***[Speed] Design Document***

**[Speed] Design Document**

November 11, 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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# **1.Executive Summary**

## ***1.1Project Overview***

In this project we will code a Sphero+ robot to three different tasks. The first task being and Endurance test where the robot will drive around the edges of Howard Hall 208 five feet away from the wall. The second task is the Speed test where the robot will drive in a figure eight starting and ending in the same location. The final being an obstacle course where the robot will do certain tasks and end on an X on the ground. Its intended audience is for our teacher Professor Eckert and the rest of our Intro to problem solving class.

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

This specification is for our Professor, Professor Eckert and for the rest of our computer science class.

# **2.Product/Service Description**

There are a few different factors that apply to the robot. First the robot moves differently depending on how charged it is. Second the robot moves differently depending if the plastic cover is on or not. Third the robot is heavily affected by the floor it is on and may move differently each time because of it.

## ***2.1Product Context***

This product is a pretty good product compared to other projects. It is fairly easy to use and can be used with different devices such as a computer, and phone. It is set up so that you can drag and drop you code and download other people's codes if you need help.

## ***2.2User Characteristics***

Student/Faculty/Staff- can use this to see how we made our robot go around the room.

## ***2.3Assumptions***

We assume that we have a device that can run the Sphero program. We also assume that we have access to room 208 to test the robot. We also assume that we have a Sphero robot and some knowledge of coding.

## ***2.4Constraints***

There are not many constraints besides if you do not have enough space to hold the code or if your robot is not charged.

## ***2.5Dependencies***

Some dependencies are that the robot needs 3 hours to charge, it needs to update every so often, and you need the specific software for it to work

# **3.Requirements**

* The robot must start on the X marked on the ground
* The robot must go around in a figure eight following the marks on the ground
* The robot must do the figure eight 5 times
* The robot must stop on the same X it started on
* The robot must say ‘I am the winner’ after it stops on the X
* The robot must flash colors for 5 seconds after it speaks

**Priority Definitions**

* Priority 1 –The robot must do a figure eight following the marks on the floor five times.
* Priority 2 – The robot must start and stop on the X marked on the ground.
* Priority 3 – The robot must say ‘I am the winner’ after it finishes the figure eight.
* Priority 3- the robot must flash random colors for 5 seconds after it speaks.

## ***3.1Functional Requirements***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Comments** | **Priority** | **Date Rvwd** | **SME Reviewed / Approved** |
| Speed\_1 | The robot must start on the X marked on the ground | The marked was placed by our professor and is the middle of the figure eight | 2 | 11/1/19 | Joseph DeRosa,  Mujeeb Ali, Elijah Barnes |
| Speed\_2 | The robot must go around the figure eight marked on the ground 5 times. | The figure eight was placed by our professor and is the main point of this sprint. | 3 | 11/8/19 | Joseph DeRosa,  Mujeeb Ali, Elijah Barnes |
| Speed\_3 | The Robot must stop on the X marked on the ground. | This X was placed by our professor and is the same X that the robot started on. | 2 | 11/8/19 | Joseph DeRosa,  Mujeeb Ali, Elijah Barnesr |
| Speed\_4 | The Robot must say ‘I am the winner’ once it has stopped on the X. | Output of code robot must complete | 1 | 11/8/19 | Joseph DeRosa,  Mujeeb Ali, Elijah Barnes |
| Speed\_5 | The Robot must flash different colors for 5 seconds after it speaks. | Output of code robot must complete | 1 | 11/8/19 | Joseph DeRosa,  Mujeeb Ali, Elijah Barnes |

## ***3.2Security***

### **3.2.1Protection**

As protection the Sphero edu program keeps you code for you under your account. If someone takes the code it will be very easy to see if someone copied someone else because you can just look up code. Each account has its own username and password so no one can steal your information unless they have them.

### **3.2.2Authorization and Authentication**

Username and password used to get access to the sphero account with the code.

## ***3.3Portability***

The code is very easily portable, it is able to be transferred from your phone to computer very easily. This makes it very easy to use.

# **4.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** |
| 11/1/19 | Joseph DeRosa, Group Member  Mujeeb , Group Member  Elijah Barnes , Group Member | Started to test the code and work on the design document. |
| 11/8/19 | Joseph DeRosa, Group Member  Mujeeb , Group Member  Elijah Barnes , Group Member | Finished the code and almost finished the design document. |
| 11/11/19 | Joseph DeRosa, Group Member  Mujeb Ali,Group Member  Elijah Barnes, Group Member | Finished up everything, made sure it was all good and submitted it to github. |

