

Semester Thesis:

## Enabling Environmental Sensing with a Smart-Watch

**Motivation:** Urban air pollution is a major concern in our modern society and, thus, monitoring air quality has received an increasing interest in the last few years. Nowadays various small and cheap environmental sensors, *e.g.* gas sensors which measure the concentration of pollutants, are available on the market. Their small packaging and low power consumption allows their integration into wearable devices.

In this thesis we want to integrate various environmental sensors (temperature, humidity, pressure and gas) into a commercial smart-watch. Smart-watches have favourable properties for environmental sensing, such as: (i) The smart-watch is usually exposed to the environment when worn on the wrist, compared to a smart-phone which remains most of the time in a pocket or bag. (ii) Commercial smart-watches can easily be paired with a smart-phone and, hence, already feature data transmission from watch to phone. (iii) In combination with an application that processes the data, the user can immediately be provided with information about the environment.

**Task:** The goal of this thesis is to investigate the feasibility of integrating environmental sensors into a smart-watch. This involves for you the following tasks:

- Extend a custom-made smart-watch with environmental sensors and develop corresponding driver-software to gather sensor data.
- Write a simple Android smart-phone application which (i) collects and stores data from the smart-watch as well as from the smart-phone sensors, (ii) processes and analyses the data and (iii) provides some features such as feedback to the user about the current state of the environment.
- Test and evaluate the feasibility of the prototype by conducting experiments in various application scenarios.

**Requirements:** Basic programming skills, Android programming experience might be helpful.

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

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Figure 1: A smart-watch equipped with a gas-sensor is able to monitor air-quality.