Arturo Flores Alvarez

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EDUCATION

University of California, Los Angeles (UCLA) – California, United States *Sep,2022 – 2024*

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

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

RobotX Fellow – Host Lab: Computational Robotics Laboratory (Acceptance ratio: 8.9%).

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)

TEACHING EXPERIENCE

Teaching Assistant

University of California, Los Angeles

- *'Introduction to Programming with MATLAB' (Dr. Edward Gao)- Undergraduate* *Jan, 2023*
- *'Kinematics of Robotics Systems' (Dr. Dennis Hong) - Graduate.* *Sep, 2023*

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 humanoid robot how to kick a ball in a Soccer Environment (Demo).
- Utilized Nvidia Isaac Gym, Legged Gym Repo (RSL), and Pytorch frameworks to facilitate simulation and training.

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

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

References: PhD. Dennis Hong

- Implemented a customized Yolov5 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 real-time ball tracking on a humanoid robot's neck mechanism to enhance performance during soccer matches of Artemis using ROS2.
- Enhanced a public dataset for customized object detection in robotics applications using semi-supervised learning with Roboflow augmentation.

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's representations 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.

PumiiPeru & UNIDA Paraguay University – Space Robotics undergraduate project ***Lima, Peru***

Undergraduate Research Experience – Research Lead *Dec, 2019– Oct, 2020*

References: *Eng. Manuel Luque Casanave*

- Designed an autonomous Rover integrated with a drilling system, an algorithm for 3D reconstruction of the environment, and a core sample extraction tool presented at the European Rover Challenge 2020 (Finalist).

- Designed and implemented the autonomous application for the Rover using ROS Melodic, Gazebo, Rviz, Matlab ROS toolbox, OpenCV, and rtab-map.
- Deployed solution using a ZED2, an Intel RealSense D435i camera, and the computing device Jetson TX2.
- Controlled remotely a Leo Rover in a Poland Mars Yard using Freedom Robotics.
- Developed lectures for beginners in ROS (Project ROSvers: GitHub)
- Co-authored 3 articles related to the solutions presented for this contest.

INDUSTRY EXPERIENCE

ZIGNAR Technologies & IRIS – Field Robotics ***Canada (remote)***

Professional Experience - Robotics and Artificial Intelligence Intern *May, 2021 – Nov, 2021*

References: Eng. Gianfranco Campos, Eng. Julio Canahuire,

- Deployed the project Interplanetary Precision Agriculture (IPA) during a Proof of Concept at the greenhouse in the Mojave Desert (Demo). IPA is an integral, end-to-end solution that seeks to automate the monitoring, production, and commercialization of agriculture processes on Earth and in outer space
- Developed the computer vision of a 17x17x16 inch holonomic robot using a Mask R-CNN algorithm for the recognition and counting of grapes and tomatoes (crop monitoring)
- Collected valuable crop data and observations during the Proof of Concept for the improvement of IPA and communicated the results during the SIMBig 2021 conference.
- Programmed the robotics software and deep learning algorithms using ROS Melodic in Ubuntu 18.0, and the framework of Pytorch and TensorFlow.

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.
- Managed and monitored the whole construction of a 16 ft x 13 ft electronics laboratory intended for the exclusive construction of automotive connectors. Designed in Autodesk Inventor all the furniture for this lab.
- Controlled R&D prototypes to showcase AGP's technologies 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

Financial grant for RoboCup – Bordeaux, France *Jul, 2023*
Received full sponsorship from UCLA, including all expenses covered, to represent as a participant and serve as the Computer Vision Lead for RoboCup 2023 in France.

Distinguished dissertation for the Engineer Title *Aug, 2022*
Excellence (final grade 19/20) during the presentation of the undergraduate thesis: "Design of a teaching module of co-operative control in a network of dynamic systems based on Lyapunov functions for the improvement of teaching in control and automation laboratories" (Mechatronic Engineer Title)

Postgraduate School Offers for MS in United States *Mar, 2022*
Universities: University of California Los Angeles, Colorado School of Mines, University of California Santa Barbara, Oregon State University, University of Rhode Island.

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 - US*, Advisor: *Professor Marco Alvarez*, 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.

