Verónica Henao Isaza

Research Fellow — Sapienza Università di Roma
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Research Summary

Research Fellow with an MSc in Engineering (Data Science / Neuroimaging) and a BSc in Bioengineering, specialized in EEG signal analysis and machine learning for classification of neurodegenerative disease (Alzheimer's, Parkinson's, Lewy body). Experience spans multi-site EEG harmonization, wearable/multimodal biosignal integration, and automated preprocessing pipelines, within large international multi-site consortia. Co-founder of a computational neuroscience research training group. 20 peer-reviewed publications, 61 citations, 2 further first-author manuscripts under review. Seeking to pursue a PhD integrating quantitative and biologically-inspired network modeling with experimental neural data, extending this methodological foundation toward computational and AI-driven approaches to brain function.

Education

M.Sc. in Engineering — Data Science / Neuroimaging (Neuroengineering specialization)
Universidad de Antioquia, Medellín, Colombia · 2021–2023
GPA 4.74/5.0 (Spanish-scale equivalent: **9.11/10**, official government declaration) · fully funded via competitive scholarship (see Awards)
Thesis: *Machine Learning Model for the Classification of Individuals at Risk of Alzheimer's-Type Dementia Using Multimodal EEG and Clinical Databases*

B.Sc. in Bioengineering
Universidad de Antioquia, Medellín, Colombia · 2013–2020
GPA 3.55/5.0 (Spanish-scale equivalent: **6.52/10**, official government declaration)
Thesis: *Development of a Tool for the Acquisition of SSVEP Using Portable and Low-Cost EEG* — presented at STSIVA 2019, peer-reviewed, IEEE-indexed

Professional Experience

Research Fellow (Assegno di ricerca) — Sapienza Università di Roma · 2024–present
PRIN 2022 project (EU Next Generation EU, SPC 2023-0070-1366-211631), under Prof. Claudio Babiloni, Laboratory of Neurosciences of Human Higher Functions. EEG biomarkers of vigilance, cognition, and neurodegeneration via advanced signal processing, machine learning, and multimodal telemonitoring (SmartMe&You / TELEMAIA platform).

Research Internship — Sapienza Università di Roma · 2022
Assessed transitions from alertness to sleepiness in dementia patients and healthy post-COVID-19 subjects using MATLAB, eLORETA, and Python, under Prof. Claudio Babiloni.

Adjunct Professor (Lecturer) — Universidad de Antioquia, Faculty of Engineering · 2021–2023
Taught Informatics I & II (Python) and supervised the Biosignals and Systems Laboratory for undergraduate Bioengineering students.

Founding Director (2019–2022) / **External Advisor** (2022–present) — NeuroCo, Computational Neurosciences Research Group, Universidad de Antioquia
Founded and directed an interdisciplinary research training hub (60+ active members) within GRUNECO, focused on EEG/neuroimaging analysis in neurodegenerative disease, sports neuroscience, BCI development, and ML for early cognitive-impairment detection.

Instructor Student — Universidad de Antioquia · 2021–2022
Competitive scholarship; teaching assistant for the Biosignals and Systems course.

Director of Innovation and Development — Gropius Innovación S.A.S., Colombia · 2020–2022
Applied R&D on medical device design, development, and clinical validation. Directed multidisciplinary teams

(engineering, clinical, regulatory). ISO quality standards compliance, ISO 7-grade cleanroom management, plastic injection manufacturing infrastructure.

Technical Advisor — Medical Device Development — Meridiano S.A.S., Colombia · 2020
InnspiraMED project (Ruta N / Universidad de Antioquia): validated pneumatic relief valves for the NEUMA V 1.0 emergency ventilator during the COVID-19 crisis. Quality analysis, calibration, ISO compliance for emergency-use equipment.

