4

Sprint 3 - Agility Design Document

December 6, 2021

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1. Executive Summary

1.1 Project Overview

This project is the third of three sprints using a Sphero Robot. The project is meant for the professor of the class and presentation to the entire class.

1.2 Purpose and Scope of this Specification

In scope

This project addresses requirements related to Sprint 3 Agility assignment

Out of Scope

Sprint 1 and 2 have been previously completed, therefore not related to this particular section of the robotics project.

2. Product/Service Description

The project must meet the requirements laid out in the directions for the Agility Sprint

2.1 Product Context

The project is independent of all other projects besides the other Sprints which have been previously completed. The other sprints will be compiled with this Sprint to create a presentation.

2.2 User Characteristics

- Professor: Grades the project based on requirements and specifications
- Students: Will observe project when it is presented in December alongside Sprints 1 and 2

2.3 Assumptions

Assumed that the person using the block code for the robot actually has a robot that can run the code and Sphero Edu software on their computer to link with the bot

2.4 Constraints

- Must work with block code in Sphero Edu app

2.5 Dependencies

List dependencies that affect the requirements. Examples:

- Project assignment requirement list on eCampus

3. Requirements

Req#	Requirement	Comments	Priority	Date Rvwd
AGILY_01	Stay on path for the first three turns		1	12/2
AGILY_02	Avoid obstacles on the first three turns		1	12/2
AGILY_03	Go over the ramp without falling off course	Everytime the robot goes over the ramp it will land at a slightly different point	1	12/2

AGILY_04	Turn at the correct angle after the ramp so robot is facing pins		1	12/2
AGILY_05	Knock down as many pins as possible at the end of the path		1	12/2
AGILY_06	Robot light colors during course		3	12/2

3.1 Security

3.1.1 Protection

- Our laptops have passwords
- One person keeps the robot at all times

3.1.2 Authorization and Authentication

- Security features were not required or needed for this assignment

3.2 Portability

- Not a requirement, none of the code written is meant to be used anywhere besides in the classroom

4. Requirements Confirmation/Stakeholder sign-off

Include documentation of the approval or confirmation of the requirements here. For example:

Meeting Date	Attendees (name and role)	Comments
//21	Vincent, Mason, Zak	confirmed all requirements

5. System Design

This section will provide all details concerning the technical design, staffing, coding, and testing the system

