Summer 2016 Seminar Series

SECURING EMERGING SHORT RANGE WIRELESS COMMUNICATIONS

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Short-range wireless communication technologies have been used in many security-sensitive smartphone applications and services such as contactless micro payment and device pairing. In this talk, I will present two novel secure short-range communication systems -- SBVLC and PriWhisper. The first system, SBVLC is a secure system for barcode-based visible light communication between smartphones. As an alternative to NFC technology, 2D barcodes have been increasingly used for security-sensitive applications including payments and personal identification. However, the security of barcode-based communication in mobile applications has not been systematically studied. Due to the visual nature, 2D barcodes are subject to eavesdropping when they are displayed on the screen of a smartphone. We formally analyze the security of SBVLC based on geometric models and then propose two secure data exchange schemes. The second system, PriWhisper is a keyless secure acoustic short-range communication system tailored for smartphones. It is designed to provide a software-based solution to secure mobile communication without pre-sharing secret keys. PriWhisper explores the friendly jamming technique from radio communication for data confidentiality. The security of PriWhisper is analytically analyzed in terms of (in)separability of the data and jamming signals against blind signal segmentation attacks. We also demonstrate AcousAuth -- a novel smartphone empowered mobile application for personal authentication, built on top of PriWhisper.

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Kui Ren is a professor of Computer Science and Engineering and the director of UbiSeC Lab at State University of New York at Buffalo. He received his PhD degree from Worcester Polytechnic Institute. Kui's current research interest spans Cloud & Outsourcing Security, Wireless & Wearable Systems Security, and Mobile Sensing & Crowdsourcing. His research has been supported by NSF, DoE, AFRL, MSR, and Amazon. He received UB SEAS Senior Researcher of the Year Award in 2015, Sigma Xi/IIT Research Excellence Award in 2012, and NSF CAREER Award in 2011. Kui has published 160 peer-review journal and conference papers and received several Best Paper Awards including IEEE ICNP 2011. He currently serves as an associate editor for IEEE Transactions on Dependable and Secure Computing, IEEE Transactions on Mobile Computing, IEEE Wireless Communications, IEEE Internet of Things Journal, and IEEE Transactions on Smart Grid. Kui is a Fellow of IEEE, a Distinguished Lecturer of IEEE, a member of ACM, and a past board member of Internet Privacy Task Force, State of Illinois.

Hosted by: Dr. Gary Leavens