

# Synopsys Announces 2018 Robert S. Hilbert Memorial Optical Design Competition Results

Annual Competition Recognizes Student Achievements in Optical Design

MOUNTAIN VIEW, Calif., Aug. 13, 2018 /PRNewswire/ -- Synopsys, Inc. (Nasdaq: SNPS) today announced that students from the University of Arizona, University of Rochester, and Stanford University received awards for their entries in the 2018 Robert S. Hilbert Memorial Optical Design Competition. The annual competition is open to students in North America working toward a bachelor's, master's or doctorate degree who utilize Synopsys' CODE V® or LightTools® software to perform optical design and engineering research. The awards are granted to students who have submitted papers that demonstrate optical design excellence.

This year's award winners are:

- Caleb Gannon of the University of Arizona, for his paper titled, "Automated Lens Database Generation." Gannon's paper featured the use of CODE V to find an efficient method to sample the large design landscape enabled by freeform optics to fuel machine-learning design methods. By coupling aberration theory with various optimization techniques, Gannon developed an algorithm to automatically generate high-performance, off-axis freeform imaging systems from input random variables.

"It is exciting that incentives like this exist to encourage novel use cases for software," said Gannon. "It's an honor to receive this award for an unconventional project, and I hope this example can encourage others to explore even more unique approaches to optical design problems in the future."

- David Lippman of the University of Rochester, for his paper titled "The Design of a High Zoom Ratio Riflescope." Lippman used CODE V to design a riflescope in three parts—objective, zoom relay, and eyepiece—and then combine the parts with precision pupil matching. The final result is an advanced design form based on a foundation of first-order optics.

"I am very honored to have received this award and would like to thank Synopsys for all they do to support students' passion for lens design," said Lippman. "I am looking forward to studying lens design through the rest of my studies and in my career."

- Miaomiao Xu of the University of Arizona, for her paper titled "Design of an Ultra-Thin Optical Combiner with Microstructure Mirrors for Augmented Reality Displays." Xu's paper described the design of an augmented reality (AR) system with a freeform collimator and an ultra-thin lightguide. Xu used CODE V to design a freeform collimator to collimate the display image to optical infinity while maintaining image performance. She used LightTools to design a lightguide as the optical combiner. The final AR system design was lightweight and compact with high image resolution.

"I appreciate being selected as a winner of the Robert S. Hilbert Memorial Design Competition," said Xu. "Using CODE V and LightTools gave me valuable optical design experience, which is very helpful for my future career in optics and lens design."

- Mohammad Asif Zaman and Yasin Buyukalp of Stanford University, for their paper titled "Design of a High-NA Achromatic Objective Lens for Endomicroscopy." Zaman and Buyukalp designed a miniature, low-cost, achromatic lens system with a large object-space numerical aperture to produce a high-quality image while maintaining the packaging size of a biopsy needle for in vivo cancer diagnosis applications. They used CODE V to design the system using plastic lenses, and CODE V's optimization feature to finetune the lens properties.

"It is a great honor for us to receive this award," said Zaman and Buyukalp. "CODE V was an excellent tool to help us learn about optical system design. We would like to thank Synopsys for giving us this opportunity. We also thank our course instructors Professor Lambertus Hesselink and Dr. Jeffrey P. Wilde, as well as our teaching assistant Samuel J. Steven, for all their help."

- Dylan Beckman of the University of Rochester, for his paper titled "Design of a Compact Telephoto Lens for Cellphone Cameras." Beckman used CODE V to design and optimize a telephoto lens suitable for use in small form factor cellphone cameras.

"I'm thankful for such a unique opportunity to compete with student lens designers," said Beckman. "It was a fun and challenging experience, which has helped fuel my passion for optics."

"The goal of our student optical design competition and academic licensing program is to give future optical engineers the opportunity and resources to augment their optical design experience and develop systems at the forefront of optical technologies," said George Bayz, vice president of Synopsys' Optical Solutions Group. "We received many well-designed and well-researched projects this year and congratulate all competition participants on their outstanding work."

Information about the winning student optical design projects will be on display at SPIE Optics + Photonics (August 21-23, 2018, San Diego, Calif.) in Synopsys' booth 232.

### **About the Robert S. Hilbert Memorial Optical Design Competition**

The annual Robert S. Hilbert Memorial Optical Design Competition recognizes excellence in student optical design projects. The competition was established in 2000 by Optical Research Associates (ORA®), now Synopsys' Optical Solutions Group, and in 2009 was named in honor of ORA's former president and chief executive officer, Robert S. Hilbert. The competition is open to students in North America working toward a bachelor's, master's or doctorate degree. To participate, students can enter an optical design class assignment or thesis work that uses CODE V or LightTools software. For more information, visit <http://optics.synopsys.com/learn/learn-design-competition.html>.

### **About Synopsys**

Synopsys, Inc. (Nasdaq: SNPS) is the Silicon to Software partner for innovative companies developing the electronic products and software applications we rely on every day. As the world's 15<sup>th</sup> largest software company, Synopsys has a long history of being a global leader in electronic design automation (EDA) and semiconductor IP and is also growing its leadership in software security and quality solutions. Whether you're a system-on-chip (SoC) designer creating advanced semiconductors, or a software developer writing applications that require the highest security and quality, Synopsys has the solutions needed to deliver innovative, high-quality, secure products. Learn more at [www.synopsys.com](http://www.synopsys.com).

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