**Sprint 1 - Endurance Design Document**

**November 12, 2020**

**Table of Contents**

[**1.** **EXECUTIVE SUMMARY 3**](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616852)

[1.1 Project Overview 3](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616853)

[1.2 Purpose and Scope of this Specification 3](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616854)

[**2.** **PRODUCT/SERVICE DESCRIPTION 3**](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616855)

[2.1 Product Context 3](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616856)

[2.2 User Characteristics 3](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616857)

[2.3 Assumptions 3](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616858)

[2.4 Constraints 3](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616859)

[2.5 Dependencies 4](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616860)

[**3.** **REQUIREMENTS 4**](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616861)

[3.1 Functional Requirements 5](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616862)

[3.2 Security 5](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616863)

[*3.2.1* *Protection 5*](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616864)

[*3.2.2* *Authorization and Authentication 6*](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616865)

[3.3 Portability 6](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616866)

[**4.** **REQUIREMENTS CONFIRMATION/STAKEHOLDER SIGN-OFF 6**](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616867)

[**5.** **SYSTEM DESIGN 6**](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616868)

[5.1 Algorithm 6](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616869)

[5.2 System Flow 6](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616870)

[5.3 Software 6](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616871)

[5.4 Hardware 6](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616872)

[5.5 Test Plan 7](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616873)

[5.6 Task List/Gantt Chart 7](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616874)

[5.7 Staffing Plan 7](https://s3.amazonaws.com/d2l-docbuilder-prod-us-east-1-converted/6614158d-abf7-4283-9159-c5aabfd3ba72/f6560db49c148417df4b4d5ab7aac8ec.html?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA5AF533RDVVDPUMVQ%2F20201110%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201110T215631Z&X-Amz-Expires=5460&X-Amz-Signature=76902a8e65b834eb70129e6fe71c42cb4c960e6a93693678a5355b07e51d0aea&X-Amz-SignedHeaders=host#__RefHeading___Toc21616875)

# **1. Executive Summary**

## ***1.1 Project Overview***

The Sphero robot should follow the Robotics Triathlon rectangular course located in HH208. The robot begins by stating, “Ready, Set, Go,” and proceeds to follow the path with a green light until it completes the course. Once it reaches its final destination the robot will turn red and state, “I’m done and I need water.”

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

**In scope**

* Audience - New Programmers
* Purpose - The software is designed to run over certain smooth surfaces.

**Out of Scope**

* The robot will not run on sand.
* The robot cannot recover its path if derailed from the course.
* The robot is not programmed to run a course that is not a rectangle.

# **2. Product/Service Description**

## ***2.1 Product Context***

The robot endurance project is designed to go around the room and follow the rectangular course located in HH208. This product is designed to entertain children.

## ***2.2 User Characteristics***

Faculty/Staff

* Experience: Established background experience
* Technical expertise: Established background working with computers and software programs.
* Other: Knowledgeable with different computer programming languages.

College Student

* Experience: Minimal experience - none.
* Technical experience: Has previously taken a computer science course
* Other: Does not have a fundamental understanding of any computer programming language.

***2.3 Assumptions***

* Sphero SPRK robot is required
* Basic understanding of programming in order to use application

## ***2.4 Constraints***

* Forced to work virtually due to COVID-19
* Difficult schedules to line up meeting arrangements

## ***2.5 Dependencies***

* A group member must be on campus to pick up a robot
* Room HH208 is necessary to use in order to test the program
* Sphero Edu application is needed to create code for robot
* WiFi connection for group meetings and project creation

