

Sprint 2 - Accuracy Design Document

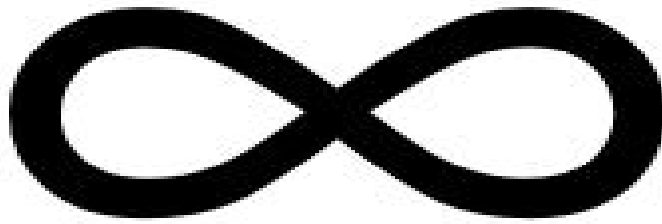


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1. Executive Summary

1.1 Project Overview

This project tests the capabilities of the Sphero SPRK+ programmable robot.

1.2 Purpose and Scope of this Specification

Purpose of this specification is to examine the ability of the Sphero SPRK+ to go 5 times around a specified path of figure 8

In scope

- Robot functions properly on a flat surface
- Supports all devices with Bluetooth
- Waterproof outer shell

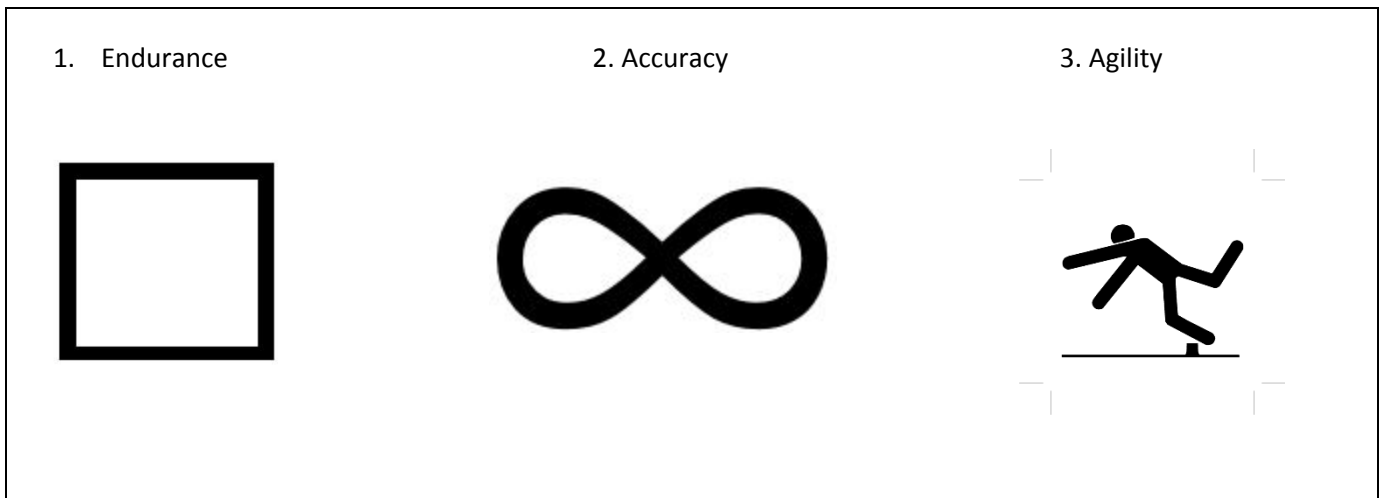
Out of Scope

- Should not be operated outside
- Bluetooth will be disconnected with a range of more than 100 feet.

2. Product/Service Description

2.1 Product Context

This project is a third of the main Robotics Triathlon project which consists of two more sprints testing endurance and agility.



2.2 User Characteristics

In order to use the robot, users only need to understand the basic concepts of block code. No knowledge of programming is required to operate it. Users should have access to a device that supports Bluetooth and an open space with a flat surface to meet the requirements.

2.3 Assumptions

- Availability of an indoor flat surface meeting the required measurements
- Equipment will only work on certain operating systems

2.4 Constraints

- Use of the officially measured course was not available
- Limited number of robots (one per group)

2.5 Dependencies

- Sphero SPRK+ needs to be charged every 60 minutes
- Check the availability of maximum area of flat surface before working on the block code

