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## **CALIFORNIA, MARYLAND, AND VIRGINIA STUDENTS WIN REGIONAL SIEMENS COMPETITION AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)**

**Regional Winners Move on to Final Phase of Competition: National Finals in Washington, D.C.**

**Manan Shah (Los Altos, CA) Wins Top Individual Honors;**

**Yoshihiro Saito (Ellicott City, MD) and Lauryn Wu (McLean, VA) Win Top Team Honors**

ISELIN, NJ, Nov. 7, 2016 –Three students have been named National Finalists in the Siemens Competition in Math, Science & Technology after earning top spots in one of two regional competitions that took place this past weekend. The Competition is the nation's premier science research competition for high school students and seeks to promote excellence by encouraging students to undertake individual or team research projects. For more information go to: [www.siemens-foundation.org](http://www.siemens-foundation.org)

**Manan Shah** of Los Altos, CA, earned top individual honors and a \$3,000 scholarship for developing a computational model that will help pathologists more rapidly and accurately assess the severity of breast cancer tumor growth and spread. **Yoshihiro Saito** of Ellicott City, MD, and **Lauryn Wu** of McLean, VA shared the \$6,000 team scholarship for research that allows a new material called two-dimensional topological insulators to be used at room temperature and opens the door to a new generation of electronics, potentially making even quantum computing more efficient and powerful. They were among 96 students overall selected to compete in regional competitions across the country this month out of a pool of more than 1,600 projects submitted for the competition this year.

These top regional winners are now moving on to the final phase of the Siemens Competition to present their work at the National Finals in Washington, D.C., December 5-6, 2016, where \$500,000 in scholarships will be awarded, including two top prizes of \$100,000.

The students presented their research this weekend to a panel of judges at the Massachusetts Institute of Technology (MIT), host of the [Region Five](#) Finals.

"These students are truly amazing," said David Etzwiler, CEO of the Siemens Foundation. "They are presenting cutting-edge, advanced research that is addressing some of the most critical issues facing our world today."

The Siemens Competition, launched in 1999 by the Siemens Foundation, was established to increase access to higher education for students who are gifted in STEM and is based on the culture of innovation, research and educational support that is the hallmark of Siemens. This competition, administered by Discovery Education, seeks to recognize and hopefully build a strong pipeline for the nation's most promising scientists, engineers and mathematicians.

### **The Winning Individual for Region Five**

Manan Shah, a senior from Harker Upper School in San Jose, CA, won the individual category and a \$3,000 scholarship for his project entitled, "Deep Learning Assessment of Tumor Proliferation in Histopathological Images for Categorical and Molecular Breast Cancer Severity and Diagnosis."

Manan's work addressed a difficult technical challenge in the field of breast cancer: the rapid, accurate and automated analysis of breast cancer tissue images. He developed a computational model that reviews the tissue images and can help pathologists rapidly and accurately assess the severity of breast cancer tumor growth and spread. His model could help speed diagnostics, improve the molecular understanding of the growth of breast cancer, and help determine more appropriate treatments for each patient. Current systems that pathologists use for grading tumors are inefficient, expensive and laborious.

According to the US Centers for Disease Control, breast cancer is the most common cancer in women not counting some types of skin cancer. It's estimated that in the United States one out of eight women and one out of one thousand men will develop breast cancer over the course of their lifetime.

"Manan's work is the wave of the future and holds the promise of improving breast cancer diagnosis and making it accessible to many more people, especially those living in areas where there is a scarcity of well-trained pathologists," said competition judge Dr. Pawan Sinha, Professor of Vision and Computational Neuroscience in the Department of Brain and Cognitive Sciences at MIT. "Manan diligently and masterfully applied cutting edge techniques from machine learning and obtained results that define 'state of the art'."

Manan is an aspiring computer scientist and applied mathematician and hopes to become a research scientist, using his knowledge of physics, math, and computer science to better predict the behavior of complex systems like cancer development. He has published in the Journal *Machine Learning Research*.

Manan's mentor is Dayong Wang of Beth Israel Deaconess Medical Center's Department of Pathology.

### **The Winning Team for Region Five**

Yoshihiro Saito of Ellicott City, MD, and Lauryn Wu of McLean, VA, won the team category and will share a \$6,000 scholarship for their project entitled "New Discovery of Large Bulk Band Gap Topological Insulators in Chemically Functionalized Two-Dimensional Compounds."

Yoshihiro and Lauryn's computational research could help develop two-dimensional topological insulators (2D TIs) that can be used at room temperature. Currently, 2D TIs are only usable at an extremely low temperature in expensive laboratory settings.

Topological insulators, which allow for electrons to move along the surface of a material instead of through the material, have been a major field of study in physics. The 2016 Nobel Prize in Physics was awarded to theoretical physicists for their work in topology. But research in the field has been limited because of the need to cool down topological insulators. 2D TIs usable at room temperature could open up a whole new area of application – such as helping information be transported without degradation.