Teaching Experience

Universidad de Antioquia, Bioengineering Undergraduate Program, Medellín, Colombia

- 2023 — Informatics I (5.8 ECTS, 4h/week)
- 2023 — Informatics II (5.8 ECTS, 4h/week)
- 2023 — Biosignals and Systems Laboratory (7.7 ECTS)
- 2021–2022 — Biosignals and Systems Laboratory, module lecturer (5.8 ECTS)

Publications (20 total, 61 citations — Google Scholar/ORCID verified 2026-07-07)

* First-author works

1. * Henao Isaza V., et al. (2026). **Longitudinal test-retest reliability of quantitative EEG in healthy individuals using an automated preprocessing approach.** *Biomedical Signal Processing and Control*, 116, 109484. DOI

2. * Isaza V.H., Aguillon D., Quintero C.A.T., Lopera F., Gomez J.F.O. (2026). **Comprehensive methodology for sample enrichment in EEG biomarker studies for Alzheimer's risk classification.** *PLOS ONE*. DOI

3. Babiloni C., Henao Isaza V., et al. (2026). **Periodic and aperiodic electroencephalographic rhythms during vigilance transitions in Alzheimer's disease mild cognitive impairment.** *Annals of the New York Academy of Sciences*. DOI

4. Babiloni C., Henao Isaza V., et al. (2026). **Abnormal Resting-State EEG delta and alpha rhythms in Huntington's and Alzheimer's Diseases: An exploratory study.** *Clinical Neurophysiology*. DOI

5. Carpi M., Afragola A.P., De Bartolo M., Lopez S., et al., Henao Isaza V., et al. (2026). **Abnormal periodic and aperiodic resting-state electroencephalographic markers in Lewy body and Alzheimer's diseases with cognitive decline.** *GeroScience*. DOI

6. Carpi M., De Bartolo M., Henao Isaza V., Noce G., et al. (2026). **Associations of daily step counts with cognitive, clinical, and resting-state electroencephalographic measures in patients with cognitive decline due to Alzheimer's disease.** *GeroScience*. DOI

7. Salamone E.M., Carpi M., Noce G., Del Percio C., Lopez S., Lizio R., Henao Isaza V., Babiloni C. (2025). **Abnormal electroencephalographic rhythms from quiet wakefulness to light sleep in Alzheimer's disease patients with mild cognitive impairment.** *Clinical Neurophysiology*. DOI

8. * Isaza V.H., Castro V.C., Villa E.S., Cuartas S.G., Ochoa J.F. (2024). **Unveiling Visual Physiology and Steady-State Evoked Potentials Using Low-Cost and Transferable Electroencephalography for Evaluating Neuronal Activation.** *International Journal of Psychological Research*, 17(2), 25–35. DOI

9. Aguillon D., Guerrero A., Vasquez D., Cadavid V., Henao V., Suarez X., Ochoa J.F. (2023). **Longitudinal analysis of qEEG in subjects with autosomal dominant Alzheimer's disease due to PSEN1-E280A variant.** *Alzheimer's & Dementia*, 19, e083226. DOI

10. Jaramillo-Jimenez A., Tovar-Rios D.A., Ospina J.A., Mantilla-Ramos Y.J., Loaiza-López D., Isaza V.H., Brønnick K. (2023). **Spectral features of resting-state EEG in Parkinson's Disease: A multicenter study using Functional Data Analysis.** *Clinical Neurophysiology*, 151, 28–40. DOI

11. * Isaza V.H., Villa E.S., Castro V.C., Gomez J.F.O. (2023). **Development of a tool for the acquisition of SSVEP using portable and low-cost electroencephalography.** *2023 IEEE 3rd Colombian BioCAS Workshop*, 1–6. DOI

12. Cadavid V., Salas E., González S., Henao V., Ortega D., Suarez J.C., Ochoa J. (2021). **Capture and analysis of steady-state visual evoked potentials using low-cost, portable technology.** *2021 XXIII STSIVA*, 1–6. DOI

13. Ortega-Rosero D., Henao V.H., Ochoa J.G. (2019). **SSVEP study in monocular and binocular vision.** *2019 XXII STSIVA*, 1–5. DOI

