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## Physical simulation model for placement of deep brain stimulator electrodes

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### BRIEF DESCRIPTION

Success of deep brain stimulation (DBS) procedures relies heavily on the precise placement of electrodes. However, current options for learning this specialized procedure are limited to observing live cases, listening to audio recordings, or watching computer simulation videos. Researchers at UC Irvine have developed a first-of-its-kind, physical simulation model that allows for easy, convenient, and realistic demonstration of DBS electrode placement to benefit both medical professionals and patients alike.

### SUGGESTED USES

This novel DBS microelectrode recording simulator can be used to demonstrate the electrode placement process and to train medical professionals to recognize special noise patterns from electrophysiological recordings to confirm correct placement.

### FEATURES/BENEFITS

- Physical model of the brain and electrodes allows realistic simulation of electrophysiological processes.
- Can demonstrate different noise patterns depending on the angle and depth of the recording electrode.

### FULL DESCRIPTION

Deep brain stimulation (DBS) is one of the most remarkable recent innovations in treatment of various functional neurological maladies such as Parkinson's disease, tics, epilepsy, and essential tremor. Success of such procedures ultimately depends on correct placement of the DBS electrode. Despite utilization of conventional, high-precision cranial frames and newer state-of-the-art robots, proper positioning of electrodes intraoperatively must be confirmed by electrophysiological studies. This is typically performed by intraoperative recording of electric activity arising from deep brain structures, which is digitally converted to special noise patterns. Neurosurgeons and neurophysiologists must recognize different noise patterns and confirm proper placement of the DBS electrodes. To date, demonstration of this specialized technique is possible only by observing live cases, listening to audio recordings, and watching computer simulation videos.

Artificial simulation models are widely used in medicine for demonstration of various anatomical structures but are rarely used for demonstration of physiological processes. Researchers at University of California, Irvine have developed a first-of-its-kind DBS microelectrode recording simulator. This physical simulation model provides a real-life and memorable demonstration for medical students and physicians, who can observe and hear the noise patterns without having to attend a live case. Additionally, patients often have difficulties understanding the process of DBS insertion when the procedure is explained theoretically or by showing videos. This physical simulation model will enable these patients to better understand the procedure.

### STATE OF DEVELOPMENT

### CONTACT

Steven T. Huyn  
shuyn@uci.edu  
tel: 949-824-7913.



### INVENTORS

» Isfahani, Sanaz

### OTHER INFORMATION

### KEYWORDS

Deep brain stimulation (DBS), Electrophysiological simulation, Basal ganglia, Microelectrode recordings

### CATEGORIZED AS

- » **Medical**
- » Devices
- » Disease: Central Nervous System
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Prototype in development

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2022-736-0

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5270 California Avenue / Irvine, CA  
92697-7700 / Tel: 949.824.2683



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