

Creating Ag Robots to Aid Farmers, Environment

University of Illinois agricultural engineers have developed several ag robots. The robots are completely autonomous, directing themselves down corn rows, turning at the end and then moving down the next row, said Tony Grift, University of Illinois agricultural engineer.

The long-term goal, he said, is for these small, inexpensive robots to take on some of the duties now performed by large, expensive farm equipment. As Grift asked, "Who needs 500 horsepower to go through the field when you might as well put a few robots out there that communicate with each other like an army of ants, working the entire field and collecting data?"

One of the robots being developed is a foot-long "Ag Ant," which is being designed to walk through crop rows on mechanical legs. Built for only \$150, these cheap robots could someday be used to form a robotic strike force.

"We're thinking about building 10 or more of these robots and making an ecosystem out of them," Grift said. "If you look at bees, they will go out and find nectar somewhere. Then a bee will go back and share this with the group and the whole group will collect the food. Similarly, one robot might find weed plants. Then it would communicate this location to the other robots and they would attack the plants together as a group--an ecosystem, if you will."

In addition to the Ag Ant, Grift and Yoshi Nagasaka, a visiting scholar from Japan, developed a more expensive, high-tech robot for about \$7,000. This robot guides itself down crop rows using a laser mounted in front to gauge the distance to corn plants.

Meanwhile, Grift and Matthias Kasten, an intern from Germany, have built yet another robot, this one for roughly \$500. The robot is equipped with two ultrasonic sensors that bounce sound waves off of objects, as well as four of the cheap infrared sensors used in simple motion detection sensors.

These low-budget robots maneuver down crop rows using what Grift calls "the drunken sailor" approach. The robot drifts to the left, senses a corn plant, then steers off to the right, senses another plant and steers back to the left. As a result, the robot weaves its way between the rows.

To make turns at the end of a row, sensors detect when crop rows end and then signal the robot to turn.

Grift would like to someday see an experimental farm where all of the work is being performed by autonomous robots. And he said the logical place for such an ambitious farm would be Illinois. But right now, they're simply focusing on navigation skills for the robots. Eventually, these robots could be equipped to perform duties such as detecting disease, weeds, or insects; sampling soil; or even applying pesticides.

"Instead of applying all of this spray that might drift everywhere, a robot could actually 'spit' chemical at the plant with great precision, using a very small amount of chemical," Grift said.



College of Agricultural,
Consumer and
Environmental Sciences

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Source: Tony Grift (217- 333-2854; grift@uiuc.edu)