

# Wilka Torrico De Carvalho, *Aspiring Brain Scientist*

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## CONTACT INFORMATION

Website: [wcarvalho.io](http://wcarvalho.io)

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Google Scholar

## RESEARCH INTERESTS

• computational cognitive science • theoretical neuroscience • artificial neural networks

## EDUCATION

**University of Michigan–Ann Arbor**, Ann Arbor, MI USA

*School of Engineering*, Ph.D. in Computer Science & Engineering, Expected May 2022

**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 Heavy-ion Collisions*”

Honors and Awards:

- Provost Award for Academic Excellence (~ 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 in Applied Physics, May 2011

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

## PROFESSIONAL EXPERIENCE

**Machine Learning Research Intern**, *September 2017 - December 2017 (expected)*

IBM Almaden, San Jose, California USA

**Machine Learning Research Intern**, *June 2017 - August 2017*

VISA, Palo Alto, California USA

## HONORS AND AWARDS

University of Michigan Rackham Merit Fellowship

2017

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

2011-2015

## 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 Conference on Neural Information*

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Compiled October 18, 2017

\* implies equal contribution

*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      “Variational Adversarial Deep Domain Adaptation for Healthcare Time Series.” *Southern California Machine Learning Symposium*. California Institute of Technology, Pasadena, CA, 2016. **Runner-up, best poster**

“Modeling a DIRC Particle Detector for High-Multiplicity Collisions.” *23rd Annual CSTEP Statewide Student Conference*. Bolton Landing, NY, 2015. **2nd place, physics and math**

“Modeling the Cognitive Process of Attributing Traits to Others.” *Summer Seminar Day*. California Institute of Technology, Pasadena, CA, 2014.

“Modeling Deep Brain Stimulation of Globus Palidus Internus.” *22nd Annual CSTEP Statewide Student Conference*. Bolton Landing, NY, 2014.

“Modeling a Detection of internally reflected Cherenkov light (DIRC) Particle Detector for High-Multiplicity Collisions.” *URECA Celebration of Undergraduate Research & Creativity*. Stony Brook University, Stony Brook, NY, 2014.

“Modeling Deep Brain Stimulation of Globus Palidus Internus.” *Poster Symposium*. University of Minnesota, Minneapolis, MN, 2013.

RESEARCH  
EXPERIENCE      **IBM Almaden**, San Jose, California USA  
**IBM Research**, *September 2017 - Present*  
Advisor: Bryant Chen

Leading the development of an algorithm to defend convolutional neural networks from poisoning attacks using Tensorflow. The algorithm projects neural activations into a low-dimensional space, in which they are clustered to determine data authenticity. I motivated projecting into a lower-space, which improved our accuracy to above 96% with a false-positive and false-negative rate of below 2%. To study our algorithm and continue to develop techniques, I am doing extensive visual analyses of neural firing patterns]

**Visa**, Palo Alto, California USA  
**Visa Research**, *June 2017 - Present*  
Advisor: Jing Huang

Leading development of a deep learning model in Tensorflow that interfaces with the ParlAI natural language processing platform. The model employs bayesian inference and relational reasoning to infer and relate linguistic features in order to answer context-dependent questions.

**University of Southern California**, Los Angeles, California USA  
**Melady Machine Learning Lab**, *November 2015 - May 2017*  
Advisor: Yan Liu

Samsung and NSF funded project: “*Variational Adversarial Deep Domain Adaptation for Health Care Time Series Analysis*”. Led development of a neural network model in Theano that employed variational inference 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. Research led to a publication and a patent.

**Stony Brook University**, Stony Brook, New York USA

**Heavy Ion Research Group**, *January 2013 - August 2015*

Advisor: Axel Drees

DOE funded project: “*Modeling a Detection of internally reflected Cherenkov light Particle Detector for High-Multiplicity Collisions*”. 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 synthetic light data. Led software development of C++ libraries and programs used for simulations and analyses.

**Stony Brook University**, Stony Brook, New York USA

**Computational Neuroscience Group**, *Fall 2014*

Advisor: Giancarlo La Camera

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 of other people 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 Pallidus 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 Pallidus 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: “*Empirical 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 and teach 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

OUTREACH

*Research and Fellowships Week NSF Panel*, Los Angeles, CA 2016

*National Society of Black Engineers Grad Panel*, Los Angeles, CA 2016

*Graduate School External Fellowship Boot Camp*, Los Angeles, CA 2016  
*Engineering Graduate Diversity Symposium*, Los Angeles, CA 2015  
*Black Student Association: What it takes to go to Graduate School*, Los Angeles, CA 2015  
*Collegiate Science and Technology Entry Program Undergraduate Research Panel*, Stony Brook, CA 2014

SKILLS

Deep learning software: TensorFlow, Theano, Keras  
Neuroscience software: Neuron  
Languages: Python, C++, C, Java  
Operating systems: Unix, Linux, Windows

INTERESTS

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