Test 1

Full Range of motion on each finger - The device should be able to move in the full range of motion for each finger. Determine through flex sensor data in the amount of flexion (degrees).

Scope:

- **System:** Robotic/assistive hand device equipped with flex sensors
- **Goal:** To determine if each finger achieves its full range of motion
- **Test Expectations (Hypothesis):** The device should enable each finger to achieve range of motion within 5% error of an average human's natural finger range.

Administrative Details:

- **Date/Location of Testing: ???**
- **Client/Organization:** This class idk
- **Test Conductors:** Research Team under Prof. David Harrison

Design of Experiment:

- **Type of test method:** Controlled experiment using flex sensors to track finger flexion
  - Significance: Ensures the device can replicate the expected movement range of human fingers.

Testing Apparatus & Equipment:

- Glove with integrated flex sensors
- Voltage divider circuit with known resistor (? ohms)
- Arduino
- Computer for data logging and visualization

Independent variable(s): Actuation movement signal sent to device.
Dependent variable(s): Measured flexion angle (degrees) from flex sensors
Number of Factors: Single-factor (flexion range per finger)
Sampling Procedure:

- **Sample Collection:** Each finger tested individually through repeated movement cycles.
- **Sample Size:** Minimum of 30 repetitions per finger to ensure statistical validity.

Procedure:

1. **Setup:** Mount the device securely and ensure proper calibration of flex sensors.
2. **Baseline Measurement:** Record natural rest position of each finger.
3. **Testing:**
   - Actuate each finger from full extension to full flexion.
   - Record flex sensor data at key points of movement (0°, 45°, 90°, etc.).
   - Repeat the process for each finger, ensuring consistency.
4. **Safety Precautions:**
   - Ensure the device does not exceed mechanical limits to prevent damage.
   - Wear protective gear when handling moving parts.
5. **Data Collection:**
   - Data logged digitally via the DAQ system (laptop).
   - Observations recorded manually for potential external influences.
6. **Observation of External Factors:**

    - Ambient temperature variations.
    - Device vibrations and mechanical inconsistencies.
    - Any potential latency in response times.

Expected Outcomes:

- The device should demonstrate flexion within the expected biomechanical range (0°- 90° for DIP, 0°- 100° for PIP, 0°- 90° for MCP, depending on finger).
- Deviation beyond 2.5% of standard human range to be flagged for recalibration.
- If the device does not meet the expected range, adjustments in control algorithms and mechanical design may be necessary.

Test 2

Ability to fit on common hand-