LUISA CHAVEZ VASQUEZ

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EDUCATION

North Carolina State University — Raleigh, USA
Master of Science in Electrical Engineering, **GPA: 4.00** — August 2025 - May 2027
Relevant Coursework: Robotics and Autonomous Systems, Software for Robotics, Control Systems Engineering, Neural Networks, Quantum Computing

Universidad Peruana de Ciencias Aplicadas — Lima, Perú
B.S., in Mechatronics Engineering, **GPA: 3.77** — December 2020

SKILLS

Programming: Python, C++, MATLAB
Machine Learning: PyTorch, Neural Networks, Model Evaluation
Robotics & Simulation: CoppeliaSim, ROS, RRT*, Control Systems
Engineering Tools: ANSYS, AutoCAD, Fusion 360

PROJECTS

AI-Based Recycling Sorting System using Delta Robot (IRB360) [GitHub]
- Designed and simulated an automated waste-sorting system for cardboard, metal, plastic, and glass using a delta robot (ABB IRB360)
- Developed a perception-to-action pipeline integrating a linear camera, proximity sensors, and conveyor system in CoppeliaSim
- Connected simulation with a pre-trained lightweight CNN (FOCUS-RCNet) via Python API for real-time material classification
- Enabled end-to-end robotic sorting in simulation, demonstrating integration of computer vision and robotic manipulation.

Obstacle-Aware Quadrotor Navigation using RRT* and CLF-CBF-QP Control [GitHub]
- Developed an obstacle-aware quadrotor navigation system integrating 3D RRT* path planning with CLF-CBF-QP safety-critical control
- Achieved zero safety violations by enforcing control barrier function constraints, maintaining minimum obstacle clearance above 0.8 m
- Improved trajectory stability and tracking accuracy compared to PD baseline, reducing oscillations and ensuring smooth altitude control
- Implemented real-time optimization-based control using quadratic programming in MATLAB with CoppeliaSim integration (20 Hz control loop).

Robust CNN-Based Plant Disease Classification Under Distribution Shift [GitHub]
- Developed CNN and logistic regression models for plant disease classification using the PlantVillage dataset.
- Implemented leaf-level splitting to prevent data leakage and evaluated robustness under real-world distribution shifts.
- Performed robustness, calibration, and generalization analysis under noise, blur, and segmented-image conditions.

SenseAhead Smart Shirt: Wearable Health Monitoring System [GitHub]
- Developed a wearable vital-sign monitoring system integrating ECG, SpO2, temperature, and IMU sensors using Arduino UNO R4 Wi-Fi.
- Validated system performance through multi-activity experiments, demonstrating stable physiological readings and real-time motion segmentation.
- Implemented real-time data acquisition, signal processing, and web-based visualization for continuous health monitoring.
- Designed a multi-sensor fusion architecture improving robustness against motion artifacts in dynamic environments.

Generalized Quantum Signal Processing for Hamiltonian Simulation
- Implemented Generalized Quantum Signal Processing (GQSP) for Hamiltonian simulation, removing parity constraints of standard QSP.
- Analyzed approximation accuracy as a function of polynomial degree for quantum time evolution operators.
- Developed optimization-based methods (COBYLA, L-BFGS) for phase angle synthesis in polynomial transformations.
- Evaluated computational complexity scaling up to O(n^3 d^2), identifying limitations of classical simulation for high-dimensional systems.

PATENTS

Firefighting and Fire Control Robot to Support the Fire Department [Website]
Patent Number: PE429131649 Publication date: April 24, 2024 Institution: OMPI, Peru
Description: A mechatronic system designed to extinguish fires in urban areas. The system features a robust metal support structure housing all components of the robot, providing innovative support for firefighting efforts.

RELEVANT EXPERIENCE

Siemens — Lima, Peru
Process Automation Trainee — September 2021 – May 2022
- Provided technical support to end-customers and solution partners in Perú and Bolivia.
- Advised on configuration, characteristics, and application of Siemens equipment.
- Selection of instrumentation equipment according to applications in sanitation, oil & gas, food & beverage, and mining industries.

- Prepared material and demonstrations related to equipment in the Process Instrumentation area.

Emerson Process Management Lima, Peru
Inside Sales April 2020 – December 2020

- Participation in the development of technical and economic proposals for mechanical and electronic equipment for the food, oil, mining, and energy industries.
- Involvement in the technical review of purchase orders.
- Review of technical sheets, datasheets, and catalogs of mechanical and electronic equipment for proposal preparation.
- Sizing and selection of Industrial Instrumentation equipment (Level, Pressure, Temperature, Flow, Analytics) based on applications or specifications. Industries: Mining, Oil & Gas, Energy, Food.

SOFTWARE EXPERIENCE

BBVA bank Lima, Peru
Analyst Software Engineer October 2022 – December 2022

- Participated in project refinement and onboarding processes.
- Provided post-production support to the developments deployed.
- Worked within the agile framework in project development.

GeoVictoria Lima, Peru
Junior Developer May 2022 – October 2022

- Assisted team leader with programming/coding aspects.
- Learned base codes from the integration team.
- Troubleshooting, updating, and applying improvements in programs.
- Use of the GeoVictoria API for integration with other assistance services used by the clients.

PUBLICATIONS

Chávez, Luisa & Cortez, Angel & Vinces, Leonardo. (2022). A Strategy of Potential Fields and Neural Networks in the Control of an Autonomous Vehicle Within Dangerous Environments. DOI: 10.1007/978-3-031-08545-1_43.
Description: Explores an innovative strategy combining potential fields and neural networks for autonomous vehicle navigation in hazardous environments. [Website]