



# Matheus Fernandes

PhD Candidate at Harvard University



matheus@fer.me



+1 (617) 495-9404



fer.me



fer.me/in



fer.me/git



fer.me/scholar

## 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
2015-20	<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

Harvard Business Club Mini MBA

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

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. Popularity 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 Mechanically Robust Lattices Inspired By Deep-Sea Glass Sponges. *Nature Materials*. doi:10.1038/s41563-020-0798-1 [PDF]
- 2020 Tunable infrared transmission for energy efficient pneumatic building façades. *Energy and Buildings*. doi:10.1016/j.enbuild.2020.110377 [PDF]
- 2020 An integrated tomographic, additive manufacturing, and parametric modeling-based approach. *Journal of Structural Biology*. doi:10.1016/j.jsb.2020.107481 [PDF]
- 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]