President: Jason R. Grenier  j.grenier@utoronto.ca
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Treasurer: Kyle Cheng  kyle.cheng@utoronto.ca
Faculty Advisor: Dr. Peter R. Herman  p.herman@utoronto.ca
1. Financial information

<table>
<thead>
<tr>
<th>Date</th>
<th>Item</th>
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<th>Expense</th>
<th>Balance</th>
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<td>CIBC Bank Account Opened ($175.50 deposited)</td>
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<td>30-Dec-11</td>
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<td><strong>TOTALS</strong></td>
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2. 2011 Chapter Activities

Public Lecture by Dr. Amir Nejadmalayeri (November 25th, 2010)

On November 25 the SPIE Toronto student chapter in collaboration with the OSA student chapter and the local IEEE Photonics hosted Dr. Amir Nejadmalayeri for a public lecture entitled: “Attosecond Photonics: Low Jitter RF Synthesis, High Speed Analog/Digital Conversion, and Precision Timing Distribution”. Amir is an alumnus of the the University of Toronto having completed his doctoral in 2007 with Prof. Peter Herman in the Photonics Group. Amir is currently a Postdoctoral fellow at the Research Laboratory of Electronics at the Massachusetts Institute of Technology. Twenty-eight people attended the talk.

Outreach at Jarvis CI High School (December 14, 2010)

On Dec. 14th, 2010 SPIE student chapter member Kenneth Lee organized an outreach activity with the science club at a local highschool. Kenneth along with Jason, SPIE chapter President, gave a seminar on the history of the laser, how a laser works and some of the everyday uses of lasers. The seminar was followed by a hands on demonstration called “Gelatin Optics” where the principles of total internal reflectiton and coupling of light were demonstrated.

(Left) Kenneth (front row left) and Jason (back row right) and members of the science club at Jarvis CI. (Right) Gelatin slab guiding light from a laser pointer
Optics Olympics Event at the Advanced Photonics Congress Conference (June 12-16, 2011)

The University of Toronto SPIE student chapter co-hosted an Optics Olympics event at the Advanced Photonics Congress Conference held in Toronto on June 12-16, 2011. The event was open to students and early career professions working in teams to complete the following Optics Olympics games:

1. Photo Competition
2. Optics Scavenger Hunt Competition
3. Laser Khet Competition
4. Laser Graffiti Competition
5. Hit the target Competition

The event was attended by approximately 20 participants and was followed by a dinner at the conference centre.

2011 SPIE Optics and Photonics (20-25 August 2011)

In August 2011, Kyle represented the University of Toronto Student Chapter as Treasurer to attend the Optics + Photonics and Student Leadership Workshop. The two-day Workshop enriched Kyle with once in a lifetime team work and problem solving experience. The discussion and interaction with other attendees has helped Kyle gain more insight into interpersonal skills. Kyle has networked with many people and known more about different researches and cultures of different universities around the world. Kyle has hanged out with other attendees for a nice dinner in San Diego. Kyle also attended the Joseph Goodman Tribute session, grasping this rare chances to learn about the research and experience of the stars in photonics over many years. In addition Kyle has visited San Diego Zoo, the coastline of San Diego, and met with two different friends who worked and was undergoing doctoral study respectively. The trip was a very enriching experience for Kyle.

Kyle (fourth from the right) attend the 2011 SPIE Student Leadership Workshop in San Diego
3. Details of planned activities for the future

In 2012 the Toronto SPIE Student chapter looks forward to attending SPIE Photonics West is strong numbers, as well as sending a chapter officer to the Student leadership workshop for a third year in a row. We are also planning on a Laser Khet tournament, a Laser Tag outing and several public lectures.
Attosecond Photonics: Low Jitter RF Synthesis, High Speed Analog/Digital Conversion, and Precision Timing Distribution

Dr. Amir H. Nejadmalayeri
Research Laboratory of Electronics (RLE), Massachusetts Institute of Technology (MIT)

Abstract

Attosecond Photonics is the art of exploiting precision timing information encoded in optical pulse trains emanating from mode locked lasers. In contrast to Attosecond Science, where generating optical pulses as short as a few attoseconds is the objective, the goal of Attosecond Photonics is not to shorten the optical pulses to attosecond level, rather to generate, synchronize, and distribute them with attosecond precision. In mathematical parlance, this basically means controlling the centre of gravity of optical pulse trains with uncertainties of better than a few attoseconds. Such precise timing information encoded in optical pulses of mode locked lasers can be exploited for variety of applications, most notably low jitter RF signal synthesis, synchronization of microwave and optical signals, long range timing distribution, and photonic sampling.

I will present the latest results from Research Laboratory of Electronics at MIT, on (1) an apparatus for low jitter RF signal synthesis and precision synchronization of RF signals to optical pulse trains, (2) an Analog-Digital-Converter that operates at 40 GHz and provides 7 effective number of bits (ENOB) at 2 GS/s, (3) a 300 m long timing distribution system for free electron lasers (FEL) that shows less than 5 fs of drift over 7 days, and (4) an 80 MHz dispersion managed mode locked Erbium doped fibre laser that has less than 3 fs integrated jitter up to its Nyquist frequency.

Biography

Amir H. Nejadmalayeri received his B.Sc. from the University of Tehran, Tehran, Iran, and his M.A.Sc. from the University of Waterloo, Waterloo, Canada, both in electrical engineering. During his master's studies, he designed integrated circuits in 180 nm CMOS process. He then joined the University of Toronto for his doctoral studies, where he worked on applications of ultrafast lasers, as well as guided wave optics in crystalline media. He received his Ph.D. in 2007 in electrical engineering, when he joined Research Laboratory of Electronics (RLE) at Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts.

Over the past three years, he has been working on applications of ultrafast lasers for precision timing, in specific, generation, distribution, and synchronization of timing signals that are accurate at attosecond to femtosecond level. Dr. Nejadmalayeri is a member of OSA and has served as a reviewer for Optics Letters, Optics Express, and Applied Physics Letters. His main research interests include ultra-high speed A/D converters, low phase noise RF synthesis, precision synchronization of RF and Optical signals, mode locked lasers, and silicon photonics.