Test plan:

(electrical)

FSR Sensors

Precision & Accuracy (ES11):

The finger simulation testing device derived by the ME's will be utilized to simulate multiple key strikes of nearly identical force. These key strikes will be monitored through oscilloscope and through software to establish the precision value of the circuit.

Pass Criteria: The circuit maintains a (+/-)10% level of precision for identical key strikes, with a goal value of (+/-)5%

Response dynamics (ES12 & ES13):

The oscilloscope and developed demo software will be used to monitor varying key strike events. The events will vary in frequency and pulse width to provide a sufficient sample. From this sample the minimum key strike duration and frequency detection values will be evaluated.

Pass Criteria: A minimum duration detected of 30ms, with an ideal value of 5ms. A minimum frequency of 5Hz detected , with an ideal value of 10Hz.

S/N Ratio (ES18):

The oscilloscope and developed demo software will be used to high force key strike events, and static (no strike) events. Monitoring with no strike will yield the value of static noise in the circuit and the effected bits, while monitoring the high force key strikes will yield worst case noise for the circuit. Evaluating all of these events will allow us to establish a signal to noise ratio.

Pass Criteria: A minimum S/N ratio of 10:1, with an ideal value of 100:1.

Sensor Matrix

Configuration:

Each matrix branch will be carefully analyzed with a multimeter and oscilloscope to verify proper connectivity and function of the circuit.

Pass Criteria: A circuit configured properly.

Sustainable Usage (ES2 & ES17):

Due to the impact being applied directly to the PCB/sensors, the flexing of the board will be monitored throughout other tests to ensure the long term integrity of the board itself.

Pass Criteria: Board sustains no damage, and portrays no signs of future damage due to direct use.

Current to Voltage Conversion Circuit

Configuration:

Each matrix branch will be carefully analyzed with a multimeter and oscilloscope to verify proper connectivity and function of the circuit.

Pass Criteria: A circuit configured properly.

Dynamic Range (ES7):

Weights will be utilized to provide a varying level of force applied to the completed assembly. These simulated key strike force values will be monitored through oscilloscope and through software to establish the dynamic range of the circuit and to establish that an acceptable amount of force is being transferred to the sensor through all material layers, and being amplified by the conversion circuits.

Pass Criteria: A dynamic range value of 0-3N, with a goal value of 0-10N.

I/O Board Interfacing

<u>Connectivity:</u>

The completed device will be attached to the PC via USB interfacing to verify communication and function through a single cable.

Pass Criteria: The keyboard and force device both communicate properly through USB.

<u>Power (ES8):</u>

The circuit will be utilized at full cycle rate, with numerous sensors activated simultaneously to simulate worst case power consumption.

Pass Criteria: A current draw at 5V of <500mA, with an ideal value of <200mA.

Demo Program:

<u>Function:</u>

The circuit will be utilized at full cycle rate, with the minimum required frequency and duration of key strikes. The matrixing function will be carefully evaluated during this utilization to ensure the proper functioning of the force vs key look up capability.

Pass Criteria: The software is able to perform the pairing of key strike force to key label at all minimum specifications simultaneously.