

## ANDREW YICK

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### Research Interests

- **PHOTONICS.** Electro-Optic Polymers, Optical Modulators and Resonators, Microwave Photonics, Analog Optical Systems, Device Theory and Simulation, All-Dielectric Sensor and Receiver Systems, Thin-Film Crystals, Laser Rapid Prototyping, Laser-Material Interactions, Optical Communication Links
- Microfabrication, Electromagnetics, Antennas, Lab-On-A-Chip, Communication Systems, Signal Processing, Statistics, Control Systems, Time and Motion Study, Science Education, Renewable Energy

### Education History

- **UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA** **Fall 2003-present**  
**Ming Hsieh Department of Electrical Engineering (Electrophysics)**  
**PhD. in Electrical Engineering (expected May 2008)**  
 Thesis: "All-Dielectric Electro-Optic Polymer Modulators and Sensors." This work proposes and experimentally demonstrates the use of electro-optic polymers in fabricating completely metal-free modulators for integration into an all-dielectric microwave receiver. Metal-free electric field sensors for high-field ( $10^8$  V/m), high speed (GHz) and small area ( $<1\text{mm}^2$ ) detection are also proposed.  
 Advisor: Prof. W.H. Steier; (3.93GPA).  
 Committee: Prof. J. D. O'Brien, Prof. P.D. Dapkus, Prof. M. E. Thompson, Prof. A. Prata Jr.
- **UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA** **Spring 2005-present**  
**Stevens Institute for Innovation**  
**Graduate Certificate in Engineering Technology Commercialization (in progress)**  
 Coursework: Introduction to New Ventures, Law for Engineers, Strategic Management of Technology
- **UNIVERSITY OF TORONTO, TORONTO, CANADA** **Summer 2001- Summer 2003**  
**Edward S. Rogers Sr. Department of Electrical and Computer Engineering**  
**MaSc. Eng in Electrical and Computer Engineering (2003)**  
 Thesis: "UV Laser Microfabrication of Lab-on-a-Chip Devices." This work experimentally demonstrates the merit of 157-nm laser-based rapid prototyping of lab-on-a-chip devices in glass substrates. Cell arrays, serpentine channels, and active dielectrophoresis devices are designed, fabricated and utilized by collaborators in the biological sciences.  
 Advisor: Prof. P.R. Herman; (4.0GPA), *Thesis Grade: A+*  
 Committee: Prof. J. S. Aitchinson, Prof. E. H. Sargent
- **QUEEN'S UNIVERSITY, KINGSTON, CANADA** **Fall 1997-Spring 2001**  
**Department of Applied Mathematics and Engineering**  
**BaSc. Eng in Applied Mathematics and Engineering: Control and Communications (2001)**  
 Senior Project: "Real-time Computer Based Satellite Return Link Group Demodulator." This work demonstrates detection of orthogonal preamble codes in a high-noise environment for slotted ALOHA.  
 Advisor: Prof. P.J. McClane; (88%, *University Medal: highest average in Applied Math and Engineering*)

**Graduate Level Coursework:** Advanced Electromagnetic Theory; Antenna Analysis; Electromagnetics for Semiconductor Photonics; Engineering Quantum Mechanics; Integrated Optical Circuit Design; Nonlinear Optics; Optical Information Processing; Optical Materials, Instruments and Devices; Optics; Photonics; Probability Models; Solid State Physics. **Other Related Coursework:** Optical Fiber Communication Systems; Statistics; Control Theory; Information Theory; Queuing Theory; Vector Calculus; Complex Analysis; Real Analysis; Linear Algebra; Abstract Algebra; Transform Methods. **Diversity Coursework:** Voice; USC Concert Orchestra; Improvisational Jazz; Loudspeaker Design; Weight Training; Hands-On-Optics (OSA).

