TEST SPECIFICATION

for

BLC's Automated Light Guide

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Contents

Revision History

Name	Date	Reason for Changes	Version
Magnus Tang, Emil Hu, Daniel Biørrith, Jens Fisker, Bastian Kramer	13/02/2021	Initializing the document and first test cases.	01
Magnus Tang, Emil Hu, Daniel Biørrith, Jens Fisker, Bastian Kramer	16/05/2021	Adding test cases for extentions and non-functional requirements.	02
Magnus Tang, Emil Hu, Daniel Biørrith, Jens Fisker, Bastian Kramer	20/05/2021	Minor corrections.	03

1 Introduction

The purpose of this document is to present the test specification for BLC's automated light guide. This document will specify the test cases, which shall ensure that the system meets the requirements set by the costumer. Thus, this document is based on our Requirements Specification document.

1.1 Acceptance of Test Cases

In order for a test case to be considered accepted, the result of the test case shall match the expected result with both the costumer and developers confirming the result.

Thus, each test case will in the end be marked with on of the following expressions:

- **Passed**
  The test case is accepted.
- **Passed w/ reservation**
  The test case is accepted but with reservations. These reservations are considered to have next-to-none influence on the overall functionality for the system.
- **Failed**
  The test case is not accepted.

If all the test cases are accepted, then BLC's automated light guide is considered accepted.

2 Overall Testing

2.1 Test Case Preparation

Before testing the test cases, the following expressions must be true or up and running:

- The server `http://localhost:3000` must be active along with the database and a MQTT broker.
- The webserver must be connected to the Raspberry Pi 4.
- The 5 PIR sensors and 5 LED must all be installed in the each of the room.
- The 5 PIR sensors and 5 LEDs shall be connected to the Raspberry Pi 4 and turned on.
- The user shall have access to the internet.
- The user must have a valid username and password.
- The time must be between 10 PM to 9 AM.

2.2 Test Environment

The testing must happen in a building or a house with a minimum of 5 rooms. Otherwise the testing can also happen with a setup that mimics rooms.

3 Test Cases

The following section will specify each test case of BLC's automated Light Guide. The test cases are based on the use cases presented in our Requirement Specification document as well as some of their corresponding extensions, which are described in the subsections. However, there are extensions, which will not be tested as they are deemed them too troublesome to simulate.

3.1 Test Case of UC1: Log in

Test Case ID	TUC1
Test Scenario	Check user login for the webapplication
Test Steps	1. Go to `http://localhost:3000` 2. Enter username 3. Enter password 4. Click log in
Test Data	1. Username: XXXXX 2. Password: XXXXX
Expected Result	The user should login into the application
Result	
Comments	

3.1.1 Extension 1.1

Extension ID	TUC1 E1
Extension Scenario	Check user login for the application with invalid data
Extension Steps	1. Go to `http://localhost:3000` 2. Enter either wrong username or wrong password 3. Click log in
Extension Data	1. Username: XXXXX 2. Password: XXXXX
Expected Result	The user should get the error message "*Wrong username or password*"
Result	
Comments	

3.2 Test Case of UC2: Detect User Movement

Test Case ID	TUC2
Test Scenario	Check if data is stored on the web servers database, when the user moves
Test Steps	1. Move inside the room 2. Check data on the webserver
Test Data	PIR sensor readings
Expected Result	The broker on the Raspberry Pi should receive data from the motion sensor and the data should be stored on the database
Result	
Comments	

3.2.1 Extension 2.1

Extension ID	TUC2 E1
Extension Scenario	Check if data are stored on the webserver, when the motion sensor is inactive
Extension Steps	1. Turn off motion sensor 2. Move inside the room 3. Check data on the webserver
Extension Data	
Expected Result	The database on the webserver should have the same data as before or remain empty
Comments	

3.2.2 Extension 2.2

Extension ID	TUC2 E2
Extension Scenario	Check if the data is stored on the webserver, when the webserver is down
Extension Steps	1. Shut down webserver 2. Move inside the room 3. Check data on the webserver 4. Start the webserver
Extension Data	PIR motion sensor reading
Expected Result	The database on the webserver should have the same data as before or remain empty.
Result	
Comments	

