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Chapter Goals and Standing

As a student group established in May 2011 under the Biomedical Engineering Department at Washington University in St. Louis, we have made significant progress as a group. We have been successful in bringing awareness to the WU community by inviting experts across United States in the fields of Optics and Photonics to provide their opinions and talk about their research. Furthermore, we have been able to establish relationships with the St. Louis community through in-reach and out-reach programs where we prepare experiments for middle school students to illustrate the underlying principles of Optics and Photonics. Our current primary mission is to maintain the much-appreciated in-reach and outreach programs and look into getting more involved with the St. Louis community. Also, we are looking to expand our awareness to both graduate and undergraduate students in all engineering disciplines in an effort to familiarize the students with the field.

2012-2013 Chapter Officers

President: Metasebya Solomon <msolomon@wustl.edu>
Vice-President: Junjie Yao <junjie.yao@wustl.edu>
Treasurer: Arie Krumholz <akrumhol@wustl.edu>
Secretary: Mahlega Hassanpour <hassanpourm@mir.wustl.edu>
Advisor: Samuel Achilefu <achilefus@mir.wustl.edu>
Outreach Coordinator: Patrick Wright <pwwright@wustl.edu>
Membership Coordinator: Tauseef Charanya <tcharanya@wustl.edu>

2013-2014 Chapter Officers

President: Tauseef Charanya <tcharanya@wustl.edu>
Vice-President: Patrick Wright <pwwright@wustl.edu>
Treasurer: Timothy York <timothy.york@go.wustl.edu>
Secretary: Karla Bergonzzi <bergonzzik@wustl.edu>
Advisor: Samuel Achilefu <achilefus@mir.wustl.edu>
Outreach Coordinator: Dolonchampa Maji <dolonchampa.maji@wustl.edu>
Membership Coordinator: Rebecca Gilson <rebecca.gilson@wustl.edu>
Webmaster: Thomas Matthews <thomas.matthews@wustl.edu>
Current Members

Karla Bergonzi
Qian Cao
Tauseef Charanya
Shengkui Gao
Rebecca Gilson
Mahlega Hassanpour
Meenal Kulkarni
Yang Liu
Dolonchampa Maji
Thomas Matthews
Suman Mondal
Saide Nergiz
Vivek Shah
Patrick Wright
Xiaoxiao Xu
Timothy York
Yong Zhou

Alumni

Xiao Xu
Junjie Yao

Metasebya Solomon
List of Events for 2012

Group Structure

Currently, our chapter meets once a month to discuss the current standing, upcoming events for the chapter, and other specifics such as recruitment strategies for other students. These meetings are restricted to an hour and half and include refreshments for the members present during the course of the meeting. During the course of the year, as more involved events are imminent such as in-reach and outreach programs, the frequency of these meetings is doubled 2-3 months in advance. Tasks are divided amongst members such as coordinating event logistics (in-reach/outreach coordinator) with the schools and community centers, designing experiments (all members), ensuring availability of resources (secretary, treasurer) for the event etc. Similarly, for seminars held for invited speakers, the president/vice-president is responsible for coordinating their talk with the research speaker.

Given the rapidly growing interest in the field of Optics in Washington University over the past couple years, there have been several new labs that have started and are unaware of our chapter. Over the course of summer, we are looking to expand our membership pool by bringing together these labs over a fun filled event. Also, as of now, there is minimal involvement of undergraduates in our chapter. We are looking to contact all engineering departments across campus during the beginning of Fall semester to foster involvement of undergraduates in our chapter activities.

