Tristan B. Swedish

121 Webster Ave. • Cambridge, MA 02141
www.tswedish.com • tristan.swedish@gmail.com • (919) 812-6889

Education

Massachusetts Institute of Technology **Cambridge, MA**
PhD Student, Media Lab, Media Arts & Sciences *2017 – Present*

Massachusetts Institute of Technology **Cambridge, MA**
M.S., Media Lab, Media Arts & Sciences (5.0/5.0) *2015 – 2017*

Northeastern University **Boston, MA**
B.S. Electrical Engineering & Physics (3.7/4.0) *2009 – 2014*

Grants and Scholarships

- NSF Graduate Research Fellowship (2017-2020)
- MIT Tata Center for Technology and Design Graduate Fellowship (MIT 2015-2017)
- Dean's Scholarship (Northeastern University 2009-2014)
- Newport Spectra-Physics Research Excellence Award (Photonics West 2011)
- SPIE Scholarship in Optics and Photonics (Northeastern University 2011)
- Provost Undergraduate Research Grant (Northeastern University 2010)

Awards and Honors

- Member of Honors Program (Northeastern University 2009-2014)
- Member of IEEE Eta Kappa Nu Honors Society (Gamma Beta Chapter)
- Student Employee of the Year (Northeastern University 2011)
- Gordon Center Subsurface Imaging Systems Scholar (Northeastern University 2009)

Research Experience

MIT Media Lab - Camera Culture Group **Cambridge, MA**
Graduate Research Assistant *Sep 2015 – present*

Primary graduate research project is a self aligning fundus camera and near eye display "eyeSelfie" for automatic screening of eye conditions (eyeselfie.org). Published the optical model and presented results from a prototype at SIGGRAPH 2015. Implemented a deep learning classifier for Diabetic Retinopathy from clinical retinal images. Created a RESTful API to make classification available as a web service (theia.media.mit.edu). Designed architecture to integrate labeling of image data in the training phase of the algorithm (eyelabel.it).

Select courses taken: probabilistic perception/estimation, machine learning, and health tech.

Technical Assistant *Sep 2014 – 2015*

Built and tested various lens configurations in Zemax and tested designs on an optical bench. Designed and assembled stand alone prototypes using a 3D printer and laser cutter. Selected and built the electronics and software interface for a digital camera and LCD screen in the device.

Developed a low cost portable device to detect non pigmented cancerous skin lesions using spectroscopy.

Northeastern University- Optical Science Lab **Boston, MA**
Undergraduate Research Assistant *March 2010 – April 2014*

Developed and maintained code environment in Matlab for Finite-Difference Time-Domain (FDTD) simulations. Deployed UNIX scripts for managing simulations on Northeastern's Venture Distributed Computing Cluster and shared with lab group to benefit other simulation projects leading to several publications.

Select courses taken: Machine Learning (grad level), Signal Processing (grad level), Algorithms and Data Structures, Quantum Mechanics, Statistical Mechanics, Mathematical Methods in Physics

---

Professional Experience

Facebook **Menlo Park, CA**
Software Engineer - Computer Vision - Intern *June 2016 – August 2016*

Designed and built a pipeline in Torch that constructed video sequences from deep convolutional neural network embeddings of videos. Defined a graph construction methodology that preserved latent structure of dataset.

Implemented a patch based road detector in Torch from caffe and chainer examples. Created a fully convolutional deep network to extend the framework to semantic segmentation.

Raytheon BBN Technologies - Emerging Opportunities **Cambridge, MA**
Digital Signal Processing Engineer Co-op *May 2013 – December 2013*

Investigated algorithms used for the detection of shock waves in a non-stationary noise environment and optimization of trajectory models to fit measurements. Surveyed statistical distribution of possible signals and created a template matching library as part of the detection improvements.

Hardware Co-op *July 2012 – December 2012*

Hasbro, Inc **Pawtucket, RI**
Electronics Engineering Co-op *July 2011 – December 2011*

Patents

[Pending] **T. Swedish**, K. Roesch, and R. Raskar, "Methods and Apparatus for Retinal Retroreflection Imaging," PCT 15142165. April 2016.

[Pending] **T. Swedish**, K. Roesch, and R. Raskar, "Methods and Apparatus for Visual Cues for Eye Alignment," PCT 15099270. April 2016.

Publications

G. Leifman, D. Rudoy, **T. Swedish**, E. Bayro-Corrochano, R. Raskar. "Learning Gaze Transitions From Depth to Improve Video Saliency Estimation," *The IEEE International Conference on Computer Vision (ICCV)*, pp. 1698–1707, 2017.

