# Sprint 1 - Endurance Design Document

## October XX, 2019

# Table of Contents

# 1. Executive Summary

## *1.1 Project Overview*

The purpose of this project is to test the Sphero's physical endurance and speed around the obstacle course. It is intended to show the project members' own skills in planning, working together, coding, and the ability to have the robot do as calculated.

## *1.2 Purpose and Scope of this Specification*

**In scope:**

- Endurance: An obstacle course shaped like a square the robot must circumnavigate through

**Out of Scope:**

- Agility: An obstacle course the robot must speed through and make it to the end.
- Accuracy: An obstacle course with 2 circles shaped like a figure-8 the robot is meant to go through

# 2. Product/Service Description

## *2.1 Product Context*

There are multiple people working on the same product, but in different groups. Although we are all aiming for the same output, there are different decisions that everyone will make to solve and finish the Endurance part of the obstacle course. We are documenting the data we observe and creating plans based on our own judgment.

## *2.2 User Characteristics*

- Professor Eckert: He has experience in computer science and teaches at Monmouth University. He went to Kean University and received a bachelor of science from Stockton State College. He's a certified network engineer and has done research on simulations, data analysis, algorithmic development, and quality control.

## *2.3 Assumptions*

- The times each group member can meet up
- The availability of room HH 208
- If the sphere robot is capable of being used
- Group members abilities to code and work as a team

## *2.4 Constraints*

- Access to robot
- Management
- Time
- Resources to Coding

## *2.5 Dependencies*

- Every team member should be assigned accordingly
- We will need multiple testing days in order to make sure the robot works perfectly
- Algorithm and Flowchart are needed beforehand
- Robot must be halfway programmed to at least start Test Case

# 3. Requirements

## *3.1 Functional Requirements*

| Req# | Requirement | Comments | Priority | Date Rvwd | SME Reviewed / Approved |
|---|---|---|---|---|---|
| ENDUR_01 | Turn green and speak | Had to turn up the volume in order to hear it speak. Light was good. | Make sure it speaks | 11/02/22 | 11/03/22 |
| ENDUR_02 | Straight line forward. 6.69s | Took multiple tries. It kept turning left. Eventually it moved straight. | Make sure the length is correct | 11/02/22 | 11/03/22 |
| ENDUR_03 | Stop and turn right. | There was not a long enough pause. Added delay. Did wonderfully. | Have it stop correctly | 11/02/22 | 11/03/22 |
| ENDUR_04 | Straight line forward, half of original length. 3.71s | Length was either too long or too short, so the distance was changed multiple times. Eventually it worked out | Making it to the end | 11/02/22 | 11/03/22 |
| ENDUR_05 | Stop and turn right | With added delay, it worked as well as ENDUR_03 | Stop correctly | 11/02/22 | 11/03/22 |
| ENDUR_06 | Straight line forward again. 6.69s | The way back always seemed better than the beginning. Went well. | Same as ENDUR_02 | 11/03/22 | 11/03/22 |
| ENDUR_O7 | Stop and turn right. | Good turn with added delay. | Stop correctly | 11/03/22 | 11/03/22 |
| ENDUR_08 | Straight line halfway. 3.71s | Make it right to the end on point when everything was set correctly together | Make it to the end | 11/03/22 | 11/03/22 |
| ENDUR_09 | Turn red and speak | Turned red and spoke just as necessary. Did what was intended. | Making sure the robot spoke | 11/03/22 | 11/03/22 |

## *3.2 Security*

### 3.2.1 Protection

- Constant checks from team members
- Saving System
- No leaking or sharing with anyone outside of the group

### 3.2.2 Authorization and Authentication

- Authorization to Camryn, Sahmi, and Nathan, as well as Professor Gil Eckert

### *3.3 Portability*

- Sent to Github into Repository
- Shared along group members
- Use in English
- Use of a clear, clean, and straight environment at the correct length

