Sprint 3 - Agility Design Document

April 21, 2021

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1. Executive Summary

1.1 *Project Overview*

The overview of this project is the third sprint to the triathlon. The third sprint is called agility.

1.2 *Purpose and Scope of this Specification*

The purpose of this sprint is for the robot to be able to follow the course. The robot must start on a square motion without hitting into any glass bottles and by staying on the lines. Then the robot must be able to go over a ramp and land in the area that lines up to knock down pins.

2. Product/Service Description

The robot is a sphere and us being used to get around an obstacle course. In the third sprint the robot has to be able to not hit any of the objects, go over a ramp, and then be able to knock down as many pins as it can.

2.1 *Product Context*

This product is related to other products because it is a robot and can be managed by different types of coding. For this specific project we are using block code. This robot would be self-contained because everything needed to control it is in the app. The app is what connects it to be able to control it through bluetooth.

2.2 *User Characteristics*

● Student/faculty/staff/other: students can learn how to use block code, teachers can gain experience by using it to teach.
● experience: gives one experience on computing, especially block code.
● technical expertise
● other general characteristics that may influence the product

2.3 *Assumptions*

I assume that this sprint will probably be one of the harder sprints. It was difficult to get the robot to go over the ramp and stop at the right spot. By going to the classroom it is easier to see the specific path size and be able to test our code out.

2.4 *Constraints*

● parallel operation with an old system
● audit functions (audit trail, log files, etc.)
● access, management and security
● criticality of the application
● system resource constraints (e.g., limits on disk space or other hardware limitations)
● other design constraints (e.g., design or other standards, such as programming language or framework)

2.5 *Dependencies*

● This new product will require a daily download of data from sphero app
● Endurance needs to be completed before we can start the final sprint 3
● figuring out time to get to the classroom and test out robot
● figuring out the code used for a figure 8

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
AGILITY_01	robot will move forward	starts on the x	1	4/16	same
AGILITY_02	robot will turn right 90 degrees	robot must avoid the glass bottles	1	4/16	same
AGILITY_03	robot will go straight again	robot will stay in straight line	1	4/16	same
AGILITY_04	robot will stop at corner and turn left 90 degrees	robot will avoid glass	1	4/16	same
AGILITY_05	robot will go straight again	continue straight	1	4/16	same
AGILITY_06	robot will turn right 90 degrees and go forward	robot will speed over the ramp	1	4/16	same
AGILITY_07	robot will will land then speed forward into pins	robot will knock over as many pins as they could	1	4/16	same

3.2 Security

3.2.1 Protection
- encryption: practicing the code and algorithms to encrypt it
- activity logging, historical data sets: keeping track of work
- restrictions on intermodule communications
- data integrity checks

3.2.2 Authorization and Authentication
We didn't use any other tools. All we used was the robot, sphero app, our phones, and classroom materials.

3.3 Portability
- Percentage of components with host-dependent code; 15%
- Percentage of code that is host dependent; 85%
- Use of a proven portable language; yes
- Use of a particular compiler or language subset; yes
- Use of a particular operating system; yes
- The need for environment-independence - the product must operate the same regardless of operating systems, networks, development or production environments.

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
04/16/2021	Adrianna	confirmed

