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 machine learning architectures for image analysis and search ranking
- 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 to complete 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

- (2021) Biomedical Engineering Graduate Program Entrance Prize
- (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