JOAO DANTAS

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EDUCATION

Aeronautics Institute of Technology, São José dos Campos, Brazil *Jan 2019 – Present*
Ph.D. in Electronic and Computer Engineering
Cum. GPA: 9.5 / 10.0

Carnegie Mellon University, Pittsburgh, PA *Nov 2021 – Jan 2023*
Ph.D. Exchange Program in Robotics

Aeronautics Institute of Technology, São José dos Campos, Brazil *Aug 2016 – Dec 2018*
M.Sc. in Electronic and Computer Engineering
Cum. GPA: 8.5 / 10.0

Stony Brook University, Stony Brook, NY *Jul 2014 – Jul 2015*
One-year Undergraduate Exchange Program in Mechanical Engineering
Cum. GPA: 3.93 / 4.00

Aeronautics Institute of Technology, São José dos Campos, Brazil *Jan 2011 – Dec 2015*
B.Sc. in Mechanical-Aeronautical Engineering
Cum. GPA: 8.7 / 10.0

RESEARCH EXPERIENCE

Institute for Advanced Studies Jan 2016 – Present
Research Engineer, Decision Support Systems Subdivision *São José dos Campos, Brazil*

Development of the **Aerospace Simulation Environment**, a custom-built, object-oriented simulation framework designed to model and simulate military scenarios, which aids the development of tactics and procedures within the aerospace context, providing critical support to the Brazilian Air Force.

Robotics Institute, Carnegie Mellon University Nov 2021 – Jan 2023
Research Associate, AirLab *Pittsburgh, PA*

Collaborating with **Prof. Dr. Sebastian Scherer** in the development of an artificial intelligence system designed to ensure the safe and predictable integration of autonomous unmanned aircraft into manned traffic. This involves sophisticated algorithms for seamless entry, navigation, and exit within traffic, break, and formation patterns.

Stony Brook University May 2015 – Jul 2015
Undergraduate Researcher, Department of Mechanical Engineering *Stony Brook, NY*

Worked with **Prof. Dr. Carlos Colosqui** on Brownian Motion and methodologies for the modeling and numerical analysis of stochastic transport processes, focusing on the dynamics of colloidal particles with micro- and nanoscale dimensions at liquid-fluid and liquid-solid interfaces.

National Council for Scientific and Technological Development Aug 2011 – Jul 2013
Undergraduate Researcher *São José dos Campos, Brazil*

Worked with **Prof. Dr. Gilberto Petraconi** as part of the Scientific Initiation Scholarship Program, conducting research in plasmas with a focus on analyzing the effects of electron thermionic emission. Additionally, engaged in research on aerospace materials, specifically studying composite materials utilized in ablative thermo-structural protective coatings for rocket engines.

PROFISSIONAL EXPERIENCE

Brazilian Air Force   Jan 2013 – Present
Research Engineer – Captain Engineer Officer   *São José dos Campos, Brazil*

- Lead cutting-edge research in **Modeling & Simulation** to enhance military operations.

- Engineer advanced decision support systems utilizing **Machine Learning** and **Data Science**, bolstering data-driven decision-making.

COC Educational System   Feb 2017 – Jul 2021
Mathematics Teacher and Scientific Olympiads Coordinator   *São José dos Campos, Brazil*

- Orchestrated and directed preparatory classes for Scientific Olympiads.

- Guided students to secure **158 medals** and honorable mentions in **46** national and international competitions.

Emerge Brazil   Oct 2016 – Dec 2017
Co-founder and Head of Communications   *São Paulo, Brazil*

- Innovated at the intersection of science and industry by bridging cutting-edge scientific research with practical applications.

- Proficiently mapped over **300 technologies**, and facilitated **60** technology-industry partnerships, fostering innovation within the Brazilian market.

SKILLS

Natural Languages	Native Portuguese ⋄ Advanced English
Programming Languages	Python ⋄ R ⋄ SQL ⋄ MATLAB ⋄ LaTeX
Deep Learning Framework	Tensorflow ⋄ Keras ⋄ Pytorch
Python Toolkits	NumPy ⋄ Pandas ⋄ Matplotlib ⋄ Scikit-Learn ⋄ SciPy

AWARDS AND HONORS

2023: Selected as one of the seven researchers by the CISB - Swedish-Brazilian Research and Innovation Centre for a travel award ($\approx$ €3200) to participate as part of a delegation of AI researchers, focusing on connecting, structuring, and developing projects between Brazil and Sweden.

2023: 3rd place in the Data Science Challenge 2023.

2023: Best PhD Colloquium Award at the 2023 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation.

2023: Travel award ($\approx$ 1,000) to participate at the 2023 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation in Orlando, FL.

2023: Travel award ($\approx$ \$2,500) to participate at the Brazil at Silicon Valley 2023 in Santa Clara, CA.

2022: Fundacão Estudar Merit Scholarship for outstanding trajectory and academic potential (30 recipients out of 33,876 applicants).

2021: 3rd place in the 5th Brazilian Competition on Knowledge Discovery in Databases (KDD-BR).

2021: Military Bronze Medal received from the Brazilian Air Force.

