

Intelligent Autonomous Agents
ICS 606 / EE606
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Agents and Robots in Search and Rescue

- Robocup Rescue project
 - Simulation
 - Robots
- NIST – test arenas for urban search and rescue
- CRASAR – center for robot assisted search and rescue

Robocup Rescue

- RoboCup Rescue <http://www.robocuprescue.org/>
- Simulation 2009 results and software for 2010
 - <http://www.robocup2009.org/217-0-general>
 - <http://www.sf.net/projects/roborescue>
 - <http://sourceforge.net/projects/roborescue/>
- Robotic League
 - http://www.robocup2010.org/competition_RoboCupRescue.php
 - <http://www.robocup2009.org/218-0-general>
- Mailing list
 - <https://lists.cc.gatech.edu/mailman/listinfo/robocup-rescue-s>

Motivation

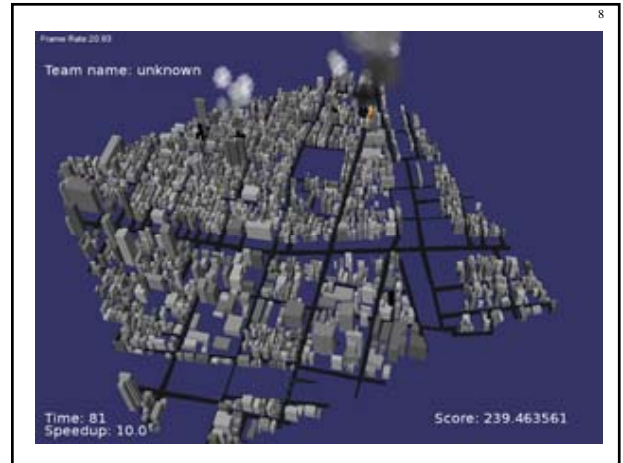
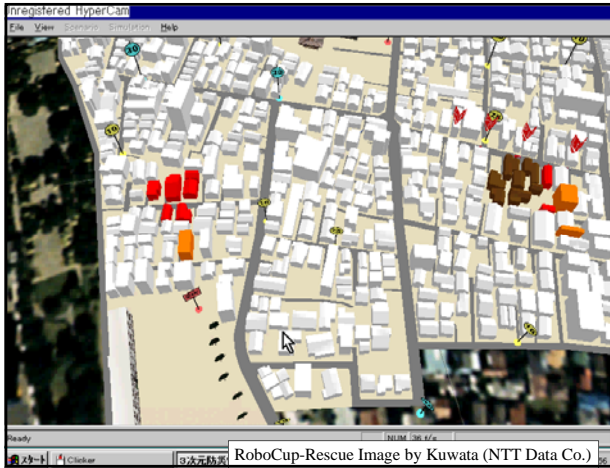
- Large-scale disasters
 - Earthquakes
 - Floods
 - Tropical storms/hurricanes
 - Volcanoes
 - Tornadoes
 - Tsunamis
 - Explosions/bombs/terrorism

Rescue Simulation Leagues

- Simulation league
 - <http://www.robocuprescue.org/agentsim.html>
- Virtual robot competition - new
 - http://www.robocuprescue.org/virtual_competitions.html

RoboCup Rescue simulation 2D display

The screenshot shows a 2D simulation environment of a city street grid. The map is color-coded with green, yellow, and red areas, representing different hazard or search zones. Several small robot icons are scattered across the map. On the right side, there is a control panel with a 'Mission' window showing a vertical bar chart and a 'Task' window with a list of tasks. At the bottom, there is an 'Information' window displaying technical details about the simulation, including the robot's name and location.



