

# Design Day 2018

The Institute of Optics | University of Rochester

The ABET-accredited Degree BS in Optical Engineering is completed by taking the OPT310/311 Senior Design course. In this course, students are teamed up with customers and academic advisors and challenged to find solutions to difficult problems that are brought to us. In the Fall semester, students work to develop a Product Requirements Document, specifying the project needs. In the Spring semester, students work on their projects and develop a Design Description Document. They present their final prototypes and results on Hajim School Design Day. In Spring 2018, eleven Optical Engineering teams worked with customers from startup companies, large corporations, medical school doctors and nurses, as well as internal UR customers. Our customers get a lot back in return for their involvement, however the students get even more—exposure to current real-world problems in Optical Engineering, and a chance to develop their teamworking skills. The courses also involve a lot of report writing, customer meetings, and presentations, making for a very full senior year experience. Thanks to all of our customers and academic advisors for helping with this important program. Please contact Professor Wayne H. Knox at [wknox@optics.rochester.edu](mailto:wknox@optics.rochester.edu) for more information.

*Thanks to all of our customers !*



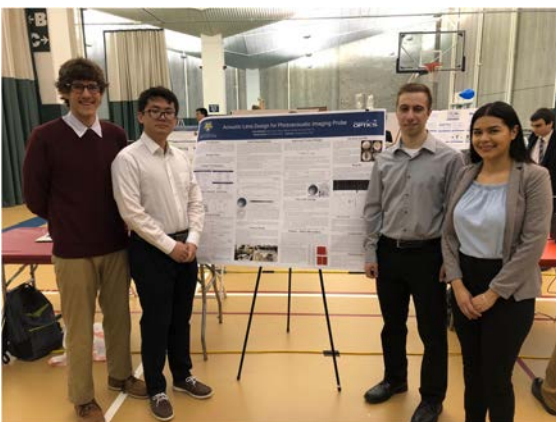
**ASML**



Harmonigenic<sup>™</sup>  
Corporation



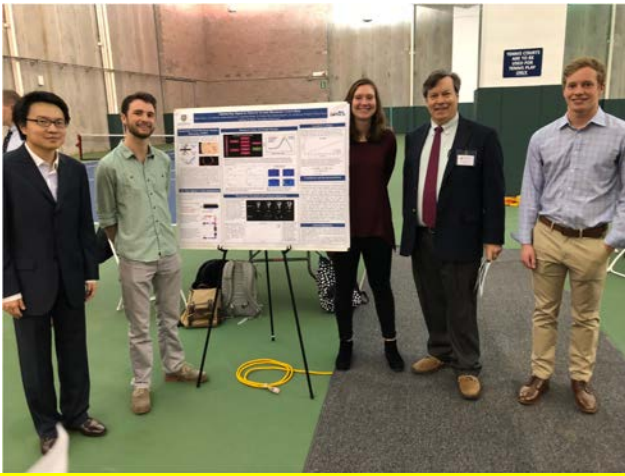
**OPTIMAX**



**TEAM ACOUSTIC: Photoacoustic Imaging of Thyroid and Prostate Cancer**

**Ryan Sauer, Yichen Gu, Daniel Graney and Nancy Aguilera**

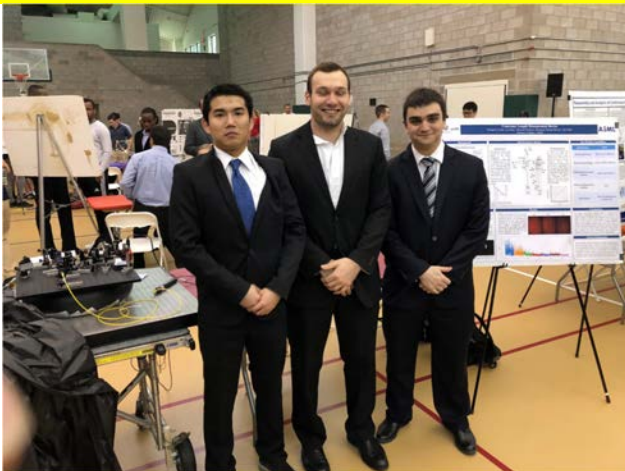
The team designed, fabricated and tested 3D printed Fresnel lenses for a photoacoustic imaging system.



**TEAM CANCER:** Optimization of Second Harmonic Generation for Breast Cancer Detection (Customer Harmonigenic)

**Yuanchao Wang, Jordan Rabinowitz, Ava Hurlock  
Customer Dr. Robert Hill and James Emery**

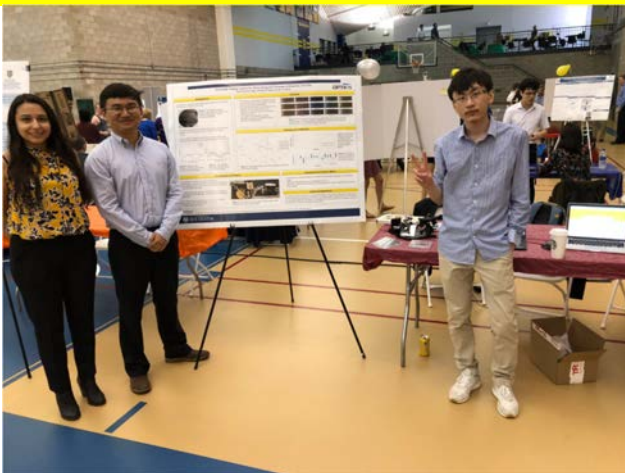
The team tested and optimized a system in order to significantly enhance SHG images in breast cancer tissue biopsy slides, enhancing ability to predict metastatic cancer.



