

# Avery Bojie Ma

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## Education

### M.A.Sc. in Systems Design Engineering

Waterloo ON

University of Waterloo, Vision and Image Processing Lab

May 2016 – Apr 2018 (expected)

- Supervised by Professor Alexander Wong and Professor David Clausi
- Thesis: "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 : 91 % (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.**, Gawish, A., Lamm, M., Wong, A., Fieguth, P., (Submitted in Dec. 2017) Real-time spatial-based projector resolution enhancement\*. *Society for Information Display - Display Week 2018*.
- **Ma, A.**, Wong, A. (Submitted in Oct. 2017). An inverse problem approach to depth from defocus via active quasi-random colored point projections\*. *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: *ICLAR'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

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### Research Engineer Intern

*Christie Digital - Advanced Technologies Group*

**Kitchener ON**

*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

*University of Waterloo - Vision and Image Processing Lab*

**Waterloo ON**

*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

*University Health Network - Princess Margaret Hospital, Guided Therapeutics Lab*

**Toronto ON**

*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

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### 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

## Scholarships and Awards

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- Ontario Graduate Scholarship *May 2017 – present*
- University of Waterloo President's Graduate Scholarship *May 2017 – present*
- University of Waterloo Provost Graduate Scholarship *May 2016 – Apr 2017*
- University of Waterloo President's Scholarship *Sept 2011*
- University of Waterloo Euclid Mathematics Contest, **Distinction** *Apr 2011*
- Sun Life Financial Canadian Open Mathematics Challenge, **Distinction** *Nov 2010*
- University of Waterloo Fermat Mathematics Contest, **Distinction** *Feb 2010*

## Teaching Experience

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- | Teaching Assistant  | University of Waterloo |
|---|------------------------|
| • Introduction to Pattern Recognition                                 | <i>Winter 2018</i>     |
| • Digital Computation: Introduction to C++ Programming                | <i>Fall 2017</i>       |
| – Volunteered to teach a lecture to gain more presentation experience |                        |
| • Advanced Engineering Math 2: Numerical Methods for ODEs             | <i>Spring 2016</i>     |

## Conference Presentations

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- **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

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- **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"*