| 04/16/2021	Dylan	confirmed

5. System Design

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

5.1 Algorithm

- The sphero robot will start at the X
- It will move forward
- Then will turn right and move to the next corner while avoiding obstacles
- It will then turn left and move to the next corner while avoiding obstacles
- It will then turn again and make it's way towards the ramp
- It will go over the ramp at a high speed and land on course
- It will then turn for the last time and go at a high speed to knock down as much markers as possible
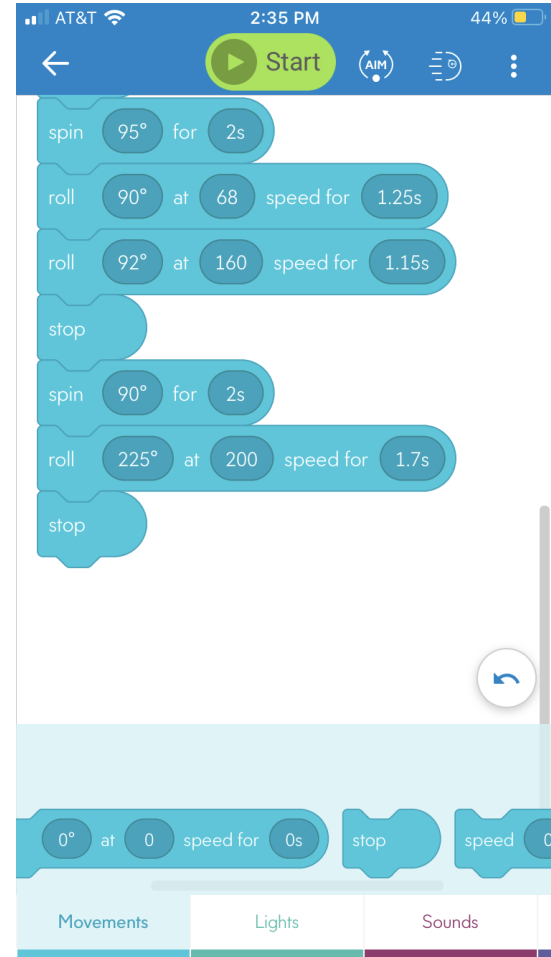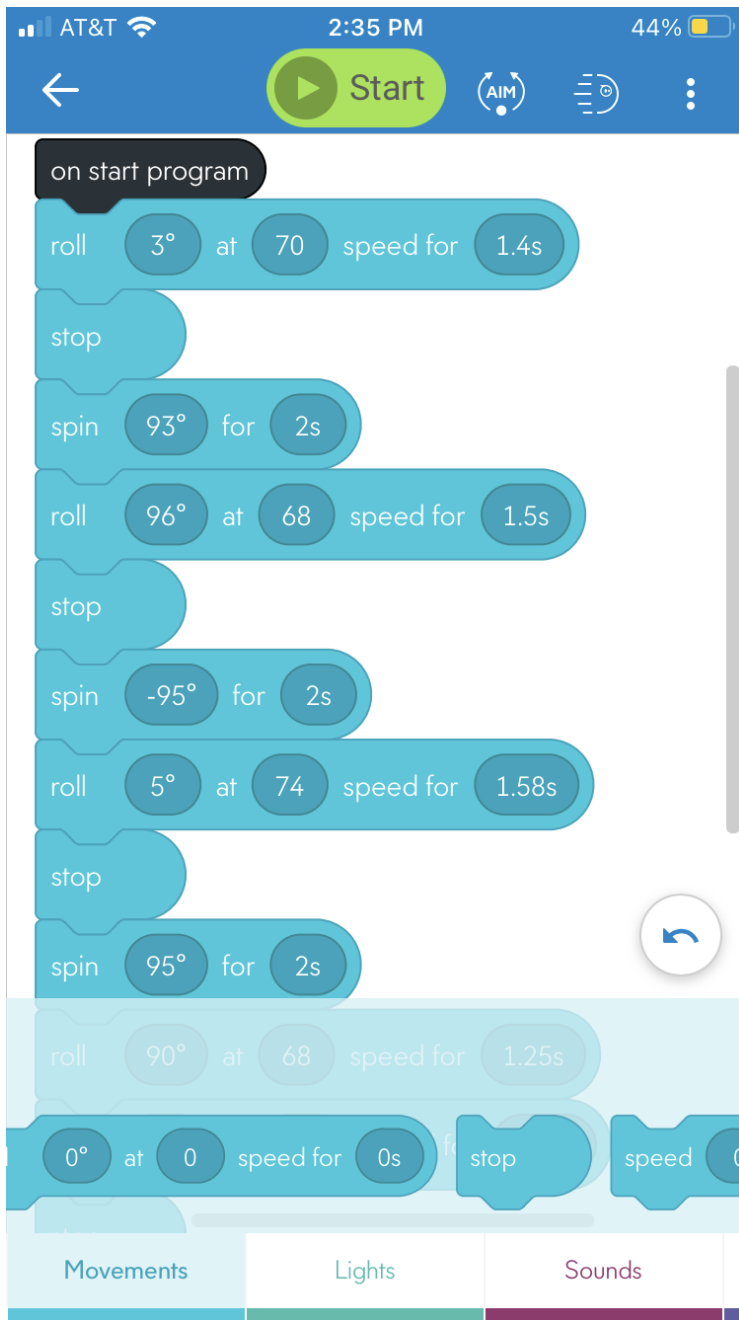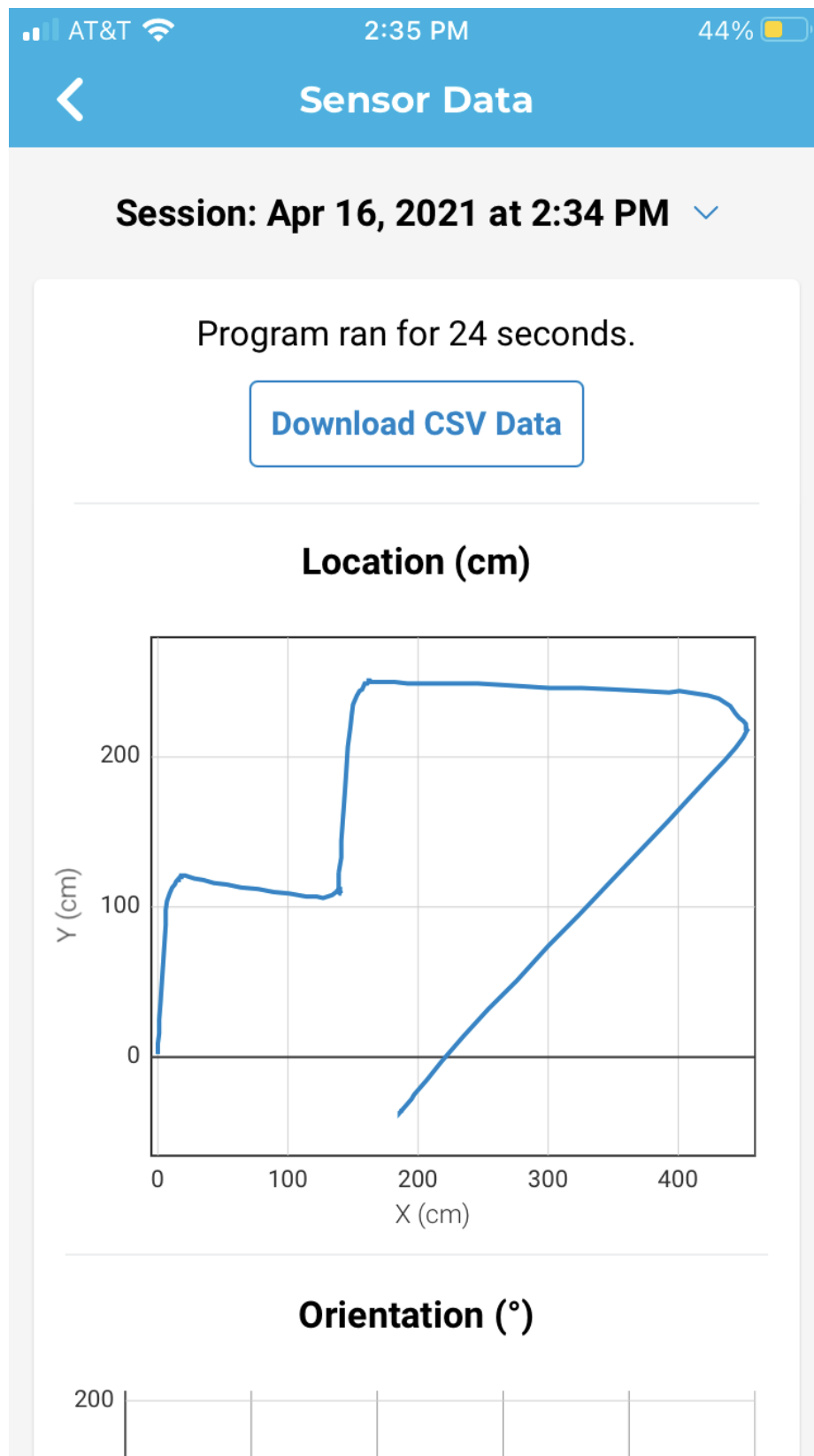
5.2 System Flow
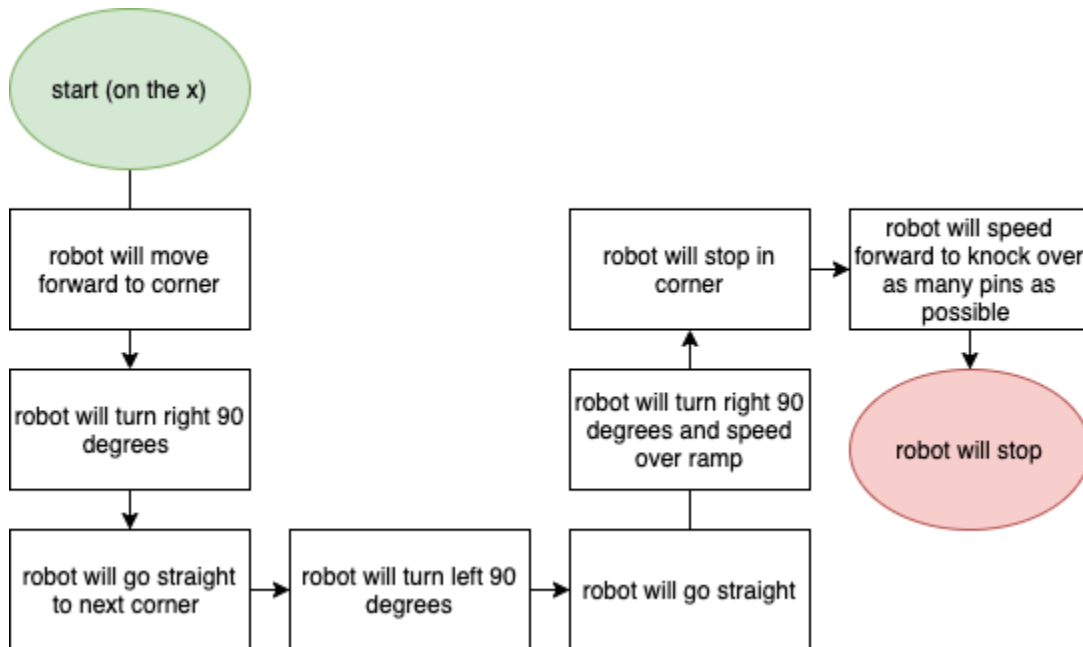
5.3 Software