3. Requirements

3.4 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ENDUR_01	Robot moves forward and spins clockwise	360 degree spin	1	11/23/20	11/23/20
ENDUR_02	Robot moves backward and spins anticlockwise	360 degree spin starting from the previous ending point	1	11/23/20	11/23/20
ENDUR_03	Robot repeats ENDUR_01 and ENDUR_02 five times	Runs figure 8 course	1	11/23/20	11/23/20
ENDUR_04	Robot stops at original starting point	Point from where it initiated the first movement	1	11/23/20	11/23/20
ENDUR_05	Robot starts and ends within given path	Square path	1	11/23/20	11/23/20
ENDUR_06	Robot stops and speaks "I am the winner"	After all movement has been completed	1	11/23/20	11/23/20
ENDUR_07	Robot flashes multicoloured lights for 5 seconds after stopping	After all movement has been completed	1	11/23/20	11/23/20

3.5 Security

3.5.1 Protection

- No personally identifiable information stored in the robot itself
- Water resistant and scratch resistant outer cover
- Works with third-party security experts to audit the Sphero Edu platform
- Data encrypted in transit and at rest where possible

3.5.2 Authorization and Authentication

Users will have to make an account on sphero.edu in order to access the program.

3.6 Portability

- Program robot with the Draw, Block, or JavaScript Canvas
- Compatible with iOS 10+, Android 5+, Windows 10, macOS, Chrome OS

4. Requirements Confirmation/Stakeholder sign-off

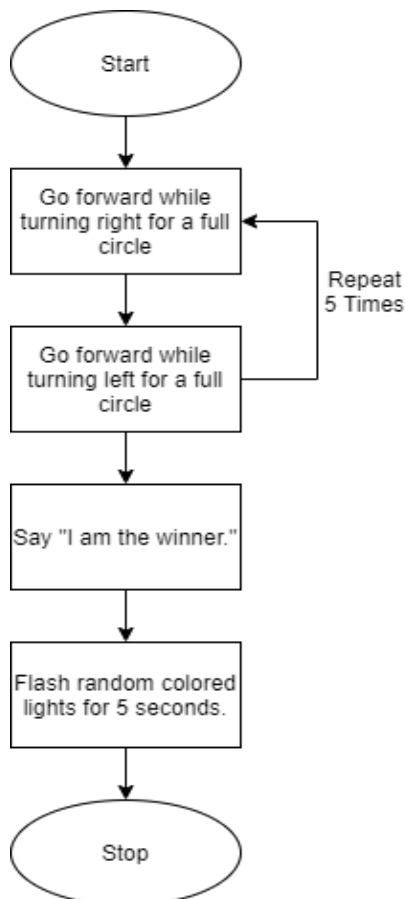
Meeting Date	Attendees (name and role)	Comments
11/24/20	Zainab, Nick, Tyler	Confirmed all requirements

5. System Design

5.4 Algorithm

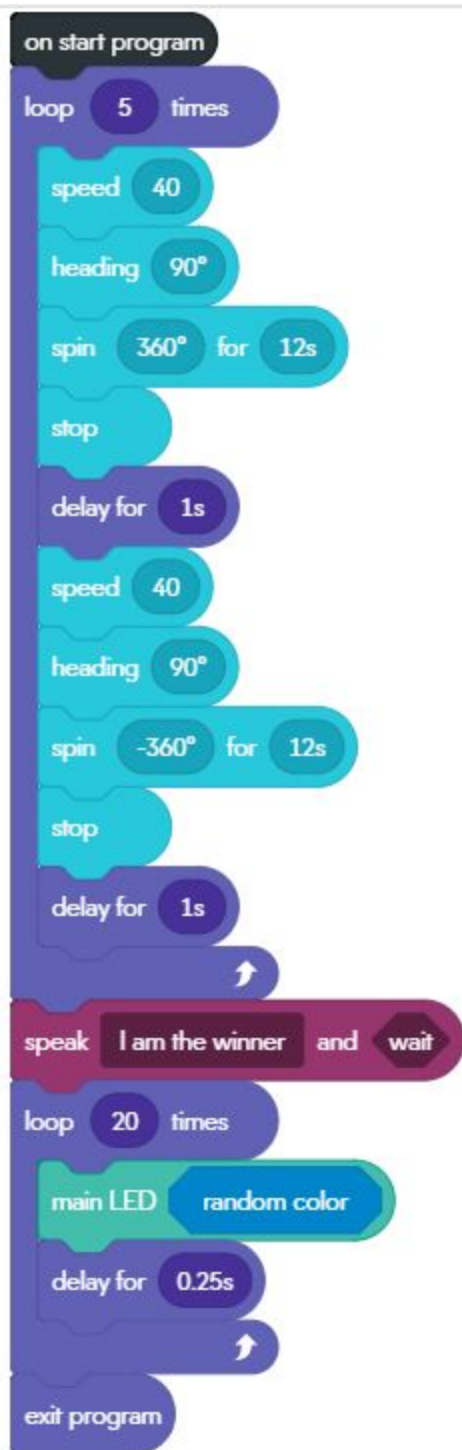
1. Go forward while turning right for a full circle
2. Go forward while turning left for a full circle
3. Repeat steps 1 and 2 5 times
4. Say "I am the winner."
5. Flash random colors for 5 seconds

