



# Daniel Saromo-Mori

MECHATRONICS ENGINEER · INVENTOR OF THE AUTO-ROTATING NEURAL NETWORKS (ARNN) · AI RESEARCHER AND LECTURER

[www.danielsaromo.xyz](http://www.danielsaromo.xyz) | [DanielSaromo](https://twitter.com/DanielSaromo) | [danielsaromo](https://www.linkedin.com/in/danielsaromo) | [Daniel Saromo-Mori](https://www.youtube.com/channel/UCv3v3v3v3v3v3v3v3v3v3v3)

## About me

→ I'm Daniel, a mechatronics engineer passionate about AI-powered robot control. My main research interest is *robotics × machine learning: robot learning*. As a result of my research in AI, I have invented the ARP and the ARNN—algorithms that I have presented in six countries. Besides, I have **6+ years of experience** in research and teaching AI, ML, and Data Science. Also, I have **practical experience in Robot Learning**, like my *AI-guided spider robot*, work recognized in the United States with the *Innovation Award* at IMECE 2019.

→ Language Skills: English (proficient level), Italian (advanced level), and Spanish (native).

## Education

**M.Sc. in Cybernetics and Robotics, with an Specialization in AI · Currently enrolled**

CZECH TECHNICAL UNIVERSITY IN PRAGUE (1<sup>ST</sup> IN CZECHIA: [QS ENGINEERING RANKING 2023](#))

Prague, Czechia

Since Sep. 2024

**M.Sc. in Automation and Control Engineering · Average mark after 3 semesters: 27.0/30**

POLITECNICO DI MILANO (13<sup>TH</sup> IN THE WORLD: [QS ENGINEERING RANKING 2022](#))

Milan, Italy

Sep. 2022 - Feb. 2024

**B.Sc. in Mechatronics Engineering & Mechatronics Engineering Professional Degree**

PONTIFICIA UNIVERSIDAD CATÓLICA DEL PERÚ (1<sup>ST</sup> IN PERU: [QS RANKING 2022](#))

Lima, Peru

03/2014 - 07/2019, 08/2019 - 11/2020

- **Bachelor's average course grade:** 15.70 (Scale: minimum: 0, required to pass: 11, maximum: 20).
- **Academic ranking:** Top fifth of class (6<sup>th</sup> of 32 mechatronics graduates) · Top 6.66% of the students of the Faculty of Science and Engineering.
- **Theses title:** *Intelligent spider robot for detecting anti-personnel metallic landmines in uneven terrain*.
- **Professional Degree Thesis Awards:** - Extraordinary Support Funding for Undergraduate [Research Thesis](#).  
- **Ranking:** Degree thesis unanimously awarded by the tribunal with the *qualification of outstanding*.
- **B.Sc. Thesis Awards:** - [Best bachelor's thesis](#) and poster presentation at the PUCP Mechatronics Workshop of the semester 2019-1.  
- Innovation Recognition Award at the International Mechanical Engineering Congress & Exposition (**IMECE**) 2019.
- **Theses advisors:** Dr. Elizabeth Villota and Dr. Edwin Villanueva.

## Scientific Publications · Currently with more than 100 citations reported in Google Scholar

- [C4] Valdenegro-Toro, M. and **Saromo, D.** "A Deeper Look into Aleatoric and Epistemic Uncertainty Disentanglement", *LXCV Workshop at CVPR 2022*. Louisiana, U.S.A. 2022 · Paper presented in the poster session and was one of the few selected for an oral presentation.
- [C3] Bravo, L., **Saromo, D.**, and Villota, E. "Smart Insole Sensor for vGRF Measurement", *9th International Symposium on Sensor Science*. Warsaw, Poland. 2022.
- [C2] **Saromo, D.**, Bravo, L., and Villota, E. "Smart Sensor Calibration with Auto-Rotating Perceptrons", *LXAI Workshop at ICML 2020*. Vienna, Austria. 2020 · Paper presented in the poster session and was one of the few selected for an oral presentation.
- [C1] **Saromo, D.**, Villota, E., and Villanueva, E. "Auto-Rotating Perceptrons", *LXAI Workshop at NeurIPS 2019*. Vancouver, Canada. 2019 · Paper presented in the poster session and was one of the few selected for an oral presentation.
- [T1] **Saromo, D.** "Intelligent spider robot for detecting anti-personnel metallic landmines in uneven terrain", *Pontificia Universidad Católica del Perú*. Lima, Peru. 2020 · Thesis published in Spanish. English abstract available: [link](#).

