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Team 2

SVVI - Software Verification and Validation Instruction

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Version History

Version	Date	Responsible	Description
0.0	150916	UH	Document created
0.1	150918	HA	All instructions written
0.2	150921	UH	Document ready for informal review

Contents

1 Reference Documents

1. PUSS154212 - System Requirements Specification v1.2
2. Programvaruutveckling för Stora System - Projekthandledning v2.2
   (*Institutionen för datavetenskap*, Lunds Univeritet 2015)
3. PUSS154213 - Software Verification and Validation Specification v1.1
4. PUSS154253 - Test Matrices for SVVS v1.1

2 Introduction

This document contains the test instructions for the tests specified in PUSS154213 (ref. 3). The test instructions are in appendices A and B. The numbering corresponds to that in the SVVS (ref. 3).

2.1 Terminology

Device refers to a Light Bulb or a Sensor Device that the application can interact with.

Device available is used when a device is connected to the MVD.

Swiping or **to drag** is meant to be a relatively smooth motion with a finger (or similar device) on the screen of the telephone.

Off or **On** refers to the device's state of transmitting data (in case of the sensor) or light (in case of the light bulb), not whether the device is receiving electrical power or not.

Light bulb refers to the physical object that shines that we can interact with, while the **Light** refers to photons emitted from the *light bulb*.

Controlled environment refers to a environment where we can control at least one of the following physical observables:

- Temperature
- Pressure
- Humidty
- Magnetic field
- Gyroscopic data
- Acceleration

Environmental variable refers to one of the physical observables listed above.

Scenario refers to the corresponding scenario in 1.

A Function Test Instructions

This is appendix A where we list all function test instructions.

A.1 MyDevices View Test Instructions

Instruction A.1.1 Test of startup screen of application.

Precondition

- The application is not running

Instructions:

1. Start the application

Postcondition:

- The application is running
- The MyDevices View is open
- The list of available devices is empty

Instruction A.1.2 Test of device list on startup.
Instructions for this test have been incorporated into **Instruction A.1.1**

Instruction A.1.3 Test of scrollability of device list.

Precondition

- MyDevices View is open
- At least one device is available

Instructions:

1. Drag the list downward
2. Drag the list upward

Postcondition:

- The list responds to the input

Instruction A.1.4 Test of selectability of devices in list.

Precondition

- The MyDevices View is open
- At least one device is available

Instructions:

1. Select one device

Postcondition:

- The device is highlighted and the "Control Device"-button is enabled

Instruction A.1.5 Test of device selection in device list.

Precondition

- The MyDevices View is open
- At least two devices are available
- One device is selected

Instructions:

1. Select an other device

Postcondition:

- Only the last selected device is still selected

Instruction A.1.6 Test of error message in device list.

Precondition

- The MyDevices View is open
- No device is selected

Instructions:

1. Press the "Control Device"-button

Postcondition:

- A pop-up message "Please select a device" is displayed

Instruction A.1.7 Test of device naming.
Precondition

- The MyDevices View is open
- There is at least one sensor in the list of available devices
- There is at least one light bulb in the list of available devices

Instructions:

1. Check the name of each device
2. Check the address of each device
3. Check the id of each device

Postcondition:

- The name of each sensor device is "Sensor"
- The name of each light bulb is "Light Bulb"
- The address of each device is their MAC address
- The id of each device is their identifier

Instruction A.1.8 Test of naming of light bulbs.
Instructions for this test have been incorporated into **Instruction A.1.7**

Instruction A.1.9 Test of scanning function.
Precondition

- The MyDevices View is open
- There is at least one available device within range of the MVD
- The list of available devices is empty

Instructions:

1. Press the "Get Devices"-button

Postcondition:

- A scan for available devices has been performed
- The list of available devices is updated

Instruction A.1.10 Test of termination of application.
Precondition

- The MyDevices View is open

Instructions:

1. Press the back button

Postcondition:

- The application is closed

Instruction A.1.11 Test if layout is consistent with specifications.

Precondition

- The MyDevices View is open

Instructions:

1. Identify the "Get Devices"-button
2. Identify the "Control Device"-button
3. Identify the list of available devices
4. Check the labels at the top of the list

Postcondition:

- The "Get Devices"-button is at the top of the view
- The "Control Device"-button is at the bottom of the view
- The list of available devices is in the middle of the view
- The "ID"-label is placed at the top left of the list
- The "Address"-label is placed at the top right of the list
- The "Device name"-label is placed inbetween the "Address"- and the "ID"-label.