## Professional and Research Experience

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- **UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CA** **Fall 2003-present**  
**Graduate Research Assistant, Polymer Photonics Laboratory**  
 Projects: Theoretically analyzed and developed MATLAB numerical solvers for the linearity, bandwidth, and sensitivity of ring-resonator modulators in an analog RF optical system. Extended theory to completely optimize designs of polymer electro-optic ring resonators for integration into an all-dielectric microwave receiver, and for metal-free field sensors. Fabricated modulator devices using in-house cleanroom facilities and extensively tested and characterized performance. Proposed and realized novel fabrication strategy to increase electro-optic poling efficiency in polymers from 50% to >90%.  
 Advisor: Prof. W.H. Steier
- **UNIVERSITY OF TORONTO, TORONTO, CANADA** **Fall 2001-Spring 2003**  
**Graduate Research Assistant, Laser Microfabrication Laboratory**  
 Projects: Completely characterized 157-nm laser-glass interactions for rapid prototyping of various devices used in the biological sciences. Cell arrays were optimized, fabricated and tested by biology researchers at collaborating universities. Results presented at an international conference.  
 Advisor: Prof. P.R. Herman
- **QUEEN'S UNIVERSITY, KINGSTON, CANADA** **Summer 2000**  
**Undergraduate Research Assistant, Optical Communications Laboratory**  
 Projects: Independently evaluated the accuracy of models in optical simulation software for predicting component behavior in a fiber-optic communication system. Verified simulations with in-lab experimentation and characterized chirp properties of an all-optical SOA wavelength converter, focusing on transmission performance.  
 Advisor: Prof. J.C. Cartledge
- **JDS UNIPHASE, OTTAWA, CANADA** **Summer 1999**  
**Process Engineer, DWDM Division**  
 Projects: Provided detailed characterization of assembly and test processes through documentation and analysis of worker operations. Helped implement improvements that lead directly to the reduction of production bottlenecks. Also, improved manufacturing yield by developing apparatuses, setting guidelines and participating in regular planning meetings. Served as a liaison between production staff and senior engineers  
 Supervisor: Charles Pierce
- **NEWBRIDGE NETWORKS (ALCATEL), KANATA, CANADA** **(part-time) 1997-1998**  
**CAE Engineer, TDM Product Support**  
 Projects: Created, updated and modified schematic drawings and oversaw the migration of older schematics to the new Mentor 8 CAE platform. Designed and documented tests for TDM shelves, backplanes and cards.  
 Supervisor: Rick Tomasi
- **LUMONICS (GSI GROUP INC.), KANATA, CANADA** **(part time) 1996-1997**  
**Process Technician, Laser Applications Laboratory**  
 Projects: Independently designed experiments and optimized parameters leading to efficient processing of customer samples using excimer and CO<sub>2</sub> industrial laser systems. Provided feedback via scientific memos on process feasibility written directly to the customer.  
 Supervisor: Dr. Bo Gu

**Professional Affiliations:** IEEE, OSA. *Secretary*, OSA Student Chapter, University of Toronto (2003)

## Publications

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### Journals

1. R. Song, **A. Yick**, W.H. Steier. "Conductivity-dependency-free in-plane poling for Mach-Zehnder modulator with highly conductive electro-optic polymer" Applied Physics Letters, 90, 19, 7 May 2007, p. 191103-1-3

### Theses

2. **A. Yick**. "Laser Microfabrication: A Tool Towards Creating a Biological Laboratory on a Glass Chip" MaSc. Thesis. Defended: Aug 14, 2003. University of Toronto