## Teaching Experience

**- PUCP's Continuing Education Department · Teacher at Specialization Diplomas**

Lima, Peru

LECTURER

- Diploma in Development of AI Applications (**Course:** AI for Games): 2019-2, 2020-1, 2020-2, 2021-1, 2021-2, 2022-1, 2022-2, 2023-1, 2023-2, 2024-1, 2024-2.

Since Sep. 2019

- Diploma in Data Analytics (**Course:** Data Analysis Methods for Time Series): 2022-1.

Jun. 2022 - Oct. 2022

**- PUCP's Center for Advanced Manufacturing Technologies (CETAM)**

Lima, Peru

LECTURER

**Courses:** - ML for Industry (2020-2, 2021-1, 2021-2, 2022-1, 2022-2, 2023-1, 2023-2);

Sep. 2020 - Sep. 2023

- [Python for Data Science](#) (2021-1, 2021-2, 2022-1, 2022-2, 2023-1).

Jun. 2021 - Sep. 2023

**- National Meteorological and Hydrological Services (SENAMHI) · Peruvian Government Entity**

Lima, Peru

LECTURER

**Course:** Introduc. to AI and ML for National Meteorological and Hydrological Services.

May. 2022 - Jun. 2022

**- PUCP Undergraduate School · Faculty of Science and Engineering**

Lima, Peru

TEACHING ASSISTANT

**Undergrad. courses:** AI (2019-1), ML (2019-2), Computer Science Applications (2019-2).

Mar. 2019 - Dec. 2019

## Honors & Awards

2023 **1<sup>st</sup> place**, at the [Pitch Competition 2023](#) organized by [Entrepreneurship Club POLIMI](#)

Milan, Italy

2022 **CVPR Registration and Travel Grant**, for attending [CVPR 2022](#) to be an oral and poster presenter · 900 USD

New Orleans, U.S.A.

2022 **LXCV Travel Grant**, for attending [CVPR 2022](#) to be an oral and poster presenter · 2567 USD

New Orleans, U.S.A.

2019	<b>LXAI Travel Grant</b> , for attending <a href="#">NeurIPS 2019</a> to be an oral and poster presenter · 1860 USD	Vancouver, Canada
2019	<b>Innovation Recognition Award</b> , Old Guard 63 <sup>rd</sup> Annual Oral Competition (World Finals at <a href="#">IMECE</a> ) · 250 USD	Utah, U.S.A.
2019	<b>ASME Travel Award</b> , to represent PUCP and South America at ASME IMECE Finals Competition · 1500 USD	Utah, U.S.A.
2019	<b>1<sup>st</sup> place + Technical Award</b> , Old Guard Oral Presentation Competition (ASME E-FEST South America) · 850 USD	Lima, Peru

## Research Experience

### German Research Center for Artificial Intelligence (DFKI)

Bremen, Germany

GUEST RESEARCHER · REMOTE MODE

Aug. 2020 - Jul. 2022

- **Auto-Rotating Neural Networks (ARNN):** I extended the ARP concept and created a new neural model family named Auto-Rotating Neural Networks. I've implemented dense, recurrent, LSTM, GRU, and convolutional layers with the Auto-Rotating operation; and obtained promising results. *Research advisor: Dr. Matias Valdenegro-Toro.*
- We are testing the implementation of the ARNN, to validate and compare their performance against equivalent models without the Auto-Rotation. Experiments ran in the research center's GPU clusters. Results presented at the [Online Asian Machine Learning School \(OAMLS\)](#).

### PUCP Applied Robotics and Biomechanics Research Group (GIRAB)

Lima, Peru

RESEARCH ASSISTANT

Mar. 2020 - Dec. 2020

- **Smart Sensor Calibration with Auto-Rotating Perceptrons:** In this paper, we applied the ARP to calibrate a wearable force sensor. By changing classic neurons to ARP, we obtained 15x better performance of the neural networks (i.e., lower loss). *Research advisor: Dr. Elizabeth Villota.*

## Talks & Presentations

Oct. 2024	<b>Pitch: Auto-Rotating Neural Networks</b> , Dny AI: AI-focused series of events taking place across Czechia	Prague, Czechia
June 2022	<b>Paper exposition: A Deeper Look into Aleat. and Epist. Uncert. Disentang.</b> , Speaker at LXCV CVPR	New Orleans, U.S.A.
Nov. 2021	<b>Poster presentation: Auto-Rotating Neural Networks</b> , Online Asian Machine Learning School at ACML	Singapore, Singapore
Jul. 2020	<b>Paper exposition: Smart Sensor Calibration with Auto-Rotating Perceptrons</b> , Speaker at LXAI ICML	Vienna, Austria
Dec. 2019	<b>Paper exposition: Auto-Rotating Perceptrons (ARP)</b> , Speaker at LXAI NeurIPS	Vancouver, Canada

