Prof. L. Thiele

Semester/Group Thesis:

Feature Extraction from Thermal Traces for the Thermal Fingerprinting Attack

Context

Today's Laptops, Servers and mobile devices (smartphones, tablets, . . .) leverage multi-processor systems on chip (MPSoCs) that put several components (cores, caches, accelerators, . . .) onto the same piece of silicon. These devices are often used for sensitive applications (bank, health, . . .) as well as non-sensitive applications. While various sandboxing and segregation techniques exist to ensure the privacy of sensitive information, the shared silicon may be used to leak information/data.

Every task that executes on an MPSoC impacts its temperature in a unique manner. We call this unique thermal pattern an application's *thermal fingerprint*. In this project, we will try to *infer* the activity of a given MPSoC by reading temperature sensors (effectively reverse mapping thermal fingerprints to applications/s running at a given point in time). In particular, we want to find features in the thermal trace (i. e. distinct thermal patterns), which can be used to classify applications using a Neural Network.

Tasks

The student will extend our work on thermal fingerprinting. The main tasks to complete the thesis will be:

- Get to know the existing framework (Matlab, Python, C, C++, Java, UNIX Shell Scripts).
- Analyse data to find thermal features in the collected traces using a dedicated platform [1].
- Test the features by implementing a simple classification using a neural network.

Requirements / Skills

- Working knowledge of:
  - Data Analysis (MATLAB, Python or similar)
  - UNIX Shell or similar System Programming (Script Languages)
  - Signal Processing, Deep Learning and Pattern Recognition
  - Basic understanding of C / C++ / Java development (Android Apps)
- Curiosity and interest in security and in systems research

Interested? Please have a look at http://www.tec.ethz.ch/research.html **and contact us for more details!**

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References

[1] Qualcomm/Intrinsyc DragonBoard 810 https://developer.qualcomm.com/hardware/dragonboard-810