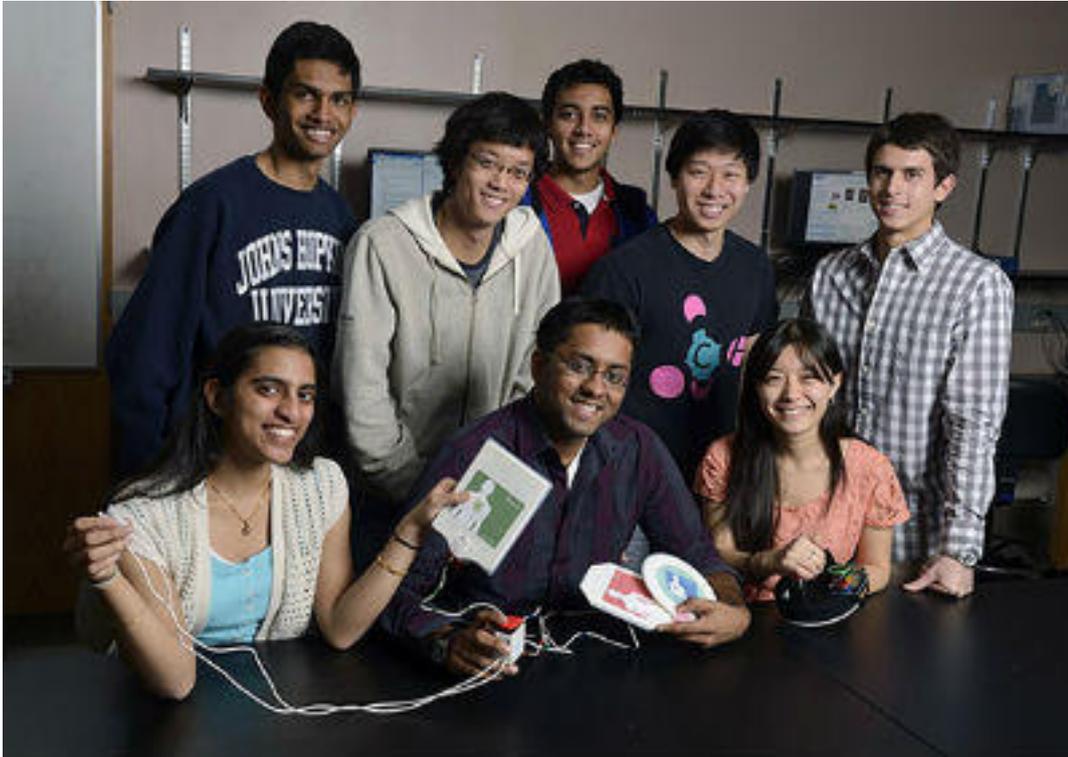


Heart Treatment Device, Cancer Test Take Top Prizes in Inventors Contest

Johns Hopkins University



A Johns Hopkins undergraduate biomedical engineering student team that devised a two-part system to improve the way life-saving shocks are delivered to hearts earned first-prize in the undergraduate division of a national Collegiate Inventors Competition. In the graduate-level competition, Isaac Kinde, a Johns Hopkins medical student, received third-place honors for developing a test to detect ovarian and endometrial cancers as part of a team at the Johns Hopkins Kimmel Cancer Center.

Winners in the Collegiate Inventors Competition, conducted by Invent Now and the National Inventors Hall of Fame, were announced Nov. 12 after the finalist teams presented their projects to contest judges at the United States Patent and Trademark Office in Alexandria, Va. This year's judging involved 31 students representing 13 entries—six undergraduate and seven graduate projects—from universities and colleges throughout the United States. After the judging, all finalists were invited to the White House to meet with John Holdren, a senior advisor to President Obama on science and technology.

[Watch: The PrestoPatch Delivers Safer Shocks to the Heart](#) [1]

The PrestoPatch system, developed by eight Johns Hopkins students, took the top honor among the six undergraduate finalist teams. This was the second consecutive year that a Johns Hopkins undergraduate biomedical engineering team finished first

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in their division of the contest. “We were up against tough competition,” said team leader Piyush Poddar of Plainsboro, N.J. Team member Sandya Subramanian of Grand Rapids, Mich., added “There were a lot of projects that were technologically complex, but our device is simple. That means clinicians are more likely to use it.”

The PrestoPatch system is designed to be used during the administration of electric shocks to patients experiencing arrhythmia, an erratic heartbeat that can be fatal. During this treatment, the doctor must decide where to place two electrode patches: on the front, side or back of the patient. The electric current passes through the heart as it moves between the two electrodes. If the first shock does not work, current patches cannot be moved to a new position that might yield better results. But the PrestoPatch system allows the doctor to attach three patches to the patient, instead of two. If the first shock doesn’t help, the doctor can quickly flip a switch and change the current’s path through the body.

The second part of the system addresses impedance, another problem that occurs during defibrillation when the patient’s body resists the life-saving current. Doctors currently try to overcome this in a crude manner by pressing down on a patient’s patch with their fists. To improve on this, the students devised a manual tool to apply the pressure in a standardized way. Lights on the tool alert the doctor when the proper pressure is applied.

In addition to Poddar and Subramanian, the PrestoPatch team members are Aaron Chang of Grand Prairie, Tex.; Kevin George of Acton, Mass.; Peter Malamas of Bucks County, Pa.; Melinda Chen of Baltimore; Rohil Malpani, of Kolkata, India; and Joon Eoh, of College Station, Tex. The team members said they plan to use their \$12,500 in prize money to help launch a company aimed at moving their invention forward.

The team’s project sponsor was Todd J. Cohen, who earned his undergraduate and medical degrees at Johns Hopkins and who now is director of electrophysiology at Winthrop University Hospital in Mineola, N.Y. The students’ project emerged from the undergraduate design team program offered by the [Department of Biomedical Engineering](#) [2], which is shared by the university’s [School of Medicine](#) [3] and its [Whiting School of Engineering](#) [4]. The work is conducted within the [Center for Bioengineering Innovation and Design](#) [5]. The team’s faculty adviser was Robert Allen.

Johns Hopkins medical student Kinde, who was honored in the graduate division of the inventors contest, used cervical fluid obtained during routine Pap tests in the development of the new test to detect ovarian and endometrial cancers. In a pilot study, the “PapGene” test, which relies on genomic sequencing of cancer-specific mutations, accurately detected all 24 (100 percent) of endometrial cancers and nine of 22 (41 percent) of ovarian cancers.

He and his colleagues say larger-scale studies are needed before clinical implementation can begin, but they believe the test has the potential to pioneer genomic-based cancer screening tests. PapGene is a high-sensitivity approach for the detection of cancer-specific DNA mutations, according to the investigators; however, false mutations can be erroneously created during the many steps —

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including amplification, sequencing and analysis — required to prepare the DNA collected from a Pap test specimen for sequencing. This required the investigators to build a safeguard into PapGene’s sequencing method, designed to weed out artifacts that could lead to misleading test results.

Kinde’s faculty adviser is Bert Vogelstein, Clayton Professor of Oncology and co-director of the Ludwig Center at Johns Hopkins.

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[2] <http://www.bme.jhu.edu>

[3] <http://www.hopkinsmedicine.org/som/>

[4] <http://engineering.jhu.edu/>

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