Alvaro Daniel Callata Suxo

R&D-Focused Mechatronics Engineer — Robotics, CAD & BioTech

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Summary

Mechatronics engineer with hands-on experience in mechanical design, robotics, and applied research. Led and contributed to national and academic projects, including Bolivia's first CubeSat selected by UNOOSA and neural network-based trajectory prediction for satellite and Astrobee missions. Authored and presented peer-reviewed papers on additive manufacturing and STEM outreach. Experienced in CAD, prototyping, system simulation, and technical documentation, with SolidWorks certifications (CSWA, additive manufacturing, sustainability). Seeking opportunities to contribute to interdisciplinary projects in robotics, AI, and intelligent systems.

Education

Universidad Mayor de San Andrés (UMSA) **2025 – Present**

Bachelor of Science in Biology (in progress) *La Paz, Bolivia*

- Engineering consultant at the Limnology Unit, applying mechatronics principles to develop bio-inspired systems, particularly in aquatic environments.
- Research intern at the Limnology Unit, focusing on aquatic ecology and bio-inspired robotics. Exploring freshwater ecosystems with applications in aquatic robotics and environmental automation.

Universidad Católica Boliviana "San Pablo" **Feb. 2019 – Jul. 2024**

Bachelor of Engineering in Mechatronics Engineering *GPA: 3.06/4.0* *La Paz, Bolivia*

- Graduated *Magna Cum Laude*. Thesis Score: 3.88/4.0.
- Long-time member of the university's R&D Center, participating in multiple robotics and automation projects.
- Team representative at NASA Human Exploration Rover Challenge, awarded 'Most Improved Performance'.

Research & Conference Publications

1st Author: *Mechanical Design and Testing of 3D-Printed Non-Pneumatic Wheels for Human-Powered Vehicles: A NASA HERC Case Study.*
Presented at the 23rd LACCEI International Multi-Conference for Engineering, Education and Technology, 2025.

2nd Author: *Additive Manufacturing for Tire Treads Design for Outer Space Challenging Terrains. Case: NASA HERC.*
Presented at the Casablanca International Conference on Additive Manufacturing (CASICAM), 2025.

4th Author: *STEM Program Management and Outreach in Different Locations of a Country. Case: Bolivian NASA HERC STEM Activities.*
Presented at the IEEE Integrated STEM Education Conference (ISEC), 2025.

Experience

Limnology Unit – Universidad Mayor de San Andrés **La Paz, Bolivia**

Engineering Consultant *Jul. 2025 – Present*

- Thesis supervisor on the development of a low-cost research facility for zebrafish that integrates IoT-based water quality monitoring and automation.
- Provided technical guidance for laboratory infrastructure and instrumentation in interdisciplinary research projects.

Research Associate (Biology) *Jul. 2025 – Present*

- Led interdisciplinary research projects that integrate robotics, computer vision, and artificial intelligence with freshwater biology applications.
- Planned studies on zebrafish embryonic development and plankton classification using neural networks and advanced image processing techniques.

FIAB – Fundación de Investigación Aeroespacial **La Paz, Bolivia**

R&D Engineer – Structural & Thermal Analysis *Jul. 2024 – Present*

- Designed thermal and structural subsystems for Bolivia's first CubeSat (UNOOSA Access to Space initiative).
- Simulated orbital thermal conditions in ANSYS; contributed to EXOpod integration documentation.
- Developed mechanical interfaces following CubeSat standards for deployment and material selection.

PRINT3D **La Paz, Bolivia**

Additive Manufacturing Intern *Feb. 2023 – Jul. 2023*

- Maintained and upgraded 15+ FDM 3D printers, improving print quality by 60%.
- Upgraded firmware using Sonic-Pad controllers and put old equipment back into operation.
- Modeled 100+ functional mechanical parts for clients in SolidWorks.

Thesis Researcher – ABS Printing Optimization *Jul. 2023 – Jul. 2024*

- Led a research–industry collaboration with PRINT3D to improve manufacturing quality in additive manufacturing.
- Designed and Implemented post-processing tools adopted by PRINT3D for internal use and graded 97/100 *(Magna Cum Laude)*.

SEDNA SRL **La Paz, Bolivia**

Software Development Intern *Jul. 2022 – Jan. 2023*

- Developed biometric access control software using C#/.NET and SQL Server.
- Contributed to full-stack solutions in Java and JavaScript for healthcare and business systems.

Projects

Lichens Computer Vision Bioindicator | *Python, OpenCV, Machine Learning* **Aug. 2025 – Present**

- Developing a system to detect and classify lichen color variations as air-quality bioindicators, with dataset compilation and model training.
- Implementing color calibration, segmentation, and environmental data correlation algorithms.

