# Candice J. X. Ip

Engineering Physics · Faculty of Applied Science · University of British Columbia

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## Education

### University of British Columbia
*Vancouver, Canada*

Engineering Physics (B.A.Sc) & Minor in Commerce — *Sep 2013 - May 2018*

- A physics and applied mathematics program enriched by design fundamentals in electrical and mechanical engineering.

### Swiss Federal Institute for Technology (ETHZ)
*Zürich, Switzerland*

International Exchange – Department of Mechanical and Process Engineering — *Sep 2016 - Dec 2016*

- Studied with a focus in Physics, Data Visualization, and Energy Sciences with the Department of Mechanical and Process Engineering.
- Courses: Quantitative Flow Visualization, Heat Transfer, Wind Energy, Plasmonics, Solar Cells, and Nuclear Energy Systems.

### St. Michaels University School
*Victoria, Canada*

Secondary School — *Sep 2005 - Jun 2013*

- Head of Student Council and Captain of the Badminton Team
- Participated in the Outdoor Leadership Program, Experiential Program, and School Orchestra

## Research & Work Experience

### Nanoplasmonics Laboratory, University of Victoria
*Victoria, Canada*

Research Intern for Dr. Reuven Gordon — *May 2017 – Aug 2017*

- Published a peer-reviewed article in *ACS Omega* and a conference proceeding in *SPIE Optical Traping and Opitcal Micromanipulation*.
- Assisted in optical experiments for detecting protein composition in heterogeneous solutions using optical tweezing techniques and fabricated double nanoholes.
- Analyzed data and developed MATLAB code to process the data for analyzing signal fluctuation and optical trap stiffness.

### Human Interaction Robotics Laboratory (RREACH), University of British Columbia
*Vancouver, Canada*

Mechatronics Engineer and Biomedical Research Intern with Dr. Machiel Van der Loos — *May 2016 – Aug 2016*

- Developed a prototype of their biomedical and mechatronics device, SleepSmart v2, for detecting physiological signals.
- Implemented SPI and UART communication protocol on the microcontroller, PIC 18F4550, and utilized LabVIEW and MATLAB software for decoding and processing digital acceleration and temperature data from the device.
- Conducted human research trials with the biomedical device, SleepSmart v1, under the guidelines of the Research Ethics Board of Canada.

### Max Planck Institute for the Structure and Dynamics of Matter
*Hamburg, Germany*

Researcher and Programmer Intern with Dr. Wesley Robertson — *Jan 2015 - Apr 2015*

- Published a peer-reviewed article in *Review of Scientific Instruments*.
- Improved and optimized software for auto-alignment of an optical and mass spectrometer sampling system for experiment involving accuracy measurements at the micrometer scale.
- Used LabVIEW and MATLAB to modify and improve the control of a 3-axis piezo stage system from analyzed and processed images.

## Research Publications

### Journal Publications

1. N. Hachohen, **C. J. X. Ip**, and R. Gordon. "Analysis of Egg White Protein Composition with Double Nanohole Optical Tweezers". *ACS Omega*. 2018.
2. Y. Lu, C. L. Pieterse, D. Eggert, **C. J. X. Ip**, F. Busse, S. Keskin, W. D. Robertson, and R. J. D. Miller. "Direct Laser Sampling of Aqueous Solutions from Lab-on-a-Chip Devices for Mass Spectrometry." Submitted March 14, 2018.
3. W. D. Robertson, L. R. Porto, **C. J. X. Ip**, M. K. T. Nantel, F. Tellkamp,Y. Lu, and R. J. D. Miller. "Note: A simple image processing based fiducial auto-alignment method for sample registration." *Rev. Sci. Instrum.* 2015, 86. 086105. doi.org/10.1063/1.4929408.

### Conference Proceedings

1. N. Hachohen, **C. J. X. Ip**, G. K. Laxminarayana, T. S. DeWolf, and R. Gordon. (2017) Nanohole optical tweezers in heterogeneous mixture analysis. *Proc. SPIE 10347, Optical Trapping and Optical Micromanipulation XIV 103470F*. doi.org/10.1117/12.2273358.

# Technical Projects

### Electrical Impedance Tomography Imaging

*Vancouver, Canada*

Project for Applied Mathematics in Approximation and Variable Methods. *Fall 2017*

- Solved Green's Functions to image a tumor given output signals at boundary nodes.
- Created the finite element analysis in MATLAB.
- See Project here: git.io/vxP3h

### Affordable Network Sensors for Alpine Environments

*Vancouver, Canada*

Team of Two: Software and Electrical Lead *Sep 2017 - Spring 2018*

- Designing and prototyping a low-powered and cost-effective humidity/temperature sensor for Alpine back-country environments.
- Incorporating Bluetooth 4.0 technology and incorporating a self-sufficient power system.
- Prototyped with a Cortex M0, Nordic Semiconductor nRF51822 microchip, and I2C communication protocol.

