Sprint 2 - Accuracy Design Document

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Table of Contents

[1. Executive Summary 3](#_Toc21616852)

[1.1 Project Overview 3](#_Toc21616853)

[1.2 Purpose and Scope of this Specification 3](#_Toc21616854)

[2. Product/Service Description 3](#_Toc21616855)

[2.1 Product Context 3](#_Toc21616856)

[2.2 User Characteristics 3](#_Toc21616857)

[2.3 Assumptions 3](#_Toc21616858)

[2.4 Constraints 3](#_Toc21616859)

[2.5 Dependencies 4](#_Toc21616860)

[3. Requirements 4](#_Toc21616861)

[3.1 Functional Requirements 5](#_Toc21616862)

[3.2 Security 5](#_Toc21616863)

[3.2.1 Protection 5](#_Toc21616864)

[3.2.2 Authorization and Authentication 6](#_Toc21616865)

[3.3 Portability 6](#_Toc21616866)

[4. Requirements Confirmation/Stakeholder sign-off 6](#_Toc21616867)

[5. System Design 6](#_Toc21616868)

[5.1 Algorithm 6](#_Toc21616869)

[5.2 System Flow 6](#_Toc21616870)

[5.3 Software 6](#_Toc21616871)

[5.4 Hardware 6](#_Toc21616872)

[5.5 Test Plan 7](#_Toc21616873)

[5.6 Task List/Gantt Chart 7](#_Toc21616874)

[5.7 Staffing Plan 7](#_Toc21616875)

# Executive Summary

## Project Overview

The Sphero robot should accurately follow the figure 8 path correctly five times. The robot will start in a square and must be back in the square once it is done running through the path. After finishing through the path five times, the robot will say “I am the winner” and flash its multicolored lights for five seconds.

## Purpose and Scope of this Specification

In scope

* Audience: New Programmers
* Purpose: Learn block code and how to control what the robot does.

Out of Scope

The product specification is for the robot to follow the figure eight path and do it five times.

# Product/Service Description

## Product Context

This product can be used easily among children or people learning how to program. Yes, the product is independent and self-contained as it doesn’t need anything else to run and it is its own program. Yes, this product interacts with a robot that is paired via Bluetooth. The program will send the block code you have to input and send it to the robot. The robot will then execute the code and the result is the robot changing LED colors, turning, moving around, etc.

## User Characteristics

* College Student:
  + Experience: Little to none
  + Technical expertise: Has worked in a computer repair shop
  + Other: Has been in a few programming classes in high school but isn’t very skilled in any specific language
* Teacher:
  + Expertise: Years of using this product or similar
  + Technical expertise: Has years of experience working with computers and different software
  + Other: Has many years of experience and knows the ins and outs of many languages
* Middle School Student:
  + Experience: None with any language
  + Technical Expertise: None
  + Other: Has a strong desire to learn how to build programs

## Assumptions

* A Sphero compatible robot is needed to test the code.
* Must know very basic programming in order to use the product

## Constraints

The biggest constraint is working with block code as it inherently doesn’t have the flexibility of text code, but the program does a good job with the variety of commands it gives. However, when it came to running tests everything went smoothly and there were no issues with software.

## Dependencies

* Somebody in the group needs to know how to use the block code in order for anything to happen
* The robot needs the block code in order to function
* Measurements of the track are needed for the robot to follow or room HH208 needs to be reserved by a group member
* Bluetooth and WiFi are needed in order for the robot to function

# Requirements

## Functional Requirements

| Req# | Requirement | Comments | Priority | Date Rvwd | SME Reviewed / Approved |
| --- | --- | --- | --- | --- | --- |
| ENDUR\_01 | Start in the square | Should be in the same spot when finished with the program. | 1 | 10/28/20 | 11/22/20 |
| ENDUR\_02 | Follow the figure eight course five times | Must follow the path provided to create a figure eight design. | 1 | 10/28/20 | 11/22/20 |
| ENDUR\_03 | Finish in the square | Should be in the same spot as starting position. This indicates whether or not the robot stuck to the right path correctly. | 1 | 10/28/20 | 11/22/20 |
| ENDUR\_04 | Speak “I am the winner” | Not declared as important in relation to points deducted, still required by CEO Eckert. | 2 | 10/28/20 | 11/22/20 |
| ENDUR\_05 | Flash multicolored lights for 5 seconds | Not declared as important in relation to points deducted, still required by CEO Eckert. | 2 | 10/28/20 | 11/22/20 |

## Security

### Protection

Actively saving your progress and making sure nobody but trusted group members have access to your account can help prevent tampering and destruction. Also, making sure you close the program whenever necessary is important, as leaving your computer open while away from work can invite people with malicious intent to disturb your work.

### Authorization and Authentication

The authentication for this project is the use of a password that protects the code from anyone that does not have explicit access. Authorization for this project includes commits to the GitHub repository as adjustments can be made there to files if needed.

## Portability

The code is shared on GitHub, which is open source. So, as long as the requirements are met, anyone can have the same outcome as long as the block code is written the same. As long as the operating system is recent and up to date, the Sphero program can be used.

# Requirements Confirmation/Stakeholder sign-off

|  |  |  |
| --- | --- | --- |
| Meeting Date | Attendees (name and role) | Comments |
| 11/22/20 | Zoë (COO), Keven (PM), Maryam (PM) | We reviewed all the requirements and confirmed them together in a team meeting. |

# System Design

## Algorithm

Develop and describe here the algorithm that will be used to provide the required performance of your software

* Start in the square
* Follow the figure eight path five times
* Finish in the square
* Speak “I am the winner”
* Flash multicolored lights for 5 seconds

## System Flow

Diagram

Description automatically generated

## Software

Block code representing JavaScript code was manipulated using Sphero Edu software.

Graphical user interface, text, application, chat or text message

Description automatically generated

Sensor data not available after turning in robot. The video of the robot shows the accuracy of the robot following the figure eight path.

## Hardware

The Sphero robot was used in testing. The version used was the SPRK+ and connected to a personal computer over Bluetooth in order to access the block code created by the COO.

## Test Plan

| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| First Test | 10/27/20 | Some errors, unknown | Did not figure 8 but instead went out into the circles both facing same direction | Zoë | Pass |
| Change way heading out into circle | 10/27/20 | Figure 8 | Circled back over itself, just going over one circle | Zoë | Fail |
| Get rid of heading block and trace negatively through circle with orientation negative | 10/27/20 | Figure 8 | Slightly off path, did not calibrate 100% correctly | Zoë | Fail |
| Redo | 10/27/20 | Aim more correctly calibrated | Figure 8 | Zoë | Pass |

## Task List/Gantt Chart

Full Gantt Chart on Github: [here](https://github.com/zoeklapman/Accuracy.git).

Table

Description automatically generated

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Description automatically generated

## Staffing Plan

| Name | Role | Responsibility | Reports To |
| --- | --- | --- | --- |
| Zoë Klapman | COO, software developer | Oversee operations, program/test robot, sections 3.1 and 5 of system design document. | (CEO) Professor Eckert |
| Keven Kevelier | PM | Monitor task list/gantt chart, sections 2-4 of system design document. | (COO) Zoë Klapman |
| Maryam Kakar | PM | Monitor task list/gantt chart, section 1 of system design document. | (COO) Zoë Klapman |