

Dissertation press release

7.9.2020

How to improve security mechanisms with implicit information

Title of the dissertation	Security from Implicit Information
Contents of the dissertation	<p>This dissertation leveraged implicit information extracted from sensor data to address existing issues of conventional security mechanisms. It designed and implemented: continuous on-body device pairing, collaborative inference over wireless signals, user authentication with transient image-based passwords, and device-to-device communication based on vocal commands.</p> <p>We witness the increasing popularity of smart devices equipped with built-in sensors. We leveraged the movement of human body, including locomotion activities and subtle motion caused by the heart, to design secure pairing protocols for these devices. To aggregate data from the smart devices, the superimposition of wireless signals was utilized to implement an implicit data perturbation. Based on that, an optimization algorithm was designed to train a classification model distributed across resource-constrained devices.</p> <p>Smart devices frequently interact with human. We proposed novel mechanisms to let them authenticate their legitimate users and establish the secure connection to each other. We analyzed the video captured by wearable cameras to generate always-fresh and personalized authentication challenges. Our method released users from the burden of changing passwords regularly, as well as preventing shoulder-surfing and smudge attacks. We introduced and evaluated a system that analyzed vocal commands and ambient sounds to initiate the secure communication between smart devices. Our approach was a natural and secure mechanism to connect personal devices and shared appliances.</p>
Field of the dissertation	Networking Technology
Doctoral candidate	Le Nguyen Ngu Nguyen, M.Sc.
Time of the defence	18.09.2020 time 17:00 EEST
Place of the defence	Via remote technology https://aalto.zoom.us/j/6549167529
Opponent	Professor Veljko Pejovic, University of Ljubljana, Slovenia
Custos	Professor Stephan Sigg, Aalto University School of Electrical Engineering, Department of Communications and Networking
Electronic dissertation	https://aaltodoc.aalto.fi/handle/123456789/46392
Doctoral candidate's contact information	Le Nguyen Ngu Nguyen, Department of Communications and Networking, le.ngu.nguyen@aalto.fi +358469518173