PRESS RELEASE

From the University of Illinois Information Trust Institute

Information Trust INSTITUTE

New Emergency Response Technology Demonstrated by Boeing

University of Illinois model airplanes, built from Hobbico kits, stand ready for the technology demonstration at Edwards Air Force Base.

A newly developed wireless multi-hop technology is set to dramatically improve the ability of emergency services personnel to obtain reliable, high-quality video footage from surveillance aircraft and combine it in real-time with other types of incoming data, thus providing them with a potentially crucial new grasp of relevant information during crisis situations. Boeing Research & Technology, the advanced research and development organization at Boeing, recently staged a demonstration of the new technology, which was developed by Boeing researchers in conjunction with Professor Natasha Neogi of the Information Trust Institute (ITI) at the University of Illinois at Urbana-Champaign. Dr. Jae H. Kim of Boeing Research & Technology led the research project as Principal Investigator and Program Manager. The research that resulted in the development of the new technology was funded by the U.S. Office of Naval Research.

The new technology makes it possible to communicate via mobile ad hoc networks (MANETs) that may form and break apart in unpredictable ways, while still maintaining trustworthy connectivity. That approach is unlike current surveillance technologies, which place heavy reliance on ground units controlled from a centralized point of command. The new technology instead allows decentralized control among a scattered group of communicating nodes, which could include both stationary and mobile units on the ground as well as airborne networks of uninhabited aerial vehicles.

The Boeing demonstration, which took place April 23 at the NASA Dryden Flight Research Center at Edwards Air Force Base in California, presented the new technology to an audience that included representatives of the U.S. Office of Naval Research. The demonstration used a network consisting of stationary and mobile units on the ground, including small roving carts carrying small mobile routers, and an airborne network consisting of radio-controlled model planes that were built from kits produced by Hobbico, Inc. of Champaign, Illinois and piloted by Hobbico employees. The researchers then broadcast video among the various nodes on the network, and found that the stationary and roving carts were able to receive good-quality video data from the planes at any time, even when some network links were broken.

The technological innovation consisted of taking protocols that were originally designed to work in static

situations with earthbound units, and altering them in an online fashion so that they would work in dynamic situations involving aerial vehicles as well as ground units. Such dynamic situations have much worse connectivity than static situations, making video transmission much more difficult.

Neogi says that the new technology should have great value for some applications, particularly in the context of search and rescue missions. “Firefighters could maintain situational awareness of a fire in progress, including the positions of other firefighters and resources, by obtaining information from handheld units,” she explains. “‘Bird’s-eye-view’ video footage provided by small aircraft drones could be made available to them, along with data provided from other perspectives on the scene, such as small cameras installed on firefighters’ hats.” The technology could have even greater value in the context of a larger disaster, like an earthquake, where rescuers might otherwise have difficulty negotiating partially impassable road systems or avoiding downed power lines. “That was a big problem in Hurricane Katrina,” Neogi points out. “They weren’t able to coordinate air and ground coverage during the rescue operation.”

Neogi, who is an expert in aerospace systems and control, holds appointments in the Department of Aerospace Engineering and the Coordinated Science Laboratory as well as the Information Trust Institute at Illinois. She is also co-leader of a project studying theoretical safety assurance and security assessment in the Information Trust Institute’s Boeing Trusted Software Center.

About the Information Trust Institute (ITI)

The Information Trust Institute is a multidisciplinary cross-campus research unit housed in the College of Engineering at the University of Illinois at Urbana-Champaign. It is an international leader combining research and education with industrial outreach in trustworthy and secure information systems. ITI brings together over 90 faculty, many senior and graduate student researchers, and industry partners to conduct foundational and applied research to enable the creation of critical applications and cyber infrastructures. In doing so, ITI is creating computer systems, software, and networks that society can depend on to be trustworthy, that is, secure, dependable (reliable and available), correct, safe, private, and survivable. Instead of concentrating on narrow and focused technical solutions, ITI aims to create a new paradigm for designing trustworthy systems from the ground up and validating systems that are intended to be trustworthy. www.iti.illinois.edu

About Boeing

Boeing is the world’s leading aerospace company and the largest manufacturer of commercial jetliners and military aircraft combined. Through its Boeing Research & Technology organization, the company conducts its own research and development and also works with top government, private, and university research centers and companies throughout the world to find the most innovative and affordable technology solutions for aerospace applications. www.boeing.com

About Hobbico

Hobbico, Inc., which is located in Champaign, Illinois, is the largest retail and wholesale distributor of radio-control hobby products in the world. www.hobbico.com

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