

John Day

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EDUCATION

University of Michigan, Ann Arbor
Bachelor of Science, Computer Science
GPA: 3.57

2016 – 2020 (Winter)

RELEVANT COURSEWORK

Machine Learning
Computer Vision
Deep Learning for CV
Linear Algebra

Cell & Molecular Neuroscience
Behavioral Neuroscience
Linguistic Analysis
Philosophy of Mind and Machines

INTERESTS

Brain-Inspired AI, Computer Vision, Computational Neuroscience

RESEARCH EXPERIENCE

University of Michigan, Ann Arbor, MI

May 2019 – Present

Research Assistant, Computer Aided Diagnosis (CAD) Lab & Luker Lab

Project: *Deep Learning for 2D and 3D Segmentation of Fluorescent Reporter Cells in Complex Tissue* with Dr. Lubomir Hadjiiski

- Developed software to segment cell nuclei in both 2D and 3D imaging using a Deep CNN (U-net architecture)
- Implemented data processing algorithms incl. sliding window, enabling input of images of any size for our model without information loss; new techniques showed improved model accuracy compared with traditional resizing algorithms
- Coordinated collaboration between two research labs on project and lead manuscript writing in preparation for publication

University of Michigan - Life Sciences Institute, Ann Arbor, MI

Fall 2016 – Fall 2018

Research Assistant, S. Xu Lab

Project: *Machine Learning for Automatic Analysis of Animal Behavior* with Dr. Adam Iliff

- Designed Matlab program using transfer learning on a pre-trained deep neural net to track worms from video recordings and predict specific behavioral features; spoke about project at multiple conferences nationwide
- Experimented with current and potential approaches to automatic behavior interpretation for methodology optimization
- 2nd place in international poster presentation competition at CeNeuro *C. elegans* Neuroscience Conference 2018

Project: *Detecting Novel Sensory Mechanisms in the Model Organism C. elegans* with Dr. Adam Iliff

- Investigated possible sensory receptors responsible for the sensory transduction of baroreception in the model organism
- Conducted behavioral assays on candidate null mutants and analyzed differences in behavioral response data, providing the lab a refined understanding of the unknown sensory mechanism and involved genes

University of Michigan, Ann Arbor, MI

Summer 2017

MCubed Research Fellow, Lab of Dr. Mark Lindquist & Lab of Dr. Bruce Maxim

Project: *Improving environmental decision-making through multisensory simulation: The contribution of sound to 3D landscape visualization*

- Designed study to evaluate how perceiving experiences with VR affected physiological state
- Built VR environments using Unity and C# for Oculus Rift to support the study

POSTER PRESENTATIONS AND CONFERENCES

John Day, Adam Iliff, Shawn Xu; *Machine Learning for Automatic Analysis of Animal Behavior*

- CeNeuro International *C. elegans* Neuroscience Conference (2018)
 - 2nd place in poster competition
- Annual Midwest *C. elegans* Meeting (2018)

John Day, Mark Lindquist, Bruce Maxim, Jennifer Proctor, Francine Dolins; *Improving environmental decision-making through multisensory simulation: The contribution of sound to 3D landscape visualization*

- Summer Research Symposium, University of Michigan (2017)

John Day, Shawn Xu, Adam Iliff; *Detecting Novel Sensory Mechanisms in the Model Organism *C. elegans**

- UROP Spring Research Symposium, University of Michigan (2017)

INDUSTRY EXPERIENCE

Neurable, Boston, MA

Summer 2018

Backend Software Development Intern

- Built application for sending live brainwave (EEG) data across computers and integrating the data into the API, allowing Neurable to work on mobile devices such as Microsoft HoloLens and Android phones; built using Unity, C#, and TCP
- Designed tests to assess the generalized performance of machine learning algorithm using exhaustive cross-validation
- Optimized Neurable's architecture by allowing for parallelized training and testing of ML models

PROFESSIONAL ACTIVITIES

Neuromatch Academy

Summer 2020

Interactive Tract Student

- Virtual summer school in computational neuroscience with course-long group project where we used representational similarity analysis (RSA) on fMRI voxel data and image data to see if color is predicted from grayscale stimuli within visual cortex

Michigan Neuroprosthetics Club

Fall 2017 - Present

Software Team Lead

- Led project to be able to communicate with prosthetic device via Bluetooth, allowing for ML inference to be run remotely on smart phones via a custom app
- Construct executable plans to achieve the goals of the team each week, distributing tasks to 10+ other software members
- Researching signal processing techniques to improve user control of prosthetic device from electrophysiological data

Microsoft TEALS Program

Fall 2020 - Present

Volunteer Teacher Assistant

- Microsoft TEALS program aims to provide resources for under-resourced high schools to teach computer science classes
- Each week I prepare and lead lessons for the Intro to Computer Science course for 9th graders, which focuses on the Snap programming language and Python

Letters to a Pre-Scientist

2018 – 2019

Pen Pal/Mentor

- The organization matches volunteers with a pen-pal from middle schools from especially under-resourced areas.
- Throughout the school year I exchange hand-written letters with the student, talking with them about what it's like to be a "scientist," answering their many questions, and encouraging an interest in a career in science and technology

PROJECTS

- Computer vision program for animal tracking – Used in wet labs to track worm (*C. elegans* nematode) movement in neurobiology studies
- Optical Music Recognition application - Computer vision pipeline which, given a digital photo of sheet music, plays the audio encoded in the notes
- *My Memorizer Tool* – Google Chrome extension employing the psychological spacing effect for convenient and effective memorizing of content on the Web. Published and available on the Chrome Web Store

TECHNICAL SKILLS

- **Proficient:** C++, Python, MATLAB, Git, Unix. PyTorch
- **Experience:** C#, C, TensorFlow, Unity, SQL, .NET, VR/AR
- **Languages:** Spanish (Basic)