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# **3.Requirements**

## ***3.1Functional Requirements***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Req # | Requirement | Comments | Priority | Date Reviewed | SME Reviewed/ Approval |
| ENDUR\_1 | Access room HH208 | Scheduled date and time to access room. | 1 | 11/10 | 11/10 |
| ENDUR\_2 | Make sure path is clear for Sphero | No objects in the way. Path is clear. | 2 | 11/10 | 11/10 |
| ENDUR\_3 | Start program on yellow square | Sphero placed on yellow square. | 2 | 11/10 | 11/10 |
| ENDUR\_4 | Set light to green | Sphero turns green while remaining in yellow square. | 2 | 11/10 | 11/10 |
| ENDUR\_5 | Speak “ready set go” | Sphero speaked successfully. | 2 | 11/10 | 11/11 |
| ENDUR\_6 | Move straight - following path | Follows straight path - light continues to be green. | 2 | 11/10 | 11/11 |
| ENDUR\_7 | Sphero makes right turn at yellow floor tiles - following path | Turned right - green light still on | 2 | 11/10 | 11/11 |
| ENDUR\_8 | Another right turn at the yellow floor tiles | No issues - Sphero continues to follow path | 2 | 11/10 | 11/11 |
| ENDUR\_9 | Another right turn at the yellow floor tiles. Begins to head towards endpoint. | No issues | 2 | 11/10 | 11/11 |
| ENDUR\_10 | Set light to red when robot is done | Sphero successfully turned red light on | 2 | 11/10 | 11/12 |
| ENDUR\_11 | Speak “I’m done and I need water” when it has reach the starting point again. | Sphero reached endpoint, completing path. | 2 | 11/10 | 11/12 |

***3.2 Security***

### **3.2.1 Protection**

The factor that will protect the system from malicious or accidental access, modification, disclosure, destruction, or misuse encryption is by backing up our program into the cloud.

### **3.2.2 Authorization and Authentication**

An account is created for Sphero so a password is required in order to view the code. A members only GitHub repository is created to secure access to the program.

## ***3.3Portability***

* The code can be accessed through any operating system that has Wifi connection and the robot.
* Block code is a beginner's programming language which makes it easy understandable to anyone.

**4.Requirements Confirmation/Stakeholder sign-off**

Include documentation of the approval or confirmation of the requirements here. For example:

|  |  |  |
| --- | --- | --- |
| **Meeting Date** | **Attendees** | **Accomplished** |
| 11/10/2020 | Carlos, Alicia, Michael | ENDUR\_03 |
| 11/11/2020 | Carlos, Alicia, Michael | ENDUR\_08 |
| 11/12/2020 | Carlos, Alicia, Michael | ENDUR\_12 |

# **5.System Design**

## ***5.1Algorithm***

## ***Place Sphero on 1st Yellow Square***

* Set Light to ‘Green”
* Speak ‘Ready Set Go’
* Move 0 at 50 speed
* Stop, Move 90 at 50 speed
* Stop, Move 180 at 50 speed
* Stop, Move 270 at 50 speed
* Stop, Set light Red
* Speak ‘I’m Done and I need Water

## 

## ***5.2System Flow***

## 

## 

## 

## ***5.3Software***

Sphero robots can be programmed with easy drag-and-drop blocks or text-based code.Intermediate coders can utilize the familiar block-based drag-and-drop interface. Pre-programmed blocks allow for a wide variety of actions and variables.

## ***5.4Hardware***

The only hardware that is absolutely necessary is the robot itself and a device that supports the Sphero Edu app. The testing took place in room HH208, but with creativity the same ‘obstacle’ course can be recreated anywhere.

