Sprint 1 - Endurance Design Document

November 1, 2022

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1. Executive Summary

1.1 Project Overview

The robot endurance project is a project for the CS-104 class. In the endurance section of the project, a robot must travel around a rectangular shape without colliding or going off course. The intended audience of this project is CS-104 students, who are learning how to code, and instructors who are overseeing the students.

1.2 Purpose and Scope of this Specification

This document is intended for the endurance section of the robot project

In scope

- Endurance section of the robot project

Out of Scope

- Agility section of the robot project
- Accuracy section of the robot project

2. Product/Service Description

2.1 Product Context

The endurance section of the robot project slightly differs from the other two sections. The main difference between each of the sections is the courses the robots are required to follow. Each section has a different aim, which the unique course addresses.

2.2 User Characteristics

People who will be viewing the completion of this project or completing a similar project of their own are as follows:

- Students
- Instructors
- People interested in learning how to code
- People interested in Sphero robots

2.3 Assumptions

- We assume we will have a device that runs iOS
- We assume the room will be available in order to test the program

2.4 Constraints

Describe any items that will constrain the design options, including

- Block code is limited
- Sphero is very simple
    - Robot cannot do much

2.5 Dependencies

- This project requires a Sphero robot
- The project requires users to download the Sphero interface
- Howard Hall room 208 must be available in order to test the program
- The user must be running iOS to view the sensor data

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ENDUR_01	Robot must follow the track outlined in blue tape		1	10/31	Approved
ENDUR_02	The robot must start with a green light		1	10/31	Approved
ENDUR_03	At the start, robot must say “ready, set, go”		1	10/31	Approved
ENDUR_04	Robot must return to its starting location.		1	10/31	Approved
ENDUR_05	Robot must finish with a red light		1	10/31	Approved
ENDUR_06	At end, robot must say “I’m done and I need water”		1	10/31	Approved
ENDUR_07	Robot must not collide with anything		1	10/31	Approved

3.2 Security

3.2.1 Protection

Specify the factors that will protect the system from malicious or accidental access, modification, disclosure, destruction, or misuse. For example:

- Must login to the account in order to access the code

3.2.2 Authorization and Authentication

Must login in order to access the account which the code is on.

3.3 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,

- Can access code on any device, given that you login
- Can only see certain aspects of program based on operating systems
    - Only iOS can view sensor data
- The robot will behave the same no matter which device it is controlled from

4. Requirements Confirmation/Stakeholder sign-off

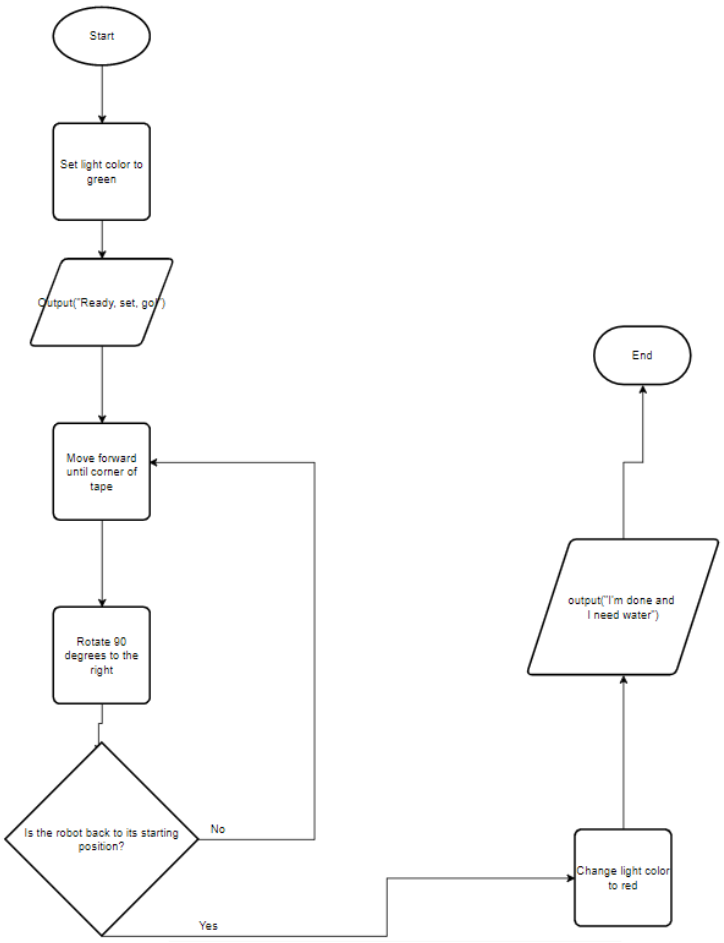
Meeting Date	Attendees	Comments
10/31/22	Emma, Kevin, Vincent	confirmed all requirements

