MCGILL ENGINEERING DESIGN

ECSE 211

ECSE 211 DESIGN PROJECT

TESTING DOCUMENT

Version *1.02*

13/03/2018

ECSE 211 TEAM 11

VERSION HISTORY

Title	Testing Document			
Description	Test the built system if meets all the requirements			
Created By	Tianyi Zou, Testing leader			
Date Created	1st March 2018			
Version Number	**Modified By**	**Modifications Made**	**Date Modified**	**Status**
1.00	Tianyi Zou	Created the Testing Document Template	1st March	Preliminary version of the document; added testing template in the appendix
1.01	Luka Jurisic	Peer reviewed the document. Fixed some small errors and formatted the document. Added the introduction, 2 appendixes, and the test plan document. Created section 1.1-1.3.2 and section 2	2nd March	Preliminary template complete
1.02	Tianyi Zou, Enan Zaman	Completed section 3.2 and 3.4; Light Sensor and Wheels preference tests	13th March	All other tests remain

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1 INTRODUCTION

1.1 PURPOSE OF THE TEST PLAN DOCUMENT

The Test Plan document documents and tracks the necessary information required to effectively define the approach to be used in the testing of the project's product. The Test Plan document is created during the Planning Phase of the project. Its intended audience is the project manager, project team, and testing team. Some portions of this document may on occasion be shared with the client/user.

1.2 TESTING TOOLS

The following tools will be used for testing:

PROCESS	TOOLS
Test Case Creation	Microsoft Word
Test Case Tracking	Microsoft Excel
Test Case Execution	Manual
Test Case Management	Microsoft Excel
Defect Management	Microsoft Excel

1.3 QUALITY OBJECTIVE

1.3.1 PRIMARY OBJECTIVE

The primary objective of this testing phase is to assure that the system meets the full requirements, including quality requirements, and maintain the metrics for each quality reequipments of the final design. At the end of the project development, the user should find that the project has met or exceeded all of their specifications detailed in the requirements.

1.3.2 SECONDARY OBJECTIVE

The secondary objective of this testing phase is to identify issues and propose solutions to all hardware and/or software issues, and to communicate all this to the project team. This requires careful and methodical testing of the design to ensure all areas of the system are scrutinized appropriately.

2 TEST DELIVARABLES

The testing phase will allow a general progression of the project in terms of both hardware and software. The testing phase will provide key deliverables that fall into 3 basic categories: Documents, Test Cases and Reports. The figure below illustrates the dependencies of these 3 categories.

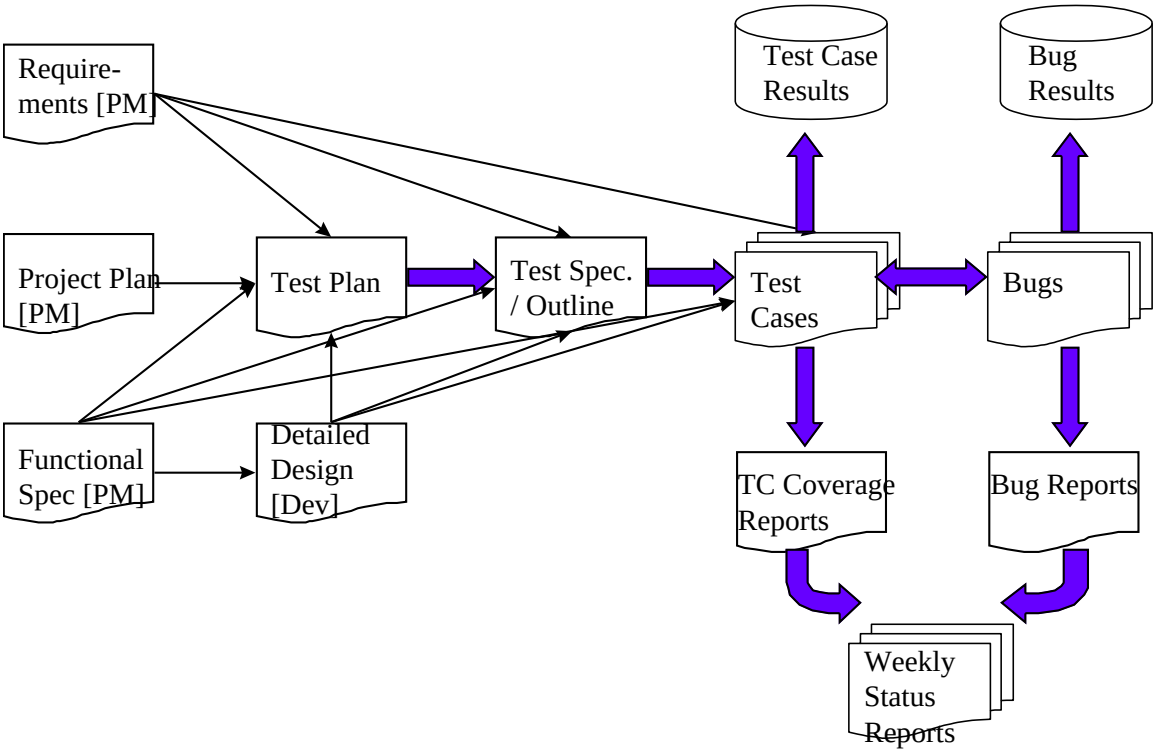

Diagram Source: https://strongqa.com/qa-portal/testing-docs-templates/test-report

3 HARDWARE TESTING

3.1,3.3, 3.5 TO BE UPDATED ITERAVELY

3.2 LIGHT SENSOR

Tester's names: *Enan Zaman, Tianyi Zou* **Test Date:** *03/12/18*
Software Version: No code is used in this test.

