Vanessa I. Cedeno-Mieles, Ph.D.

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I am a research scientist and interdisciplinary leader with over 10 years of experience building data-driven modeling, simulation, and AI-enabled analytical systems to solve complex sustainability challenges. I have a proven record of owning research agendas, developing scalable scientific frameworks, and translating research into actionable strategy across technical and business stakeholders. I bring experience leading large, multi-stakeholder organizations and driving impact at scale.

Education

Ph.D. in Computer Science **2014 - 2019**
Virginia Tech - Blacksburg, VA

M.S. in Computer Science **2008 - 2010**
Florida State University - Tallahassee, FL

B.S. in Computer Science **2002 - 2007**
ESPOL, Escuela Superior Politecnica del Litoral - Guayaquil, Ecuador

Experience

Postdoctoral Research Associate / Department of Environmental Sciences **2024 - Present**
University of Virginia - Charlottesville, VA

- **Project: Agent-based modeling for low-carbon cement adoption in the U.S. cement industry**
- Industrial manufacturing faces high CO_2 emissions with slow adoption of low-carbon technologies due to complex stakeholder dynamics.
- Owned and led a research agenda designing **agent-based simulation frameworks augmented with ML and LLMs**, grounded in empirical data, interviews, and qualitative analysis of Portland Limestone Cement adoption; built formal data structures, metrics, and iterative experimentation pipelines in Python.
- Delivered **actionable, evidence-based recommendations** to accelerate low-carbon cement adoption across U.S. supply chains, informing sustainability strategy and policy discussions.
- **Project: Multi-dimensional coupled socio-environmental framework**
- Existing socio-environmental modeling efforts lacked scalable, reusable frameworks to represent heterogeneous entities and interactions across spatial and temporal scales.
- Owned the design and implementation of a multi-dimensional coupled socio-environmental modeling framework, defining **formal data structures and computational models in Python** and an iterative modeling cycle to support multi-action, interactive simulations.
- Enabled consistent, reusable experimentation across domains and demonstrated applicability through an **agroecological transition** case study, improving **analytical rigor and scalability** for sustainability research.

Associate Dean **2022 - 2024**
ESPOL, Escuela Superior Politecnica del Litoral - Guayaquil, Ecuador

- A large academic organization required alignment of research, programs, and institutional priorities to improve impact and effectiveness.
- Lead complex, multi-stakeholder operations while strengthening research output and organizational performance.
- Served as Associate Dean overseeing 5 undergraduate programs, 10 graduate programs, 123 faculty, and 2,000+ students; coordinated curricula and inclusive policies.
- Improved program alignment, faculty engagement, and student outcomes.

Associate Professor **2019 - 2021**
ESPOL, Escuela Superior Politecnica del Litoral - Guayaquil, Ecuador

- For families separated by distance experience reduced opportunities for bonding and sustained connection, investigated how shared media experiences can support long-distance family relationships and generate analyzable behavioral data.
- Designed and deployed **FamilySong**, a domestic media space enabling synchronized music listening, and built **custom software to analyze six-month experimental data** from six distributed families, including interaction routines and music-sharing patterns.

- Produced empirical insights into long-distance family social behavior and delivered a **reusable data-analysis pipeline**, establishing FamilySong as an exemplar for efficient analysis in ICT and HCI research.

Graduate Research Assistant **2015 - 2019**

Virginia Tech / Network Dynamic and Simulation Science Laboratory - Blacksburg, VA

- **Project: Pipelines for computational social science experiments and model building**
- Networked social science experiments generated large-scale behavioral data difficult to analyze using ad-hoc methods.
- Designed **scalable modeling and analysis pipelines** to explain human behavior and support hypothesis testing.
- Developed **mechanistic and data-driven behavioral models** from large experimental datasets and integrated them into an agent-based simulation and experimentation platform; implemented cloud-ready, reproducible data pipelines with automated ingestion, model validation, and statistical evaluation.
- Enabled statistically valid experimentation and produced **behavioral insights** beyond observational analysis, supporting AI-assisted and human-centered system research **published in top peer-reviewed venues**.

Assistant Professor **2010 - 2014**

ESPOL, Escuela Superior Politecnica del Litoral - Guayaquil, Ecuador

- Led a complex, multi-phase accreditation program resulting in the **first ABET-accredited Computer Science degree in Ecuador**, coordinating cross-functional teams, documentation pipelines, quality assurance processes, and external audits to meet international standards for continuous improvement.
- Developed and taught courses in Programming and Database Systems, covering data modeling, query optimization, and advanced database architectures.

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. Dec 7-10, Seattle, WA, USA.
- **Cedeno-Mieles, V.** et al. "Data analysis and modeling pipelines for controlled networked social science experiments." PLOS ONE. Published: November 24, 2020.
- **Cedeno-Mieles, V.** et al. "Data Analysis on a Domestic Media Space Connecting Internationally Distributed Families". The International Conference on Information and Communication Technologies and Development (ICTD) 2020. June 17-20, Guayaquil, Ecuador.
- **Cedeno-Mieles, V.** et al. "Networked experiments and modeling for producing collective identity in a group of human subjects using an iterative abduction framework". Social Network Analysis and Mining, SNAM (Journal). Volume 10. Article 11. Published online: 07 January 2020.
- **Cedeno-Mieles, V.** et al. "On the Modeling and Agent-Based Simulation of a Cooperative Group Anagram Game". The Winter Simulation Conference (WSC) 2019. December 8-11, National Harbor, MD, USA, pp. 169-180.
- **Cedeno-Mieles, V.** et al. "Mechanistic and Data-Driven Agent-Based Models to Explain Human Behavior in Web-Based Group Anagram Game". The IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM) 2019. August 27-30, Vancouver, Canada.

(Full list available at vcedeno.github.io)

Core 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 & administration
- Programming: Python, JavaScript, R, C++, Java, MATLAB, SQL

Honors and Recognition

- Best Researcher, Communication Media Studies Subarea - ESPOL 2023, 2024.
- Teaching Merit Diploma, ESPOL, 2011.
- Fulbright Scholar, Master's Studies in the U.S. Aug 2008 - May 2010.

Languages

- Spanish (Native)
- English (Fluent)
- French (Intermediate)