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Test Plan - Part 1

Unit Tests

- Verify that the power supply provides a constant 5V via USB to ESP32 Feather.
- Verify that each FSR sensor outputs an increasing ADC value with increasing load.
- Verify that each FSR sensor outputs an increasing voltage with increasing load.
- Verify that each FSR sensor outputs a decreasing resistance with increasing load.
- Verify that each FSR sensor outputs an increasing force with increasing load.
- Verify multiplexers select the correct sensor channel to read from.
- Verify polling mechanism to poll all sensor channels from multiplexers correctly.
- Verify that the ESP32 Feather is outputting a constant 3.3V to all of the FSR sensors.
- Verify that the ESP32 Feather is able to connect to WiFi.
- Verify that the ESP32 Feather is able to connect to the TCP frontend Node.js server.
- Verify that the ESP32 Feather is able to send data over WiFi to the frontend connected via a TCP server using Node.js.

Verification Tests

- Verify that the GUI heatmap color responds to different pressure magnitudes.
- Verify that the system correctly detects "balanced standing" (even left/right distribution).
- Verify that the system detects "leaning left."
- Verify that the system detects "leaning right."
- Verify that the system detects "forward leaning" (toe pressure increase).
- Verify that the system detects “backward leaning” (heel pressure increase).
- Verify that the system flags “one foot only” posture.
- Verify GUI shows correct pressure region (left vs right foot).
- Verify posture summary updates as new data arrives.

Validation Tests

- Test that the system detects pressure on the mat.

- Test that the system detects imbalance (left vs right).
- Test that the system sends data to the GUI wirelessly.
- Test that the system updates data in real-time.
- Test that the system reconnects automatically after wireless drop-outs.
- Test that the system displays a summary of posture statistics.
- Test that the system supports firmware updates over Wi-Fi.
- Test that the system stores posture history.