

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

**April 11, 2022**

## Table of Contents

<b>1. EXECUTIVE SUMMARY</b>	<b>3</b>
1.1 PROJECT OVERVIEW	3
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	4
<b>3. REQUIREMENTS</b>	<b>4</b>
3.1 FUNCTIONAL REQUIREMENTS	5
3.2 SECURITY	5
3.2.1 <i>Protection</i>	5
3.2.2 <i>Authorization and Authentication</i>	6
3.3 PORTABILITY	6
<b>4. REQUIREMENTS CONFIRMATION/STAKEHOLDER SIGN-OFF</b>	<b>6</b>
<b>5. SYSTEM DESIGN</b>	<b>6</b>
5.1 ALGORITHM	6
5.2 SYSTEM FLOW	6
5.3 SOFTWARE	6
5.4 HARDWARE	6
5.5 TEST PLAN	7
5.6 TASK LIST/GANTT CHART	7
5.7 STAFFING PLAN	7
5.8 BLOCK CODE	8
5.9 SENSOR DIAGRAM	8

# 1. Executive Summary

## **1.1 Project Overview**

For this project, our robot, Sphero SPRK+, will move in a figure 8 shape, guided by blue tape in our classroom.

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

The purpose of this specification is to run the robot in a figure 8 course that can be used by students.

### **In scope**

This document addresses requirements related to the second sprint of a series of sprints.

### **Out of Scope**

The following items in sprint 2 are out of scope:

- User modifications.
- Clients requesting more work done without paying extra.

# 2. Product/Service Description

The general factors that affect the product and its requirements are the pathway in the classroom and the placement of the robot. It will have to move in a figure 8 shape and repeat the same movement 5 times.

## **2.1 Product Context**

This product is one of many products manufactured to be used by the Sphero robot. It can be used interchangeably with many products depending on the customer's needs. This particular product is part of a series of systems that will be used on the Sphero robot.

## **2.2 User Characteristics**

- University students with minimal technical expertise.
- School tech teachers.
- Anyone with a simple understanding of robots.

## **2.3 Assumptions**

This product requires software to be installed in our devices with a functional bluetooth connection. If the software is not available, the user will not be able to use the product.

## **2.4 Constraints**

- The code design is constrained by the use of the Shero app's blockcode's pre-existing format.
- The product's functionality is constrained to the classroom it was tested in, with the exact measurements of the tape that is on the floor.

## **2.5 Dependencies**

This product will require an environment that is similar to the one provided at the time of programming. This product will require an obstacle free surface to operate appropriately.

### 3. Requirements

#### 3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ACCUR_01	Robot must run the figure 8 course 5 times	confirmed	Yes	04/06/2022	All
ACCUR_02	Robot must stay within the path provided.	confirmed	Yes	04/11/2022	All
ACCUR_03	Robot must start and finish in the square provided.	confirmed	Yes	04/06/2022	All
ACCUR_04	Upon finishing, the robot will say "I am the winner" and flash multicolored lights for 5 seconds.	confirmed	Yes	04/06/2022	All

#### 3.2 Security

##### 3.2.1 Protection

- The system is protected with a user login and password requirement.
- This system is also protected with a history log of all activity performed on it from logging in to logging out.
- The system requires verification from a human, therefore protecting it from malicious robots.

##### 3.2.2 Authorization and Authentication

- Human authentication is required by CAPTCHA upon setting up the user profile.
- User authentication is also required through the mechanism PubCookie.

#### 3.3 Portability

This product is very portable, the only thing you need is the Shpero robot, a device that has the Sphero app and a bluetooth feature, the blockcode on the sphero app, and the robot charging port.

