Rogelio Gracia Otalvaro, Ph.D.

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Education

Embry-Riddle Aeronautical University — Daytona Beach, FL, USA

Ph.D. in Computer Science and Electrical Engineering (GPA 4.0/4.0) — 2023 – December 2025

Master of Science in Mechanical Engineering (GPA 3.83/4.0) — 2021 – 2022

ICAI Universidad Pontificia de Comillas — Madrid, Spain

Master of Science in Industrial Technologies Engineering (Thesis: 9.5/10) — 2020 – 2022

Bachelor's in Industrial Technologies Engineering (Thesis: 9.5/10) — 2015 – 2020

Peer-Reviewed & Accepted Publications

1. **Gracia Otalvaro, R.**, & Watson, B. C. (2026, June). Democratizing Resilience Analysis: Open-Source Tool Adaptation for Multi-Stakeholder Infrastructure Assessment. *INCOSE International Symposium 2026 (IS 2026)*, Yokohama, Japan, 13–18 June 2026. Accepted for presentation and publication in conference proceedings.
2. **Gracia Otalvaro, R.**, & Watson, B. C. (2026, April). Evaluating Complex System Resilience Through BARD: A Bifurcation Analysis for Resilience Diagnostics Framework. *Systems Engineering*. doi.org/10.1002/sys.70055
3. **Gracia Otalvaro, R.**, & Watson, B. C. (2026, January). Soft Actor-Critic Reinforcement Learning Approach to Multi-Drone 3D Terrain Scanning and Target Detection in Search and Rescue Operations. *AIAA SciTech Forum 2026*, AIAA 2026-0563. doi.org/10.2514/6.2026-0563
4. **Gracia Otalvaro, R.**, & Watson, B. C. (2025, June). Bifurcation analysis for system resilience: A case study on power infrastructure. *INCOSE International Symposium* (Vol. 35, No. 1, pp. 1845-1859). doi.org/10.1002/iis2.70091
5. **Gracia Otalvaro, R.**, & Watson, B. C. (2024, August). Barriers to sustainable system evolution: A simulation study exploring the transition from private to public transportation. *ASME IDETC/CIE* (Vol. 88391, pp. V005T05A015). doi.org/10.1115/DETC2024-143201
6. **Gracia Otalvaro, R.**, & Watson, B. C. (2024, July). A framework to use bifurcation analysis for insight into complex systems resilience. *INCOSE International Symposium*, 34(1), 2384–2399. doi.org/10.1002/iis2.13276

Under Review:

- **Gracia Otalvaro, R.**, & Watson, B. C. Advancing System of Systems Resilience Through Transient Ecological Network Metrics and Dynamic Performance Analysis. *IEEE Systems Journal*.
- **Gracia Otalvaro, R.**, & Watson, B. C. The BARD Framework Applied to Power Systems: Quantifying Absorptive, Adaptive, and Recovery Capabilities. *Reliability Engineering and System Safety*.

In Preparation:

- **Gracia Otalvaro, R.** Multi-Agent Reinforcement Learning for Prosumer Energy Management in Distributed Energy Networks. *Target: AAAI | Backup: IEEE Trans. Control of Network Systems.*
- **Gracia Otalvaro, R.** Bifurcation Analysis in Deep Neural Networks: Understanding Critical Transitions and Stability. *Target: NeurIPS | Backup: Nature Machine Intelligence.*

Academic Research Reports

1. **Gracia Otalvaro, R.** (2020). Augmented reality-based solutions for industrial equipment maintenance [Bachelor's thesis, Universidad Pontificia Comillas]. hdl.handle.net/11531/41255
2. **Gracia Otalvaro, R.** (2024). An open-source-based graphical platform for efficient analysis and design of electrical systems [Master's thesis, Universidad Pontificia Comillas]. hdl.handle.net/11531/87868
3. **Gracia Otalvaro, R.** (2024). ADS-B security: A critical review and proposed machine learning defense mechanism (Qualifying exam report). Embry-Riddle Aeronautical University.
4. **Gracia Otalvaro, R.** (2024). Optimizing flight operations: Data-driven strategies to combat air traffic delays caused by weather and congestion (Qualifying exam report). Embry-Riddle Aeronautical University.
5. **Gracia Otalvaro, R.** (2025). Resilience Engineering via Bifurcation and Ecological Network Analysis: Demonstrated in an Electric Power Case Study [Doctoral dissertation, Embry-Riddle Aeronautical University]. commons.erau.edu/edt/947

Awards & Grants

- **SCEEE Development Grant** – Combining Biological Inspiration, Machine Learning, and Graph Theory to Improve Early-Stage Electric Grid Transient Response Design
  Role: Investigator and grant composer | Amount: $80,000 | Aug 2024 – Jul 2025
- **Philanthropy Council Grant** (2024) – $4,000 for UAV Swarm Navigation for Search and Rescue Missions research. Role: Investigator and grant composer
- **SPARK Travel Grant** (2024–2025) – $900 for research dissemination and conference participation
- **SPARK Travel Grant** (2023–2024) – $700 for research dissemination and conference participation
- **Graduate Research Symposium** (2024) – Poster Competition: Second Place & People's Choice Award ($500)
- **Frontiers in Engineering Design Research Summer School (FinDER)** (2023) – Selected participant; full travel, lodging, and meals support

Grant Proposals (Submitted, Not Funded):

- **ARPA-E (U.S. DOE) IGNIITE 2025**: "A Biologically Inspired Architecture Screening Tool to Improve Safety-Critical System Transient Response"
  Role: Co-author (methods, modeling plan, ENA–bifurcation integration)

Invited Talks

- **INCOSE CIPRWG** (Critical Infrastructure Protection and Recovery Working Group). Invited special speaker. "Resilience Engineering via Bifurcation and Ecological Network Analysis: Demonstrated in an Electric Power Case Study." February 2026.