5. System Design

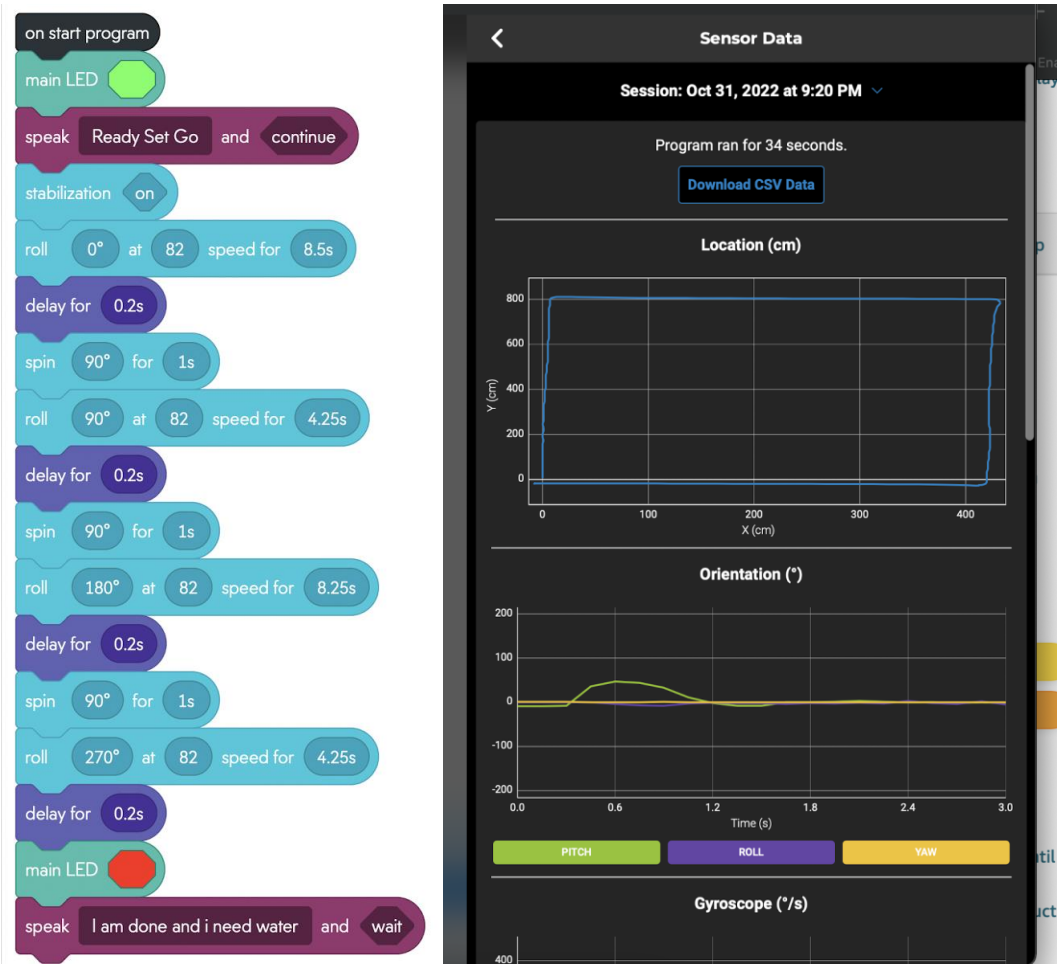
5.1 Algorithm

1. Make robot light green
2. Speak “ready, set, go!”
3. Move forward until the corner of the tape
4. Rotate towards to the right
5. If the robot has not reached its starting position, repeat steps 3-4
6. Change light color to red
7. Speak “I’m done and I need water”

5.2 System Flow



5.3 Block Code and Sensor Data



5.4 Software

The robot was coded using block code.

