Agustin Castellano

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Agustin Castellano
Homepage

Summary

- 6+ years expertise in (Deep) Reinforcement Learning and Dynamic Programming, leading to 7 first-author publications in IEEE Transactions on Automatic Control, ACC, among others.
- Led development of a Learning Algorithm for Uruguay's electric utility company, serving over 3 million residents [3].
- Skilled in large-scale ML projects, proficient in deep learning (`Pytorch`), optimization (`CVXPY, Gurobi, MOSEK`), modeling (`Gym`) and data management (`Scipy, Pandas`).
- Awarded first place for Master's Thesis work, given by the National Academy of Engineers.
- Excellent communication skills, evidenced by 5+ years of working in collaborative research environments and 8+ years of teaching.

Education

Johns Hopkins University — Baltimore, MD, USA
Ph.D. in Electrical and Computer Engineering — 2021–May 2026

- Thesis: *"Reinforcement Learning with almost sure constraints"*

Universidad de la República — Montevideo, Uruguay
M.Sc. in Electrical Engineering — 2018–2021

- Thesis: *"Optimization of Energy Storage Systems in Electric Grids"* (link) **[First Place Award]**

Universidad de la República — Montevideo, Uruguay
B.S. in Electrical Engineering — 2013–2017

- Thesis: *"DAF: Under-frequency Load-shedding"* (link)

Technical skills

- **Machine Learning**
  SVMs; Deep Learning (`Pytorch`; MLPs; CNNs); Reinforcement Learning (Constrained RL, Deep RL, SAC, PPO, DDPG, etc.); Regression.
- **Optimization**
  Stochastic Optimization (batch SGD, Adam); Convex Optimization (SDPs, QCQPs, etc); `cvxpy, Gurobi, MOSEK`.
- **Data analysis & Statistics**
  Dimensionality reduction (PCA, t-SNE, MDS, `Scipy`); Clustering; Sequential Hypothesis Testing; Bayesian Modeling; Regression.
- **Programming**
  Python (6+ years, parallel computing); Matlab (6+ years, `Simulink`, `CVX`); C; High-Performance Computing (`slurm, UNIX`).
- **Control Theory**
  Model Predictive Control; Non-linear Control; Robust Control.

Work experience

Research Assistant, Johns Hopkins University Baltimore, MD, USA
Dept. of Electrical and Computer Engineering 2021-present

- Thesis focus on safety-critical Reinforcement Learning (RL).
- Developed theory for RL under almost sure constraints with convergence guarantees.
- Published results in high-impact journal [1] and conferences [2], [5].

Research Assistant, Universidad de la República Montevideo, Uruguay
Dept. of Electrical Engineering 2018-2021

- Research on integration and control of distributed storage in power systems.
- Applied Reinforcement Learning algorithms to power systems under stochastic uncertainty.
- Obtained and curated real-world data of demand and renewable generation.

Research Assistant, Fundación Julio Ricaldoni Montevideo, Uruguay
Systems & Control Theory group 2018-2019 & 2021

- Research on optimal power flow and storage systems' operation for dynamic electric networks.
- Experience with large dataset (rain in hydro reservoirs), dimension-reduction techniques [3].
- Developed approximate dynamic programming algorithm using convex solvers and high-performance computing.

Teaching experience

Teaching Assistant, Johns Hopkins University Baltimore, MD, USA
Dept. of Electrical and Computer Engineering 2022–present

- Teaching assistant on graduate level Reinforcement Learning course.
- Hold recitations and office hours, prepare homeworks and coding assignments. Class of 40 students.

Teaching & Research Assistant, Universidad de la República Montevideo, Uruguay
Dept. of Electrical Engineering and Dept. of Physics 2016-2021

- 5 years of combined experience as a teaching assistant of Reinforcement Learning, Circuit Theory and Physics courses.
- Held recitations, created homework assignments and exam problems, and offered office hours. Classes of 10-200 people.
- Co-led design and teaching of an undergraduate workshop on Renewable Energies for 3 years. Class of 30 people.

Awards & Scholarships

- ***Johns Hopkins University*** – **MINDS Institute Spring Fellowship** 2022
  - Full stipend coverage awarded to only a handful of students for their work on Data Science.
- *Johns Hopkins University* – ECE Departmental Fellowship 2021–2022
  - Awarded in support of the first year of Ph.D. program.
- ***National Academy of Engineers (Uruguay)*** – **First prize in M.Sc. Graduate Thesis Contest** 2021

– Awarded for impactful work and dissertation.

- *Comisión Académica de Posgrado (CAP)* – Scholarship extension for M.Sc. (link) 2021
  – Nine-month full stipend support to finish M.Sc.
- *Comisión Académica de Posgrado (CAP)* Scholarship for M.Sc. in Electrical Engineering (link) 2019–2021
  – Two-year full stipend support given to few graduate students each year.

Publications

[1] **A. Castellano**, H. Min, J. Bazerque, and E. Mallada, "Learning to act safely with limited exposure and almost sure certainty", in *Transactions on Automatic Control (TAC)*, IEEE, May 2023.

[2] **A. Castellano**, J. Bazerque, and E. Mallada, "Learning to be safe, in finite time", in *2021 American Control Conference (ACC)*, IEEE.

[3] **A. Castellano**, C. Martínez, P. Monzón, J. A. Bazerque, A. Ferragut, and F. Paganini, "Quadratic approximate dynamic programming for scheduling water resources: a case study", in *2020 IEEE PES Transmission Distribution Conference and Exhibition - Latin America*.

[4] **A. Castellano**, H. Min, J. A. Bazerque, and E. Mallada, "Learning safety critics via a non-contractive binary bellman operator", in *2023 57th Asilomar Conference on Signals, Systems, and Computers*, 2023, pp. 814–821.

[5] **A. Castellano**, H. Min, J. Bazerque, and E. Mallada, "Reinforcement learning with almost sure constraints", in *Learning for Dynamics and Control*, PMLR, 2022.

[6] **A. Castellano**, "Optimization of energy storage in power systems", M.S. thesis, Facultad de Ingeniería, UdelaR, Uruguay, 2021.

[7] **A. Castellano** and J. Bazerque, "Learning the operation of energy storage systems from real trajectories of demand and renewables", in *2020 IEEE Power Energy Society Innovative Smart Grid Technologies Conference (ISGT)*, 2020.