

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] Qualcomm/Intrinsyc DragonBoard 810 <https://developer.qualcomm.com/hardware/dragonboard-810>