Prof. L. Thiele

Semester/Group Thesis:

What's my Thermal Fingerprint?

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). As a specific use-case, we will try to identify videos being played at a given point in time. Being able to identify videos/applications entails a significant security/privacy breach.

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).
- Develop/extend the method to classify the thermal fingerprints.
- Test the developed classification/identification methods on a target hardware platform [1].

Requirements / Skills

- Working knowledge of:
    - C / C++ / Java development (Android Apps)
    - Data Analysis (MATLAB, Python or similar)
    - UNIX Shell or similar System Programming (Script Languages)
    - Signal Processing, Deep Learning and Pattern Recognition
- 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] Qualcpmm/Intrinsyc DragonBoard 810 https://developer.qualcomm.com/hardware/dragonboard-810