#### **UC Irvine**

#### **SSOE Research Symposium Dean's Awards**

#### **Title**

3D Visualization & amp; Modeling for Epilepsy

#### **Permalink**

https://escholarship.org/uc/item/31t5p162

#### **Authors**

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#### **Publication Date**

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Peer reviewed







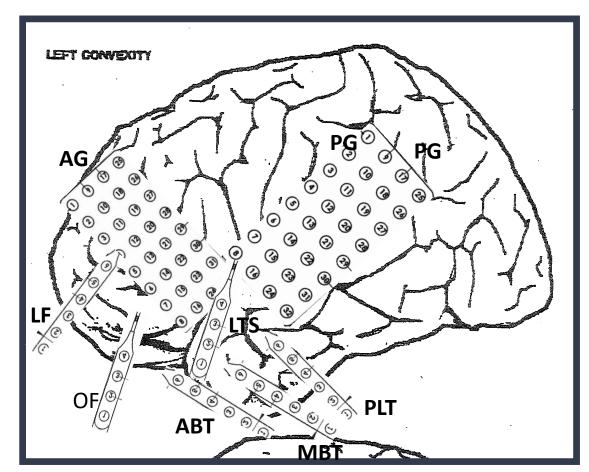
UCI Samueli BME Undergrad. Students: Andrew Dam, Dishant Donga, Leslie Fernando, Natalie Mai, Paul Nguyen, Prachi Shah | Mentored by: Daniel Shrey, PhD, M.D & Beth Lopour, PhD UC Irvine Department of Biomedical Engineering | Children's Hospital of Orange County

PROJECT DESIGN



### **BACKGROUND & GOAL**

- **Goal**: to develop a 3D visualization tool that accurately & intuitively displays critical cerebral components in epilepsy patients pre/post surgery
- Limitations of current technology:
  - 2D images
  - Not patient-specific
- Lack of coregistration
- Non user-friendly

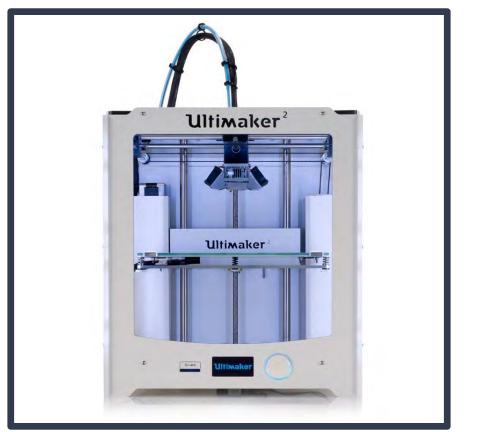


Generic 2D visualization currently used at CHOC

### **3D Printing**

Designed as a communication tool for surgical planning

- Physically pinpoint areas for surgery on the model
- Assist communication between medical professionals
- Assist understanding & reassurance for patients and families



3D printer used for printing our brain models

### **Virtual Reality**

Designed as a diagnostic tool for surgical planning

- Accurately display areas of epileptic activity
- Toggling/transparency between anatomical areas of the brain
- Intuitive functions: zoom, rotate, & slice
- Note-taking/marking



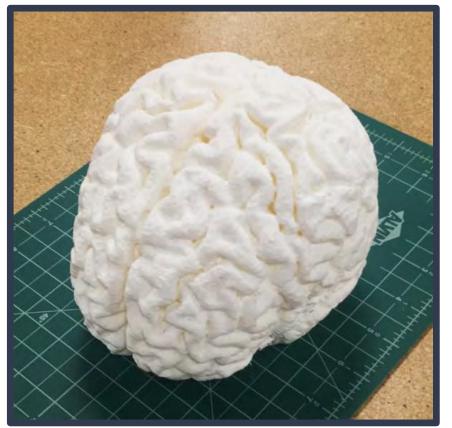
Enables immersive experience and interaction with patient brain

### SPRING TIMELINE



### **3D Printing**

- 3D printed a 1:1 model with PLA using patient MRI scans
- Investigated new materials that are flexible for manipulable models.
- **Smoothed and filtered** images for ease of printability



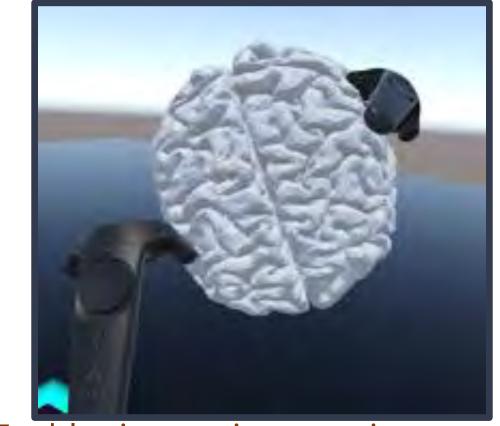
3D printed brain constructed from MRI scans

### **CURRENT PROGRESS**

# **Virtual Reality**

**ACKNOWLEDGEMENT & CONTACT** 

- **Combined MRI and CT** scans together for a comprehensive model
- Separated anatomical components of the brain
- **Integrated functions:** grab, rotate, transparency, toggling



Enables immersive experience and interaction with patient brain

### MEET OUR TEAM OF BIOMEDICAL ENGINEERS



**Prachi Shah** Team Leader VR Engineer



**Dishant Donga** Virtual Reality & MATLAB Specialist



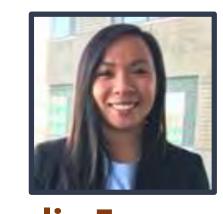
**Paul Nguyen** Image Specialist Quality Assurance



**Andrew Dam** Regulations DFMECA/PFMECA



**Natalie Mai** 3D Modeling & Printing expert



**Leslie Fernando** Material Specialist **Business Analyst** 

## Thank you to BioAccel and Applied

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