Robotics Triathlon Design Document- Sprint 2

November 12, 2019

Use this Requirements Specification template to document the requirements for your product or service, including priority and approval (Must do).

This document will also serve as a System Design Document (How to) and will include sections detailing system flow, algorithms, staffing plan, software/hardware, and Test Plan

This document contains instructions and examples which are for the benefit of the person writing the document and should be removed before the document is finalized.

To regenerate the TOC, select all (CTL-A) and press F9.

**Table of Contents**

[**1.**](#_heading=h.1fob9te) **EXECUTIVE SUMMARY 3**

[1.1](#_heading=h.1fob9te) Project Overview 3

[1.2](#_heading=h.2et92p0) Purpose and Scope of this Specification 3

[**2.**](#_heading=h.tyjcwt) **PRODUCT/SERVICE DESCRIPTION 3**

[2.1](#_heading=h.3as4poj) Product Context 3

[2.2](#_heading=h.3dy6vkm) User Characteristics 3

[2.3](#_heading=h.1t3h5sf) Assumptions 3

[2.4](#_heading=h.4d34og8) Constraints 3

[2.5](#_heading=h.2s8eyo1) Dependencies 4

[**3.**](#_heading=h.17dp8vu) **REQUIREMENTS 4**

[3.1](#_heading=h.1pxezwc) Functional Requirements 5

[3.2](#_heading=h.26in1rg) Security 5

[*3.2.1*](#_heading=h.lnxbz9) *Protection 5*

[*3.2.2*](#_heading=h.35nkun2) *Authorization and Authentication 6*

[3.3](#_heading=h.1ksv4uv) Portability 6

[**4.**](#_heading=h.49x2ik5) **REQUIREMENTS CONFIRMATION/STAKEHOLDER SIGN-OFF 6**

[**5.**](#_heading=h.z337ya) **SYSTEM DESIGN 6**

[5.1](#_heading=h.3j2qqm3) Algorithm 6

[5.2](#_heading=h.1y810tw) System Flow 6

[5.3](#_heading=h.4i7ojhp) Software 6

[5.4](#_heading=h.2xcytpi) Hardware 6

[5.5](#_heading=h.1ci93xb) Test Plan 7

[5.6](#_heading=h.3whwml4) Task List/Gantt Chart 7

[5.7](#_heading=h.2bn6wsx) Staffing Plan 7

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# 1. Executive Summary

## Project Overview

The robotics triathlon is about working with a group to test and present a software system. This software engineering project will test the ability to problem solve, organize, document, code and test a robot’s ability to perform. The project will require tests of a robot’s endurance, speed and agility to perform certain tasks. This product’s intended audience is anybody who has a sphero robot.

## Purpose and Scope of this Specification

This document focuses on phase two and addresses the requirements of phase two in order to successfully complete the speed sprint. Within this scope of the project, the group will be focused on successfully completing a figure eight five times. The robot must stay on the course laid out on the ground to receive full credit. This part must take place in the room where the triathlon will take place. The scope of the specification is reliant on the robot's ability to complete two of the same size circles five times. Phase 1, the endurance sprint, and phase 3, Agility sprint, are out of the scope of this document. Another out of scope element is that this project is not done with any other robot.

# Product/Service Description

Sphero is a creative experience for kids, parents, teachers and more. It was originally designed as creative experiences with a robotic ball. The growth of the company has led to more and more products and has changed the way that kids play. This is a new way for people of all ages to explore the creative realm of coding and robotics.

## Product Context

This product is new and innovative because as technology advances, more products come out to expand the business. The product is independent and self-contained in the company with a variety of the same type of product.

## User Characteristics

The user can be of any age. They must have a sphero robot. There are minimal experience requirements or expertise related to this program. As long as the user has a sphero robot and the sphero edu app, this program can be learned and used.

## Assumptions

The user must have a sphero robot and must have the sphero edu app to run this program. The app can be downloaded on any operating system such as ios, OSX, windows, etc.

## Constraints

Some constraints to this project include the size of the room, the ability to access the room, working in a group with different schedules and the ability of the robot to make complete circles that are the same size..

## Dependencies

In order to complete this sprint correctly, it is dependent on being able to aim the robot correctly and make sure the duration is correct.

