# Naoki Harrison Yokoyama

*Website:* naoki.io

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**Education**

**Northeastern University, Boston, MA** 2013 - 2018
MS in Electrical Engineering, Conc. in Machine Learning & Computer Vision GPA 3.63
BS in Electrical Engineering GPA 3.69

**Stuyvesant High School, New York, NY** 2009 - 2013

**Research Experience**

**Charles River Analytics** Cambridge, MA
*Scientist II* Jul 2018 - Present

- Working on novel research to denoise images in real-time, using convolutional cGANs and the Lottery Ticket Hypothesis with rewinding to significantly reduce network size.
- Designed a model leveraging fully convolutional layers and multi-task learning to estimate the pose of aircrafts from the view of a pursuing aircraft.
- Used Deep Deterministic Policy Gradients to autonomously pilot an aircraft towards another lead aircraft in simulation in conjunction with OpenAI Gym.
- Implemented Mask R-CNN, YOLOv3, OpenPose, and Convolutional Pose Machines to detect/track targets and recognize human gestures using video feeds from mobile robots.
- Writing technical proposals to secure funding for novel research projects.
- Giving lectures open to entire company about advanced machine learning every few months.

**Northeastern University Robotics and Intelligent Vehicles Research Lab (RIVeR)** Boston, MA
*Research Assistant with Prof. Taskin Padir* Dec 2017 - Jul 2019

- Developed a pipeline to rapidly generate exhaustive annotated artificial datasets for object detection/segmentation using videos taken of objects, afflicted with various types of noise to train detectors robust against varying orientation, occlusions, and lighting.
- Used Tensorflow, Keras, and Darknet to train and implement Mask R-CNN, YOLOv2, and SSD object detection/segmentation models.
- Integrated Google's Speech-to-Text API, Natural Language API, and Word2Vec neural net to recognize, label, and map perceived words from verbal commands into discretized sequential tasks the robot could execute.
- Used Keras to process images in conjunction with outputs from OpenPose to detect humans and determine their age, gender, emotion, and clothing fashion/color.
- Implemented OSLSM, a low-shot semantic segmentation deep learning model, with Caffe to instantly teach the robot to detect novel objects.
- Led Northeastern team to compete in the 2018 RoboCup@Home competition in Montreal using Toyota Research Institute's (TRI) Human Support Robot (HSR), placing 1$^{st}$ among the US teams and 4$^{th}$ internationally.
- Led team using the HSR for the 2018 World Robot Challenge in Tokyo and the 2019 RoboCup@Home competition in Sydney.
- Supported Northeastern team with competing in HSR Challenges hosted by TRI every 2-3 months. Achieved fastest successful completion time against teams from MIT, Stanford, Berkeley, and UMich.
- Mentored/guided underclassmen through research and advanced machine learning concepts.

**Publications**

T. Kelestemur, **N. Yokoyama**, J. Truong, A. Allaban, and T. Padir. "System Architecture for Autonomous Mobile Manipulation of Everyday Objects in Domestic Environments." *In Proc. of the ACM International Conf. on PErvasive Technologies Related to Assistive Environments 2019*

**Projects**

**Demonstration and Analysis of Deep Convolutional Generative Models** Apr 2018
naoki.io/dlt/deep_generative_models

- Built and trained a normal convolutional autoencoder (AE), residual AE (like UNet), and variational AE to denoise corrupted images and generate smooth animations of transitioning facial expressions.

- Presented and discussed mechanisms behind different types of deep convolutional AE and generative adversarial networks.

**Deep Learning Tutorials** Mar 2018 - Present

naoki.io/dlt

- Creating posts on my site detailing various computer vision and deep learning concepts, citing significant papers published at various conferences.

**Udacity AI for Robotics Project** Feb 2017 - May 2017

naoki.io/portfolio/lane_detection

- Used OpenCV to highlight lanes in dashcam footage recorded from driving around Boston.
- Implemented convolutional filters, Canny edge detection, color and contour thresholding, and perspective warping to isolate, detect, and label lane markers.

