



Robots go head to head

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Helios, the winning robot at Field Robot, 2007 a competition designed to test the capability of robots to complete agriculturally related tasks in the paddock.

Right now a small revolution is taking place. A new breed of robots will soon be able to carry out a variety of tasks such as inter row weeding, spraying and disease monitoring. The Field Robot Event held at Wageningen, Netherlands in June gives research teams from across the globe the opportunity to compete and demonstrate the capabilities of completely autonomous robots working in the field.

First held in 2003; Field Robot Event has become a regular date on the calendar.

Field Robot is not the only robot design contest the world, perhaps the most famous is the student design competition of the Massachusetts Institute of Technology (MIT), however, there are several unique elements to the Field Robot Event. These include:

- The robots are operating outdoors, in an harsh and unstructured environment with varying light and climatic conditions;
- The robots are not attacking each other, but competing in an Olympic manner to identify the best;
- The choice of components is not limited to a standard kit to allow unhampered creativity;
- The cost/performance relation of the robots is taken into consideration;

In 2007, 10 Field Robot teams from Germany, Finland, Denmark and Japan competed in the event. The judges, five eminent research and commercial engineers from Germany and Holland, scored each robot on its execution of four tasks. Points were also awarded for producing a robot for less than \$6656 (€4000) with additional points for every \$830 (€500) under this budget.

The tasks are all about speed, accuracy, robustness of navigation and smoothness of operation. These robots are self-propelled and total autonomous. They use sensors to gather data; this data is processed to enable a predefined task to be completed. Robots competing in the 2007 event weighed between 3 and 20kg, with a ground clearance of between 50 and 120mm.

The four tasks involved the intelligent robots navigating courses and completing tasks in a mini paddock of maize (2.4m by 2.4m). The maize was planted at 30cm row spacing and plants were between 16 and 30cm tall. The robots were allowed to touch but not damage the crop.

The first task was to navigate between curved rows of maize, making a turn on the headland and returning down the adjacent row.

The second task was advanced navigation in straight rows with plants

missing. The robot was required to make left and right hand turns on the headland, recovering ground to return to the finishing point. The navigation path was pre-coded into the robot and as with all tasks the time limit for completion was three minutes.

Task three involved weed control. The robot had to cover as much distance within three minutes, while navigating between straight rows of maize plants and detecting randomly distributed artificial weeds – represented by yellow golf balls. These were placed within 5 to 7cm of the stems of the maize plants. Detection of a 'weed' had to be demonstrated by producing a clear signal such as a flashlight or a sound and a 'weed-killing' operation was performed on the 'weed'.

The fourth task was the opportunity for robots to perform a free-style operation that was of agricultural relevance.

This year Germany took top honours with Helios from the Technical University Braunschweig, with second place going to Ameizing from the University of Applied Sciences, Osnabrück. The host, Wageningen University came third with Forward Thinking.

For more details including the winners of the junior event and plenty of photographs visit www.fieldrobot.com