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## *System Test Plan of Comfort Mat System (CMS)*

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## 1. Test Plan

The system test plan consists of multiple tests outlined in the table shown below to ensure that the hardware and software components function properly as standalone functional units, as well as the integrated product as a whole.

### 1.1 Hardware

The hardware test plans focus on functionality of each individual component under the specific environment.

Functional units	Function to be tested	Test to be conducted	Pass/Fail
FSR array	Full array of FSRs works with single input	Apply pressure to single FSR while observing change in resistance	
	Full array of FSRs work with multiple inputs simultaneously, while outputting correct pressure	Apply pressure to multiple FSRs while observing the change in resistance	
	Calibration of FSRs	Value of output is 0 when no pressure is applied	
	Impact from pressure relief cushion	Compare the value of full array of FSRs with and without pressure relive cushion. The result should be consistent	
Temperature and Humidity Sensor	Outputting correct temperature	Bring the sensor to different temperatures and check if it gives the right temperature	
	Outputting correct humidity	Bring the sensor to different humidity environments and check if it gives the right humidity	
Vibration Motor	Vibrates with reasonable force when power is supplied	Gentle vibration force when holding the motor in the hand after powering it.	

	Comfort level	Adjust motor's speed level while tester is sitting on it
BLE mini	Continuity of transmitted signal	Transmit a large set of data to wireless device frequently

## 1.2 Software

The software testing side consists of two graphical user interface options, one is phone application and another one is Matlab.

### 1.2.1 Phone application

Each individual component of the Android application will be tested so the overall functionality of the app is fully verified and validated.

Functional units	Function to be tested	Test to be conducted	Pass/Fail
Bluetooth	Turn Bluetooth ON if it's not already ON.	Once the user clicks on the app icon. It will turn the Bluetooth ON if it's not already ON.	
Connection with the BLE mini	App will connect to the BLE mini. If it's not able to it will throw an error.	Once the user clicks on the 'Connect' tab, the app will establish the connection to the BLE mini.	
Data transfer	Data transfer will occur between the BLE mini and phone app.	The sensors' data will be displayed on the home screen of the app. If it's not then the default values will be displayed.	
Humidity and Temperature sensor's data	The home screen will display the humidity, temperature, and heat index values.	User needs to make sure that the values displayed are correct by measuring the displayed parameters via other means like Matlab interface.	
Pressure data from FSR	After the user clicks the 'Pressure Map', the pressure is displayed in the form of a DPI	The pressure is displayed in form of DPI and it varies according to the change in the	

		pressure applied in real time.
Alarm	Once the FSR pressure data meets a threshold value the alarm is actuated. A pop up will be displayed along with vibration or sound will play depending upon the phone's settings.	User can put an extra amount of pressure for a set amount of time at particular FSR so its value goes beyond the set threshold and the alarm is activated.
GUI	GUI is properly displayed.	User must see the GUI correctly displayed in portrait mode.

### 1.2.2 Matlab

Testing unit	Function to be tested	Test to be conducted	Pass/Fail
Matlab	Data consistency	Apply different forces on the FSR matrix for a short period of time, all sensors' data can be transmitted and received by Matlab simultaneously	
	Pressure mapping result	Apply pressure on the FSR matrix, and then a pressure mapping result will be displayed. The color of different pressure levels will be changed	

### 1.3 Unit Test

In this section, we should treat CMS as a final product, which is ready for sale. The test plans will combine both hardware and software together.

Testing unit	Function to be tested	Test to be conducted	Pass/Fail
Comfort Mat System	Sequence of the FSR array	Apply a force on the FSR matrix at location (1,1)(1,8)(8,1)(8,8) individually to see whether the graphical user interface shows	

	users a proper sequence
Overall functionality of CMS	<p>Sit on the CMS, a pressure mapping result will be displayed simultaneously on one of the GUI. The color of different pressure levels will be changed accordingly.</p> <p>After the long lasting pressure remains for a preset time, the vibrating motors will be triggered.</p>
Data transfer	Transfer correct sensors' values including FSR and temperature/humidity to wireless device and computer. Meanwhile, wireless device and computer should output the exact values