

# **Sprint 2 – Accuracy Design Document**

## **November 20<sup>th</sup>, 2023**

## Table of Contents

<b>1. EXECUTIVE SUMMARY .....</b>	<b>2</b>
1.1 PROJECT OVERVIEW .....	2
1.2 PURPOSE AND SCOPE OF THIS SPECIFICATION .....	3
<b>2. PRODUCT/SERVICE DESCRIPTION .....</b>	<b>3</b>
2.1 PRODUCT CONTEXT .....	3
2.2 USER CHARACTERISTICS .....	3
2.3 ASSUMPTIONS .....	3
2.4 CONSTRAINTS .....	3
2.5 DEPENDENCIES .....	3
<b>3. REQUIREMENTS .....</b>	<b>3</b>
3.1 FUNCTIONAL REQUIREMENTS .....	3
3.2 SECURITY .....	4
3.2.1 Protection .....	4
3.2.2 Authorization and Authentication .....	4
3.3 PORTABILITY .....	4
<b>4. REQUIREMENTS CONFIRMATION/STAKEHOLDER SIGN-OFF .....</b>	<b>4</b>
<b>5. SYSTEM DESIGN .....</b>	<b>4</b>
5.1 ALGORITHM .....	4
5.2 SYSTEM FLOW .....	5
5.3 SOFTWARE .....	5
5.4 HARDWARE .....	6
5.5 TEST PLAN .....	6
5.6 TASK LIST/GANTT CHART .....	7
5.7 STAFFING PLAN .....	7

## 1. Executive Summary

### 1.1 Project Overview

The intended audience of our project is Professor Eckert and our class.

## ***Sprint 2 - Accuracy Design Document***

This project serves to demonstrate our ability to function as a team when faced with the challenge of making a robot move around the room. The multitude of facets and moving pieces require us to organize our time and workload. We intend to show this project to the professor instructing our class.

### **1.2 Purpose and Scope of this Specification**

The purpose of this specification is to place the robot at the center of the eight figure and make robot follow the eight-figure path 5 times. This is phase two, accuracy out of three sprints, endurance, and agility. The intended audience is my professor and CS 104-02 class.

Inside scope:

- For the next phase we will have to adjust our program to be able to accurately run the figure eight course 5 times and will staying the path efficiently and accurately.

Outside scope:

- Outside of the scope of these specifications include a sprint phase where the robot will have to run through an obstacle course and avoid the objects and then knock over as many pins as possible.

## **2. Product/Service Description**

One of the general factors influencing the product and its requirements is the need to coordinate around our group members' schedules, while other key factors encompass the program's development based on the algorithm, as well as the hardware and software utilized during the project's endurance phase.

### **2.1 Product Context**

Our product is entirely self-contained in the coding application it was made in. It is run inside of and fills out its sensor data diagram inside the Sphero EDU app.

### **2.2 User Characteristics**

Our product can be used by anyone. It does not require any special knowledge aside from having to navigate the Sphero EDU application and where the robot needs to be placed.

### **2.3 Assumptions**

The code being run on a computer with MacOS so that the sensor data diagram can be exported as an easily readable image instead of raw data.

The robot starting in the center of the eight figure.

The track being clear of debris and obstacles.

### **2.4 Constraints**

Constraints of our design options is resetting the robot's position and angle so that it perfectly circumnavigates the track.

### **2.5 Dependencies**

- A clear room to test our robot.
- Having the robot itself.

## **3. Requirements**

### **3.1 Functional Requirements**

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<b>Req#</b>	<b>Requirement</b>	<b>Comments</b>	<b>Priority</b>	<b>Date Rvwd</b>	<b>SME Reviewed / Approved</b>
Accuracy_1	Start the robot in the center of the eight figure.	Robot needs to start in the center of eight figure.	1	11/09/23	11/09/23
Accuracy_2	Make the robot go robot go around the eight figure.	Need robot to angle horizontally straight.	1	11/09/23	11/09/23
Accuracy_3	After the first run, loop it four times.	Need the robot to go around 5 times around the eight figure.	2	11/09/23	11/09/23
Accuracy_4	Make the robot stop.	Need to add a stop before turning and at the very end.	1	11/09/23	11/09/23
Accuracy_5	Make the robot say, "I am the winner."	Need robot to stop in the center of eight figure to speak.	3	11/09/23	11/09/23
Accuracy_6	Make the robot flash multicolor for 5 seconds.	Robot has to stop in the center of eight figure and flash multicolor for 5 seconds.	3	11/09/23	11/09/23

### **3.2 Security**

#### **3.2.1 Protection**

- Password protected laptop.
- Making backups of the code.

#### **3.2.2 Authorization and Authentication**

There will be none.

### **3.3 Portability**

- 100% of the project's components and code are host dependent.
- The product is environment independent.

