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Professor Gil Eckert
CS 104

Sprint 1 - Endurance Design Document

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1. Executive Summary

1.1 Project Overview

The Robot must successfully travel around the periphery of HH208 (circumnavigate). Robot will start from the yellow square with blue tape. The Robot starts with a green light and will speak ‘ready set go’ and stop with a red light and say ‘I’m done and I need water’. The Robot travels to each of the yellow floor tiles and turns right at the center of each tile. The Robot returns to it’s starting location at the end of the program. The Robot does not collide with any objects as it goes around the room.

1.2 Purpose and Scope of this Specification

In scope

- Testing for Endurance course

Out of Scope

- Testing for agility course
  Testing of accuracy course

2. Product/Service Description

2.1 Product Context

This is the Endurance sprint which is the first leg of 3 total sprints including an Agility and Accuracy course to follow.

2.2 User Characteristics

Create general customer profiles for each type of user who will be using the product. Profiles should include:

- Students will use this product to fulfil course needs.

. The professor will use the product to check functionality.

. This product can be used for mapping out a perimeter of a rectangular room, field, or area, etc.

2.3 Assumptions

Robot Srk+ should be fully charged and available for testing.

Room HH208 should be open and available for testing.

Group members should be available and ready for testing.

Course should be placed intact.

2.4 Constraints

Describe any items that will constrain the design options, including

- Robot cannot deviate off course
- Room HH208 is not open all times
- Robot was not charged for testing
- Meeting with groups i not always

2.5 Dependencies

List dependencies that affect the requirements.

- Depending on room availability may not be able to test the course.
- Other groups in the room may limit time for testing.
- Depending on the furniture in the room, the course may be obstructed.
- Old floor tape may disrupt how the robot runs the course.

3. Requirements

3.1 Functional Requirements

Req#	**Requirement**	**Comments**	**Priority**	**Date Rvwd**	**SME Reviewed / Approved**
ENDUR_01	Robot must start by saying “Ready set Go” and flash green light.		1	11/3/21	Yes-Omar
ENDUR_02	Robot must move in a straight line and stop on the first blue corner.		1	11/3/21	Yes-Omar
ENDUR_03	Robot must stop and turn 90 degrees and continue to move in a		1	11/3/21	Yes- Omar

	straight line and stop on the 2nd blue arrow.				
ENDUR_04	Robot must stop and turn 180 degrees and continue to move in a straight line and stop on the 3rd blue arrow.		1	11/3/21	Yes-Omar
ENDUR_05	Robot must stop and turn 270 degrees and continue to move in a straight line and stop on the 4th blue arrow.		1	11/3/21	Yes-Omar Robt
ENDUR_06	Robot must flash red light and speak “I'm done and I need water”		1	11/3/21	Yes-Omar
ENDUR_06	Blue light has to face opposite of where it is intended to aim at the start.	Blue light lines up with the end of the yellow tile at the start	2	11/3/21	Yes- Omar
ENDUR_07	Aim robot in correct position	Code doesn’t have to change as long as the aim is right.	2	11/3/21	Yes- Omar
ENDUR_08	The robot has to reach a certain speed to attain a consistent direction	The slower it goes, the more of a chance the robot will drift from where we want to end up	2	11/3/21	Yes-Omar
ENDUR_09	Robot has to be placed in the middle of the corner of the blue tape	Tape might affect the direction of the robot slightly. Resulting in	2	11/3/21	Yes-Omar

		the whole course being affected			
ENDUR _10	Robot must be fully charged	While performing the course, the robot kept dying mid test run	2	11/3/21	Yes- Omar
ENDUR _11	Robot must end by saying, “i’m done and i need water”		2	11/3/21	Yes-Omar

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:

- Block code is protected by password for Sphero Edu log in.
- App is protected by personnel login information.

3.2.2 Authorization and Authentication

Only personnel working on the Endurance course have access to the code.

Program could only run if logged into a personal device and Sphero edu app.

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,

- Robot can only run on course in room HH208
- Robot cannot function if not connected to a nearby device.