## Awards

**Robocup@Home 2018 1st Place U.S., 4th Place Internationally**

*International robotics competition aimed to develop service and assistive robot technology for personal domestic applications.*

**Northeastern Senior Capstone Design, 1st Place**

*Competition among all graduating seniors to design and build a technical solution to an open-ended problem.*

**Joseph Spear Scholarship 2017**

*Recognizes outstanding students who have demonstrated good citizenship and exemplary leadership abilities. One Northeastern recipient out of all senior engineering applicants.*

**SASE Kellogg Scholarship 2016**

*Recognizes SASE members who have demonstrated exceptional academic achievements and leadership credentials. Five recipients across all chapters across the country.*

**Clara & Joseph Ford Scholarship 2016**

*Recognizes students who have demonstrated good citizenship and embody leadership qualities. Three Northeastern recipients out of all second to fourth year applicants.*

**HackMIT "Best NativeScript App for IoT" Winner 2016**

*Hackathon competition at MIT among 1000 undergraduate students from around the world.*

**SASE National InnoService Competition 3rd Place 2014-15, 3rd Place 2013-2014**

*Competition to design an innovative product and business strategy.*

**Karen T. Rigg Scholarship 2014**

*Recipients are a shining example within their student organization through their enthusiasm and positive attitude. Two Northeastern recipients out of all freshman applicants.*

**Gordon CenSSIS Scholar 2013**

*One of 18 selected freshman applicants to get involved in research projects, K-12 STEM outreach programs, and professional development training and seminars.*

**George Alden and Amelia Peabody Scholarship**

*Recognizes Honors students who have good academic standing and actively participate in the Honors Program.*

**Dean's Scholarship**

*Prestigious scholarship awarded to top 10-15% of Northeastern applicants to help fund tuition for 5 years.*

**Northeastern Honors Program**

## Industry Experience

**Bluefin Robotics** Quincy, MA

*Electrical Engineering Co-op* Jul 2017 - Dec 2017

- Designed ground fault detection system to sense and locate faults in the AUV using FFT and pilot signals, implemented in C.
- Designed a robust power interface board to provide power and communication busses between the main computer, peripherals, and smart lithium batteries.

**iRobot** Bedford, MA

*Robotics Engineering Co-op* Jul 2016 - Dec 2016

- Designed hardware and software of smart Li-ion battery charger that charged batteries quickly and efficiently and communicated with its onboard battery management system through SMBus.
- Developed Python scripts for the Roomba 900 to collect more information about the home using various sensors, which would be conveyed to users in an informative graphical map.

**Medtronic** Boston, MA

*R&D Electrical Engineering Co-op* May 2015 - Dec 2015

- Designed the schematic of a new version of the embedded system that interfaced the robot's computer with peripherals.
- Developed Python scripts to allow users to change display and scaler settings using PySerial.
- Designed schematic and layout for the robot's power distribution system.

**Pavlok** Boston, MA

*Electrical and Software Engineering Intern* May 2014 - Dec 2014

- Developed software for various capabilities for the wearable, such as allowing users to zap themselves without their phone using signal processing techniques and the onboard IMU.
- Developed software and redesigned circuitry of secondary product in C++.
- Created an alarm app incorporating Parse's and Facebook's API to allow authenticated users to beep/vibrate/zap themselves at a set time with Ruby on Rails.

## Teaching Experience

**Sherman Center for Engineering Entrepreneurship Education** Mar 2014 - May 2016

*Workshop Instructor*

- Planned out and taught hands-on student-led workshops for groups of 20 students and faculty every month.
- Taught crash courses on Arduino, C programming, closed loop control systems, 3D printing, and front-end web design using HTML/CSS/JavaScript and Twitter Bootstrap.
- Demonstrated to all 1st year engineering professors how students could be introduced to microcontrollers and embedded programming using Arduino; Arduino was subsequently adopted and integrated into the official freshman curriculum.

**Fundamentals of Computer Science I** Jan 2015 - May 2016

*Teaching Assistant*

- Ran lab sessions, managed tutors/graders, held office hours for students, and graded exams.

**Northeastern University Culture and Language Learning Society** Sep 2016 - Apr 2018

*Japanese Instructor*

- Taught beginner and intermediate level Japanese every week to groups of about 10 students.

## Media

**News@Northeastern** - Sick of Household Chores? These Students are Building a Robot Help You at Home, June 2018

**WCVB-TV (ABC-affiliate)** - Cutting Edge: Robot designed to make aging easier, March 2018

**Northeastern Magazine** - Role Reversal: Student writes curriculum, January 2016

## Leadership & Involvement

**Eta Kappa Nu**

*Institute of Electrical and Electronics Engineers (IEEE) international honor society*

**Society of Asian Scientists and Engineers**

*Vice President, Corporate Relations Chair*

## Prototyping & Development

**Languages:** Python, C/C++, MATLAB, HTML/CSS/JavaScript, Ruby on Rails

**Libraries:** TensorFlow, Keras, PyTorch, OpenCV, ROS