

# Matheus Sobreira Farias

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## EDUCATION

<b>Harvard University</b> <i>Ph.D. in Electrical Engineering</i> Working on efficient hardware architectures for machine learning. Advised by Prof. H. T. Kung ( <a href="#">link</a> )	<b>Cambridge, MA</b> 2021–PRESENT
<b>Federal University of Pernambuco</b> <i>B.Sc. in Electronics Engineering</i> 1st out of 40 students, GPA 8.90/10. Senior Thesis: <i>iOwlT: Sound Geolocalization System</i> ( <a href="#">link</a> ).	<b>Recife, Brazil</b> 2016–2021

## RESEARCH

Current projects and other information can be found [here](#).

<b>Computing in Memory</b> <i>Harvard University</i> 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.	2021–PRESENT
<b>iOwlT: Sound Geolocalization System</b> ( <a href="#">link</a> ) <i>Federal University of Pernambuco</i> 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.	2019–2020
<b>Lock-in: Nano-Volt Signal Amplifier</b> ( <a href="#">link</a> ) <i>Federal University of Pernambuco</i> 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.	2019–2020
<b>iTraffic: Smart Semaphore Network</b> ( <a href="#">link</a> ) <i>Federal University of Pernambuco</i> 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.	2017
<b>Maracatronics: Robotics Team</b> ( <a href="#">link</a> ) <i>Federal University of Pernambuco</i> 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.	2017

## PUBLICATIONS

\*denotes equal contribution

- [1] **M. S. Farias\***, H. T. Kung\*, "Sorted Sectioning for Computing in Memory Crossbars: Reducing 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

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### 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

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### Neurotech

*Machine Learning Intern*

Served as workshop instructor and collaborated adding +5 machine learning algorithms to production.

**Recife, Brazil**

2020–2021

### Espaço Diferencial

*Co-Founder and Teacher*

Idealized the course, a non-profit school to support underprivileged 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.

**Recife, Brazil**

2016–2018

## AWARDS AND RECOGNITIONS

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### Behring Foundation Fellowship

*Harvard University*

Honored by the Behring Foundation with a fellowship to cover my graduate studies at Harvard.

2021-PRESENT

### Silver Award at InnovateFPGA 2019 Contest (*Grand Finals*)

*Tianjin, China*

2nd out of 270 teams with iOwlT: Sound Geolocalization System.

2019

### Silver Award at InnovateFPGA 2019 Contest (*Regional Finals*)

*Americas*

2nd out of 40 teams with iOwlT: Sound Geolocalization System.

2019

### Community Award at InnovateFPGA 2019 Contest

*Americas*

Elected as best project by the community with iOwlT: Sound Geolocalization System.

2019

### PIBIC/CNPq funding to do research

*Brazil*

Awarded by national government funding to do research for Lock-in: Nano-Volt Signal Amplifier.

2019

### 5th Place at XVI Latin American Robotics Competition

*Latin America*

In the Small Size League category of autonomous soccer with Maracatronics: Robotics Project.

2017

### 1st Place at Embedded Systems Regional Contest

*Brazil*

1st out of 14 teams with iTraffic: Smart Semaphore Network.

2017

### Honorable Mention at Brazilian Physics Olympiad

*Brazil*

One of the 180 medalists over more than 300,000 contestants.

2015

## DIVERSITY, INCLUSION & OUTREACH

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- 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

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<b>Futuras Cientistas – Ministry of Science, Technology &amp; Innovation of Brazil</b> ( <a href="#">link</a> ) <i>Technology and its Social Impact</i>	2023
<b>Federal University of Pernambuco</b> <i>Journey to become a Ph.D student</i>	2022
<b>PodCast Ph.D nos EUA</b> ( <a href="#">part 1</a> ) ( <a href="#">part 2</a> ) <i>Journey to become a Ph.D student</i>	2021