5.5 System flow

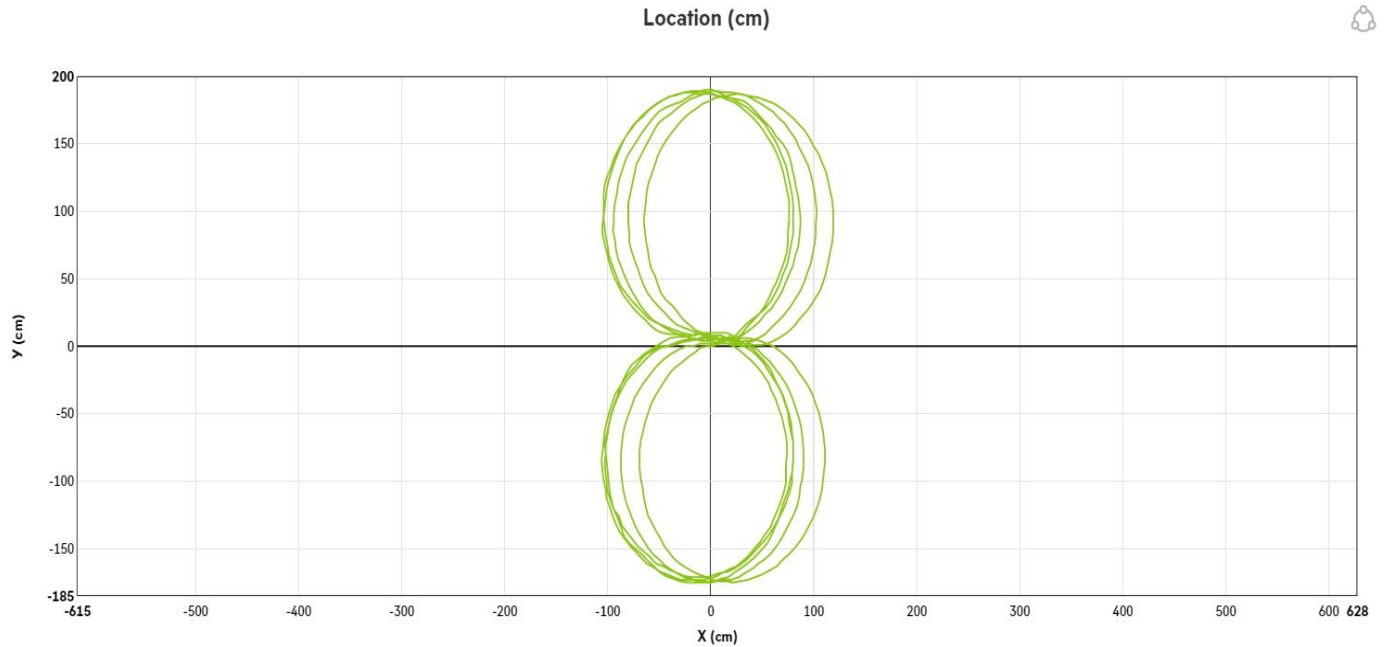


5.6 Software

Sphero Edu mobile application was downloaded in order to program the robot through block code. Sphero Edu also allows users to see sensor data and write their own code in JavaScript. Windows 10 was used to document and record the test results.



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5.7 Hardware

Code was developed on iPhone (iOS 10+) and tested on a Windows 10 Laptop.