# 4. Requirements Confirmation/Stakeholder sign-off

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

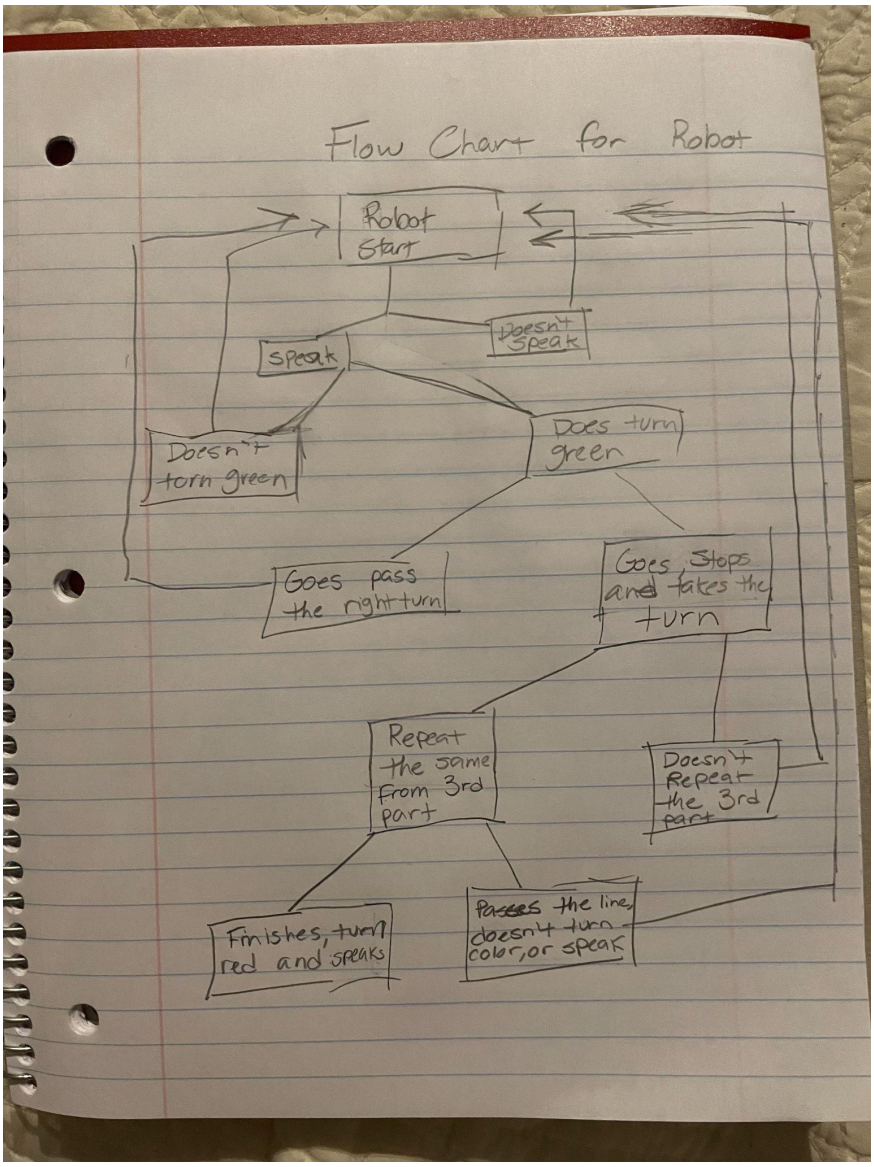
| Meeting Date | Attendees (name and role) | Comments11 |
|---|---|---|
| 11/02/22 | Camryn, Sahmi, Nathan | Finished summary, course completion, and system design |
| 11/03/22 | Camryn, Nathan | Video taped robot following correct path |

# 5. System Design

### *5.1 Algorithm*

- The robot should start with a green light in the yellow square.
- It'll speak "ready set go"
- The robot will walk 22 feet straight.
- Robot will turn right 90 degrees and walk 11 feet and 8 inches
- Robot will turn right again 90 degrees and roll 21 feet and 6 inches
- Robot will turn right one more time 90 degrees and 11 feet and 10 inches.
- At the end the robot will turn red. Return back to the yellow square.
- It'll speak "I'm done and I need water"

## *5.2 System Flow*




## *5.3 Software*

The software we are using is called Sphero Edu. It is a drag and drop code.

## *5.4 Hardware*

The hardware is the Sphero robot that our professor provided for us.

## *5.5 Test Plan*

| Reason for Test Case | Test Date | Expected Output | Observed Output | Staff Name | Pass/Fail |
|---|---|---|---|---|---|
| Checking for correct completion of robots first path. | 11/2/22 | Robot would be on the almost correct path. | Ran into the wall, went too fast. | Nathan and Sahmi | Fail |
| Checking for correct completion of robots first path. | 11/2/22 | Robot will follow the line almost perfectly | Went outside of the blue square | Nathan and Sahmi | Fail |

| Reason for Test Case | Test Date | Expected Output | Observed Output | Staff Name | Pass/Fail |
|---|---|---|---|---|---|
| Checking for correct completion of robots first path. | 11/2/22 | Robot will follow instructions as intended. | Robot died halfway through the test. | Nathan and Sahmi | Fail/ Software Disfunction |
| Checking for correct completion of robots first path. | 11/3/22 | Robot will follow the guidelines to 100% completion. | Robot followed the path accurately. | Nathan | Pass |
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## *5.6 Task List/Gantt Chart*

https://live365monmouth-my.sharepoint.com/:x:/g/personal/s1342098_monmouth_edu/ETGeIvHwjtFKtvZWJNNQwjUBNq-AIfq45W7ReX8a27nawg?e=ChjEw8

## *5.7 Staffing Plan*

| Name | Role | Responsibility | Reports To |
|---|---|---|---|
| Sahmi | Software Design | Creates code, takes measurements, creates algorithms, and has the lead on making sure the robot follows the correct procedures. | Camryn |
| Nathan | System Design | Provide all details concerning the technical design, staffing, coding, and testing the system | Camryn |
| Camryn | Project Manager | Receives and gives instructions, suggests changes that should be made to better the tests. Filled out Gantt chart and project summary. | Professor Eckert |