Sprint 3 - Accuracy Design Document

December 06, 2021

Table of Contents

1. Executive Summary

1.1 Project Overview

This project is software for the Sphero SPRK+ which is used to navigate the course avoiding all of the obstacles along the course and knocking over as many pins as possible, and intended audience is our fellow students and professor

1.2 Purpose and Scope of this Specification

The purpose of the specification for the project is to have the code for the navigation of the course and to avoid the bottles along the course to knock over as many pins as possible

1. Product/Service Description

Our group needs to create software or to be specific block code that will allow our robot to complete the required course and have it completed the other requirements like avoiding the obstacles and knocking over all the pins

1.3 Product Context

This product is software for the Sphero SPRK+ and so it may work with other Sphero devices which can run off the block code

1.4 User Characteristics

- Students have more experience but have developed the block code the robot is using to complete the course and navigate around the 3 obstacles
- Professor has more experience but will be evaluating the students' performance on the sprint

1.5 Assumptions

If the difference in elevation of the ground and when placing the robot down to test it that the differences don't make too many differences when testing and navigating the course

1.6 Constraints

- We can only use the robot that we are assigned
- The robot must be programmed through the Sphero Edu application with its block code
- Must fulfill the requirements for the sprint

1.7 Dependencies

There aren't many dependencies that could affect the project requirements though whether the robot is charged, or the balance of the floor could lead to small changes in the trajectory

2. Requirements

2.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
AGIL_01	The robot must avoid the 3 obstacles	The obstacles are the 3 bottles	1	12/01	
AGIL_02	The robot must run the course	Must stay on the course	1	12/01	

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
AGIL_03	Robot must knock over as many pins as possible	The pins are markers and we knocked over 4	2	12/01	

2.2 Security

2.2.1 Protection

- The software or block code for our robot is protected behind multi factor authentication
- The other documents are private documents which are not available to the public

2.2.2 Authorization and Authentication

- The authorization and authentication processes we have are that to access our documents and GitHub you need to have them shared with you

2.3 Portability

- Portability is not a requirement but the software was done in block code so it can be used on any Sphero device which uses block code

3. Requirements Confirmation/Stakeholder sign-off

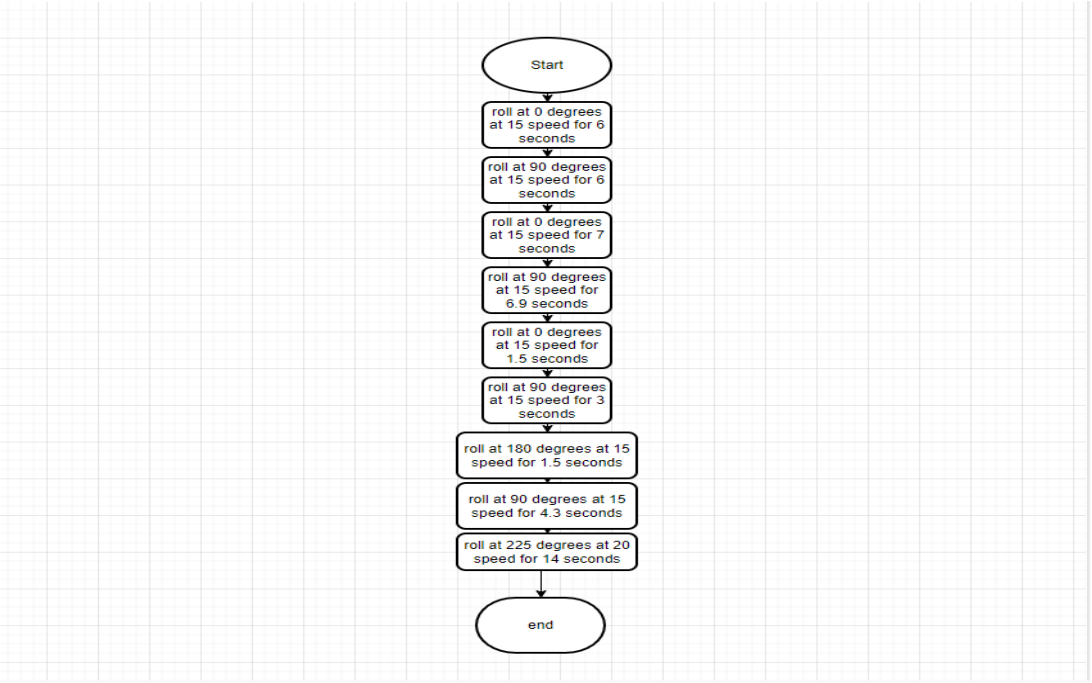
Meeting Date	Attendees (name and role)	Comments
12/01/21	Thomas Schulz-recorder/ Robot tester, Damien Pugh- Robot tester, Chrishen Tissera- Robot tester	Discuss project, and responsivities. Brainstormed and started working on how the robot will complete the course and avoid the obstacles on the course
12/03/21	Thomas Schulz-recorder/ Robot tester, Damien Pugh- Robot tester , Chrishen Tissera- Robot tester	Robot was able to complete the course avoiding the obstacles and knocked over 4 markers/ pins

