



# Effects of Electromagnetic Radiation on Rowhammer

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## Motivation

In smart home environments, there are unpredictable occurrences of electromagnetic radiation. Different devices will be placed in physical proximity and suffer from unforeseen amounts of electromagnetic radiation emitted by devices in the proximity. Also, the combination of multiple devices, e.g., multiple microwave ovens, or a collection of wireless communication devices, e.g., several wireless LAN devices or a phone charging station, may lead to additional unforeseen amounts of electromagnetic radiation. While these radiation peaks will only occur in limited time frames, these time frames may be predictable.

This leads to multiple security and privacy issues. First, the use of smart home devices is tied to daily routines and schedules, e.g., a microwave oven is used to prepare a meal before leaving the house. An attacker might leak information on daily schedules by observing an increased bit flip frequency. Second, if the attacker can target the short time frames of high electromagnetic radiation, a privilege escalation attack using Rowhammer may be possible.

In this Bachelor's project and thesis, you will measure and analyze the effects of the intensity and frequency of the radiation to the amount of bit flips. You will use off-the-shelf software-defined radio (SDR) devices and wireless LAN antennas to control the amount of radiation DDR memory is exposed to. Then, you will investigate whether the amount of bit flips that occurs in a given time due to Rowhammer can be influenced with these real-world amounts of electromagnetic radiation.

## Goals and Tasks

-  Get familiar with Rowhammer in general [2 Weeks]
-  Get familiar with the SDR [1 Week]
-  Setup a test system for experiments [1 Month]
-  Perform measurements [1 Month]
-  Analyze the results of the measurements [2 Weeks]

## Literature

- > [Y. Kim et al.](#)  
Flipping Bits in Memory Without Accessing Them: An Experimental Study of DRAM Disturbance Errors  
ISCA
- > [P. Jattke et al.](#)  
BLACKSMITH: Rowhammering in the Frequency Domain  
S&P

## Courses & Deliverables

- Introduction to Scientific Working**  
Short report on background  
Short presentation
- Bachelor Project**  
Project code and documentation
- Bachelor's Thesis**  
Project code  
Thesis  
Final presentation

## Recommended if you're studying

- CS
- ICE
- SEM

## Prerequisites

- > Interest in the topic area
- > Programming (C/C++, Python)

## Advisor Contact

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