The Scarabs RoboCup 2002 Rescue Robot Team

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In the fall of 1999, a group of high school and junior high students from Los Angeles took on the enormous challenge of competing against some of the top robotics and artificial intelligence researchers in the world in the RoboCup middle (F2000) league. After over two years of hard work, funded on a shoestring budget (mostly out-of-pocket), the Scarabs team: field-tested a color-tracking system at RoboCup 2000 in Melbourne, Australia; designed and built a prototype vehicle and omnidirectional vision system; and successfully demonstrated this vehicle / vision system combination in the Rescue Robot competition at RoboCup 2001 in Seattle, Washington.

The goals of the Scarabs RoboCup team are: to build viable robots at minimal cost; to learn about math, computer science, electronic engineering, physics, artificial intelligence, system integration, international relations, character development, and teamwork; to have fun (!); and to make a positive difference.

In light of September 11, creating search and rescue robots has taken on added significance and urgency. We are fielding two radically different robots: an updated version of the prototype we ran at RoboCup 2001; and Morph-Dragon, a sophisticated six-wheeled robot designed to compete on the Robotica television program.(described below). Both robots will use the same vision and control systems.

We have upgraded our custom-built omnidirectional vision system with the Axis 2120 Network Camera (www.axis.com). The 2120 features direct connection with a 10/100 MBit Ethernet network and a built-in Linux web server. This allows a single Ethernet cable for video and robot control, and the future possibility of running Carnegie Mellon University's CMVision color-tracking software inside the camera.

Previous experience has shown that radio interference can be a significant problem, particularly when video transmission is involved. Data transmission will be via an ethernet cable, offering the advantages of: reliability; simplicity; low cost; distance and direction measurement; a guideline for rescuers / victims; and manual robot retrieval.

The cable will be marked at 0.5 m intervals: this will allow the operator to determine how far the robot has traveled simply by counting marks with the omnidirectional vision system. Robot direction can also be determined by observing the direction of cable deployment.

A laptop computer will provide the operator interface. Custom software will make it possible for the robot to be operated and mapped by a single person. The software will consist of three parts: robot control, mapping, and printing.