**[**Sprint 2-Speed**] Design Document**

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CS 104-03

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Fall 2019 Semester

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# 1. Executive Summary

## ***Project Overview***

This software project is the first step of our software project. The entire project is to design software for our robot to complete a series of sprints; speed, agility, and speed. The intended audience of this project is the CS 104 class and Professor Eckert, along with anyone else in the Monmouth University Computer Science Department.

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

The purpose of this part of the project is to be able to complete the first sprint which is speed. The intended audience of the first sprint is Professor Eckert, the CS 104 class, and any other person who is a part of the Computer Science and Software Engineering Department.

**In scope**

This document addresses requirements related to phase 2 of the Robot Project:

* modification of javascript code along with sphero plug in code in order for the robot to be able to beat the speed test

**Out of Scope**

The following items in phase 2 and 3 of the Robot Project are out of scope:

* modification of javascript and plug sphero code to meet the expectations of the agility test.
* modification of javascript and plug sphero code to meet the expectations of the endurance test.

(Phase 2 and 3 (agility and endurance) will be considered in the development of the requirements for Phase 2 and 3, and these requirements will be documented separately.)

# Product/Service Description

The general factors that affect the speed code for the Robot Project include the ability to write the code for the sprint, and the ability of the robot to complete the speed track given to the class by the professor. The code for this level of the project should allow the robot to complete the speed test.

## ***Product Context***

This product relates to other products because for the next two sprints, we will be working on doing two more similar things with the robot, such as endurance and agility. This product is independent, because it does not rely on the other tests in order to run and function and complete the course.This product relates to other products because it has to pass a test in order to run.

***User Characteristics***

* Anyone interested in learning or studying programming
* Ability to use Sphero program
* Use of basic computer block programming

## ***Assumptions***

Equipment required for this project is a sphero robot, charging case, charging cable, robot cover, and robot case. Availability of Howard Hall 208 also affect the requirements of the project, since the course is in that room. Little to no user expertise required because it is a guess and check system using the angles of a protractor and course angles.

## ***Constraints***

Describe any items that will constrain the design options, including

* Deadline October 29, 2019
* Access to campus after normal school hours
* Availability of Howard Hall 208
* Group availability

## ***Dependencies***

* This new product will require a download of the program to the robot each time the code is changed in order to run it properly.
* speed program must be completed before the robot can run, and must be downloaded to the robot in order to run it.

# Requirements

## ***Functional Requirements***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Comments** | **Priority** | **Date Rvwd** | **SME Reviewed / Approved** |
| SPEED\_01 | Robot should start and end on the tape “X” that is in the middle of the figure 8. | This is the center of the figure 8. | 3 | 11/6/19 | Holly Bernich  Nolan Beagell  Anthony Berardis |
| SPEED\_02 | The robot should continue from the path and not stray from the course | Speed and accuracy affect this part of the project | 1 | 11/6/19 | Holly Bernich  Nolan Beagell  Anthony Berardis |
| SPEED\_03 | Robot should loop 5 times in the program in order to complete the figure 8 test. | Important procedure for proper run of program | 2 | 11/6/19 | Holly Bernich  Nolan Beagell  Anthony Berardis |
| SPEED\_04 | The robot must speak, “I am the winner!” and flash multicolor lights. |  | 3 | 11/6/19 | Holly Bernich  Nolan Beagell  Anthony Berardis |
| SPEED\_05 | Robot has completed the speed test | Completion of test required for this project. | 1 | 11/6/19 | Holly Bernich  Nolan Beagell  Anthony Berardis |

## 

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## ***Security***

### **Protection**

* Private code on our accounts
* Robots are sign out only
* Robots are locked up
* Silicone cover on the outside of the robot to protect against damages

### **Authorization and Authentication**

Username and passcode to login to Sphero to access code. Access to GitHub to share code with group members.

## ***Portability***

If portability is a requirement, specify attributes of the system that relate to the ease of porting the system to other host machines and/or operating systems. For example,

* Percentage of components with host-dependent code;
* Percentage of code that is host dependent;
* Use of a proven portable language;
* Use of a particular compiler or language subset;
* Use of a particular operating system;
* Use of specific Block code
* Use of specific java code from block code
* Use of a specific Application (Sphero)
* The need for environment-independence - the product must operate the same regardless of operating systems, networks, development or production environments.

# 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 | Holly Bernich, Project Manager  Nolan Beagell, Code and Tester | Confirmed SPEED\_01-SPEED\_05 |
| 11/3/19 | Holly Bernich, Project Manager  Anthony Berardis, Document and Chart Manager | Worked on section 2 of Requirements Doc |
| 11/5/19 | Holly Bernich, Project Manager  Nolan Beagell, Code and Tester | Worked on Section 3 of Requirements Doc |

# System Design

## ***Algorithm***

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

1. Put robot on tape “x”
2. Using sphero app connect to the robot via bluetooth
3. On start program, robot moves 358 degrees for 7.7 seconds.
4. Robot completes first circle of the figure 8.
5. Next, robot moves -358 degrees for 7.7 seconds.
6. Robot ends up on tape ‘x’.
7. Robot continues this exact same code for 4 more times, with the code iterating each time one figure 8 is completed.
8. Loop goes for 5 times.
9. Robot stops on tape ‘x’.
10. Robot speaks, “I am the winner!”
11. Robot flashes multicolor lights for 5 seconds
12. Robot has completed the ‘speed test’