Instruction A.1.12 Test of MAC addresses

Precondition

- The "MyDevices View" is open
- The devices with the MAC addresses in Ref 1 are within range of the MVD
- At least one device with an unknown MAC address is within range of the MVD
- All devices are active

Instructions:

1. Press the "Get Devices"-button

Postcondition:

- The two devices with the MAC addresses in Ref 1 are available
- No other devices are available

A.2 Sensor View Test Instructions

Instruction A.2.1 Test of transition from main view to sensor view.
Precondition

- The MyDevices View is open
- A sensor device is available in the list

Instructions:

1. Select a sensor device
2. Press the "Control Device"-button

Postcondition:

- The Sensor View is open
- The sensor name is shown in the top of the view
- The MAC address is shown in the top of the view
- The temperature, pressure, humidity, magnetic field strength, gyroscopic data and acceleration text fields are all empty

Instruction A.2.2 Test of naming of sensor.
Instructions for this test have been incorporated into **Instruction A.2.1**

Instruction A.2.3 Test of on/off switch.
Precondition

- The Sensor View is open
- The on/off-status switch is set to off

Instructions:

1. Set the on/off-status switch to on

Postcondition:

- The on/off-status switch of the selected sensor is on
- The status lamp on the sensor device is lit

Instruction A.2.4 Test of text field naming in Sensor View.
Precondition

- The Sensor View is open

Instructions:

1. Identify the six text fields
2. Check the labels preceding the six text fields

Postcondition:

- The labels preceding the six text fields are "T", "P", "H", "M", "G" and "A" respectively

Instruction A.2.5 Test of get-button functionality.
This test should be run once for each of the text fields and its corresponding physical observables.
Precondition

- The Sensor View is open
- The on/off-status switch is set to on
- The sensor is in a controlled environment

Instructions:

1. Get a reference value for the environmental variable
2. Press the corresponding "Get"-button to the text field
3. Confirm that the reference value is consistent with the controlled environment
4. Change the variable in the controlled environment
5. Press the "Get"-button

Postcondition:

- The values of the corresponding sensors are retrieved if available and displayed
- The retrieved value in step five is different from that in step two

Instruction A.2.6 Test of "Get All"-button functionality.
Precondition

- The Sensor View is open
- The on/off-status switch is set to on
- The sensor is in a controlled environment

Instructions:

1. Get a reference value for one or more of the environmental variables
2. Press the "Get All"-button
3. Confirm that sensor data is consistent with the controlled environment
4. Change one or more of the reference values in the control environment
5. Press the "Get All"-button

Postcondition:

- The new values for all six sensor's data are displayed in their corresponding text fields
- The retrieved values in step five are different from those in step two

Instruction A.2.7 Test of "Clear All"-button functionality.
Precondition

- The Sensor View is open
- Sensor data are displayed in the text fields

Instructions:

1. Press the "Clear All"-button

Postcondition:

- All the sensor text fields are empty

Instruction A.2.8 Test of unavailable data.
This test should be run 1 time for each of the text fields
Precondition

- The Sensor View is open
- The on/off-status switch is set to on
- Some sensor data is unavailable

Instructions:

1. Press the corresponding "Get"-button to the text field

Postcondition:

- The text field displays "No data available" if no sensor data is available

Instruction A.2.9 Test of on/off-status switch functionality.
Precondition

- The Sensor View is open

Instructions:

1. Change the status of the on/off-status switch

Postcondition:

- The on/off-status switch corresponds to the status light on the sensor device

Instruction A.2.10 Test of back button functionality in the Sensor View.
Precondition

- The Sensor View is open

Instructions:

1. Press the back button

Postcondition:

- The MyDevices View is open

Instruction A.2.11 Test of text fields on selecting new device.
Instructions for this test have been incorporated into **Instruction A.2.1**

Instruction A.2.12 Test of resemblance of Sensor View to specification.
Precondition

- The Sensor View is open

Instructions:

1. Identify the text field showing the name and the MAC address
2. Identify the on/off-status switch
3. Identify the six text fields and their corresponding "Get"-buttons
4. Identify the "Get All"-button
5. Identify the "Clear All"-button

Postcondition:

- The text field showing the name and the MAC address is placed at the top of the view
- The on/off-status switch is placed below the text field described above
- The six text fields are aligned
- The six text fields are placed below the on/off-status switch
- The "Get"-buttons are aligned vertically
- The "Get"-buttons are aligned with their respective text fields
- The "Get All"-button is placed at the bottom left of the view
- The "Clear All"-button is placed at the bottom right of the view
- The "Get All"- and the "Clear All"-button are aligned horizontally

