



HNO-Klinik

Waldstr. 1 91054 Erlangen

## Master thesis for students in: Medical Engineering / Medizintechnik

**Hals-Nasen-Ohren-Klinik  
Kopf- und Halschirurgie**  
Direktor: Prof. Dr. med. Dr. h.c. H. Iro

**Audiologische Abteilung**  
Leiter: Prof. Dr. Dr. Ulrich Hoppe

Telefon: 09131 85-32722  
Fax: 09131 85-32711  
Email: [ulrich.hoppe@uk-erlangen.de](mailto:ulrich.hoppe@uk-erlangen.de)

[www.hno-klinik.uk-erlangen.de](http://www.hno-klinik.uk-erlangen.de)  
Waldstraße 1, 91054 Erlangen

10.05.2023

## Speech recognition in Hearing Aid Users Applying Machine Learning Techniques

### Background:

This is a research project by the ENT department of the University Hospital Erlangen within the division of Audiology.

Hearing loss is one of the most common diseases, affecting 20% of the population worldwide. In Germany, unfortunately only 18% of the hearing-impaired people with hearing-aid indication wear hearing aids. Since there is no standardized procedure for hearing-aid fitting, speech recognition with hearing aids is often not sufficiently improved and far below the actual potential of the hearing-aid users. Clinical hearing-aid reviews have been evaluated in our hearing center since 2019, including subjective speech recognition measurements, objective real-ear measurements that provide information about the amplification setting of the hearing aids. Machine learning techniques will be applied to determine significant features describing speech recognition and their dependency on the individual hearing thresholds, demographic data and objective real-ear measurements, being the **goal of the MS thesis**.

### Work packages:

(1) Preprocessing of the data. (3) Different machine learning methods will be investigated and compared regarding their potential for classification. (4) Perform feature selection to identify parameters from subjective and objective measurements and demographic information with the most significant importance.

The **hypothesis** of the study is that speech recognition depends primarily on hearing thresholds. Other factors contribute to the specific audiometric constellations as well as subjective and objective parameters influence speech recognition. Speech recognition in quiet can be described sufficiently using hearing thresholds and amplification.

### Requirements:

- Knowledge in machine learning methods and/or Audiology
- Experience with Matlab/Python
- Interest in interdisciplinary work and research
- Thesis can be written in German or English

### Contact:

Prof. Dr.-Ing. Dr.rer.med. Ulrich Hoppe, ENT department, [ulrich.hoppe@uk-erlangen.de](mailto:ulrich.hoppe@uk-erlangen.de); Tel. 091318532981  
Max Engler, M. Sc., ENT department, [max.engler@uk-erlangen.de](mailto:max.engler@uk-erlangen.de); Tel. 091318532981