

Recording of asynchronous breathing behavior

Type	Bachelor thesis
Workingtitle	Investigation of asynchronous ventilation using time constant determination of regional EIT curves

Impaired diaphragmatic function can lead to reduced respiratory function and hypoventilation, which can be caused by a phrenic blockade that persists beyond the patient's clinical discharge following surgery. The diagnosis of asynchronous respiratory behavior is currently mainly performed by sonography and/or spirometry. However, there are already studies that rely on electrical impedance tomography (EIT) for the detection of regional ventilation delay to enable rapid and comprehensive lung analysis. EIT is a non-invasive technique that enables the visualization of pulmonary ventilation by stimulating and measuring weak currents on the body. In the course of research and development at ICCAS, methods for determining time constants are to be used in a bachelor thesis in order to characterize the regional ventilation behaviour within the lungs over time using EIT curves.

The aim of this project is to develop a process that uses signal analysis, image analysis and image processing methods to determine and visualize the time constants of breathing curves in real time. After an initial training phase on the EIT method and the associated medical use cases, the necessary processes are to be determined and implemented on the basis of an existing database, with the help of which the behavior of the respiratory/EIT curves during ventilation can be analyzed over time. Finally, the results of the analyses are to be visualized and the method evaluated on the basis of investigations in laboratory environments.

Requirements

- Bachelor's degree in a natural science or engineering program
- experience with image processing and signal processing required
- experience with programming required (Python/Matlab/C++)

Contact

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