

Christopher Stephen Nielsen

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Research Interests

- My research interests primarily involve developing machine learning tools for ophthalmology, with a focus on building interpretable models for clinical use
- I am also interested in federated learning and the challenges associated with preserving privacy when developing machine learning models that train on sensitive patient data

Education

- **PhD in Biomedical Engineering** Sep 2021 – Present
Research Area: Interpretable Machine Learning for Ophthalmology
Schulich School of Engineering, University of Calgary
Supervisor: Nils Forkert
- **MSc in Electrical and Computer Engineering** Jan 2017 – Nov 2019
Thesis Title: Improving Image Classification Through Generative Data Augmentation
Schulich School of Engineering, University of Calgary
Supervisor: Michal Okoniewski
GPA: 4.0/4.0
- **BSc in Applied Mathematics** Sep 2012 – Nov 2016
University of Calgary
Graduated with Distinction
GPA: 4.0/4.0

Teaching Experience

Sessional Instructor in Electrical and Computer Engineering at the University of Calgary

- ENEL 625 – Estimation Theory Jan 2020 – Apr 2020

Teaching Assistant in Electrical and Computer Engineering at the University of Calgary

- ENEL 625 – Estimation Theory Jan 2019 – Apr 2019
- ENEL 419 – Probability and Random Variables Sep 2018 – Dec 2018
- ENEL 503 – Computer Vision Jan 2018 – Apr 2018

Guest Lecturer in Electrical and Computer Engineering at the University of Calgary

- ENEL 503 – Computer Vision Apr 2018

Selected Research/Work Experience

Data Scientist, Getty Images

Aug 2017 – Aug 2021

- Developed deep neural network architectures for image composition analysis and personalized search recommendation
- Designed statistical models for processing large scale customer data
- Contributed to the implementation of an AWS based big data pipeline

Algorithm Engineer, Appropolis

Apr 2015 – Oct 2016

- Developed computer vision algorithms for multiple target tracking inside crowded indoor environments
- Combined video processing and WiFi measurements in software framework for indoor positioning applications
- Integrated 3D processing from the Microsoft Kinect sensor with other tracking technologies to provide 6DOF positioning for indoor environments

Research Assistance, University of Calgary, Electrical Engineering

Jan 2012 – Dec 2012

Supervisor: Dr. Michal Okoniewski

- Developed stereoscopic tracking software for analysis and diagnosis of sleep apnea

Summer Research Assistant, University of Calgary, Geomatics Engineering

May 2011 – Sep 2011

Supervisor: Dr. Gerard Lachapelle

- Contributed to project involving the minimization of required temporal data for GPS localization

Junior Research Assistant, University of Calgary, Geomatics Engineering

Jul 2010 – Aug 2010

Supervisor: Dr. Gerard Lachapelle

- Developed a trajectory tracking system using a camera collocated with a wireless receiver

Leadership and Volunteering Activities

Pianist, Calgary Danish Lutheran Church

Nov 2010 – Present

- Provide music accompaniment for weekly Sunday services as well as community events such as baptisms, weddings, and funerals

Team Lead, Tikkun Olam Makers Make-A-Thon

Aug 2017

- Developed an educational software tool tailored to an autistic individual's audiovisual needs when searching the Internet for schoolwork

Technical Skills

- Programming Languages: C, C++, Python, Matlab
- Libraries: Tensorflow, Theano, Scikit-learn, OpenCV, OpenGL
- Extensive experience developing production data science systems
- Detailed knowledge of statistical models
- Experience developing Android mobile applications

Patents

Reference Number: US20180025500A

Jan 2018

- The patent presents a novel method of combining computer vision tracking observables from security cameras inside an indoor environment with sensor information sampled from handheld devices to improve indoor positioning accuracy

Publications

- (2019) - C. Nielsen, M. Okoniewski, “*GAN Data Augmentation Through Active Learning Inspired Sample Acquisition*”, CVPR Workshops.
- (2016) - C. Nielsen, J. Nielsen, V. Dehghanian, “*Fusion of security camera and RSS fingerprinting for indoor multi-person tracking*”, Indoor Positioning and Indoor Navigation.
- (2016) - J. Nielsen, C. Nielsen, “*Assessment of receiver signal strength sensing for location estimation based on Fisher information*”, Sensors Journal.
- (2012) - C. Nielsen, J. Nielsen, “*Robust 6DOF ego-motion estimation for handheld indoor positioning*”, International Conference on Image Processing, Computer Vision, and Pattern Recognition.

Honours and Awards

Scholarships

- (2018) Alberta Graduate Student Scholarship
- (2015) Alexander Rutherford Scholarship
- (2013-2015) Book Prize for top student in Faculty of Physics
- (2014) Undergraduate Merit Award
- (2014) Jason Lang Scholarship
- (2013-2014) Dean’s List in Faculty of Science
- (2012-2013) President’s Scholarship

2012 Intel International Science and Engineering Fair

- First Place Award in Electrical and Mechanical Engineering
- All-expense paid trip to visit the CERN physics laboratory
- Honourable mention from the International Council on Systems Engineering
- K. Soumyanath Memorial Award for overall best computer engineering project
- United Technologies Corporation Prize

2011 Intel International Science and Engineering Fair

- Namesake for minor planet Chrisnielsen (28353) awarded by Lincoln Laboratory, Massachusetts Institute of Technology
- First Place Award in Electrical and Mechanical Engineering
- International Society for Optical Engineering Second Place Award

2010 Intel International Science and Engineering Fair

- Fourth Place Award in Electrical and Mechanical Engineering
- Google CS Connect Award for top computer science project

Other Interests

- **Sports:** CrossFit, hiking, skiing, soccer, hockey
- **Hobbies:** music, reading, cooking, movies