

## Wilka Torrico De Carvalho, *Aspiring Brain Scientist*

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### CONTACT INFORMATION

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Google Scholar

### RESEARCH INTERESTS

With seemingly an unbounded set of relevant labels, how do humans and animals so effectively and efficiently ascribe labels to objects correctly? I am interestd in this from two perspectives. First, from how this knowledge is utilized: a system navigating the world, recognizing objects around it, and then planning accordingly. Second, from how this knowledge is computed: sensory information being processed by the brain's neural networks into representations that allow it to decompose scenes and then assign appropriate probabilities to their consituents.

• computational cognitive science • theoretical neuroscience • machine learning • reinforcement learning • bayesian inference • artificial neural networks • deep learning

### EDUCATION

**University of Southern California**, Los Angeles, California USA  
*Viterbi School of Engineering*, M.S. in Computer Science, May 2017  
Advisor: [Yan Liu](#)

**Stony Brook University**, Stony Brook, New York USA  
*College of Arts and Sciences*, B.S. in Physics, May 2015  
Advisor: [Axel Drees](#)

Honors Thesis: “*Modeling a Detection of Internally Reflected Cherenkov Light Particle Detector for High-Multiplicity Collisions*”

Honors and Awards:

- Provost Award for Academic Excellence ( $\sim 0.5\%$  of graduates chosen), 2015
- Researcher of the Month (1 school-wide per month), 2014

**Brooklyn Technical High School**, Brooklyn, New York USA  
Diploma, Applied Physics, May 2011  
Honors and Awards:

- USA National Achievement Scholarship Finalist (top 5% nationally), 2011

### HONORS AND AWARDS

GEM Fellowship sponsored by IBM (declined)	2017
ICLR Travel Award	2017
NSF Graduate Research Fellowship (Neuroscience)	2015
HHMI Minority Undergraduate Research Fellowship	2014
Sigma Pi Sigma Physics Honor Society (only 2nd year student inducted)	2013
Scholar of Science, Technology, Engineering and Math	2012
NSF Louis Stokes Alliance for Minority Participation Scholar	2011
Deans List	

### CONFERENCE PUBLICATIONS

Sanjay Purushotham\*, **Wilka Carvalho\***, Yan Liu. “Variational Recurrent Adversarial Domain Adaptation” *In 5th International Conference on Learning Representations (ICLR)*, 2017

Sanjay Purushotham\*, **Wilka Carvalho\***, Yan Liu. “Variational Adversarial Deep Domain Adaptation for Health Care Time Series Analysis” *In 29th Annual Confer-*

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\* implies equal contribution

ence on Neural Information Processing Systems Workshop on Machine Learning for Healthcare (NIPS ML4HC), 2016 (**Spotlight**)

**Wilka Carvalho.** “Modeling a Detection of internally reflected Cherenkov light (DIRC) Particle Detector for High-Multiplicity Collisions.” *State University of New York Undergraduate Research Conference* (SURC), 2015