14. * Isaza V.H., Aguillon D., Quintero C.A.T., Lopera F., Gomez J.F.O. (2024). **Comprehensive Methodology for Sample Augmentation in EEG Biomarker Studies for Alzheimer's Risk Classification.** *arXiv preprint.* DOI

15. Ochoa-Gómez J.F., Mantilla-Ramos Y., Isaza V.H., Tobón C.A., Lopera F., Aguillon D., Suárez J.X. (2023). **Reproducing Group Independent Component Analysis in Resting State Electroencephalographic Data.** *bioRxiv.* DOI

16. Babiloni C., Henao Isaza V., et al. (2025). **Ongoing EEG delta and alpha rhythms reflect abnormal transitions from quiet wakefulness to sleep in patients with mild cognitive impairment.** *Alzheimer's Association International Conference (AAIC)*, Toronto.

17. * Henao Isaza V. (2026). **Periodic and Aperiodic EEG Parameters During Transitions from Wakefulness to Light Sleep: Preliminary Results on Patients with Mild Cognitive Impairment Due to Alzheimer's Disease vs. Healthy Elderly.** *Alzheimer's & Dementia.* DOI

18. Ochoa-Gómez J.F., Mantilla-Ramos Y.J., Henao Isaza V., Tobón C.A., Lopera F., Aguillón D., Suárez J.X. (2023). **Reproducible Neuronal Components found using Group Independent Component Analysis in Resting State EEG Data.** *Research Square.* DOI

19. * Henao Isaza V., Cadavid Castro V., Zapata Saldarriaga L.M., Mantilla-Ramos Y.J., Suarez Revelo J.X., Tobón Quintero C.A., Ochoa Gómez J.F. (2023). **Tackling EEG Test-Retest Reliability with a Pre-Processing Pipeline Based on ICA and Wavelet-ICA.** *SSRN.* DOI

Manuscripts under review

* Henao Isaza V., Lopez S., Carpi M., et al. (including Ritter P., Thirion B., Güntekin B., Yener G., Taylor J.-P., Antonini A.), Babiloni C. **Different impacts of periodic and aperiodic EEG spectral components in classifying patients with cognitive deficits due to Lewy body and Alzheimer's diseases.** Under review, *Clinical Neurophysiology* (manuscript CLINPH-S-26-00949, submitted June 26, 2026). 30-author international multi-site consortium (Sapienza, Charité/Brain Simulation Section, Inria, Newcastle University, Istanbul Medipol, Dokuz Eylül, Padua, and others).

* Henao Isaza V., Carpi M., Noce G., Del Percio C., et al., Babiloni C. **Associations between resting-state electroencephalographic activity and daily heart rate dynamics in cognitively unimpaired older people and patients with cognitive deficits due to Parkinson's disease.** Under review, *Brain Research Bulletin* (manuscript BRB-S-26-01587, submitted July 2, 2026; SmartMe&You/TELEMAIA platform). N=64 (HC=21, PDMCI=24, PDD=19); ANCOVA + GLM/OLS + bootstrap BCa (Holm-corrected); 4 confirmed associations between diurnal HR amplitude and EEG/cognitive/motor measures.

Conference Presentations & Invited Talks

- **2026 — ICCN 2026** (Cartagena de Indias, Colombia, Sep 8–12) — *Invited Speaker*, Pre-Congress Course P08: AI in Neurophysiology — "AI Tools in Clinical Neurophysiology" (harmonization of clinical indexes/biomarkers in multicentric studies).
- **2026 — ICCN 2026** (Cartagena de Indias, Colombia) — *Speaker*, Symposium Session 222, alongside Prof. Claudio Babiloni and Prof. Bahar Güntekin.
- **2026 — AIIC 2026**, 26th Convegno Nazionale (Turin, Italy, June 11) — *Oral Presentation*, **Top 3 Finalist**, Oral Presentation Category.