4. System Design

4.1 Algorithm

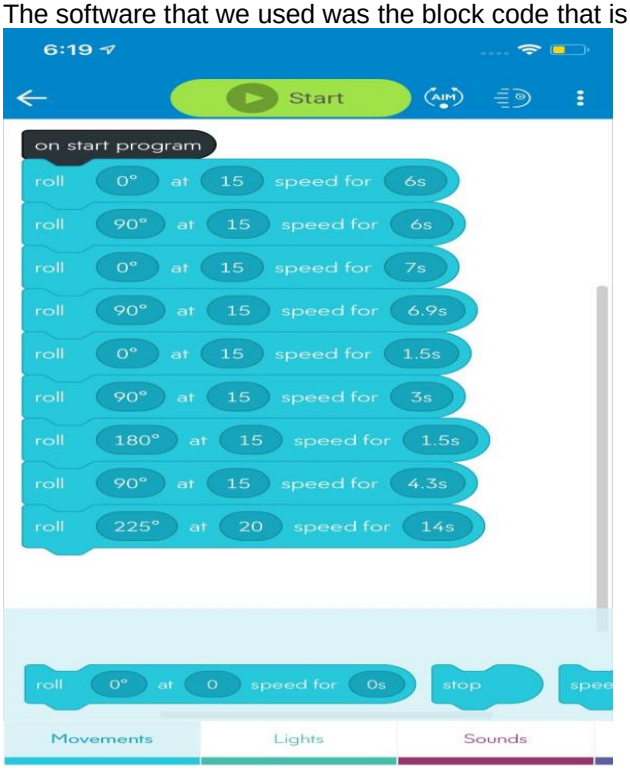
- 1 roll at 0 degrees at 15 speed for 6 seconds
- 2 roll at 90 degrees at 15 speed for 6 seconds
- 3 roll at 0 degrees at 15 speed for 7 seconds
- 4 roll at 90 degrees at 15 speed for 6.9 seconds
- 5 roll at 0 degrees at 15 speed for 1.5 seconds
- 6 roll at 90 degrees at 15 speed for 3 seconds
- 7 roll at 180 degrees at 15 speed for 1.5 seconds
- 8 roll at 90 degrees at 15 speed for 4.3 seconds
- 9 roll at 225 degrees at 20 speed for 14 seconds

4.2 System Flow



4.3 Software

The software that we used was the block code that is integrated in the Sphero Edu application



