Matheus Sobreira Farias

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Education

Harvard University — **Cambridge, MA**
Ph.D. in Electrical Engineering — 2021–Present
Working on efficient hardware architectures for machine learning. Advised by Prof. H. T. Kung (link)

Federal University of Pernambuco — **Recife, Brazil**
B.Sc. in Electronics Engineering — 2016–2021
1st out of 40 students, GPA 8.90/10. Senior Thesis: *iOwlT: Sound Geolocalization System* (link).

Research

Detailed information can be found here.

Computing in Memory — 2021–Present
Harvard University
Working on the algorithmic-level to improve efficiency of deep neural network deployment in the crossbar architecture. Particularly interested in reducing bottlenecks such as data conversions, nonidealities, programming time and weight mapping.

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

[2] **Matheus Farias**, H. T. Kung, "A Distribution-Based Efficient Programming of Sorted Compute-in-Memory Crossbars", *in submission*.

[1] **Matheus Farias**, H. T. Kung, "Sorted Weight Sectioning for Energy-Efficient DNNs on Compute-in-Memory Crossbars", *in submission*.

Conferences

2. **2019 International Conference on Field-Programmable Technology** — Tianjin, China
1. **VII Brazilian Symposium on Computing Systems Engineering** — Curitiba, Brazil

Teaching

Harvard University
CS205 – *High Performance Computing* — Spring 2023

Federal University of Pernambuco
ES456 – *Machine Learning* — Fall 2020

MA326 – *Complex Variables and Applications* 2018–2019

FI007 – *Physics II: Gravitation, Waves and Thermodynamics* 2017–2018

MA026 – *Calculus I: Limits, Derivatives and Integrals* FALL 2016

WORK EXPERIENCE

Neurotech **Recife, Brazil**
Machine Learning Intern 2020–2021
Served as workshop instructor and collaborated adding +5 machine learning algorithms to production.

Espaço Diferencial **Recife, Brazil**
Co-Founder and Teacher 2016–2018
Idealized a non-profit school for underpriviledge students in basic engineering classes. Managed the action strategy planning that impacted over 200 students with a team of 10 teachers. Taught Physics at the undergraduate level.

AWARDS AND RECOGNITIONS

Bronze Medal at the Online Young Physicists' Tournament 2023
Online
8th place at the Online Young Physicists' Tournament 2023.

Silver Medal at the International Young Physicists' Tournament (Physics World Cup) 2023
Murree, Pakistan
2nd place at the 36th International Young Physicists' Tournament 2023 Pakistan.

Behring Foundation Fellowship 2021-PRESENT
Harvard University
Honored by the Behring Foundation with a fellowship to cover my graduate studies at Harvard.

Silver Award at InnovateFPGA 2019 Contest (*Grand Finals*) 2019
Tianjin, China
2nd out of 270 teams with iOwlT: Sound Geolocalization System.

Silver Award at InnovateFPGA 2019 Contest (*Regional Finals*) 2019
Americas
2nd out of 40 teams with iOwlT: Sound Geolocalization System.

Community Award at InnovateFPGA 2019 Contest 2019
Americas
Elected as best project by the community with iOwlT: Sound Geolocalization System.

PIBIC/CNPq funding to do research 2019
Brazil
Awarded by national government funding to do research for Lock-in: Nano-Volt Signal Amplifier.

5th Place at XVI Latin American Robotics Competition 2017
Latin America
In the Small Size League category of autonomous soccer with Maracatronics: Robotics Project.

1st Place at Embedded Systems Regional Contest 2017
Brazil
1st out of 14 teams with iTraffic: Smart Semaphore Network.

Honorable Mention at Brazilian Physics Olympiad 2015
Brazil
One of the 180 medalists over more than 300,000 contestants.

DIVERSITY, INCLUSION & OUTREACH

- 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 4th Brazilian Physicists' Tournament 2021
- Officer of the School of Engineering at the Harvard Brazilian Association 2021–PRESENT
- Judge for the International Young Physicists' Tournament Brazil 2021–2023

TALKS

Futuras Cientistas – Ministry of Science, Technology & Innovation of Brazil (link) 2023
Technology and its Social Impact

Federal University of Pernambuco 2022
Journey to become a Ph.D student

PodCast Ph.D nos EUA (part 1) (part 2) 2021
Journey to become a Ph.D student