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	**Attendees (name and role)**	**Comments**

10/25/21	Amani (organizer) , Omar (organizer), Malea (organizer)	Worked on Gantt chart, algorithm, SDD
10/27/21	Amani(organizer) , Omar (organizer/programmer) , Malea(organizer)	Worked on algorithm, Gantt chart, flow chart, SDD, code, course
11/3/21	Amani(organizer) , Omar (organizer/programmer) , Malea(organizer)	Worked on Gantt chart, flow chart, SDD, Code, course.
11/4/21	Amani(organizer) , Omar (organizer) , Malea(organizer)	Worked on algorithm, Gantt chart, flow chart, SDD, Code, course.

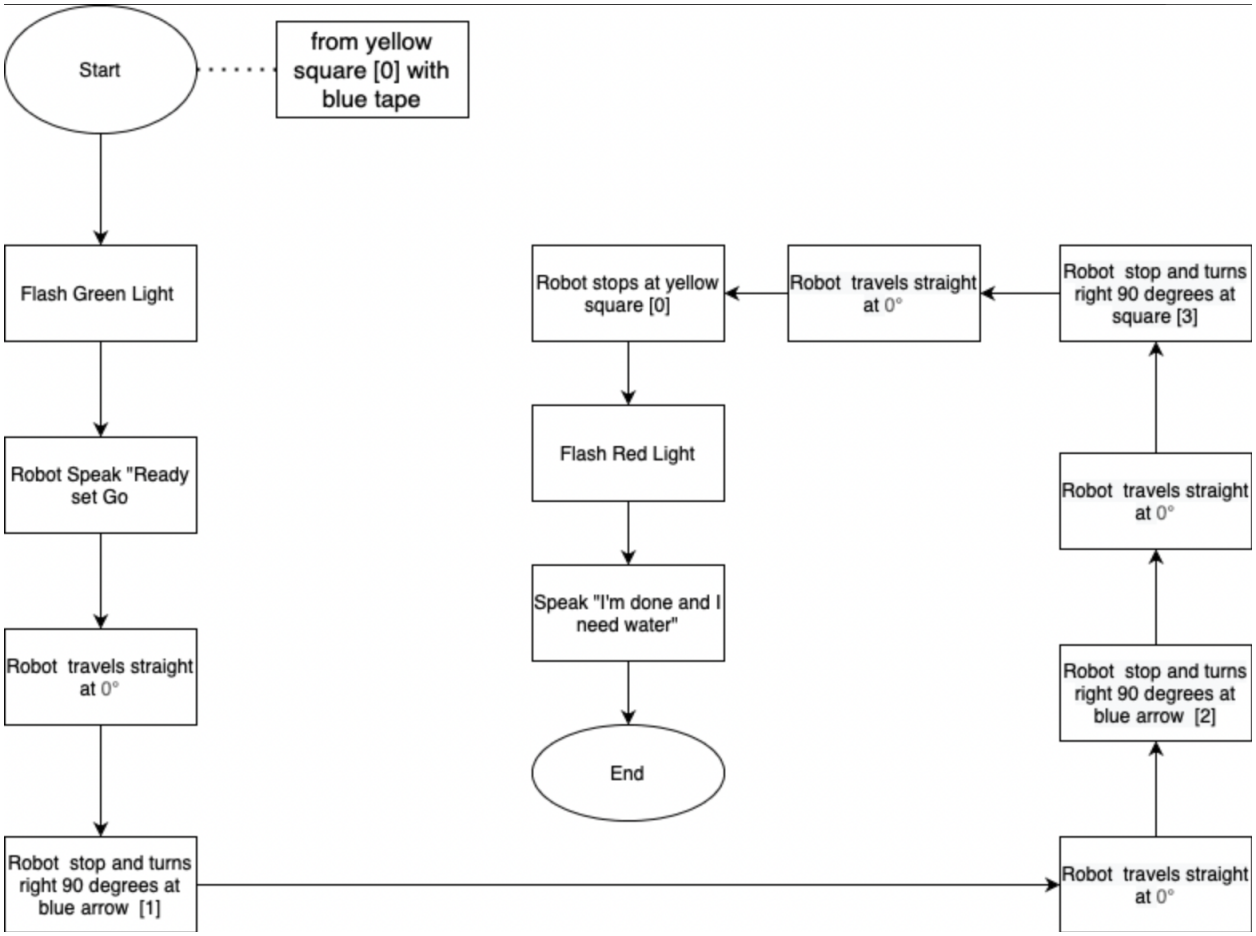
5. System Design

5.1 Algorithm ()

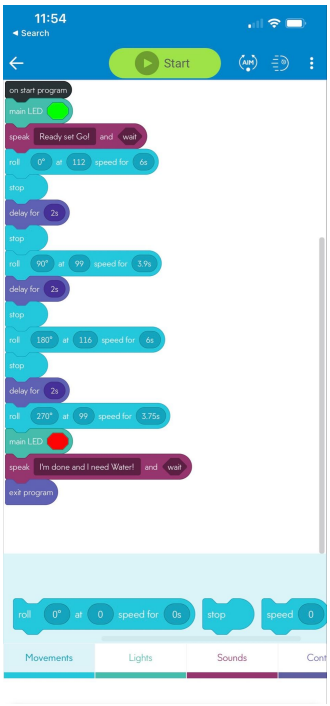
1.) Start (# from yellow square [0]with blue tape)
- ➔ Green Light
- ➔ Speak “ready set go”

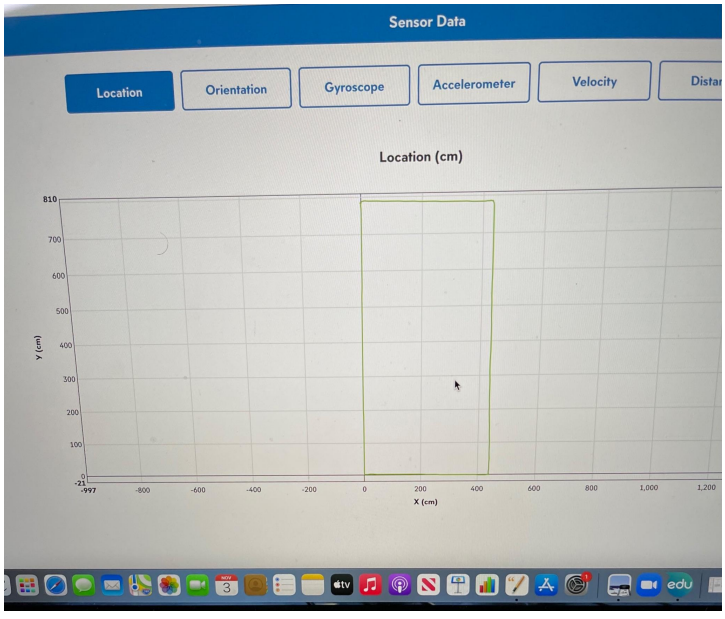
2.) Robot travels Straight at 0°
3.) Robot stop and turns right 90 degrees at blue arrow [1]
4.) Robot travels straight 0°
5.) Robot stops and turns right 180 degrees at blue arrow [2]
6.) Robot travels straight 0°
7.) Robot stops and turns right 270 degrees at blue arrow [3]
