

Matheus Sobreira Farias

Room 3.410, Science & Engineering Complex, 150 Western Ave. Allston, MA 02134

matheusfarias@g.harvard.edu | matheussfarias.com

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EDUCATION

Harvard University

Ph.D. in Electrical Engineering

Hardware-software co-design of efficient hardware architectures for deep learning. Advised by Prof. H. T. Kung ([link](#)). GPA: 3.90/4.00

Cambridge, MA

2021–2026 (EXPECTED)

Harvard University

M.Sc. in Electrical Engineering

Relevant Coursework: Hardware Architectures for Deep Learning (A), Tiny Machine Learning (A), High Performance Computing for Science and Engineering (A), Advanced Computer Architecture (A). GPA: 3.92/4.00

Cambridge, MA

2021–2024

Federal University of Pernambuco

B.Sc. in Electronics Engineering

1st out of 40 students, GPA 8.90/10. Senior Thesis: *iOwlT: Sound Geolocalization System* ([link](#)).

Recife, Brazil

2016–2021

RESEARCH

Detailed information can be found [here](#).

EfficientAI/TinyML (Meta AI/AFRL collab)

2021–PRESENT

Harvard University

Designing algorithms to improve deep neural networks efficiency (i.e. quantization, pruning, knowledge distillation, etc). Past work addresses bottlenecks such as data conversions, nonidealities, programming time and weight mapping of compute-in-memory crossbars.

iOwlT: Sound Geolocalization System ([link](#))

2019–2020

Federal University of Pernambuco

Developed a system using neural networks, adaptive filtering and real-time processing in FPGAs to recognize sound events and determine gun shooters location on a mobile application. Earned 3 international awards at InnovateFPGA 2019 in China (Top 0.7%).

Lock-in: Nano-Volt Signal Amplifier ([link](#))

2019–2020

Federal University of Pernambuco

Design and optimization of a phase-sensitive lock-in amplifier advised by the former Minister of Science and Technology of Brazil Prof. Sergio Rezende to investigate magnetic properties of IrMn/Py thin films using MOKE technique.

iTraffic: Smart Semaphore Network ([link](#))

2017

Federal University of Pernambuco

Design and proposal of an internet of things intelligent system to dynamically choose traffic lights timing to optimize vehicle flow on urban roads using genetic algorithm. Achieved 130% improvement in the average speed of cars in tested tracks.

Maracatronics: Robotics Team ([link](#))

2017

Federal University of Pernambuco

Member of the collective autonomous soccer sub-team, acting on robots control on Tiva-C microcontroller, computer vision mapping and tracking, and intelligent robots decision-making strategies. Achieved 5th Place at XVI Latin American Robotics Competition.

PUBLICATIONS

*denotes equal contribution

- [5] **M. Farias**, H. T. Kung, “Breaking Sneak Paths: An Accuracy-Aware Bit Flipping Heuristic for Computing-in-Memory Crossbars”, *in submission*.
- [4] **M. Farias**, “Semi-Nonnegative Matrix Factorization Improves Compute-in-Memory Crossbars Energy Efficiency”, *in submission*.
- [3] **M. Farias**, H. T. Kung, “Efficient Reprogramming of Memristive Crossbars for DNNs: Weight Sorting and Bit Sticking”, *ISCAS 2025*, <https://arxiv.org/pdf/2410.21730>.
- [2] **M. Farias**, H. T. Kung, “Sorted Weight Sectioning for Energy-Efficient Unstructured Sparse DNNs on Compute-in-Memory Crossbars”, *ISCAS 2025*, <https://arxiv.org/pdf/2410.11298>.

- [1] O. E. Akgun*, N. Cuevas*, M. Farias*, D. Garces*, “Tiny Reinforcement Learning for Quadrupled Locomotion Using Decision Transformers”, <https://arxiv.org/pdf/2402.13201>.

CONFERENCES

- | | |
|---|------------------------|
| 3. 2025 International Symposium on Circuits and Systems | London, United Kingdom |
| 2. 2019 International Conference on Field-Programmable Technology | Tianjin, China |
| 1. VII Brazilian Symposium on Computing Systems Engineering | Curitiba, Brazil |

TEACHING

Harvard University

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|---|--------------------------|
| CS242 – <i>Computing at Scale</i> | FALL 2024, SPRING 2026 |
| CS205 – <i>High Performance Computing for Science and Engineering</i> | SPRING 2023, SPRING 2026 |

Federal University of Pernambuco

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| ES456 – <i>Machine Learning</i> | FALL 2020 |
| MA326 – <i>Complex Variables and Applications</i> | SPRING 2018, FALL 2019 |
| FI007 – <i>Physics II: Gravitation, Waves and Thermodynamics</i> | FALL 2017, SPRING 2018 |
| MA026 – <i>Calculus I: Limits, Derivatives and Integrals</i> | FALL 2016 |