## 

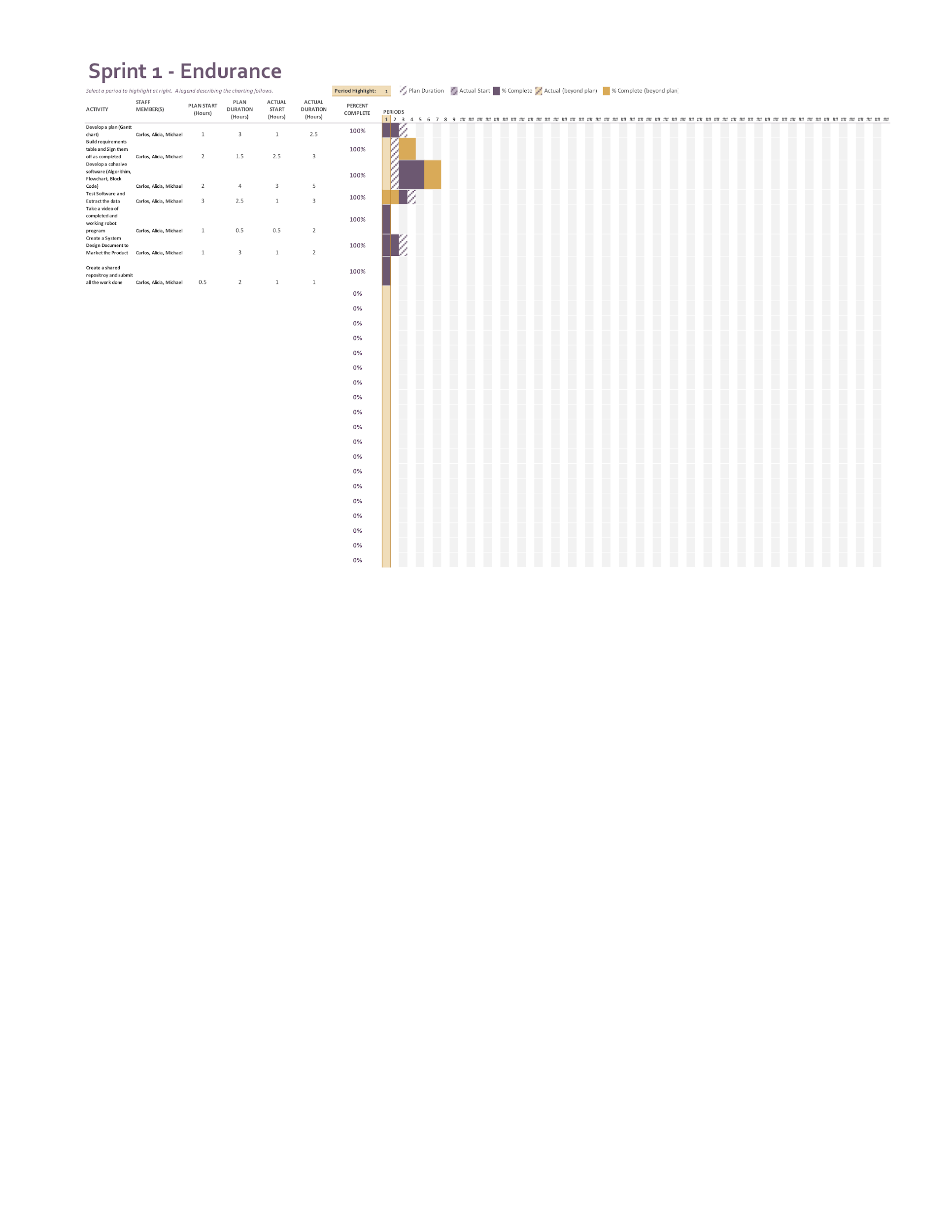
## 

## 

## ***5.5 Test Plan***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Start The Program | 11/11 | The Program will run, but not in the exact direction/speed needed | The Sphero ball did not move in the direction necessary | Michael | Fail |
| Attempt 1 of lining Robot Straight | 11/11 | The program will run direct towards the first turn | The robot did not move straight towards the first turn | Michael | Fail |
| Attempt 2 | 11/11 | The program will run direct towards the first turn | Program ran and the robot went straight towards first turn/ Correct direction | Michael | Pass |
| Program Distance for the Turn | 11/11 | Sphero Ball will turn at correct first point | Sphero Ball turned at correct point | Michael | Pass |
| Program a different degree values for each necessary turn | 11/11 | Sphero Ball will turn at every correct point | Sphero Ball turned at every correct point | Michael | Pass |
| Input Program for the robot to Talk | 11/11 | Robot will Talk indicated phrases at beginning and end | Robot correctly spoke when imputed | Michael | Pass |
| Overall Test of Program | 11/11 | Robot will run as necessary | Robot ran correctly and efficiently | Michael | Pass |

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



## 

## 

## ***5.7 Staffing Plan***

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Role | Responsibility | Reports To |
| Carlos Navarro | Planner | Organizing the role of each group member. Carlos made sure that there was clarity between group members in what each others roles were and executed his role to the best of his ability. | Michael Mendoza |
| Michael Mendoza | Engineer | Michael was in charge of the inner workings of the robot. He led the group in software engineering and developed a sophisticated algorithm that made the robot usable. | Alicia Sanchez |
| Alicia Sanchez | Organizer/ Promoter | Alicia was in charge of putting together the marketing plan for our robot. She was the voice behind our description in the System Design and organized the group members work. Her role was to make our product as desirable and marketable as possible | Carlos Navarro |

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