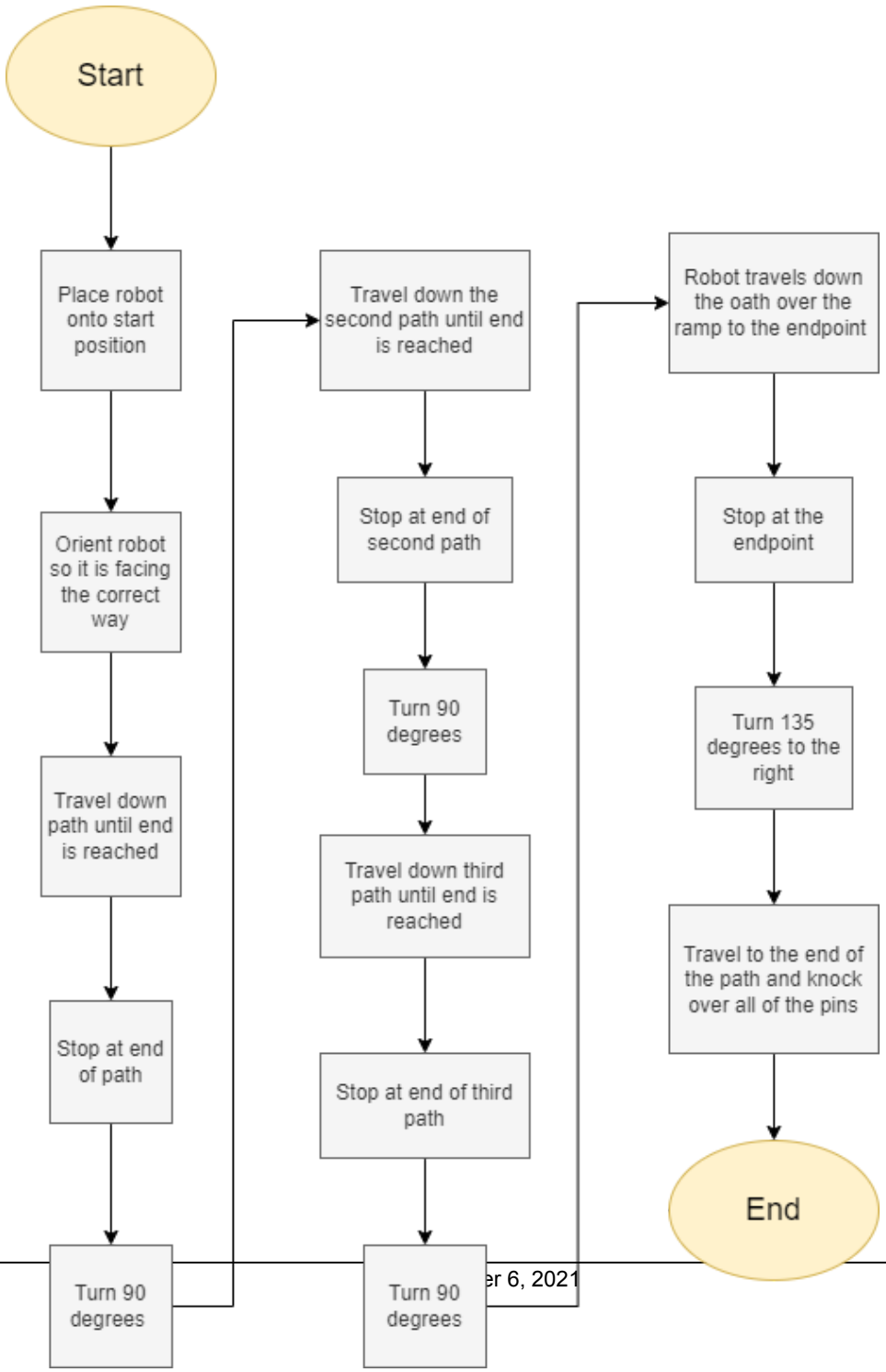
5.1 Algorithm

1. Start
2. Place the Robot on the start position.
3. Orient the robot in the proper direction.
4. Robot travels down the path.
5. Robot STOPS.
6. Robot turns 90 degrees
7. Robot travels down the path.
8. Robot STOPS.
9. Robot turns 90 degrees.
10. Robot travels down the path.
11. Robot STOPS.
12. Robot turns 90 degrees.

13. Robot travels down the path over the ramp and continues to travel to the endpoint.
14. Robot STOPS.
15. Robot Turns 135 degrees to the right.
16. Robot travels down the path and collides with the pins.
17. END

5.2 System Flow

Develop a flowchart (and show here) that accurately depicts how your software application will act to fulfill the algorithm



5.3 Software

Describe software languages/platforms/api's used to develop and deploy this application

- Sphero Edu

5.4 Hardware

Describe hardware platforms that were used to develop, test and demonstrate this application

