

# João Pinheiro

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Purdue University Department of Computer Science | 336. 997.5178 | West-Lafayette IN 47906

## EDUCATION

**Purdue University**, West-Lafayette, North Carolina

Ph.D. Candidate in Computer Science, GPA 3.8

**Wake Forest University**, Winston-Salem, North Carolina

Master of Science in Computer Science, GPA 3.9, May 2025

**Wake Forest University**, Winston-Salem, North Carolina

Bachelor of Science in Applied Mathematics, May 2023, Cum Laude

Minors in Computer Sciences and in Schools, Education, and Society (SES)

**Westhill Institute**, Mexico City

IB Diploma, May 2019

## PROFESSIONAL EXPERIENCE

**Teaching Assistant**, *Department of Computer Science at Purdue*, Aug 2025 – present

- Supported course instruction by assisting with assignments and leading discussion sessions in which I deliver lectures and guide students through course material.

**Research Assistant**, *Department of Computer Science WFU*, July 2023 – May 2025

- Conducted NSF-funded research under Dr. Grey Ballard, contributing to projects on tensor decompositions with applications in matrix multiplication algorithms, numerical optimization, and multidimensional data compression.
- Developed expertise in algorithm design and high-performance scientific programming systems.
- Collaborated with interdisciplinary teams of computer science and mathematics professors, enhancing interdepartmental communication and teamwork skills.
- Presented research findings at SIAM CSE25 and SIAM PP26

**Academic Tutor**, *Math and Stats Center WFU*, Jan 2021 – May 2025

- Provided one-on-one tutoring for 10+ undergraduate mathematics courses, from introductory to advanced levels, while refining subject expertise and communication skills; prepared thoroughly for higher-level sessions by reviewing course material in advance.
- Leveraged nearly four years of experience to mentor and support new tutors, fostering their integration into the center's operations and promoting a collaborative environment.

**Program Ambassador**, *Summer Immersion Program at WFU*, Winston-Salem, May 2022 – July 2022

- Guided middle and high school students through STEM career pathways and experiential learning activities while managing logistics, social media, and administrative tasks; ensured safety and engagement during on-campus and off-campus activities by demonstrating adaptability and strong leadership.

**Student Tutor**, *Latinx Mentoring Initiative at Latino Community Services*, Aug 2019 – Dec 2020

- Tutored middle and high school Latin American students in mathematics and statistics, fostering academic achievement while building trust and mentorship through bilingual communication; created supplementary resources to support the program's structure, ensuring long-term success and sustainability beyond my involvement.

**Teaching Assistant**, *Department of Computer Science at WFU*, Spring 2025

- CSC 301 Algorithm Design and Analysis under Dr. Grey Ballard. Work included grading student's homeworks and quizzes, holding weekly office hours where students could get direct help.

## RESEARCH EXPERIENCE

### IN COMPUTER SCIENCE

- Tensor Decompositions, Dr. Grey Ballard & Dr. Aditya Devarakonda, Summer 2023 – present
  - Developed, implemented, and benchmarked a new algorithm for Tucker decomposition, leveraging both MATLAB and C++/MPI on NERSC's Perlmutter supercomputer.

- Contributed to the TuckerMPI library, integrating novel improvements for handling large-scale tensor decompositions on high-performance computing systems.
- Fast Matrix Multiplication, Dr. Grey Ballard & Dr. Frank Moore, Summer 2023 – present
  - Developed and implemented new numerical optimization methods for tensor decomposition to search for fast matrix multiplication algorithms with cyclic invariant structure.
  - Discovered several algorithms, including both previously known ones (validating our optimization methods) and new algorithms (contributing novel insights to the field).
  - Collaborating with mathematicians to explore the mathematical foundations of these algorithms, studying permutations and actions to improve efficiency and develop new variants.
- Machine Learning & Computer Vision, Dr. Paul Pauca, Fall 2022 – Spring 2023
  - Developed a machine learning algorithm to identify species of palm trees in drone imagery from Ecuador, Peru, and Brazil, leveraging computer vision techniques for automated recognition.
  - Contributed to environmental preservation efforts by providing valuable data to local agencies, aiding in the reduction of deforestation of endangered palm tree species.

## IN EDUCATION

- Latin American Education, Dr. Betina Wilkinson, Fall 2019 – Spring 2020
  - Collaborated with Dr. Wilkinson and fellow tutors to investigate the educational impacts of the COVID-19 pandemic on underprivileged Latin American students at Latino Community Services (LCS).
  - Conducted pre-pandemic baseline assessments on academic performance and self-perception, later shifting focus to analyze the pandemic's effects on education in communities represented by LCS.
- Educational Computer Science, Dr. Ali Sakkal, Spring 2023, (SES Minor Senior Project)
  - Explored the methodology and best practices of conducting research in computer science as part of a dual research project within Dr. Paul Pauca's lab.
  - Investigated the research process in computer science, including problem identification, data collection, algorithm design, and result analysis, while performing hands-on machine learning research.
  - Conducted qualitative interviews with professors and postdoctoral researchers to gain insights into effective research practices and compiled findings into a comprehensive final report and presentation for the SES program

## PUBLICATIONS

- K. Cui, Z. Shao, G. Larsen, V.P. Pauca, S. Alqahtani, D. Segurado, J. Pinheiro, M. Wang, D. Lutz, R. Plemmons, and M. Silman. 2024. PalmProbNet: A Probabilistic Approach to Understanding Palm Distributions in Ecuadorian Tropical Forest via Transfer Learning. Proceedings of the 2024 ACM Southeast Conference (ACMSE '24). ACM, 272–277. <https://doi.org/10.1145/3603287.3651220>
- Joao Pinheiro, Aditya Devarakonda, and Grey Ballard. 2025. Parallel Rank-Adaptive Higher Order Orthogonal Iteration. In Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC '25). Association for Computing Machinery, New York, NY, USA, 1800–1815. <https://doi.org/10.1145/3712285.3759865>
- João Victor De Oliveira Pinheiro. 2025. *Advances in Tensor Decompositions: Fast Matrix Multiplication Algorithms and Parallel Adaptive Compression Techniques*. Thesis, Department of Computer Science, Wake Forest University. <http://hdl.handle.net/10339/111016>

## TALKS & PRESENTATIONS

- Parallel Rank-Adaptive Higher Order Orthogonal Iteration. Presented at SIAM Parallel Processing March 6<sup>th</sup>, 2026, Berlin, Germany
- Advances in Tensor Decompositions. Presented at Wake Forest University April 16<sup>th</sup>, 2025, Winston-Salem, NC
- Parallel Higher-Order Orthogonal Iteration for Tucker Decomposition with Rank Adaptivity. Presented at SIAM Computational Science and Engineering March 7<sup>th</sup>, 2025, Fort-Worth, TX
- Searching for Cyclic-Invariant Fast Matrix Multiplication Algorithms. Presented at Wake Forest Graduate Research Day March 4<sup>th</sup>, 2024, Winston-Salem, NC
- Searching for Cyclic-Invariant Fast Matrix Multiplication Algorithms. Presented at NSF's Workshop on Sparse Tensor Computations October 18<sup>th</sup>, 2023, Chicago, IL