Sprint 2 - Accuracy Design Document

November 24, 2020

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1. Executive Summary

1.1   Project Overview

The project is designed to have a robot successfully complete a figure eight course 5 times without colliding with any obstacles. The robot must also adhere to the specific distance specifications of the two circles and travel around said circles successfully as specified in the requirements table.

1.2   Purpose and Scope of this Specification

This product and program runs within all legal requirements. No laws are broken in the utilization of this program and robot. All legal mandates are met. Outlines and meets all requirements present in this document.

2. Product/Service Description

2.1   Product Context

This product is more effective than other products due to its simplicity within the code and ease of maneuverability. It interacts with Sphero EDU software, available on mobile devices as well as computers.

2.2   User Characteristics

Students and children will use this product to demonstrate a basic version of code that can teach them the ins and outs of coding and program design. This product could be utilized at a place like Code Ninjas, an early coding academy that teaches the basics of code to children. This software can teach the beginning elements of coding and algorithmic design to kids with or without a specific interest in the field. Little technical experience is required due to the lack of actual code needed to create a program. The block coding does not require the user to have previous computer science knowledge, making the market for this market larger than the competition.

2.3   Assumptions

It is assumed that the user has access to a device that can run the Sphero EDU program, a SPRK+, and enough common sense to understand and run the program.

2.4   Constraints

The constraints of this program are the limit of block code on the Sphero EDU app. The robot can do only as many things available on the app block coding software. Another constraint could be the strength of the bluetooth connection to the robot, limiting the range at which the robot can operate while away from the user. The only main constraint with the utilization of the program is that the user must have a SPRK+ robot as well as a bluetooth compatible device with the Sphero EDU software.

2.5   Dependencies

This program requires a SPRK+ Robot and the Sphero EDU app to successfully run the program.

3. Requirements

3.1   Functional Requirements

Req#	Requirement	Comments	Priority
ACCUR_01	Robot Must Travel Along a Figure 8 Path	Composed of 2 Circles Each Having a Circumference of about 195"	1

ACCUR_02	Robot Must Complete the Path 5 Times	Robot Must Not Stray Away From the Path	1
ACCUR_03	Robot Must Stop Where it Started	There is a Square Marking the Start and Stop Point	1
ACCUR_04	Robot Must Say "I am the Winner"		1
ACCUR_05	Robot Must Flash Multicolored Lights for 5 Seconds		1

3.2 Security

3.2.1 Protection

This program does not have large security protection due to the lack of personal information in this program. There is nothing worth stealing within the program, therefore, highly maintained security is not necessary such as those present on a banking website. The activity of the robot is logged in sensor data but deleted after the program is run again. Data integrity checks are not necessary with this program due to the lack of personal information present.

3.2.2 Authorization and Authentication

A user must authorize their identity by the logging into their Sphero EDU account in order to access their program. Programs can be made public or private depending on the preferences of the user.

3.3 Portability

This program is portable due to the portability of the physical robot as well as the code can be run from any device with bluetooth and the Sphero EDU software.

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	Attendees (name and role)	Comments
11/21/20	Andrew Catapano, Estania Blanc, & Matthew Emery	Confirmed all Requirements listed in Gantt Chart and Algorithm

5. System Design

5.1 Algorithm

- Start Program
- Robot travels around the left circle with a circumference of 195"
- Robot travels around the right circle with a circumference of 195"
- Robot repeats Steps 2 and 3 four more times
- Robot stops where it started
- Robot says "I am the Winner"
- Robot flashes multicolored lights for 5 seconds

