Autonomous Robot Swarm - CS4500 Project Pitch

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Goal

Develop a working example of a simple robot swarm (n>8), building upon existing technologies, adding some new algorithms and hardware. Robots are heterogeneous yet share the same code. Use simple, low cost Lego Technics and Mindstorms for the chassis and most of the sensors and motors, and JCX Java electronics for the brains.

Description

Systronix has been developing a specific implementation of embedded Java, aimed at the university-level educational market. This includes, but is not limited to, robotics. We are searching for a compelling and useful demonstration of these robots. An actual implementation (vs the typical software simulation) would serve as tangible proof of the concept of easy-to-program, affordable, yet powerful, Java-based robotics hardware.

This project will be hosted and posted in the robotics community at java.net. Java.net is the 150,000 member community sponsored by Sun and O'Reilly. It may also be used in a book. This project code and documentation is intended to serve as the base application for researchers who will be elated to find affordable, practical hardware and sofware for swarm and emergent behavior research.

Details

1. PC-based development environment
   a) Windows and parallel port required for loading/debugging DLL, JTAG port to target
   b) Eclipse with CVS, Ant for build management
   c) All Java code, running on native-execution hardware (3 million byte codes per second)
   d) Javadoc and supporting HTML pages
2. Robot hardware & software
   a) Lego Technics and Mindstorms
      - Geared DC motors
      - Touch, light, rotation sensors
   b) Other sensors and motors
      - R/C servos are possible
      - Sonar and IR rangefinders
      - CMUcam color vision sensors
   c) Software/firmware
      - All robots will share the same code base, developed by the team
      - Robots are heterogeneous – different mechanics and electronics
      - Tagging of each I/O point makes this possible

Perks & Publicity

The project and team(s) will be highlighted at java.net -- great exposure with other developers and employers.

There will be a JavaOne robotics area as part of the java.net pavilion, May 15-18 in San Francisco. If the project is a resounding success Systronix may sponsor 1-2 students to attend the conference and represent the project on the pavilion floor. Partial sponsorship in the form of travel/lodging may be available for the whole team.

Systronix has submitted a JavaOne presentation on this topic. Sun will be announcing the winners in February. If this talk is accepted, the same student(s) who appear in the pavilion could become co-authors (there are at most three authors per presentation).

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