

Intracranial EEG Phantom for Brain Stimulation Studies

Date: 9/18/2025

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 met with the clients to gain background information and discuss goals for the project. The team continued researching background information on TMS and iEEG, as well as other specifications. This helped to inform the writing of the initial product design specifications.

Difficulties / advice requests

Major team goals for the next week

1. Brainstorm preliminary design ideas
2. Construct design matrix for materials and other aspects of the design
3. Meet with clients and tour PNL

Next week's individual goals

- Avery
 - Continue researching materials and other design aspects
 - Work with team to create design matrices
 - Brainstorm and mock up design ideas for phantom base
- Lilly
 - Research phantom hydrogel materials for initial prototyping
 - Work on design matrices and choose a direction (shape) for initial prototype
- Helene
 - Brainstorm phantom designs to discuss with the team to create our design matrix
 - Continue research into potential materials and existing brain phantoms
- Orla
 - Coordinate lab tour in the PNL space
 - Bring ideas to next team meeting to construct design matrix
 - Research electrode types used in iEEG
- Corissa
 - Perform research to complete the design matrices
 - Continue looking for defined standards to aim towards during testing

Timeline

[illegible]

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