

Semester Thesis:

What Is My Smart-Watch Measuring?

Motivation: The increasing number of sensors and computation power of wearable devices in the last few years have given rise to mobile-centric context recognition systems, which provide automatic and autonomous support in various facets of our daily lives, e.g., tracking personal health or fitness. The inclusion of low-cost environmental sensors (e.g. gas, ambient pressure and temperature) in wearable devices offers new possibilities and additional features for context recognition.

In this thesis we want to enhance a smart-watch equipped with various environmental sensors with the possibility of accurately recognizing the context of a user. This is done in a twofold manner:

(i) *Excluding environmental sensors:* State-of-the-art context recognition algorithms already achieve accurate results solely based on sensors of commercial smart-phones (accelerometer, GPS, etc.). We want to adapt those techniques in order to provide the environmental sensor data with meta-information, e.g. location and activity of the user.

(ii) *Including environmental sensors:* Environmental sensors broaden the field of possible situations that can be distinguished. For instance, a gas sensor can be used to detect if a user is smoking. We want to investigate the feasibility of using the available environmental sensors for improving state-of-the-art context recognition.



Tasks: This thesis involves the following tasks for you:

- Write a simple Android application that collects data from smart-phone and smart-watch sensors and labels the gathered measurements. In a first step labelling is done manually for training purposes and in a second step automatically based on an online context recognition algorithm.
- Implement a context recognition algorithm with emphasis on the above mentioned twofold differentiation.
- Conduct various experiments with a custom-made smart-watch and a commercial smart-phone to train and evaluate your approach.

Requirements: Basic programming and signal processing skills.

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

Contacts

- Balz Maag: bmaag@ethz.ch, ETZ G75
- Dr. Zimu Zhou: zzhou@ethz.ch, ETZ G75