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

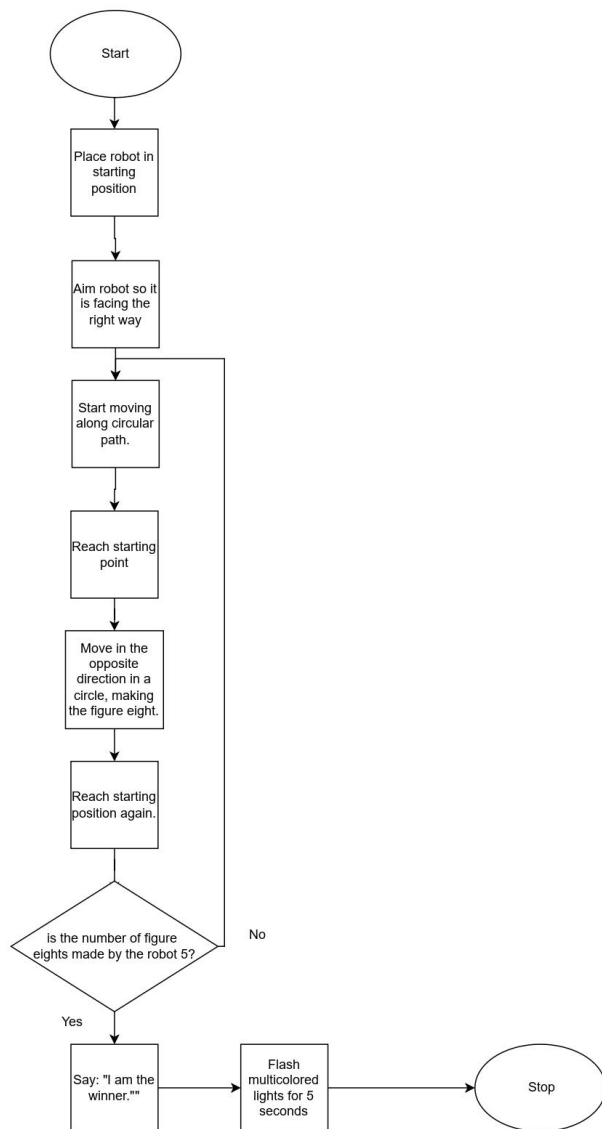
Meeting Date	Attendees	Comments
04/06/2022	Maheen (Project Planner and Programmer) Gina (Project Manager)	confirmed all except ACCUR_02.
04/11/2022	Maheen (Project Planner and Programmer) Gina (Project Manager)	confirmed all.

## 5. System Design

### 5.1 Algorithm

1. The robot is placed in the starting position facing left.
2. The robot starts moving along the circular path.
3. The robot reaches the point where it started.
4. The robot moves in the opposite direction in a circle, making a figure 8.
5. The robot reaches its starting position again.
6. Steps 1-5 are repeated five times
7. The robot says "I am the winner"
8. The robot flashes multicolored lights for 5 seconds

### 5.2 System Flow



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### **5.3 Software**

The software used to develop and deploy this system was the Sphero app which uses block codes and executes the program.

### **5.4 Hardware**

The hardware platforms used to develop, test and demonstrate this application was the SPRK+ robot, an HP laptop, an ASUS laptop, A Xiaomi smartphone and a Motorola smartphone.