**TEAM COHERENCE:** Instrument for measuring the coherence length of sources (Customer ASML)

**Lei Ding, Pelligrino Conte and Maxwell Wolfson**

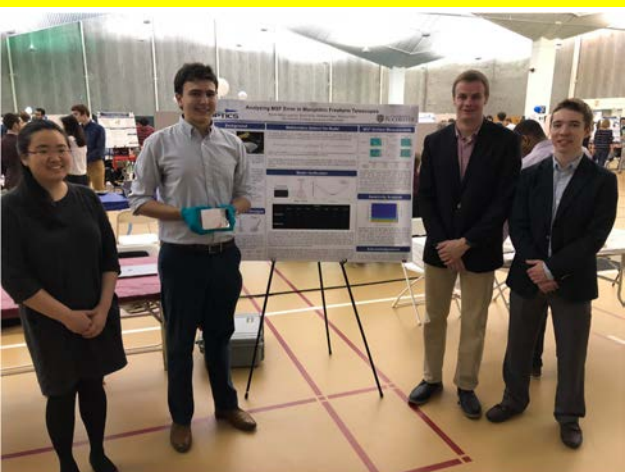
The team designed, built and tested a prototype optical interferometer to measure coherence length of laser sources that are used in a lithography system mask aligner



**TEAM FILMS:** System to measure the thickness of silicon dioxide films for semiconductor fabrication (Customer J. Krushwitz/RIT)

**Diana Magana, Yang Deng and Zheng Tan**

The team designed, fabricated and tested an optical system for precise (1 nm) measurements of oxide layers on silicon wafers

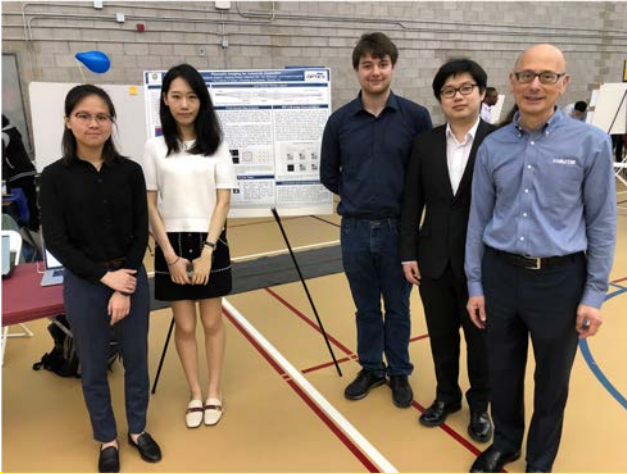


**TEAM MONOLITH:** Model for Mid-Spatial Frequency Fabrication Error (Customer Optimax)

**Wooyoun Kim, David Lippman, Kevin Kuyk and  
Matt Page**

The team created a new model for mid-spatial frequency error in free-form fabricated monolithic telescopes and compared their model results to lab testing of surface roughness and imaging quality

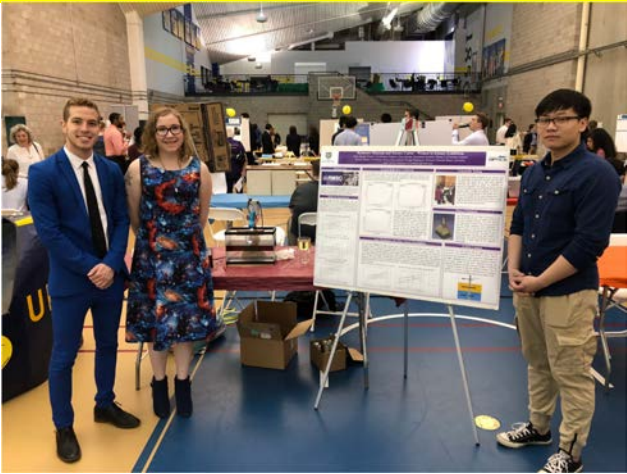




TEAM PLENO: Image processing for a plenoptic imaging system (Customer Navitar)

**Xiaojing Huang, Wen Zhou, Stephen Watson and Weichen Yao, Customer Julian Goldstein**

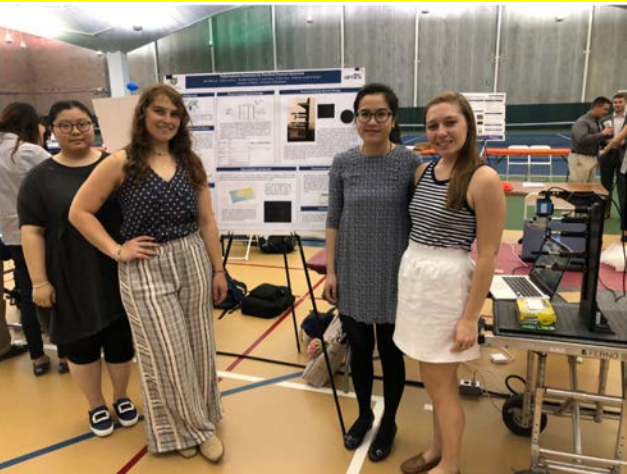
The team created a new methodology for processing images created by a plenoptic imaging system for high speed inspection of integrated circuits



