

RUBEN DARIO FLOREZ ZELA

Electronic Engineer · RENACYT Level V Researcher

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ORCID | Google Scholar | ResearchGate | LinkedIn | Personal Web

Citations: 143 · h-index: 5 · i10-index: 3 (Google Scholar, 2025)

RESEARCH PROFILE

Computational neuroengineering researcher specializing in multimodal AI systems for cognitive state monitoring in safety-critical environments. My work integrates EEG signal processing, computer vision (RGB and NIR imaging), and deep learning for real-time driver drowsiness detection deployed on embedded platforms (NVIDIA Jetson Nano). Recognized as a RENACYT Level V researcher by CONCYTEC (Peru's National Science Council) and member of the IEEE Engineering in Medicine and Biology Society (IEEE EMBS). My research addresses a high-impact public safety problem: cognitive impairment is a leading factor in road traffic fatalities worldwide. I seek a PhD position to advance multimodal physiological sensing and edge AI architectures for human-machine safety systems.

EDUCATION

M.Sc. in Electronic Engineering (Automation & Instrumentation)

2024 – Present

Universidad Nacional de San Agustín de Arequipa (UNSA), Arequipa, Peru

Thesis focus: Multimodal driver drowsiness detection using EEG + computer vision on embedded systems

B.Sc. in Electronic Engineering

Graduated

Universidad Nacional de San Antonio Abad del Cusco (UNSAAC), Cusco, Peru

Professional License (CIP): 336757

ACADEMIC POSITIONS

Contract Lecturer – Electronic Engineering Department

April 2024 – Present

Universidad Nacional de San Antonio Abad del Cusco (UNSAAC), Cusco, Peru

- Courses: Robotics, Digital Image Processing, Artificial Intelligence, Electronics Laboratory
- Teaching undergraduate students in embedded systems programming and computer vision pipelines

RESEARCH INTERESTS

Computational Neuroengineering · Multimodal AI Systems · EEG Signal Processing · Computer Vision (RGB/NIR) · Driver Drowsiness & Cognitive State Monitoring · Deep Learning for Edge Deployment · Embedded AI (NVIDIA Jetson) · Human-Machine Safety Systems · Medical Image Analysis

PEER-REVIEWED JOURNAL ARTICLES

- [1] **Florez, R.**, Palomino-Quispe, F., Alvarez, A. B., Coaquira-Castillo, R. J., & Herrera-Levano, J. C. (2024). A Real-Time Embedded System for Driver Drowsiness Detection Based on Visual Analysis of the Eyes and Mouth Using Convolutional Neural Network and Mouth Aspect Ratio. *Sensors*, 24(19), 6261. [27 citations]

- [2] **Florez, R.**, Palomino-Quispe, F., Coaquira-Castillo, R. J., Herrera-Levano, J. C., Paixão, T., & Alvarez, A. B. (2023). A CNN-Based Approach for Driver Drowsiness Detection by Real-Time Eye State Identification. *Applied Sciences*, 13(13), 7849. [82 citations — #1 most cited]
- [3] Fuentes-Beingolea, J. H., Palomino-Quispe, F., Herrera-Levano, J. C., Vargas-Mateos, W., **Florez, R.**, & Alvarez, A. B. (2025). Illumination-Robust Conjunctival Image Preprocessing for Accurate Segmentation and Anemia Detection Using Deep Learning. *International Journal of Online and Biomedical Engineering (iJOE)*, 21(07), 106–124.
- [4] Fragoso, J., Silva, C., Paixão, T., Alvarez, A. B., Júnior, O. C., **Florez, R.**, Palomino-Quispe, F., Savian, L. G., & Trazzi, P. A. (2025). Coffee-Leaf Diseases and Pests Detection Based on YOLO Models. *Applied Sciences*, 15(9), 5040. [14 citations]
- [5] Jancco-Chara, J., Palomino-Quispe, F., Coaquira-Castillo, R. J., Herrera-Levano, J. C., & **Florez, R.** (2023). Doppler Factor in the Omega-k Algorithm for Pulsed and Continuous Wave Synthetic Aperture Radar Raw Data Processing. *Applied Sciences*, 14(1), 320. [6 citations]
- [6] Paixão, T., Alvarez, A. B., **Florez, R.**, & Palomino-Quispe, F. (2023). Fuzzy Controller Implemented for Movement of a Tendon-Driven 3D Robotic Lumbar Spine Mechanism. *Sensors*, 23(24), 9633. [4 citations]

