SPIE Student Chapter
Duke University

Annual Report
2013-2014

Introduction

The Duke University OSA/SPIE student chapter was established in January of 2008. This past year, we have focused on establishing strong academic, outreach, and professional development programs for our members with events such as the Duke Science Summer Sleuths, FIP Optics/Photonics Symposium, Optics Summer Internship for High School Students, as well as various outreach events to students in K-12. We also put emphasis on growing our member pool by hosting recruitment events and social activities. Our main goals for our chapter's future is to develop our professional development programs to expose our graduate student members to career opportunities in industry by fostering networking and internship opportunities in key specific optics/photonics corporations. In this report we will describe our chapter's activities over the past year and also describe in detail our plans for the future, many of which we have gotten started on.

Student Membership

Officers

President	Shwetadwip Chowdhury
Vice-president	Oscar Carrasco-Zevallos
Treasurer	Theo DuBose
Secretary	Will Eldridge
Outreach Coordinator	Derek Nankivil

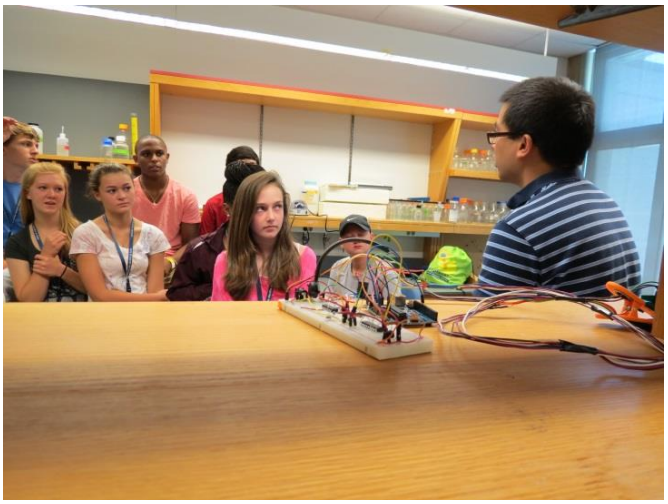
Detailed Membership List

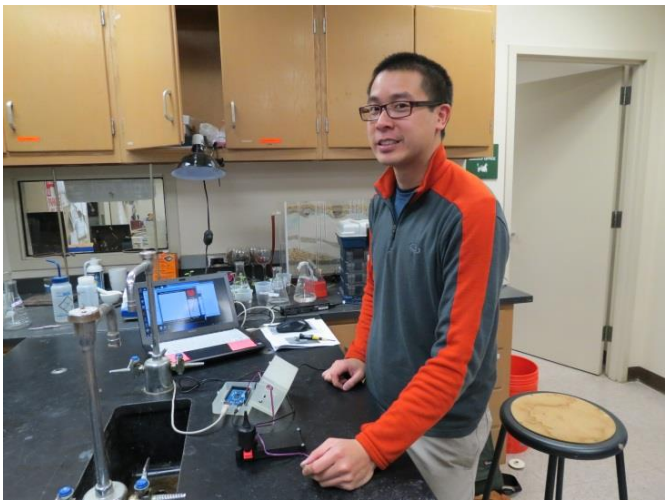
Theo DuBose	You Li	Tyler Drake
Derek Nankivil	Stephanie Kennedy	Amy Frees
Chris Lam	Matt Rinehart	Henry Fu
Torre Bydlon	Francisco Robles	Yu-Ju Tsai
Francesco LaRocca	Al-Hafeez Dhalla	Vinh Nguyen
Siddarth Arumugam	Justin Lo	Will Eldrige
Oscar Carrasco-Zevallos	Sehoon Lim	
Shwetadwip Chowdhury	Kevin Seekell	
Jenna Mueller	Alexander Mrozack	

Chapter Activities

Optics Outreach

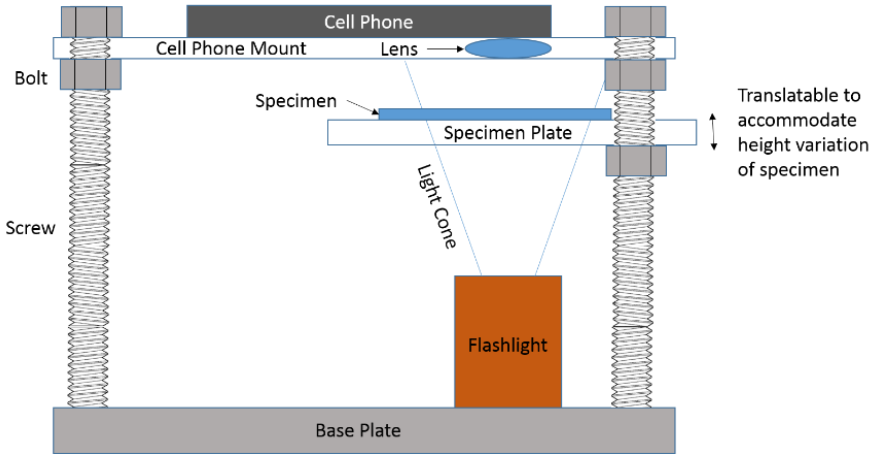
This past year, our chapter visited local high schools (NC School of Science and Math and Durham Academy). We gave optics presentations that showcased the role many advanced optical principles played in seemingly basic, everyday products. We also gave basic demos that illustrated these principles in physically basic and feasible real-day examples.





