Sprint 3 - Agility Design Document

December 4, 2023

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1. Executive Summary

1.1 Project Overview

This project's goal is to make a Bluetooth Sphero robot traverse an obstacle course.

1.2 Purpose and Scope of this Specification

In scope

- Modification of robot programming
- Measurement of tape on room floor
- Frequent communication via text, virtual, or in person

Out of Scope

- Managing requirements and time
- Fixing colors and distance

2. Product/Service Description

2.1 Product Context

This robot functions similarly to other programs. It's like a normal computer program, it requires a set of instructions to perform a task. When the robot is hooked up to someone's computer, they can use the blocks to code the robot to move in a certain direction. When the code is provided to speak, the voice will come out of the computer rather than the robot.

2.2 User Characteristics

The professor has worked with the robots before. He is proficient in how they work since he's used them before. For us, we only had three previous experiences with the robot.

2.3 Assumptions

The room might not be available to us, so we might not get accurate measurements for how far the robot should move. A Mac computer is also required for the sensor data diagram. There will also be lots of trial and error since we don't have lots of experience with the Sphero robots and this kind of technology. Also, we might have trouble connecting the Bluetooth to enable the Sphero robots.

2.4 Constraints

- Windows computers won't work
- One audit trail (test table) and don't know all of computer's functions
- Classes and other activities take up access time, need to manage time
- Don't know how to do professional computer evaluation, only evaluate at a normal level
- Possible limits of storage space
- Computer lag is predictable
- Robot might run out of battery

2.5 Dependencies

- This product requires a computer to function
- The first distance must be measured correctly before the other distances are embedded in

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
AGIL_01	Avoid first obstacle	90 degree angle to the right	1	11/30	Yes
AGIL_02	Avoid second obstacle	90 degree angle to the left	1	11/30	Yes
AGIL_03	Avoid third obstacle	90 degree angle to the right	1	11/30	Yes
AGIL_04	Go over ramp		1	11/30	Yes
AGIL_05	Take sharp turn	Should move in east direction afterwards	1	11/30	Yes
AGIL_06	Knock over markers		1	11/30	Yes

3.2 Security

3.2.1 Protection

- Security and privacy on computer protects data from being stolen
- Activity logging helps keep track of what we've done up to that point
- Robot isn't always with computer, restricting intermodule communication
- Data integrity checks when necessary

3.2.2 Authorization and Authentication

For authorization, Sphero has a privacy policy verifying that the users know how to use the product safely and effectively. For authentication, the computers and logging in to the coding software require usernames and passwords to enter, validating user's identities.

3.3 Portability

- The robot must be connected to the computer the code is being made on;
- A Mac is required for the sensor data diagram

4. Requirements Confirmation/Stakeholder sign-off

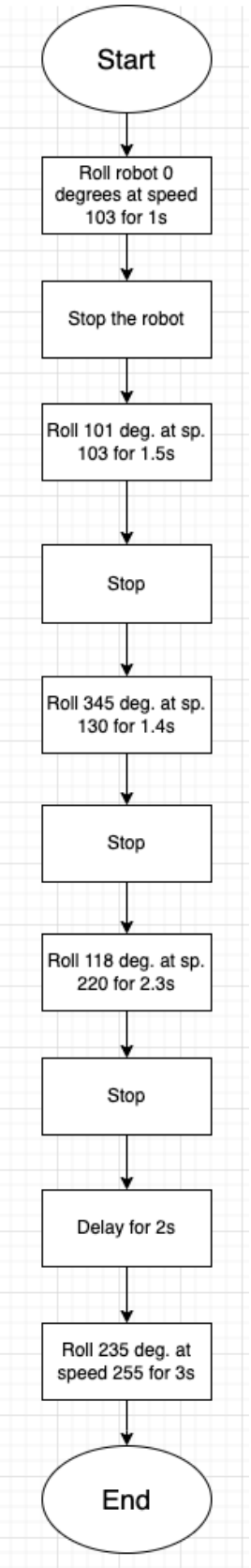
Meeting Date	Attendees (name and role)	Comments
11/30	Andrew	Requirements Approved

5. System Design

5.1 Algorithm

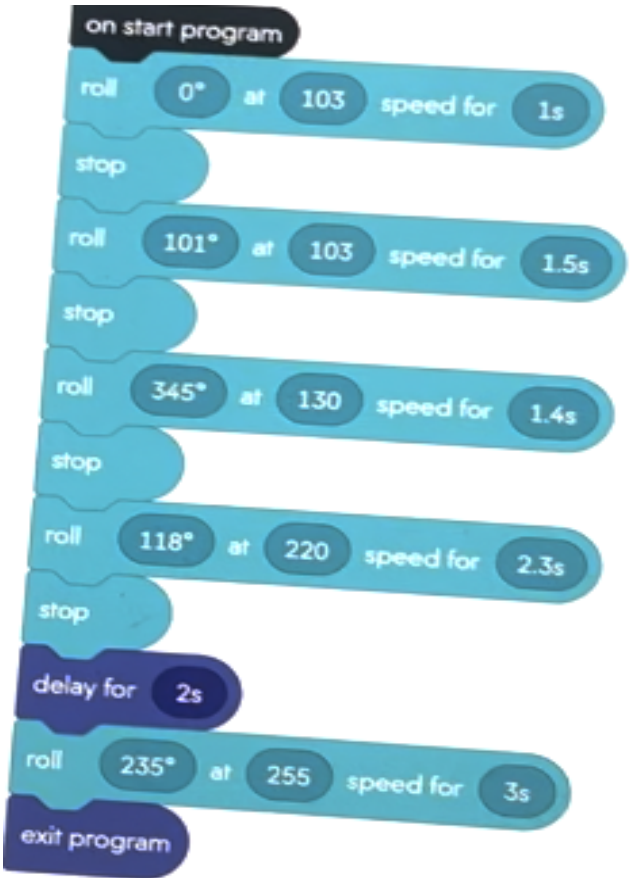
1. Roll robot 0° at speed 103 for 1 s.
2. Stop the robot briefly.
3. Roll 101° at speed 103 for 1.5 s.
4. Stop.
5. Roll 345° at speed 130 for 1.4s.
6. Stop.
7. Roll 118° at speed 220 for 2.3 s.
8. Stop.
9. Delay for 2s.
10. Roll 235° at speed 255 for 3s.
11. End program.

