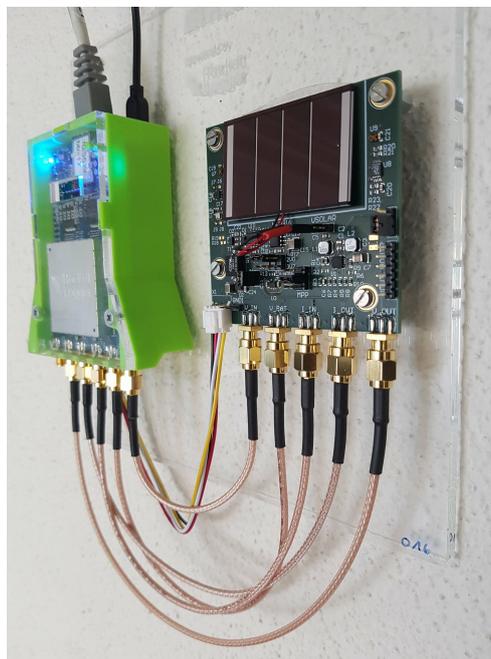


Semester Thesis:

## Making Sense of Energy Harvesting Data

Energy harvesting systems have recently received extensive attention. This is because these systems have pervasive applications ranging from wearables and Internet-of-Things, to remotely deployed sensor nodes. Energy harvesting is deployed to prolong the lifetime of battery powered sensing systems or, in the emerging class of batteryless systems, to directly power wireless sensor nodes. With the available energy budget being dependent on the highly variable environment (e.g. solar or wind), efficient execution of the application becomes a very challenging task. To apply proven efficient algorithms with proven efficiency for scheduling application tasks, reliable prediction of future energy income is of high importance. Only the combination of energy prediction and adaptive task scheduling allows providing quality of service guarantees and dimensioning a system to meet a required quality of service level.



### Tasks

The goal of this thesis is developing a prediction model for indoor solar energy harvesting systems. In a first step you will analyze the energy harvesting traces we are recording in several of our offices. Using principal component analysis, the impact of a wide range of parameters that are recorded in parallel to the harvested energy is quantified. Based on the insights gained in the first part of the thesis, suitable energy source models are derived for short- and long-term energy prediction. At the end, the performance of the models is evaluated in terms of prediction accuracy and runtime complexity.

### Requirements / Skills

- Good foundation in statistics
- Familiarity with a scripting language for data analysis, e.g. R, Python (pandas) or MATLAB.
- Curiosity, ability to work independently and motivation to bring in your own ideas.

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

### Contacts

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