

VANESSA CEDENO-MIELES, PH.D.

Research Scientist - Applied Machine Learning, Simulation & Large-Scale Systems - vcedeno.github.io

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Research Interests: Research scientist and interdisciplinary leader with 10+ years of experience building scalable modeling, simulation, and AI-driven analytics to solve complex sustainability challenges.

Education

Ph.D. in Computer Science - Virginia Tech, Blacksburg, VA	2014-2019
M.S. in Computer Science - Florida State University, Tallahassee, FL	2008-2010
B.S. in Computer Science - ESPOL, Guayaquil, Ecuador	2002-2007

Research

University of Virginia

Aug 2024 – Present

Postdoctoral Research Associate

Charlottesville, VA

- **Owned and initiated** a research agenda on large-scale agent-based and networked simulations to evaluate carbon reduction interventions in U.S. cement manufacturing.
- Designed and implemented a **Python-based experimentation framework** supporting large-scale simulation runs, iterative hypothesis testing, and metric-driven evaluation.
- Integrated **machine learning and large language models with empirical and qualitative data** to parameterize, validate, and stress-test simulation models.

ESPOL

Jun 2019 - July 2024

Assistant Professor

Guayaquil, Ecuador

- Led applied research on **data-driven modeling and simulation of networked social systems**, combining empirical data analysis, simulation, and experimentation.
- Built **Python-based data pipelines** for longitudinal behavioral datasets from distributed systems (FamilySong), enabling scalable and reusable analysis for ICT/HCI research.
- Served as Associate Sub-Dean (2022-2024) overseeing large academic programs (2,000+ students, 120+ faculty), managing complex, and multi-stakeholder initiatives.

Network Dynamic and Simulation Science Laboratory - Virginia Tech

January 2015 – May 2019

Graduate Research Assistant

Blacksburg, VA

- Independently **owned end-to-end research problems** from formulation through experimental design, large-scale simulation, evaluation, and publication.
- Developed **scalable, reusable Python research infrastructure** for simulation and data analysis of networked social experiments to explain human behavior.
- Developed **mechanistic and data-driven behavioral models** from large experimental datasets and integrated them into an agent-based simulation and experimentation platform.

Selected Publications

- **Cedeno-Mieles, V.** et al. “A Framework for Modeling and Simulation of Multi-dimensional Coupled Socio-Environmental Networked Experiments.” Winter Simulation Conference (WSC) 2025.
 - **Cedeno-Mieles, V.** et al. “Data analysis and modeling pipelines for controlled networked social science experiments.” PLOS ONE, 2020.
 - **Cedeno-Mieles, V.** et al. “Mechanistic and Data-Driven Agent-Based Models to Explain Human Behavior in Web-Based Group Anagram Game”. ASONAM, 2019.
- (Full list available at vcedeno.github.io/papersbyyear.html)

Experience

ESPOL

May 2010 – Jul 2014

Assistant Professor

Guayaquil, Ecuador

- Led a multi-phase accreditation initiative resulting in the **first ABET-accredited Computer Science program in Ecuador**, coordinating cross-functional teams, formal evaluation frameworks, documentation pipelines, and audits.

Technical Skills

ML & Modeling: Agent-based and stochastic simulation, Statistical & ML models, Data-driven behavioral modeling, Generative & hybrid models, Deep learning, NLP.

Systems & Data: Large-scale simulation, Data pipelines, ETL, Model validation, HPC workflows, Database design.

Programming: Python, JavaScript, R, C++, Java, MATLAB, SQL