- Block Coding on Sphero app using Sphero robot
- Google Docs
- Github
- Google Sheets

Screen 1 (left):

on start program

- roll 3° at 70 speed for 1.4s
- stop
- spin 93° for 2s
- roll 96° at 68 speed for 1.5s
- stop
- spin -95° for 2s
- roll 5° at 74 speed for 1.58s
- stop
- spin 95° for 2s
- roll 90° at 68 speed for 1.25s

0° at 0 speed for 0s   stop   speed 0

Movements   Lights   Sounds

Screen 2 (right):

- spin 95° for 2s
- roll 90° at 68 speed for 1.25s
- roll 92° at 160 speed for 1.15s
- stop
- spin 90° for 2s
- roll 225° at 200 speed for 1.7s
- stop

0° at 0 speed for 0s   stop   speed 0

Movements   Lights   Sounds

5.4 Hardware

- Sphero Robot
- Sphero App
- Dylan's and Adriana's Phones

5.5   Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Create Code	04/16/2021	Assign Correct speed and time for first move	Robot didn't go far enough	Adrianna and Dylan	F
Adjust Code	04/16/2021	Fix the speed and time for the first straight	Robot went the correct distance	Adrianna and Dylan	P
Create Code	04/16/2021	Use same time and speed for first straight for the second straight	Robot went correct distance while avoiding obstacles	Adrianna and Dylan	P
Create Code	04/16/2021	Third straight was a little longer so time of robot moving was longer	Robot went correct distance	Adrianna and Dylan	P
Create Code	04/16/2021	Fourth straight was long and had a ramp. Needed robot to go farther and faster	Robot wasn't fast enough and didn't go over ramp	Adrianna and Dylan	F
Adjust Code	04/16/2021	Robot needed to go faster to get up ramp	Robot made it over the ramp and stopped on the final corner	Adrianna and Dylan	F
Create Code	04/16/2021	The robot needed to turn right and go down the final straight to knock down as many markers as possible	Robot went down the final straight perfectly and knocked down all markers.	Adrianna and Dylan	P

5.6   Task List/Gantt Chart

Embed your gantt chart here

5.7   Staffing Plan

Name	Role	Responsibility	Reports To
Dylan	Member	Sphero coding, system design document	All members
Adrianna	Member	Sphero coding, recording, system design document	All members