5.8 Test Plan

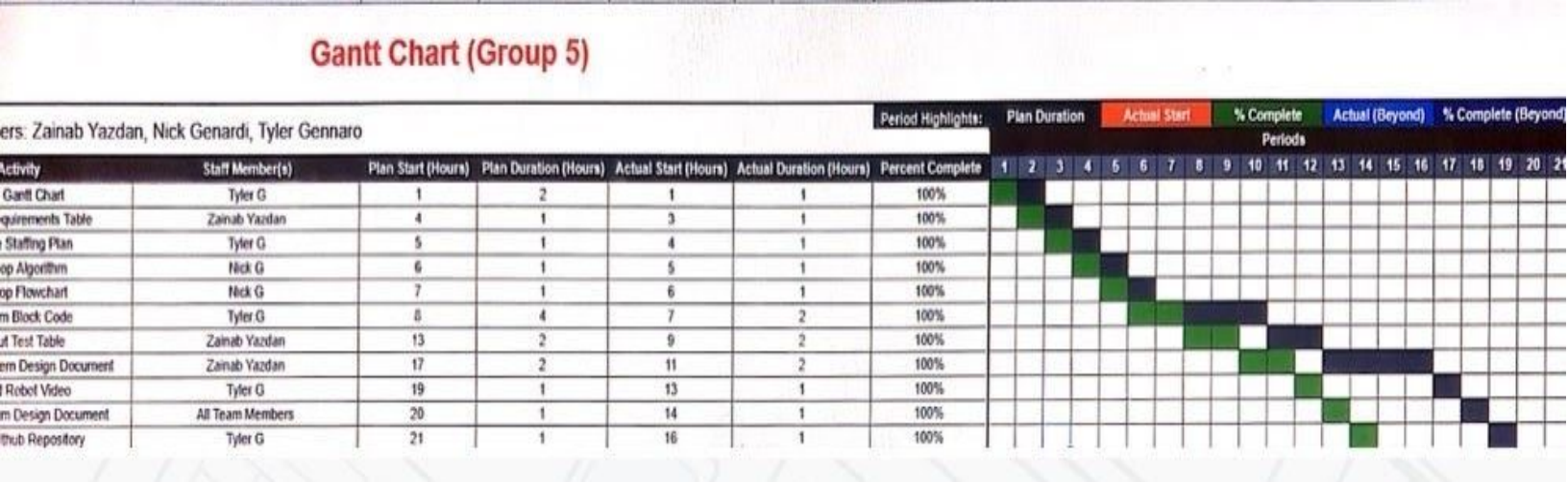
Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Check if the robot spins 360 degree clockwise	11/24/20	Robot spins 360 degree clockwise	Robot spins 360 degree clockwise	Tyler.G	Pass
Check if robot spins 360 degree anticlockwise	11/24/20	Robot spins 360 degree anticlockwise	Robot spins 360 degree anticlockwise	Tyler.G	Pass
Check if robot makes figure 8	11/24/20	Robot makes figure 8	Robot moves towards left after completing first spin	Tyler.G	Fail
Check if robot makes figure 8	11/24/20	Robot makes figure 8	Robot does not make figure 8	Tyler.G	Fail
Check if robot makes figure 8	11/24/20	Robot makes figure 8	Robot makes figure 8	Tyler, G	Pass
Check if robot repeats figure 8 course 5 times	11/24/20	Robot repeats figure 8 course 5 times	Robot does not repeat figure 8	Tyler. G	Fail
Check if robot repeats figure 8 course 5 times	11/24/20	Robot repeats figure 8 course 5 times	Robot repeats figure 8 5 times	Tyler.G	Pass

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Check if robot starts and stops within the given square path	11/24/20	Robot starts and stops within the path	Robot starts and stops within the path	Tyler.G	Pass
Check if robot finished where it started	11/24/20	Robot finished where it started	Robot finished where it started	Tyler.G	Pass
Check if robot stops and says "I am the winner"	11/24/20	Robot stops and says "I am the winner"	Robot stops and says "I am the winner"	Tyler.G	Pass
Check if robot stops and flashes multicoloured lights at the end	11/24/20	Robots stops and flashes multicoloured lights	Robot stops and flashes multicoloured lights	Tyler.G	Pass

5.9 Task List/Gantt Chart

[Sprint 1 - Gantt Chart](#)



5.10 Staffing Plan

Name	Role	Responsibility	Reports To
Nick Genardi	Project Lead	Coordinate group and activities	Instructor
Tyler Gennaro	Developer	Develop code	Nick Genardi
Zainab Yazdan	Documenter	Document observations for use in this document	Nick Genardi