Raspberry Pi network for low memory overhead orchestration of across containerized ROS Noetic/Melodic nodes modularizing robot software components (localization, navigation, control, etc.)
- Built robust autonomous navigation system by developing ROS package of custom 3D RRT motion planner with dynamic obstacle avoidance and cubic spline trajectory smoothing, enabling real-time path planning for 6-DOF underwater vehicle control
- Developed ROS driver for WaterLinked DVL A50 integrating acoustic-IMU sensor data (velocity, pose, altitude) into Extended Kalman Filter 3D-SLAM system and enabling power-efficient operations through programmable acoustic toggling service
- Resolved perception system stalling by diagnosing serial communication failures using Linux debugging tools (dmesg, lsusb), implementing robust udev rule corrections that achieved 99.9% sensor data reliability for IMU

Software Engineer Intern **San Diego, CA | May 2025- Aug 2025**
Qualcomm Technologies Inc, Modem Software, 5G Access Stratum Automation Integration & Test

- Implemented a modular Python test case extractor into Jenkins-based cloud testing framework to parse 5G testcase log files with regexs and populate a searchable SQL database, enabling rapid developer testing against 10,000+ daily generated test cases
- Resolved critical race condition in cloud file upload system by analyzing and debugging multiprocessing monolithic Python testing framework to identify optimal timing for log file processing, ensuring safe and reliable capture of all test execution data
- Identified existing testing framework bugs through strict schema enforcement during log parsing, improving 5G test case validity
- Documented local developer guide to enable future enhancements on test case extraction and reduce cloud resource dependency

Robotics Software Engineer **Pittsburgh, PA | Sep 2023- Aug 2024**
CMU Autonomous Underwater Vehicle Design Team, TartanAUV

- Simulated depth camera using Microsoft Kinect in ROS Gazebo, enabling obstacle avoidance based autonomous navigation tests
- Expanded training dataset of 3000+ annotated bounding boxes using CVAT for improving CenterNet object detection model
- Engineered battery monitoring firmware using Arduino-Jetson UART interface, preventing power failures with safety shutdowns
- Created HSV color detection algorithm for red objects, processing RGB feeds at 30 FPS and publishing filtered image to Rviz

Software Engineer Intern **Austin, TX | May 2023- Aug 2023**
National Instruments, Telemetry Squad

- Prototyped a containerized Extraction-Transfer-Load (ETL) pipeline running on a distributed Spark cluster for an analytics model
- Reduced ETL runtime by 90% by caching batches of Mongo data in PostgreSQL enforcing a schema for faster data aggregation
- Accelerated test-driven development with comprehensive parameterized unit tests in Pytest to design polymorphic data reducers
- Optimized cluster performance by benchmarking 4 architectures, reducing 30% processing throughput for large-scale workloads

Scientific Computing Research Assistant **Pittsburgh, PA | May 2021- May 2022**
Mellon College of Science, Department of Physics, Neutrino Physics Group

- Parallelized photodetector waveform analysis using C++ multi-threading for 90% speedup of Michel-electron distributions
- Quantified magnetic field effect on photosensor geometry with numerical analysis improving accuracy of physics simulator
- Calibrated photosensors' energy readings on a heavy-water detector using simulated vs. measured Michel-electron distributions

PROJECTS

Performance Analysis and Optimization of Direct Lidar-Inertial Odometry (DLIO) for Edge Computing **Present**

- Benchmarked real-time performance of DLIO algorithm on an NVIDIA Jetson AGX Orin edge platform, demonstrating its viability for high-sampling-rate and low-memory-footprint localization and mapping required by autonomous vehicles.
- Analyzed multi-dimensional system data (CPU load, core utilization, memory footprint, and computation time) using the default multi-threaded DLIO implementation, revealing a key performance bottleneck in the Generalized Iterative Closest Point step.

Multimodal GenAI Personal Nutrition Assistant, Qualcomm Edge AI Developer Hackathon **Jul 2025**

- Leveraged Snapdragon on-device inference of Gemma3 model with smartphone food photos and text-based user prompts
- Enhanced multimodal reasoning capabilities with RAG backend and FAISS vector database enabling accurate nutritional analysis