### Thermal Time-Of-Flight Flow Meter

*Vancouver, Canada*

Team of Three: Communication Lead *Sep 2016 – Apr 2017*

- Developed a electro-mechanical device to detect fluid velocity within a pipe using a thermal time-of-flight principle for use in a helium recovery system.
- Prototyped with thermistors as temperature sensors and nichrome wire as heaters and acquired signals through Arduino and processed in MATLAB.
- Implemented noise-reduction techniques for time sensitive and microvolt signals in both hardware and software.

### Senior Design Engineering Robot Competitions

*Western Canada*

Team of Four: Hardware and Software Lead *Fall 2015 - Fall 2017*

- Competed in robotics competition hosted by UBC and was invited to participate in the 2016 Western Engineering Robot Competition after winning first place at the UBC robot competition.
- Developed autonomous robots with VEX in an 8 hour span and presented to a panel of technical judges.
- See the competitions here: https://git.io/vx6Rb

### Autonomous Robot for Object Retrieval

*Vancouver, Canada*

Team of Four: Software Lead and Electrical Member *Sep 2014 - Aug 2014*

- Designed, prototyped, and developed a fully autonomous robot using an in-house modified Arduino microcontrollers and electrical and mechanical components such as servo and DC motors, IR sensors, sheet and bulk metal and 3D printed components.
- Gained experience in PID control, circuit building, C programming, 3D printing, laser cutting, and water-jet cutting.
- See the project here: https://goo.gl/7Vdaqm

### Formula Electric / E-Racing, University of British Columbia

*Vancouver, Canada*

Engineering Student Team Member *Sep 2014 - Aug 2016*

- Helped develop circuitry an casing for the TSAL and brake-light. Also helped with product selection for the fluid braking system and produced a 3D printed waterproof casing for sensor components.
- Gained experience in PCB layout, mechanical braking systems, component specification, waterproofing, and CAD.
- See the website here: http://www.ubcformulaelectric.com/

### Orbit, University of British Columbia

*Vancouver, Canada*

Engineering Student Team Structural Sub-Team Member *Sep 2013 - Apr 2014*

- Developed a vacuum flange for testing the satellite in sub-atmospheric conditions.
- Gained experience in vacuum systems, mechanical prototyping, and waterjet cutting.
- See the website here: https://www.ubcorbit.com/

# Honors & Awards

## Competitions

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| 2017 | **2nd Place**, UBC Senior Design Competition | *Vancouver, Canada* |
| 2015 | **1st Place**, UBC Seniors Design Competition | *Vancouver, Canada* |

### Awards

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|---|---|---|
| 2017 | Natural Sciences and Engineering Research Council of Canada Undergraduate Student Research Award | *Victoria, Canada* |
| 2016 | Engineers in Scrubs Undergraduate Student Research Award Fellowship | *Vancouver, Canada* |
| 2014 | Dean's Honour List | *Vancouver, Canada* |

## Professional Development

### Conferences

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| May 2016 | Innovation in Health and Research Technologies Symposium. *Student Attendee.* | *Vancouver, Canada* |

### Certification

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| 2017 | Laser Safety Training | *Victoria, Canada* |
| 2017 | Workplace Hazardous Materials Information System (WHIMIS) Training | *Victoria, Canada* |
| 2016 | Tri-Council Policy Statement:Ethical Conduct for Research Involving Humans Course on Research Ethics | *Vancouver, Canada* |

## Leadership Experience

**Engineering Physics Student Association** *Vancouver, Canada*

VP Graduate Representative *Sept 2017 - April 2018*

- Organizing the graduate class of Engineering Physics for graduation requirements.
- Acquired funding for and planned the final graduation trip as a professional development activity to network with graduate schools and tech companies in San Francisco.

**Engineering Physics Student Association** *Vancouver, Canada*

VP Events Executive *Sept 2015 - May 2017*

- Organized successful events for students, faculty, and alumni.
- Applied for and obtained licensing for events and over $15,000 in funding from university organizations and sponsorships from associated companies.

**St. Michael's Outdoor Leadership Program** *Victoria, Canada*

Outdoor Leadership *Sept 2011 - June 2013*

- Led and guided a 5 day sea kayaking trip around the Gulf Islands.
- Developed skills including wilderness first aid to plan, organize, and conduct outdoor trips.