Low Intensity Ultrasound Neurostimulation Therapeutic Device

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Background
- The prefrontal cortex of PTSD patients is understood to be the most accessible and susceptible brain region for neurostimulation
  - Existing neurostimulation devices (TMS) are limited in both time and cost for patients
- Ultrasound can produce neuromodulatory effects within specific brain regions at certain frequencies
- Need better understanding of how ultrasound neurostimulation treatments affect brain performance

Objective: Develop a transducer device that is capable of neurostimulation using ultrasound within the 400-700 kHz frequency range

Solution
- Frequency Range: 400 - 700 kHz
- Resonance Frequency (kHz) (Hydrophone Verification Test)

<table>
<thead>
<tr>
<th>Disk ID #</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Mean</th>
<th>SD (±)</th>
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<td>417</td>
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- Piezoceramic Disk
- 3D Printed Transducer Housing
- Epoxy Matching Layer
- Silicone Lens (in Mold)

Impact
- Novel neurostimulation device with compact and cost effective design allows for greater accessibility for PTSD patients and hospitals

Future Work
- Testing further PZT frequencies
- Clinical trials of ultrasound device
- Addition of fNIRs feedback system to improve stimulation