UNIVERSITY OF SOUTH FLORIDA

Defense of a Doctoral Dissertation

Leveraging Channel State Information to Localize and Pair Wireless Devices

by

Abed Alanazi

For the Ph.D. degree in Computer Science and Engineering

Abstract: The availability of channel state information (CSI) may enhance the security of the IoT pairing process without requiring any overhead equipment or sensors. Leveraging CSI may help to distinguish between indoor and outdoor connections. In this presentation, we present a new system that utilizes CSI to establish a secure pairing protocol. This system localizes the devices requesting to pair before acceptance of that connection. First, we built machine learning models to distinguish and localize devices based on the pattern of CSI. The best-known accuracy of identifying the pairing device's location (indoor vs. outdoor) is 96.24% (AUC=0.993). Also, we built a hierarchical deep learning model that detects attacks in the first level and then precisely detects the location of indoor packets based on a grid layout. Our Deep learning model achieves 89% spot localization and attack detection rate at 75% compared to 35% in traditional localization schemes. For validation, we conduct a real-life experiment that utilizes commercial-off-the-shelf (COTS) Wi-Fi devices to extract physical layer proprieties, the channel state information.

Examining Committee
Ghanim Ullah, PhD, Chairperson
Yao Liu, Ph.D., Major Professor
Attila Yavuz, Ph.D.
Mehran Mozaffari, Ph.D.
Nasir Ghani, Ph.D.
Kaiqi Xiong, Ph.D.

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9:30 a.m.
Online (Collaborate Ultra)
Please email for more information
Abed@usf.edu
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Robert Bishop, Ph.D.
Dean, College of Engineering

Dwayne Smith, Ph.D.
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