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## **TEXAS STUDENTS WIN REGIONAL SIEMENS COMPETITION AT UNIVERSITY OF TEXAS AT AUSTIN**

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

**Prateek Kalakuntla (Plano, TX) Wins Top Individual Honors;  
Adhya and Shriya Beesam (Richardson, TX) Win Top Team Honors**

ISELIN, NJ, Nov. 21, 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 promotes 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).

**Prateek Kalakuntla**, of Plano, TX, earned top individual honors and a \$3,000 scholarship for his research developing a new tool to test for the presence of the neuro-toxin mercury in water that could be used in developing countries. **Adhya and Shriya Beesam**, of Richardson, TX, shared the \$6,000 team scholarship for developing a new approach to diagnose schizophrenia earlier in patients using both brain scans and psychiatric evaluation. They are 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 now move 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 University of Texas at Austin, host of the [Region Two](#) Finals.

"This year's competitors continue to impress me with the level of expertise they've acquired on their topics," said David Etzwiler, CEO of the Siemens Foundation. "The creativity and vision of these young researchers give us great hope for the future of the scientific enterprise."

The Siemens Competition, launched in 1999 by the Siemens Foundation, increases 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, recognizes and builds a strong pipeline for the nation's most promising scientists, engineers and mathematicians.

### **The Winning Individual for Region Two**

Prateek Kalakuntla, a senior from Texas Academy of Math and Science in Denton, TX, won the individual category and a \$3,000 scholarship for his project entitled, "Luminescent Heavy Metal Sensors."

Prateek developed a new test to identify the presence of mercury in water, which can irreversibly harm brain function. The chemical test that he created emits light when the water is safe and no light when mercury, a lethal toxin, is present. Importantly, he showed that this tool is sensitive to very low levels of mercury and responds to the presence of mercury but not similar contaminants, such as lead. He is developing this work into a simple and inexpensive test, similar to a pregnancy test, so that it may be used in communities in developing countries.

Mercury poisoning damages the cerebellum, the region of the brain that controls movement, as well as the kidney and other organs. The dangers of mercury poisoning are highest in developing countries with artisanal small-scale gold mining, which is the largest source of mercury pollution in the world other than from burning fossil fuels. However, most tools to test for the presence of this metal in water are expensive and unwieldy in these settings.

"Prateek not only sought to address the problem of water contamination in developing communities, he did so by developing a new chemical test that allows him to detect very small amounts of mercury in water," said lead judge, Dr. Jennifer Maynard, an associate professor in the McKetta Department of Chemical Engineering at the University of Texas at Austin. "We were really impressed by his ability to take it a step further to envision the development of a simple tool that could be packaged and used by local communities."

Prateek was inspired to pursue his research on his mercury sensor once he realized how many people are impacted globally by mercury-related illnesses each year. He describes the burden of mercury poisoning in rural communities as "a game of roulette that thousands of people lose each year." While he is currently working to help the millions of people at risk of mercury poisoning around the world, he hopes to one day to work on gene editing using CRISPR-Cas9.

Prateek's mentors are Mohammad Omary, PhD, and Sreekar Marpu from the department of chemistry at the University of North Texas.

### **The Winning Team for Region Two**

Sisters Adhya and Shriya Beesam of Plano East Senior High School in Plano, TX, won the team category and will share a \$6,000 scholarship for their project entitled, "Linked Neuro-Fuzzy Inference System: A Novel Approach to Schizophrenia Diagnosis."

Adhya, a senior, and Shriya, a junior, developed a computer algorithm that aims to diagnose schizophrenia earlier in patients and with a higher certainty. The novel aspect of their approach is that it combines the results of brain imaging technology, using magnetic resonance imaging (MRI) with a traditional psychiatric assessment questionnaire, known as the Positive and Negative Syndrome Scale (PANNS).

Studies show that patients with schizophrenia respond better to treatment when detected early, however, the diagnosis of schizophrenia has historically been based largely on psychiatric evaluations—which are primarily based on observation and conversations—and ruling out other possible diagnoses. The development of tests, such as MRIs or CT scans have accelerated testing, but integrating these two approaches offer hope for faster, more accurate diagnosis.

"The judges were moved by Adhya and Shriya's deep personal motivation to find a better way to diagnose schizophrenia as well as their ability, with very little guidance, to understand the field and existing tools. The result of their efforts is a new, more integrated and potentially more accurate way to diagnose this disorder," said Maynard. "Furthermore, this approach has the potential to improve diagnosis of many other brain disorders and diseases, such as Alzheimer's disease and multiple sclerosis."

Adhya and Shriya were both driven to research better ways to diagnose schizophrenia after watching an uncle struggle with mental illness and several misdiagnoses before being diagnosed with schizophrenia. Eventually, they lost their uncle to suicide. Driven by the desire to help others be more quickly diagnosed and access better treatment earlier, they taught themselves about the two tools for diagnosis. Armed with this knowledge, they developed a computer program that would take the results of both quantitative (MRI) tests and qualitative tests (psychiatric evaluation by a professional) and combine the results to better diagnose schizophrenia. Adhya and Shriya used an approach known as "fuzzy logic," which uses a computer program to continually improve the ability to diagnose by making minor adjustments to how much the program weights the brain scans and psychiatric evaluation.

The team's mentor is Julie Baker, of the biology department at Plano East Senior High School.

### **Regional Finalists**

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

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

- **Ankur Khanna**, Caddo Parish Magnet High School, Shreveport, LA
- **Kailash Raman**, Sandra Day O'Connor High School, Phoenix, AZ

- **Kavita Selva**, Clear Lake High School, Houston, TX
- **Byron Xu**, Clements High School, Sugar Land, TX

**Team Regional Finalists were:**

- **William Duke** and **Nicolas Nahas**, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, AR
- **Sandra Kong**, Highland Park High School, Dallas, TX, and **Saumya Rawat**, School of Science and Engineering, Dallas, TX
- **Megan Liu** and **Kevin Zhou**, Highland Park High School, Dallas, TX
- **Sarah Zhao** and **Lana Chen**, Vestavia Hills High School, Vestavia Hills, AL

**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 are 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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The [Siemens Foundation](https://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 closing 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](https://www.siemens-foundation.org) or follow [@sfoundation](https://twitter.com/sfoundation).

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