



# Matheus Fernandes

PhD Candidate at Harvard University



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## About me

Matheus has lived in three different continents and has a vast international experience that extends beyond his technical skills. Born in Brazil, he also lived in Germany and three different states within the US, where he has gained a global and diverse experience that compliments his cultural appreciation.

## Skills

Python

ABAQUS

Scikit-learn

Matlab

Keras

Tensorflow

C and C++

SQL

## Interests

Matheus's interests lie at the intersection of mechanics, machine learning and numerical modeling. In his research, he currently works on modeling bio-inspired optimized materials and applying generative parametric machine learning algorithms to control soft robotic actuators to haptically classify objects based on data acquired through embedded sensors.

## Education

2015-21	<b>Ph.D. in Applied Mathematics</b> Advised by <i>Prof. Katia Bertoldi</i>	Harvard University
2015-21	<b>S.M. in Computational Science and Engineering</b>	Harvard University
2013-15	<b>M.Eng. in Engineering Sciences</b> Concentration in Mechanical Engineering and Material Sciences Advised by <i>Prof. James R. Rice</i>	Harvard University
2009-13	<b>B.Sc. in Mechanical Engineering</b> Minor in Business Management	Case Western Reserve University

## Industry Experience

2016	<b>Corning Incorporated</b> <ul style="list-style-type: none"> <li>Optimized glass tubing process using Finite Pointset Method for Corning Pharmaceutical Technologies.</li> <li>Developed experimental setup for mechanical characterization of wet ceramic substrate composition.</li> <li>Generated application for post-processing simulation data that seeks defects during glass tube fabrication.</li> </ul>	<i>Summer Research Intern</i>
2013	<b>COMSOL Multiphysics</b> <ul style="list-style-type: none"> <li>Modeled multiphysics interactions of dynamic systems and controls using finite element analysis.</li> <li>Developed tutorials and application for unexperienced users of the software.</li> <li>Interacted with customers to develop a work-flow methodology using COMSOL to match their particular application.</li> </ul>	<i>Summer Business Development Intern</i>
2012-13	<b>PTTech</b> <ul style="list-style-type: none"> <li>Designed and implemented an electronic circuit system to read torques on wind turbine shafts as part of bachelor's thesis.</li> </ul>	<i>Engineering Intern</i>
2011	<b>Bayer Material Science (COVESTRO)</b> <ul style="list-style-type: none"> <li>Solved problems and inefficiencies in plant's piping system using a piping and instrumentation diagram analysis.</li> <li>Designed bases for extruders to serve as stabilizers to reduce effect of vibrations on the machinery.</li> <li>Programmed PLCs and designed a system to distribute power to new electric piping valves.</li> </ul>	<i>Summer Engineering Intern</i>
2010	<b>Bayer Material Science (COVESTRO)</b> <ul style="list-style-type: none"> <li>Performed quality control on polycarbonate pellets using Microsoft Excel with Visual Basic Macros to develop a SPC chart system.</li> <li>Developed Python software to schedule preventative maintenance of factory's machinery and to track plant downtime.</li> </ul>	<i>Summer Engineering Intern</i>

# Matheus Fernandes

## Certifications

Abaqus Structural Analysis  
Certification by SIMULIA

Engineer-In-Training (Engineer  
Intern) by Ohio Board of Professional  
Engineers

HeartSaver First Aid CPR AED by  
American Heart Association

Lean Six Sigma Green Belt

Wind Turbine Technology - Climbing  
and Safety at Heights by Lorain  
Community College

Programmable Logic Controller,  
Programming and Operation  
Certification

## Honors/Awards

Harvard Horizons Scholar (2019)  
(Video: <http://fer.me/hh>)

Certificate of Distinction in Teaching  
Award X 4 (2019,18,16,15)

National Graduate Engineering  
Minority (GEM) Fellowship (2016)

Harvard Graduate School Leadership  
Institute (HGSLI) Fellow (2016)

National Science Foundation  
Graduate Research Fellowship  
Program (NSF-GRFP) (2015)

Harvard Graduate Prize Fellowship  
(2015)

University President Civic  
Engagement Scholar Honorary Award  
(2012)

COMSOL, Inc. Poplars Choice Best  
Poster Award (2012)

## Languages

English (Native, Bilingual)

Portuguese (Native, Bilingual)

German (Full Professional)

Spanish (Limited Working)

## Complete CV

For a comprehensive document,  
please refer to Matheus's Curriculum  
Vitae at: [fer.me/cv](http://fer.me/cv)

## Academic Research

- 2015-20 **Harvard University** *Modeling of Bio-Inspired Mechanics*
- Developed mechanical and hydrodynamic numerical model to investigate Hexactinellid Sponge structure for optimal arrangement of truss systems and vortex dissipation.
  - Created numerical model for investigating mechanical properties of the structural coloring formation of Beetles.
  - Developed a picture-less sensing soft robotic actuator using generative parametric machine learning classifiers.
- 2013-15 **Harvard University** *Mechanics of Subglacial Hydrology*
- Developed Finite Element model to analyze Röthlisberger Channel fully incised in ice stream shear margin.
  - Created Finite Element model to analyze power law creep rheology of ice under hydrostatic pressure.
- 2012-13 **Case Western Reserve University** *Wind-turbine Flow Dynamics*
- Analyzed and constructed a wind flow model of campus to investigate effects of buildings surrounding university wind turbine developing expertise in finite element development and analysis.
  - Established a testing procedure to validate Computational Fluid Dynamics model against physical data.

## Peer Reviewed Publications

- 2020 An integrated tomographic, additive manufacturing, and parametric modeling-based approach. *Journal of Structural Biology*. doi:10.1016/j.jsb.2020.107481
- 2020 A geometrically adaptable heart valve replacement. *Science Translational Medicine*. doi:10.1126/scitranslmed.aay4006 [PDF]
- 2017 Harnessing Geometric Frustration to Form Band Gaps in Acoustic Networks. *Physical Review Letters*. doi:10.1103/PhysRevLett.118.084302. [PDF]
- 2016 Effects of Ice Deformation on Röthlisberger Channels and Implications for Transitions in Subglacial Hydrology. *Journal of Glaciology*. doi:10.1017/jog.2016.65. [PDF]
- 2015 Time Scale for Rapid Draining of a Surficial Lake into the Greenland Ice Sheet. *Journal of Applied Mechanics*. doi:10.1115/1.4030325. [PDF]

## Patents

- 2019 Design Principles for production of stronger lattices and beam structures. United States Patent - US 3,597,875. *Harvard University Office of Technology Development*. [PDF]