Arturo M. Flores Alvarez

AMAZON AI PHD FELLOW

Los Angeles, CA | afloresa@ucla.edu | +1 (310) 926-1381 | Portfolio | LinkedIn | Google Scholar

EDUCATION

University of California, Los Angeles (UCLA) *California, United States*

PhD Candidate, Mechanical Engineering (Systems & Control + Robotics) — PI: Dr. Dennis Hong; M.S. conferred Spring 2024 *Sep 2022 – Jun 2028*

- Teaching Assistant: Introduction to MATLAB (undergraduate) and Kinematics of Robotic Systems (graduate).

Swiss Federal Institute of Technology, Zurich (ETH) *Zurich, Switzerland*

RobotX Fellowship (acceptance ratio: 8.9%) + Visiting Researcher, Spring 2024 *Jul 2023 – Aug 2023*

Universidad Nacional de Ingeniería (UNI) *Lima, Peru*

B.Sc. in Mechatronics Engineering, Engineer Title — Dissertation 19/20; PPA 13.714/20 ("Very Good", literal scale "A") *Mar 2014 – Sep 2020*

RESEARCH EXPERIENCE

University of California, Los Angeles — Humanoid Robotics *California, US*

Graduate Researcher, Robotics and Mechanisms Laboratory (RoMeLa) *Jan 2023 – Present*

Reinforcement Learning & Software Lead — RoboCup 2026 (Booster T1)

- Leading the RoboCup software team for the Booster T1 humanoid, architecting migration from a model-based ROS2 Foxy stack (ARTEMIS) to a learning-based ROS2 Humble stack, integrating mid-level path planning, behavior-tree task execution, perception, and localization into a unified autonomy pipeline.
- Developing an end-to-end RL locomotion pipeline in Isaac Gym (GPU-accelerated) with domain randomization, sim-to-real transfer via per-joint sysID and optimization-based dynamics calibration in MuJoCo, and sim2sim validation in mjlab across progressive terrain curricula and disturbance profiles.
- Built a full soccer-field simulation environment in MuJoCo for end-to-end validation of locomotion, planning, and perception prior to hardware deployment.
- Integrating multi-skill RL policies for autonomous soccer play using Adversarial Motion Priors (AMP) and curriculum learning, combining dynamic locomotion and kicking with policy switching for skill transitions.

Full-Stack Humanoid Control — High-Torque Humanoid

- Developing a C++ ROS2 software stack including hardware integration, multi-threaded state estimation, RL-based locomotion control, and template-model-based adaptation for robust real-time walking during hardware development cycles.
- Implementing cross-compiled embedded software for motor controllers, sensor fusion, and real-time control loops using modern C++ (C++17/20) on Linux targets.

Computer Vision for Soccer Humanoids — RoboCup 2024 (Winner, Adult Size, Eindhoven)

- Implemented a customized YOLOv5/YOLOv8 network on ARTEMIS (demo) for real-time detection and depth sensing of soccer-field landmarks (RoboCup 2023, Bordeaux).
- Developed a real-time ball-tracking system on the humanoid's neck mechanism using ROS2, PyTorch, TensorRT, and PyBEAR.
- Enhanced a public dataset for custom object detection via semi-supervised labeling and Roboflow augmentation, enabling fast on-site fine-tuning during competition.

Humanoids for the Entertainment Industry — Netflix

- Developed a C++17/Python stack for upper-body control of a medium-sized humanoid (demo) with a finite state machine for lifelike motion and safe interaction, using Gazebo, ROS1/2, MoveIt, and OMPL, deployed in Docker for global exhibitions (Comic Con New York, London, Lucca 2024).
- Built a C++ ONNX sim2real pipeline deploying imitation-learning policies for balancing and walking.
- Developed ChatEMIS, a fully offline RAG conversational AI system for RoMeLa's humanoids on Jetson Orin Nano with compact LLMs (GitHub | demo).

ETH Zurich — Deep Reinforcement Learning *Zurich, Switzerland*

RobotX Fellow & Visiting Researcher, Computational Robotics Laboratory (CRL) *Jul 2023 – Present*

References: Prof. Stelian Coros, Dr. Fan Shi

- Developed a deep RL solution teaching a Robotis OP3/OP2 humanoid to kick a ball in a soccer environment (demo); validated in simulation and on hardware using Legged Gym and PyTorch, with libtorch for hardware deployment.
- Developed multi-skill policies using Generative Adversarial Motion Priors for human-like motion in diverse, dynamic real-world conditions; ongoing deployment leverages C++ onnxruntime (sim).

Universidade Estadual de Campinas — Control Systems *Campinas, Brazil*

Undergraduate Research Intern — References: Prof. Grace S. Deaecto, Dr. Lucas N. Egidio *Aug 2019 – Dec 2019*

- Created a switched cooperative control technique for networked systems using a time-varying Lyapunov function and linear matrix inequalities.
- Implemented the technique in real time on a Quanser inverted pendulum and active suspension using MATLAB/Simulink; results published as a journal article.

