



HNO-Klinik Abteilung Phoniatrie und Pädaudiologie
Waldstr. 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**
Prof. Dr.-Ing. Dipl. Math. Michael Döllinger

Telefon: 09131 85-33814
Fax: 09131 85-32687
Michael.doellinger@uk-erlangen.de
Waldstr. 1, 91054 Erlangen
CICERO-Gebäude: Raumerstr. 1a

Öffentliche Verkehrsmittel:
Buslinie 289, 293, 294
Haltestelle Krankenhausstraße

24.11.2020

Multi-sensor (image and acoustic) data analysis by Machine Learning methodologies

Your tasks: The goal of the project is the further development of a clinically usable software tool to judge voice/speech quality and treatment progress based on multi-sensor data. Data will stem from clinical high-speed video recordings (4000fps), acoustic and patient data. At the moment, the software tool *Glottis Analysis Tools (GAT)* is equipped with deep learning based image processing allowing for segmentation and subsequent parameter computation. The major goal in this project is the deep learning based classification of laryngeal pathologies. The research on methods for classification of voice quality will provide the methodical basis for the software tool *GAT*. The project has the **following main goals** by applying **machine and deep learning techniques**:

1. objectively grade speech disorders;
2. objectively assess and quantify treatment progress;
3. perform feature selection to determine most significant parameters;
4. implement the developed machine learning algorithms in the software *GAT*.

This *GAT* software is distributed by us and is currently used by more than 30 colleagues in nine countries. The software *GAT* is used by other researchers and clinicians to finally transfer our developed machine learning methods to clinical application to provide a computer based quantitative and visual presentation of the clinical status for assessment of the clinical picture of speech disorders and treatment progress.

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

Supervision of Habilitation is enabled by the membership of Prof. Döllinger (mentor) at the Medizinische Fakultät (discipline: Computational Medicine).

Our team is highly interdisciplinary and our division has several collaborations with technical and natural science chairs at FAU (e.g. LS Informatik 9, LS Informatik 10, LS Biophysik, LS AM -

Kont. Optimierung, LS Sensorik, LS Photonische Technologien) and with internationally high-ranking universities (University of California Los Angeles; McGill - Montreal, University of Sydney, Graz) as well as with LMU in Munich. We foster personal development and exposure to an international, cutting-edge environment.

What we expect:

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

We offer a highly motivated interdisciplinary team, international contacts and personal supervision / mentoring on e.g. presenting conference talks and writing up scientific papers.

For current work of us in this field, see e.g.:

1. P. Gomez, M. Semmler, A. Schützenberger, C. Bohr, M. Döllinger. Low-light image enhancement of high-speed endoscopic videos using a convolutional neural network. *Med Biol Eng Comput*, 57(7): 1451-63; 2019.
2. P. Gomez, A. M. Kist, P. Schlegel, D. A. Berry, D. K. Chhetri, S. Dürr, M. Echternach, A. M. Johnson, S. Kniesburges, M. Kunduk, Y. Maryn, A. Schützenberger, M. Verguts, M. Döllinger. BAGLS, a multihospital benchmark for automatic glottis segmentation. *Scientific Data*, 7(1):186; 2020.
3. 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.
4. A. Kist, M. Döllinger. Efficient biomedical image segmentation on EdgeTPUs at point of care. *IEEE Access*, vol. 8, art. 9151951:139356-139366; 2020.

Additional Information:

- **Starting point:** between January 1 and April 1, 2021 or as soon as possible
- **Duration:** 3 years (can be extended)
- **Funding:** Sachbeihilfe by Deutsche Forschungsgemeinschaft (DFG)

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

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