

Thesis Defense

Computer Science Master's Program

“Reproducing and Evaluating Charger Surfing: Robustness of Smartphone Charging-Line Side-Channels”

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Abstract:

Smartphones are frequently connected to external, untrusted charging hardware, creating opportunities for side-channel attacks that do not require malware or direct access to device data. Charger Surfing, a recently proposed charging-line power analysis side-channel attack, reported high accuracy in inferring touchscreen input from voltage measurements collected from a smartphone's charging cable; however, the reproducibility and robustness of these results under different conditions remain unclear. This thesis presents an independent replication and evaluation of Charger Surfing, including the development of an end-to-end data collection pipeline consisting of a modified charging cable, oscilloscope-based recordings, custom Android app, automated trace processing, and convolutional neural network classification framework. Experiments were conducted across multiple users, devices, collection sessions, and interaction styles to evaluate signal observability and model generalization. Results show that charging-line measurements can contain information associated with touchscreen input, achieving up to 95.24% same-day test accuracy and 96.20% second-day accuracy on a Google Pixel 4a; however, performance often degraded significantly across collection sessions and devices, with accuracy approaching chance levels in some settings, suggesting that Charger Surfing is highly dependent on collection conditions and that robustness remains a major challenge.

Date: Thursday, June 11th, 2026

Time: 2:00 PM – 4:00 PM

Location: 14-238b

Committee: Dr. Stephen Beard, Dr. Bruce DeBruhl, Dr. Alex Bisberg