5.2   System Flow

```
                    ┌─────────────┐
                    │    Start    │
                    └─────────────┘
                           │
                           ▼
              ┌──────────────────────────┐
              │ Robot travels around     │
              │ the left circle with a   │
              │ circumference of         │
              │ 195"                     │
              └──────────────────────────┘
                           │
                           ▼
              ┌──────────────────────────┐
              │ Robot travels            │
              │ around the right         │
              │ circle with             │
              │ circumference of         │
              │ 195"                     │
              └──────────────────────────┘
                           │
                           ▼
              ┌──────────────────────────┐
              │ Robot repeats step 2     │
              │ & 3 four more times      │
              └──────────────────────────┘
                           │
                           ▼
              ┌──────────────────────────┐
              │ Robot must stop          │
              │ where it started & say   │
              │ " I am the winner"       │
              └──────────────────────────┘
                           │
                           ▼
              ┌──────────────────────────┐
              │ Robot must flash         │
              │ multicolored for 5       │
              │ seconds                  │
              └──────────────────────────┘
                           │
                           ▼
                    ┌─────────────┐
                    │    Stop     │
                    └─────────────┘
```
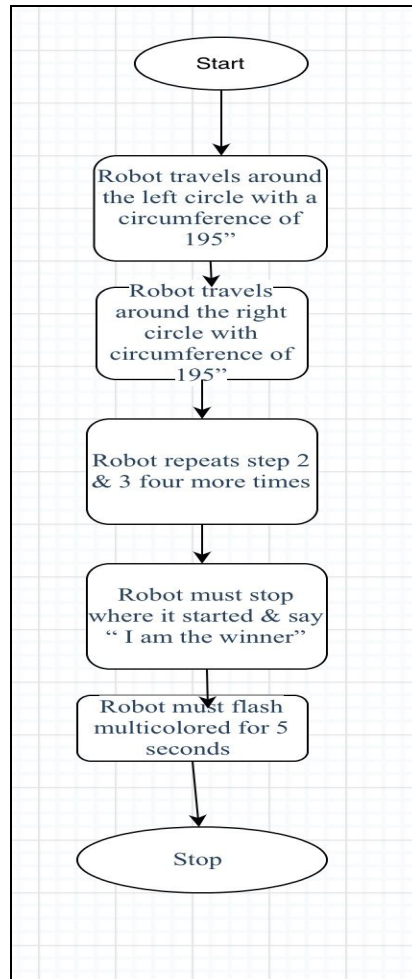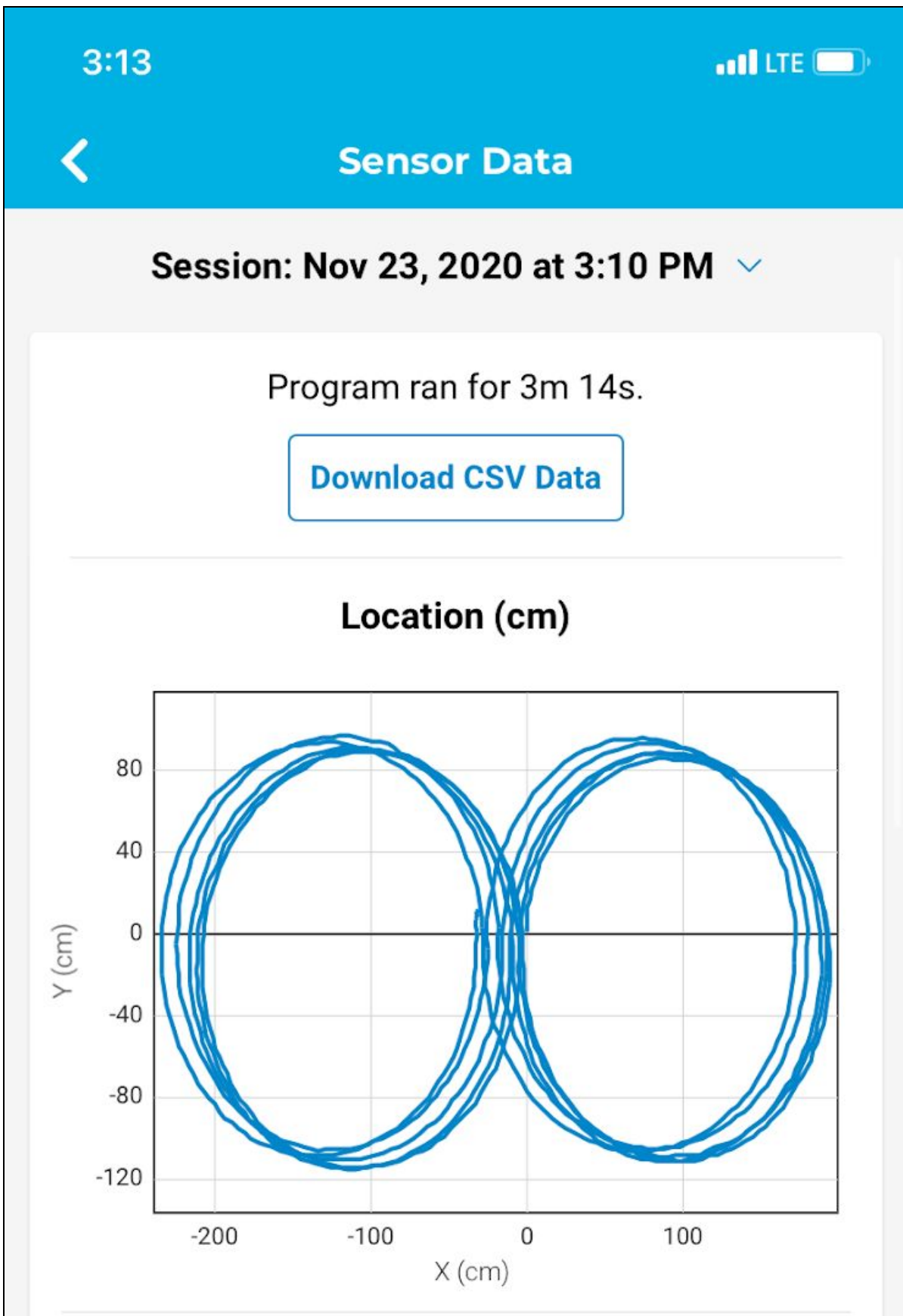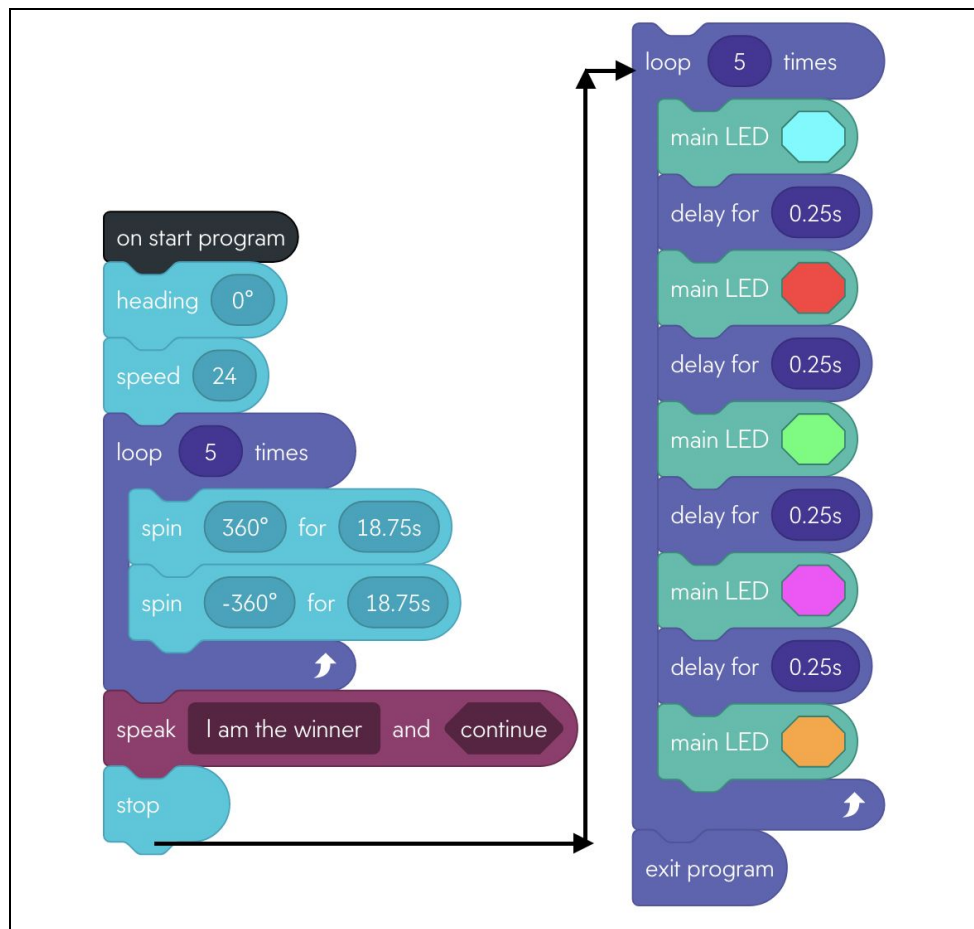
5.3   Software

