# 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.