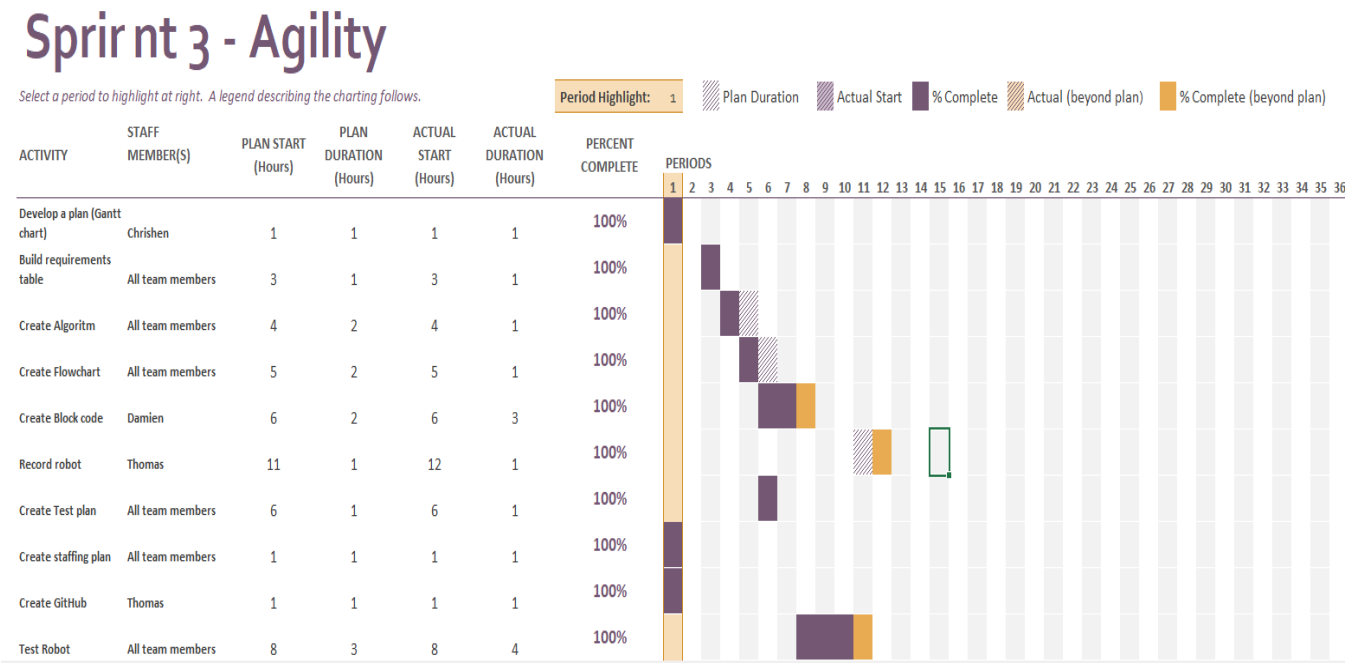
4.4 Hardware

The hardware platform that we used was the Sphero SPRK+

4.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Trying to get the robot to make it past the first bottle	12/01	The robot will follow the line and avoid the first bottle	The robot ran into the bottle	Damien Thomas Chrishen	Fail
Modified the block code to see if the robot avoids the first obstacle	12/01	The robot will make it past the first obstacle	The robot makes it past the bottle smoothly	Damien Thomas Chrishen	pass
Attempting to get the robot past the other 2 obstacles	12/01	The robot will avoid all of the obstacles	The robot went off course after the second bottle	Damien Thomas Chrishen	fail
Seconds attempt at passing all the obstacles	12/01	The robot will avoid all the obstacles	The robot crashed into the third bottle	Damien Thomas Chrishen	fail
Third attempt at successfully navigating the course and obstacles	12/03	The robot will avoid all 3 bottles	The robot was able to get passed the obstacles	Damien Thomas Chrishen	pass
Testing to see if the robot can make it to the pins after passing the obstacles	12/03	The robot will avoid all obstacles and hit all the pins	The robot made it to the final stretch, but the angle was off, so it went off course and into the wall	Damien Thomas Chrishen	fail
Modified attempt to see if the robot will hit the pins	12/03	The robot will avoid all obstacles and hit all the pins	The robot successfully navigated the course and hit 4 pins	Damien Thomas Chrishen	pass

4.6 Task List/Gantt Chart



4.7 Staffing Plan

Name	Role	Responsibility	Reports To
Damien	Tester, Coder	Helped brainstorm ideas Created the block code worked on the SDD	
Thomas	Tester, Recorder	Brainstormed and helped implement ideas Recorded the test runs Worked on the SDD Created the GitHub repository	
Chrishen	Tester, Documenter	Brainstormed and discussed ideas, suggestions, and strategies Worked on the SDD and Gantt Chart	