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Exhibit Descriptions

Robots: An Exhibition of U.S. Automatons from the Leading Edge of Research
Highlighting the WTEC International Study of Robotics

TABLE 1

Learning and Attention with a Humanoid Robot Head
University of Southern California
Stefan Schaal
(e-mail: schaal@usc.edu; phone: (213) 740-9418;
Web site: http://www-clmc.usc.edu/~sschaal/)
Laurent Itti
(e-mail: itti@usc.edu; phone: (213) 740-9418;
Web site: http://ilab.usc.edu/itti/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (324 KB)

The USC humanoid robot head shares some functions with human heads. The robot can learn from a human teacher to perform various motor behaviors and can use visual attention mechanisms to focus on interesting objects in the environment. The demonstrated behaviors reflect interdisciplinary research in neuroscience, robotics and computer vision, and serve as building blocks for creating autonomous, full-body humanoid robots.

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TABLE 2

Learning to Walk in 20 Minutes
Massachusetts Institute of Technology
Russ Tedrake
(e-mail: russt@mit.edu; phone: (617) 253-1778;
Web site: http://people.csail.mit.edu/russt/index.html)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (417 KB)

View a clip of the MIT's Bipedal Walking Robot.

MIT's small, bipedal walking robot learns to walk in 20 minutes by taking advantage of walking dynamics. The robot learns with every step it takes, continually adapting to terrain. That learning technology will enable robots to walk more quickly, more efficiently and over more terrain, potentially making robots practical for applications from prosthetics to robotic exploration.

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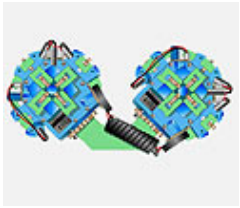
TABLE 3



Molecule Self-Configuring Robots
Massachusetts Institute of Technology
Daniela Rus
(e-mail: rus@csail.mit.edu; phone: (617) 258-75670;
Web site: http://groups.csail.mit.edu/drl/)
Keith Kotay
(e-mail: kotay@csail.mit.edu; phone: (617) 253-6292;
Web site: http://www.cs.dartmouth.edu/~kotay/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (853 KB)

The molecule robot demonstrates how a robot composed of many simple modules can use the property of module relocation to change shape. Module relocation allows the robot to adapt to different tasks and build arbitrary, 3-dimensional structures.

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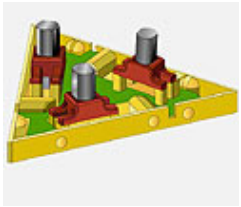
TABLE 4



Self-Assembling Robotics
University of Washington
Eric Klavins
(e-mail: klavins@ee.washington.edu; phone: (206) 616-1743;
Web site: http://faculty.washington.edu/klavins/index.html)
Nils Napp
(e-mail: nnapp@ee.washington.edu; phone: (206) 543-2505)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (634 KB)

View a clip of Self-Assembling Robots.

The exhibit demonstrates approximately 10 self-assembling robots that attach to each other to form larger structures. Attendees will be able to handle the robots--4 inches (10 centimeters) wide, less than a quarter pound (100 grams) in weight--and discover the assembly rules encoded on them. The exhibit will include videos of the robots assembling into structures.

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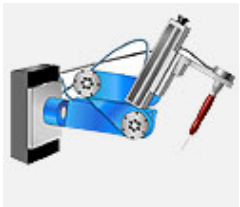
TABLE 5



Systems for Surgical Assistance
Johns Hopkins University
Russell Taylor
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Web site: http://www.cs.jhu.edu/~rht/)
Peter Kazanzides
(e-mail: pkaz@cs.jhu.edu; phone: 410) 516-5590;
Web site: http://cisstweb.cs.jhu.edu/~pkaz/)
Center for Computer Integrated Surgical Systems and Technology (Web site: http://lacuna.cs.jhu.edu/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (431 KB)

This is a demonstration of "steady hand" robotic guidance. Researchers will showcase virtual fixtures for neurosurgical applications such as aneurysm clipping and skull base drilling. Attendees will be invited to have a "hands on" experience with the robot. The exhibit will also show two compact, image-guided robot systems developed for prostate biopsy and brachytherapy applications. Video will show other related activities from the NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technology (CISST).

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TABLE 6

Solar-Powered Autonomous Underwater Vehicle (SAUV)
Rensselaer Polytechnic Institute
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D. Richard Blidberg
(e-mail: blidberg@ausi.org; phone: (603) 868-3221;
Web site: http://www.ausi.org/staff/staff.html#Dick)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (333 KB)

View a clip of SAUV.

Spanning 8 feet in length and weighing roughly 370 pounds, the SAUV is a long-endurance underwater robot that can endure multi-day missions supporting sensory mapping, security and environmental monitoring applications. The robot will be on display along with video showing the vehicle in action.