K. Roesch, **T. Swedish** and R. Raskar. "Automated retinal imaging and trend analysis," *Clinical Ophthalmology*. Vol. 11, 2017.

G. Satat, B. Heshmat, **T. Swedish**, and R. Raskar, "Computational Laser Speckle Contrast Imaging in Endoscopic System," *OSA 3D IAD*. July 2016.

G. Leifman, **T. Swedish**, K. Roesch, and R. Raskar, "Leveraging the crowd for annotation of retinal images," *IEEE EMBC*. Aug. 2015.

T. Swedish, K. Roesch, I.H. Lee, K. Rastogi, S. Bernstein, and R. Raskar, "eyeSelfie: self directed eye alignment using reciprocal eye box imaging," *ACM Transactions on Graphics*, vol.34, no.4, Aug. 2015.

A. Das, **T. Swedish**, A. Wahi, M. Moufarrej, M. Noland, T. Gurry, E. Aranda-Michel, D. Aksel, S. Wagh, V. Sadashivaiah, X. Zhang, and R. Raskar, "Mobile phone based mini-spectrometer for rapid screening of skin cancer," *Proc. SPIE Next-Generation Spectroscopic Technologies VIII*. June 2015.

A. Gouldstone, N. Caner,**T. Swedish**, S.M. Kalkhoran, and C.A. DiMarzio, "Mechanical and Optical Dynamic Model of Lung," *Biomedical Engineering, IEEE Transactions on*, vol.58, no.10, pp.3012-3015, Oct. 2011.

T. Swedish, J.P. Robinson, M.R. Silva, A. Gouldstone, D. Kaeli, C.A. DiMarzio, "Computational model of optical scattering by elastin in lung," *Proc. SPIE 7904 Photonics West*. Jan. 2011.

[Conf. Course] H. Li, L. Wei, A. Das, **T. Swedish**, P. Shah, and R. Raskar, "Capturing the human body: from VR, consumer, to health applications," *ACM SIGGRAPH Courses*, July 2016.

[Conf. Course] **T. Swedish**, P. Shah, M. Mohit, and R. Raskar, "Clinical Imaging of the Human Body," *CVPR Courses*, June 2016.

[Conf. Course] H. Li, **T. Swedish**, H. Park, and R. Raskar, "Modeling and Capturing the Human Body: For rendering, health, and visualization," *ACM SIGGRAPH Courses*, Aug. 2015.

Activities

Peer Reviewer

Optics Letters *Spring 2016-present*

Open Source Projects

OpenEye.io *Summer 2016*

Created and curated website, blog, and community forum for the open source development of diabetic retinopathy screening platforms. Primary contributor to deep learning source: model router and trainer and server backend code maintainer.

Tutoring and Teaching

LVPEI Srujana Innovation Center Mentor *Spring 2015-present*

Working remotely with engineers at LV Prasad Eye Institute to deploy emerging imaging and interaction technologies for the purpose of providing better eye care in India. Co-organized a week long REDX workshop in Hyderabad, bringing together engineers and doctors from LVPEI, MIT, and Harvard. Additionally involved in two such workshops in Mumbai.

Engineering Health Mentor *Fall 2014*

Mentored a group MIT graduate students to build health related projects, helping with optics design and signal processing. Traveled to India to mentor project at REDX innovation workshop in Mumbai.

IEEE HKN Tutor *Spring 2013*

Provided weekly office hours for Electrical and Computer Engineering related course work. Tutoring as a member of IEEE Eta Kappa Nu Honor Society.

SLERP (slerp.github.io/slerp-base/) *Fall 2013*

Designed the class project for the first year Engineering Design course at Northeastern University. Wrote open source tutorials on Github for students to follow along and provided personal help when needed to teach incoming engineering students about core engineering principles.

Skills

Programming Languages
Python, Lua, Matlab, C/C++, Java, bash scripting, HTML5, Javascript (MEAN/React)

DevOps and Libraries
Git, JIRA, Robot Operating System (ROS), OpenCV, Android, Torch7, Theano, TensorFlow

Embedded Programming
Experience building interfaces with I^2C,RS-232 Serial Protocols

Hardware
Optics, Photodetectors, Lasers, Microcontrollers, PCB Layout, 3D Printing

Personal
Member of Northeastern Ski Team (2011, 2012), Music Production and Composition, Guitar, Bass, and MIDI controller performance (2007-present)

References Furnished Upon Request