# Antonio R. Paiva

https://arpaiva.github.io
alpharomeopapa@gmail.com

## Professional Experience

**Principal Data Scientist** *March 2022 – present*
Allstate, Chicago, IL (Remote – NJ basedJ)

- Developed strategic plan, directed external projects, and conducted research on methods for measuring the traffic safety risk of driver-assistance and autonomous driving systems.
- Developed tools for automated extraction of structured information from customer interactions using LLM prompt optimization methods and AI-agentic frameworks.
- Developed models for extraction of property insights from aerial images.

**Advanced Data Analytics Researcher** *Aug. 2015 – March 2022*
ExxonMobil, Annandale, NJ

- Led research projects on deep learning probabilistic models, geophysical uncertainty quantification, and occupational safety data analytics.
- Developed framework for preventative occupational safety interventions.
- Developed machine learning models for fault detection in industrial systems.

**Technical Team Lead** *Jan. 2014 – Jul. 2015*
ExxonMobil Upstream Research Company, Houston, TX

- Managed research deployment and Agile software development and deployment.
- Commercialized two software products and initiated development of 3 new projects.

**Pattern Recognition Researcher** *Oct. 2010 – Dec. 2013*
ExxonMobil, Houston, TX

- Developed pattern recognition and signal processing methods for analysis of geophysical (i.e., seismic) image volumes. Innovations included in 8 patents.
- Contributions include algorithm that produced 100x speed-up of previous approach, enabling the analysis to be deployed and performed on user's workstations.

**Post-Doctoral Fellow**, Scientific Computing and Imaging Institute *Aug. 2008 – Sept. 2010*
University of Utah, Salt Lake City, UT

- Developed neural network and image pattern recognition methods, with applications in cell detection, identification, and reconstruction from electron microscope image volumes.

**Research Assistant** *Aug. 2004 – July 2008*
University of Florida, Gainesville, FL

- Developed new kernel machine learning framework for point processes.
- Applied new kernel methods for neurophysiological signal data analysis.

## Education

**Ph.D.**, Electrical & Computer Engineering *Aug. 2008*
University of Florida, Gainesville, FL, USA

**M.S.**, Electrical & Computer Engineering *Dec. 2005*
University of Florida, Gainesville, FL, USA

***Licentiate***, Electronics & Telecommunications Engineering *Sept. 2003*
University of Aveiro, Aveiro, Portugal

## Technical Skills

Artificial Intelligence: AI (LLM-based) Agents; Prompt Engineering and Optimization; Large Language Models (LLMs)

Machine Learning: Deep Learning/Neural Networks (e.g., Transformers, CNNs, RNNs, VAEs, Normalizing Flows), Probabilistic Graphical Models, Kernel Methods, Signal Processing, Image Processing, Computer Vision

Programming: Python (incl. Numpy, Scikit-learn, PyTorch, TensorFlow, Keras, Pandas), Bash/shell scripting, Matlab, PyStan, C/C++, web development (HTML, CSS, PHP, SQL)

## Professional Activities

**IEEE Senior Member** *Jan. 2005 – present*

**Associate Editor**, IEEE Transactions on Neural Networks and Learning Systems *Jan. 2017 – Dec. 2022*

**Associate Editor**, IEEE Signal Processing Journal *July 2016 – June 2020*

## Patents

10 granted patents and 1 pending patent application.

## Publications

Summary:

- 4 book chapters,
- 17 journal articles,
- 28 articles in (refereed) conference proceedings,

Selected publications:

- Han Wang, Yuneil Yeo, **Antonio R. Paiva**, Jean Utke, and Maria Laura Delle Monache. Modular framework for uncertainty prediction in autonomous vehicle motion forecasting within complex traffic scenarios. *Technical report, University of California, Berkeley, January 2025*, arXiv: 2501.16480.
- Zhonghua Zheng, Arlene M. Fiore, Daniel M. Westervelt, George P. Milly, Jeff Goldsmith, Alexandra Karambelas, Gabriele Curci, Cynthia A. Randles, **Antonio R. Paiva**, Chi Wang, Qingyun Wu, and Sagnik Dey. Automated Machine Learning to Evaluate the Information Content of Tropospheric Trace Gas Columns for Fine Particle Estimates Over India: A Modeling Testbed. *Journal of Advances in Modeling Earth Systems*, 15(3), March 2023.
- **Antonio R. Paiva** and Giovanni Pilloni. Inferring Microbial Biomass Yield and Cell Weight using Probabilistic Macrochemical Modeling. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 20(1), 2023.
- **Antonio R. Paiva** and Ashutosh Tewari. Methodology for Testing and Evaluation of Safety Analytics Approaches. *Safety Science*, 152, Aug. 2022.
- Weike Sun, **Antonio R. Paiva**, Peng Xu, Anantha Sundaram, and Richard Braatz. Fault detection and identification using Bayesian recurrent neural networks. *Computers & Chemical Engineering*, 141, October 2020.
- **Antonio R. Paiva**. Information-theoretic dataset selection for fast kernel learning. *IEEE International Joint Conference on Neural Networks*, Anchorage, AK, USA, May 2017.
- Elizabeth Jurrus, **Antonio R. Paiva**, Shigeki Watanabe, James Anderson, Bryan Jones, Ross Whitaker, Erik M. Jorgensen, Robert Marc, and Tolga Tasdizen. Detection of neuron membranes in electron microscopy images using a series of neural networks. *Medical Image Analysis*, 14(6):770–783, December 2010.
- **Antonio R. Paiva**, Il Park, and José C. Príncipe. A reproducing kernel Hilbert space framework for spike train signal processing. *Neural Computation*, 21(2):424–449, February 2009.

## Languages

English and Portuguese