

National Robotics Engineering Center Demonstrates the Future of Smart Work

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Operator monitoring 3D image of excavation area

Caisson 3D Modeling Command Center. Image: Carnegie Mellon NREC

The National Robotics Engineering Center, (NREC) at Carnegie Mellon University is at the forefront of partnering man with technology to improve safety and costs. Among the completed projects are, the Caisson Construction 3D Modeling system used in the construction of the Nagasaki Bay Bridge, the Micro-Inertial Navigation Technology (MINT) a satellite free tracking system and a Strawberry Plant Sorter for California's growers.

The Caisson Construction 3D Modeling system:

The NREC developed the Caisson 3D Modeling system for the Kajima

Corporation to support the placement of a 42-meter deep caisson in solid bed rock in order to construct the Nagasaki Bay Bridge. The specifications included the ability to see through dust and effectively map and display the interior of the caisson digging area to personnel operating below ground.

According to NREC the Caisson 3D system improved safety in the construction of the bridge and reduced labor costs by employing tele-operations during the caisson cutting and removal process. The system's efficiency replaced the often time dangerous task of inspectors entering pressurized excavation sites to perform the same job.

Micro-Inertial Navigation Technology, (MINT):

The MINT tracking device technology is attached to the inside of shoes or boots and tracks every step a person makes. The primary use of MINT is for use in combat, first responder work and the entertainment industry where satellite or GPS service is unavailable. The apparatus includes a pair of inertial measurement units and miniature radar antennas. A command center is transmitted the location of every user by a portable wearable computer. The energy use is minimal and only requires the act of walking to power the unit. NREC is developing the navigation algorithms and the test hardware. Carnegie Mellon's [Electrical Engineering](#) Department is developing the miniaturized sensors.



First responders and soldiers could be located at all times with MINT.

MINT will operate in buildings, under tree canopies, underground and virtually anywhere GPS isn't available. In particular, MINT will be able to track and coordinate personnel in caves, and heretofore no visibility locations in the operation and planning of missions or rescue efforts. Rescue efforts in mine and other disasters could be coordinated more efficiently if affected personnel and rescuers are equipped with the technology. According to NREC, the technology is aimed to improve the all important element of time in subterranean rescue efforts.

Strawberry Plant Sorter:

Lassen Canyon Nursery and other commercial suppliers representing 80-percent of all strawberry producers in California support NREC's development of an automated strawberry plant sorter. Lassen Canyon Nursery, and large strawberry grower Driscoll's Berries with farms around California supply the bulk of new strawberry plants to commercial producers.

The high-tech sorter is designed to streamline the harvesting process and provide consistent quality control of product. Sorting quality plants from low quality damaged plants is the most labor-intensive and costly part of the process for producers.

The vision system developed by NREC examines the rootstock of strawberry plants and sorts them according to size and quality using data sets of harvested plant images. The system uses air jets to sort the plants into three bins based on their classification. The good product bin is released for packaging and shipping to customers. The bad product bin is discarded and the borderline product bin is sent to a human inspector for

a final decision. NREC successfully demonstrated the Strawberry Sorter vision system resulting in a buy-in from a significant segment of all California strawberry growers.

More information: For further reading about NREC:
www.rec.ri.cmu.edu/

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