Problem: Neonatal Brachial Plexus Injury
- 3 in 2000 births → 20 - 30% no total neurological recovery
- No measure between degree of injury and forces during birth
- Existing Solution: Developing device to perform controlled in vivo stretch of the neck to induce BPI in a neonatal piglet model

Goal: Create a computational model to estimate distraction force induced to the neck by the device

Design Inputs
R1. Displacement rate up to 10 mm/s
R2. Max. displacement up to 100 mm
R3. Estimate force up to 250 N

Solution
Flow Diagram of System

Testing Results
Test 1. 10 mm/s for 10 s @ 30% k ratio

Testing Results Table

<table>
<thead>
<tr>
<th>Rate up to 100 mm</th>
<th>Stiffness (N/m)</th>
<th>Max. Force (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mm/s</td>
<td>15892</td>
<td>159.5</td>
</tr>
<tr>
<td>1 mm/s</td>
<td>15892</td>
<td>1589.8</td>
</tr>
<tr>
<td>10 mm/s</td>
<td>7946</td>
<td>80</td>
</tr>
<tr>
<td>10 mm/s</td>
<td>31784</td>
<td>318.4</td>
</tr>
</tbody>
</table>

Possible Errors
1. Inaccurate assumptions
2. High strain rate of 112%

Future
Revisions
1. Improve accuracy for stiffness assumptions, viscoelastic behavior, and validation with device build components
2. Incorporate all device components with interface connectivity

Impact
- Adapting a piglet model will aid researchers to understand the injury mechanisms of BPI
- Computational modeling will provide more accurate testing for the device components for the current build – such as model suggestions on high load from high strain rates