

Colin Cooke

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Skills

- **Data Science:** Deep Learning, Reinforcement Learning, Computer Vision, and Signal Processing
- **Tools:** Tensorflow, Pytorch, NumPy, SciPy, Keras, Docker, Kubernetes, Akka, and Kivy
- **Programming Languages:** Python, Verilog, Java, C/C++, Scala, MatLab, and JavaScript

Education

Bachelor of Applied Science – Mechatronics Engineering

University of Waterloo, Ontario, Canada

April 2019

- Completed six internships and earned the highest possible evaluation for each
- CGPA 3.94/4.0

Experience

Machine Learning Researcher - Computational Optics

Duke University, Durham, North Carolina

August 2019 – Current

- Led multiple research programs integrating microscope design with machine learning, resulting in several conference and journal publications
- Educated team members through seminars on reinforcement learning, state of the art computer vision, and general deep learning
- Developed prototype system enabling real-time compression of high-speed imaging on an FPGA

Firmware Engineering Intern

Ramona Optics, Durham, North Carolina

May 2018 – August 2019

- Developed hardware architecture for custom high-bandwidth imaging system (5 GB/s over PCIe)
- Wrote interface library to control imaging hardware through low level kernel functions

AI Research Intern

Kindred AI, Toronto, Ontario

April 2018 – August 2018

- Led design and experimentation of reinforcement learning on robotic applications
- Worked with multi-disciplinary team to develop robust reinforcement learning systems for use within robots at customer sites
- Collaborated with team members to develop and validate novel reinforcement learning algorithms

Computer Vision and Machine Learning Researcher

Heliolytics, Toronto, Ontario

January 2017 – December 2017

- Led development of deep learning systems to segment aerial imagery
- Designed novel image-to-image mapping systems, making use of spatial information and image content
- Implemented signal processing algorithms using SciPy to extract image features from aerial imagery

Real Time Systems Integration Engineering Intern

Google/Nest Labs, Palo Alto, California

April 2016 – August 2016

- Lead a major overhaul of load test tooling to improve consistency and reflect production traffic.
- Worked with team member to produce custom traffic distributions to stress test features and push the system past its limits

Research

Learned Sensing

- Amery Chaware*, **Colin L. Cooke***, Kanghyun Kim, Roarke Horstmeyer "Towards an Intelligent Microscope: adaptively learned illumination for optimal sample classification", *ICASSP 2020*
- **Colin L. Cooke**, Fanjie Kong, Amey Chaware, Rong Xu, Kanghyun Kim, Pavan C. Konda, Roarke Horstmeyer "Physics-enhanced machine learning for augmented microscopy", *In Prep.*

Biomedical Imaging

- Bradley Feiger, Lorenzana-Saldivar, Roarke Horstmeyer, **Colin Cooke**, Muath Bishawi, Julie Doberne, G. Chad Hughes, David Ranney, Soraya Voigt, Amanda Randles, "Context Aware Convolutional Neural Networks for Segmentation of Aortic Dissection", *Submitted MIDL 2020*

Remote Sensing

- Developed techniques to train networks at low resolution and increase resolution during prediction
- **C.L.V. Cooke**, and K.A. Scott, "Estimating Sea Ice Concentration: Training Convolutional Neural Networks with Passive Microwave Data", *IEEE Transactions on Geoscience and Remote Sensing*

Reinforcement Learning to Understand Human Motion Patterns

- Linking concepts from biomechanics and reinforcement learning together to test biomechanical theorems
- Investigating new techniques for policy exploration using the Muscle Synergy hypothesis from biomechanics

Patents

Medical Devices

- **Colin Cooke**, Daniel Zhou, Jackson Fisher, Michael Jonas "Adjustable Support Apparatus", US Patent Pending

Imaging Devices

- Mark Harfouche, Jaehee Park, **Colin Cooke**, Gregor Horstmeyer "A method to capture multiple simultaneous microscopy images from multiple digital sensors using field programmable gate arrays", US Patent Pending