## **4. Requirements Confirmation/Stakeholder sign-off**

11/09/23	Luca Bertinelli, Delvis Rodriguez, Xochitl Martinez	confirmed all except ENDUR_XX
11/10/2023	Delvis Rodriguez, Xochitl Martinez	confirmed.....

## **5. System Design**

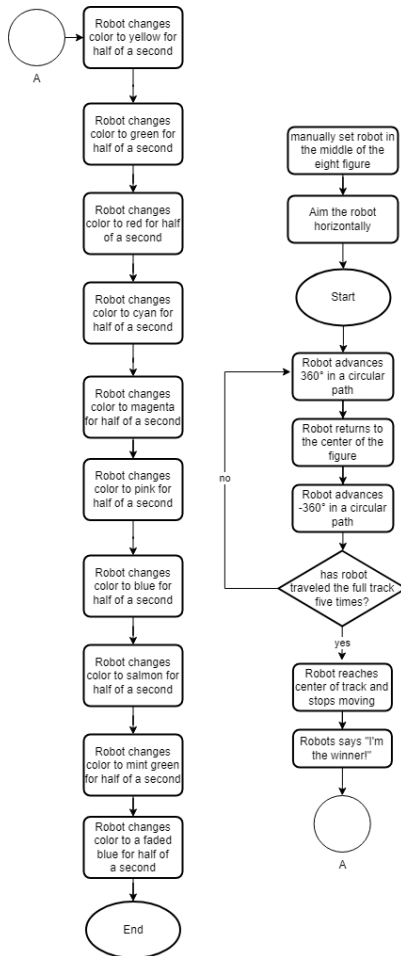
### **5.1 Algorithm**

1. Start robot in middle of 8-figure.
2. Aim robot horizontally straight.
3. Make robot do 360 degrees down.
4. Once robot returns to middle of 8-figure, robot does -360 degrees up.
5. Loop step one, three and four, four more times.

## Sprint 2 - Accuracy Design Document

6. Stop the robot.
7. Make robot say, "I am the winner!"
8. Make robot flash multicolor lights for 5 seconds.

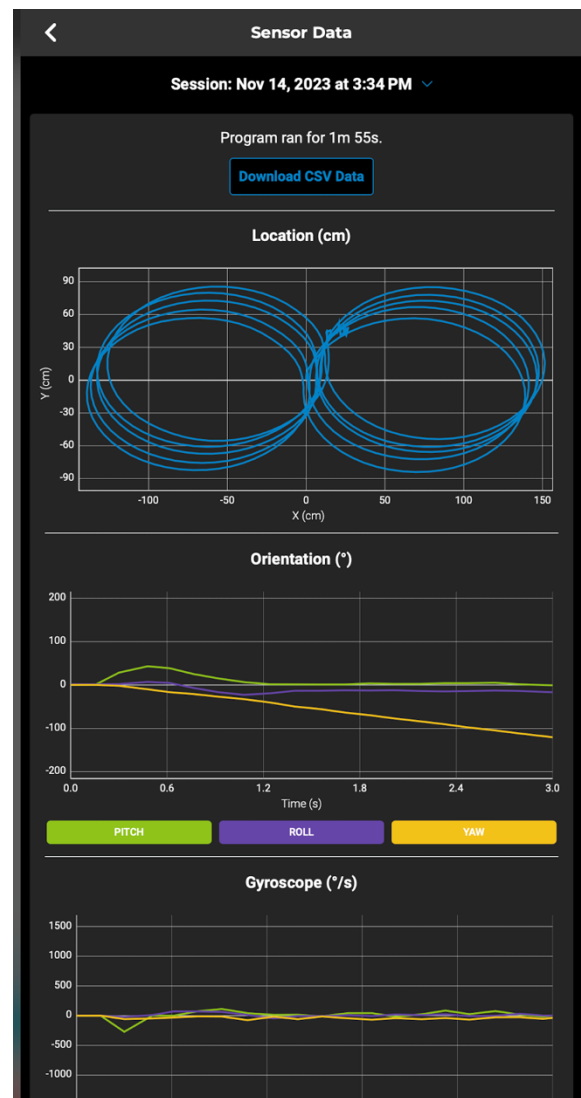
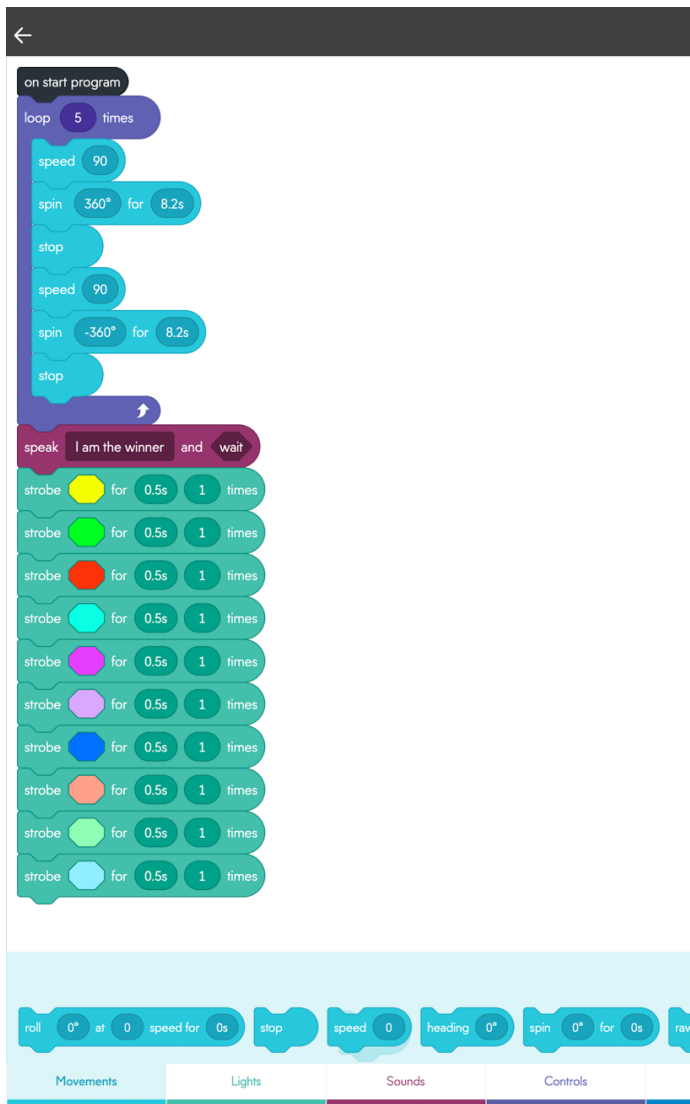
### 5.2 System Flow



