Protecting electronic information from theft, abuse research goal

April 9 2007

Learning to design computers so that personal and security information can be protected from theft or abuse is the goal of Virginia Tech College of Engineering researcher Patrick Schaumont, who has received a National Science Foundation Faculty Early Career Development Program (CAREER) Award.

Schaumont, an assistant professor in the Bradley Department of Electrical and Computer Engineering, recently secured the five-year CAREER grant, which is worth $400,000 and is NSF's most prestigious award for creative junior faculty who are considered likely to become academic leaders of the future.

"An increasing amount of personal and private information is stored in electronic form on portable computers," said Schaumont, who directs the Secure Embedded Systems Group at Virginia Tech. "This ranges from the access codes used by the electronic key fob that unlocks your car to the high-resolution photograph of your signature encoded on your electronic passport."

Electronic information can be "locked" — or made unreadable — by encryption with a selected key, and it can be restored only by employing decryption with a correct and matching key, Schaumont explained. However, encryption and decryption were introduced during the days of large mainframe computers to protect information during transmission, not during storage.

“Many computers today are so small that we carry them around and often lose them,” he said. “Who hasn’t lost a credit card, a cell phone, a PDA or a laptop? And computers of all sizes can be stolen. The way we use computers everyday is changing, so we need to rethink how to safely store information.”

A radio-frequency identifier (RFID) is another example of a small embedded computer used for information storage. “RFIDs are the wirelessly readable electronic tags that stores attach to clothes so an alarm sounds if someone tries to walk out without paying,” Schaumont said. “They can also be used to store private information, such as the code that opens a car lock.”

The major goal of Schaumont’s CAREER project is to develop a methodology that computer designers can use to create secure embedded system designs. In addition to protecting information in cell phones, RFIDs and other embedded systems, solving the problem of security would protect copyrighted materials, such as songs and movies in portable players, and intellectual properties, such as embedded software.

Each CAREER project has an educational component. Schaumont plans to use his research in computer engineering courses to train students in hardware-software co-design, which is the combined development of hardware and software components in an embedded system. Software that will be developed as part of the project will be made available to other engineering schools for use in similar courses, he said.

Source: Virginia Tech