



CECS

**CENTER FOR EMBEDDED & CYBER-PHYSICAL SYSTEMS
UNIVERSITY OF CALIFORNIA · IRVINE**

CECS Seminar

“Systematic Security Analysis of Cellular Network Specifications and Implementations”



Dr. Imtiaz Karim

Postdoctoral Research Associate in the Department of
Computer Science at Purdue University

Thursday, December 7th

2:30-3:30 p.m. PST

Location: EH 2430

Abstract: Cellular networks are the bedrock of modern communication. The recent deployment of the 5G has generated further enthusiasm and opportunities in both academia and industry, because of its promise of enabling innovative applications, such as autonomous vehicles, industrial IoT, and augmented reality. Therefore, the security of cellular network protocols is critical. In this talk, I will elaborate on the critical challenges of ensuring cellular network security and move on to the research we are doing to enhance the resilience of the networks. I will detail our developed techniques for both white-box and black-box analysis of cellular implementations. On the whole, using these approaches we have found 24 critical issues in both commercial and open-source implementations. Lastly, I will talk about our recent work SPEC5G, the first-ever public 5G dataset for NLP research, and discuss how using SPEC5G and state-of-the-art Large Language Models (LLMs) we are detecting inconsistencies in the cellular protocol specifications.

Biography: Imtiaz Karim is a postdoctoral research associate in the Department of Computer Science at Purdue University working with Prof. Elisa Bertino. He received his Ph.D. degree from the same department in Spring 2023. His research interests lie in analyzing the security and privacy of wireless communication protocols (e.g., 4G, 5G, Bluetooth, VoWiFi, vehicular, WiFi, and IoT), their implementations, networked systems, and mobile computing. His research has led to several changes in the design of 4G and 5G cellular standards, and commercial implementations. He has been inducted into the GSMA Mobile Security Research Hall of Fame three times and has received numerous bug bounties, CVDs, and CVEs. He received the best paper award at ACSAC 2019, and the best paper award nomination at ICDCS 2021. For outstanding security research, he has received the Maurice H. Halstead Memorial Award and the Bilsland Dissertation Fellowship Award from Purdue University in 2020 and 2022 respectively. He worked as an Applied Scientist Intern at Amazon (Summer 2021) and a Security Researcher Intern at Intel (Summer 2020, 2019).