## ***System Flow***



## ***Software***

Sphero block code, javascript, GitHub

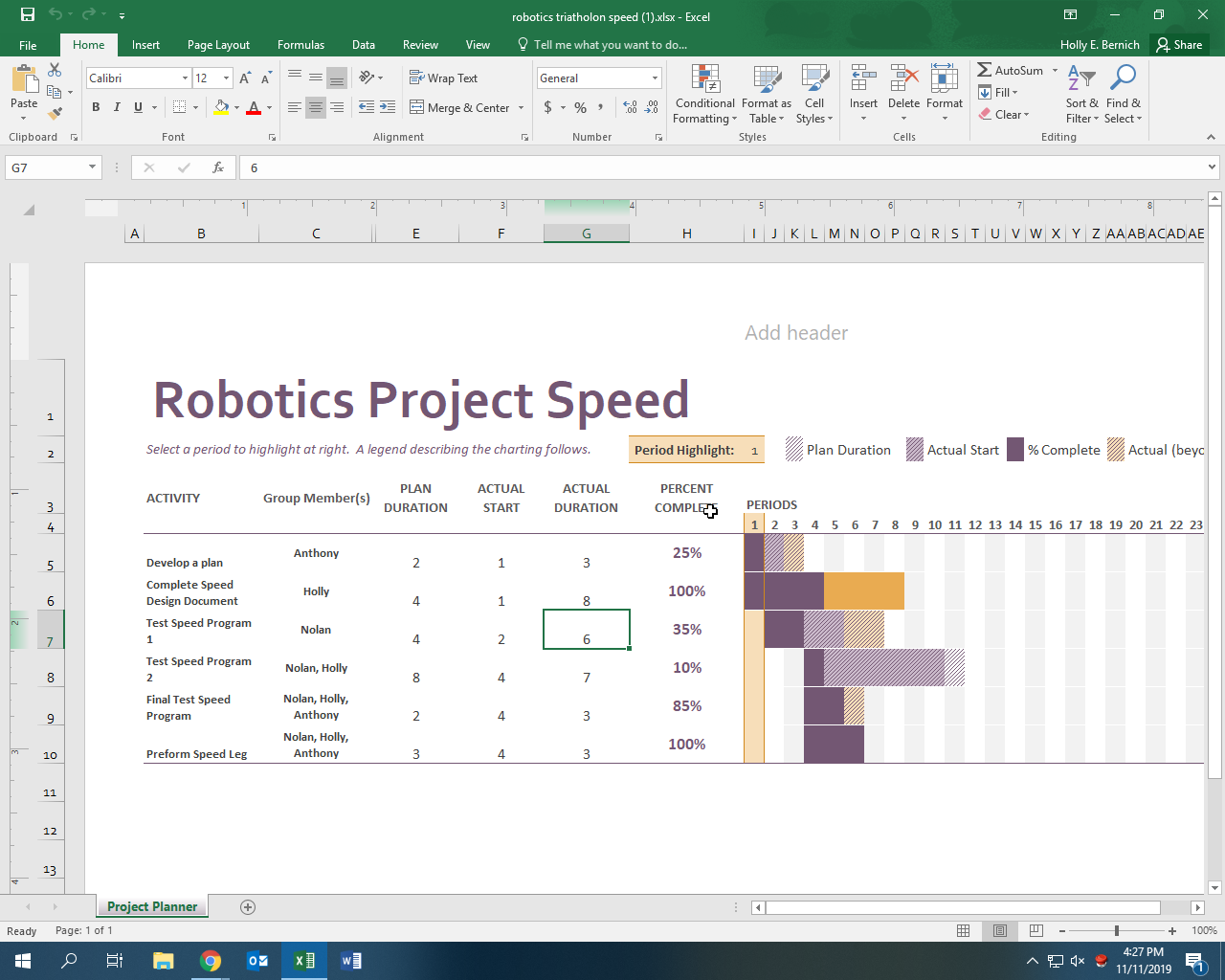
## ***Hardware***

Sphero robot, phone to run code, laptop computer to run code

## ***Test Plan***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Testing angle of speed test | 11/1/19 | Robot will attempt to perform first figure 8 loop. | Robot was slightly off angle | Holly Bernich | Fail |
| Adjusting angle of first loop of speed test from 360-358. | 11/1/19 | Robot will perform first loop with adjusted angle and aim | Robot completed the first line of the speed test. | Nolan Beagell | Pass |
| Turning the code into a loop of 5 times. | 11/1/19 | Robot will perform the speed figure 8 loop 5 times. | Robot was slightly off due to speed. | Holly Bernich | Fail |
| Adjust speed for robot to go slower | 11/1/19 | Robot will use adjusted aim and speed to complete the figure 8 test. | Robot completed the second line of the speed test | Nolan Beagell | Pass |
| Test whole loop and speed and angle | 11/1/19 | Robot has completed full figure 8 test | Robot has completed the test | Holly Bernich  Nolan Beagell | Pass |
| Completion of course | 11/1/19 | Testing angles and speed for whole course | Robot has completed the course | Nolan Beagell | Pass |

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



## ***Staffing Plan***

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Role** | **Responsibility** | **Reports To** |
| Holly Bernich | Project Manager  Code Tester | Code starter/implementer  Document writer  Calculate algorithms  Presenter | Professor Eckert |
| Anthony Berardis | Code Tester  Document Manager | Document leader  Code Tester  Adjust documents and gantt chart | Professor Eckert |
| Nolan Beagell | Code Tester  Document Manager | Figuring out aim  Writing document  Figuring out algorithms | Professor Eckert |