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 2024

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	Ph.D. Computer Science, Robotics and Machine Learning	M.S. Computer Science, Robotics and Machine Learning	B.S. Electrical Engineering, Machine Learning and Controls
Coop Careers (July 2025 - Decmeber 2025)	UC Santa Barbara (January 2018 – June 2024)	UC Santa Barbara (January 2024 – June 2024)	UC San Diego (July 2012 – December 2017)
	(All-But-Dissertation, Left due to Lack of Funding)		

PUBLICATIONS

(First Author): Understanding Reinforcement Learning Behavior in High-Degree-Of-Freedom Robotic Systems. 2023. [Link]

(First Author): High Dimemsionality, Value Iteration, and Barycentric Interpolation in Robotic Control. June 2024. [Link]

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

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 6th graders who were under-performing in math compared to their peers.