[SprintOne] Design Document

November 25, 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.

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# Executive Summary

## Project Overview

Our robot must be able to perform three different tasks. These tasks include moving around the room in a rectangle, move in a figure 8 five times and stop and the same spot and finally go through an obstacle course.

## Purpose and Scope of this Specification

The purpose of this is to show problem solving skills and the intended audience is our Professor, Gil Eckert.

# Product/Service Description

In order for the product to work you will want to have an open space with a flat floor for optimal performance.

## Product Context

This product is used with application on IOS and Windows Devices. You can use a Computer or even your smart phone to connect to the product.

## =============User Characteristics

This product would be very useful to children trying to get into computers at a young age, or even older students who are just trying to gain some knowledge about software engineering

## Assumptions

* Need a Sphero device
* No knowledge needed, could be very experienced

## Constraints

Some constraints could be battery life. If the robot is low on battery it will not receive your code as well. The rubber protection could also be a problem because each one is different. The Robot Must now be able to stay on course and stop at the correct point.

## Dependencies

The device will need the code to operate, you should also charge before use because it will result in the robot failing to receive code if it is running low on battery.

# Requirements

## Functional Requirements

In the example below, the requirement numbering has a scheme - BR\_LR\_0## (BR for Business Requirement, LR for Labor Relations). For small projects simply BR-## would suffice. Keep in mind that if no prefix is used, the traceability matrix may be difficult to create (e.g., no differentiation between '02' as a business requirement vs. a test case)

The following table is an example format for requirements. Choose whatever format works best for your project.

For Example:

| Req# | Requirement | Comments | Priority | Date Rvwd | SME Reviewed / Approved |
| --- | --- | --- | --- | --- | --- |
| RO\_01 | Don’t hit the three objects in the path. | The outer rubber on the robot makes it difficult to stay on path. | 1 | 11/20 | Joe  Ryan  Amelia |
| RO\_02 | The robot must knock over as many pins as possible | If you do not get the right angle coming out of the obstacles than your code does not matter, and the robot will not hit any pins | ~~2~~ | 11/20 | Joe  Ryan  Amelia |
| RO\_03 | The robot must go over the ramp and stop in the same square as the starting point, | To robot needs to have enough speed to make it up the ramp, and should try to stay in the middle to stop in the square as best as possible. | 3 | 11/20 | Joe  Ryan  Amelia |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

## Security

### Protection

The Sphero application will protect your code from other people if you want to keep it private under you account.

### Authorization and Authentication

In order to gain access to private code, you need to have the right username and password to access the account if the code is private.

## Portability

The system is able to be transported to different devices, even if they run on different operating systems. It will be able to be transported from and IOS device to a windows device with ease.

# System Design

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

## Algorithm

Steps

* Roll 0 Degrees at a speed of 100 for .95 seconds
* Delay for 2 seconds
* Roll 95 degrees at a speed of 115 for 1 second
* Delay for 2 seconds
* Roll 0 degrees at 127 speed for .75 seconds
* Delay for 2 seconds
* Roll at a speed of 220 degrees at a speed of 226A screenshot of a cell phone

  Description automatically generated

## Software

The software language that is used is already given in the app, just input the speed and degrees of turning.

A picture containing outdoor

Description automatically generated

## Hardware

What we used for our project was our iPhone and computers.

## Test Plan

| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| We wanted to to try and get around the first obstacle | 11/15 | The robot is going to make it around the first bottle | The robot made it around the first bottle | Joe, Ryan, Emilia | Pass |
| We wanted to have the robot stop moving and change direction to go around the second bottle. | 11/15 | The robot is going to make it around the first bottle, stop, then change direction and go around the second bottle | The robot was able to change directions, but the degrees of the turn was not far enough, so it hit the bottle | Joe, Ryan, Emilia | Fail |
| We increased the degrees of the turn to make it around the second bottle and stop | 11/15 | The robot is going to make it around the first bottle, stop, make It around the second then stop again | The robot made it around both bottles and stopped on time, | Joe, Ryan, Emilia | Pass |
| We copied the degrees for the turn to set a base set of values for the final bottle. | 11/16 | The robot is going to make it around all of the bottles and move to the next obstacle | The robot moved a little bit off course but made it around. | Joe, Ryan, Emilia | Pass/Fail |
| We changed the degrees of turning and tried to knock down as many pins as possible and then stop moving. | 11/16 | The robot is going to knock over fifty percent of the pins. | The robot knocked over all but two of the pins | Joe, Emilia,  Ryan | Pass |
| We turned the robot to go towards the ramp and we tried to have it make it over. | 11/16 | The robot is going to make it over the ramp and stop in the square. | The robot was not able to make it over the ramp. | Emilia, Joe | Fail |
| We increased the speed of the robot to be able to make it over the ramp and land in the square. | 11/17 | The robot will make it over the ramp and land in the square. | The robot made it over the ramp and stopped in the square. | Joe, Emilia | Pass |
|  |  |  |  |  |  |

## Task List/Gantt Chart

Task List

* Staffing Plan

Joe 11/3

* Algorithm (DONE)

Ryan 11/3

* Flow Chart (DONE)

Amelia 11/4

* Code (DONE)

Ryan and Joe 11/6

* Test Plan (DONE)

Joe Amelia 11/7

* Design Document (DONE)

Joe Amelia Ryan 11/3-7

## 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** |
| --- | --- | --- | --- |
| **Joe** | Group Member | Gantt chart | Ryan |
| **Ryan** | Group Member | Task list | Amelia |
| **Amelia** | Group Member | Code | Joe |