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TABLE 7

RHex/RiSE
Carnegie Mellon University
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Web site: http://www.ri.cmu.edu/people/rizzi_alfred.html)
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Web site: http://www.ri.cmu.edu/people/skaff_sarjoun.html)
University of Pennsylvania
Daniel Koditschek
(e-mail: koditschek@seas.upenn.edu; phone: (215) 898-9241;
Web site: http://ai.eecs.umich.edu/people/kod/)
Haldun Komsuoglu
(e-mail: hkomsuog@eecs.umich.edu; phone: (215) 898-8576;
Web site: http://www.eecs.umich.edu/~hkomsuog/)
University of California, Berkeley
Robert Full
(e-mail: rjfull@socrates.berkeley.edu; phone: (510) 642-9896;
Web site: http://www.berkeley.edu/news/media/releases/2002/09/rfull/home.html)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (596 KB)

This joint demonstration by researchers from Carnegie Mellon, the University of

Pennsylvania and the University of California, Berkeley, focuses on novel forms of legged locomotion. The collaboration brings together seven research and development groups, including biologists, robotics researchers and industrial robotics developers. The resulting systems exhibit mobility, speed and efficiency not previously seen in the robotics field.

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TABLE 8

COOL Aide: Robotics Assistance for the Elderly
University of Virginia
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Web site: http://www.cs.virginia.edu/~gsw2c/)
Pradip Sheth
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http://www.mae.virginia.edu/faculty/sheth.htm)
Majd Alwan
(e-mail: ma5x@virginia.edu; Web site:
http://marc.med.virginia.edu/people_majda.html)
Cunjun Huang
(e-mail: ch8me@virginia.edu)
Alex Ledoux
(e-mail: afl9e@virginia.edu; Web site: http://www.ledoux.cc/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (487 KB)

View a clip of COOL Aide.

One of the most important quality-of-life factors for older adults is their ability to independently move from place to place. The Co-operative Locomotion Aide (COOL Aide) is a passive, shared control, robotic walking aide that seeks to determine a user's intent and assist the user with movement. This exhibit will show how COOL Aide determines a user's intent from low-level input and how the control system operates without destabilizing its user.

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TABLE 9

COTS-M Scout Robot
University of Minnesota
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Web site: http://www-users.cs.umn.edu/~npapas/)
Andrew Drenner
(e-mail: drenner@cs.umn.edu; phone: (612) 626-7977;
Web site: http://www-users.cs.umn.edu/~drenner/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (517 KB)

View a clip of COTS-M Scout.

The exhibit revolves around a miniature robot--smaller than a soda can--called the COTS-M Scout. Equipped with multiple sensors, including a camera, researchers will throw the robot and then ask it to drive to a particular location and transmit video to a handheld unit. Visitors will be able to drive the robot or monitor an object of interest.

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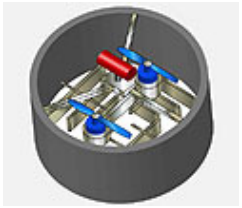
TABLE 10



Aerial Robots
Drexel University
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(e-mail: paul@coe.drexel.edu; phone: (215) 895-6396;
Web site: http://www.pages.drexel.edu/~pyo22/)
William Green
(e-mail: weg22@drexel.edu; Web site:
http://www.pages.drexel.edu/~weg22/)
Keith Sevcik
(e-mail: Keithicus@drexel.edu; Web site:
http://www.pages.drexel.edu/~kws23/home/home.html)
Vefa Narli
(e-mail: vefanarli@yahoo.com; Web site:
http://www.pages.drexel.edu/~vn43/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (698 KB)

The Drexel Autonomous Systems Lab (DASL) researches and develops both manned and unmanned aerial and terrestrial vehicles. DASL's current focus is on sensor suites to fly autonomously in near-Earth environments like forests, buildings, caves and tunnels. The exhibit showcases several flying test beds and DASL's recent work using air and ground robots to identify and extract casualties from disaster areas and battlefields.

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TABLE 11

Mars Exploration Rover
NASA Headquarters
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Web site: http://marsrovers.jpl.nasa.gov/home/)

Credit: *Zina Deretsky, National Science Foundation*
Download the high-resolution JPG version of the image. (814 KB)

NASA's twin robot geologists, the Mars Exploration Rovers, launched towards Mars on June 17, 2003, in search of answers about the history of water on Mars. They landed on Mars January 24 PST (January 4 and 25 UTC). The Mars Exploration Rover mission is part of NASA's Mars Exploration Program, a long-term effort of robotic exploration of the red planet. The full-scale Rover replica from NASA Headquarters will be on display.

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