**Sprint 1 - Endurance Design Document**

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# 1. Executive Summary

## ***1.1*** ***Project Overview***

The goal of this project was to create a program that would make a Sphero SPRK robot complete 1 lap of a rectangular course.

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

This project is to show that our team can create a program that shows how steady this robot can follow a course. This is only part 1 of the final project. For example:

**In scope**

This document addresses requirements related to Sprint 1: Endurance of Project A:

· Sprint 2 and 3 will be completed at a later date

**Out of Scope**

The following items in Sprint 1 of Project A are out of scope:

· Sprint 2 and 3 will test other elements of the robot, not just ‘endurance’

(Phase 3 will be considered in the development of the requirements for Phase 2, but the Phase 3 requirements will be documented separately.)

# 2. Product/Service Description

Many general factors and considerations must be taken into account when talking about this program. Steps will be taken to ensure a smooth operation.

## ***2.1*** ***Product Context***

This product runs independently with a user, and works in unison with the EDU programs on the computer.

## ***2.2*** ***User Characteristics***

Anyone can use this software and product, including younger people. For the most part they are also used for/by:

· Student/faculty/staff/other

· experience

· technical expertise

## ***2.3*** ***Assumptions***

Here describes any constraints or dependencies this design may need or encounter.

## ***2.4*** ***Constraints***

Some factors may limit the program from running properly with the product

· Battery life/limits

· Space, especially for courses

· Access, management and security

· Up-to-date software

· Any unexpected glitch

## ***2.5*** ***Dependencies***

Dependencies examples that will most definitely affect the program:

· This program must need a secure Bluetooth connection between computer and product (Sphero)]

· Program needs a computer to run

# 3. Requirements

Many of the requirements listed within this section have been set in place form the computer science department here at Monmouth. These will be crucial in deciding whether our team successfully completed portions of this project.

## ***3.1*** ***Functional Requirements***

The following table represents what each Endurance Sprint requirements are:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Comments** | **Priority** | **Date Rvwd** | **SME Reviewed / Approved** |
| ENDUR\_01 | - Start with green light  - Speak “ready set go”  - Follow the rectangle course  - stop at the same starting point  - speak “I am done” and have a red light |  | Important | March 31st | Completed |
| ENDUR\_02 | - Make a figure eight,  - Repeat the program 5 times  - Stop at the same starting point  - Speak” I am the winner”  - Shine different lights for 5 seconds |  | important | April 12 | In progress |
| ENDUR\_03 | - Complete the agility course, avoiding objects, making sharp turns, jumping the ramp, and hitting the ‘pins’ down |  | important | April 21 | In progress |

## ***3.2*** ***Security***

### **3.2.1** **Protection**

Certain factors must be ensured before the robot performs its activities. For example:

- flat surface

- no obstruction or obstacles (Sprint1)

### **3.2.2** **Authorization and Authentication**

Our team and progress will be overlooked by Professor Gil Eckert

## ***3.3*** ***Portability***

The Sphero company offers many products, including the SPRK. Our program can run on any SPrk device. Furthermore,

- Sphero SPRK can be operated anywhere, so long as the Sphero EDU program is running on a computer or laptop capable

# 4. Requirements Confirmation/Stakeholder sign-off

|  |  |  |
| --- | --- | --- |
| **Meeting Date** | **Attendees** | **Comments** |
| 03/24/2021 | Armand Valentno, Krstina Good | Completed part of Sprint 1 Project |

# 5. System Design

## ***5.1*** ***Algorithm***

The algorithm for Sprint 1 must complete a circuit that is shaped as a rectangle. The product must follow the rectangle lines at a steady pace. The coding will involve inputs controlling the moving and turning mechanisms of the product, in order for it to output 1 lap completing the circuit.

## ***5.2*** ***System Flow***

Below is the system flow chart mapping out what our block code for Sprint 1 should look like:

## ● The actual block coding program that was created and used on the robot is below, along with the sensor data showing the completion of 1 rectangular lap around the Endurance sprint court:

***5.3*** ***Software***

|  |  |
| --- | --- |
|  |  |
|  |  |

## 

The software used to create and run this program is called Sphero EDU. Within the application, block coding is an option to create programs for the Sphero SPRK robot, which is what our team used.

## ***5.4*** ***Hardware***

Our team used a MacBook to test our product and its coding design.

## ***5.5*** ***Test Plan***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| First long straight (running 10 seconds) | 3/24 | Reach first end point | Overshot the endpoint | Kristina, Armand | Fail |
| First long straight (shortened running time) | 3/24 | Reach the first end point, and rotate for second leg. | Stopped right at the first end point to turn. | Kristina, Armand | Pass |
| First short straight (running 5 seconds) | 3/24 | Reach the second end point, and rotate for third leg. | Stopped too short of the second end point | Kristina, Armand | Fail |
| First Short straight (shortened running time) | 3/24 | Reach the second end point, and rotate for the third leg. | Stopped at the second end point, ready to turn. | Kristina, Armand | Pass |
| Second long straight & second short straight | 3/24 | Complete the third and fourth legs of the circuit using the same running times as first long, first short | Did not exactly follow the second half of the course correctly | Kristina, Armand | Fail |

## ***5.6*** ***Task List/Gantt Chart***

## ***5.7*** ***Staffing Plan***

Below lists a table of contributors to the project, and what roles and responsibility

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Role | Responsibility | Reports To |
| Kristina Good | Coder/contributor | Gantt Chart, Develop algorithm, videographer, completing system design | Professor Gil Eckert |
| Armand Valentino | Coder/coder contributor | Gantt Chart, Create code and flowchart, completing system design | Professor Gil Eckert |