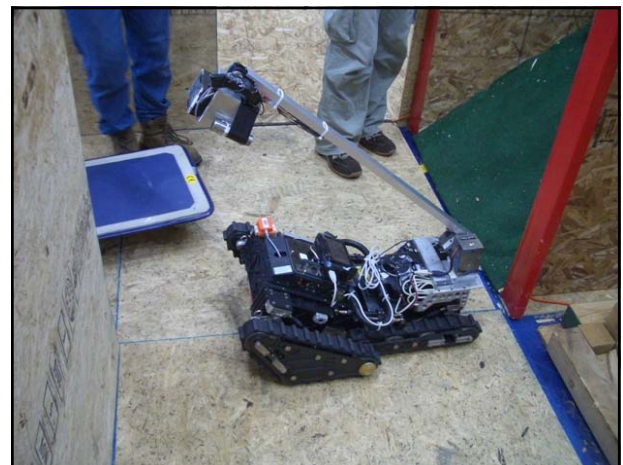
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Rescue Robotics

- Center for Robot Assisted Search and Rescue www.crasar.org
 - Living with robots screened at Sundance <http://crasar.org/2010/01/25/living-with-robots-screened-at-sundance/>
- NIST – standards and testbeds for autonomous mobile rescue robot development
 - <http://www.isd.mel.nist.gov/projects/USAR/>
 - <http://www.isd.mel.nist.gov/projects/USAR/RealityArena/>
- Photos: CRASAR robots at the world trade centers

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Rescue Robot Demonstration





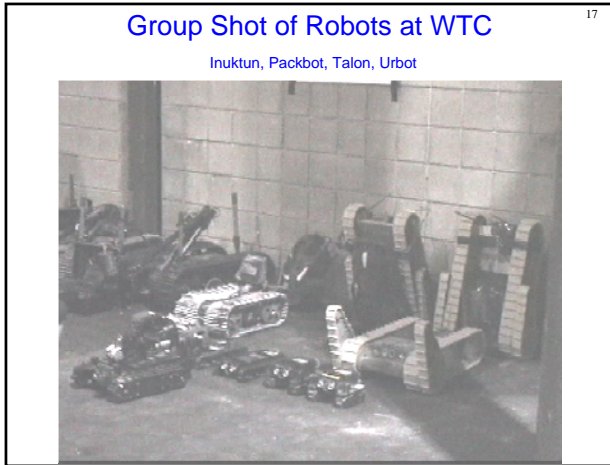
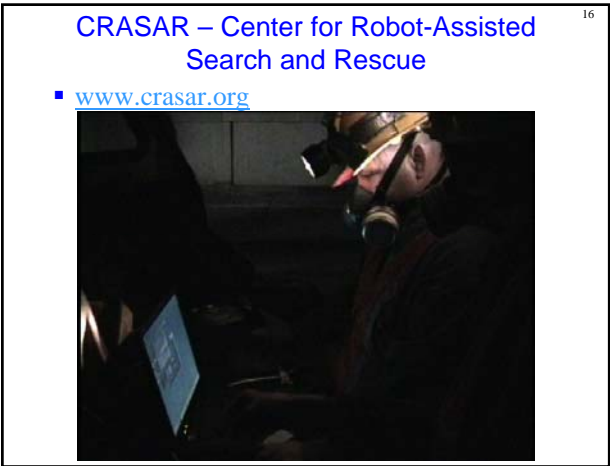
- ### Urban Search and Rescue
- NIST -- National Institute of Standards and Technology
 - Performance Metrics and Test Arenas for Autonomous Mobile Robots
 - <http://www.isd.mel.nist.gov/projects/USAR/>

Rescue Robot Competitions

- <http://www.isd.mel.nist.gov/projects/USAR/competitions.htm>

Labels in diagram:

- HUMAN FORM
- CLOTHING: DUST COVERED OR COLORFUL
- REFLECTIVE TAPE
- LOCATOR STROBE
- VICTIM ID: 6
- CO2 EMISSIONS
- TAPPING
- LOCATOR ALARM
- VOICE
- WAVING ARMS
- MOVING FINGERS
- BODY HEAT





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- ### Search and Rescue Summary
- Robots perfect for areas too dangerous or inaccessible to people or rescue animals
 - Extremely difficult problems
 - real-time responses, autonomous action
 - difficult to collect data and/or communicate
 - coordination of large number of resources
 - Current progress
 - large-scale simulations and competitions sponsored by RoboCup, AAIL, CRASAR, ..
 - robots assisted finding victims at WTC
 - The future
 - Many interesting areas for research

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- ### Credits
- Photos and movies
 - ©RoboCup Federation
 - © NIST
 - ©CRASAR – Center for Robot-Assisted Search and Rescue

