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](http://www.tec.ethz.ch/research.html) and contact us for more details!

- Philipp Miedl: philipp.miedl@tik.ee.ethz.ch, ETZ G76
- Rehan Ahmed: rehan.ahmed@tik.ee.ethz.ch, ETZ G76

**References**