### Conference Proceedings

3. P.R. Herman, **A. Yick**, J. Li, C. Valdivia, N. Munce, L. Lilge. "Advanced laser processing for integrated biophotonics on a chip" Conference on Lasers and Electro-Optics (CLEO) 2004
4. A.H. Nejadmalayeri, **A. Yick**, J. Li, P.R. Herman. "Kinoform optics: direct fabrication by F<sub>2</sub> laser ablation" Conference on Lasers and Electro-Optics (CLEO) 2003
5. J. Li, A. Nejadmalayeri, M.L. Ng, **A. Yick**, J. Ihlemann, P.R. Herman. "Nano-milling of diffractive optics by F<sub>2</sub>-laser ablation" Conference on Lasers and Electro-Optics Europe (CLEO/Europe 2003)
6. P.R. Herman, **A. Yick**, J. Li, N. Munce, L. Lilge, E. Jervis, S. Krylov. "F<sub>2</sub>-laser micromachining of microfluidic channels and vias for biophotonic chip applications" Conference on Lasers and Electro-Optics (CLEO) 2003
7. J. Li, A. Nejadmalayeri, **A. Yick**, P.R. Herman. "The F<sub>2</sub>-laser micro-scalpel for photonic applications" The 5<sup>th</sup> Pacific Rim Conference on Lasers and Electro-Optics (CLEO/Pacific Rim) 2003
8. **A. Yick**, J. Li, P.R. Herman. "F<sub>2</sub>-laser micropatterning of chrome-coated CaF<sub>2</sub> for vacuum-ultraviolet masks" Proceedings of the SPIE - The International Society for Optical Engineering, 4977, 2003, pp. 400-10
9. **A. Yick**, J. Li, P. R. Herman. "Micropatterning of chrome-coated CaF<sub>2</sub> masks by direct F<sub>2</sub>-laser ablation" Gordon Research Conference, Laser Interaction With Materials, July 21-26, 2002, Proctor Academy, Andover, NH
10. J. Li, P. R. Herman, X. M. Wei, **A. Yick**, C. Valdivia, K. P. Chen. "Vacuum-Ultraviolet Laser Fabrication of Photonic and Micro-Optic Structures" Gordon Research Conference, Laser Interaction With Materials, July 21-26, 2002, Proctor Academy, Andover, NH
11. S.-C. Cao, J.C. Cartledge, I. Monfils, **A. Yick**. "A Detailed experimental characterization of the chirp properties of an SOA-MZI wavelength converter" OFC 2001. Optical Fiber Communication Conference and Exhibit. Technical Digest Postconference Edition 2001, pt. 3, p. WDD68-1-3

### In Preparation

- **A. Yick**, W.H. Steier, J. Luo, A. Jen. "Low-voltage flexible polymer phase modulator fabricated via novel lift-off poling technique"
- B. Jalali, A. Ayazi, R. Hsu, **A. Yick**, W.H. Steier, G. Betts. "A Non-Electronic Wireless Receiver with Immunity to Damage by Electromagnetic Pulses"

## Other Technical Talks

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1. **A. Yick**. "Thin-film LiNbO<sub>3</sub> Waveguide Technology for Phase-Preserving Wavelength Conversion" USC Electrical Engineering Departmental Seminar, Los Angeles, CA. Jul 21, 2006
2. **A. Yick**. "Design, Analysis and Construction of a Three-Driver Loudspeaker for Home Theater" JBL Headquarters, Northridge, CA. Dec 2005

## Awards and Fellowships

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### Graduate

- USC Dissertation Completion Fellowship
- USC Electrical Engineering Department Fellowship
- Natural Sciences and Engineering Research Council of Canada Post Graduate Scholarship

### Undergraduate (list)

Queen's University Medal in Mathematics and Engineering (2001), Nelly & Ralph Jeffery Award in Mathematics (2000), James H. Rattray Memorial Scholarship in Applied Science (2000), Susan Near Scholarship (2000), Les Gulko Award (1999), Dean's Award (1999, 1998)

## Technical Skills

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### • SOFTWARE

#### High Proficiency (+ sample projects)

- **MATLAB** – time-domain optical resonator linearity and bandwidth simulations, beam propagation method (BPM), finite element static E-field solver, antenna radiation patterns using mutual induction method, microwave stripline design
- **Alcatel OlympIOs** (BPM, Selene) – ring resonator design (bend loss and coupler optimization), thermo-electric and electro-optic analysis for stripline and coplanar Mach Zehnder modulators, waveguide/mode analysis of optical loss due to metal electrodes
- **Maple** – RF optical link receiver sensitivity simulations, analysis of phase matching in non-linear optical interactions
- **Labview** – multiple-GPIB instrument control and monitoring of current and temperature in high voltage poling
- **AutoCAD** – multi-layer photomask designs of optical circuits, 3D solid object device illustrations
- **C** – real-time software signal processing using the Intel math libraries
- **Mentor Graphics Design Architect** – schematic capture of PCB layouts for TDM shelves
- **Microcal Origin** – graphical differentiation for ATR measurements, loss data curve fitting

