Sprint 1 - Endurance Design Document

November 7th, 2023

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1. Executive Summary

1.1 Project Overview

The intended audience of our project is Professor Eckert and our class.

This project serves to demonstrate our ability to function as a team when faced with the challenge of making a robot move around the room. The multitude of facets and moving pieces require us to organize our time and workload. We intend to show this project to the professor instructing our class.

1.2 Purpose and Scope of this Specification

The purpose of this specification is to lay the robot at starting point A to travel to back to point A in a rectangular style. This is phase one, endurance out of three sprints, accuracy and agility. The intended audience is my professor and CS 104-02 class.

Inside scope:

- For the next phase we will have to adjust our program to be able to accurately run the figure eight course 5 times and will staying the path efficiently and accurately.

Outside scope:

- Outside of the scope of these specifications include a sprint phase where the robot will have to run through an obstacle course and avoid the objects and then knock over as many pins as possible.

2. Product/Service Description

One of the general factors influencing the product and its requirements is the need to coordinate around our group members' schedules, while other key factors encompass the program's development based on the algorithm, as well as the hardware and software utilized during the project's endurance phase.

2.1 Product Context

Our product is entirely self-contained in the coding application it was made in. It is run inside of and fills out its sensor data diagram inside the Sphero EDU app.

2.2 User Characteristics

Our product can be used by anyone. It does not require any special knowledge aside from having to navigate the Sphero EDU application and where the robot needs to be placed.

2.3 Assumptions

The code being run on a computer with MacOS so that the sensor data diagram can be exported as an easily readable image instead of raw data.

The robot starting in the top left corner of the track.

The track being clear of debris and obstacles.

2.4 Constraints

Constraints of our design options is resetting the robot's position and angle so that it perfectly circumnavigates the track.

2.5 Dependencies

- A clear room to test our robot.
- Having the robot itself.

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
Endurance_1	Robot starts with green light	Robot light needs to be changed to green.	3	10/20/23	10/29/23
Endurance_2	Before starting robot says “ready, set, go”.	Need to add delay to give the robot time to speak.	3	10/20/23	10/29/23
Endurance_3	Robot goes from the start to the other side of the room. (Point A to point B)	Robot must travel efficiently from point A to point B.	2	10/20/23	10/29/23
Endurance_4	Robot turns right and goes to the next side. (Point B to point C)	Robot must travel efficiently from point B to point C.	2	10/20/23	10/29/23
Endurance_5	The robot turns right and goes from that side to the other side of the room. (Point C to point D)	Robot must travel efficiently from point C to point D	2	10/20/23	10/29/23
Endurance_6	The robot turns right and goes to the end point/starting point. (Point D to Point A)	Robot must travel efficiently from point D to point A.	2	10/20/23	10/29/23
Endurance_7	Robot stops with a red light and says, “I’m done and I need water”.	Robot need to be able to do all of these functions.	3	10/20/23	10/29/23
Endurance_8	Check that the robot can travel through point A back to point A efficiently.	The robot is shown to travel efficiently in the video.	1	10/20/23	10/29/23

3.2 Security

3.2.1 Protection

- Password protected laptop.
- Making backups of the code.

3.2.2 Authorization and Authentication

There will be none.

3.3 Portability

- 100% of the project’s components and code are host dependent.
- The product is environment independent.

4. Requirements Confirmation/Stakeholder sign-off

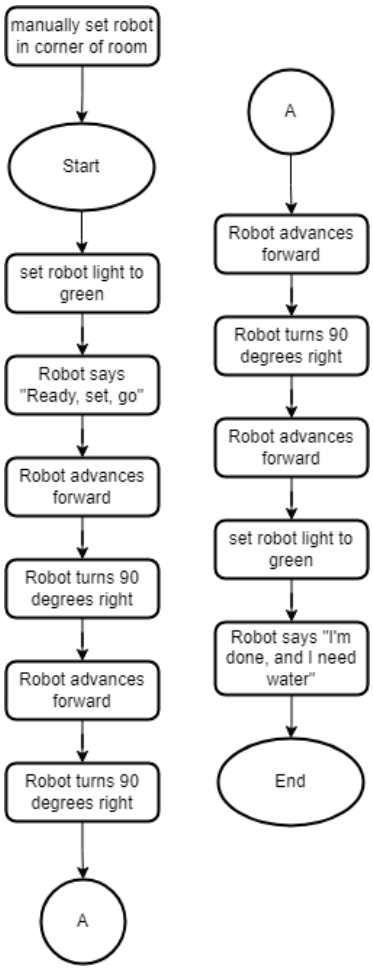
11/02/23	Luca Bertinelli, Delvis Rodriguez, Xochitl Martinez	confirmed all except ENDUR_XX
11/03/2023	Delvis Rodriguez, Xochitl Martinez	confirmed…….

5. System Design

5.1 Algorithm

- Start robot in corner of room.
- Set robot light to green.
- Robot says “ready, set, go.”
- Robot advances and stops.
- Robot turns 90 degrees.
- Robot advances and stops.
- Robot turns 90 degrees.
- Robot advances and stops.
- Robot turns 90 degrees.
- Robot Advances and stops.
- Set robot light to red.
- Robot says, “I’m done, and I need water.”

5.2 System Flow



5.3 Software

We use the Sphero EDU platform and block code to make our robot move throughout the course.