A.3 Light Bulb View Test Instructions

Instruction A.3.1 Test of transition from the MyDevices View to the Light Bulb View.
Precondition

- The MyDevices View is open
- At least one light bulb is in the list of available devices

Instructions:

1. Choose a light bulb in the list of available devices
2. Press the "Control Device"-button

Postcondition:

- The Light Bulb View is open
- The name of the light bulb is shown in the top of the view
- The MAC address of the light bulb is shown at the top of the view
- The text fields specifying color are empty

Instruction A.3.2 Test of naming of light bulb.
Instructions for this test have been incorporated into **Instruction A.3.1**

Instruction A.3.3 Test of light emittance from lamp.
Precondition

- The Light Bulb View is open
- The on/off-status switch is set to on
- The state of the light bulb corresponds to the state of the switch

Instructions:

1. Change the on/off-status switch to off

Postcondition:

- The light bulb is off

Instruction A.3.4 Test of editability of text fields in Light Bulb View.
Precondition

- The Light Bulb View is open

Instructions:

1. For each of the four fields, enter "A"

Postcondition:

- The four fields are preceded by "R:", "G:", "B:" and "W:" respectively
- It is possible to enter a character into the fields

Instruction A.3.5 Test of starting values of text fields.
Instructions for this test have been incorporated into **Instruction A.3.1**

Instruction A.3.6 Test of "Get"-button functionality.
Precondition

- The Light Bulb View is open
- The light bulb is on
- The light bulb has known values, set via other means than the application.

Instructions:

1. Press the "Get"-button
2. Verify that the values are consistent with the values entered at precondition.

Postcondition:

- The R-, G-, B-, W-values are displayed in the fields specified in Req. 5.4.4-5.4.7 in ref 1

Instruction A.3.7 Test of changeability of color of light bulb.
This test should be run six times with the following configurations:

1. A=FF, B=00, C=00, D=00 (color: Red)
2. A=00, B=FF, C=00, D=00 (color: Green)
3. A=00, B=00, C=FF, D=00 (color: Blue)
4. A=00, B=00, C=00, D=FF (color: White)
5. A=F0, B=F0, C=F0, D=F0 (color: White)
6. A=ff, B=ff, C=ff, D=ff (color: White)

Precondition

- The Light Bulb View is open
- The light bulb is on

Instructions:

1. Set the "R:"-field to A
2. Set the "G:"-field to B
3. Set the "B:"-field to C
4. Set the "W:"-field to D
5. Press the "Set"-button

Postcondition:

- The light bulb has the specified color

Instruction A.3.8 Test of interpretation of empty text fields.
This test should be run four times with the following configurations:

1. A blank, B=FF, C=00, D=00 (color: Green)
2. A=00, B blank, C=FF, D=00 (color: Blue)
3. A=00, B=00, C blank, D=FF (color: White)
4. A=FF, B=00, C=00, D blank (color: Red)

Precondition

- The Light Bulb View is open
- The light bulb is on
- The R-, G-, B-, W-, fields show FF, FF, FF and FF respectively
- The light bulb glows white

Instructions:

1. Set the "R:"-field to A
2. Set the "G:"-field to B

3. Set the "B:"-field to C
4. Set the "W:"-field to D
5. Press the "Set"-button
6. Press the "Get"-button

Postcondition:

- The light bulb has the specified color
- The fields that were left blank show "00"

Instruction A.3.9 Test of allowed values in text fields.
This test should be run three times with the following configurations:

1. A = '111'
2. A = 'GG'
3. A = -1

Precondition

- The Light Bulb View is open
- The light bulb is on

Instructions:

1. Try to enter A into the "R:"-field
2. Try to enter A into the "G:"-field
3. Try to enter A into the "B:"-field
4. Try to enter A into the "W:"-field

Postcondition:

- The value A is not accepted

Instruction A.3.10 Test of user feedback when color is changed.

Precondition

- The Light Bulb View is open
- The light bulb is on
- The light bulb glows white

Instructions:

1. Set the "R:"-field to FF
2. Set the "G:"-field to 00
3. Set the "B:"-field to 00
4. Set the "W:"-field to 00
5. Press the "Set"-button

Postcondition:

- A pop-up message saying "Color successfully changed" is displayed
- The light bulb is red

Instruction A.3.11 Test of user feedback when color could not be changed.