**Other Specialty software:** LaTeX/Scientific Word, Endnote

**Past proficiency in:** OPTSIM, VPI Photonics Design Suite, Pascal, AHDL, Intel and Motorola 6811/12 Assembly Languages, HP-BASIC for GPIB

- **MICROFABRICATION** Karl Suss Contact Aligners (Photolithography, MJB-3, MA6), Spin Coating, Reactive Ion Etching, Wet Etching, Electron Beam Metal Deposition, Electroplating, Chemical Vapour Deposition, Rapid Thermal Annealing, Dicing, Wet Bench, Ion Implantation (handling only), Fusion Splicing, Contact Bonding, High Voltage Poling, Excimer and CO<sub>2</sub> Laser Microfabrication, XYZ computerized stage control
- **MATERIAL METROLOGY** Atomic Force Microscopy, Scanning Electron Microscopy (FESEM), Surface Profilometry, Optical Microscopy, Ellipsometry, General Reflectometry
- **TESTING** IR Laser Sources, Tunable Lasers, Optical Stages and Alignment, Detectors, Polarizers, Attenuators, Optical Amplifiers, Optical Spectrum Analyzer, RF Spectrum Analyzer, RF Vector Parameter Analyzer, High-Speed Oscilloscope, Bit-Error-Rate Testbed, Picoammeter, Device Packaging, GPIB Interface Control, SWR Measurement

## Teaching Experience

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- **WEEMES ELEMENTARY SCHOOL, LOS ANGELES, CA** **Fall 2004**  
**Mission Science Volunteer**  
 Aided a local Grade 2 teacher in an after-school science program under the Joint Educational Project of USC. Maintained classroom order over 25 students while actively engaging them in projects ranging from making ice-cream to assembling air-propelled rockets. Press clip: [\[Hyperlink\]](#)
- **UNIVERSITY OF TORONTO, TORONTO, CANADA** **Fall 2001-Spring 2003**  
**Teaching Assistant**  
**Courses: Electrical Systems Analysis and Design, Optical Communication Systems, Fields and Waves**  
 Independently planned and delivered one two-hour tutorial lecture a week in Electrical Systems, and two one-hour tutorial lectures a week in Optical Communications. Freely composed, invigilated and graded class quizzes and provided feedback to the course professor. Demonstrated proper use of RF lab equipment in Fields and Waves
- **UNIVERSITY OF TORONTO, TORONTO, CANADA** **Fall 2001-Spring 2002**  
**Private Tutor**  
**Course: Electrical Systems Analysis and Design**  
 Uniquely responsible for the continued development and learning of one underclassman.
- **QUEEN'S UNIVERSITY, KINGSTON, CANADA** **Fall 2000-Spring 2001**  
**Project Manager/Teaching Assistant**  
**Course: Engineering Design Projects**  
 Provided daily technical support and guidance to 6 teams of freshman engineering students (3 members/team) working on two separate engineering design projects. Called weekly meetings to plan project strategies and to set milestones. Assessed student performance and provided feedback to assist career and academic development. Topic areas in free-space infrared communications and bioremediation of phenol-contaminated water.
- **QUEEN'S UNIVERSITY, KINGSTON, CANADA** **Fall 1999-Fall 2000**  
**ENGLINK Tutor (Private Tutor)**  
**Courses: Linear Algebra, Calculus, Linear Circuit Theory**  
 Responsible for three underclassmen.

