Sprint 2: Speed Design Document

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# Executive Summary

## Project Overview

This project will allow us to test the endurance, speed, and agility of different Sphero robots in a class-wide competition. The intended audience for our project is our Professor and the other competitors.

## Purpose and Scope of this Specification

This document addresses requirements related to the endurance section of the triathlon.

In scope

* the program will only be able to be run inside of the classroom HH208

Out of Scope

* the program will not be used over the internet, only within the confines of HH208 and with the singular laptop that the program was written on

# Product/Service Description

## Product Context

The product used in this project, the Sphero robot, is related to the other robots it is competing against in that they are all the same model and contain the same programing capacity. The robots we are working with are self-contained in that they are not interconnected and the code we create can only control one robot at a time. Our code is universal for every robot in the class, so the code can interface with a variety of related systems (in this case, with many different robots). For our purposes, however, our robot will remain self-contained and we will only be programing for our specific Sphero robot.

## User Characteristics

General Customer Profile:

* The users are students
* The users have had experience in manually driving the robot as well as programing specific tasks for the robot in the Sphero Edu app.
* The user’s expertise is experience in coding in Python as well as the Sphero program
* The users of this product are strictly the students in the specified group that are competing in the robot triathlon.

## Assumptions

Assumptions that may affect the requirements include: not being able to sign out a robot when needed, not having access to Howard Hall room 208 when needed, unawareness of the capabilities of our Sphero robot, time management, and equal effort from all group members.

## Constraints

* Parallel operation with other systems: The program created for our specific Sphero robot might not be compatible with newer models of Sphero robots.
* Access and management: Not having access to the designated obstacle course space in HH208, not having enough time with the robot, and not having access to the robot.
* System resource constraints: limited amount of disk space or capacity for programing in the Sphero app.
* Other: Not having sufficient knowledge on the capabilities of the robot.

## Dependencies

* Before attempting this project, our group must obtain sufficient knowledge of the capabilities of our robot.

# Requirements

## Functional Requirements

| Req# | Requirement | Comments | Priority | Date Rvwd | SME Reviewed / Approved |
| --- | --- | --- | --- | --- | --- |
| SPEED-01 | The system must successfully run the figure eight course five times | Speed Process = “Five Figure Eights” | 1 | 11/5/19 | Arielle Sinicin |
| SPEED -02 | The system must remain within the provided path on the floor | Speed Process = “Stay On Track” | 2 | 11/5/19 | Arielle Sinicin |
| SPEED -03 | Upon finishing, the system must flash multicolored lights for five seconds | Speed Process = “Ending Light Colors” | 1 | 11/5/19 | Arielle Sinicin |
| SPEED -04 | The system must start and end its figure eight at the same location indicated by a square on the path. | Speed Process = “Beginning and End Location” | 2 | 11/5/19 | Arielle Sinicin |

## Security

### Protection

* In order to access the code, one must sign into their individual Sphero account.
* In order to add, delete, or edit information within the project, the group member must be named a “collaborator” in the GitHub repository for the project.

### Authorization and Authentication

In order to access the code and the project documents, one must be named a “collaborator” for the GitHub repository containing this information. In addition, the specific code for the programing of the robot is located in a desktop app for Sphero under the log in of strictly group members.

## Portability

* Code is located solely on the desktop app of one group members laptop; however, this code can be shared publicly through the Sphero database.
* The project documents and information are also stored in a GitHub repository that all group members have access to.
* This program will only be used within this group for the specific purpose of the end competition, so it does not have to have large portability between other host machines or operating systems.

# Requirements Confirmation/Stakeholder sign-off

*Include documentation of the approval or confirmation of the requirements here. For example:*

|  |  |  |
| --- | --- | --- |
| Meeting Date | Attendees (name and role) | Comments |
| 11/5/19 | Arielle Sinicin, Matthew Silano, Jabril Shakur | Confirmed SPEED-01 - SPEED-04 |

# System Design

*This section will provide all details concerning the technical design, staffing, coding, and testing the system*

## Algorithm

1. Using the Sphero app, connect to the robot
2. Place the robot in its starting position
3. Aim the robot in the correct direction
4. Spin the robot 360 degrees at a speed of 100 for 5.0 seconds to create a circle.
5. Spin the robot 360 degrees at a speed of 100 for 5.0 seconds to create a backwards circle.
6. Stop the robot
7. Repeat steps 4 through 6 five times.
8. The robot will stop at the exact same point that it started.
9. The robot will speak “I am the winner”.
10. The robot will flash multicolored lights for 5 seconds.

## System Flow

Separate outside document

## Software

The software that will be used to develop and deploy this application is written in Java Script. The software where the code is written is located in the Sphero Edu desktop app, and the method of coding is simplified block coding.

## Hardware

The hardware platforms used to develop, test, and demonstrate this application is the Sphero Edu desktop app. This app allows developers to readily test their code by sending the program to the robot and running it at the click of a button. This app will run on an apple laptop.

## Test Plan

| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| Aim the robot | 11/5/19 | The blue light shows the direction | the blue light is pointing in the direction to go | Arielle, Matt | Pass |
| Spin the robot at 360 degrees | 11/5/19 | The robot will roll in a circle | The robot rolled in a half circle and then stopped | Arielle, Matt | Fail |
| Determine the optimal speed for the robot | 11/5/19 | The speed will remain the same for the entire task | The robot’s speed changed based on the terrain and if it had its case on | Arielle, Matt, Jabril | Pass |
| Determine the optimal duration for the robot to complete a full circle | 11/5/19 | After robot determines the correct angle it will be able to travel in a complete circle | The robot successfully completed a full circle at a speed of 100 for 5 seconds. | Arielle, Matt, Jabril | Pass |
| How will the robot go from the first circle to the second, backwards circle | 11/5/19 | The robot will adjust itself while transitioning from the first circle to the second circle | The robot correctly adjusted itself to perform a second circle and complete the figure eight. | Arielle, Matt | Pass |
| The robot must complete the figure eight 5 times | 11/5/19 | The robot will repeat these circles 5 times without going off course | For the first figure eight, the robot perfectly stayed along the track. However, for the other four loops the robot was more and more off from the track because it could not re aim itself. | Arielle, Matt | Fail |
| The robot must travel along the predetermined path | 11/5/19 | The robot will complete the figure eight in the exact same way every time | The robot only traveled along the path for the first figure eight. In order to solve this, the robot would have to be manually aimed before every figure eight. | Arielle, Matt | Fail |
| The robot must stop where it started | 11/5/19 | The speed will have to be slow enough for the robot to make an accurate stop | The robot only stopped where it started after the first figure eight, other than that the robot was off. | Arielle, Matt | Fail |
| The robot must speak “I am the winner” upon completion | 11/5/19 | The robot will speak “I am the winner” upon completion | The robot spoke the correct line. | Arielle, Matt, Jabril | Pass |
| The robot must flash multicolored lights for 5 seconds upon completion | 11/5/19 | The robot will flash multicolored lights for 5 seconds upon completion | The robot flashed colors for 5 seconds. | Arielle, Matt, Jabril | Pass |

## Task List/Gantt Chart

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## Staffing Plan

| **Name** | **Role** | **Responsibility** | **Reports To** |
| --- | --- | --- | --- |
| **Arielle Sinicin** | Project Manager, Presentation Developer | Responsible for all project deliverables, updates the project plan | **Client, the team** |
| **Matthew Silano** | Tester, Documenter | programming, testing, documents development activities | **the team** |
| **Jabril Shakur** | Tester, Documenter | programming, testing, documents development activities | **the team** |