Precondition

- The Light Bulb View is open
- The light bulb is on
- The light bulb glows red
- The color of the light bulb can not be changed

Instructions:

1. Set the "R:"-field to 00
2. Set the "G:"-field to 00
3. Set the "B:"-field to FF
4. Set the "W:"-field to 00
5. Press the "Set"-button

Postcondition:

- A pop-up message saying "Error: Could not change color." is displayed
- The light bulb glows red

Instruction A.3.12 Test of set button characteristics.

Precondition

- The Light Bulb View is open
- The light bulb is off

Instructions:

1. Identify the "Set"-button

Postcondition:

- The "Set"-button is unavailable

Instruction A.3.13 Test of back button functionality in the Light Bulb View.

Precondition

- The Light Bulb View is open

Instructions:

1. Press the back button

Postcondition:

- The MyDevices View is open

Instruction A.3.14 Test if layout is consistent with specifications.

Precondition

- The Light Bulb View is open

Instructions:

1. Identify the text field showing the name and the MAC address
2. Identify the on/off-status switch
3. Identify the four text fields
4. Identify the "Get"-button
5. Identify the "Set"-button

Postcondition:

- The text field showing the name and the MAC address is placed at the top of the view
- The on/off-status switch is placed below the text field described above
- The four text fields are aligned
- The four text fields are placed below the on/off-status switch
- The "Get"-button is placed at the bottom left of the view
- The "Set"-button is placed at the bottom right of the view
- The "Get"- and the "Set"-button are aligned horizontally

B System Test Instruction

This is appendix B where we list all system test specifications.

B.1 Use Cases

Instruction B.1.1 Test of Scenario 5.1.1.

Precondition

- The MyDevices View is open
- There is a light bulb and a sensor device with MAC addresses as specified in Ref 1 within scan range of the MVD
- No other known devices are within range of the MVD

Instructions:

1. Press the "Get Devices"-button

Postcondition:

- The light bulb is displayed in the MyDevices View
- The sensor device is displayed in the MyDevices View

Instruction B.1.2 Test of exception handling in Scenario 5.1.1.

Precondition

- The MyDevices View is open
- No known devices are within range of the MVD

Instructions:

1. Press the "Get Devices"-button

Postcondition:

- A pop-up message with the text "No devices found" is found
- The list of avilable devices is empty

Instruction B.1.3 Test of Scenario 5.1.2.

Precondition

- The MyDevices View is open
- A light bulb is available

Instructions:

1. Select the light bulb
2. Press the "Control Device"-button

Postcondition:

- The Light Bulb View is open

Instruction B.1.4 Test exception in Scenario 5.1.2.
Precondition

- The MyDevices View is open
- A light bulb and a sensor device is available

Instructions:

1. Press the "Control Device"-button

Postcondition:

- A pop-up message with the text "Please select a device" is shown

Instruction B.1.5 Test of Scenario 5.1.3.
Precondition

- The Sensor View is open
- A sensor device is available

Instructions:

1. Select the sensor
2. Press the "Control Device"-button

Postcondition:

- The Sensor View is open

Instruction B.1.6 Test exception handling in Scenario 5.1.3.
Instructions for this test have been incorporated into **Instruction B.1.4**

Instruction B.1.7 Test of Scenario 5.1.4.
Precondition

- The Light Bulb View is open
- The light bulb is on

Instructions:

1. Set the on/off-status switch to off

Postcondition:

- The light bulb is off

Instruction B.1.8 Test of Scenario 5.1.5.

Precondition

- The Light Bulb View is open
- The light bulb is off

Instructions:

1. Set the on/off-status switch to on

Postcondition:

- The light bulb is on

Instruction B.1.9 Test of Scenario 5.1.6.

Precondition

- The Sensor View is open
- The sensor device is on

Instructions:

1. Set the on/off-status switch to off

Postcondition:

- The sensor device is off

Instruction B.1.10 Test of Scenario 5.1.7.

Precondition

- The Sensor View is open
- The sensor device is off

Instructions:

1. Set the on/off-status switch to on

Postcondition:

- The sensor device is on

Instruction B.1.11 Test of Scenario 5.1.8.

Precondition

- The Light Bulb View is open
- The light bulb is on
- The "R:"-field of the light bulb is set to FF
- The "G:"-field of the light bulb is set to FF
- The "B:"-field of the light bulb is set to 00
- The "W:"-field of the light bulb is set to 00

Instructions:

1. Set the "R:"-field to FF
2. Set the "G:"-field to 00
3. Set the "B:"-field to 00
4. Set the "W:"-field to 00
5. Press the "Set"-button

Postcondition:

- The light bulb glows red

Instruction B.1.12 Test of Scenario 5.1.9.