## Continuing Education

Aug. 2024	<b>Robot Operating System (ROS) (Grade: 20/20)</b> , PUCP Center for Engineering Vinculation (FABRICUM)	FABRICUM PUCP
Nov. 2023	<b>Disaster Risk Monitoring Using Satellite Imagery</b> , NVIDIA Deep Learning Institute	NVIDIA DLI
Aug. 2022	<b>Oxford Machine Learning Summer School</b> , Oxford University & AI for Global Goals	Oxford University
Nov. 2021	<b>Online Asian Machine Learning School</b> , Asian Conference on Machine Learning (ACML)	ACML 2021
Jul. 2021	<b>Robot Operating System (ROS)</b> , Center for Advanced Manufacturing Technologies (CETAM)	CETAM PUCP
Nov. 2020	<b>Scrum Master Certification Training</b> , IEEE Ricardo Palma University Student Branch	IEEE Peru Section
Jul. 2019	<b>Getting started with AI on Jetson Nano</b> , NVIDIA Deep Learning Institute	NVIDIA DLI
Nov. 2018	<b>PyTorch Scholarship Challenge</b> , Udacity / Facebook	Udacity / Facebook
Apr. 2018	<b>Machine Learning for Data Science and Analytics</b> , Columbia University	edX

## Robot Learning Projects

### Robot learning using DDQN and Neuroevolution for my 2 DOF laser pointer robot

Lima, Peru

GOAL: TO HAVE A PHYSICAL ROBOT TO BE CONTROLLED USING MACHINE LEARNING, PYTHON, AND C++

Apr. 2020 - May 2020

- I built an arm-type robot that learned to control a laser pointer using Deep Reinforcement Learning, Neuroevolution, and Computer Vision.
- The 2 DOF robot learned to point a laser beam to reach a target located at the center of two marks. The algorithms used were DDQN and NEAT, and were executed on Linux. Then, the commands were sent to an Arduino board using the [PyDuino Bridge Library](#) I authored.

### My 8 DOF spider robot: making it learn to walk · Honored with IMECE's Innovation Award

Lima, Peru

GOAL: TO HAVE A PHYSICAL ROBOT TO TEST THE AI-BASED ALGORITHM I PROPOSED FOR MY THESES

Aug. 2018 - Jul. 2019

- I designed and built a spider robot following Kamrani's rapid prototyping methodology.
- The algorithm that enabled the robot to learn how to walk was based on supervised ML, genetic algorithms, and Python/C++ integration.

## Skills

<b>Technical tools</b>	<b>Robotics:</b> ROS.   <b>CAD/CAE:</b> <i>Mechanics:</i> Inventor, SolidWorks, AutoCAD. <i>Electronics:</i> EagleCAD, Altium Designer, Circuit Maker, Proteus, B2 Spice, NI Multisim.   <b>Embedded Systems:</b> ATmega328P, ATmega2560 (Arduino IDE); Raspberry Pi (SBC and RP2040); Jetson Nano.   <b>Coding:</b> Python, MicroPython, C, C++, MATLAB, VBA (for Excel), UserRPL, $\LaTeX$ .   <b>Frameworks:</b> Git, Tensorflow, Keras, Scikit-Learn, PyTorch, NumPy, Pandas, Seaborn, Matplotlib, Plotly, OpenCV, OpenAI Gym, <a href="#">PyDuino Bridge</a> .
<b>Technical skills</b>	<b>Mechanics:</b> Parametric 3D modeling and assembly. Technical drawing. <b>Electronics:</b> Schematic drawing. PCB design, assembly, and testing. Excellent soldering skills (THT and SMT).   <b>Automatic Control:</b> Classical and state-space.   <b>Artificial Intelligence and Machine Learning:</b> Deep Learning (MLP, CNN, ARNN, ARP). Search algorithms and heuristics. Bio-inspired optimization (ABC, ACO, and PSO). Decision Trees. Random Forests. SVM. Clustering. PCA. Ensemble Learning. Transfer Learning. Deep Reinforcement Learning (DQN, DDQN). Computer Vision. Image Segmentation. Image Style Transfer.
<b>Soft skills</b>	Strong abilities in public speaking, teaching, teamwork, and leadership. Maker spirit. Curiosity and perseverance.