

## Teen Wins IEEE Presidents' Scholarship for Tool That Detects Parkinson's Disease

Wearable device monitors symptoms more efficiently than current methods

By [JOHN R. PLATT \(/author/platt-john-r\)](/author/platt-john-r) 19 July 2017



Photo: Lynn Bowlby

Surabhi Mundada displayed her project, "MyHealth: A Novel Wearable Solution for Early Detection and Monitoring of Parkinson's Disease and a Transformation From Subjective to Quantifiable Testing," at the Intel International Science and Engineering Fair, held in May in Los Angeles. Her invention earned the US \$10,000 IEEE Presidents' Scholarship.

A few years ago, Surabhi Mundada noticed that one of her 10th-grade teachers at Olympia High School, in Washington, had a mild tremor in his hand. She later learned his tremors were benign but similar to those caused by Parkinson's disease.

“It really stood out to me,” Mundada says. “I realized that we use our hands for so much: eating, drinking, writing. I couldn’t imagine how difficult it must be to live with hand impairments.”

That realization led Mundada, who says she has been doing research in physics, environmental science, and medicine “since childhood,” on a three-year journey to develop medical devices to help people with Parkinson’s and other conditions that cause tremors. “I researched tremors and found there wasn’t really much to address them from an engineering standpoint,” she says.

Trying to fill that gap, she first developed MyGlove, a mechanical glove that could help improve hand movements and grip. “I developed hardware and software algorithms,” she says. “They read values from sensors attached to the glove and move the glove to help with the hand movement.” She later improved it with pneumatic actuators so that it could stabilize the wearer’s hand tremors. She displayed the glove at several science fairs and eventually tested it on people with Parkinson’s.

“That has been one of my most touching moments,” she says. “Being able to see what I made actually function, and seeing people’s optimism when I’m doing that testing. It was so exciting.”

Inspired by her early success, Mundada set out to broaden the system to help detect other symptoms caused by Parkinson’s, such as muscle rigidity. She used an off-the-shelf armband embedded with sensors, and developed algorithms in Python and Java to interpret a patient’s tremors and motions, including changes in arm-swing motion affected by an impaired walking gait. She then came up with a method to detect, monitor, and quantify Parkinson’s symptoms more efficiently and earlier than current methods, such as the unified rating scale used by doctors.

Mundada displayed her project, “MyHealth: A Novel Wearable Solution for Early Detection and Monitoring of Parkinson’s Disease and a Transformation From Subjective to Quantifiable Testing,” at the annual Intel International Science and Engineering Fair (<https://www.societyforscience.org/intel-international-science-and-engineering-fair>), held in May in Los Angeles. Her invention earned the annual US \$10,000 IEEE Presidents’ Scholarship ([http://www.ieee.org/education\\_careers/education/preuniversity/scholarship.html](http://www.ieee.org/education_careers/education/preuniversity/scholarship.html)).

“It’s very exciting,” she says of the scholarship. “One of the coolest things at ISEF has been meeting and bonding with IEEE members. Not only do they like talking about my project, they’re so encouraging. That’s really inspired me to continue.”

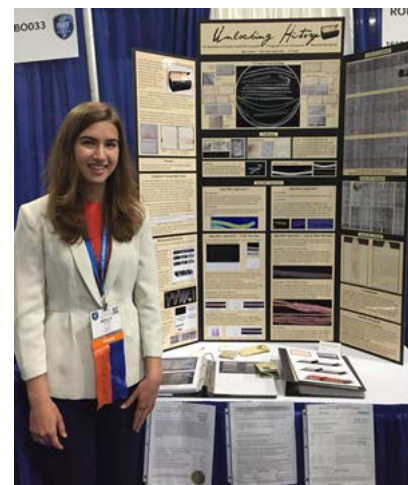


Photo: Lynn Bowlby  
Holly Jackson received second prize for her algorithm to virtually unfold unopened historical documents.

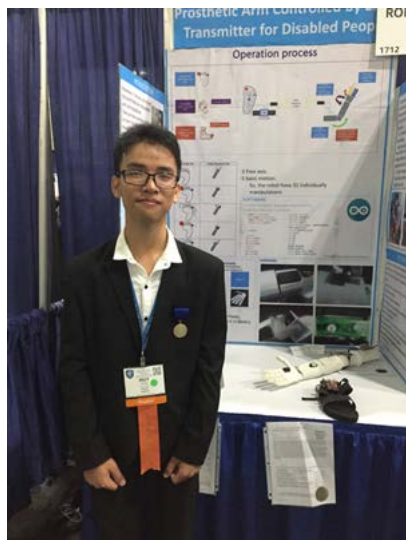


Photo: Lynn Bowlby  
Pham Huy won third prize for his prosthetic arm controlled by a transmitter in a patient’s leg.

For the first time, the scholarship program selected second- and third-place recipients. Holly Jackson from Notre Dame High School in San Jose, Calif., received \$600 for her algorithm to virtually unfold unopened historical documents. Pham Huy, from Quang Tri High School in Vietnam, received \$400 for his prosthetic arm controlled by a transmitter in a patient’s leg.

Administered by IEEE Educational Activities

([http://www.ieee.org/education\\_careers/education/eab/DF\\_IEEE\\_MIG\\_MCT\\_19173](http://www.ieee.org/education_careers/education/eab/DF_IEEE_MIG_MCT_19173)), the Presidents’ Scholarship is given by the IEEE Foundation (<http://www.ieeefoundation.org/>) to a high school student who creates a project that demonstrates an understanding of electrical or electronics engineering, computer science, or another IEEE area of interest. The \$10,000 award, payable over four years of undergraduate study, includes complimentary IEEE student and student society membership during the four years of college.

**BRIGHT FUTURE**

Mundada, who graduated in June, is set to attend Stanford in the fall. There she’ll pursue a degree in either computer science or electrical engineering, she says, possibly with a minor in bioengineering.

She hopes to continue working on her MyHealth project while at Stanford. “I want to apply it to more diagnostic devices for different diseases or conditions with motor symptoms, such as muscular dystrophy, ALS, or even arthritis,” she says, adding that wearable devices that can monitor diseases will be great tools for doctors, patients, and researchers.

She plans to make MyHealth available to other developers so they can modify it. “I feel it’s more important to make it more accessible to patients, as well as collaborate with others to improve its capabilities,” she says. “Keeping it accessible for other developers will allow them to collaborate on the project and potentially look at other diseases and other Parkinson’s symptoms using different sensors or other technologies.”

Meanwhile, she plans to continue expanding the device on her own, adding the ability to monitor more Parkinson’s symptoms and potentially moving her algorithms from the commercially purchased armband into customized hardware, or into already popular trackers such as smartwatches. She’s working on a smartphone app to allow users to integrate the MyHealth system into their life.

“It’s been a really exciting journey,” she says. “Seeing how this could be helpful to people inspired me to go on.”



Video: Olympia School District

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