Roman Aguilera

Robotics & AI Engineer

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SUMMARY

Accomplished Robotics, AI, RL, and ML engineer with deep expertise in reinforcement learning, robot arm control, computer vision, and end-to-end robotics system development. Proven track record building scalable, modular, and high-quality ML/RL systems, designing custom RL environments, reward structures, and multi-link robotic control policies. Experienced integrating and debugging simulation and physical robot platforms, rapidly prototyping functional solutions under ambiguity, and developing embedded systems with C/C++ for microcontrollers. Strong foundation in classical controls and robot dynamics, with extensive hands-on experience in Python, MATLAB, PyBullet, MuJoCo, OpenAI Gym, and multi-link manipulation. Effective cross-functional communicator, mentor, and collaborator, thriving in fast-iteration, hands-on environments. Ph.D-level robotics research experience, complemented by professional training in data analytics, combined with an entrepreneurial mindset enables delivery of scalable, high-impact automation systems.

WORK EXPERIENCE

Senior AI & ML Engineering Lead

PivotalVC - August 2025 - Present

Developed AI- and ML-powered web applications, leveraging cutting-edge models to build enterprise-grade solutions across high-GDP-value domains.

- Contributed to backend AI service development using FastAPI to build scalable ML endpoints.
- Collaborated with engineers to understand system architecture and model integration.
- Explored infrastructure for scalable, maintainable, and modular ML system deployment.

Computer Vision Engineer

Confidential Robotics Startup - September 2024 - November 2024

Created an automated plant detection and performance tracking system, paired with GPS data.

- Created image data collection software in ROS framework to improve ease of use, organization, and documentation.
- Trained a neural network to detect the center points of crops on video frame images.
- Set up and calibrated the camera system in the office and field, ensuring proper image quality.

AI Robotics Researcher & Engineer

UCSB Dynamic Robotics Lab - May 2018 - June 2025

Investigated fundamental performance of RL control algorithms, as robot parts and simulation environment were changed.

- Discovered evidence to suggest that the PPO algorithm is learning motions, rather than making sense of end-goal points.
- Investigated performance of Model-Free/Model-Based Reinforcement Learning and Rapidly-Exploring Random Trees.
- Successfully trained a 32-link arm control policy such that the end effector would touch a goal point (Python, OpenAI Gym).
- Developed a Python script that automatically generates a URDF/XML model of a robot's physical properties, for an arbitrary number of links desired on a robot. URDF model was used in a simulation environment (Python, xml.etree.ElementTree Python Package).
- Created over 8 custom reinforcement learning simulation environments for a multi-link robot arms (Python, OpenAI Gym, OpenAI Baselines, Stable-Baselines 3, PyBullet Physics Simulator, Mujoco Physics Simulator).
- Applied PPO RL algorithm to perform policy search for multi-link arm control (Python, OpenAI Baselines, Stable Baselines).
- Applied RRT algorithm to perform trajectory search for multi-link robot arm control. Code works for an arbitrary number of links (MATLAB).
- Implemented Value Iteration algorithm with Barycentric Interpolation on both Gridworld and Double Integrator control problems (MATLAB).
- Performed extensive literature reviews on Reinforcement Learning, Koopman Operator Theory, and Trajectory Optimization.
- Video demonstration of results here [Link]. Research proposal here [Link].

Teaching Assistant

UC Santa Barbara - September 2020 - March 2024

Supervised sections for over 8 courses across 3 Departments: Computer Science, Electrical and Computer Engineering, and Physics.

- Robot Dynamics and Control (MATLAB), Machine Learning (Python), Introduction to Data Science II (Python), Object Oriented Design and Implementation (C++), Problem Solving with Computers II (C++), Problem Solving with Computers I (C++), Introduction to Computer Science (Python), Introductory Experimental Physics.
- Created solutions for homework and lab assignments, hosted sections and office hours, and graded assignments.

Research Mentor

UCSB CSEP & EUREKA Scholars Program - June 2020 – August 2020

Supervised undergraduate mentee in their summer research project.

- Taught basic concepts in Object-Oriented Programming, Python, Reinforcement Learning, and PyBullet.
- Met with undergraduate mentee at least 2 times per week to ensure adequate progress.

Embedded Systems Researcher & Engineer

UCSD Neural Interaction Lab - December 2014 – October 2016

Created a prototype wireless sensor that sends real time skin flexion information to smart phone application.

- Integrated Bluetooth Low Energy (BLE) capabilities from PSoC4 onto wearable microelectronic biosensors.
- Optimized BLE capabilities of microelectronics using C Programming and PSoC Creator integrated development environment.
- Researched, designed, built and validated microelectronic circuits for different wearable biosensor applications.

PROJECT EXPERIENCE

COOP Data Analytics Projects [Link]

Coop Careers - August 2025 - Present

Data Analytics Dashboards in Tableau for recommended modifications to stakeholder strategies. (Tableau)

RTOS4ROBOTS: Hard Real-Time Operating Systems for Robots [Link]

Runtime Systems Course - January 2020 – March 2020

Compiled a hard-real time Kernel based off Xenomai and Ubuntu for time critical applications. (Linux shell scripting).

Pixel-RNN

Computer Vision Course - January 2020 – March 2020

Implemented the Pixel Recurrent Neural Network algorithm for image generation. (PyTorch).

SKILLS

- **Programming Languages:** C++/C, Python, MATLAB, Racket/Rosette, R, PSPICE, MIPS R2000 Assembly
- **Software Tools:** FastAPI, OpenAI Gym, OpenAI Baselines, Stable-Baselines 3, RLlib, PyBullet, Mujoco, Godot, Unreal Engine, PyTorch, TensorFlow, Xenomai, Ubuntu, Linux, Vim, Roboflow, ROS, CVXPY, SQL, Tableau
- **Algorithms:** Model Free Reinforcement Learning, PID Control, Rapidly Exploring Random Trees

EDUCATION

Fellow,
Data Analytics

Coop Careers
(July 2025 - Present)

Ph.D. Computer Science,
Robotics and Machine Learning

UC Santa Barbara
(January 2018 – June 2024)

(All-But-Dissertation,
Left due to Lack of Funding)

M.S. Computer Science,
Robotics and Machine Learning

UC Santa Barbara
(January 2024 – June 2024)

B.S. Electrical Engineering,
Machine Learning and Controls

UC San Diego
(July 2012 – December 2017)

PUBLICATIONS

(Co-author) Scalable manufacturing of solderable and stretchable physiologic sensing systems. Advanced materials, 29 39, 2017.

VOLUNTEER WORK

Coffee Hour Seminar Host / Social Chair

UCSB Computer Science Graduate Student Committee - June 2020 – June 2021

Organized external and internal guest speakers to present their research at the UCSB Computer Science Coffee Hour. Guest speakers were a mix of Professors, Post-Docs, and Graduate Students and presented on a variety of topics.

Communications Chair

National Society of Black Engineers - June 2016 - June 2017

Sent out communications Emails, tabled, and gave advice to address critical need for participation in NSBE on campus.

Elementary School Outrech Chair

Society of Hispanic Professional Engineers - June 2014 – June 2015

Created science project curriculum from scratch that engaged 6^{th} graders who were under-performing in math compared to their peers.