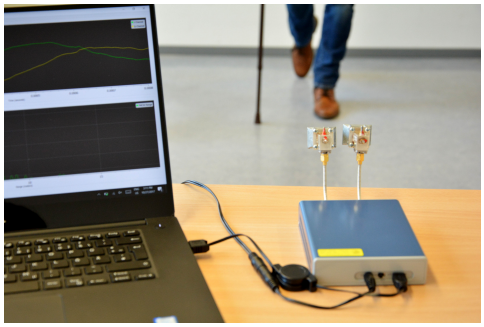
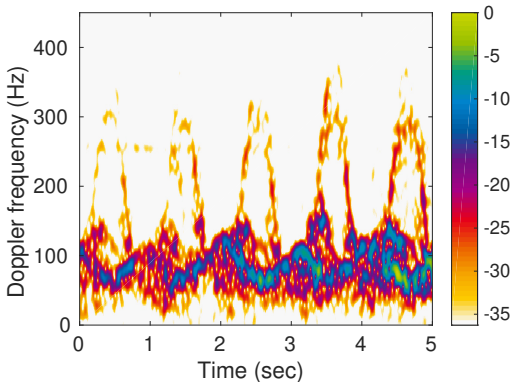
Radar Signal Processing for Medical Gait Analysis

TECHNISCHE UNIVERSITÄT DARMSTADT

Pro-/Projektseminar or Bachelor/Master Thesis





In the near future, radar signal processing for fall motion detection will be a key technology for assisted living. Radar systems as small as the palm of your hand will be installed in apartments to monitor the motions of the elderly person. Besides the detection of falls, it is important to assess the risk of falling, and possibly predict, and thus prevent, an upcoming fall. For this, gait analysis can be helpful. In fact, observing human gait plays a key role in many areas such as medical diagnosis, biomedical engineering, physiotherapy and rehabilitation. For example, changes in gait patterns can reveal many neurological conditions, such as Parkinson's, at an early stage.

Each motion induces characteristic Doppler frequency shifts in the radar return signal. They form the so-called micro-Doppler signatures in the time-frequency domain. These micro-Doppler signatures can be used to classify the motion, i.e. to identify whether a person is walking normally, limping or walking with a cane for example. Further, the degree of abnormality is of interest to assess the state of health of the person.

Students participating in this project will learn about detection and estimation theory focusing on micro-Doppler analysis. In particular, the project is about radar-based human gait analysis. Using real measurement data, we consider the short-time Fourier transform or spectrogram to discriminate different micro-Doppler signatures. In order to classify the motion, features are extracted from the spectrogram and used for classification. Considering the spectrogram as an image, also image processing techniques can be used for feature extraction and classification. Depending on the student's knowledge and interest, an individual topic for a student project can be discussed.

If you are interested in the project please contact:

Ann-Kathrin Seifert, M.Sc.
seifert@spg.tu-darmstadt.de
Room S3|06 252

SIGNAL PROCESSING GROUP