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)*

- Supervisors: Richard Zemel and Amir-Massoud Farahmand

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"
  - Designed a novel active depth sensing system that infers depth by analyzing the blurriness of the projection pattern at different depth levels caused by camera defocus
  - Built an ensemble of deep neural networks as the inference model to reconstruct 3D images
- Cumulative GPA : 92 % (4.0 / 4.0 equivalent)

B.A.Sc. in Mechatronics Engineering, Honours, Co-operative Program **Waterloo ON**
University of Waterloo *Sept 2011 – Apr 2016*

- Capstone project: "All Terrain Personal Transportation Device"
  - Engineered a personal transportation platform that is capable of carrying a 70kg person for 10km at walking speed on a single charge
  - Implemented the maneuver control system using PID control theory that enabled users to ride the device by simply changing the center of gravity
- Cumulative GPA : 83 % (3.7 / 4.0 equivalent)

Publications

- **Ma, A.**, Wong, A.,Clausi, D.A. (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.*
- **Ma, A.**, Gawish, A., Lamm, M., Wong, A., Fieguth, P. (2018). Real-time spatial-based projector resolution enhancement*. In: *SID'18: Society for Information Display.*
- **Ma, A.**, Wong, A. (2018). An inverse problem approach to computational active depth from defocus*. *Journal of Physics: Conference Series.*
- **Ma, A.**, Wong, A., Clausi, D.A. (2017). Depth from defocus via active multispectral quasi-random point projections using deep learning*. In: *CVIS'17: Conference on Vision and Imaging Systems.*
- Hu, X., **Ma, A.**, Gawish, A., Lamm, M., Fieguth, P. (2017). Motion detection in high resolution enhancement*. In: *CVIS'17: Conference on Vision and Imaging Systems.*
- **Ma, A.**, Wong, A., Clausi, D.A. (2017). Depth from defocus via active quasi-random point projections: a deep learning approach*. In: *ICIAR'17: International Conference on Image Analysis and Recognition.*
- **Ma, A.**, Wong, A. (2017). Enhanced depth from defocus via active quasi-random colored point projections*. In: *ICIPE'17: International Conference on Inverse Problems in Engineering.*
- **Ma, A.**, Li, F., Wong, A. (2016). Depth from defocus via active quasi-random point projections*, In: *CVIS'16: Conference on Vision and Imaging Systems.*

*: *Peer-reviewed*

Patents

- **Ma, A.**, Gawish, A., Wong, A., Fieguth, P., Lamm, M. (Submitted in Aug. 2017). Real-time spatial-based resolution enhancement using shifted superposition. Patent: P6932US00

Research Experience

Research Engineer Intern **Kitchener ON**
Christie Digital - Advanced Technologies Group *May 2016 – Apr 2017*

- Advised by Professor Paul Fieguth and Professor Alexander Wong
- Developed multiple spatial-temporal super-resolution enhancement methods for projectors
- Collaborated with hardware engineers to achieve real-time resolution enhancement
- Enabled Christie to deliver a new line of low-cost high-resolution projectors
- Supported by the Collaborative Research and Development (CRD) fund from the National Science and Engineering Research Council (NSERC) and the Voucher for Innovation and Productivity II (VIP-II) fund from the Ontario Centres of Excellence (OCE)

Undergraduate Research Assistant **Waterloo ON**
University of Waterloo - Vision and Image Processing Lab *Jan – Apr 2015*

- Advised by Professor Alexander Wong
- Conducted a research project on graph contraction algorithms for large scale graph computation
- Evaluated and implemented several Graph Cuts algorithms for image segmentation

Research Assistant, Co-op **Toronto ON**
University Health Network - Princess Margaret Hospital, Guided Therapeutics Lab *May – Aug 2013*

- Advised 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
- Implemented the well-known pseudo-random pattern generation algorithm for structured light published by Morano *et al.*

Work Experience

Mechatronics Engineer, Co-op **Cleveland OH**
Bendix Commercial Vehicle Systems - Vehicle Electronics Group *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 **Mississauga ON**
Baylis Medical Company - Biomedical Engineering Group *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 **Ottawa ON**
JSI Telecom - UX Team *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 **Calgary AB**
TeleCommunication Systems Inc. - QA Team *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

Scholarships and Awards

- NSERC Postgraduate Scholarships-Doctoral (PGS-D) *Sept 2018 – present*
- 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 Experience

Teaching Assistant **University of Waterloo**

- Introduction to Pattern Recognition *Winter 2018*
- Digital Computation: Introduction to C++ Programming *Fall 2017*
  - Volunteered to teach a lecture to gain more presentation experience
- Advanced Engineering Math 2: Numerical Methods for ODEs *Spring 2016*

Conference Presentations

- **Ma, A.**, Gawish, A., Lamm, M., Wong, A., Fieguth, P. (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
- **Ma, A.**, Wong, A.,Clausi, D.A. (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
- **Ma, A.**, Wong, A., Clausi, D.A. (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.
- Hu, X., **Ma, A.**, Gawish, A., Lamm, M., Fieguth, P. (2017). Motion detection in high resolution enhancement. **Poster Presentation** at the *3rd Annual Conference on Vision and Imaging Systems.* University of Waterloo, Waterloo, Ontario.
- **Ma, A.**, Wong, A., Clausi, D.A. (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
- **Ma, A.**, Wong, A. (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.
- **Ma, A.**, Wong, A., Clausi, D.A. (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"