



Bachelor's/Master's thesis proposal:

Algorithms, models and experimental methods for improving binaural reproduction quality in Virtual Reality

In IKT we work a lot with the rendering, reproduction, and playback of virtual sound events through headphones. Various approaches are being proposed and tested towards the ultimate goal of a plausible and immersive listening experience.

Head-Related Transfer Functions (HRTFs), which are transfer functions that contain all the acoustical and perceptual cues responsible for spatial hearing, are vital for the quality of the reproduced virtual sound event. There are many possibilities to explore regarding improving the accuracy of measured HRTFs or understanding HRTFs' features better through modeling. Research aspects include digital filters, Fourier analysis, psychoacoustics, and so on.

Tasks:

- Understand the nature and key features of HRTFs for binaural rendering
- Improve existing acoustical and DSP methods for HRTF acquisition or modeling
- Evaluate results from the proposed method in terms of binaural reproduction quality and make comparison to other (published) approaches

Requirements:

- Solid knowledge in acoustics and digital audio signal processing, a good understanding of digital filters, Fourier Transform, frequency-domain analysis of audio signals, and preferably knowledge in psychoacoustics and listening tests.
- Programming experience in MATLAB for digital signal processing
- Willingness to design and perform acoustical experiments in the laboratory (instruction and supervision will be provided)
- Enthusiasm to study new topics, face problems and work towards solutions

If you are interested in the aforementioned audio signal processing aspects as well as in virtual audio and you have already acquired some prior knowledge, you are welcome to contact us about a possible thesis topic.

If you are interested, please contact:

Yuqing Li

Institut für Kommunikationstechnik (IKT)

Raum 1435, 14. Etage, Appelstr. 9A

yuqing.li@ikt.uni-hannover.de

+49 511 762 18860