

"Marketing Spy"

TEST PLAN

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Version	Version 1.0
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Originator	T15
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Approval Date	
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Approver	
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Modification History:

Version	Date	Author	Description
1.0	11/20/2014	T15	Initial Version

HIERARICAL TEST PLAN

Test plan includes testing engineering and marketing requirements and specifications. All the system requirements and system design are accessible here:

<https://projects.cecs.pdx.edu/projects/golriz-ece411/wiki>

- Materials or equipment required
 - One sensor block
 - One processing module
 - Closure box
- Module Tests
 - Power
 - Battery charging
 - battery life
 - low power battery
 - Sensor block
 - LCD display
 - Reset pushbutton
- Stress test
 - Picking up and putting back the targeted object too many times
 - Picking up and putting back the targeted object too quickly and too many times
 - Too many sensor blocks for the processing module
 - Dropping off the item on the sensor block too hard
- User Error Test
 - Picking up the wrong item and putting it back too quickly
 - Picking up the item and not putting it back on the sensor (idle sensor)
- System Error Test
 - Measured time of pick up equals the boundary conditions (15 seconds and 3 hours)
- Installation test
 - Sensing any object besides the targeted item; for example the hand movement of the user when checking out the item
 - No need of additional equipment or startup software
- Parametric test
 - Power consumption
 - Time delay
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- Integration test
 - Interaction of sensor block and microcontroller
 - Reset button and microcontroller
 - LCD and microcontroller

SAMPLE TEST CASES DESCRIPTION

Test Case Name		Power Supply Module		Test ID#		PSM-01	
Description		Verify the power supply voltage and the current levels		Type:		white box	
						X black box	
Tester Information							
Name of Tester:				Date:			
Hardware Version:		1.0		Time:			
Test Condition:		T = 25 °C, Input Voltage = 7.5 to 20V, Output Current of voltage regulator = 5mA upto 1A					
Test Setup:		Connect the voltage regulator to the voltage source ranging from 7.5 to 20V while there is an ON/OFF switch to control the power ON and OFF. Connect the output of the regulator to multimeter					
Step	Action	Expected Result		Pass	Fail	N/A	comments
1	Turn on the ON/OFF switch	You should see output voltage of (5 ± 0.25)V and output current of 5mA to 1A					
2	Turn off the ON/OFF switch	No output					

Table 1. Matrix unit test for power supply

Test Case Name		Track Sensor	Test ID#	TS-01		
Description		simulate picking up the item from different distances and verify the digital output voltage	Type:	X	white box	
				black box		
Tester Information						
Name of Tester:			Date:			
Hardware Version:		1.0	Time:			
Test Condition:		T = 25 °C, Input Voltage = 3.3 to 5DCV, threshold voltage = 3.5V				
Test Setup:		Connect V pin to power supply, G pin to ground and S pin to multimeter or oscilloscope. Adjust the potentiometer of the sensor to set the threshold voltage and therefore to set the detecting height range (0 to 50mm)				
Sensor behavior explanation		When sensor detects an obstacle and the induced voltage in above the threshold voltage, output is digital high (3.3V-5V), and when there is no obstacle and induced voltage is below the threshold voltage, the digital output is 0V.				
Step	Action	Expected Result	Pass	Fail	N/A	comments
1	Hook up the S pin of the sensor to oscilloscope and digital multimeter	Oscilloscope should show low level and multimeter should read 0V				
2	Place an obstacle on the sensor	Oscilloscope should show high level and multimeter should read 3.3-5V				
3	Twist the wiper of the potentiometer to left to increase the threshold voltage	Detecting height should increase				
4	Twist the wiper of the potentiometer to right to decrease the threshold voltage	Detecting height should decrease				
5	Try a black object to be detected	LED will be ON when no obstacles but black objects are detected				
6	Try a non-black object to be detected	LED lamp will be OFF when obstacles or non-black objects are detected				