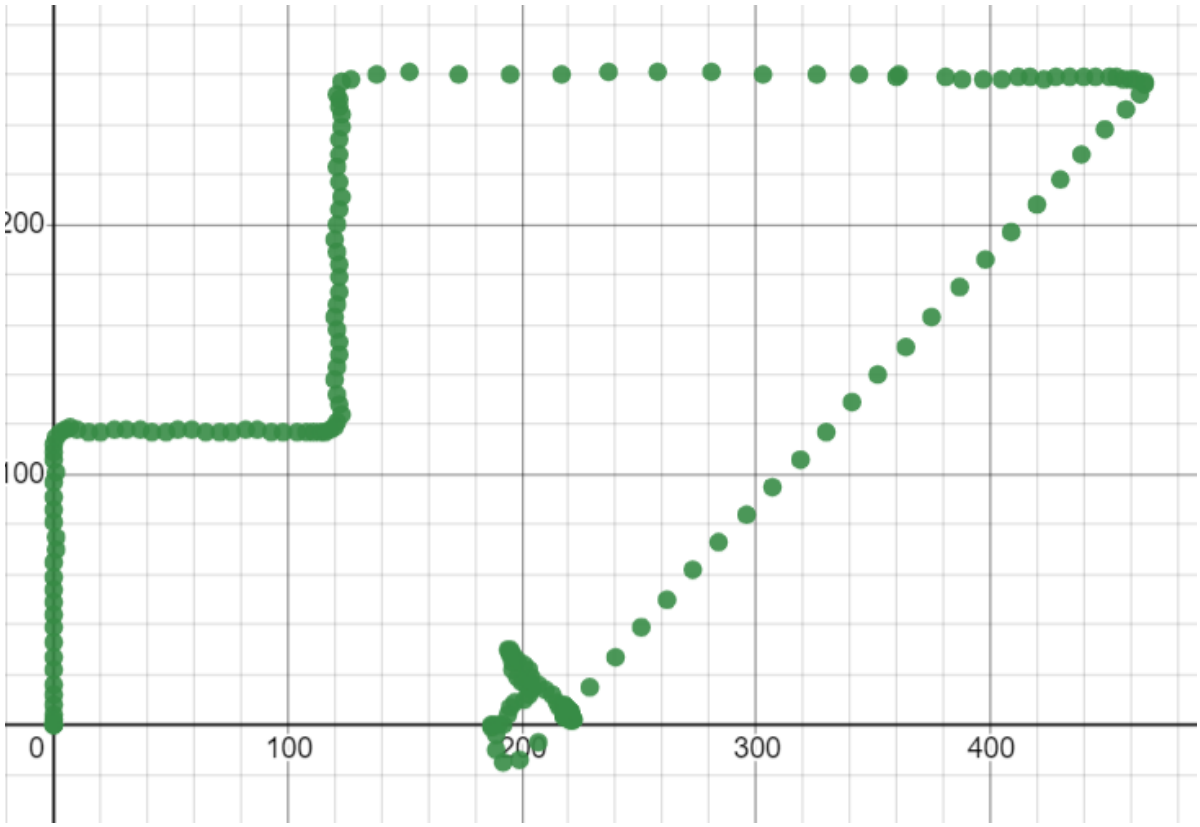
- Laptops

5.5 Test Plan

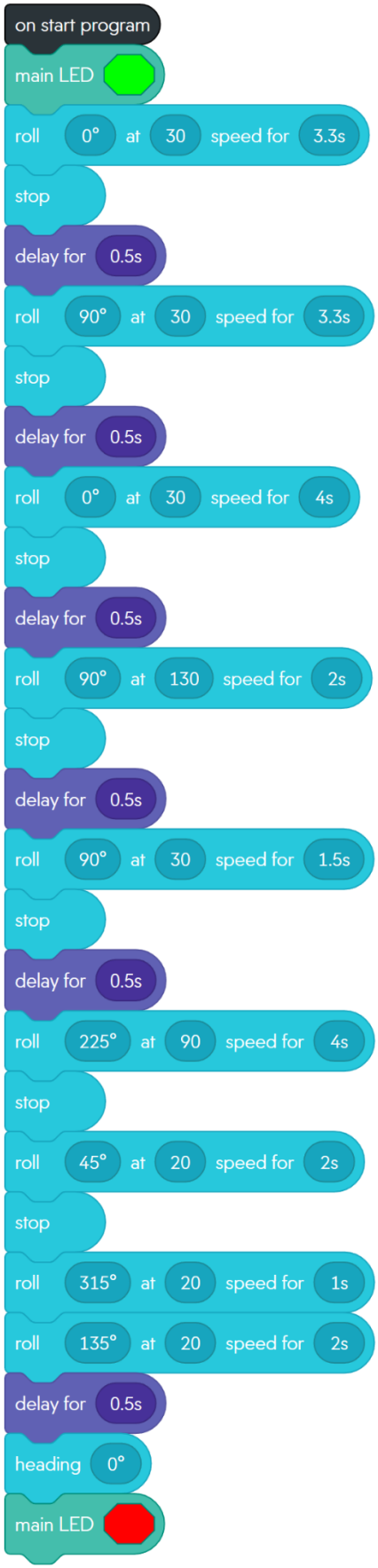
Include a test plan showing all unit tests performed for this application, Include test rational, test date, staff member, pass/fail status