Journal Club

Over the course of last year, with the help of Dr. Samuel Achilefu (our chapter advisor) and Dr. Lihong Wang, we have sponsored five journal clubs, covering a wide range of topics about biomedical optics (see table 1 below). These journal clubs were generally lead by one main presenter with all the audience highly involved in the discussions. The topics were either about the cutting edge technology in biomedical optics or the commercial marketing of these technologies, which always attracted a lot of interests among students, faculties and other researchers from departments such as Biomedical engineering, Computer science and Electrical and system engineering. These journal clubs were extremely engaging and were always followed by healthy discussions about the topic. Food and drinks were provided for the journal talks using the funds from SPIE student chapter.
<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Club leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 31st, 2012</td>
<td>Issues with Surgical Resection Margins and Potential Applications of Novel Intraoperative Imaging Technology</td>
<td>Dr. Ryan Felds (M.D.)</td>
</tr>
<tr>
<td>April 24th, 2012</td>
<td>OCT noise model</td>
<td>Amy Winkler (Postdoctoral fellow, BME)</td>
</tr>
<tr>
<td>March 7th, 2012</td>
<td>Image processing</td>
<td>Lin Yang (Professor, U Kentucky)</td>
</tr>
<tr>
<td>May 30th, 2012</td>
<td>Single photon counting</td>
<td>Ivan Rech and Angelo Gulinatti (Politecnico di Milano, Italy)</td>
</tr>
<tr>
<td>January 10th, 2013</td>
<td>Emerging Imaging modality research in Anastassio Lab</td>
<td>Mark Anastasio (Professor of Biomedical Engineering, Washington University in St. Louis)</td>
</tr>
</tbody>
</table>

**Table 1:** List of journal talks sponsored by SPIE Chapter with the help of Dr. Samuel Achilefu and Dr. Lihong Wang

**Figure 1:** Pictures taken from one of our Journal clubs
In-reach Event

In November the WU PEN Skills Development Core, in conjunction with SPIE and the Washington University Institute for School Partnership organized a nanotechnology in-reach event for middle school students. The focus was to raise awareness about the field in the general community and inform them of the latest innovations in nanotechnology. Built upon our previous outreach efforts through the St. Louis Science Center, and St. Louis area Elementary schools, this year we extended our scope to include Middle School students. The previous curriculum was reinforced to include a more didactic approach to presenting the experiments and challenged the students to write up their own experimental plans and reports. Forty students, recruited from both Hixson Middle School and Brittany Woods Middle School, came to the Washington University campus to be introduced to and carry nanoscience experiments at the university chemistry laboratories. To give you an example, find below the nature of these experiments:

**Chemistry Experiments**

Students were organized into groups of three and given a lab report to fill out as a group. The students were required to fill out the hypothesis and procedure portions of their write-ups before the start of each experiment. They recorded their observations while doing the experiments and developed their own conclusion.

**Testing Stain-Resistant Nano-fabrics Experiment:** The goal was to show how nanotechnology is present in their everyday life. The goal of this experiment was to show how nanotechnology can have a significant effects on basic properties of materials, such as the ability to resist stains. A few drops of water, ketchup, grape juice, coffee, mustard and turmeric were deposited on 12 pieces of fabric (regular and Nano-Tex). The students were required to determine the fabric coated with nanoparticles and its effect in making stain resistant materials.

**Ultraviolet (UV) Radiation Detection Experiment:** The goal was to qualitatively grade the amount of UV light transmission. Students used UV beads that contain particles that change color when exposed to UV lamp. The students assessed the color change of the beads through a transparent surface coated with sunscreen with different protection factors (High and Low SPF numbers). The students ranked unknown creams with regards to UV blocking efficiency.

**Dynamic Light Scattering (DLS) Experiment:** In this activity, the students were required to observe the effect of particle size and solubility of five solutions (water,
salt, milk, polystyrene (PS)-polyacrylic acid (PAA) di-block polymer and micelle (nanoparticle)) based on the reflected and scattered light from a laser. For many of the students, this was their first visit to campus. The students were remarkably enthusiastic about the science activities. The most common complaint was that it didn’t last long enough! In the survey sheets that the students filled out at the end of the activity, one student even replied next time, “I would want to stay overnight, I loved it.”

There were fifteen members of SPIE Student Chapter that actively volunteered in this event. Please find below pictures taken at this successful event:

**Figure 2:** A nanoscience in-reach day, brought students from both Hixson and Brittany Woods Middle Schools into the campus of Washington University in St. Louis. For many students, this was their first visit to Washington University.
Figure 3: Drs Culver, Shokeen and Lapi gave introductory lectures on nanoscience and the length scales. Here the students are playing a paper folding game that illustrates the exponential effects of the powers of 2.

Figure 4: Student’s working on a dynamic light scattering experiment. Polymer compounds were combined to create micelle structures. The changes in size and the formation of the micelles were monitored using dynamic light scattering.

