

Faculty Candidate Seminar

MY SMARTPHONE KNOWS WHAT YOU PRINT: EXPLORING SMARTPHONE-BASED SIDE-CHANNEL ATTACKS AGAINST 3D PRINTERS

Monday March 20, 2017 • 12:00PM to 1:00PM • HEC 356

Additive manufacturing, also known as 3D printing, has been increasingly applied to fabricate highly intellectual-property (IP) sensitive products. However, the related IP protection issues in 3D printers are still largely underexplored. On the other hand, smartphones are equipped with rich onboard sensors and have been applied to pervasive mobile surveillance in many applications. These facts raise one critical question: is it possible that smartphones access the side-channel signals of 3D printer and then hack the IP information? In this talk, we answer this by performing an end-to-end study on exploring smartphone-based side-channel attacks against 3D printers. Specifically, we formulate the problem of the IP side-channel attack in 3D printing. Then, we investigate the possible acoustic and magnetic side-channel attacks using the smartphone built-in sensors. Moreover, we explore a magnetic-enhanced side-channel attack model to accurately deduce the vital directional operations of 3D printer. Experimental results show that by exploiting the side-channel signals collected by smartphones, we can successfully reconstruct the physical prints and their G-code with Mean Tendency Error of 5.87% on regular designs and 9.67% on complex designs, respectively. Our study demonstrates this new and practical smartphone-based side channel attack on compromising IP information during 3D printing.



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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 (UB). 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 Exceptional Scholar Award for Sustained Achievement in 2016, 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 extensively in peer-reviewed journals and conferences and received several Best Paper Awards including IEEE ICNP 2011. According to Google Scholar, his total citation exceeds 16,000, and his h-index is 52. He currently serves as an associate editor for IEEE Transactions on Dependable and Secure Computing, IEEE Transactions on Mobile Computing, IEEE Wireless Communications, and IEEE Internet of Things Journal. 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.

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