5.4 Hardware

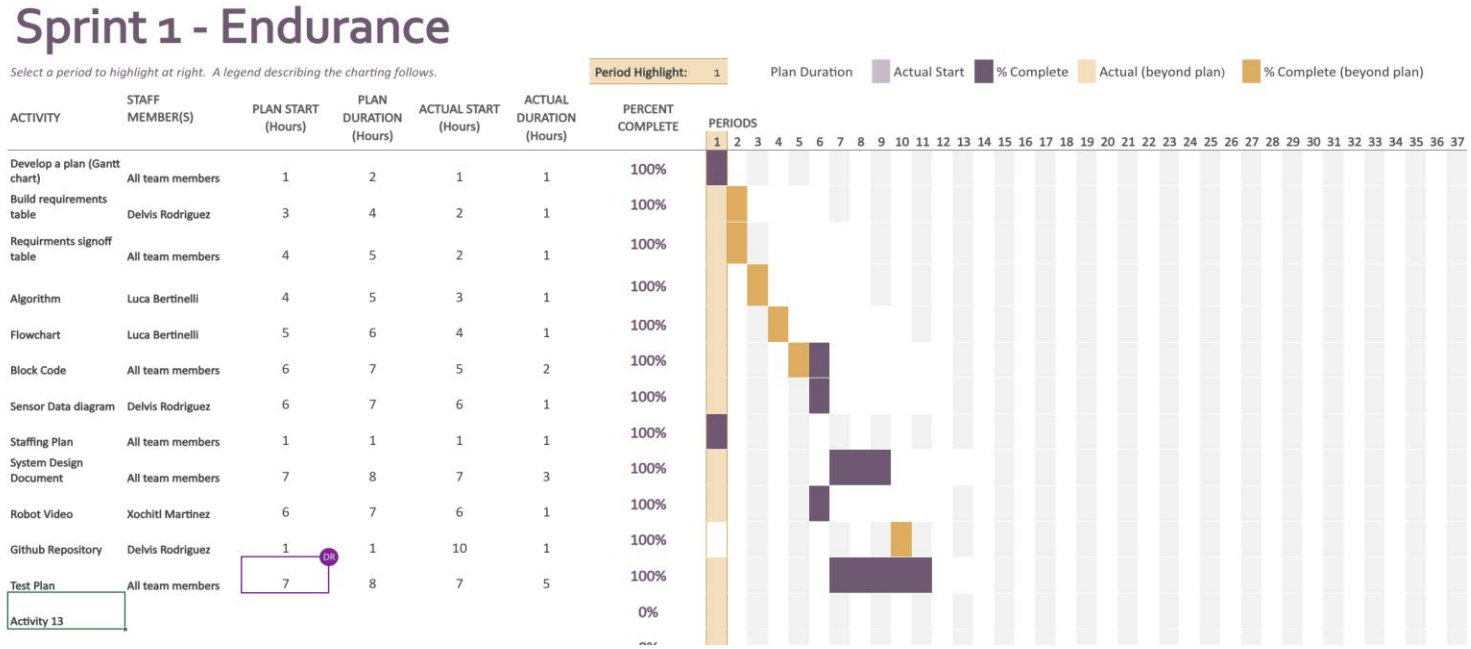
The hardware platforms used for this project were the Sphero SPRK 2.0 robot and our laptops.

5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
if robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Went forward too soon stopped after first advancement	All	FAIL
if robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Turned too soon	All	FAIL
if robot could travel from point A to point B	11/2/23	T For the robot to successfully travel from point A to point B	Went too far and turned too soon	All	FAIL
if robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Turned and stopped too soon	All	FAIL
if robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Curved slighting to the left and passed point B	All	FAIL
if robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Curved slightly to the right and passed point B	All	FAIL
If robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Curved slightly to the right	All	FAIL
If robot could travel from point A to point B	11/2/23	For the robot to successfully travel from point A to point B	Traveled from point A to point B	All	PASS
If robot could travel from point A to point B to point C	11/2/23	For the robot to successfully travel from point A to point B to point C	Traveled from point A to point B, turned and passed point C	All	FAIL
If robot could travel from point A to point B to point C	11/2/23	For the robot to successfully travel from point A to point B to point C	Turned sooner from point B to point C and passed point C by a bit	All	FAIL
If robot could travel through all points	11/2/23	For the robot to successfully travel through all points	Turned sooner from point B to point C and curved slightly to the left and turned sooner from point D back to point A and didn't reach point A	All	FAIL
If robot could travel through all points	11/2/23	For the robot to successfully travel through all points	Wobbled from point B to point C	All	FAIL
If robot could travel through all points	11/2/23	For the robot to successfully travel through all points	Traveled through all points!	All	PASS

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
For Accuracy	11/3/23	For the robot to successfully stay on the tape	Slightly curved after every turn	Delvis & Xochitl	FAIL
For accuracy	11/3/23	For the robot to successfully stay on the tape	Went off the tape and turned to soon on point B	Delvis & Xochitl	FAIL
For accuracy	11/3/23	For the robot to successfully stay on the tape	Stayed on track with the tape!	Delvis & Xochitl	PASS

5.6 Task List/Gantt Chart



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	2	1	1	100%
Build requirements table	Delvis Rodriguez	3	4	2	1	100%
Requirments signoff table	All team members	4	5	2	1	100%
Algorithm	Luca Bertinelli	4	5	3	1	100%
Flowchart	Luca Bertinelli	5	6	4	1	100%
Block Code	All team members	6	7	5	2	100%
Sensor Data diagram	Delvis Rodriguez	6	7	6	1	100%
Staffing Plan	All team members	1	1	1	1	100%
System Design Document	All team members	7	8	7	3	100%
Robot Video	Xochitl Martinez	6	7	6	1	100%
Github Repository	Delvis Rodriguez	1	1	10	1	100%
Test Plan	All team members	7	8	7	5	0%
Activity 13						

5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Luca Bertinelli	Manager	All	All
Delvis Rodriguez	Manager	All	All
Xochitl Martinez	Manager	All	All