# JOHNSON ZHONG

ROBOTICS ENGINEERING STUDENT

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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

## WORK EXPERIENCE

**2016-05 TO 2017-09**

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

16 months Professional Experience Year, Zurich - veritystudios.com

Verity Studios is an ETH spinoff specializing in indoor drone show systems. I designed and implemented a robust parameters system.

- Real time performance
- Parameter values smartly retained after adding/removing other parameters
- PC software can modify parameters on **all hardware platforms and versions** without recompilation
- Simplified usage so much that a coworker wrote: **"Tears of joy come to my eyes seeing how much simpler the code becomes"**

## RESEARCH EXPERIENCE

**2016-05 TO 2017-09**

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

16 months Professional Experience Year, Zurich - veritystudios.com

- Modelled novel indoors localization system using physics first principles
- Enabled optimization of flight performance
- Achieved **correlation of 0.86** (95% confidence >0.80) against experimental performance

**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

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

## 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

**2015-10** **1st** in Canada in IEEEXtreme 9.0 (28/6800 globally) - johnsonzhong.me/res/ieee9.pdf

**2015-01** Context.io API prize in PennApps Winter 2015 **($500)** - devpost.com/software/snowball

**2014-10** 8th in Canada in IEEEXtreme 8.0 (52/6500 globally) - johnsonzhong.me/res/ieee8.pdf

**2014-09** Google Cloud Platform prize in Hack the North 2015 **($1000)** - devpost.com/software/forenships

**2013-10** 6th in Canada in IEEEXtreme 7.0 (43/7500 globally) - johnsonzhong.me/res/ieee.jpg

## Languages

| | Experience [> thousands lines of code] |
|---|---|
| **C++** | 50 |
| **Javascript** | 10 |
| **Python** | 5 |
| **C** | 5 |

## Projects

**2015-09 to 2015-11**

### Autonomous Cooperating Robots

AER201 Design Project in a team of 3 - 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/

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

## Software Skills

| | |
|---|---|
| **Build tools** | CMake, Makefile |
| **Version control** | Git, SVN |
| **Environments** | Windows, Linux, Arduino |
| **Libraries** | Boost, QT |
| **Code review** | Gerrit |
| **Integration** | Buildbot, Jenkins |

## Courses

| | |
|---|---|
| **Heavy focus** | Control theory, Machine learning, Modelling |

**Medium focus**

Dynamics, Kinematics, Probability, Algorithms

| | |
|---|---|
| **Light focus** | Economics, Marketing |