XXIII Twenty Third Annual engineering ▪ design expo2016

Measurement of Human Trunk Stiffness and Stability

University of Idaho College of Engineering

Project Outline

Problem

- The likelihood of sustaining injury during a fall may be related to postural control and alignment.
- Muscle tone can be measured to determine the relationship between torso stiffness and postural performance.

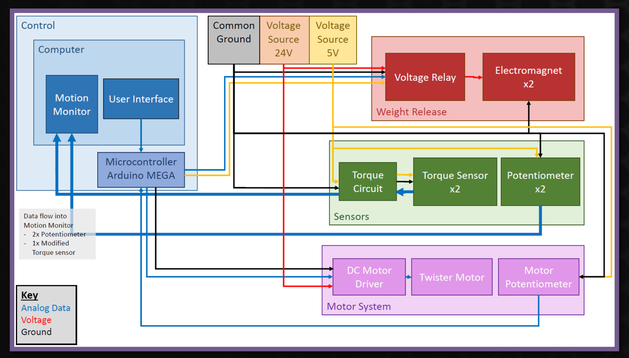
Goal

- Continuing development of a device designed to measure axial and torsional stiffness in the core muscles of the human body.
- Gathered data will be used to associate muscle reaction patterns with changes in mobility due to several psycho-physical factors.

Outcome

The final product, "Twister," will be installed in the Mind in Movement Laboratory. Equipped with modern electronics and simplified mechanics, it will help to further research into cognitive and neural factors underlying control of posture and action.

- **System Schematic**



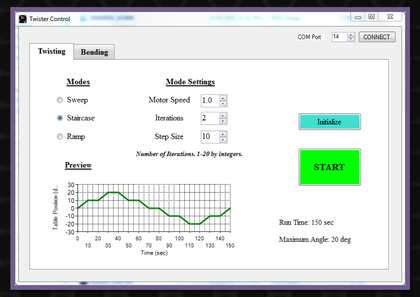
Robert Regent
Jacquelin Remaley
Sally Mei
Austin Steiner

Faculty Advisor: Dr. Joel Perry
Technical Liaison: Dr. Eric Wolbrecht
Graduate Mentor: Dillon Savage

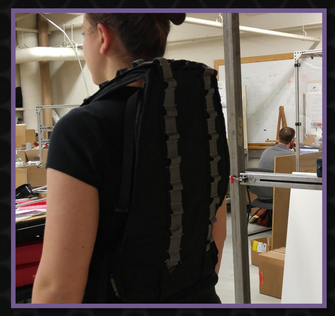
Project Learning

The original device was developed in the early 2000s by Dr. Victor Gurfinkel of the Oregon Health and Science University. Many original components required a redesign or upgrade.

- **GUI:** Motor and Weight control



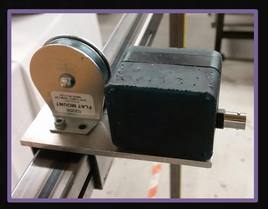
- **Harness:** Adjustable for multiple heights and weights

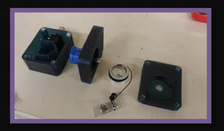


- **Electromagnets:** Hold weights used in axial testing

- **Torque Arm:** Transmits torsional forces to torque sensor

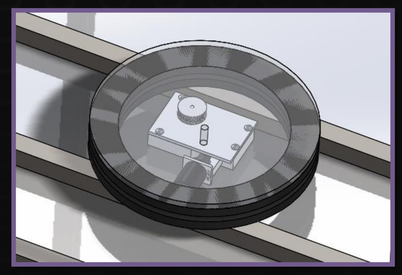
- **Pulley Attachment:** Convert vertical force to lateral and mount string potentiometers





- **Roller feet:** Provides mobility and ease of transportation

- **Motor Drive:** Rotates platform to twist subject in a controlled motion



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