

Stereotactic device compatible with a 4.7 Tesla Magnetic Resonance Imaging system

Team: Jeremy Glynn – Team Leader
Jeremy Schaefer– Communications
Adam Goon – BWIG
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Week: February 23- February 29

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Problem Statement

This project requires the design and fabrication of a stereotactic device used to minimize the movement of the heads of anesthetized animals whilst positioned within a 4.7 T magnetic resonance (MR) imaging scanner. The magnetic field within the scanner is approximately 100,000 times greater than the Earth's magnetic field and therefore significantly restricts the choice of materials that may be used. Consequently, the entire system should be constructed of MR-compatible materials that are non-magnetic and non-conductive, to avoid artifacts and distortion of the MR images. The device should fit into a range of MR coils used specifically for imaging mice or rats and should also be able to support the positioning of additional MR coils so that images may be obtained from different anatomical regions. Further refinements might include the incorporation of a warming unit, using circulating water or air, within the base of the device. The unit construction may involve the use of 3D printing techniques. In addition, the stereotactic device should also be compatible with a dedicated uCT/PET system so that images may be more easily merged between the three different imaging modalities. In addition to the design and fabrication processes, this project would provide the opportunity to gain some experience with the use of both a 4.7 Tesla dedicated animal MRI and a uCT/PET systems.

Last Week's Goals

- Learn software necessary to use 3D printing technology
- Get dimensions of rat MRI coil
- Get accurate measurement from ear to brain of mouse
- Talk to Professor Webster about designing a feedback-controlled heating system
- Post an updated PDS on website

Accomplishments

- Had meeting with client and 3D printing technicians
- Acquired more specific dimensions for our design constraints
- Individual research into heat piping structures
- Updated PDS, will be posted to website

This Week's Goals

- Work on 3 distinct prototypes for mid-semester report
- Analyze prototypes
- Design tests to evaluate efficiency of heat piping structures

Difficulties

- This week was heavy with exams for all team members, making a team meeting difficult to schedule.

Team Effort

Team Member	Accomplishments	Time (Hrs)	Running Total (Hrs)
Jeremy Glynn	Individual research, team meeting, 3D printing meeting	2.5	14.5
Adam Goon	Individual research, team meeting, 3D printing meeting	2.5	14.5
Jeremy Schaefer	Individual research, client communications, 3D printing meeting	2.5	14.5
Mike Conrardy	Individual research, BSAC, team meeting, 3D printing meeting	2.5	14.5

Project Schedule

TASK	Jan.	February				March				April				May		
DATES	31	6	13	20	27	5	12	19	26	2	9	16	23	30	7	14
WORK																
Brainstorming																
Research																
Designing Prototype																
Selecting Prototype																
Obtaining Materials																
Building Prototype																
Testing Prototype																
Modifications																
DELIVERABLES																
PDS																
Mid-Sem. Report																
Mid-Sem. Presentation																
Final Report																
Final Presentation																
Weekly Reports																
Notebooks																
MEETINGS																
Team Meetings																
Client Meetings																
Advisor Meetings																
BSAC Meetings																
OTHER																
Web Page																
Special Lectures																

Expenses to Date:

- No expenses to report at this time.