Team 4: Firmware to Induce Brachial Plexus (BP) Injury in Neonatal Piglets

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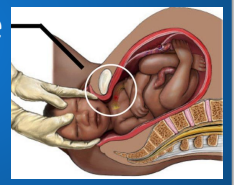
Problem:

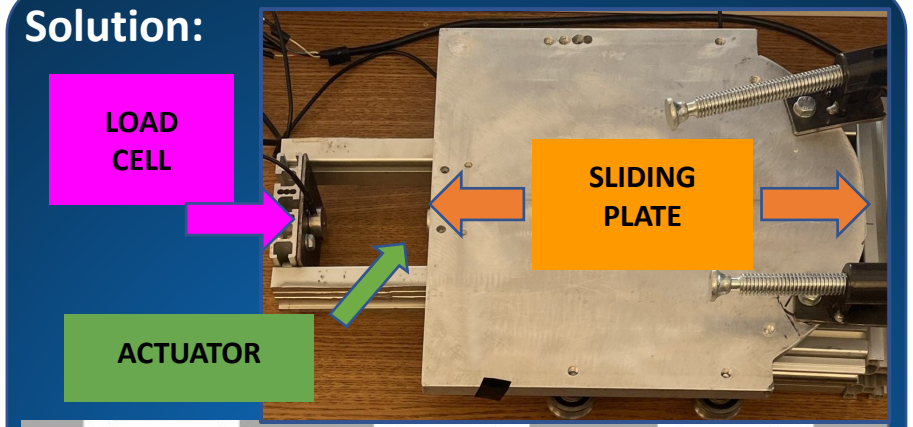
- Injury to BP results when contact pressure between baby's shoulder and mother's pubic bone exceeds threshold (1-4 of 1000 births)
- BP: Network of nerves from the spinal cord to the shoulder, arm and hand

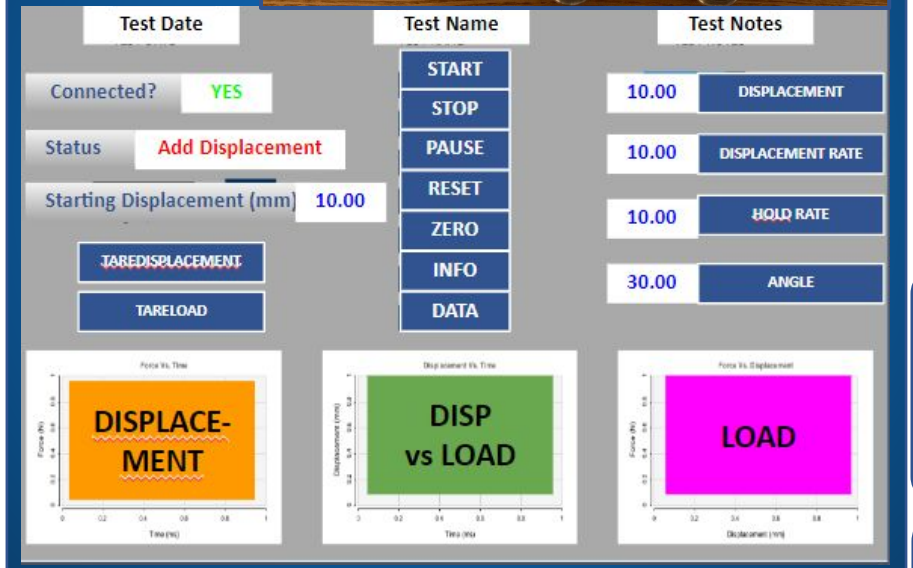


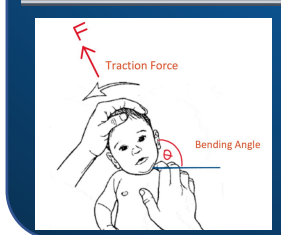
- Can cause temporary or permanent paralysis
- Researchers do not know how to quantify displacement and loading that leads to injury

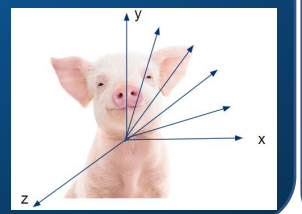
Objective: Create firmware that will displace the head of a neonatal piglet and plot graphs showing various displacement, displacement rates and force values that lead to BP Injuries

Solution:









Verification:

Design Inputs	Test	Avg. Error	Results
Displace piglets neck up to 100 mm	**Displacement** (0-100 mm)	≤ 1%	**PASS**
Control displacement rate of piglets neck	**Displacement Rate** (0-10 mm/s)	≤ 1%	**PART**
Record a force up to 100 N	**Force Collection** (0-100 N)	≤ 1%	**FAIL**
Record Data at 52 Hz	**Data Collection** (10 sec @ 52 Hz)	≤ 1%	**PASS**

Future Developments:

- Connect GUI wirelessly with hardware
- Create app compatible with device

Sources

Innovation and Societal Impact:

- First Quantitative research tool for brachial plexus injury in piglets
- Information will assist surgeons and improve live birth delivery techniques