Robotics

Carnegie Mellon To Develop Autonomous Capability for "Flying Car"

The Defense Advanced Research Projects Agency (DARPA) has awarded a 17-month, $988,000 contract to Carnegie Mellon's Robotics Institute to develop an autonomous flight system for the Transformer (TX) Program, which is exploring the feasibility of a military ground vehicle that could transform into a vertical-take-off-and-landing (VTOL) air vehicle. The TX vehicle envisioned by DARPA would be capable of transporting four people and 1,000 pounds of payload up to 250 nautical miles, either by land or by air. Its enhanced mobility would increase survivability by making movements less predictable and would make the vehicle suitable for a wide variety of missions, such as scouting, re-supply and medical evacuation.

Carnegie Mellon's Robotics Institute has been a world leader in basic and applied research in the field of robotics since 1979. The institute takes a broad view of robotics: it builds robots for planetary exploration, robots that crawl through pipes and over rough terrain robot arms, minifactories, grippers, sensors and controllers. But it also works on speech understanding, process scheduling, data mining, traffic safety and many more things that don't exactly look like robots. At the institute's National Robotics Engineering Center, scientists are building robot forklifts, ship-cleaning robots and other devices for prompt commercial application. Other work is more conceptual, and may take longer to find practical use, but will undoubtedly have major impact on life in the future.

Field Robotics Center: The area of field robotics involves mobile robots operating in natural terrain. These robots must learn about their surroundings and safeguard themselves while performing tasks and objective sensing as well as self-navigation in random or dynamic environments. Projects at the Field Robotics Center include robots that can map mines and explore harsh planetary environs.
www.frc.ri.cmu.edu

MERITS of Pittsburgh: This center performs basic and applied research in computer-assisted surgery, smart medical and diagnostic tools, 2D and 3D medical image analysis and informatics, rehabilitative and prosthetic devices, assisted living and preventive health care equipment and continuous health care process improvement. Much of its research involves partnerships with a variety of regional medical centers and biotechnology corporations.
www.ri.cmu.edu/centers/mrcas

Center for Integrated Manufacturing and Decision Systems: CIMDS is an eclectic collection of people, projects and labs involved in research in the fields of manufacturing; visualization and interfaces; intelligent coordination and logistics; intelligent sensors, measurement, and control; and artificial intelligence.
www.ri.cmu.edu/centers/cimds

National Robotics Engineering Consortium: Founded in 1994, with a $2.5 million grant from NASA, NREC's mission is to commercialize the mobile robotics technologies that NASA has developed by working with

Carnegie Robotics LLC

Carnegie Mellon University has launched a new firm, Carnegie Robotics LLC, which will develop, manufacture and service robotic components and systems in partnership with the university's highly successful National Robotics Engineering Center (NREC). Carnegie Robotics will create products based upon technology licensed from the NREC, an arm of Carnegie Mellon's Robotics Institute that performs applied research and prototype development for industrial and government organizations. John Bares (right), director of the NREC since 1997, has taken a leave of absence from the university to lead the startup company.

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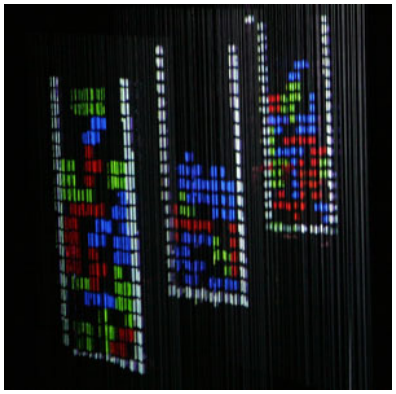

Multi-Layered 3-D Imaging on Water Surfaces

AquaLux 3D, a new projection technology developed at Carnegie Mellon University's Robotics Institute, can target light onto and between individual water droplets, enabling text, video and other moving or still images to be displayed on multiple layers of falling water. In contrast to existing technologies for projecting images onto water surfaces, AquaLux 3D makes it possible to create three-dimensional images in water by using multiple layers of precisely controlled water droplets. By combining the droplets with clouds of mist, it would be possible to create unique 3-D effects for theme parks, exhibitions and interactive games that don't require special eyeglasses to view.

