From Wearable to Wireless On the Construction Site

From wearable devices and multi-rotor unmanned aerial vehicles (UAVs) to speedy robotic-like layout solutions and augmented reality construction apps, the world of construction as we know it is undergoing a considerable technology revolution.

Fran Rabuck, technology/strategy research analyst speaking at Fiatech's recent "Creating the Future" webinar, highlighted some of the year's truly transformative technology advancements that he believes could make a difference in the construction industry. Of note, he believes the phone is going to become "the front and center piece on the jobsite, the controlling piece of the Internet of Things movement," with faster processing speeds, multiple cameras and impressive user interfaces.

He also believes wireless charging stations are worth a second look. During the webinar, he said, "We're entering an era where we'll be able to unplug our phones. I strongly recommend that contractors look into the locked box charging station for a construction site."

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Of course, UAVs are also part of his conversation—and not just the multi-rotor variety currently available for surveying and inspection. Follow-me and wearable drones with built-in cameras are a big hit in the consumer market. For instance, Nixie is a wearable drone that straps to your wrist ready for flight at a moment's notice. Rabuck suggested, "Perhaps a wearable drone could be part of a contractor's toolbox used to reach and take pictures in high places on a project site minimizing the chance of injury?"

Researchers are also actively building construction-specific solutions. For instance, the Bridge-MINDER, a minimally invasive robotic non-destructive evaluation and rehabilitation robot for bridge decks, is under development by robotics researchers at Rutgers University in New Jersey and Texas A&M University (TAMU). The Bridge-MINDER is expected to reduce bridge maintenance cost and minimize public inconvenience by minimizing bridge closures. Rutgers recently completed some early field work and demonstration of the robot with several transportation agencies and expects to have a fully functioning robot by 2017 or sooner.

As part of the National Robotics Initiative, another group of researchers is using bats as an inspiration to develop the design and implementation of a prototype 30-80 cm bat-like robot that will be augmented with perception and reasoning abilities. The purpose of the bat-like robot, according to the development team at Brown University and the University of Illinois at Urbana-Champaign, will be to provide support for construction site activities such as site monitoring, inspection and general surveillance of the work site to provide image data to enhance situational awareness of human workers. They say the robot will be equipped with sensing systems and planning algorithms, to facilitate localization, mapping, inspection and surveillance at construction sites.

Augmented reality is also continuing to evolve for the construction industry. The BIMAnywhere augmented reality mobile app is already helping project teams access "live" virtual models on jobsites for installation checks and conflict resolutions.

Researchers at Georgia Tech's School of Building Construction, led by Dr. Javier Irizarry, P.E., an associate professor and director of the CONECTech Lab, are working to further understand the benefits, technical challenges and possible applications of BIM-based mobile augmented reality for architecture, engineering, construction and facility management (AEC+FM) applications, as well as the implications of unmanned aerial systems (UAS) integration in the AEC+FM industry.

The Georgia Tech team is working with the Georgia Dept. of Transportation to evaluate the potential uses of UAVs for highway construction and monitoring. Dr. Irizarry adds, "Beyond transportation, we are also looking at UAVs for safety management and construction management applications. We're also particularly excited about our research in the use of wearable devices such as Google Glass and smart watches for AEC+FM applications."

Dr. Irizarry imagines a day in the very near future when project managers will be able to collect and disseminate real-time data to the jobsite through small, powerful devices. The technology is here...just waiting to be put to work. ■