Table 2. Matrix unit test for sensor block

Test Case Name		Marketing Spy Functional Test #1		Test ID#	MS-FT-01		
Description		To confirm basic functionality of the device. Device must instantaneously count up one if the targeted item, which is placed on top of the sensor, is picked up and display the cumulative count.		Type:	white box		
					X black box		
Tester Information							
Name of Tester:				Date:			
Hardware Version:		Marketing Spy 1.0		Time:			
Test Setup:		Device should be fully charged and an object should be placed on top of the sensor block (the more the object is reflective the better to detect), make sure that the device has been reset before. Adjust the potentiometer to detect the object form 3cm distance					
Step	Action	Expected Result		Pass	Fail	N/A	comments
1	Program the microcontroller to count the number of pick up	Program should be tested statically to verify the accuracy. It should monitor the input from the sensor at a sufficient rate depending on the frequency of picking up the object					
2	Case 1: pick up the object from the top of the sensor by a distance less than 3 cm. Put the object back on the sensor block.	Device should not count the case and LCD display shouldn't change					
3	Case 2: Pick up the object from the top of the sensor and move it to have a distance greater than 3 cm from the sensor. Put the object back on the sensor block.	Device should count one and LCD should display 1					
4	Repeat steps 2 and 3 several more times	Device should correctly count and display the number of picking-ups					

Table 3. Step by step functional test for Marketing Spy

Test Case Name		Marketing Spy Integration Test #1	Test ID#	MS-IT-01		
Description		Checks the interaction of sensor and microcontroller (MCU).	Type:	white box		
				X black box		
Tester Information						
Name of Tester:			Date:			
Hardware Version:		Marketing Spy 1.0	Time:			
Test Setup:		Hook up the sensor block as following: V to power supply, G to GND and S to pin PB0 of microcontroller. Adjust its potentiometer to detect the object form 3cm distance. Connect AVCC and VCC pins of MCU to power supply through 100nF capacitors and ground the GND pins (8 and 22). Connect pins PD0 through PD3 of MCU to the digital analyser. Connect 16MHz crystal oscillator to PB6-7 of MCU.				
Step	Action	Expected Result	Pass	Fail	N/A	comments
1	Program the microcontroller to count the number of pick up	Program should be tested statically to verify the accuracy. It should monitor the input from the sensor at a sufficient rate depending on the frequency of picking up the object				
2	Case 1: pick up the object from the top of the sensor by a distance less than 3 cm. Put the object back on the sensor block.	PD0 through PD3 should be 0.				
3	Case 2: Pick up the object from the top of the sensor and move it to have a distance greater than 3 cm from the sensor. Put the object back on the sensor block.	PD0 should be 1 and PD1-PD3 should be 0.				

Table 4. Step by step integration test for microcontroller and sensor

Test Case Name	Marketing Spy acceptance Test #1		Test ID#	MS-AT-01		
Description	Checks the engineering requirement: The device should measure the time that the targeted item, which is placed on top of the sensor, is picked up (the maximum detecting distance is 5 centimetre from the sensor), if the measured time is within 15 seconds to 3 hours, the device counts up 1, calculates the average time and displays both numbers; else it doesn't count the case.	Type:	white box			
			X black box			
Tester Information						
Name of Tester:			Date:			
Hardware Version:		Marketing Spy 1.0	Time:			
Test Setup:		Completed device should be fully charged and an object should be placed on top of the sensor block (the more the object is reflective the better to detect), make sure that the device has been reset before. Adjust the potentiometer to detect the object form 3cm distance				
Step	Action	Expected Result	Pass	Fail	N/A	comments
1	Program the microcontroller to measure the time duration of picking up the item and check for the time range condition	Program should be tested statically to verify the accuracy. It should sample the sensor input over a sufficient timeframe depending on the time duration that the object has been picked up.				
2	Case 1: pick up the object from the top of the sensor by a distance less than 3 cm for any amount of time and put the object back on the sensor block.	Device should not count the case and LCD display shouldn't change				

3	Case 2: Pick up the object from the top of the sensor and move it to a distance greater than 3 cm from the sensor, hold it for less than 15 sec. Put the object back on the sensor block	Device should not count the case and LCD display shouldn't change				
4	Case 3: Pick up the object from the top of the sensor and move it to a distance greater than 3 cm from the sensor, hold it within the timeframe of $15\text{sec} \leq t \leq 3\text{hrs}$. Measure the time. Put the object back on the sensor block	Device should count one and LCD should display 1 for count #. Device should display average time using the following equation: $(\text{Sum of measured time})/(\text{\#count})$				
5	Case 4: Pick up the object from the top of the sensor and move it to a distance greater than 3 cm from the sensor, leave it in that position for more than 3hrs.	LCD should display error message "No device detected"				
6	Put the object back on the sensor block	Error message should disappear while device should not count the case and LCD display's previous state shouldn't change				

Table 5. Step by step acceptance test for Marketing Spy

APPENDIX

The addition, change from previous version:

#	Previous version	Current version