

Computational model of the inner ear with a cochlea implant

Study project

Our working group

The Auditory Prosthetic Group (APG), headed by Prof. Waldo Nogueira, conducts research on implantable hearing prostheses, in particular cochlear implants, at the German Hearing Center of Hannover Medical School. Our interdisciplinary team covers the fields of acoustics, signal processing, psychoacoustics, electrophysiology, computer modeling and artificial intelligence. Students of technical subjects such as **biomedical engineering**, **mechanical engineering**, **computer science** or **natural sciences** have the opportunity to gain practical experience as part of study projects, for example when writing their Bachelor's or Master's thesis.

About the project

Cochlea-Implantate (CIs) ermöglichen hochgradig ertaubten Personen das Hören, indem sie die Schallinformationen durch elektrische Stimulation an das Innenohr (Cochlea) übertragen. Wir nutzen detailgetreue 3D-Modelle und Finite Elemente Methode, um die elektrische Spannungsverteilung in der Cochlea zu präzisieren. Mittels Computermodellen kann die Anregung des Hörnervs untersucht werden, um beispielsweise Stimulationsparameter oder die Elektrodenlage zu optimieren. Die Simulation von elektrophysiologischen Antworten und dem Sprachverstehen runden das Aufgabengebiet ab.

Tasks in the project

Various tasks are possible as part of the project, e.g:

- Extension of the 3D model using computer-aided design (CAD) software and performance of finite element method (FEM) simulations
- Comparison of neuronal activation for different stimulation modes
- Investigation of electrophysiological responses on the computer model
- Simulation of loudness perception for the CI

Prerequisites

- Motivation and willingness to familiarize yourself with complex topics
- Experience with CAD or programming, ideally with MATLAB
- Fluent communication in English
- Structured and independent way of working

Applications

Please send applications including CV and overview of marks to:

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