Financial grant for an international competition *Apr, 2019*
Partial financial grant of Engie Energia Company for travel expenses at the Human Exploration Rover Challenge 2019. Scholarship: 1000 USD

TECHNICAL SKILLS

Equipment | Inverted Pendulum (Quanser), Active Suspension (Quanser), Dexter (Haddington Dynamics), ProMetric I Colorimeter (Radiant Vision Systems)
DevOps| VS Code, Sublime, Docker, Google Cloud Console, AWS S3, AWS Kinetic, Git, GitHub
Artificial Intelligence| TensorFlow**,** Pytorch, Keras, OpenCV, MaskRCNN, YoloV3, fbprophet, pmdarima, scikit-learn
Robotics | Jetson TX2, Intel RealSense D435i, ZED camera, see3CAM_CU20, RP Lidar A3, Raspberry, ROS Melodic and Kinetic, RViz, Gazebo, rtabmap_ros, Freedom Robotics, Dexter Development Environment
Software & CAD| C, C++, Python, Java, Latex, MATLAB, Simulink, LabView, COMSOL, PLC-SIM, AutoCAD, SolidWorks, Inventor, Protheus,
Microcontrollers| Arduino boards and sensors, Adafruit boards and sensors**,** PIC 16F877A**,** Teensy 4.0, STM 32
Language | Spanish (Native Proficiency), English (Full working Proficiency), Portuguese (Working Proficiency)
Editing Programs | Photoshop, Camtasia Studio 9

SPECIALIZATIONS & COURSES

NASA L'SPACE - Proposal writing & evaluation experience *May, 2023 – Jun, 2023*
Academy – Mentee
NASA-sponsored workforce development program designed to teach proposal writing and evaluation, and enhance effective teaming practices and soft skills

Deep Learning with Keras *Jul, 2021*

Information and Communications Technology Center (CTIC) - UNI
Specialization in Artificial Intelligence in the design and optimization techniques of Deep Neural Networks, Convolutional Neural Networks, and Recurrent Neural Networks

- Worked with the framework of Google Cloud Console, Keras, TensorFlow, and Visual Studio

MMAARS Virtual Training Level I *Mar, 2021*

Mars-Moon Astronautics Academy & Research Science (MMAARS)
Interactive course that prepares the participant for a selection into a MMAARS Low Fidelity Analog Astronaut mission -

'***How to write in English a scientific article' – Ph.D. Erick Garcia Garcia*** *Jan, 2021*
Casa de Lletres

Robot Operating System (ROS) for Beginners I, II module *May, 2020*
Udemy

EXTRA-CURRICULAR ACTIVITIES

Space Generation Advisory Council – United Nations (UN) *2022 – Ongoing*

Project Leader in the ROADMAP Team

The ROADMAP committee is a research group that aims to provide an opportunity for students and young professionals to think about current space exploration roadmaps and let their voices be heard at the UN forums.

Speaker in Competitive Debate Formats *2016 – 2019*
Founder/Captain of the UNI Debate Club
Interdisciplinary group that fosters the teaching of critical thinking and oratory among my university community. Active participant in national and international Debate competitions.

Student Branch of American Society of Mechanical Engineers (ASME) *2016 – 2020*
Secretary
Student branch that organizes talks, technical visits to power plants, and multidisciplinary projects in the School of Mechanical Engineering of the Universidad Nacional de Ingenieria. Plus, it encourages active participation in engineering projects for students of our university.

Hablemos de Cambio Member 2017 – *2020*
Active Member
Interuniversity organization that generates spaces for interuniversity dialogue where undergraduate students are motivated to propose innovative social solutions to mitigate the main social, political, and education issues of Peruvian society.
Positions in the organization: Active member in User Experience, in Alliances & Fundraising, and in Human Resources.

MEDIA MENTIONS

Meet ARTEMIS – the soccer-playing robot created by UCLA researchers (link) *May, 2023*

Peruvian researchers design robot fish to search for life on Jupiter's moon Europa (link) *Oct, 2022*

Interview by the Official newspaper from the Peru State "El Peruano" (link) *Aug,2022*

Astronauta Análogo Peruano (Scientific meeting UNAC, Peru) *Nov,2021*
Keynote speaker (link)

El multiverso de las oportunidades (Microsoft Learn Student Ambassadors - Americas) *Oct, 2021*
Keynote speaker (link min 6:25)

¡Houston! El cielo ya no es el límite (Inspirate UNI) *Dec, 2020*
Keynote Speaker (link)