

Intracranial EEG Phantom for Brain Stimulation Studies

Date: 10/02/2025

Client: Dr. Raheel Ahmed

Alternative Contact: Dr. Arun Karumattu Manattu

Advisor: Dr. Paul Campagnola

Team:

Avery Schuda (*Team Leader*)

Lilly Mackenzie (*Communicator*)

Helene Schroeder (*BSAC*)

Orla Ryan (*BWIG*)

Corissa Hutmaker (*BPAG*)

Problem statement

Intracranial electroencephalography (iEEG) is routinely used in surgical planning for individuals with uncontrolled seizures. Transcranial magnetic stimulation (TMS) may provide complementary information for mapping out critical brain regions that should be avoided during surgery, however, there are still safety concerns around the use of TMS in patients with iEEG. The major safety concerns are the induction of electrical currents, heating, and displacement of the implanted electrodes. The goal of this project is to develop a phantom that can be used to simulate the effect of TMS on electrode currents, temperatures, and changes in position.

Brief status update

This week the team prepared for our preliminary presentation. We also met with the alternate client, Dr. Manattu, to tour the Pediatric Neuromodulation Lab and discuss the project further.

Difficulties / advice requests

Major team goals for the next week

1. Complete the preliminary report
2. Plan material testing
3. Purchase hydrogel materials

Next week's individual goals

- Avery
 - Plan rheological testing of hydrogel
 - Work with team to complete preliminary report
- Lilly
 - Determine base hydrogel composition and work toward ordering materials
 - Work on preliminary deliverables
 - Plan material testing
- Helene
 - Complete the preliminary deliverables with the team
 - Work on material fabrication and testing
- Orla
 - Work to complete preliminary report
 - Plan material testing
- Corissa
 - Write assigned sections of preliminary report
 - Figure out how to order hydrogel materials
 - Research hydrogel testing with rheometer

Timeline

[illegible]

Advisor	X	X	X	X											
Website															
Update	X	X	X	X	X										

Filled boxes = projected timeline
X = task was worked on or completed

Previous week's goals and accomplishments

- Avery
 - Collaborated with team to create preliminary design presentation slides
 - Started brainstorming methods of material testing
 - Attended tour of PNL with team
- Lilly
 - Worked on building and practicing presentation slides
 - Met with the team and Dr. Manattu at the PNL
 - Finished up design matrices
- Helene
 - Created and practiced the preliminary presentation with the team
 - Toured the PNL with other members of the team
- Orla
 - Picked up test electrodes from Dr. Ahmed
 - Finished design matrices and formatted preliminary presentation slides
 - Practiced with team for Friday's presentation
- Corissa
 - Attended meeting with Dr. Manattu at PNL to learn more about TMS
 - Finalized hydrogel design matrix and decided on agar for material
 - Completed preliminary presentation slides and practiced with team

Current design

N/A

Materials and expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
3D prints										
Formlabs BioMed Clear	Step wedge with thicknesses of 0.1, 0.2, and 0.3 inches	UW Design and Innovation	N/A	N/A	N/A	10/1	1	\$7.14	\$7.14	

Sample Swatch	for prelim presentation prop	Lab								
									\$0.00	
Category 2										
									\$0.00	
									\$0.00	
								TOTAL:	\$0.00	