GUEST LECTURE SERIES „MEDICAL INFORMATION SCIENCES“

On behalf of our new guest lecture series „Medical Information Sciences“, we cordially invite you to attend our next lecture which will take place on **Monday, January 30th 2023 (starting 5:30 pm).** On this occasion, we proudly welcome:

DR. MARTIN SCHMIDT

(Head of the Biosignal Processing Group at the Institute of Biomedical Engineering, TUD)

„Morphological ECG Analysis – Revealing Valuable Features for Medical Diagnosis”

Cardiovascular disease (CVD) is the most common cause of death worldwide. Changes in biosignals can provide early indications of CVD. Current research shows that the analysis of ventricular repolarization by means of QT variability (QTV) analysis in the electrocardiogram (ECG) can contribute to diagnosis and risk stratification of various CVDs. Today's methods for the analysis of QTV can reflect complex morphological changes in the ECG only to a limited degree. However, the analysis of these changes opens new approaches to the diagnosis and therapy of CVD.

To overcome the limitations of current methods and to provide the basis for a clinical application in medical diagnosis, a novel innovative method for analyzing the morphology of biosignals has been developed. The method is based on an iterative two-dimensional deformation of a one-dimensional template (2DSW, Two-Dimensional Signal Warping). The adaptation of the template is made with a two-dimensional warping grid to analyze complex changes, especially the QT interval morphology. Focusing on robust detection of subtle changes in quasiperiodic biosignals as well as generalized implementation, the method is feasible in various application areas.

The evaluation of 2DSW showed a higher robustness for common artefacts compared to current methods. At the same time, 2DSW shows an improved sensitivity to subtle beat-to-beat changes in different simulated and clinical data sets. Amongst others, using the proposed method, we could demonstrate for the first time a significant influence of sleep stages on QTV. Based on 2DSW, new QTV parameters have been developed that have improved risk stratification in various clinical trials. For example, in assessing acute mental stress that is associated with higher CVD risk in the long-term, the parameters developed were shown to provide substantial additional value.

The fundamental improvements in the detection of complex morphological changes in ECG by 2DSW result in more accurate QTV analyses and provide the possibility to extend existing clinical monitoring procedures to QTV analysis, thus contributing to better diagnosis of CVD and potential therapeutic approaches.

Martin Schmidt received his PhD in electrical engineering from TU Dresden (TUD), Germany, in 2020. Since 2019, he is head of the Biosignal Processing Group at the Institute of Biomedical Engineering, TUD. His research interests include biomedical signal processing, especially analysis of electrocardiograms (QT interval analysis, fetal ECG analysis) and electromyograms (real-time diagnostics in sports), smart implants (adaptive communication and biosignal processing systems), research related to sleep and network physiology.

Preceding the lecture, informal individual meetings with the speaker can be arranged in order to discuss related scientific questions and common grounds with regards to your research interests. Please send an e-mail to office.bioinf@informatik.uni-augsburg.de to make an individual appointment!

Following the lecture, snacks and beverages will be served. Please feel free to join!

Date: January 30th 2023 (5.30 pm) **Place: N2045**