

# Zenna Tavares

ZENNA@CSAIL.MIT.EDU – 617-642-6145 – 93 GORE STREET, APT 1, CAMBRIDGE, MA, 02141

## CURRENT POSITION

*Massachusetts Institute of Technology, Computer Science Artificial Intelligence Lab (CSAIL)*

**Postdoctoral Researcher, since January 2020**

Advised by Armando Solar-Lezama. Co-advised by Joshua Tenenbaum.

Research focuses on probabilistic and causal reasoning in simulation models, combining tools from Bayesian inference, machine learning, probabilistic programming, program analysis and synthesis.

## EDUCATION

*Massachusetts Institute of Technology, Department of Brain and Cognitive Sciences*

**Ph.D Cognitive Science and Statistics, 2011 - 2019**

Advised by: Armando Solar-Lezama (Computer Aided Programming Group, CSAIL)

Affiliation: Joshua Tenenbaum (Computational Cognitive Science).

Thesis: “Imaginative Reasoning in Probabilistic Programs”

Thesis committee: Joshua Tenenbaum, Armando-Solar Lezama, Leslie Kaebbling, Thomas Icard

*Imperial College London*

**MSc in Biomedical Engineering with Neurotechnology, 2009 - 2010**

Advised by: Mauricio Barahona

Thesis: “Exploring Hierarchical Structure in Complex Brain Networks”

*University of Nottingham*

**MEng in Electronic Engineering with Japanese, 2005 - 2009**

First Class Degree with Honours

Dissertation: “XEAL: An XPU (CPU/GPU) Evolutionary Algorithm Library”

*Osaka University, Japan – JST ERATO LAB*

**Visiting Student - OUSSEP Exchange Program, 2008**

Reinforcement Learning with CB2Robot. Pruning in Fahlman neural networks

## AWARDS AND FELLOWSHIPS

*Fulbright Program - International Institute of Education*

International Fulbright Science and Technology Award for Outstanding Foreign Students

*Imperial College and Royal College of Art - Design London*

**Design Fellow on Innovation, Entrepreneurship and Design Program, 2011**

*Imperial College London*

Imperial College Neurotechnology Brain Machine Interface Competition Prize

*University of Nottingham*

Farnell Project Student of the Year

## PUBLICATIONS

**Synthesizing Programmatic Policies that Inductively Generalize** – *JP Inala, O Bastani, Z Tavares, A Solar-Lezama* – International Conference on Learning Representations 2020

**Predicate Exchange: Inference with Declarative Knowledge** – *Z Tavares, J Burroni, E Minasyan, A Solar-Lezama, R Ranganath* International Conference on Machine Learning 2019

**The Random Conditional Distribution** *Z Tavares, X Zhang, E Minasyan, J Burroni, R Ranganath, A Solar-Lezama* – arXiv:1903.10556

**Learning Distribution Sensitive Data Structures** – *Z Tavares, A Solar-Lezama* – AAAI Spring Symposium 2017

**Parametric Inverse Simulation** – *Z Tavares, A Solar-Lezama* – NIPS 2016, Advances in Approximate Bayesian Inference Workshop

**Smooth Nondeterministic Arrows** – *Z Tavares, A Solar-Lezama* – NIPS 2015, Black-Box Inference Workshop (Best Paper)

**Probabilistic Programming by Abstraction Refinement** – *Z Tavares, A Solar-Lezama* – NIPS 2014, Probabilistic Programming Workshop

## IN PROGRESS

**Parametric Inversion of Non-Invertible Functions** – *Z Tavares, J Burroni, E Minasyan, A Solar-Lezama* – In Preparation

**A Language for Counterfactual Generative Models** – *Z Tavares, J Koppel, X Zhang, A Solar-Lezama* – Under Submission *NeurIPS 2020*

**Active Discovery of Causal Probabilistic Programs** – *Z Tavares, R Das, E Weeks, K Lin, Joshua Tenenbaum, A Solar-Lezama* – In Preparation

## TEACHING AND MENTORSHIP

Masters of Engineering Advisor, *Massachusetts Institute of Technology, (2012-2020)*: Advised five MEng student theses.

Advisor in undergraduate research opportunity program (UROP), *Massachusetts Institute of Technology, (2012-2020)*. Advised seven UROP students.

Teaching Assistant in Lab in Visual Cognition, *Massachusetts Institute of Technology (Spring 2014)*. Lectured and graded for course in experimental design and statistical analysis of experimental data.

Teaching Assistant in Computational Cognitive Science, *Massachusetts Institute of Technology, (Fall 2012)*:. Lectured, tutored and graded for large mixed undergraduate/graduate class.

## WORK EXPERIENCE

*Imperial College, Department of Mathematics*

**Research Assistant, 2010 - 2011**

Research on combinatorial energy landscapes, graphical analysis of complex systems.

*Cortexica Vision Systems*

**GPU Research Engineer, 2009 - 2010**

Optimised core image recognition algorithm, reducing runtime of core CUDA loop from 30ms to 7ms. Devised parallel linear algebra routines such as QR matrix decomposition, matrix inversion.

*Lokku – nestoria.com*

**Engineering Intern, January 2008 - May 2008**

Learned programming skills as well as software development practices.

## SELECTED TALKS

*Strange Loop 2017*

**Running Programs In Reverse For Deeper A.I.**

[www.thestrangeloop.com/2017/running-programs-in-reverse-for-deeper-a-dot-i.html](http://www.thestrangeloop.com/2017/running-programs-in-reverse-for-deeper-a-dot-i.html)

*Strange Loop 2015*

**Probabilistic Programming That Makes Common Sense**

[www.youtube.com/watch?v=xxA766PrzQI](http://www.youtube.com/watch?v=xxA766PrzQI)

*JuliaCon 2015*

**Julia as a Probabilistic Programming Language**