PEER-REVIEWED CONFERENCE PAPERS

- [1] Paixão, T., Alvarez, A. B., **Florez, R.**, & Palomino-Quispe, F. (2023). Fuzzy Control for Simplified Lumbar Spine Robotic Mechanism Motion. *2023 IEEE International Conference on Networking, Sensing and Control (ICNSC)*, Vol. 1, pp. 1–6. IEEE.
- [2] Paixão, T., Alvarez, A. B., **Florez, R.**, & Palomino-Quispe, F. (2023). Motion Control of a Robotic Lumbar Spine Model. *Int'l Work-Conference on Bioinformatics and Biomedical Engineering (IWBBIO)*, pp. 205–216. Springer Nature.
- [3] Paixão, T., Alvarez, A. B., **Florez, R.**, Palomino-Quispe, F., Angst, L., & Maggi, L. (2023). Development of Simplified Lumbar Spine Mechanism Implemented with Tendon-Driven Motion. *2023 27th International Conference on Methods and Models in Automation and Robotics (MMAR)*, pp. 187–192. IEEE.
- [4] **Florez, R.**, Concha-Ramos, Y., Palomino-Quispe, F., & Coaquira-Castillo, R. J. (2022). CNN for the Detection of COVID-19 from Chest X-Ray Images. *2022 IEEE Engineering International Research Conference (EIRCON)*, pp. 1–4. IEEE.
- [5] Vilavila, R., Justo, F., **Florez, R.**, & Figueroa, N. (2021). Low-Cost Mini Humanoid Robot Mechanical Design for Mini Humanoid Robot Contest INTERCON 2021. *2021 IEEE XXVIII International Conference on Electronics, Electrical Engineering and Computing (INTERCON)*, pp. 1–4. IEEE.

PEER REVIEW SERVICE

Active reviewer for the following indexed journals:

- ACM Transactions on Intelligent Systems and Technology
- Scientific Reports (Springer Nature)
- Discover Artificial Intelligence (Springer Nature)
- Discover Applied Sciences (Springer Nature)
- Discover Internet of Things (Springer Nature)
- International Journal of Science and Technology (IJST)
- IAES International Journal of Artificial Intelligence (IJ-AI)

RESEARCH PROJECTS

Driver Drowsiness Detection via Embedded Vision (Principal Investigator)
LIECAR Lab (UNSAAC) & PAVIC Lab (Federal University of Acre – UFAC, Brazil)

Feb 2023 – Aug 2023

- Designed a novel ROI correction algorithm for eye-region detection under varying illumination conditions
- Developed and benchmarked 3 CNN architectures via transfer learning for eye-state classification
- Proposed a custom CNN architecture for drowsiness detection; deployed on NVIDIA Jetson Nano

Control of a Simplified Lumbar Spine Mechanism (Co-Investigator)
LIECAR Lab (UNSAAC) & PAVIC Lab (UFAC, Brazil)

Feb 2023 – Jul 2023

- Developed PID and Fuzzy Logic controllers for vertebral movement in a tendon-driven 3D-printed lumbar spine model

Computer Vision Applied to a Low-Cost Mini Humanoid Robot (Collaborator)
RoboticsLab (UNSAAC) & CONCYTEC

Mar 2021 – Apr 2022

- Implemented a computer vision guidance system enabling autonomous navigation in competition environments

AWARDS & RECOGNITIONS

1st Place – VIII Regional Science, Technology & Innovation Fair

Regional Government of Cusco, OCTI & CORCYTEC | Project: COVID-19 Diagnostic System via AI

Sep 2023

1st Place – II International Congress of Research, Innovation & Entrepreneurship

UNSAAC | Project: Real-Time Driver Drowsiness Detection System

Nov 2022

1st Place – First Andean Region Hackathon

UNI, Dara Big Data & Hack4Dev (Venezuela, Peru, Colombia, Ecuador, Bolivia, Chile) | Galaxy Classification via ML

Feb 2023

1st Place – Mini Humanoid Robot Contest (×2)

CONEIMERA UNA PUNO 2021 | INTERCON 2021

2021

2nd Place – Hult Prize (On-Campus Round)

UNSAAC | Advanced to Regional Finals in Bogotá, Colombia

Jan 2020

INVITED TALKS & PRESENTATIONS

Drowsiness Detection System for Vehicle Drivers Using Neural Networks

VII Seminar on Industrial Electronics and Automotive Mechatronics | IESTP EPAMET

May 2023

Python in Image Processing and Artificial Intelligence (Webinar)

Pythonistas Community

Jun 2024

Machine Vision and AI in Robotics (Webinar)

Data Science Research Peru (DSRP)

Oct 2021

Computer Vision and AI Applied to Humanoid Robots (Webinar)

IEEE Computer Society – UDEP Lima & Data Science Research Peru

Oct 2021

PROFESSIONAL MEMBERSHIPS

- IEEE Engineering in Medicine and Biology Society (IEEE EMBS)
- RENACYT Researcher Level V – CONCYTEC, Peru

TECHNICAL SKILLS

Programming	Python, MATLAB, C/C++ (Arduino / STM)
Deep Learning & ML	TensorFlow, Keras, OpenCV, Pandas, NumPy, Matplotlib
Computer Vision	RGB/NIR camera systems, EEG signal processing, ROI extraction
Embedded Platforms	NVIDIA Jetson Nano, Raspberry Pi, ESP-32, STM32, Arduino
Hardware	PCB design & fabrication, Oscilloscope, Multimeter
CAD / Simulation	Autodesk Fusion 360, Proteus, Eagle

LANGUAGES

Spanish	Native
English	Intermediate (academic reading/writing; improving spoken)

INTERNATIONAL RESEARCH COLLABORATIONS

- Federal University of Acre (UFAC), Brazil – Joint projects in embedded vision and robotic control systems (PAVIC Lab)