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# **5.System Design**

## ***5.1Algorithm***

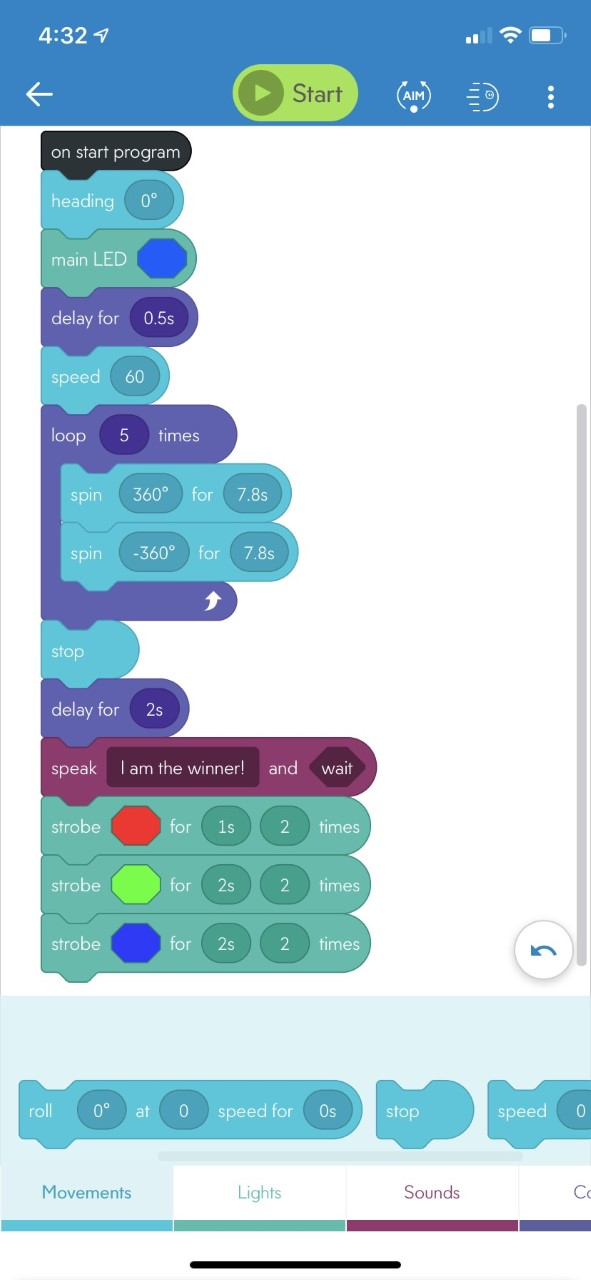
1. Place the robot on the X on the ground
2. Start the code
3. Robot starts spinning at 360 degrees
4. The robot then spins at -360 degrees
5. The Robot spins at 360 degrees
6. The robot then spins at -360 degrees
7. The Robot spins at 360 degrees
8. The robot then spins at -360 degrees
9. The Robot spins at 360 degrees
10. The robot then spins at -360 degrees
11. The Robot spins at 360 degrees
12. The robot then spins at -360 degrees
13. The robot stops on the X it started on
14. The robot says ‘I am the winner’
15. The robot flashes different colored lights

## ***5.2System Flow***

On another Document

## ***5.3Software***

In order to code the robot we used the Sphero Edu program which was a drag and drop block code. This made it very easy to code the robot because all you needed to do was drag and drop blocks.



## ***5.4Hardware***

We used our computers and Phones to run the app that allowed the robot to run the code.

## ***5.5Test Plan***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Testing the first angle of the speed test | 11/1/19 | Robot will attempt first circle of figure 8 test. | Robot performed test a little off target | Joseph, Elijah, Mujeeb | Fail |
| Test adjusted angle of robot and aim | 11/1/19 | Robot will complete first circle of figure 8 test a | Robot completed first circle of the figure 8 test | Joseph, Elijah, Mujeeb | Pass |
| Test to see if robot will complete second circle of figure 8. | 11/1/19 | The robot will complete the second circle of figure 8 test | Robot was off target and needs to be adjusted angle wise. | Joseph, Elijah, Mujeeb | Fail |
| Test to see if robot completes second circle of figure 8 with adjusted aim and degrees | 11/1/19 | Robot will complete second circle of figure 8 test | The robot completed the second circle of the figure 8 test | Joseph, Elijah, Mujeeb | Pass |
| Test to see if robot can complete the loop 5 times. | 11/1/19 | Robot will complete the whole figure 8 course 5 times. | Robot was off target. | Joseph, Elijah, Mujeeb | Fail |
| Test to see if robot can complete the whole course looping 5 times with adjusted speed. | 11/1/19 | Robot will complete figure 8 course in full with the adjusted speed | The robot completed the whole course and landed on x with the adjusted speed. | Joseph, Elijah, Mujeeb | Pass |

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

On another Document

## ***5.7Staffing 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** |
| Joseph DeRosa | Group Member | Code, some questions | Mujeeb, Elijah |
| Mujeeb | Group Member | Gantt Chart, some questions | Joseph, Elijah |
| Elijah Barnes | Group Member | Flow Chart, some questions | Joseph, Mujeeb |