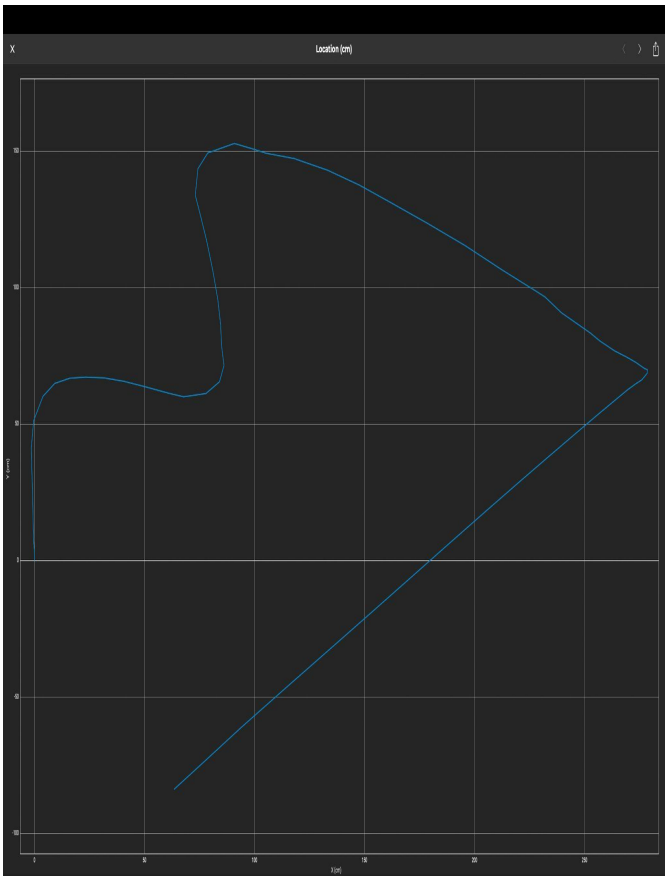
*5.2 **System Flow** (need picture)*



5.3 Software

Made with Sphero. (block code and sensor data diagram)





5.4 Hardware

An Apple Macbook Air was used to code this robot.

5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Observe how the robot will clear the bottles	**11/28**	the robot will make a sharp 90 deg turn for all of the bottles clearing them	the robot made a rounded 90 deg turn, clearing the first bottle, skimming the second bottle, and clearing the third bottle	Kiumbura	Fail
Observe how the robot will clear the bottles and scale the binder	**11/28**	the robot clears the bottles and scale the binder	the robot clears the bottles and almost scales the binder then rolls back down	Kiumbura	Fail
Observe how the robot will clear the bottles and scale the binder then rolls down in the direction of the markers	**11/30**	the robot will clear the bottles and scale the binder rolling back down in the angular direction of the markers	the robot clears the bottles and misses the binder rolling to the right	Kiumbura	Fail

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Observe how the robot will clear the bottles and scale the binder then rolls down in the direction of the markers	**11/30**	the robot will clear the bottles and scale the binder rolling back down in the angular direction of the markers	the robot cleared the bottles and scaled the binder rolling back down in the angular direction of the markers	Kiumbura	Pass
Observe how the robot will clear the bottles and scale the binder then rolls down in the direction of the markers and hit one	**12/4**	the robot will clear the bottles and scale the binder then rolls down in the direction of the markers and hit one	the robot clears the bottles and scale the binder then rolls down in the direction of the markers and missed	Kiumbura	Fail
Observe how the robot will clear the bottles and scale the binder then rolls down in the direction of the markers and hit one	**12/4**	the robot will clear the bottles and scale the binder then rolls down in the direction of the markers and hit one	the robot clears the bottles and scale the binder then rolls down in the direction of the markers and hit one in the back right	Kiumbura	Pass
Observe the Robot and it's accuracy to complete the course	**12/4**	The robot completes the course and knocks down all of the markers	The robot completes the course and knocks down all but one of the markers	Kiumbura	Fail
Observe the Robot and its accuracy to complete the course knocking down all markers.	**12/4**	The robot completes the course and knocks down all of the markers	The robot completes the course and knocks down all of the markers	Kiumbura	Pass and Complete

5.6 Task List/Gantt Chart

Sprint 3 Agility Gantt project plan Template.xlsx

5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Kiumbura	group technical writer and team captain	primary code writer and tester, videographer, creator of sensor data diagram	Professor Eckert
Alex	group manager and assistant team captain	algorithm, flowchart, uploading to Github repository	Professor Eckert
Andrew	group planner	doing sections 1 - 4 of SDD (summary, description, requirements, and requirements signoff) and Gantt chart	Professor Eckert