### **5.5 Test Plan**

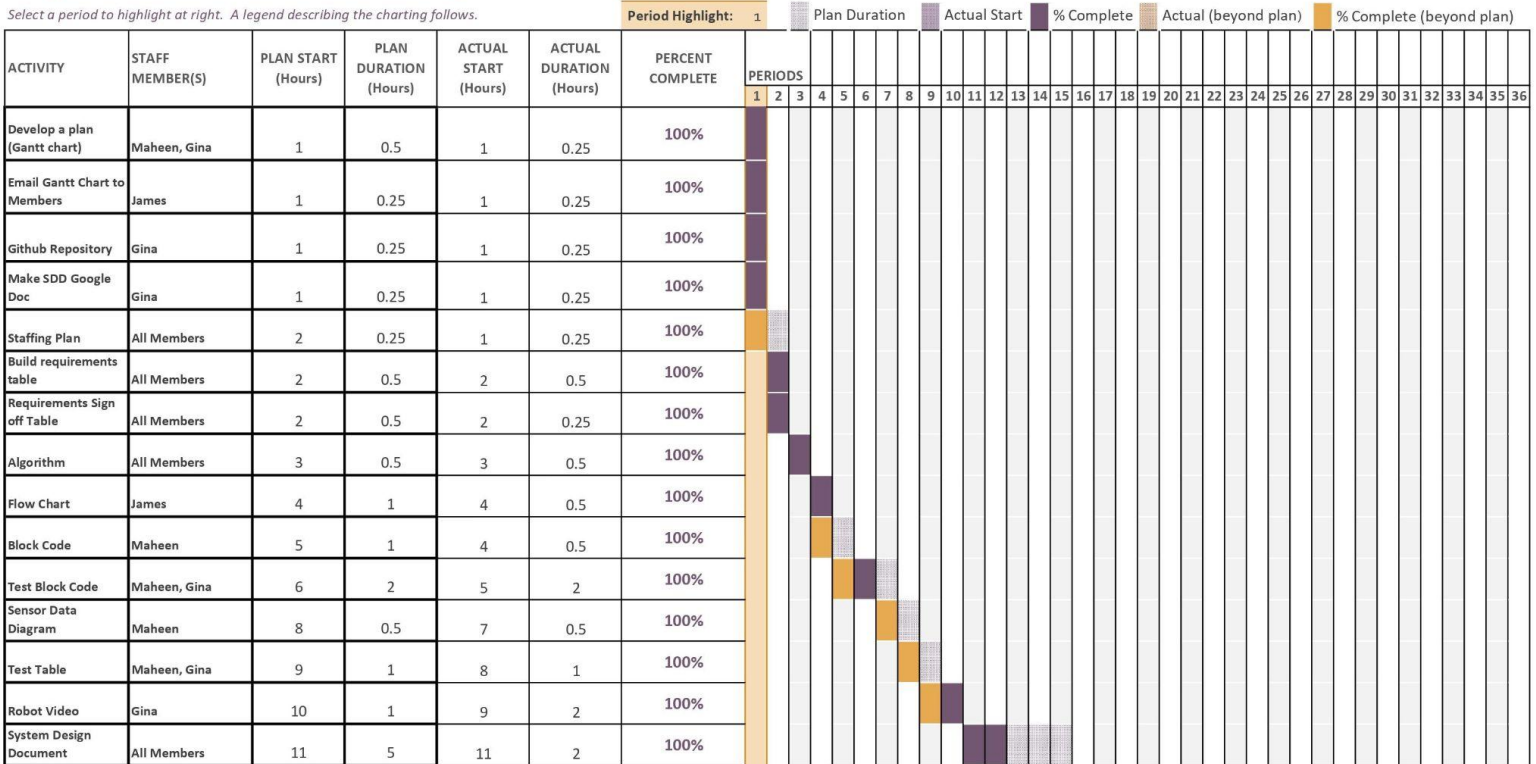
<b>Reason for Test Case</b>	<b>Test Date</b>	<b>Expected Output</b>	<b>Observed Output</b>	<b>Staff Name</b>	<b>Pass/Fail</b>
To see if the robot moves in figure 8 shape.	04/06/2022	The robot will move in a figure 8 shape five times without any specified path.	The robot only moved in a circle	Maheen Hanif-Ghafar Gina Elbanna	Fail
To see if the robot moves in figure 8 shape after editing the code.	04/06/2022	The robot will move in a figure 8 shape five times without any specified path.	The robot moved in a figure 8 shape five times.	Maheen Hanif-Ghafar Gina Elbanna	Pass
To see if the robot speaks.	04/06/2022	The robot will move in a figure 8 and say "I am the winner."	The robot said "I am the winner" after completing the figure 8.	Maheen Hanif-Ghafar Gina Elbanna	Pass
To see if the robot lights up.	04/06/2022	The robot will have different colors flashing for 5 seconds.	The robot lit up with different colors one after the other for 5 seconds.	Maheen Hanif-Ghafar Gina Elbanna	Pass
To see if the robot moves in figure 8 shape on the path.	04/06/2022	The robot will move along the figure 8 path provided in the classroom 5 times.	The robot was not in line with the path but it moved in a figure 8 shape five times.	Maheen Hanif-Ghafar Gina Elbanna	Fail
To see if the robot moves in figure 8 shape on the path.	04/06/2022	The robot will move along the figure 8 shape provided in the classroom five times.	The Robot moved very close to the line five times but not fully on it and the sensor data had an overlapping figure 8.	Maheen Hanif-Ghafar Gina Elbanna	Fail
To see if the robot moves in figure 8 shape on the path.	04/11/2022	The robot will move along the figure 8 path provided in the classroom five times.	The robot moved along the line five times in a figure 8 shape.	Maheen Hanif-Ghafar Gina Elbanna	Pass

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### 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
Gina Elbanna	Project Manager	Carrying out project tasks and motivating members to do work.	All members
Maheen Hanif Ghaffar	Project Planner and Programmer	Actively making sure things are going according to plan and setting up meetings with the members. Programming the robot and designing the code.	All members
James Voss	Project Reviewer	Creating the flowchart and rechecking the documents.	All members

### 5.8 Block Code:



### 5.9 Sensor Diagram:

