

Avery Bojie Ma

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Education

Ph.D in Computer Science

Toronto ON

University of Toronto, Vector Institute for Artificial Intelligence

Sept 2018 – Aug 2022 (expected)

- Topic: Security and adversarial robustness of learning algorithms
- Supervisors: Amir-massoud Farahmand and Richard Zemel
- Cumulative GPA : 3.6

M.A.Sc. in Systems Design Engineering

Waterloo ON

University of Waterloo, Vision and Image Processing Lab

May 2016 – Aug 2018

- Supervisors: Alexander Wong and David Clausi
- Thesis: "[Computational Depth from Defocus via Active Quasi-random Pattern Projections](#)"
- Cumulative GPA : 4.0

B.A.Sc. in Mechatronics Engineering *with Distinction, Honours, Co-op Program*

Waterloo ON

University of Waterloo

Sept 2011 – Apr 2016

- Capstone project: "[All Terrain Personal Transportation Device](#)"
- Cumulative GPA : 3.7

Publications

- **Avery Ma**, Aladin Virmaux, Kevin Scaman, Juwei Lu (2020). Improving Hierarchical Adversarial Robustness of Deep Neural Network. (*Under Review*).
- **Avery Ma**, Fartash Faghri, Nicolas Papernot, Amir-massoud Farahmand (2020). SOAR: Second-Order Adversarial Regularization. (*Under Review*).
- **Avery Ma**, Alexander Wong, David Clausi (2018). Deep Learning-driven Depth from Defocus via Active Multispectral Quasi-random Projections with Complex Subpatterns. In: *CRV'18: Conf. on Computer and Robot Vision*.
- **Avery Ma**, Ahmed Gawish, Mark Lamm, Alexander Wong, Paul Fieguth (2018). Real-time Spatial-based Projector Resolution Enhancement. In: *SID'18: Society for Information Display*.
- **Avery Ma**, Alexander Wong (2018). An Inverse Problem Approach to Computational Active Depth from Defocus. *Journal of Physics: Conference Series*.
- Xiaodan Hu, **Avery Ma**, Ahmed Gawish, Mark Lamm, Paul Fieguth (2017). Motion Detection in High Resolution Enhancement. *CVIS'17: Conference on Vision and Imaging Systems*.
- **Avery Ma**, Alexander Wong, David Clausi (2017). Depth from defocus via active multispectral quasi-random point projections using deep learning. In: *CVIS'17: Conference on Vision and Imaging Systems*.

- **Avery Ma**, Alexander Wong, David Clausi (2017). Depth from Defocus via Active Quasi-random Point Projections: a Deep Learning Approach. In: *ICLAR'17: International Conference on Image Analysis and Recognition*.
- **Avery Ma**, Alexander Wong (2017). Enhanced Depth from Defocus via Active Quasi-random Colored Point Projections. In: *ICIPE'17: International Conference on Inverse Problems in Engineering*.
- **Avery Ma**, Francis Li, Alexander Wong (2016). Depth from Defocus via Active Quasi-random Point Projections, In: *CVIS'16: Conference on Vision and Imaging Systems*.

Patents

- **Avery Ma**, Ahmed Gawish, Alexander Wong, Paul Fieguth, Mark Lamm (2018). Real-time spatial-based resolution enhancement using shifted superposition. Patent No.: US10009587 B1

Research Experience

Research Intern

Huawei - Noah's Ark Lab

Toronto ON

May 2020 – Oct 2020

- Hosted by Aladin Virmaux, Kevin Scaman and Juwei Lu
- Research project on improving hierarchical adversarial robustness of deep neural networks

Research Intern

Christie Digital - Advanced Technologies Group

Kitchener ON

May 2016 – Apr 2017

- Hosted by Mark Lamm
- Research project on multiple spatial-temporal super-resolution enhancement methods for projectors
- Funded by the NSERC-CRD grants and the OCE VIP-II grants

Undergraduate Research Assistant

University of Waterloo - Vision and Image Processing Lab

Waterloo ON

Jan – Apr 2015

- Advised by Prof. Alexander Wong
- Research project on graph contraction algorithms for large scale graph computation

Research Intern

University Health Network - Princess Margaret Hospital, Guided Therapeutics Lab

Toronto ON

May – Aug 2013

- Hosted by Dr. Robert Weersink
- Prototyped an integrated 3D imaging and reconstruction system using a pico projector and a rigid endoscope for intra-operative 3D registration

Work Experience

Mechatronics Engineer, Co-op

Bendix Commercial Vehicle Systems - Vehicle Electronics Group

Cleveland OH

Sept – Dec 2015

- Developed an embedded program for a tire pressure monitoring system (TPMS)
- Programmed an automatic system configuration tool for anti-lock braking systems (ABS) in trucks