3.3 Test Case of UC3: Turn on light

Test Case ID	TUC3
Test Scenario	Check if the LED lights up in the room
Test Steps	1. Move inside the room
Test Data	PIR motion sensor readings
Expected Result	The LED inside the room should turn on
Result	
Comments	

3.3.1 Extension 3.1

Extension ID	TUC3 E1
Extension Scenario	Check if the LED turns on, when no signal is send
Extension Steps	1. Turn off the motion sensor 2. Move inside the room
Extension Data	
Expected Result	The LED should not turn on.
Result	
Comments	

3.3.2 Extension 3.2

Extension ID	TUC3 E2
Extension Scenario	Check if the LED turns on, when it is inactive
Extension Steps	1. Turn off LED 2. Move inside the room
Extension Data	PIR motion sensor readings
Expected Result	The LED should not turn on
Result	
Comments	

3.4 Test Case of UC4: Turn on next light

Test Case ID	TUC4
Test Scenario	Check if the light guides the user in correct direction
Test Steps	1. Move inside the current room 2. Enter the next room, where the LED is light up 3. Proceed with step 1-2 until there are no new LED that lights up
Test Data	PIR sensor readings
Expected Result	The LED in the next rooms should turn on until the bathroom is reached
Result	
Comments	

3.4.1 Extension 4.1

Extension ID	TUC4 E1
Extension Scenario	Check if the LEDs in the rooms turn on, when one LED is inactive
Extension Steps	1. Turn off LED 2. Move inside the current room 3. Go to the next room where the LED lights up
Extension Data	PIR sensor readings
Expected Result	The LED should be off in the first room, whereas the LED in the next room should turn on.
Result	
Comments	

3.4.2 Extension 4.2

Extension ID	TUC4 E2
Extension Scenario	Check if the LEDs turn on when the PIR motion sensor is inactive
Extension Steps	1. Turn off motion sensor 2. Move inside the current room
Extension Data	PIR sensor readings
Expected Result	The LED in the current room as well as the next room should stay off.
Result	
Comments	

3.5 Test Case of UC5: Turn off light

Test Case ID	TUC5
Test Scenario	Check if the LED turns off after the user has left the room
Test Steps	1. Move in the room 2. Go out of the room or stand still
Test Data	PIR motion sensor readings
Expected Result	The LED should turn off in the room the user left.
Result	
Comments	

3.5.1 Extension 5.1

Extension ID	TUC5 E1
Extension Scenario	Check if the lights turn on when the LED is inactive
Extension Steps	1. Move in the room 2. Turn off the motion sensor 3. Go out of the room or stand still
Extension Data	PIR sensor readings
Expected Result	The LED should still be turned on.
Comments	

3.6 Test Case of UC6: Request stored data

Test Case ID	TUC6
Test Scenario	Check if the user receives the correct data upon request
Test Steps	1. TUC1 2. Click `"View Data"`
Test Data	1. Username: XXXXX 2. Password: XXXXX
Expected Result	The user should be able to see the requested data
Result	
Comments	

4 Test Cases: Nonfunctional Requirements

ID	Description	Expected Result	Result	Comment
NFR1	BLC's automated light guide must work in a setup with at least 5 rooms	TCU2, TCU3, TCU4 and TCU5 are executed successfully on a setup with at least 5 rooms		
NFR2	The system must use MQTT with JSON encoding for server communication and follow HEUCOD recommendations	TCU2 is executed successfully using MQTT brokers and HEUCOD events		
NFR3	The system must use Zigbee based sensors and actuators and a Raspberry Pi 4 as the controller.	TCU2, TCU3, TCU4 and TCU5 are executed successfully using Zigbee based sensor and actuators and a Rasperry Pi 4		
NFR4	PIR sensors must be used to detect user presence and LEDs to turn on the lights.	TCU2, TCU3, TCU4 and TCU5 are executed successfully		
NFR5	The system must provide a web application for the user	TCU1 and TCU6 are executed successfully		
NFR6	The system must use a MySQL database and the server will be based on NodeJS	TCU2, TCU3, TCU4 TCU5 and TCU6 are executed successfully using a MySQL database		

5 Test Results

The results of the test cases will be presented in the table below.

Test Case	Status	Comment	Date
TCU1			
TCU2			
TCU3			
TCU4			
TCU5			
TCU6			