Precondition

- The Light Bulb View is open
- The light bulb is on
- The light bulb glows yellow
- The R-value of the light bulb is FF
- The G-value of the light bulb is FF
- The B-value of the light bulb is 00
- The W-value of the light bulb is 00

Instructions:

1. Press the "Get"-button

Postcondition:

- The "R:"-field displays FF
- The "G:"-field displays FF
- The "B:"-field displays 00
- The "W:"-field displays 00

Instruction B.1.13 Test if no data is available in Scenario 5.1.9.

Precondition

- The Light Bulb View is open
- The light bulb is on
- The light bulb glows yellow
- One or more R-, G-, B-, W-values are unavailable

Instructions:

1. Press the "Get"-button

Postcondition:

- One or more fields are updated to "No data available"

Instruction B.1.14 Test of Scenario 5.1.10.

Precondition

- The Sensor Device View is open
- The sensor device is on

Instructions:

1. Press the "Get"-button next to the "T:"-field

Postcondition:

- The temperature is displayed in the "T:"-field

Instruction B.1.15 Test of Scenario 5.1.2, when some data is unavailable.

Precondition

- The Sensor Device View is open
- The sensor device is on
- The temperature data for the sensor device is unavailable

Instructions:

1. Press the "Get"-button next to the "T:"-field

Postcondition:

- The text in the "T:"-field is set to "No data available"

Instruction B.1.16 Test of Scenario 5.1.11.

Precondition

- The Sensor Device View is open
- The sensor device is on

Instructions:

1. Press the "Get All"-button at the bottom of the view

Postcondition:

- All the sensor values are displayed in their respective field

Instruction B.1.17 Test of Scenario 5.1.11, when some data is unavailable.

Precondition

- The Sensor Device View is open
- The sensor device is on
- Some sensor data for the sensor device is unavailable

Instructions:

1. Press the "Get All"-button

Postcondition:

- The field corresponding to the data that were unavailable is set to "No data available"

Instruction B.1.18 Test of Scenario 5.1.12.

Precondition

- The Sensor Device View is open
- At least one of the sensor data fields has data

Instructions:

1. Press the "Clear All"-button

Postcondition:

- All the sensor data fields are empty

B.2 Quality Test Instructions

Instruction B.2.1 User friendlyness test
Measure the time it takes to perform this test
Precondition

- 5 persons without prior knowledge of the project or the application are chosen

Instructions:

1. Give the test persons a minor introduction of what the application is able to do
2. Tell the test persons to turn the lamp green
3. Tell the test persons to collect all data from the sensor

Postcondition:

- All test persons completed the tasks without any major problems
- The full test requires less than 10 minutes to perform

Instruction B.2.2 Interaction time test.
For each step in the instruction below, measure the response time for the application. For the test to pass, the response time for each step should be less than 2 seconds.

Precondition

- The application is not running

Instructions:

1. Start the application
2. Press "Get Device"-button
3. Select a sensor
4. Press "Control Device"-button
5. Turn the sensor on by flicking the switch
6. Press "Get"-button. Do this for all data
7. Press "Get All"-button
8. Press "Clear All"-button
9. Turn the sensor off by flicking the switch
10. Press "Back"-button
11. Select a light bulb
12. Turn the ligt bulb on by flicking the switch
13. Press "Get"-button
14. Enter any value in the color fields
15. Press "Set"-button
16. Turn the light bulb off by flicking the switch
17. Press "Back"-button until the application is closed

Postcondition:

- Application is not running

Instruction B.2.3 Test of response time for error messages.
For each step in the instruction below, measure the time until an error message is displayed. For the test to pass, the error message response time for each step should be 15 seconds.

Precondition

- In each step, the corresponding device should be out of range of the MVD
- In each step, first navigate to the appropriate view (some devices may need to be connected for this. In that case, remove them from range before the test instruction is performed)

Instructions:

1. Press the "Get Devices"-button
2. Change the on/off-status switch of the sensor device to on
3. Press the "Get All"-button in the Sensor Device View
4. Change the on/off-status switch of the sensor device to off
5. Change the on/off-status switch of the light bulb to on
6. Change the color of the light bulb:
   - Set the "R:"-field to 00
   - Set the "G:"-field to 00
   - Set the "B:"-field to FF
   - Set the "W:"-field to 00
   - Press the "Set"-button
7. Change the on/off-status switch of the light bulb to off