### 5.3 Software

We use the Sphero EDU platform and block code to make our robot move throughout the course.

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### 5.4 Hardware

The hardware platforms used for this project were the Sphero SPRK 2.0 robot and our laptops.

### 5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
For the robot to do flashing multi-color lights.	11/09/23	For the robot to flash different colors.	The robot flashed different colors.	All	PASS
For the robot could go around in a circle.	11/09/23	For the robot to go in a circle.	Did a full 360 and went in a straight line.	All	FAIL
For the robot could go around in a circle.	11/09/23	For the robot to go in a circle.	Did a full 360 and stopped.	All	PASS
To make the robot do a bigger circle	11/09/23	For the robot to do a bigger circle.	Did a bigger 360 and stopped.	All	PASS

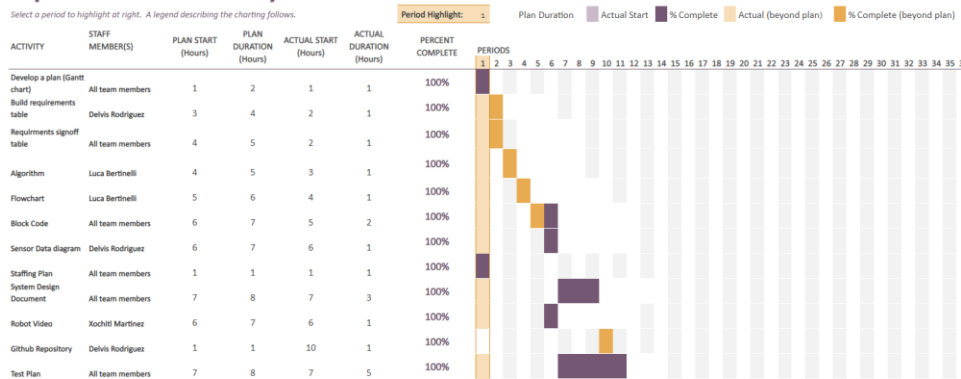
### Sprint 2 - Accuracy Design Document

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
For the robot to do the 8 figure.	11/09/23	For the robot to do the 8 figure.	The robot did an 8 figure!	All	PASS
For the robot to stay as accurate as possible on the 8-figure path.	11/09/23	For the robot to follow the 8-figure path accurately.	The robot did the 8-figure but was slightly off course.	All	FAIL
For the robot to stay as accurate as possible on the 8-figure path.	11/14/23	For the robot to follow the 8-figure path accurately.	The robot did the 8-figure path!	All	PASS
For the robot to do the 8-figure path 5 times.	11/14/23	For the robot to do the 8-figure path 5 times continuously.	The robot did the 8-figure path 5 times continuously!	All	PASS

## 5.6 Task List/Gantt Chart

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Select a period to highlight at right. A legend describing the charting follows.



## 5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Luca Bertinelli	Manager	All	All
Delvis Rodriguez	Manager	All	All
Xochitl Martinez	Manager	All	All