ENSC 440: System Test Plan

PresTrack – Group 14

March 31st, 2014

1 System Test Plan

We will be testing the integrated testing unit (1.3) for the following scenarios:

1. Jog In Place
2. Jumping
3. Squatting
4. Sitting Feet Swinging
5. Sitting Still Feet Hanging
6. Sitting Still Feet Planted
7. Stand Arms Moving
8. Standing Still Backpack
9. Stand Still
10. Walking
11. Walking with load on (Backpack)

1.1 Individual components

Component	Areas to be tested	Test to be conducted
FSR sensors	Change in resistance when force is applied	Connect individual sensors to the multimeter and apply force to the sensor to observe the change in resistance
	Ensure that body weight can be accommodated by the sensor	Place the sensor under the heel of the foot to ensure that the sensor could detect the force applied by the body weight
	Compensation for hysteresis	Assume the output voltage is directly dependent to the loading history as a moving integral. Obtain an equation for compression force which is dependent on current output voltage and the moving integral.
	Compensation for shear	Place the sensor in a situation simulating prolonged shear loading
Gyroscope	Ensure that the device is calibrated	Using the digital gyroscope, placing the gyroscope on a flat surface when the device is switched on to calibrate the axes to zero
	Ensure that data is being collected	Connect the gyroscope to the Arduino and extracted some dummy data
Accelerometer	Ensure that the device is calibrated	
	Ensure that data is being collected	Connected the accelerometer to the Arduino and extracted some dummy data
Arduino	Ensure that the Arduino powers on	Connect the Arduino to the power supply and see the LED turn green
	Ensure that the required ports are working	After ensuring the individual components are working accurately and they are connected to the Arduino, collect the data from the sensors to ensure that the ports are working
Multiplexer	Ensure that input and output ports are working	Using dummy data, collect the data in the Multiplexer and ensure that the desired input is can be extracted from the

Component	Areas to be tested	Tests to be conducted
		outputs
Data logging shield	Ensure that data logs in	Connect the SD card to PC and open the file containing the data analysis
	Identify how much data can be stored	Run the system for a 1 hour with different tests indicating the frequency of sampling data
Battery	How long it can power on the Arduino	The battery will power on the Arduino for long periods of time to estimate the battery life.

1.2   Sensor Placement

Component	Areas to be tested	Tests to be conducted
FSR Sensor	Ideal location of the sensor	Research peer review paper and study the pressure map across the feet to isolate key points for the sensor placement
	Distance of the sensor from the surface of the insole	Connect the sensor after incorporating into the insole to see the distance that the sensor can be placed within the insole and still read accurate results
Gyroscope	Ideal location of the sensor	Place the sensor in different regions around the ankle to accomplish extracting accurate data while maintaining comfort
Accelerometer	Ideal location of the sensor	Place the sensor in different regions around the ankle to accomplish extracting accurate data while maintaining comfort

1.3 Integrated Unit Testing

Component	Areas to be Tested	Tests to be conducted
FSR sensor into the shoe insole	Comfort	The newly integrated insole is worn by our own team members as well as friends and family to identify the comfort level
	Accuracy of data	The Arduino extracts the data from the sensors from team members and they are matched with those pressure map extracted from the F-scan machine
	How long the data extracted from the sensor is viable	The insole are worn for long periods of time by different team members, following which the data is periodically checked to see data disruption and corrupted data
Accelerometer and Gyroscope with the MUX to the Arduino	Comfort	The newly integrated insole is worn by our own team members as well as friends and family to identify the comfort level
	Accuracy of data	The Arduino extracts the data from the sensors and they are compared with peer reviewed journals for accuracy and reliability
	How long the data extracted from the sensor is viable	The data extracted is compared to those of peer reviewed journals to account for corrupted data
Arduino with the MUX	Rapidly select the inputs get desired output	The sensors are connected to the MUX and the software is utilised to extract the data from each individual sensors separately
Arduino with data logger	Ensure that the data is logged in	The SD card inserted into the Arduino Uno is removed and connected to the PC to ensure that the data was successfully logged into the SD card and if it can be read
Electronic infrastructure	Ensure the compatibility of various components	Test for proper ventilation so that the system does not get over heated and provide

Component	Areas to be Tested	Tested to be conducted
		sufficient space for the wiring of the components
Insole with FSR integrated with MUX	Ensure that the data is being logged into the MUX	Extract the data from each individual FSR sensors through the MUX by appropriately choosing the input ports.

1.4   Usability Testing

Component	Areas to be Tested	Tested to be conducted
FSR sensors in the insole	Comfort	The newly integrated insole is worn by our own team members as well as friends and family to identify the comfort level
	Ensure that it can withstand day to day living conditions	Will be worn in place of normal shoes by executive members of PresTrack with hopes of replicating their daily routine.
Gyroscope and accelerometer	Comfort	The newly integrated insole is worn by our own team members as well as friends and family to identify the comfort level

1.5   Software Testing

Component	Areas to be Tested		Tests to be conducted
GUI	User interface	Comfort and effectiveness	Friends and family of the group members are requested to use the GUI to verify if the GUI is user friendly and self-explanatory
		Ensure that data is displayed	Run the GUI with data extracted from one of the patients and allow the user to view the results
	Algorithm	Algorithm extracts and analyses data	Extract data from the SD card and ensure that the data is appropriately analysed and depicted correctly
		The accuracy of the pressure map	Sample data will be analysed by PresTrack and the F-scan for comparison