Professional Experience

Amazon Industrial Robotics Group — Humanoid Whole-Body Control *North Reading, MA, US*
Applied Scientist II Intern — Advisors: Prof. Aaron Ames, Prof. Nima Fazeli *Jun 2026 – Sep 2026*

- Developed whole-body control for forceful humanoid locomanipulation using MPC, control barrier functions, and RL.
- Trained RL policies on Lambda cloud nodes with 8× NVIDIA H100 GPUs per run, using Kubernetes for job submission and cloud tools for evaluation and rapid experimentation.
- Built an automated mjlab batch-evaluation suite to benchmark whole-body controllers on forceful tasks.
- Co-led two research projects submitted to ICRA 2027 and demonstrated whole-body controllers to VP-level leadership.

Institute for Human and Machine Cognition (IHMC) — Humanoid Whole-Body Control *Pensacola, US*
Humanoid Robotics Software Intern — References: Dr. Beomyeong Park, Dr. Robert Griffin *Jul 2025 – Sep 2025*

- Led hardware bring-up of the H1-2 whole-body control stack, conducting real-time debugging and torque-control parameter optimization to improve stability and locomotion through iterative testing, log analysis, and documentation.
- Developed a Whole-Body Model Predictive Control (WBMPC) robustness testing framework with progressive disturbance evaluation and optimized footstep generation, improving simulated locomotion stability across the Nadia and H1-2 humanoids.
- Integrated command functionality between WBMPC and IHMC's proprietary simulators in Java, and developed real-time embedded control interfaces for teleoperation and automated experiment logging.

Publications & Technical Work

Journal Publications

"A Hierarchical, Model-Based System for High-Performance Humanoid Soccer." *Advanced Intelligent Systems*. Accepted for publication. **Coauthor.** (DOI)

Flores, A. M., Egidio, L. N., Deaecto, G. S. "Cooperative Networked Control Based on a Time-Varying Lyapunov Function." *Journal of Control, Automation and Electrical Systems* 32, Springer, 533–542, 2021. (link)

Conference Publications

Dang, A.*, **Flores, A. M.***, et al. "HULK: Learning Whole-Body Forceful Loco-Manipulation for Humanoids." Under review, submitted to *IEEE ICRA*, 2027 — work done during Amazon Robotics internship.

Gonzales, J., **Flores, A. M.**, et al. "LIMBO: Learning and Internalizing Model-Free Barrier Objectives for Agile and Safe Whole-Body Control." Under review, submitted to *IEEE ICRA*, 2027 — work done during Amazon Robotics internship.

Flores, A. M., Lintu, N., et al. "Around the World: Unified Learned Locomotion on a 270 g Continuous-Rotation Quadruped." Under review, submitted to *IEEE ICRA*, 2027.

Flores, A. M., Zargarbashi, F., Liu, H., et al. "Learning to Walk in Costume: Adversarial Motion Priors for Aesthetically Constrained Humanoids." Contributed Paper, *IEEE Humanoids*, 2025.

Liu, H., Zhu, M., **Flores, A. M.**, et al. "From Screen to Stage: Kid Cosmo, A Life-Like, Torque-Controlled Humanoid for Entertainment Robotics." Contributed Paper, *IEEE Humanoids*, 2025 — **Mike Stilman Award**.

Flores, A. M., Morales, A., Campos, G., Gelso, J. "Energy Efficiency Using IOTA Tangle for Greenhouse Agriculture." *Information Management and Big Data, SIMBig 2021*, CCIS vol. 1577, Springer, 2022. (link)

Cevallos, B., Jamanca, G., Napan, J., **Flores, A. M.**, Vásquez, Y. "FISHER-X: A Bioinspired Robotic Alternative for the Exploration of the Oceanic Environment on a Jupiter's Moon." *IAC*, 2022. (link)

* Equal contribution.

Conference Exhibitions

Zhu, M., Liu, H., **Flores, A. M.**, et al. "Kid COSMO: A Humanoid Robot Movie Character." *ICRA 2025 EXPO* — **Best Exhibition Award Winner**.

Reviewer: IEEE Robotics and Automation Letters (RA-L).

Honors, Scholarships & Awards

Humanoid Free Walk Winner, IEEE RAS — Austin, Texas *Dec 2023*

- First place at the IEEE-RAS International Conference on Humanoid Robots 2023, with full sponsorship by UCLA; the fastest humanoid in the world.

Research Experience for Peruvian Undergraduates (REPU) — Computer Science *Dec 2021*

- Highly selective national research program placing top Peruvian undergraduates in leading institutions worldwide.

Telemetry Award — NASA *Apr 2019*

- Best telemetry proposal at the NASA Human Exploration Rover Challenge, Huntsville, Alabama.

Specialization Courses

CUDA Parallel Programming on NVIDIA GPUs, Udemy (certificate) *Mar 2025 – Apr 2025*
GPU architecture, CUDA programming, memory optimization, and parallel processing on Windows and Linux.