Students Brush Up On Robotics At Vermont Institute

By Tim Johnson, Free Press Staff Writer

Constructed from Legos, the robot built by Matthew Chambers and Dillon Welch was a work in progress.

A day after they started putting it together, it could move across a table. Whether they could get it to perform a higher-order task -- picking up trash -- remained to be seen. They had another day or so to figure that out, but not before they heard a quick disquisition on adaptive robots by one of the University of Vermont's resident experts, Josh Bongard.

So it goes for technically inclined high school students during the annual Engineering Institute, a heady week full of intellectual challenges and diversions on the UVM campus.

Engineering is just one of seven summer enrichment programs held throughout the summer, and across the state, sponsored by the Governor's Institutes of Vermont. For 330 motivated high school students, the offerings range from arts, Asian cultures and activism to science, math and technology.

Renewable energy and robotics are among the hot topics in the engineering week. Typical activities include a sand-arch-building competition (on beach day, weather permitting) and designing innovative wind turbines.

Bongard, an assistant professor of computer science, regaled 14 students Tuesday afternoon with video clips of his celebrated "starfish" robot, which taught itself how to move -- if not exactly walk -- and then managed to learn how to keep moving after one of its legs was removed.

Creating machines that can adapt to changing conditions is a major focus in robotics these days, Bongard said. It's also a major interest of NASA, which wants to field robots that can keep functioning as they prowl the surface of Mars, say, even after they stumble into something unexpected, or fall off a cliff.

The starfish, which Bongard developed with colleagues at Cornell, essentially was programmed to be curious -- in that it considered all possible ways to move before choosing one and rejecting the others. That a machine could go through such a selection process suggests a form of consciousness, Bongard said. And what's especially stimulating about adaptive robotic research, he said, is that it's interdisciplinary, drawing from biology, psychology, neuroscience.

He also showed a clip of a robot known as "Big Dog," walking on four legs through woods and snow, slipping on ice.

After the lecture, Chambers, 17, of Fairfax, Va., and Welch, 16, of Duxbury turned their attention back to their own creation.

Their assignment, as Chambers described it, was "to build something that would help people do something."

They settled on a trash-picking device, which they were hoping would be adaptive in its own way. It was equipped with one sensor that's supposed to make it avoid obstacles as it moves across a floor, and another sensor to detect objects to be picked up with a kind of claw and then deposited in a receptacle.

That was how it was supposed to work, anyway.

"We still have to program it," Welch said.