****NOTE THAT ROBOT MUST COMPLETE ALL OF PRIOR COURSE SECTION BEFORE EACH TEST OBJECTIVE****

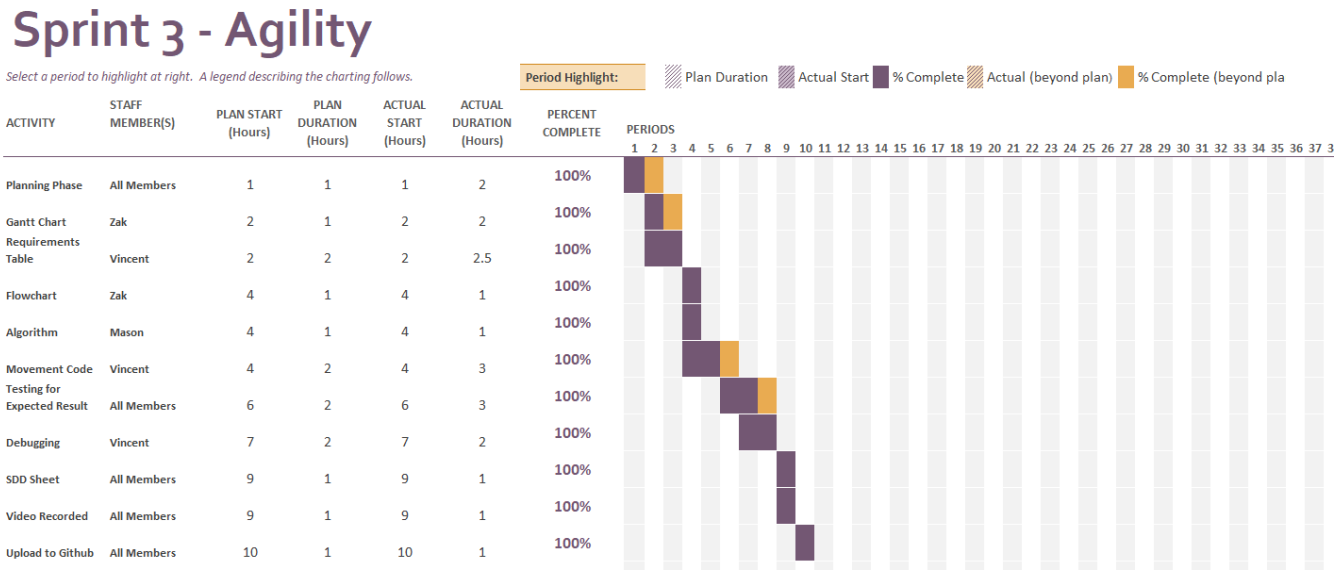
Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Make the robot move in a zig-zag shape	11/29	Robot moves in a similar formation as the track	Robot moved in a zig-zag but went off track	Vincent	Pass
Move robot through initial course before ramp	11/29	Robot moves on the zig-zag line around the obstacles	Robot followed the line but made movements too early, causing it to collide with obstacles	Vincent	Fail
Move robot through initial course before ramp	12/1	Robot moves on the zig-zag line around the obstacles	Robot followed the line but made movements too early, causing it to collide with obstacles	Vincent	Fail
Move robot through initial course before ramp	12/2	Robot moves on the zig-zag line around the obstacles	Robot successfully made it to the ramp after some minor code adjustments	Vincent	Pass
Get robot over ramp and facing pin direction	12/2	Robot goes over ramp and turns towards pins	Robot was too slow to make it over ramp but faced correct direction	Vincent	Fail
Get robot over ramp and facing pin direction	12/2	Robot goes over ramp and turns towards pins	We opted to make the robot land after the ramp then adjust its position to the end point before the turn, success	Vincent	Pass
Knock over all pins *NOTE: Some markers are missing for some reason*	12/2	Robot moves towards pins and collides with them	Robot hit only a few pins	Vincent	Fail
Knock over all pins *NOTE: Some markers are missing for some reason*	12/2	Robot moves towards pins and collides with them, then turns to ensure all pins are down	Robot knocked over all pins	Vincent	Pass


200
100
0
100
200
300
400

Block Code


on start program
main LED
roll 0° at 30 speed for 3.3s
stop
delay for 0.5s
roll 90° at 30 speed for 3.3s
stop
delay for 0.5s
roll 0° at 30 speed for 4s
stop
delay for 0.5s
roll 90° at 130 speed for 2s
stop
delay for 0.5s
roll 90° at 30 speed for 1.5s
stop
delay for 0.5s
roll 225° at 90 speed for 4s
stop
roll 45° at 20 speed for 2s
stop
roll 315° at 20 speed for 1s
roll 135° at 20 speed for 2s
delay for 0.5s
heading 0°
main LED

5.6 Task List/Gantt Chart



ACTIVITY	STAFF MEMBER(S)	PLAN START (Hours)	PLAN DURATION (Hours)	ACTUAL START (Hours)	ACTUAL DURATION (Hours)	PERCENT COMPLETE
Planning Phase	All Members	1	1	1	2	100%
Gantt Chart	Zak	2	1	2	2	100%
Requirements Table	Vincent	2	2	2	2.5	100%
Flowchart	Zak	4	1	4	1	100%
Algorithm	Mason	4	1	4	1	100%
Movement Code	Vincent	4	2	4	3	100%
Testing for Expected Result	All Members	6	2	6	3	100%
Debugging	Vincent	7	2	7	2	100%
SDD Sheet	All Members	9	1	9	1	100%
Video Recorded	All Members	9	1	9	1	100%
Upload to Github	All Members	10	1	10	1	100%

5.7 Staffing Plan

Insert a chart/table that depicts the roles and responsibilities of each team member that worked on this project

Name	Role	Responsibility	Reports To
Zak	Group Member	Flowchart	Other Members
Mason	Group Member	Algorithm	Other Members
Vincent	Group Member	Block Code	Other Members