Integrated System Test-Procedure Protocol and Checklist(ISTPAC)

Test 1	Connection between Front- and Backend				
Precondition		**Procedure description**			
RasPi with installed Backend together with the Frontend application is placed in the same network.		After the Textbox gets an input the Connect button is clicked. Then, the Table shows system messages or the Textbox reacts differently.			
Components used during test		**Checklist**			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Table	System message	**1.1**	Textbox input is the IP of the Backend	Table shows connection established	O.K.
Textbox	User Input (Backend IP)	**1.2**	Textbox input is not the IP of the Backend	Table shows connection failed	O.K.
Button	Connect	**1.3**	Textbox input is not related to numbers	Textbox remains empty	N/A
		1.4	Textbox is empty	Tooltip pops on the screen indicating to input an IP-Address.	N/A

Test 2	Sending of requests from Frontend to Backend				
Precondition		**Procedure description**			
RasPi with installed Backend together with the Frontend application are successfully connected. Besides, the RasPi is wired correctly to the Breadboard, specified by Sivantos.		The LED input will be used to test whether requests were successfully received and executed or not. Depending on which Button will be clicked the LED is going to turn on or off.			
Components used during test		**Checklist**			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Button	LED On	**2.1**	LED on is clicked	LED lights up	O.K.
Button	LED Off	**2.2**	Volume Off is clicked	LED turns off	O.K.

Test 3	User Control of GPIO Pins via GUI				
Precondition		**Procedure description**			
RasPi with installed Backend together with the Front-End application are successfully connected. Besides, Hardware-Components are directly or indirectly connected with GPIO Pins. Default Configuration: Pin23 is connected to a LED.		A random discrete number between 0 and 29 will be typed in the Textbox. After clicking a certain Button the referenced operation will be executed on the provided Pin ID. The operation result will be indicated in the Table by showing different System messages.			
Components used during test		**Checklist**			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Textbox	Input of Pin ID under Test	**3.1**	23 is typed in the Textbox	Textbox shows “23”	O.K.
Button	Read Pin	**3.2**	Read Pin is clicked	Table shows “low”	N/A
Button	Write Pin	**3.3**	Write Pin is clicked	LED lights up	O.K.
Button	Reset	**3.4**	Reset is clicked	LED turns off	O.K.
Table	System message	**3.5**	Value < 0 is typed in	Textbox remains empty	N/A

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Hardware	LED	**3.6**	Value >30 is typed in	Textbox remains empty	N/A

Test 4	**Sending of requests from Frontend to Backend via I2C**				
Precondition		**Procedure description**			
RasPi with installed Backend together with the Front-End application are successfully connected. Besides, a LCD Modul is correctly wired to the RasPi and connected via I2C.		In LCD Control, different GUI-Elements will be used which invokes request to the Backend which are respectively processed on the LCD.			
Components used during test		**Checklist**			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Textbox	Text Input which shall be displayed on the LCD	**4.1**	Toggle Backlight is clicked	LCD backlight turns on. Display shows IP	FAIL
Button	Reset	**4.2**	A <Text> will be typed in the Textbox	Textbox displays <Text>	O.K.
Button	Toggle Backlight	**4.3**	Reset is clicked	Display blinks off and on then remains cleared	N/A
Button	SampleText 16 C	**4.4**	SampleText 16 C is clicked	Textbox displays „Das ist ein Text“	O.K.
Button	SampleText 32 C	**4.4**	SampleText 32 C is clicked	Textbox displays <„SampleText 32>	O.K.
Button	Send	**4.7**	Send is clicked	<SampleText >32 C> is displayed in thwo lines on LCD	N/A
Hardware	LCD				

```
Looking up requested Command in Assembly.....
Found the following Command in Request: 'RaspberryBackend.ToggleBacklight_LCD' and instantiated it
Exception thrown: 'System.NullReferenceException' in RaspberryBackend.exe
Awaiting Request...
```

Cant see Result without Backlight

Test 5	**Controlling of the Potentiometer**				
Precondition		**Procedure description**			
RasPi with installed Backend together with the Frontend application are successfully connected. Besides, the RasPi is wired correctly to the Breadboard, specified by Sivantos.		The Analog Volume Control will be used to evaluate whether the Potentiometer is working correctly or not. Therefore the Multimeter is used to measure the output Voltage by connecting Pin 5 and Pin 2 the Potentiometer.			
Components used during test		**Checklist**			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Slider	Volume Control	**5.1**	Slider is moved 0%	Multimer shows 0	O.K.
HW Pin	Pin 2 of Potentiometer	**5.2**	Slider is moved to 50%	Multimeter shows 0,5*VBAT	O.K.
HW Pin	Pin 5 of Potentiometer	**5.3**	Slider is moved to 100%	Multimeter shows VBAT	O.K.
Tool	Multimeter set to 20V				

Test 6	**Pushbutton simulation**

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Precondition	Procedure description
RasPi with installed Backend together with the Frontend application are successfully connected. Besides, the RasPi is wired correctly to the Breadboard, specified by Sivantos and the Multiplexer is set to the test configuration 1.	The Pushbutton in the User Controls tab of the UI will be pressed after the duration was set to different values. The Multimeter is simultaneously used to monitor changes in voltage

Components used during test		Checklist			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Button	Pushbutton (PB)	**6.1**	Multimer is set and connected to Pins	Multimeter shows init-value between 0 and 1	O.K.
Drop Down Menu	Duration	**6.2**	duration is set to short and PB pressed	Value drops to 0 and back to init-value very quick	O.K.
HW Pin	PB configured x-Output-Pin of Multiplexer	**6.3**	duration is set to medium and PB pressed	Value drops to 0 and back to init-value after 250 ms	O.K.
HW Pin	Ground configured x-Output-Pin of Multiplexer	**6.4**	duration is set to long and PB pressed	Value drops to 0 and back to init-value after 3 sec	O.K.
Tool	Multimeter set to 20V				

Der Volt Wert liegt bei 0,1 Volt, egal wie VBAT eingestellt ist

Test 7	Rocker Switch simulation
Precondition	**Procedure description**
RasPi with installed Backend together with the Frontend application are successfully connected. Besides, the RasPi is wired correctly to the Breadboard, specified by Sivantos and the Multiplexer is set to the test configuration 1.	The Rocker Switch in the User Controls tab of the UI will be pressed after the duration was set to different values. The Multimeter is simultaneously used to monitor changes in voltage

Components used during test		Checklist			
Component	**Purpose / Label**	**No**	**Cases**	**Expected**	**Result**
Button	Rocker Switch Down (RSD)	**7.1**	Multimer is set and connected to Pins	Multimeter shows init-value between 0 and 1	O.K.
Button	Rocker Switch Up (RSU)	**7.2**	duration is set to long and RSD pressed	Value drops to 0 and back to init-value after 3 sec	O.K.
Drop Down Menu	Duration	**7.3**	duration is set to long and RSU pressed	Value rise up to 1 and back to init-value after 3 sec	O.K.
HW Pin	RS configured x-Output-Pin of Multiplexer	**7.4**			
HW Pin	Ground configured x-Output-Pin of Multiplexer				
Tool	Multimeter set to 20V				

Der Volt Wert liegt bei 0,1 Volt, egal wie VBAT oder AVC eingestellt ist