UNIVERSITY OF SOUTH FLORIDA

Defense of a Doctoral Dissertation

Human-centric Cybersecurity Research: From Trapping the Bad Guys to Helping the Good Ones

by

Armin Ziaie Tabari

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

Cybersecurity, in general, can be seen as primarily a human problem, and it is for this reason that it requires human solutions and tradeoffs. In order to study this problem, using two perspectives; that of the adversaries and that of the defenders, I investigated human activities in cybersecurity. I researched the adversaries' intentions of successfully breaking into internet of things (IoT) devices through the use of a new honeypot ecosystem in part one of this dissertation. MPMFPot is a multi-phased multi-faceted IoT honeypot framework that was designed to monitor adversaries across multiple stages of deployment. As a result of utilizing MPMFPot, I was able to capture more sophisticated attacks in each phase, allowing me to capture real human activities at the end. Using similarity clustering algorithm, I was also able to determine what the intention of an adversary might be. In the second part of this dissertation, I conducted an ethnographic study of a software development company using the anthropological research method of participant observation for a period of six months. The findings of this study illustrate the nuanced nature of the root causes of software vulnerability and the necessity to consider a significant amount of contextual information in order to better comprehend how and why software vulnerabilities can develop during software development. I present a method to improve software security during the development process through a co-creation model, in which security experts and software developers work together to identify security concerns and provide tools that are easily integrated into software development processes.

Examining Committee
Daniel Lende, Ph.D., Chairperson
Xinming Ou, Ph.D., Major Professor
Jarred Ligatti, Ph.D.
Mehran Mozaffari Kermani, Ph.D.
Nasir Ghani, Ph.D.
Raj Rajagopalan, Ph.D.

Thursday, October 28, 2021
12:00 PM EST
Online (Microsoft Teams)
Please email for more information
aziaietabari@usf.edu
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Publications

1) Palombo, H., **Ziaie Tabari, A.**, Lende, D., Ligatti, J., & Ou, X. (2020). "An ethnographic understanding of software (in) security and a co-creation model to improve secure software development". In Sixteenth Symposium on Usable Privacy and Security (SOUPS 2020) (pp. 205-220).
2) **Ziaie Tabari, A.**, and Ou, X. "POSTER: A Multi-phased Multi-faceted IoT Honeypot Ecosystem." Proceedings of the 2020 ACM SIGSAC Conference on Computer and Communications Security. 2020.

Robert Bishop, Ph.D.
Dean, College of Engineering

Dwayne Smith, Ph.D.
Dean, Office of Graduate Studies

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