A. JAMES CLARK SCHOOL OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Mechanical Engineering Design Day

December 6, 2016

Team Melangé: Load Sensing Interbody

Objective

Design a tool that provides K2M researchers the means to measure loads experienced by lumbar interbodies, so future interbody designs can be developed with appropriate load requirements.

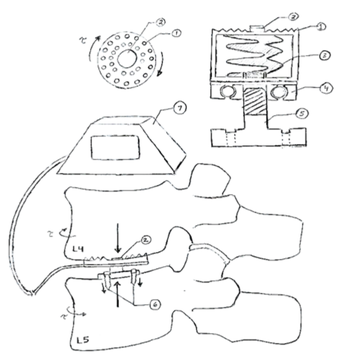
Customer Requirements

- Withstand typical lumbar loads
- Capable of measuring static and dynamic loads
- Provide baseline load data for future interbody designs

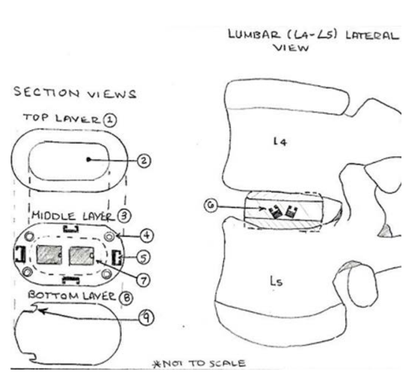
Engineering Characteristics

- Deformation load
- Sample rate
- Sample resolution
- Number of load measurements

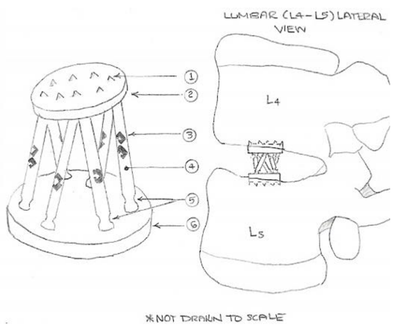
Concept Generation



Torsional Endplate Interbody



PCB Embedded Interbody

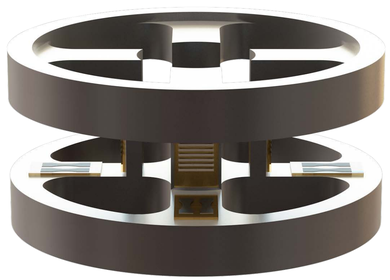


6 Pillar Multi-Axis Interbody

Design

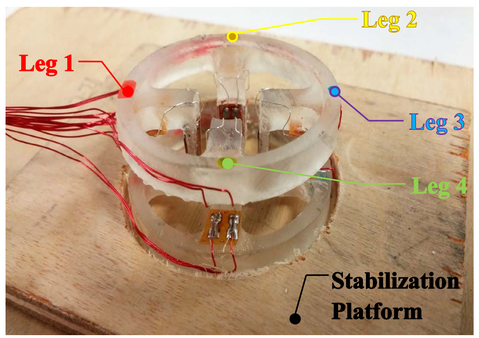
The final concept utilizes four C-shaped pillars to measure compressive loads at four locations.

Axial strain on each vertical pillar will be used to measure total compressive loads and bending moments.

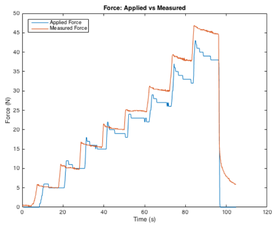


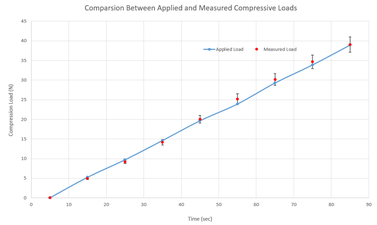
Prototype and Testing

- Generate calibration curve
- Determine sensor effective lifetime
- Determine sensing accuracy



Test Results and Future Work





- Integrate axial moment sensing feature
- Incorporate wireless technology
- Conduct further prototyping with stainless steel interbodies to evaluate the effective life cycle
- Proceed development to achieve a research in-vivo testing capabilities

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