Arturo Flores Alvarez

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EDUCATION

University of California, Los Angeles (UCLA) – California, United States *Sep,2022 – 2027*

Candidate in PhD Mechanical Engineering (Systems & Control+ Robotics) – PI: Dr. Dennis Hong

Master's in Mechanical Engineering conferred in Spring 2024

- Teacher Assistant: Introduction to MATLAB (undergrad) and Kinematics of Robotics Systems (grad)

Swiss Federal Institute of Technology, Zurich (ETH) – Zurich, Switzerland Jul 2023 – Aug, 2023

RobotX Fellowship – (Acceptance ratio: 8.9%) + Visiting Researcher in S24

Universidad Nacional de Ingeniería (UNI) – Lima, Peru *Mar, 2014 – Sep, 2020*

Bachelor of Science in Mechatronics Engineering, Engineer Title (Academic Qualification – Dissertation: 19/20)

PPA: 13.714/20 (commendation of 'Very Good', literal scale 'A': References on my Transcript)

RESEARCH EXPERIENCE

ETH, Zurich – Deep Reinforcement Learning **Zurich, Switzerland**

RobotX Fellowship - Computational Robotics Laboratory (CRL) *July 2023 – Ongoing*

References: PhD. Stelian Coros, PhD. Fan Shi

- Developed a Deep Reinforcement Learning (RL) solution to teach a simulated Robotis OP3/OP2 humanoid robot how to kick a ball in a Soccer Environment (demo). Simulated and Implemented on Hardware.
- Utilized Legged Gym library, and Pytorch for simulation and training, and libtorch for hardware implementation.

Visiting Researcher - Computational Robotics Laboratory (CRL)

- Developed multi-skill policies for a humanoid using Generative Adversarial Motion Priors to achieve human-like motion in diverse, dynamic real-world conditions; ongoing implementation leverages C++ onnxruntime (sim)

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

Graduate Research Experience – Robotics and Mechanisms Laboratory (RoMeLa) *Jan, 2023 – Ongoing*

Computer Vision for Soccer Humanoids – RoboCup ***(Winner, Adult Size Humanoid Soccer, RoboCup 2024 Eindhoven)***

- Implemented a customized Yolov5/Yolov8 neural network in the robot Artemis (demo) for real-time detection and depth-sensing of soccer-field landmarks (RoboCup 2023 – Bordeaux, France).
- Developed and implemented a real-time ball tracking system on a humanoid robot's neck mechanism to enhance performance during soccer matches of Artemis using ROS2, Pytorch, TensorRT an PyBEAR.
- Enhanced a public dataset for custom object detection in robotics using semi-supervised labeling and Roboflow augmentation, enabling fast on-site model fine-tuning for the competition

Humanoids for Entertainment Industry – Netflix

- Developed a Python/C++ software stack for upper-body control of a medium-sized humanoid (demo), incorporating a finite state machine for lifelike movement and safe interaction and transitions, using Gazebo, ROS1/2, Moveit, and OMPL, deployed in Docker for real-time operation and global exhibitions (Comic Con New York, London, Lucca 2024).
- Developed a C++ ONNX sim2real pipeline to deploy imitation learning for robot balancing and walking policy.

University of Rhode Island – Artificial Intelligence ***Rhode Island, US***

Undergraduate Research Experience – Research Intern *Dec, 2021– Mar, 2022*

References: PhD. Marco Alvarez

- Carried a deep study of MLP-Mixer'srepresentations using Centered Kernel Alignment as a similarity measure
- Demonstrated that this Google AI architecture had recurrent ill-condition patterns in their last layers and presented the results during an AI workshop.
- Worked under the framework of TensorFlow with GPU acceleration, CKA Google library, Scipy, and Matplotlib.

