



BA:

Designing a Solar Powered UV Sensor

This document describes the subject and the general time schedule of the semester thesis of Jonathan Weber, beginning in the spring term 2012. Adaptations or changes can be agreed upon by the advisors.

Sunlight is a driving force for life and, amongst others due to its role in the production of vitamin D, indispensable for our health. However, over the past decades an increasing number of studies warned against the risks of excessive sunlight exposure. A vast majority of people has already experienced the unpleasant feeling of sunburn after having stayed in the sun too long. Unfortunately, the harmful effects can go beyond unpleasant feelings. Long-term damage, such as premature skin aging and skin cancer are severe implications that can result from an overexposure to sunlight, even if no immediate signs of sunburn are visible

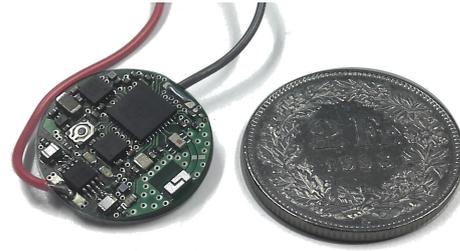
In our lab, we have developed a sensor platform called *Sundroid* that measures UVA and UVB radiation and transmits it to a smartphone over bluetooth. Sundroid can be used to increase the awareness of people for UV-exposure. Currently this platform is powered by a button cell that has to be exchanged from time to time.

The goal of this thesis is to extend the hardware design of the sensor platform, so that it is powered by a solar cell. This means that the PCB design has to be adapted to include charging components and solar cells have to be added. Moreover, the software running on the sensor has to be optimized to consume as little energy as possible to meet the more difficult energy requirements of a solar powered platform.

Requirements: Good low-level programming skills and experience in hardware design. The student(s) should be able to work independently on the topic.

Contacts

- Samuel Welten: swelten@tik.ee.ethz.ch, ETZ G61.4



Detailed Project Outline

We denote the following primary tasks mandatory (on the right side you find a rough estimate for the time that we allocate to the respective task):

- Get used to the Sundroid platform (★)
- Find and evaluate the new hardware components (★★)
- Design the new PCB (★★★)
- Rewrite parts of the sensor software for energy conservation (★★★)
- Evaluate the energy consumption of the platform and the solar charging functionality (★★)
- Write a report documenting the development process and the final status of the application and discuss the findings. (★★)
- Prepare a presentation about the results of your work (★★)

The Students' Duties

- Regular check-ins into the provided *revision control system* (Subversion)
- A final presentation (15 min) of the work and results obtained in the thesis
- A final report (English or German), presenting work and results
- Independent working is expected
- A possibility to work in the ETZ is provided. It is also possible to work at home