Figure 5: Rather than give the students a recipe, the general idea of the experiments were discussed with the students. The groups of 3-4 for students then wrote their own experimental plans and drew their own conclusions. In this experiment, they worked to distinguish which of the creams was most effective at blocking the UV irradiation from a Lamp.
Outreach Event

Washington University's SPIE Chapter also established a working relation with the St. Louis Science center.

Figure 6: St. Louis Science Center

Similar to the in-reach event, we designed experiments for this event. There were 10 SPIE volunteers for this event helping setup stations at various booths. A group of 52 students were divided into pairs of 4 and got opportunities to work through all different experiments. They were given a brief introduction prior to the experiment and were given the opportunity to come up with their own design. SPIE members assisted them in formulating the hypothesis and conducting the experiment. They were given sheets of paper with questions regarding the experimental design and conclusions once the experiment was complete.
Figure 7: “From the lab to the laundry” Riccardo Ferdani (left), staff scientist in radiology, assists fourth-graders Kamryn Senizaiz (L-center), Hannah Fuller (R-center) and Jonah Mendelson in applying ketchup and coffee to stain-resistant fabric treated with nanoparticles. Students from University City School District were present to learn more about nanotechnology.
**Future Chapter Goals**

1. **Journal club (WU-Light club)**
   The chapter will continue inviting faculty, senior graduate students, or post-docs who just recently published in high impact journals to lead the group discussions. While we have successfully been able to do this in the past, we would like to increase the number of such events over the course of the year (monthly). This would also allow chapter members to schedule practice talks for conferences, proposal meetings, qualifying exams, interviews, etc.

2. **Hot topics**
   Invite faculties to give an overview of the state-of-art research in optics field. This will be termed 'Lightman in WU'.

3. **Lab tour**
   Organize middle and high school students to come over to our labs to have a short tour, and give them a brief idea kind of experimental setup we deal with. If possible, we can also give them a short seminar to introduce the lab work and then guide them through the lab. This can be a every other month event based on demand.

4. **Poster competition**
   Organize our own poster competition or incorporate into other bigger poster competitions, like BME Day. SPIE faculty members would be invited to these to serve as judges and give out awards.

5. **Research workshops**
   Invite technical writing professors (who specialize in Engineering communications) in writing center to give us a 1-2 h seminar about writing a research paper. Representatives from career center would also be invited to give talks on how to apply for faculty and industry jobs in the optical field. These workshops would also include talks given by the OISS staff on how to maintain your immigration status.

6. **Logo design**
   Organize a competition on designing a logo for SPIE student chapter in WU. We can make this as a social event.
7. **Inreach/Outreach Programs**
   Maintain the already in-place in-reach/outreach programs that we have received impressive feedback from. In doing so, we would like to run/spONSor our own community outreach event(s) that are unique to us. We are also looking to start general service events by giving physics lectures (in optics and photonics) in nearby high schools that do not hold such topics in their curriculum. Any funds accumulated from these events will be donated towards a charity organization chosen by the chapter members.

8. **Member of the Year Award**
   Recognize the member of the year based on their contribution to the chapter.

9. **Membership**
   As mentioned previously, we are looking to expand our membership pool to engineering undergraduate, graduate and post-doctorate students working in the newly formed optics related labs on campus.

10. **Website**
    We hope to have our website up and running this upcoming year.

**Financial Status**

In 2011, our chapter started off with $500 worth of funds. This money was not sufficient to sponsor as many journal talks as planned. However, we received majority of the financial support from Drs. Samuel Achilefu and Lihong Wang for the same. Furthermore, the Program of Excellence in Nanotechnology (PEN) provided financial support for the in-reach and outreach events. As mentioned in the “Future Chapter Goals”, we would like to sponsor the in-reach/outreach events independently in the upcoming year. As of now, we have $250 left of the $500 we initially started off with. We plan on using this money towards food (while recruiting undergraduate and graduate students) and sponsoring journal talks. Funds accrued from SPIE over this year will be spent towards further in-reach and outreach events.

**Conclusions**

The membership pool of our SPIE chapter in its second year was vastly increased from the first. The experience gained from organizing journal talks, formulating experiments was valuable to all people involved. The Chapter continues to look forward to the future, and exploring new ways to enrich the college experience of undergraduate, and graduate students.