

# Intracranial EEG Phantom for Brain Stimulation Studies

**Date:** 9/25/2025

**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 continued research into materials for the brain mimicking hydrogel and 3D printed skull material, using this to construct design matrices. It was decided that we will pursue a box-gel phantom for preliminary testing before progressing to a more complex skull based phantom. Next Friday (10/3) we will be presenting at the Preliminary Presentation between 12-2pm.

## Difficulties / advice requests

We have \$50 from the BME department to begin prototyping at the Makerspace, but will need assistance setting up a funding string or other method to access funds.

## Major team goals for the next week

1. Create and practice for Preliminary Presentation (10/3 12-2pm)
2. Attend lab tour at the Pediatric Neuromodulation Lab (PNL) (10/1 9-10am)

## Next week's individual goals

- Avery
  - Work with team to prepare for the preliminary presentation and refine design matrices
  - Attend tour of PNL
- Lilly
  - Work on preliminary presentation and organizing design ideas
  - Tour PNL with client for a better understanding of the testing conditions
- Helene
  - Complete and rehearse the preliminary presentation with the team
  - Tour the PNL with the client
- Orla
  - Create slides for Preliminary Presentation
  - Help with material decisions
- Corissa
  - Work on assigned sections of the preliminary presentation and practice with the team
  - Attend the PNL tour and gather sample materials to kickstart fabrication

## Timeline

[illegible]

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

## Previous week's goals and accomplishments

- Avery
  - Worked with team to construct design matrix
  - Met with assigned medical student for BME/TECH partnership
- Lilly
  - Worked on material choices and design matrix
  - Met with Dr. Wille briefly about testing, continued materials research
- Helene
  - Met with the team and worked on the design matrix
  - Met with Dr. Wille to discuss potential material testing options
- Orla
  - Met with our assigned medical student to discuss team expectations
  - researched/constructed design matrix
  - Coordinated PNL tour
- Corissa
  - Brainstormed initial material choices using design matrix
  - Continued researching to move forward with later deliverables

## Current design

N/A

## Materials and expenses

Item	Description	Manufac-turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	
Category 2										
									\$0.00	
									\$0.00	
								<b>TOTAL:</b>	<b>\$0.00</b>	