

# Johnson Zhong

Robotics Engineering Student

## CONTACT

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## EDUCATION

2013-09 to 2018-06

### University of Toronto

- ◆ B.ASc in Engineering Science Robotics
- ◆ Cumulative GPA: 3.92/4.0
- ◆ Major GPA: 4.0/4.0
- ◆ Rank 2/161 in 3rd year

## RESEARCH EXPERIENCE

2017-09 to 2018-05

### Magnetic Microbead Control for Intracellular Manipulation with Prof. Yu Sun

Undergraduate Thesis at the Advanced Micro and Nanosystems Laboratory

Project plan is to:

- ◆ Create simulation of the magnetic system
- ◆ Adapt controllers to a lower visual feedback frequency (30Hz to 4Hz)
- ◆ Design a controller to simultaneously control multiple beads to enable twist manipulation

2016-05 to 2017-09

### Verity Studios R&D Engineering Intern with Prof. Raffaello D'Andrea

16 months Professional Experience Year, Zurich - [veritystudios.com](http://veritystudios.com)

Verity Studios is an ETH spinoff specializing in indoor drone show systems.

- ◆ Modelled indoors localization system using physics first principles
- ◆ Estimated localization performance at any point inside any hypothetical flight space
- ◆ Validated model against real localization performance for **0.86 correlation with 95% confidence of >0.8**
- ◆ Designed model for computational efficiency and suitability as a cost function
- ◆ Designed and implemented cross-platform parameters framework
- ◆ Parameters retained stored values intelligibly after firmware updates

2015-05 to 2015-09

### FPGA CAD Routing Optimization with Prof. Vaughn Betz

Summer research with USRA NSERC 5k grant, University of Toronto - [johnsonzhong.me/projects/vpr](http://johnsonzhong.me/projects/vpr)

Verilog-to-Routing (VTR) is a CAD flow mapping Verilog to FPGAs. Its runtime performance was bottlenecked by the routing phase for large circuits.

- ◆ Developed route tree pruning algorithm to allow incremental reroutes, speeding up routing by up to **3x** on difficult benchmarks
- ◆ Designed targeted rerouting algorithm for critical yet suboptimal connections, producing up to **30% faster** resulting circuits (maximum frequency)
- ◆ Benchmarked over realistic circuits, with speedups scaling with circuit size

## FUNDING AWARDED

2015-05

Undergraduate Student Research Awards (USRA) grant from Natural Sciences and Engineering Research Council of Canada (NSERC) (\$6000)

## ACADEMIC HONOURS

2013-09 to 2018-05

Shaw Admission Scholarship (\$20000)

2013-09

Walter Scott Guest Memorial Scholarship (\$5000)

## AWARDS

2018-01

3rd in Ontario Engineering Competition 2018 Programming category (\$500)

2016-03

1st in Ontario Engineering 2016 Competition Programming category (\$2000) - [johnsonzhong.me/projects/snowfun](http://johnsonzhong.me/projects/snowfun)

2015-10

1st in Canada in IEEEExtreme 9.0 (28/6800 globally) - [johnsonzhong.me/res/ieee9.pdf](http://johnsonzhong.me/res/ieee9.pdf)

2015-01

Context.io API prize in PennApps Winter 2015 (\$500) - [devpost.com/software/snowball](http://devpost.com/software/snowball)

2014-10

8th in Canada in IEEEExtreme 8.0 (52/6500 globally) - [johnsonzhong.me/res/ieee8.pdf](http://johnsonzhong.me/res/ieee8.pdf)

2014-09

Google Cloud Platform prize in Hack the North 2015 (\$1000) - [devpost.com/software/forenships](http://devpost.com/software/forenships)

2013-10

6th in Canada in IEEEExtreme 7.0 (43/7500 globally) - [johnsonzhong.me/res/ieee.jpg](http://johnsonzhong.me/res/ieee.jpg)

## PUBLICATIONS

2018-01

Kevin Murray, Oleg Petelin, Jason Luu, Sheng Zhong, Jia Min Wang, Eugene Sha, Ken Kent, Vaughn Betz. "VTR 8.0: Highly Customizable FPGA Architecture Evaluation and CAD." To be submitted to ACM Transactions on Reconfigurable Technology and Systems.

## PROJECTS

2015-09 to 2015-11

### Autonomous Cooperating Robots

AER201 Design Project in a team of 3 - [johnsonzhong.me/projects/robot/](http://johnsonzhong.me/projects/robot/)

The task was to design and build a mobile robot to play connect-4 on a semi-randomized game board. We decided to pursue a two robots approach, one for retrieving the ball and one for playing the ball.

- ♦ Targeted randomly placed high-reward ball dispensers to obtain **fastest ball retrieval time** (3 ball/min vs average 0.5 ball/min)

2014-11 to 2015-09

### Simple Algorithms and Data Structures Library

Open source personal project - [johnsonzhong.me/sal/](http://johnsonzhong.me/sal/)

Header only C++ template library with an interactive tester focused on implementation readability.

- ♦ Implemented sets and maps with treaps to get **4x insertion and 2x read time** improvements over standard library

## LANGUAGES

Experience [> lines of code]

C++	50k
Javascript	10k
Python	5k
C	5k