Microscopy/Pulse Ox Science Camp

This past year, our chapter aimed to heighten awareness of the ubiquity and need for optics in our everyday life. As part of our efforts, we wanted to let high-schoolers build optical devices that showcased some important needs that optics is used to address in our society. Two relatively simple technologies that have found a solid niche in our society today are (simple) microscopes and pulse-oximeters. We set up separate sessions where gifted students from North Carolina School of Science and Math (NCSSM) and Durham Academy (DA), high schools in the locality that offered a curriculum that emphasized science and math, came for a day to build microscopes and pulse oximeters under the guidance of optics grad students.



The microscope was of a simple design with parts totaling < $20, and demonstrated the core optical principles behind optical imaging. This design was particularly elegant considering it was

built more as an add-on to cell-phones, which is ubiquitous among students today, and allowed imaging of micro-structures with minimal additional cost/components. We show a brief schematic of this microscope to the right.

The pulse oximeter project was a simple demonstration of optical biosensing/spectroscopy. Students used two LEDs of different wavelength, synchronized and controlled by an Arduino control board, and user-controlled by Arduino GUI PC-software, to estimate hemoglobin concentration and saturation from fingertip sensing. Aspects of spectroscopy, such as Beer's Law and its relationship to concentration/saturation sensing were emphasized.

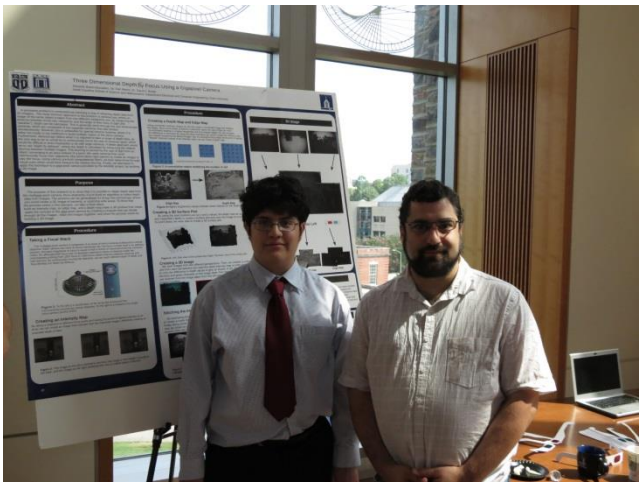
FIP Symposium

Every year, the Fitzpatrick Institute for Photonics (FIP) hosts an annual symposium where graduate students at Duke have the opportunity to survey the diverse field of optics without the expenses of traveling. However, past symposia have focused primarily on academic research and lacked emphasis on the commercialization of technology. This past year, for the first time, we invited representatives from different optical industries (Edmund Optics, Coherent, ThorLabs, BD, OptoSigma, etc) to attend the symposium and set up booths where they could talk to interested faculty/students about their products. We set up several additional components that highlighted the translation of technology from bench-top research to commercialization, as well as organized the reception event, which showcased the companies to the Duke photonics community. We also set up lab tours where they could go and see how their products are being used in the various labs around Duke, as well as a VIP dinner where they could interact directly with graduate students.

High School Summer Internship Program

Our chapter created a summer research program in which we paired high school students with graduate student mentors to involve students in cutting edge research. We partnered with the North Carolina School of Science and Math (NCSSM) and Durham Academy (DA), high schools in the locality that offered a curriculum that emphasized science and math. We pooled together research projects in the Duke Fitzpatrick Photonics Institute (FIP) that had room for high-schooler involvement and set up applications that offered these projects as research opportunities. These applications were then sent out to the high schools and interested students applied. A list of the applicants, complete with their project preferences, school transcript, recommendations, and CV, were given to the grad students for the final student-project pairing.

The offered projects last year included works in holography, quantum computing, biomedical imaging, optical camera design, and magnetic resonance imaging (the one non-optical imaging project). The project duration officially ran for 5 weeks (though some students worked for longer) with one half-term check-in where the students summarized their work's progress (with a short powerpoint presentation) to the rest of their program-mates. There was a final end-term presentation where the students did poster-presentations to the whole FIP department, and all affiliated faculty/students were able to view their works and ask questions. Heavy advertisement, along with free food/beverages, was used to increase attendance at this poster-session.



Recruitment

Sunshine Breakfast – Our engineering atrium the hub of engineering life and we used its "buzz" to hold a chapter-promoting SPIE/OSA Sunshine Breakfast. An alluring breakfast spread lured students and faculty, and a prize raffle retained participants while we presented our goals, new projects and past successes. The 50-person breakfast closely preceded an outreach event, giving new members the opportunity to invest in a project.

Ice-cream social – We held our second recruitment session during the Spring semester and centered it around afternoon ice-cream, where vanilla, chocolate, and strawberry ice cream with a variety of toppings was offered. We presented out goals and previous work from the first semester and previous years to convince students to join.

Web Development

Our president has revamped our group's website using PhP and Drupal modules. The basic structure is online now and puts upcoming events on the front page, as well as keeps record of past events. The secretary is in charge of inputting the events as they get scheduled and organized. For more information, visit dosc.pratt.duke.edu to see what we have going on.

Future Activities

Expanding FIP Symposium

Our efforts to input a more corporate component into the FIP symposium, as discussed above were great successes. We want to follow this train and invite more companies to pariticpate in this symposium, as well as organize more events that give visibility to these companies to grad students, potentially for recruitment purposes.

RTP Companies Outreach

Duke is a simple 20 minute drive away from Research Triangle Park (RTP), which is home to many optical/biotech companies (Zenalux, Bioptigen, Oncoscope, BD, etc). We are currently working with a few of these companies to allow day-long tours of these companies for interest grad students. This would be a great opportunity for our members to get a personal and up-close look at a few of the companies that they may be applying to after graduate school, as well allowing the companies a greater recruitment opportunity.