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

Current projects and other information can be found here.

Computing in Memory — 2021–PRESENT
Harvard University
Working on the algorithmic level perspective to allow efficient deep neural networks under the crossbar architecture. Particularly interested in ways to avoid bottlenecks on the architecture such as energy consumption due to data conversions, wire resistance impact, sneak paths, and negative weight representation.

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 geographically track sound events and then determine the position of gun shooters on a mobile application by Bluetooth connection. Earned 3 international awards, placing Top 0.7% at InnovateFPGA competition in China.

Lock-in: Nano-Volt Signal Amplifier (link) — 2019–2020
Federal University of Pernambuco
Design and optimization of a phase-sensitive lock-in amplifier circuit for the Magnetism and Magnetic Materials' group led by the former Minister of Science and Technology of Brazil Prof. Sergio Rezende to be used for investigating magnetic properties of thin films such as IrMn/Py 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
Part of collective autonomous soccer sub-team, acting on robots control on Tiva-C microcontroller, computer vision mapping and tracking, and intelligent robots decision-making strategies.

PUBLICATIONS

*denotes equal contribution

[1] **M. S. Farias***, H. T. Kung*, "Applying Sorted Sectioning to Compute-in-Memory Crossbars for DNN Computations Reduces ADC Cost and Wire Resistance Impact", submitted to the *International Conference on Supercomputing 2023 (ICS'23)*.

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 the course, a non-profit school to support underpriviledge students in basic engineering classes. Managed the action strategy planning that turned to impact over 200 students with a team of 10 teachers. Taught Physics at the undergraduate level.

Awards and Recognitions

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

- Brazilian Team Leader of 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 and Applied Sciences at the Harvard Brazilian Association 2021–2023
- 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