2019: 6th place out of 39 competitors in the 3rd Brazilian Competition on Knowledge Discovery in Databases (KDD-BR).

2019: Ambassador Award of Excellence, International Youth Math Challenge.

2019: 4th place in the Data Science Challenge at Engineering Education for the Future (EEF).

2016: Selected by Institute Four to participate at the Prolider Program (29 recipients out of 2,013 applicants).

2015: Honorable Mention in the Department of Humanities, Aeronautics Institute of Technology.

2014–2015: Full scholarship from Brazil's Ministry of Education for one-year study program at Stony

Brook University, College of Engineering and Applied Sciences ($\approx$ \$75,000).

2014: Military Merit Award from the Brazilian Air Force (25% best military behavior grades among the Officer Candidates).

2011–2013: Fellowship of Scientific Initiation Scholarship Program for 24 months, National Council for Scientific and Technological Development.

2011: 1st place overall out of 120 Officer Candidates, Brazilian Air Force Reserve Officer Training Corps (CPORAER-SJ)

2011: Approved in the Aeronautics Institute of Technology entrance exam, 120 recipients out of 7627 applicants.

2009: Academic Merit Award from the Brazilian Air Force (25% best military grades).

2007: Bronze Medal, 10th Brazilian Olympiad of Astronomy and Astronautics (OBA) (187,726 competitors).

2006: Honorable Mention in the XIV Ceara Science and Biology Olympiad, a competition managed by the Federal University of Ceara, Brazil.

2006: Gold Medal in the Internal Science Olympiads in the disciplines of Mathematics, Physics, Chemistry and Biology, Farias Brito High School, Brazil.

2004–2006: Full scholarship for three years study program at Farias Brito High School, Brazil ($\approx$ \$30,000).

2003: Honor to Merit for 2nd place for 3 times and 5th place for 1 time in the Internal Mathematics Olympiad, Christus Middle School.

2003: 2nd place in the 3rd Christus Exhibition of Science and Technology (EXCETEC) in the area "Exact, Social and Commercial Sciences" with the project "Educational Exodus Study", Christus Middle School, Brazil.

PUBLICATIONS

[1] **Joao P. A. Dantas**, Samara R. Silva, Vitor C. F. Gomes, Andre N. Costa, Adrisson R. Samersla, Diego Geraldo, Marcos R. O. A. Maximo, and Takashi Yoneyama. AsaPy: A Python Library for Aerospace Simulation Analysis. In *Proceedings of the 2024 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*, SIGSIM-PADS'24, Atlanta, GA, USA, 2023. Association for Computing Machinery [submitted].

[2] Ingrid Navarro, Jay Patrikar, **Joao P. A. Dantas**, Rohan Baijal, Ian Higgins, Sebastian Scherer, and Jean Oh. Sorts: Learned tree search for long horizon social robot navigation. *Robotics and Automation Letters (RA-L)*, pages 1–8, 2024 [submitted].

[3] **Joao P. A. Dantas**, Diego Geraldo, Felipe L. L. Medeiros, Marcos R. O. A. Maximo, and Takashi Yoneyama. Real-Time Surface-to-Air Missile Engagement Zone Prediction Using Simulation and Machine Learning. In *Interservice/Industry Training, Simulation and Education Conference (I/ITSEC)*, pages Orlando, FL, USA, 2023.

[4] **Joao P. A. Dantas**, Diego Geraldo, Andre N. Costa, Marcos R. O. A. Maximo, and Takashi Yoneyama. ASA-SimaaS: Advancing Digital Transformation through Simulation Services in the Brazilian Air Force, 2023.

[5] **Joao P. A. Dantas**, Marcos R. O. A. Maximo, and Takashi Yoneyama. Autonomous Agent for Beyond Visual Range Air Combat: A Deep Reinforcement Learning Approach. In *Proceedings of the 2023 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*, SIGSIM-PADS'23, Orlando, FL, USA, 2023. Association for Computing Machinery.

[6] Andre N. Costa and **Joao P. A. Dantas**. Analysis of Sequential Parameter Optimization for Computer Simulation Optimization. *Available at SSRN 4328180*, 2022.

[7] **Joao P. A. Dantas**, Andre N. Costa, Felipe L. L. Medeiros, Diego Geraldo, Marcos R. O. A. Maximo, and Takashi Yoneyama. Supervised Machine Learning for Effective Missile Launch Based on

Beyond Visual Range Air Combat Simulations. In *Proceedings of the Winter Simulation Conference*, WSC '22, 2022.

[8] **Joao P. A. Dantas**, Andre N. Costa, Victor C. F. Gomes, Andre R. Kuroswiski, Felipe L. L. Medeiros, and Diego Geraldo. ASA: A Simulation Environment for Evaluating Military Operational Scenarios. In *Proceedings of the 20th International Conference on Scientific Computing*, 2022.

[9] Jay Patrikar, **Joao P. A. Dantas**, Sourish Ghosh, Parv Kapoor, Ian Higgins, Jasmine J. Aloor, Ingrid Navarro, Jimin Sun, Ben Stoler, Milad Hamidi, et al. Challenges in Close-Proximity Safe and Seamless Operation of Manned and Unmanned Aircraft in Shared Airspace. In *Aerial Robotics Workshop, International Conference on Robotics and Automation (ICRA) 2022*, 2022.

