



HNO-Klinik Abteilung Phoniatrie und Pädaudiologie
Waldstrasse 1 91054 Erlangen

Research Assistant (PhD Student - Dr.-Ing.)

or

Postdoctoral Researcher

(TV-L E13 -100%)

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

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29.04.2021

Machine learning based classification of laryngeal disorders based on video and voice signals for clinical application

Your tasks: The goal of the project is the development of classification algorithms to be integrated in a clinically usable software tool for diagnostics. The algorithms are intended to rate voice quality and laryngeal dynamics based on endoscopic imaging data and the acoustic voice signal. Three classifiers including grading of severity of disorders have to be developed based on: 1) endoscopic videos; 2) acoustic data; 3) combined video and acoustic data. Video data will stem from clinical high-speed video recordings (> 2000 Hz), which allow capturing the rapid movement of the vocal folds, which oscillate with 100 – 400 Hz. Acoustic data is the synchronous recorded voice signal. Data is already recorded and will continuously be collected during the project by Medical Doctors. The project has the **following goals and topics:**

1. Labeling of data, based on clinical diagnose.
2. Developing of machine learning based algorithms (e.g. DNN) for classifying / grading severity of laryngeal pathologies that enable the quantification of disorder and actual treatment status.
3. Develop three classifiers, based on 1) endoscopic videos; 2) acoustic data; 3) combined videos and acoustic data
4. Code and algorithms will be first developed and implemented in Python and then transferred to C#/.NET.
5. Source code documentation is mandatory, since the algorithms are intended to be used in clinical environment.

Supervision enabled by the membership of Prof. Döllinger (supervisor) at the Technische Fakultät (Department Informatik).

Our team is highly interdisciplinary. Our division has several collaborations with technical and natural science chairs at FAU (Dept. CS 5, Dept. CS 9, and Chair for Applied Mathematics II) as well as with internationally highly recognized Universities; e.g. UCLA; NYU, University of Sydney, McGill.

What we expect:

- M.Sc. in medical engineering, computer science, computational engineering, mathematics
- Requirement 1: Knowledge in pattern recognition, machine learning and especially deep learning
- Requirement 2: Programming skills in Python and preferable in an object-oriented language (preferably C#/.NET)
- Structured and independent working practice, good communication and English skills

Additional information:

- **Time frame:** best would be 01.08.2021 or as soon as possible
- **Duration / payment:** 3 years, 100% TV-L-E13

Please send your application (CV, certificates, skills) to

Prof. Dr.-Ing. Michael Döllinger, Dipl.-Math. (michael.doellinger@uk-erlangen.de), Tel. 09131- 85 33814

Information on preliminary and previous work for this project – the work in this project will be based on the experience of these work:

1. P. Schlegel, S. Kniesburges, S. Dürr, A. Schützenberger, M. Döllinger. Machine learning based identification of relevant parameters for functional voice disorders derived from endoscopic high-speed recordings. Scientific Reports, 10(1):10517; 2020.
2. P. Schlegel, A. Kist, M. Semmler, M. Döllinger, M. Kunduk, S. Dürr, A. Schützenberger. Determination of clinical parameters sensitive to functional voice disorders applying boosted decision stumps. IEEE J Transl Eng Health Med, vol. 8, Epub, no. 9098960, 2020.