Lehrstuhl für Bildverarbeitung

RWTH AACHEN UNIVERSITY

Master/- Bachelor Thesis

Design and Evaluation of whole FDM 3D-Printed RF Coils made of conductive Materials for use in low-field MRI Systems

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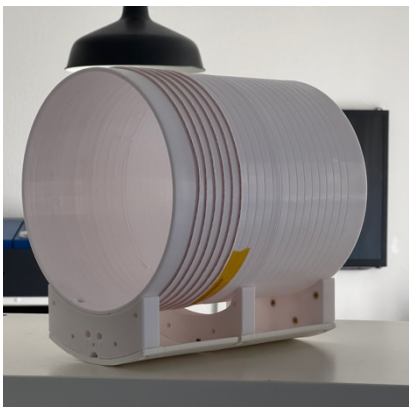
Keywords
Low-Field MRI | **Electrical Engineering** | **Rapid Prototyping | Simulation**

Background
Magnetic resonance imaging (MRI) is an imaging technique that uses magnetic fields and radio waves to create detailed images of the inside of the body. Low-field MRI systems work with a weaker magnetic field.
In the DeLoRi project, together with the Fraunhofer MEVIS Institute, we are developing a low-field MRI device to support cancer diagnostics.
An MRI requires an RF coil to generate and receive radio frequency electromagnetic signals that excite the resonance of the hydrogen nuclei in the body and capture their signals for imaging.



Tasks
The RF coil is an essential component of the MRI system. In our low-field MRI setup, these are produced by hand using a previously 3D-printed irrigation body. This thesis will investigate whether it is possible to create coils with similar performance using multi material 3D printing. The design will first be created using common simulation software packages and then printed using the FDM technique. In the evaluation, the performance in a real MRI will be determined and evaluated.

Your Profile
For the successful implementation of the project, you should have an interest in one or more of the following subject areas:

- RF-Coils <10Mhz | RF Matching and Tuning
- 3D Printing techniques | FDM | SLA
- Electrical Coil Simulation | Python | MATLAB or Octave

Our Offer
The call for applications is aimed at master's students with a technical background (e.g. electrical engineering or technical computer science) and is carried out in cooperation with Fraunhofer MEVIS. A workstation can be provided at the Chair of Image Processing, includes modern IT infrastructure, includes access to modern IT infrastructure, a workshop and rapid prototyping (includes milling and 3D printing capabilities) facilities.