- **2026 — The Third China–Europe Alzheimer's Disease Symposium** (Beijing, China) — *Invited Speaker* — "SmartMe&You-Telemaia Platform for Digital Assessment of Cognitive Function and Peripheral Biomarkers in Alzheimer's and Parkinson's Disease."
- **2025 — European Congress of Clinical Neurophysiology (ECCN)** (London, UK) — *Invited Speaker*, Symposium: "EEG biomarkers of cortical excitatory/inhibitory unbalance and vigilance dysfunctions in Alzheimer's disease: The Hans Berger's Legacy," alongside Prof. Claudio Babiloni and Prof. Bahar Güntekin.
- **2025 — Public Engagement** (Rome, Italy) — Science outreach seminar for secondary-school students (PCTO program) — "Exploring the Brain and Its Functions: The Digital Revolution."
- **2025 — SIN** (Società Italiana di Neurologia) Annual Congress (Padova, Italy) — Oral presentation.
- **2025 — AAIC** (Toronto, Canada) — Poster.
- **2024 — Advanced Training workshop series** (Rome, Italy) — 4-session hands-on course: "Python Machine Learning Techniques for Classifying Patients with Neurodegenerative Disorders."
- **2023 — IEEE 3rd Colombian BioCAS Workshop** — Oral (peer-reviewed proceedings).
- **2023 — XII Congreso Internacional Cerebro y Mente** (ALAN, Medellín, Colombia) — Invited talk.
- **2022 — Sapienza Research Day** (Rome, Italy) — Oral: exploratory analysis of EEG data for wakefulness.
- **2021 — XXIII STSIVA** (Colombia) — Oral (peer-reviewed proceedings).
- **2020 — XV Jornadas de Informática en Salud** (JIS Go Live, Buenos Aires, virtual) — Oral.
- **2019 — XXII STSIVA** (Colombia) — Oral (peer-reviewed proceedings).

Awards & Fellowships

- **AIIC Awards 2026** — Top 3 Finalist, Oral Presentation Category, 26$^{\text{th}}$ Convegno Nazionale AIIC, Turin.
- **Assegno di ricerca A.R. n. 20/2023 — PRIN 2022**, Sapienza Università di Roma / European Union – Next Generation EU (2024–present).
- **Travel Scholarship** — Annual Interdisciplinary Workshop on Aging and Brain Health, Rutgers University (workshop held Aspen, CO, Jan 2024).
- **Instructor Student Scholarship** ("Estímulo Estudiante Instructor") — competitive award, Maestría en Ingeniería, 34th cohort, Universidad de Antioquia (2021).
- **1st Place — Best Design & Best Photograph**, Global Space Balloon Challenge (Stanford/Univ. Michigan/MIT), 2018 — 500+ teams, 60 countries.

Academic Service

Peer review: *Computers in Biology and Medicine* (Elsevier); *Biomedical Signal Processing and Control* (Elsevier); Springer Nature journals

Memberships:

- EBRAINS — Open research infrastructure for neuroinformatics, Human Brain Project (Work Package 8), 2024–present
- Grupo de Neurociencias de Antioquia (GNA), 2023–present
- GRUNECO — Grupo de Neuropsicología y Conducta, Universidad de Antioquia, 2019–present

Technical Skills

Languages/Frameworks: Python, PyTorch, MATLAB
EEG/Neuroimaging: eLORETA, ICA/wavelet-ICA preprocessing, BIDS standardization, neuroHarmonize (multi-site harmonization), periodic/aperiodic spectral decomposition (specparam)
Connectome & Network Modeling: The Virtual Brain (TVB) large-scale brain network simulation; Spectral

Graph Model (SGM) fitting on DTI connectomes; neural mass models (Wilson–Cowan, Reduced Wong–Wang excitatory/inhibitory); source-space (eLORETA) and connectome-informed simulation pipelines
Statistics/ML: ANCOVA, GLM, OLS regression, bootstrap BCa, SVM, SHAP, decision trees
Other: Wearable/multimodal biosignal integration (smartwatch heart rate, PPG), ISO quality standards (medical devices)

Languages

- Spanish — Native
- Italian — B2
- English — B2
- French — A2