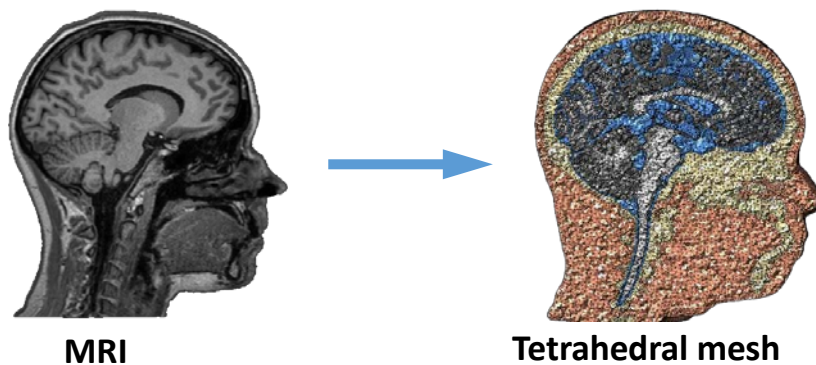


BSc/MSc-project

Title: Creating highly realistic and versatile mesh models of the human head

Description: Transcranial brain stimulation (TBS) techniques aim to modulate brain activity non-invasively by introducing electric currents in the brain. TBS approaches are used actively as tools in clinical therapy (treating depression) and in neuroscience research to probe the function of the human brain. The application of TBS requires accurate tetrahedral mesh models of the human head where the induced electric fields can be modelled, so that the treatment can be optimized. These meshes are attractive for other medical applications as well, and are used for example in numerical approaches to localize neural sources in EEG and MEG.



The aim of this project is to develop and optimize the automatic creation of such tetrahedral meshes using open-source tools. The prospective student will conduct a study comparing the accuracy and robustness of freely available meshing tools on a data set consisting of whole-head scans of healthy subjects acquired using MRI. Additionally, the automated meshing approach will also be applied to a small set of subjects with abnormal brains to test the feasibility of creating head meshes in the presence of pathologies. Finally, if time allows, there is a chance to do an electric field simulation experiment using the tools developed during the project. The new meshing approach will be integrated into an open-source software project on brain stimulation (www.simnibs.org).

Required qualifications:

Interest and prior knowledge in image processing are of advantage. Basic to intermediate programming skills in C and C++ are desired.

Responsible institution:

DTU Elektro/Compute and Danish Research Centre for MR, DRCMR,
<http://www.cmr.elektro.dtu.dk> , <http://www.compute.dtu.dk>, <http://drcmr.dk/>

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Allowed no of students per report: 1-2

DTU supervisors: Axel Thielscher, Kristoffer Madsen, Koen van Leemput, Oula Puonti