Universidade Estadual de Campinas – Control Scientist ***Campinas, Brazil***

Undergraduate Research Experience – Research Intern *Aug, 2019– Dec, 2019*

References: PhD. Grace S. Deaecto, PhD. Lucas N. Egidio

- Created a switched cooperative control technique for networked systems using a time-varying Lyapunov function and linear matrix inequalities.
- Demonstrated that this approach was less computationally expensive to solve than state-of-art techniques.
- Implemented this technique in real-time in an Inverted Pendulum and an Active Suspension of Quanser, using MATLAB and Simulink and wrote a scientific article.

INDUSTRY EXPERIENCE

AGP eGlass Group – Glazing Technology for Luxury Automotive Industry ***Lima, Peru***

Professional Experience – Research & Development Intern *Oct, 2020 – Jun, 2021*

References: Eng. Ian Riofrio

- Designed several innovative prototypes for a glass connector with embedded photovoltaics technology and its manufacturing process for an awarded program with the Swedish car manufacturer Volvo.
- Validated experimental solutions for the technologic line of Lux Fractal – ambient car lightning systems –using glass embedded electronic light sources and microcontrollers for ambient lighting of Tesla cars.
- Showcased AGP's prototypes during its worldwide exhibitions.

PUBLICATIONS

Journal Publications

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)

Pisfil Puicón, P. A., **Flores Alvarez, A. M.**, "Controlador difuso de velocidad para un motor DC con escobillas", *Revista UNIDA científica*, vol. 5, 1rst edn., pp. 1-8, July, 2021 (link)

Mendoza Vargas, G. A., **Flores Alvarez, A. M.**, "Diseño y simulación de un manipulador robótico de 5 GDL para rovers y otros vehículos menores según lineamientos del concurso European Rover Challenge", *Revista UNIDA científica*, vol. 5, 2nd edn., July, 2021(link)

Aparicio Palomino, H. D., **Flores Alvarez, A. M.**, "Uso del material UTP y estimación de cargas para el diseño de una rueda UPTIS", *Revista UNIDA científica*, vol. 4, 2nd edn., January, 2021 (link)

Conference Publications

Flores, A. M., Morales, A., Campos, G., Gelso, J., "Energy Efficiency Using IOTA Tangle for Greenhouse Agriculture ". Information Management and Big Data. SIMBig 2021, *Communications in Computer and Information Science*, vol 1577. Springer, April, 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". *International Astronautical Congress*, September, 2022 (link)

Undergraduate Thesis

Flores, A. M., "Cooperative Control of Dynamical Systems Based on a Time-Varying Lyapunov Function: Experimental Implementation in an Inverted Pendulum and an Active Suspension", Undergraduate Thesis, *School of Mechanical Engineering – UNICAMP*, 2019 (link)

HONORS, SCHOLARSHIPS, AWARDS

Humanoid Free Walk Winner IEEE RAS – Austin, Texas Dec, 2023

First place in the competition organized at the International Conference of Humanoid Robots IEEE -RAS 2023. Full sponsorship by UCLA. The fastest humanoid in the world.

Research Intern in Research Experience for Peruvian Undergraduates (REPU) – Computer Science *Dec, 2021*

Research program that complements the education of talented Peruvian undergraduate students by organizing scientific research internships in the best institutions of the world. Extremely competitive selection process. Host Institution: *The University of Rhode Island* - Topic: *Optimization of Neural Networks.*

AGP Kaizen Ideas Winner: 3D-printed tool for fast alignment of automotive connectors *Mar, 2021*

Recognition for innovative ideas that can improve production processes of AGP eGlass products.

European Rover Challenge 2020 finalist – ESA *Aug, 2020*

Finalist in the Poland space robotics competition sponsored by ESA. Final results: 18TH place from 40 competitors around the world.

MIT COVID-19 LATAM Challenge winner *Jun, 2020*

Winner in the track 'G' Education for the proposal 'Teachers4Teachers'

Financial grant for research internship in Brasil *Aug, 2019*

Full financial support granted by Universidad Nacional de Ingenieria due to outstanding academic performance. Scholarship: 2212 USD

Telemetry Award - NASA *Apr, 2019*

Best Telemetry proposal in the Human Exploration Rover Challenge -NASA 2019 organized in Huntsville, Alabama.