Point Optimization in NASA HERC) | *Linear Programming, Path Planning, Simulation* **Jun. 2025 – Present**

- Leading collaboration with UNIVA (Mexico) to develop LP and path-planning algorithms for maximizing points in NASA HERC.
- Formulated decision variables, constraints, and simulations combining LP with graph-based heuristics.

1U CubeSat Development | *CVXPy, Simulink, STM32, ROS* **Jul. 2024 – Present**

- Led a team of five students as a GNC engineer, developing a neural network-based trajectory predictor for Astrobee.
- Integrated the predictor into the Astrobee control simulator using ROS, Gazebo, enabling applied control testing.
- Developed PIL/SIL environments and deployed payloads via STM32 in stratospheric balloon missions for sensor validation.

Robotic Chess System with KUKA Arm | *ROS, Python, CAD, Embedded Systems* **Jul. 2023 – Dec. 2024**

- Founder and lead engineer of an autonomous chess system integrating KUKA robotic arm, ROS-based control, and a custom PCB chessboard.
- Implemented motion planning, inverse kinematics, and EKI communication.

Encapsulation and Post-Processing System for ABS | *CAD, Firebase, MicroPython, IoT* **Jul. 2023 – Jul. 2024**

- Developed two integrated systems to improve industrial-grade ABS printing for PRINT3D: an IoT-enabled thermally controlled enclosure eliminating warping/layer cracking, and an airtight acetone vapor chamber reducing surface roughness to 0.16% of visible layers with glossy finishes.
- Implemented remote parameter control via mobile interface and Firebase dashboards.

NASA HERC 2024 | *SolidWorks, 3D Printing, CNC, Mechanical Design* **Nov. 2023 – Apr. 2024**

- Led design and fabrication of rover task tools, optimizing performance to contribute to the "Most Improved Performance" Award.
- Produced components via SolidWorks modeling, 3D printing (TPU/ABS), and CNC machining.

Volunteering, Outreach & Lecture Experience

Casablanca International Conference on Additive Manufacturing **Casablanca, Morocco**

Lecturer – Virtual Conference *Apr. 2024*

- Presented *"Additive Manufacturing for Tire Treads Design for Outer Space Challenging Terrains"* to 300+ attendees, including ESA, Airbus, and universities across Europe and Africa.

International Multi-Conference on Engineering, Education and Technology **Mexico City, Mexico**

Lecturer – Virtual Conference *Jul. 2025*

- Presented *"Mechanical Design and Testing of 3D-Printed Non-Pneumatic Wheels for Human-Powered Vehicles: A NASA HERC Case Study"* to Latin American engineering researchers and academic leaders.

Universidad Católica Boliviana "San Pablo" – ITEC 2024 **La Paz, Bolivia**

KUKA Robotic Arm Workshop Lecturer *Oct. 2024*

- Delivered practical sessions on KUKA arm operation, KRL programming, and safety protocols.
- Taught inverse kinematics, path planning, and Robot Operating System (ROS) integration.

Universidad Católica Boliviana "San Pablo" – VEMEC Team **La Paz, Bolivia**

STEM Outreach Lecturer *Nov. 2023 – Apr. 2024*

- Co-led outreach team delivering STEM workshops in 8 out of 9 Bolivian departments, reaching over 7,000 participants.
- Trained students in physics topics, electronics, and mechatronics during national tour *Gira STEM*, with hands-on rover engineering activities.

Research & Development Leader *Apr. 2024 – Jul. 2025*

- Led a team of 12 students to publish and present 3 peer-reviewed papers on NASA HERC innovations at international conferences.

Technical Skills & Certifications

Languages: Spanish (native), English (B2)
Soft Skills: Leadership, teamwork, adaptability, self-motivation, quick learning, multitasking, resilience, self-taught.
Programming & Frameworks: Python (TensorFlow, CVXPy), C/C++, MATLAB/Simulink, ROS, Java, JavaScript, SQL
Tools & Hardware: Git, Docker, STM32, Raspberry Pi, Jetson Nano, ESP32, Arduino, KUKA robots
CAD & Manufacturing: SolidWorks, Blender, Cura, PrusaSlicer, RDWorks, laser cutting, 3D printing (FDM, DLP)
Affiliations: IEEE Robotics and Automation Society (2021–2024), IEEE Power & Energy Society (2024), Mechatronics Student Scientific Society – UCB (2021–Present), UCB Mechatronics Alumni Network (2024–Present)
Certifications:

- SolidWorks CSWA – CAD Design (Dassault Systèmes, 2024)
- Additive Manufacturing Associate (Dassault Systèmes, 2024)
- Sustainability Associate (Dassault Systèmes, 2023)

Awards & Recognitions

NASA HERC 2024 – Most Improved Performance Award (Huntsville, USA)
UNOOSA–EXOpod – Bolivia's First CubeSat Selected for Launch (Vienna, Austria)
LACCEI 2025 – Full Paper Presentation Certificate
Bolivian Senate – Recognition for NASA HERC Representation (2024)