Hardware Version: This test does not need a robot built. Only the brick and sensors are used.

Objective:

Determine which light sensor performs best by testing the distance between sensor and object where the sensor is able to detect object.

Procedure:

1. Put a blue paper on the table. Use a ruler to measure the distance by putting a block adjacent to the ruler so that the ruler can be stabilized and placed perpendicular to the table surface.
2. Connect the Port 1 on the brick to the sensor via a cable.
3. Use the tools application on the EV3 brick. Select Tools>Test Sensors >Go> Port 1>EV3 Color >Color ID.
4. Place the light sensor next to the ruler and on the table surface. Make sure the direction of light should be to the blue paper on the table.
5. Move up the light sensor along the ruler slowly.
6. Record the distance (d1)between the light screen of light sensor and the table surface when the value of color ID shown on the screen of EV3 brick becomes 2.0.
7. Repeat step 5 and record the distance (d2) when the value of color ID becomes 7.0.
8. Repeat step 5 and record the distance (d3) when the value of color ID becomes -1.0.
9. Do the same procedure to test other two light sensors.

Expected result:

The value of d1 and d2 are respectively the closest and farthest distance that the light sensor is able to precisely detect an object, which means light sensor can both detect the object in front of it and identify the color of the object. Value of d3 is the farthest distance that the light sensor is able to detect an object, but not able to identify the color.

Test reports:

	d1(cm)	d2(cm)	d3(cm)
Light sensor 1	0.3	1.8	4.5
Light sensor 2	0.6	1.0	3.5
Light sensor 3	0.5	1.5	3.7

Conclusion:

Different light sensor performs differently. Generally all sensors can detect objects well within the distance between 0.6 cm and 1.0 cm. Sensors can still detect objects but fail to identify the color at distance from 1.8 cm to 3.5cm.

Action:

We have to place the sensor at distance between 0.6 cm and 1.0 cm from the block in order to detect the block and identify its color.

Distribution: Hardware team

3.4 WHEELS

Test's Title:_Testing Different Methods of transportation_

Tester's Names:_Enan Ashaduzzaman & Tianyi Zou_ **Test Date:_Monday, March 12, 2018__**

Software Version:_____

Hardware Version:_____

Objective:

The objective of this test was to check whether to use the treads or the regular wheels. Treads can be very useful at overcoming the bumps and not implementing a variable track.

Fears include treads not being accurate during navigation. All these outcomes will be tested, and the best form of transportation will be implemented on the final robot.

Background knowledge:

From past knowledge from the labs, it was seen that the robot completes the navigation of the square accurately.

Procedure:

1. Build a robot using either the treads or regular wheels.
2. Check how the robot completes its navigation through the bridge.
3. Make the robot complete the square navigation to see the accuracy.

Expected Results:

It is expected both the regular wheels and treads will overcome the bumps on the bridge as they are relatively small. It is expected that the treads will be less accurate than the regular wheels during navigation. These little discrepancies can accumulate at the end of the day.

Test Report:

Treads

Design 1: The treads were loose on the robot since the wheels didn't span the entire length of the tread. The robot completed the navigation through the bumps. The robot had a lot of accuracy issues during the square navigation.

Design 2: The front wheel of the tread was lifted slightly, tightening the tread on the robot. The robot had no difficulty traversing the bumps on the bridge. While the navigation got better from the first implementation, there were still some problems in the navigation of the robot.

Regular Wheels

Design 1: Having two wheels on each motor helped with the traction of the robot. The single marble holding the back end of the robot caused many issues when going through the bumps. It caused the robot to never travel straight. At the end, the robot never made

it through the bridge during the tests. The navigation of the robot was more accurate than the navigation using treads.

Design 2: Having two marbles on the back end instead of one slightly helped the robot when traversing the bridge. It still encountered a lot of problems. It was concluded that the marble was not going to be a viable option for the robot.

Design 3: The marble was completed replaced with a single wheel on the back end of the robot. The wheel was stabilized, meaning it couldn't move in all directions like the marble could. The robot plowed through the bridge with ease, showing no sign of difficulties.

Conclusion/Action/Distribution

It was concluded that the final robot would have the regular wheels implemented over the treads. Even though the treads were better at traversing the bridge, it was only by a slight margin. Considering that navigation is a key component during the final project, it is important to use the hardware that completes the navigation the bests. Therefore, the regular wheels were chosen considering they were a ton better at navigation.

The next step in the hardware process is to implement a lazy wheel. This wheel will have similar abilities to a marble but will traverse the bumps on the bridge with ease.

This will all be distributed to the hardware team.

5 TEST REPORT TEMPLATES

TESTING TEMPLATE

Test's Title:_____

Tester's names:_____ Test Date:_____

_____ Software Version:_____

_____ Hardware Version:_____

_____

Objective:

Background knowledge (if needed):

Procedure:

Expected Results:

Test Report:

Tests	**Variables**				**Passed?**	**Comments:**
1						

2						
3						
4						
5						
6						

Conclusion/Action/Distribution

TEST PLAN APPROVAL

The undersigned acknowledge they have reviewed the **Test Plan** document and agree with the approach it presents. Any changes to this document will be coordinated with and approved by the undersigned.

Signature: _____ Date: _____
Print Name: _____
Title: _____
Role: _____

Signature: _____ Date: _____
Print Name: _____
Title: _____
Role: _____

Signature: _____ Date: _____
Print Name: _____

Title: _____

Role: _____

Appendix A: References

The following table summarizes the documents referenced in this document.

Document Name and Version	Description	Location

Appendix B: Key Terms

The following table provides definitions for terms relevant to this document.

Term	Definition