

Semester / Master Thesis:

Automated Energy Harvesting Source Characterization

Motivation In the emerging Internet of Things (IoT), energy will most likely be the most limiting factor in system-level design. It is already infeasible to power a long-term network of devices without changing batteries, plugging them to the grid, or using energy harvesting. Consequently, energy harvesting is seen as the key enabler to provide truly infrastructure-less and maintenance-free energy supply for ultra-long application lifetimes. Unfortunately, the amount of harvested energy is typically very low, and can only be used to meet the demands of low-power applications. System designers are thus forced to use measurement equipment to characterize different low power energy sources and test the application's power consumption. Collecting harvesting characterization data of different sources in different harvesting scenarios helps a system designer to simulate the behavior of a new prototype in the early design phase and optimization on the hardware and software level. For this purpose we want to extend our newly developed power logging platform [1] to automate the process of energy harvesting source characterization in real-world deployments and start building a database for collecting characteristics of different harvesting sources.

Task Description During this project you will develop an automated energy harvesting source characterization extension for the ROCKETLOGGER measurement platform [1] and develop a database to collect various harvesting source characterizations in a central and organized manner.

In a first step you will familiarize yourself with the ROCKETLOGGER platform and analyze the transient response of different energy harvesting sources on load switching. Based on the gained experience you will then develop an external load switching module and integrate it together with environmental sensing into the ROCKETLOGGER platform. The resulting harvesting characterization traces should then be collected and organized in a central harvesting database based on a classification system for the measured harvesting scenarios.



Requirements: Familiarity with C/Linux and Matlab programming. Experience in circuit/PCB design is expected (or parallel attendance of the PCB design course [2]).

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

Contacts

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References

- [1] L. Sigrist, A. Gomez, R. Lim, S. Lippuner, M. Leubin, and L. Thiele, Measurement and Validation of Energy Harvesting IoT Devices, in Design, Automation and Test in Europe, 2017.
<http://rocketlogger.ethz.ch>
- [2] [227-0651-00L](#) Applied Circuit and PCB-Design.