Electrical Engineer, Co-op

Baylis Medical Company - Biomedical Engineering Group

Mississauga ON

Jan – Apr 2014

- Designed a thermocouple probe for temperature monitoring during minimally invasive surgery

- Hands-on circuit design experience gained from diagnosing malfunctioned radio-frequency ablation probes for spine tumor treatments

Software Developer, Co-op

JSI Telecom - UX Team

Ottawa ON

Sept – Dec 2012

- Enhanced the name search algorithm that drastically improved the user experience of the software
- Self-taught C# and Windows WPF, and developed a Gomoku board game

QA Engineer, Co-op

TeleCommunication Systems Inc. - QA Team

Calgary AB

Jan – Apr 2012

- Developed a series of automated tests that focus on the reliability of the software
- Implemented an automatic fault logging program that sends notifications to software developers regarding the latest bugs reported

Honors and Achievements

- NSERC Postgraduate Scholarships-Doctoral (PGS-D) *Sept 2018 – present*
- University of Waterloo Alumni Gold Medal (Department Nomination) *Sept 2018*
- Ontario Graduate Scholarship *May 2017 – Apr 2018*
- University of Waterloo President's Graduate Scholarship *May 2017 – Apr 2018*
- University of Waterloo Provost Graduate Scholarship *May 2016 – Apr 2017*
- University of Waterloo President's Scholarship *Sept 2011*

Teaching Assistantships

University of Toronto

- Mathematical Expression and Reasoning for Computer Science *Winter 2020*

University of Waterloo

- Introduction to Pattern Recognition *Winter 2018*
- Digital Computation: Introduction to C++ Programming *Fall 2017*
- Advanced Engineering Math 2: Numerical Methods for ODEs *Spring 2016*

Conference Presentations

- **Avery Ma**, Amir-massoud Farahmand (2019). Adversarial Robustness using Taylor Series-based Regularizer. **Post Presentation** at the *Evolution of Deep Learning Symposium*. Vector Institute, Toronto, Ontario
- **Avery Ma**, Amir-massoud Farahmand (2018). Adversarial Robustness Through Loss regularization. **Post Presentation** at the *Vector Research Symposium*. Vector Institute, Toronto, Ontario
- **Avery Ma**, Ahmed Gawish, Mark Lamm, Alexander Wong, Paul Fieguth (2018). Real-time Spatial-based Projector Resolution Enhancement. **Oral Presentation** at the *Society for Information Display - Display Week 2018*. Los Angeles Convention Center, Los Angeles, California
- **Avery Ma**, Alexander Wong, David Clausi (2018). Deep Learning-driven Depth from Defocus via Active Multispectral Quasi-random Projections with Complex Subpatterns. **Poster Presentation** at the *15th Conference on Computer and Robot Vision*. York University, Toronto, Ontario

- **Avery Ma**, Alexander Wong, David Clausi (2017). Depth from Defocus via Active Multispectral Quasi-random Point Projections using Deep Learning. **Oral Presentation** at the *3rd Annual Conference on Vision and Imaging Systems*. University of Waterloo, Waterloo, Ontario.
- Xiaodan Hu, **Avery Ma**, Ahmed Gawish, Mark Lamm, Paul Fieguth (2017). Motion Detection in High Resolution Enhancement. **Poster Presentation** at the *3rd Annual Conference on Vision and Imaging Systems*. University of Waterloo, Waterloo, Ontario.
- **Avery Ma**, Alexander Wong, David Clausi (2017). Depth from Defocus via Active Quasi-random Point Projections: a Deep Learning Approach. **Poster Presentation** at the *14th International Conference on Image Analysis and Recognition*. Polytechnique Montréal, Montreal, Quebec
- **Avery Ma**, Alexander Wong (2017). Enhanced Depth from Defocus via Active Quasi-random Colored Point Projections. **Oral Presentation** at the *9th International Conference on Inverse Problems in Engineering*. University of Waterloo, Waterloo, Ontario.
- **Avery Ma**, Alexander Wong, David Clausi (2016). Depth from Defocus via Active Multispectral Quasi-random Point Projections using Deep Learning. **Poster Presentation** at the *2nd Annual Conference on Vision and Imaging Systems*. University of Waterloo, Waterloo, Ontario

Talks

- **University of Waterloo, Vision and Image Processing Lab** **Nov 2017**
"Real-time Spatial-based Resolution Enhancement"
- **University of Waterloo, Systems Design Engineering Graduate Seminar** **Feb 2017**
"Depth from Defocus via Active Quasi-random Pattern Projection: A Deep Learning Approach"
- **University of Waterloo, Vision and Image Processing Lab** **Oct 2016**
"Depth from Defocus via Active Quasi-random Pattern Projection"