

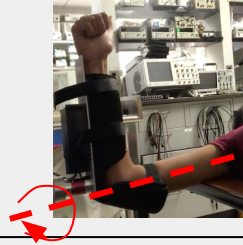
Team 17 - Revise Shoulder-Torque-Range-of-Motion (STROM) Device

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Need

- Aims to quantify rotational stiffness
- Users: Physicians who need to assess shoulder stiffness in baseball players

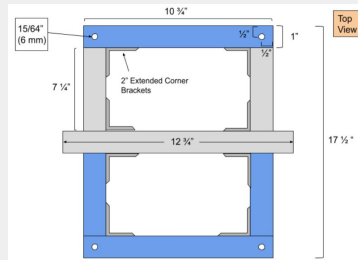


Design Inputs

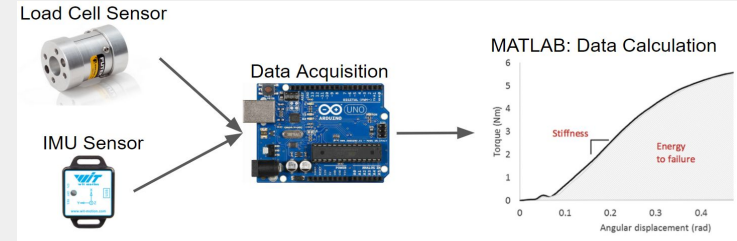
- Measure angular displacement and torque accurately, compute stiffness (95% accuracy)
- Device is stable and not moving around while using
- Height needs to be adjustable

Solution Design

- **Improve** mechanical stability
- **Improve** calibration of angle measurement
- **Improve** software calculation



Solution



Results & Impact

- Device can be set up in 10 min
- Angular displacement and torque measurements are within 95% accuracy

Angular displacement

Goniometer Angle	Theoretical Value	Old IMU	NEW IMU
Handle down 0°/360°	0°	10.2°	0.2°
Rightside 90°/270°	90°	24.9°	88.5°
Handle upright 0°/180°	0° or 180°	170.4°	0.4°
Leftside -90°	90°	92.7°	86.2°

Torque

Theoretical Value (Nm)	Tested Value (Nm)	% Error
11.6	11.83	1.98
16.6	16.66	0.39
33	33.18	0.55

Impact

STROM can be used by physicians to perform more accurate diagnoses, and for athletes to have better tracking of improvement during injuries.