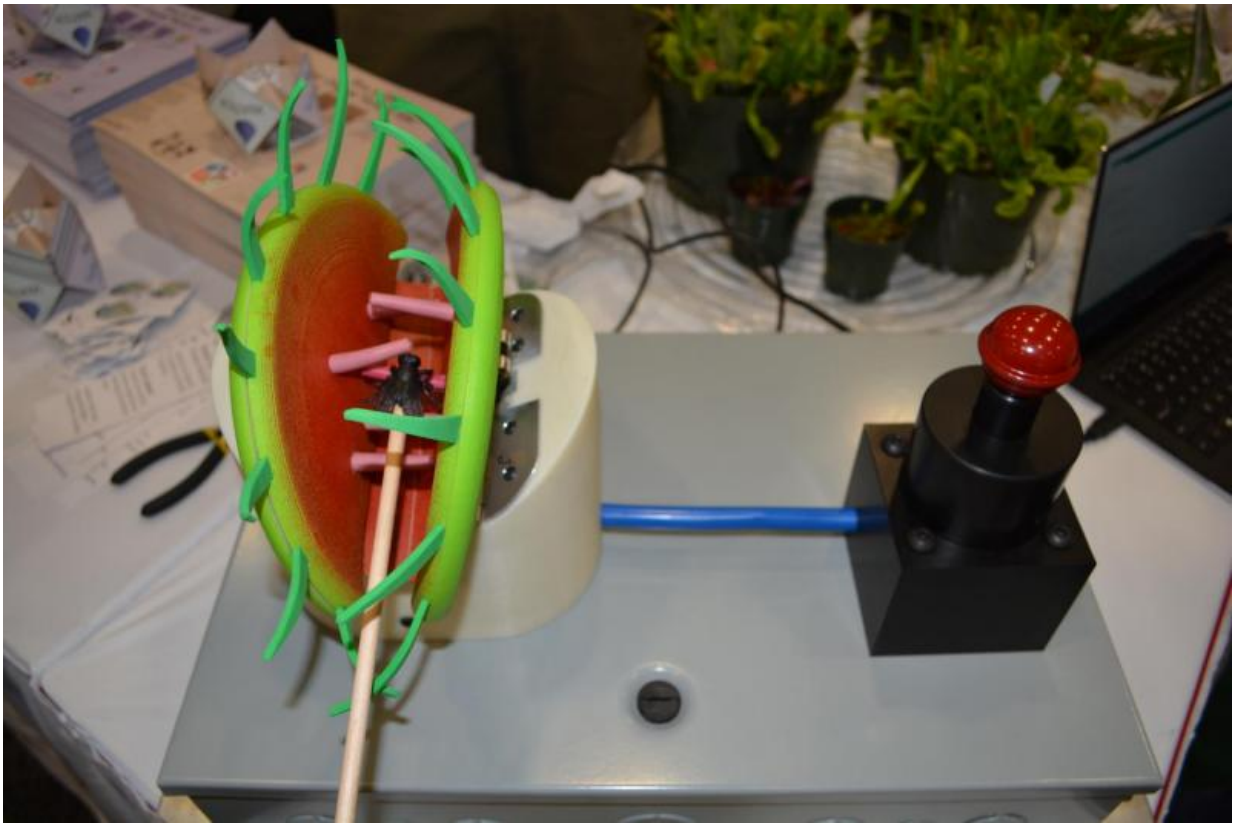
Engineers build Venus flytrap robot

April 27 2016, by Todd B. Bates



The largely plastic flytrap, built by Rutgers students as an educational exhibit for the Botanical Society of America, shows how the plant traps unsuspecting prey. Credit: Sandra Arango-Caro/Donald Danforth Plant Science Center

Venus flytraps are fascinating, creepy carnivores. They literally trap flies and other insects between two toothy, hairy leaves and then digest bug nutrients.

Taking cues from nature, a team of Rutgers mechanical engineering students has built an interactive robotic venus flytrap that's now on display at the United States Botanic Garden in Washington.

Like the real McCoy, the green and orange flytrap has leaves that close when something touches at least two of its sensitive "hairs."

The largely plastic flytrap, built as an educational exhibit for the Botanical Society of America, shows how the plant traps unsuspecting prey, according to its creators. They are senior Adam Burrous and first-year student Valeria Saro-Cortes, who were assisted by seniors Ryan Colbridge and Yianni Frangos and sophomore Joseph Spaniol. The students were overseen by design specialist Paul Pickard and assistant professor Jonathan P. Singer in the Rutgers Department of Mechanical and Aerospace Engineering. John Petrowski, senior project administrator in the department, also helped out.

The flytrap model – displayed on April 16 and 17 at the 2016 USA Science & Engineering Festival Grand Finale Expo in Washington – is aimed at showing children what they could accomplish through design and engineering. The festival is a national grassroots effort to advance STEM (science, technology, engineering and mathematics) education. Rutgers students and participants from more than 1,000 other leading STEM organizations offered hands-on science and engineering activities at the Walter E. Washington Convention Center.

From left to right: Assistant Professor Jonathan P. Singer, first-year student Valeria Saro-Cortes and senior Adam Burrous. Credit: Sandra Arango-Caro/Donald Danforth Plant Science Center

Singer said one of the hardest things about engineering is that schoolchildren don't have engineering courses, so it's important to find ways to show them what they could do as mechanical engineers.

"Any time someone sits down and says, 'that's really cool. How did you do that?' – for a kid, that's a good thing," Burrous said.

The Rutgers robot had to meet certain specifications to ensure that it would closely mimic a live venus flytrap. These included sensitive hair-like triggers on the inside of the leaves that detect when a fly or foreign

object has landed. The robot needed an internal "timer" that closes both leaves when two hairs have been touched within 20 seconds. It also needed a switch to pump the leaves open, an interactive feature that shows it takes more work to open the leaves than to close them.

The students also wanted to ensure that the device is safe for anyone, including children.

Their design includes small motors, an electronic controller and "hairs" with motion sensors.

To create design drawings, the students used 3D computer-aided design (CAD) software. They tapped SolidWorks software to 3D-print the two leaves, their base and a shelf inside the base for the motors.

They used Plasti Dip paint – a spray-on rubber – to coat the leaves so they'd feel natural. The students made the hairs from silicone rubber and red acrylic paint in molds made from plastic syringe tips.

"This isn't any different than any project I've ever worked on," Pickard said. "It had all the same kind of problems, issues, things that go as planned, things that don't go as planned. This is how prototyping happens: trying something, doing it and learning from it."

Said Singer: "We want to show kids how you can, even in a few months, complete a project by combining design and programming and mechanical engineering to make a model system that illustrates something that has evolved over millions of years."

Provided by Rutgers University

https://phys.org/news/2016-04-venus-flytrap-robot.html