# Requirements

## 3.1 Functional Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Comments** | **Priority** | **Date Rvwd** | **SME Reviewed / Approved** |
| SPEED-01 | The robot should stop and start in the same place | Most important because if this is done, other requirements are satisfied | 1 | 11/5 | Reviewed |
| SPEED-02 | The robot should complete one circle | In order to make this happen, find the best degree and duration for the spin | 2 | 11/5 | Reviewed |
| SPEED-03 | After a complete circle, the robot must cross the proper spot to begin the next circle | This is very important because it shows the robot is on the right track | 3 | 11/5 | Reviewed |
| SPEED-04 | Complete a second full circle | Each time the robot completes a figure 8, the location is affected by a little | 4 | 11/5 | Reviewed |
| SPEED-05 | Complete the figure 8 a third time | Each time the robot completes a figure 8, the location is affected by a little | 5 | 11/5 | Reviewed |
| SPEED-06 | Complete the figure 8 a fourth time | Each time the robot completes a figure 8, the location is affected by a little | 6 | 11/5 | Reviewed |
| SPEED-07 | Complete the figure 8 a final time | Hopefully, the robot can complete 5 figure 8’s while staying directly on course | 7 | 11/5 | Reviewed |
| SPEED-08 | Light up multicolored lights for 5 seconds | Block code towards the end | 8 | 11/5 | Approved |
| SPEED-09 | Say “I am the winner” | Last block code needed | 9 | 11/5 | Approved |

## Security

### Protection

The system is pretty easy to use, accessible and easily understood. In order to protect the system, Github repositories should be public and only able to be edited by collaborators. All pull requests need to be reviewed by reviewer before committed to master, in order to ensure everything is correct and won’t mess up the code.

### Authorization and Authentication

On sphero, users can create a three different types of accounts; learner, educator, or parent. These three accounts allow users to keep the information in the cloud and to share content publicly.

***Portability***

The software is very portable because it can be used on many different devices.

# 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** |
| 11/0519 | Sarina Jones- systems design document  Frank Illiano- programming and coding  Ehsan Salih - gannt chart, flowchart | Confirmed by Sarina, Frank and Eshan |

# System Design

## Algorithm

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

list of all the steps:

* Use the app to connect the robot
* Put the robot in the starting position
* Aim the robot in the right direction
* Spin the robot 360 degrees, duration: 5.2
* Set the speed at 100
* Stop the robot after the first circle
* Spin the -360, duration: 5.1
* Stop the robot after completion of the second circle
* Loop that five times
* Robot stops
* Light up robot multicolored for 5 minutes
* Make the robot say “I am the winner”

## System Flow

Develop a flowchart (and show here) that accurately depicts how your software application will act to fulfill the algorithm

## Software

The software for the robot is Sphero Block Coding.

## Hardware

Must have bluetooth requirements.

## Test Plan

Include a test plan showing all unit tests performed for this application, Include test rational, test date, staff member, pass/fail status

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Determine best duration at 360 spin for one circle | 11/5 | Robot will spin in a circle that is the appropriate size | The change is duration changes the size of the circle. The first circles best duration was 5.2 | Frank and Sarina | Pass |
| Determine the best speed | 11/5 | Determine the best speed possible | The best possible speed is 100 | Frank and Sarina | Pass |
| To find out if the robot goes through the correct crossing point | 11/5 | If the duration is determined and spin is 360, then this will be the case | Found it to be true | Frank and Sarina | Pass |
| Determine best duration at 360 spin for the second circle | 11/5 | It is expected that the duration would be the same as the first circle | The best duration is not the same but fairly close. Duration was 5.1. | Frank | Pass |
| To find out if the robot can successfully complete the same size circles, five times | 11/5 | It is expected that the robot is capable of doing this | Even though the duration remains the same, the robot tends to go off course has the times increase. | Frank | Pass |
| Confirm the code loops 5 times | 11/5 | It is expected to complete the figure 8 five times | The robot successfully completes 5 figure 8’s. | Frank | Paa |
| Determine if the robot stops in the same place it started | 11/5 | It will stop in the same place | The robot was able to stop in the place it started | Frank | Pass |
| The robot lights up multicolored when finished for 5 seconds | 11/5 | After the robot finishes, it will light up multicolored | This is what takes place with the code | Frank | Pass |
| The robot speaks  “I am the winner” | 11/5 | After the robot finishes, it will speak | This is what takes place with the code | Frank | Pass |

## Task List/Gantt Chart

Embed your gantt chart here

## Staffing Plan

Insert a chart/table that depicts the roles and responsibilities of each team member that worked on this project

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Role** | **Responsibility** | **Reports To** |
| Sarina Jones | Project Manager | Systems Design Document, Requirements chart, algorithm | All Teammates |
| Frank Illiano | Developer | Code, Gantt chart, Systems design document | All Teammates |
| Ehsan Salih | Program Planner | Flowchart, Gantt Chart | All Teammates |