WORK EXPERIENCE

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|---|------------------------------------|
| Nissan Advanced Technology Center
<i>AI Hardware Accelerator Intern</i>
Led AI accelerator architecture exploration and C++ behavioral modeling. Designed state-of-the-art vectorized processing elements optimized for self-driving vehicle workloads, synthesizing RTL using Vitis HLS. Conducted architecture performance analysis and benchmarking, delivering reports on resource utilization and timing metrics. | Silicon Valley, CA
2025 |
| Neurotech
<i>Machine Learning Operations Intern</i>
Implemented 5 machine learning algorithms for creditworthiness assessment system. Built end-to-end ML pipeline using PyTorch for model development, ONNX for production deployment, and MLflow for experiment tracking and model management. | Recife, Brazil
2020–2021 |
| Espaço Diferencial
<i>Co-Founder and Teacher</i>
Idealized a non-profit school for underprivileged students in introductory engineering classes. Managed the action strategy planning that impacted over 200 students with a team of 10 teachers. Taught Physics at the undergraduate level. | Recife, Brazil
2016–2018 |

AWARDS AND RECOGNITIONS

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| Full Member at Sigma Xi, the Scientific Research Honor Society
<i>International</i>
Nominated to the world’s largest general research honor society. Founded in 1886, with 200+ Nobel laureates among its members. | 2025 |
| R\$100k Prize at Who Wants to be a Millionaire
<i>Brazil</i>
Correctly answered 11 out of 15 questions in the world’s most competitive trivia game. | 2025 |
| 1st Ecosis Award of Innovation and Sustainability at Mostratéc (The biggest S&T fair in LatAm)
<i>Brazil</i>
SIMBA is an AI-powered sound localization system that monitors <i>Antilophia bokermanni</i> , an endangered bird of cultural value in Brazil. | 2024 |
| MIT Innovator Under 35 in Artificial Intelligence
<i>Brazil</i>
Title given to top innovators in Science and Technology under the age of 35. | 2024 |
| Líder Estudante Fellow (“the Brazilian Rhodes Scholarship”)
<i>Brazil</i>
One of the 26 students over 45,000 candidates – the most competitive scholarship in the country. | 2024 |

Bronze Medal at the Online Young Physicists' Tournament <i>Online</i> 8th place at the Online Young Physicists' Tournament 2023.	2023
Silver Medal at the International Young Physicists' Tournament (Physics World Cup) <i>Murree, Pakistan</i> 2nd place at the 36th International Young Physicists' Tournament 2023 Pakistan.	2023
Behring Foundation Fellowship <i>Harvard University</i> Honored by the Behring Foundation with a fellowship to cover my graduate studies at Harvard.	2021–PRESENT
Three International Awards at InnovateFPGA 2019 Contest <i>Tianjin, China</i> 2 Silver Awards (<i>Grand Finals</i> and <i>Regional Finals</i>) and Community Award (<i>Best project in America</i>). 2nd out of 270 teams with iOwlT.	2019
PIBIC/CNPq funding to do research ("the Brazilian National Science Foundation fellowship") <i>Brazil</i> Awarded by national government funding to do research for Lock-in: Nano-Volt Signal Amplifier.	2019
5th Place at XVI Latin American Robotics Competition <i>Latin America</i> In the Small Size League category of autonomous soccer with Maracatronics: Robotics Project.	2017
1st Place at Embedded Systems Regional Contest <i>Brazil</i> 1st out of 14 teams with iTraffic: Smart Semaphore Network.	2017
Honorable Mention at Brazilian Physics Olympiad <i>Brazil</i> One of the 180 medalists over more than 300,000 contestants.	2015

DIVERSITY, INCLUSION & OUTREACH

• President of Brazil Conference 2025	2024–2025
• Vice President of Brazil Conference 2024	2023–2024
• Brazilian Team Leader at the Online Young Physicists' Tournament	2023
• Brazilian Team Leader at the International Young Physicists' Tournament in Pakistan	2023
• Author of the Experimental Exam for the Brazilian selective to the International Physics Olympiad	2023
• Leader of the Diversity & Inclusion branch at the Harvard Brazilian Association	2022–2023
• Judge for the InnovateFPGA 2022 Contest	2022
• Judge for the 4th Brazilian Physicists' Tournament	2021
• Officer of the School of Engineering at the Harvard Brazilian Association	2021–2024
• Judge for the International Young Physicists' Tournament Brazil	2021–PRESENT

TALKS

Backstage PodCast – How's the Mind of a Harvard student (link) <i>My favorite PodCast! Talked about journey and projects</i>	2025
Who Wants to be a Millionaire (link) <i>Trivia + my journey and projects (only available to watch in Brazil)</i>	2025
Conferência Nacional de Defesa e Difusão da Ciência (link) <i>Applied Knowledge: The Academic, Entrepreneur, and Corporative Perspective of Science</i>	2025

Educar – Terra (link) <i>From failing Physics to a Ph.D at Harvard: discover the MIT award recipient from Pernambuco</i>	2024
Crusoé – O Antagonista (article) (video) <i>The story of the first Brazilian EE Ph.D student at Harvard</i>	2024
Mais Você – Globo (biggest Brazilian TV channel) (link) <i>An interview about my journey and projects</i>	2024
Futuras Cientistas – Ministry of Science, Technology & Innovation of Brazil (link) <i>Technology and its Social Impact</i>	2023
PodCast Ph.D nos EUA (part 1) (part 2) <i>Journey to become a Ph.D student</i>	2021