INVITED TALKS	Machine Learning Lunch Seminar. University of Southern California. (April, 2017)
SYMPOSIUM PRESENTATIONS	<p>“Variational Adversarial Deep Domain Adaptation for Healthcare Time Series” <i>California Institute of Technology</i>, Pasadena, CA, 2016. <b>Runner-up, best poster</b></p> <p>“Modeling a DIRC Particle Detector for High-Multiplicity Collisions” <i>23rd Annual CSTEP Statewide Student Conference</i>, Bolton Landing, NY, 2015. <b>2nd place, physics and math</b></p> <p>“Modeling the Cognitive Process of Attributing Traits to Others” <i>California Institute of Technology</i>, Pasadena, CA, 2014.</p> <p>“Modeling Deep Brain Stimulation of Globus Palidus Internus” <i>22nd Annual CSTEP Statewide Student Conference</i>, Bolton Landing, NY, 2014.</p> <p>“Modeling a Detection of internally reflected Cherenkov light (DIRC) Particle Detector for High-Multiplicity Collisions” <i>Stony Brook University</i>, Stony Brook, NY, 2014.</p> <p>“Modeling Deep Brain Stimulation of Globus Palidus Internus” <i>University of Minnesota</i>, Minneapolis, MN, 2013.</p>
RESEARCH EXPERIENCE	<p><b>University of Southern California</b>, Los Angeles, California USA <b>Melady Lab</b>, November 2015 - May 2017 Advisor: Yan Liu Samsung and NSF funded project: “<i>Variational Adversarial Deep Domain Adaptation for Health Care Time Series Analysis</i>”. Built a neural network model in Theano that employed variational methods and adversarial training to perform domain adaptation on multivariate time-series. Proposed analyses used in publications to empirically verify that our model (a) performed domain adaptation by creating domain-invariant representations and (b) transferred temporal dependencies across domains.</p> <p><b>Stony Brook University</b>, Stony Brook, New York USA <b>Heavy Ion Research Group</b>, January 2013 - August 2015 Advisor: Axel Drees DOE funded project: “<i>Modeling a Detection of internally reflected Cherenkov light Particle Detector for High-Multiplicity Collisions</i>”. Created a model for a DIRC particle detector and a corresponding Monte Carlo light simulator. Developed a pattern recognition algorithm that exploited physics, statistics, and geometry to identify particles from the synthetic light data. Led software development of C++ libraries and programs used for simulations and analyses.</p> <p><b>Stony Brook University</b>, Stony Brook, New York USA <b>Computational Neuroscience Group</b>, Fall 2014 Advisor: Giacarlo La Camera</p>

NSF LSAMP funded project: “*Spectral Analysis of Rodent Neural Data*”. Performed spectral analyses on neural data to determine behavioral correlates of neural activity.

**California Institute of Technology**, Pasadena, California USA

**Emotion and Social Cognition Laboratory**, *Summer 2014*

Advisor: Ralph Adolphs

HHMI funded project: “*Modeling the Cognitive Process of Attributing Traits to Others*”. Developed a Trait Learning Task, in which participants would learn about the distinguishing traits by observing their behavior in various situations. Built a free, web-based, general-purpose platform existed to administer online psychology experiments with user-input contingent progression.

**University of Minnesota**, Minneapolis, Minnesota USA

**Neuromodulation Research and Technology Laboratory**, *Summer 2013*

Advisor: Matthew Johnson

NIH funded project: “*Modeling Deep Brain Stimulation of Globus Palidus Internus*”. Wrote a python script that interfaced with the neural network simulation environment, “Neuron”, to build a computational model of the network of neurons surrounding Globus Palidus Internus, and simulated Deep Brain Stimulation and the resultant neural activity.

**National Central University**, Jhongli City, Taiwan

**Turbulent Combustion Laboratory**, *Summer 2012*

Advisor: Shenqyang Shy

Project: “*Empricial Analysis of Theories from Fluid Dynamics*”. Explored boundary layer conditions, and laminar and turbulent flow of fluids through pipes of varying cross-sections.

TEACHING  
EXPERIENCE

**Stony Brook University**, Stony Brook, NY

**Calculus Instructor**, *Spring 2015*

Worked with two math professors to develop a supplementary calculus curriculum that promoted minority representation in stem majors.

**Stony Brook University**, Stony Brook, NY

**Educational Opportunity Program Personal Tutor**, *Spring 2013 - Fall 2014*

Tutored marginalized students in introductory physics and math courses.

SERVICE

Student Volunteer, ICLR, 2017

SKILLS

Deep learning software: Theano, TensorFlow, Keras

Neuroscience software: Neuron

Languages: Python, C++, C, Java

Operating systems: Unix, Linux, Windows

INTERESTS

• traveling • chess • software development • improvisational dance • deadpan humor