[10] **Joao P. A. Dantas**, Marcos R. O. A. Maximo, Andre N. Costa, Diego Geraldo, and Takashi Yoneyama. Machine Learning to Improve Situational Awareness in Beyond Visual Range Air Combat. *IEEE Latin America Transactions*, 20(8), 2022.

[11] Andre N. Costa, Felipe L. L. Medeiros, **Joao P. A. Dantas**, Diego Geraldo, and Nei Y. Soma. Formation Control Method Based on Artificial Potential Fields for Aircraft Flight Simulation. *SIMULATION*, 98(7):575–595, 2022.

[12] **Joao P. A. Dantas**, Andre N. Costa, Diego Geraldo, Marcos R. O. A. Maximo, and Takashi Yoneyama. Weapon Engagement Zone Maximum Launch Range Estimation Using a Deep Neural Network. In André Britto and Karina Valdivia Delgado, editors, *Intelligent Systems*, pages 193–207, Cham, 2021. Springer.

[13] **Joao P. A. Dantas**, Andre N. Costa, Diego Geraldo, Marcos R. O. A. Maximo, and Takashi Yoneyama. Engagement Decision Support for Beyond Visual Range Air Combat. In *Proceedings of the 2021 Latin American Robotics Symposium*, pages 96–101, 2021.

[14] **Joao P. A. Dantas**, Andre N. Costa, Marcos R. O. A. Maximo, and Takashi Yoneyama. Enhanced Self-Organizing Map Solution for the Traveling Salesman Problem. In *Anais do XVIII Encontro Nacional de Inteligência Artificial e Computacional*, pages 799–802. SBC, 2021.

[15] **Joao P. A. Dantas** and Caio Augusto de Melo Silvestre. Modelo de Simulação Aplicado às Missões de Transporte na Região Amazônica. *Aplicações Operacionais em Áreas de Defesa*, 21:10–15, 2020.

[16] **Joao P. A. Dantas**. Apoio à Decisão para o Combate Aéreo Além do Alcance Visual: Uma Abordagem por Redes Neurais Artificiais. Master's Thesis, Instituto Tecnológico de Aeronáutica, São José dos Campos, SP, Brazil, 2018.

[17] **Joao P. A. Dantas**, Jelton Alexandre da Cunha, Jamesson Lira Silva, Alessandro Oliveira Arantes, and Vitor Conrado Faria Gomes. Análise Exploratória de Dados de Acidentes Aeronáuticos no Brasil. *Revista Conexão SIPAER*, 9(2):106–127, 2018.

[18] **Joao P. A. Dantas**, Caio Augusto de Melo Silvestre, Daniel Alberto Pamplona, and Anibal Tavares de Azevedo. Modelo de simulação aplicado à logística aérea na região amazônica. In *Anais do III Encontro Regional de Pesquisa Operacional do Sudeste*, 2018.

[19] **Joao P. A. Dantas**. Teoria dos jogos aplicada ao combate BVR. *Aplicações Operacionais em Áreas de Defesa*, 20, 2017.

[20] **Joao P. A. Dantas**. Hexacóptero para monitoramento de construção civil: montagem, testes e operação. Senior Thesis, Instituto Tecnológico de Aeronáutica, São José dos Campos, SP, Brazil, 2015.

[21] **Joao P. A. Dantas** and Gilberto Petraconi Filho. Aquisição automática de dados em ensaios de materiais de barreira térmica realizados em túnel de plasma supersônico. In *Anais do XIX Encontro de Iniciação Científica e Pós-Graduação do ITA - XIX ENCITA*, 2013.

[22] **Joao P. A. Dantas** and Gilberto Petraconi Filho. Estudo de uma descarga de catodo termiônico em baixa pressão. In *Anais do XVIII Encontro de Iniciação Científica e Pós-Graduação do ITA – XVIII ENCITA*, 2012.

VOLUNTEERING

International Astronomy and Astrophysics Competition Apr 2020 – Jul 2021
Ambassador *Sao Jose dos Campos, Brazil*

Working to enables motivated students and supportive mentors to inspire youths for astronomy and astrophysics and to encourage them to participate in the competition.

International Youth Math Challenge Jul 2019 – Jul 2021
Ambassador *Sao Jose dos Campos, Brazil*

Working to inform schools and encourage students and youths to participate in the competition.

Alpha Lumen Institute Jun 2012 – May 2013
Mathematics Teacher *Sao Jose dos Campos, Brazil*

Teacher of mathematics in the preparatory class for the Aeronautics Institute of Technology entrance exam.

ADDITIONAL ACTIVITIES

Competitive basketball player (2007-2009) – Brazilian Air Force Academy, Pirassununga, Brazil
Amateur bodybuilder (2014-2015) – The National Physique Committe, New York, United States.
Hobbies: brazilian jiu-jitsu, hiking, cooking, traveling.

January 2, 2024