"This research provides a 'play space' for physicists to explore using topological insulators in new and exciting ways -- like building quantum computers and other new electronics," said Michelle Tomasik, a teaching post-doctoral fellow at MIT. "People have theorized a lot of uses for these topological insulators but because we always have to cool them down to use them, it is harder to figure out all of the potential applications for them. I was very impressed with Yoshihiro and Lauryn's depth of knowledge of the field and the materials and they complimented each other very well."

Yoshihiro, a sophomore at Marriotts Ridge High School in Marriottsville, MD, was inspired to pursue this area of research because of his passion for physics and the fact that the area of topological insulators is such a growing and exciting field. He has been influenced by many physicists, not only the great Isaac Newton and Einstein, but also contemporary theoretical physicists and astrophysicists, such as Stephen Hawking, Michio Kaku, and Neil DeGrasse Tyson. Yoshihiro has competed in the Science Olympiad and the American Invitational Mathematics Examination (AIME) and he also plays soccer for his high school. Yoshihiro aspires to have a job that involves physics in some way.

Lauryn's love of science and particularly math led her to want to delve deeper into topological insulators with her teammate especially because efficient and productive technology and computers are so essential to everyday life. She has competed in math competitions since elementary school and her proudest accomplishments include being a qualifier in the American Invitational Mathematics Exam (AIME) in sixth grade and serving as Vice President of the National Junior Honor Society. Lauryn plays tennis at a national level and is a top player in the Mid-Atlantic region. Lauryn wants to pursue a career in science or computer programming.

The team's mentor is Xuan Luo of the National Graphene Research and Development Center.

### **Regional Finalists**

The remaining regional finalists each received a \$1,000 scholarship.

#### **Regional Finalists in the individual category were:**

- Jacy Fang, Bergen County Academies, Hackensack, NJ
- Veda Murthy, Lexington High School, Lexington, MA
- Nishita Sinha, Chatham High School, Chatham, NJ
- Albert Yue, Phillips Academy, Andover, MA

#### **Team Regional Finalists were:**

- Garyk Brixi, Winston Churchill High School, Potomac, Maryland and Gordan Brixi, Saddlebrook Preparatory School, Wesley Chapel, Florida
- Jang Hun Choi, Jericho Senior High School, Jericho, NY, Matthew Li, Horace Mann School, New York City, NY and Elaine Moon, Peddie School, Hightstown, NJ
- Amir Siraj, Brookline High School, Brookline, MA and Shiva Mudide, Acton Boxborough Regional High School, Acton, MA
- Yi Zhu, Thomas S Wootton High School, Rockville, Maryland and Robert Yang, Montgomery Blair High School, Silver Spring, Maryland

### **The Siemens Competition**

For the 2016 Siemens Competition, 2,146 students (1271 individuals, 304 2-person teams and 89 3-person teams) submitted applications from 46 states plus the District of Columbia and 7 countries with more than 1,600 projects submitted for consideration. 498 students were named Semifinalists from which 96 were named Regional Finalists. For the regional finals, the students present their research in a closed, online forum, and entries are judged by esteemed scientific experts at six leading research universities which host the regional competitions: Georgia Institute of Technology and Massachusetts Institute of Technology (November 4-5), California Institute of Technology and University of Notre Dame (November 11-12), and Carnegie Mellon University and The University of Texas at Austin (November 18-19).

The winners of each regional weekend will be announced at 12 noon (ET) on the following Monday at <http://siemensusa.synapticdigital.com/US/Siemens-Foundation>. For news and announcements about the Regional Competitions and the National Finals, follow us on Twitter [@sfoundation](https://twitter.com/sfoundation) (#SiemensComp) and like us on Facebook at [Siemens Foundation](https://www.facebook.com/Siemens-Foundation).

*Interviews, video and photos available by  
visiting <http://siemensusa.synapticdigital.com/US/Siemens-Foundation>.*

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**About the Siemens Foundation**

The [Siemens Foundation](http://www.siemens-foundation.org) has invested more than \$90 million in the United States to advance workforce development and education initiatives in science, technology, engineering and math. The Foundation's mission is inspired by the culture of innovation, research and continuous learning that is the hallmark of Siemens' companies. Together, the programs at the Siemens Foundation are helping close the opportunity gap for young people in the U.S. when it comes to STEM careers, and igniting and sustaining today's STEM workforce and tomorrow's scientists and engineers. For further information, visit [www.siemens-foundation.org](http://www.siemens-foundation.org) or follow @sfoundation.

**About Discovery Education**

Discovery Education is the global leader in standards-based digital content for K-12, transforming teaching and learning with award-winning digital textbooks, multimedia content, professional development, and the largest professional learning community of its kind. Serving 4.5 million educators and over 50 million students, Discovery Education's services are in half of U.S. classrooms, 50 percent of all primary schools in the UK, and more than 50 countries. Discovery Education partners with districts, states and like-minded organizations to captivate students, empower teachers, and transform classrooms with customized solutions that increase academic achievement. Discovery Education is powered by Discovery Communications (NASDAQ: DISCA, DISCB, DISCK), the number one nonfiction media company in the world. Explore the future of education at [www.discoveryeducation.com](http://www.discoveryeducation.com).