Professional Experience

Embry-Riddle Aeronautical University Daytona Beach, FL, USA
Visiting Assistant Professor January 2026 – Present

- Teaching undergraduate and graduate courses in Signals and Systems, Optimization, and Digital Communications

- Conducting research in resilience engineering, multi-agent reinforcement learning, complex systems analysis, LLM fine-tuning, and decentralized strategies for critical infrastructure optimization and safety

Embry-Riddle Aeronautical University Daytona Beach, FL, USA
Graduate Research / Teaching Assistant Aug 2021 – Dec 2025

- Led machine learning and AI data-driven initiatives in the BID4R lab, directing cross-functional research teams to develop analytical solutions for critical infrastructure and aerospace applications
- Conducted research in resilience engineering, bifurcation analysis of complex systems, bio-inspired design, aerial robotics, machine learning, cloud computing, and deep learning applications
- Presented and published findings in 10+ conference and symposium proceedings (INCOSE, ASME IDETC, AIAA)
- Developed and delivered course content for Dynamics, Modern Controls, and Electrical Engineering courses, instructing 150+ students and contributed to design of three new graduate courses
- Utilized MATLAB, Python, AnyLogic, and Cloud services to model and study complex dynamic systems
- Mentored two undergraduate research projects resulting in poster presentations at university-wide research symposiums (Student Research Symposium; Discovery Day 2025)

IMAGINE + INVERSION Madrid, Spain
Associate Quantitative Analyst Feb 2021 – Aug 2021

- Engineered data mining strategy using SQL and Excel to evaluate 700+ companies, achieving 50% reply rate from decision-makers
- Delivered data-driven BI presentations to investment committees, translating analyses into actionable recommendations
- Built financial models to assess tech startups' growth potential

BALLESOL Madrid, Spain
Project Manager Oct 2018 – Jan 2020

- Led creation of centralized business model, reducing operational costs by 30% through cost-control initiatives
- Monitored operational efficiency across 45+ residential sites using custom KPIs, reducing delivery timelines by 20%

Teaching Experience

Embry-Riddle Aeronautical University Daytona Beach, FL, USA
As Visiting Assistant Professor (Spring 2026):

- **CEC 315 Signals and Systems** (50 students, Instructor) – Mathematical foundations for analyzing linear time-invariant systems; convolution, stability, Fourier series, Fourier and Laplace transforms, network analysis in the complex frequency domain
- **SYS 303 Optimization in Systems Engineering** (7 students, Instructor) – Deterministic modeling, linear programming, duality, sensitivity analysis, integer and dynamic programming, network models, nonlinear programming

- **EE 620 Digital Communications** (7 students, Instructor) – Digital communication theory; base-band and pass-band signal representations, matched filter, optimal detection, bit error rate analysis

As Graduate Teaching Assistant (2021–2025):

- **EE 327 Electrical Engineering Fundamentals** (Fall 2025, 90+ students across 2 sections, Instructor) – Circuit theory, AC/DC analysis, phasors, transient response, and digital logic. *Student evaluations: 3.86/4.0 overall teaching effectiveness on a 4-point scale (College avg: 3.26, Campus avg: 3.48); 89% of students rated "Strongly Agree" on effectiveness*
- **SYS 699 Complex System Modeling** (Summer 2023, Content Designer) – Original graduate course on system dynamics and agent-based modeling
- **EE 402 Control Systems Laboratory** (Spring 2023, Instructor) – System identification, state feedback, controller implementation
- **EE 401 Control Systems Analysis and Design** (Spring 2023, TA) – Analog/digital control, stability, frequency domain methods
- **ME 595FF Dynamic Systems, Stability, and Control** (Fall 2021 & Spring 2022, Content Designer & TA) – Nonlinear dynamics, Lyapunov methods, robust control
- **ES 204 Dynamics** (Fall 2021, TA) – Kinematics, kinetics, energy methods, momentum

Skills & Knowledge

Languages: Spanish (Native), English (Fluent, TOEFL 112/120)

Data & Analytics: Python, SQL, MATLAB & Simulink, Power BI, Excel, AnyLogic, CSS, HTML

Engineering & Development: Google Cloud Platform (GCP), PyTorch, TensorFlow, C++, Java, Linux, JavaScript, React, Unity 3D

Office & PM Tools: Microsoft Office Suite, Teams, Outlook, Trello, Scrumwise (Agile), Jira

Soft Skills: Analytical Thinking, Proactive Problem-Solving, Teamwork & Leadership, Fast Learner

Professional Memberships

- Member, International Council on Systems Engineering (INCOSE) 2023 – Present
- Member, American Society of Mechanical Engineers (ASME) 2024 – Present

Leadership & Volunteering

- **PADI Divemaster**, Professional Scuba Diver. 400+ dives in 10+ countries. 100+ as a guide.
- **Member of the World Wildlife Fund (WWF)**. Participated in oriented trips to raise awareness for environmental problems.

Last updated: February 2026