TEAM RMSC: “Invisible Glass” model for museum exhibit (Customer RMSC)

**Stephen Chess, Haley Knapp and Zilong Li**

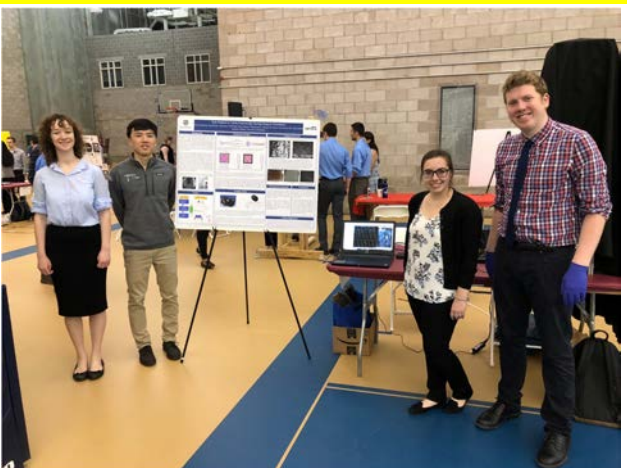
The team created a prototype for a new exhibit at the Rochester Museum and Science Center that demonstrates index matching and simulates antireflection coatings



TEAM TB: Optical detection of skin bumps in tuberculosis testing (Customer RN Torres)

**Yubai Coco Yang, Rebecca Silver, Sze Wah Lee and Madilyn Beckman**

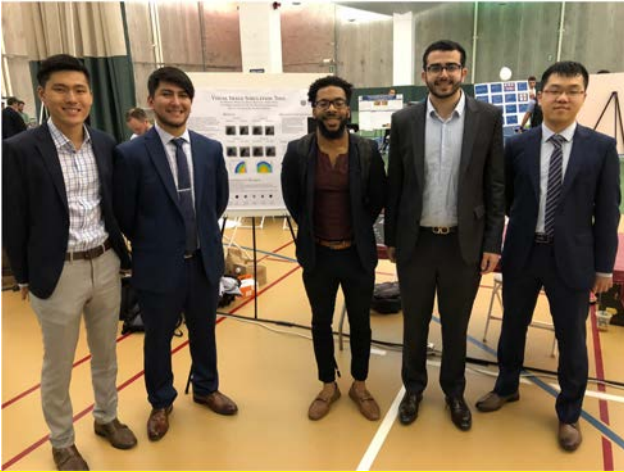
The team created a prototype optical instrument for measuring surface topography of skin bumps that are produced by injection of PPD for tuberculosis testing



TEAM TRAINER: Model for Surgical Training Utilizing Near Infrared Light (Customer UR Urology)

**Nora Lane, Chih-Hsuan Tsao, Katherine Armstrong and Joseph Kelly**

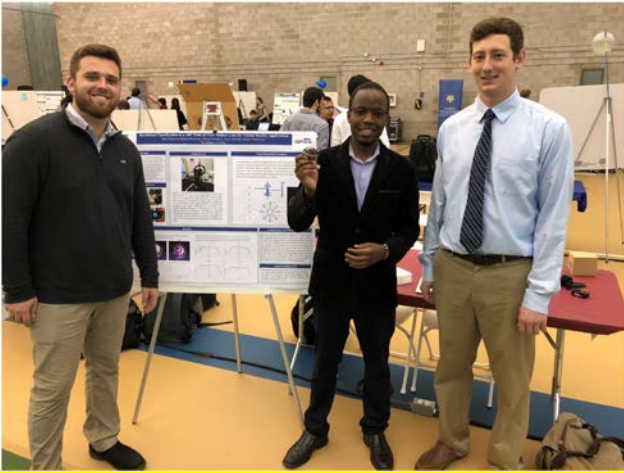
The team created and demonstrated the feasibility of a new training device for training surgeons that replaces X-Ray fluoroscopy with safe near-infrared light imaging through scattering media



TEAM VISION: Model for improving the initial steps in vision correction (Customer DigitEyz)

**Perry Wang, Diego Martinez, Customer Brandon Zimmerman, Ali Hashim and Weidi Liu**

The team worked on a new model for simulating human visual images, enabling better estimation of required vision correction



TEAM VR/AR: Characterization of ultra-wide angle lenses for VR/AR systems (Customer Raptor)

**Mitchell Soufleris, Michael Brunsman, Barry Maganya**

The team developed a testing methodology for ultra-wide angle lenses used in virtual reality/augmented reality imaging systems, testing up to 240 degree fields



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