The software for this program was developed in the Sphero EDU coding platform using block code. It is required for the program required successfully.

5.4 Hardware

The hardware for this program includes the SPRK+ Robot, computers and phones used to create and test code, as well as the course in the classroom at Monmouth University.

5.5 Test Plan

| Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
To confirm first step in alorightm	11/23	Robot travels around the left circle with a circumference of 195"	Robot traveled too short of a circumference	All Members	Fail
To confirm second step in alorightm	11/23	Robot travels around the right circle with a circumference of 195"	Robot did not line up properly to begin second circle and went too wide	All Members	Fail
To confirm third step in alorightm	11/23	Robot repeats Steps 2 and 3 four more times	Robot successfully completed the loop 5 times	All Members	Pass
To confirm fourth step in alorightm	11/23	Robot stops where it started	Robot stopped but not where it started due to issues in 2nd and 3rd step of algorithm	All Members	Fail
To confirm fifth step in alorightm	11/23	Robot says "I am the Winner"	Robot successfully said "I am the Winner"	All Members	Pass

To confirm sixth step in alorightm	11/23	Robot flashes multicolored lights for 5 seconds	Robot successfully flashed lights for 5 seconds	All Members	Pass
To retest first step in alorightm	11/23	Robot travels around the left circle with a circumference of 195"	Robot successfully traveled around the circle	All Members	Fail
To retest second step in alorightm	11/23	Robot travels around the right circle with a circumference of 195"	Robot successfully traveled around the circle	All Members	Pass
To retest fourth step in alorightm	11/23	Robot stops where it started	Robot stopped where it started successfully	All Members	Pass

5.6 Task List/Gantt Chart
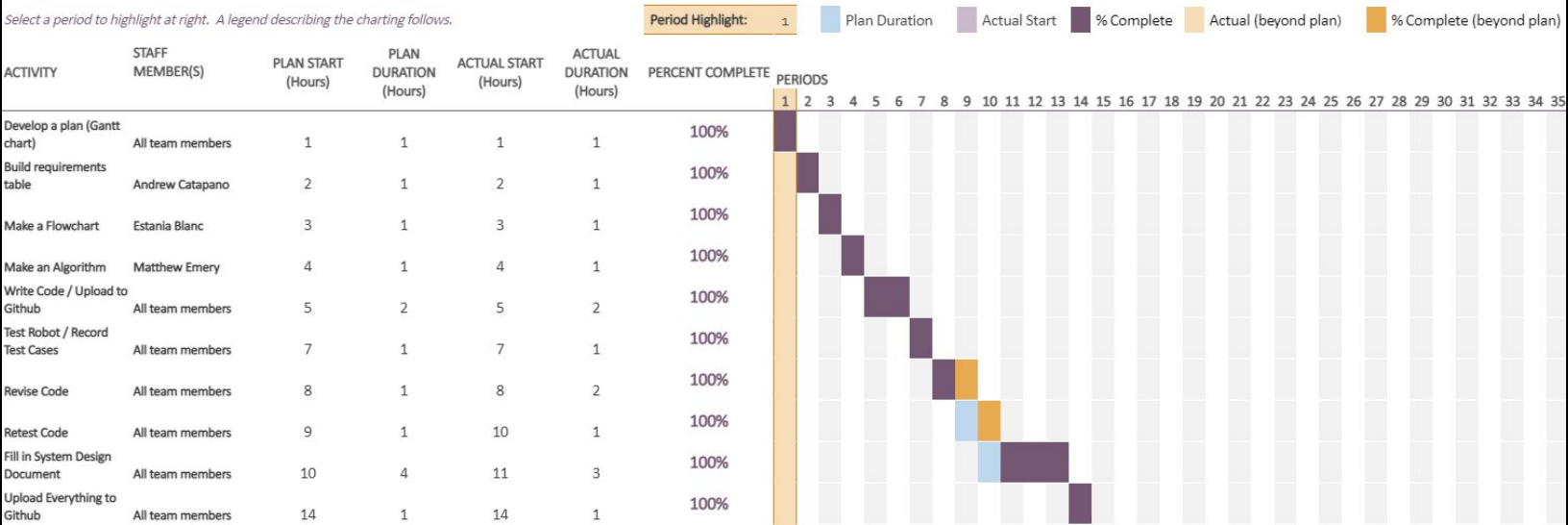
5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Matthew Emery	Programmer/Testers/ Documenters/Technical Writer	● Algorithm ● Test/Build Code ● Complete SDD ● Collaborate with other members	All Team Members
Andrew Catapano	Project Manager/ Programmer/Testers/ Documenters/Technical Writer	● Requirements ● Test/Build Code ● Complete SDD ● Collaborate with other members	All Team Members
Estania Blanc Doblas	Programmer/Testers/ Documenters/Technical Writer	● Flow Chart ● Test/Build Code ● Complete SDD ● Collaborate with other members	All Team Members