American industry. Currently, NREC has nearly 20 projects ranging from autonomous farming equipment to robots that inspect and repair gas lines without disturbing gas flow. *www.rec.ri.cmu.edu*

Vision and Autonomous Center: Computer vision, autonomous navigation, virtual reality and space robotics are the areas explored by the 100 faculty, staff and students here. A vision-guided autonomous helicopter that can help law enforcement officials in mapping, surveillance and search-and-rescue operations is one of the premier projects developed at this center. *http://vasc.ri.cmu.edu*

Space Robotics Initiative: The SRI is developing robots and their support technologies (communication, manipulators and multiple robot coordination) for interplanetary exploration, space solar power station construction and MRO and solar-powered space flight. Some projects include Autonomous Rover Technologies; pursuing insights in fundamental aspects of robot perception; navigation; position estimation; integrated exploratory science from a robot; and the "Icebreaker" Lunar Ice Discovery Initiative, a proposed mission to explore the south pole of the Moon. *http://www.ri.cmu.edu/centers/sri*

Advanced Mechatronic Laboratory: Research within the AML focuses on the idea of Rapidly Deployable Intelligent Systems. The main threads of this research are composition, collaboration, task management and adaptation; current research focus includes adaptable software, distributed information systems, distributed robotics systems, intelligent instruments and interactive robot programming. www.cs.cmu.edu/~aml

Tele-Supervised Autonomous Robotics: In January 2004, NASA established a long-term program to extend human presence across the solar system, a primary goal of which will be to establish a human presence on the moon no later than 2020, as a precursor to human exploration of Mars. A central concept of this vision is that future space exploration activities must rely on human and robotic capabilities combined in order to achieve a long-term, well-orchestrated campaign of space exploration. In order to meet these technological challenges, systems which support safe human supervision of fleets of task-oriented robots will be a necessity for future space exploration. T-SAR's research focuses on providing end-to-end tools for human telesupervision of autonomous robots in support of sustained, affordable and safe space exploration. *www.ri.cmu.edu/labs/lab_72.html*

Intelligent Software Agents Laboratory: The ISAL envisions a world in which autonomous, intelligent software programs, known as software agents, undertake many of the operations performed by human users of the World Wide Web, as well as a multitude of other tasks. The Software Agents Lab has developed the RETSINA multi-agent system infrastructure and has applied that infrastructure and its agents to many domains, including financial portfolio management; personalized Web information management; book-buying auctions; logistics planning in military operations; and wireless, mobile communications, to name a few. *www.cs.cmu.edu/~softagents*

Manipulation Laboratory: The goal of the Manipulation Lab is autonomous robotic manipulation in the presence of uncertainty, that is, the production of robots that can perform a variety of tasks in the physical world, ranging from industrial assembly to everyday chores. Examples include pre-positioning parts for camcorder assembly to sorting papers on a desktop. Practical issues addressed by the lab's research include: What are the fundamental mechanics of manipulation? How can a robot construct a plan to achieve specified goals? How can minimal sensor information be used to achieve tasks? *www.ri.cmu.edu/labs/lab_9.html*

Microdynamic Systems Laboratory: The MSL is exploring the limits of robotics in terms of speed, precision, dexterity and miniaturization. This endeavor requires development of new sensing, actuation and control technologies for agile robotic systems that can be applied to a variety of real-world situations. Major themes of the work include moving toward robotics operating at or below the micrometer scale, simplifying robotic mechanisms while providing greater functionality through software and providing new ways for humans to interact with the world through robotics. Examples include sensor-moderated coarse-fine manipulation, miniature factories for precision assembly, magnetic levitation haptic interfaces that allow humans to interact with remote or simulated environments through the sense of touch, dynamically-stable mobile robots for human environments and high-speed walking machines. *www.msl.ri.cmu.edu*

NASA Delivers $500,000 to Astrobotic Technology for Moon Mission

Carnegie Mellon University spin-out Astrobotic Technology has received the first $500,000 task order from the $10 million contract that NASA awarded the company in October. The order will help the company design, build and test the primary structure for its lunar lander. With the addition of engines, electronics and departure ramps, this lander will carry Astrobotic's robotic rover to the Sea of Tranquility landing site of Apollo 11 in 2013.