5.5 Hardware

The robot was coded on the Sphero program

5.6 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Testing to see if the robot travels the first side of the rectangle.	10/31	The robot travels the first side and stops on the corner.	The robot continued way past the corner.	Kevin	Fail
Testing to see if the changes made to the code fix the issue	10/31	The robot travels the first side and stops on the corner.	The robot still went too far past the corner	Kevin	Fail

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Testing to see if the changes made to the code fix the issue	10/31	The robot travels the first side and stops on the corner.	The robot was closer to the corner, but still went a little bit too far.	Kevin	Fail
Testing to see if the changes made to the code fix the issue	10/31	The robot travels the first side and stops on the corner.	The robot travels the first side and stops on the corner.	Kevin	Pass
Testing to see if the robot successfully travels the second side of the rectangle	10/31	Go the entire length, then turn and go down the entire width.	The robot traveled the first side perfectly, then went a weird angle down the second side.	Kevin	Fail
Testing to see if the changes made to the angle work.	10/31	Go the length, turn right down the width and stop at the end.	The robot went down the first side, stopped at the corner, went down the second side, then stopped at the corner.	Kevin	Pass
Testing to see if the robot successfully travels the first three sides of the triangle.	10/31	The robot will travel the first three sides successfully.	The robot traveled the first two sides successfully, then went too far on the third side.	Kevin	Fail
Testing to see if the changes made to the time fix the issue.	10/31	The robot will travel the first three sides successfully.	The robot traveled the first two sides successfully, then went too short on the third side.	Kevin	Fail
Testing to see if the changes made to the time fix the issue.	10/31	The robot will travel the first three sides successfully.	The robot traveled the first three sides successfully.	Kevin	Pass
Testing to see if the robot successfully travels the entirety of the rectangle.	10/31	The robot will travel the whole rectangle successfully	The robot traveled the first three sides of the triangle successfully, but then went a weird angle and for way too long on the final side.	Kevin	Fail
Testing to see if the changes made to the code fix the issues.	10/31	The robot will travel the whole rectangle successfully	The robot traveled the first three sides properly. On the fourth side, the angle was better, but it still went too far.	Kevin	Fail
Testing to see if the changes made to the code fix the issues.	10/31	The robot will travel the whole rectangle successfully	The robot traveled the first three sides properly. One the fourth side it went a little too short.	Kevin	Fail

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Testing to see if the changes made to the code fix the issues.	10/31	The robot will travel the whole rectangle successfully	The robot traveled the whole rectangle successfully	Kevin	Pass
Testing to see if the lights and sounds are correct	10/31	The robot will start green and say “ready, set, go.” It will then go around the whole rectangle and turn red and say “I’m done, and I need water” at the end.	The robot started as green and said “ready, set, go.” It then went around the whole rectangle and turned red and said “I’m done, and I need water” at the end.	Kevin	Pass

5.7 Task List/Gantt Chart

Select a period to highlight at right. A legend describing the charting follows.

Period Highlight: 1

Plan Duration

Actual Start

ACTIVITY	STAFF MEMBER(S)	PLAN START (Hours)	PLAN DURATION (Hours)	ACTUAL START (Hours)	ACTUAL DURATION (Hours)	PERCENT COMPLETE
Develop a plan (Gantt chart)	All team members	1	1	1	1	100%
Build requirements table	emma g, kevin c, vincent m	2	1	2	1	100%
Requirements Signoff Table	All team members	3	1	9	1	100%
Staffing Plan	All team members, uploaded by emma	4	1	2	1	100%
Algorithm	Vincent M	5	2	3	1	100%
Flowchart	Vincent M	7	2	4	1	100%
Blockcode	All team members, uploaded by emma	9	2	5	2	100%

PERIODS 1 2 3 4 5 6 7 8 9 10 11 12 13

Sensor Data Diagram	**All team members**	11	1	5	2	**100%**
Test Table	**Kevin Collura**	12	1	5	2	**100%**
System Design Document	**All team members, Uploaded by Kevin**	13	2	7	2	**100%**
Robot Video	**emma g**	15	1	5	2	**100%**
GitHub Repository	**Emma G**	16	1	10	1	**100%**

5.8 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
Emma Green	Videographer, repository creator!	Make robot video, upload block code, create staff plan	Vincent
Kevin Collura	Documenter	Document items in the system design document, fill out test table during robot testing	Vincent
Vincent Macri	Manager	Manage the project, make sure everything gets done, commit to GitHub repository. Also working on flowchart.	Myself