## Other Current Activities

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- **RAYMOND WONG KUNG FU STUDIO, SAN GABRIEL, CA** **2004-present**  
**USC KUNG FU CLUB, LOS ANGELES, CA**  
**My Jhong Law Horn Kung Fu (6-8hrs/week)**  
 Weekly training in traditional Chinese martial arts, self defence, stick fighting and sparring. Completed 15 single and two-man open-hand and weapon forms including saber, short stick, long staff and spear. Aid junior members in basic training and forms.  
 Mentor: Sifu Raymond Wong
- **USC CONCERT ORCHESTRA, LOS ANGELES, CA** **Fall 2003-Fall 2007**  
**First and Second Violinist (3hrs/week)**  
 Partial list of repertoire performed in concert at USC Bovard Auditorium: *Gershwin* Rhapsody in Blue, *Grofé* Grand Canyon Suite, *Tchaikovsky* Symphony #5, *Saint-Saëns* Danse Macabre, *Wagner* Das Rheingold Entrance of the Gods into Valhalla, *Borodin* Symphony #2, *Tchaikovsky* Symphony #4, *Holst* The Planets.,  
 Conductors: Sharon Lavery, Michael Powers
- **USC CHINESE AMERICAN STUDENT ASSOCIATION, LOS ANGELES, CA** **Fall 2004-present**  
**Culture Show Director (2006)**  
 Directed a group of 70 performers and backstage personnel to produce a 2.5 hour Chinese Culture at USC's Bovard Auditorium. Wrote an original play exploring the relationships between Chinese-American youths and their parents.  
**Culture Show Performer (2005, 2006, 2007)**  
 Performed in the annual CASA culture show as both an actor and martial artist. Press clip: [\[Hyperlink\]](#)  
**Community Service Director (2005-2006)**  
 Served on the executive board of CASA (with over 150 members). Helped organize and lead multiple events including AIDS Walk L.A., Big Bear Ski Trip, Chinese New Year Festival and Bay Area Weekender. Engaged in recruitment drives, fundraising and general networking.

## Volunteerism

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- **LAWRENCE LIVERMORE NATIONAL LAB, LIVERMORE, CA** **Fall 2006**  
**Hands-On-Optics, Optics Resource Volunteer (Optical Society of America Outreach)**  
 Trained as an optics resource volunteer for local elementary school science programs.
- **AIDS WALK, LOS ANGELES, CA** **2005, 2006**  
**CHINESE FOOD FESTIVAL, CHINATOWN, LOS ANGELES, CA** **2005**
- **WEEMES ELEMENTARY SCHOOL, LOS ANGELES, CA** **Fall 2004**  
**Mission Science Teacher - Joint Educational Project, USC (3hrs/week)**  
 Aided a local Grade 2 teacher in an after-school science program.
- **HUNTINGTON MEMORIAL HOSPITAL, PASADENA, CA** **Fall 2004**  
**ER Front Desk Clerk (4hrs/week)**  
**Porter**  
 Greeted, signed in, and tagged ER patients and prepared them for examination.
- **MOUNT SINAI HOSPITAL, TORONTO, CANADA** **Fall 2002-Spring 2003**  
**Medical Imaging Clerk (4hrs/week)**  
 Greeted and prepared patients for CT imaging and administered oral contrasts. Performed English-Cantonese translation for doctors taking medical histories of non-English speaking patients.

## Other Associations/Activities (partial list)

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- Nike Run-Hit Wonder 10K Road Race (2005) Press clip: [\[Hyperlink\]](#)
- Hart House Symphony Orchestra, University of Toronto (2001-2003)
- University of Toronto Intramural Soccer (2002)
- Killer Players Basketball Team, Queen's University (2000-2001)
- Queen's University Badminton Club (1999-2001)
- Queen's University Symphony Orchestra (1999-2001)
- Queen's University Intramural Soccer (1997-2000)
- Kanata Symphony Orchestra (1994-1997)

## Over 20 Concerts Performed, Including Following Pieces:

- *Bach* Air on G string (solo at a wedding)
- Symphonies: *Bizet* #1, *Beethoven* #5, *Borodin* #2, *Brahms* #1, #2 and #4, *Dvorak* #8 and #9, *Haydn* #100 and #101, *Mendelssohn* #4, *Mozart* #40 and #41, *Nielson* #4, *Shostakovich* #5 and #10, *Tchaikovsky* #2, #4 and #5 (in concert as a first or second violinist)
- *Stravinsky* Firebird Suite, *Glick* Suite Herbraique, *Pergolesi* Stabat Mater, *Mozart* Magic Flute Overture, *Prokofiev* Peter and the Wolf, *Handel* Messiah, *Glinka* Ruslan and Ludmila Overture, *Rimsky-Korsakov* Capriccio Espagnol (in concert as a first or second violinist).

Also, self-taught guitarist and pianist.

## Languages

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- Fluent in English
- Conversationally fluent in Cantonese (Chinese)
- Moderately proficient in French

## References Available on Request