8.)Robot travels straight 0°
9.) Robot stops at yellow square [0]
- ➔ Red light
- ➔ Speaks “i’m done and i need water”

5.2 System Flow


Start
from yellow square [0] with blue tape
Flash Green Light
Robot Speak "Ready set Go
Robot travels straight at 0°
Robot stop and turns right 90 degrees at blue arrow [1]
Robot travels straight at 0°
Robot stop and turns right 90 degrees at blue arrow [2]
Robot travels straight at 0°
Robot stop and turns right 90 degrees at square [3]
Robot travels straight at 0°
Robot stops at yellow square [0]
Flash Red Light
Speak "I'm done and I need water"
End

5.3 Software


11:54
Search
Start
on start program
main LED
speak Ready set Go! and wait
roll 0° at 112 speed for 6s
stop
delay for 2s
stop
roll 90° at 99 speed for 3.9s
delay for 2s
stop
roll 180° at 116 speed for 6s
stop
delay for 2s
roll 270° at 99 speed for 3.75s
main LED
speak I'm done and I need Water! and wait
exit program
roll 0° at 0 speed for 0s
stop
speed 0
Movements
Lights
Sounds


Sensor Data
Location
Orientation
Gyroscope
Accelerometer
Velocity
Location (cm)
Y (cm)
X (cm)

Sphero Edu Block Code Sphero Edu Sensor Data

5.4 Hardware

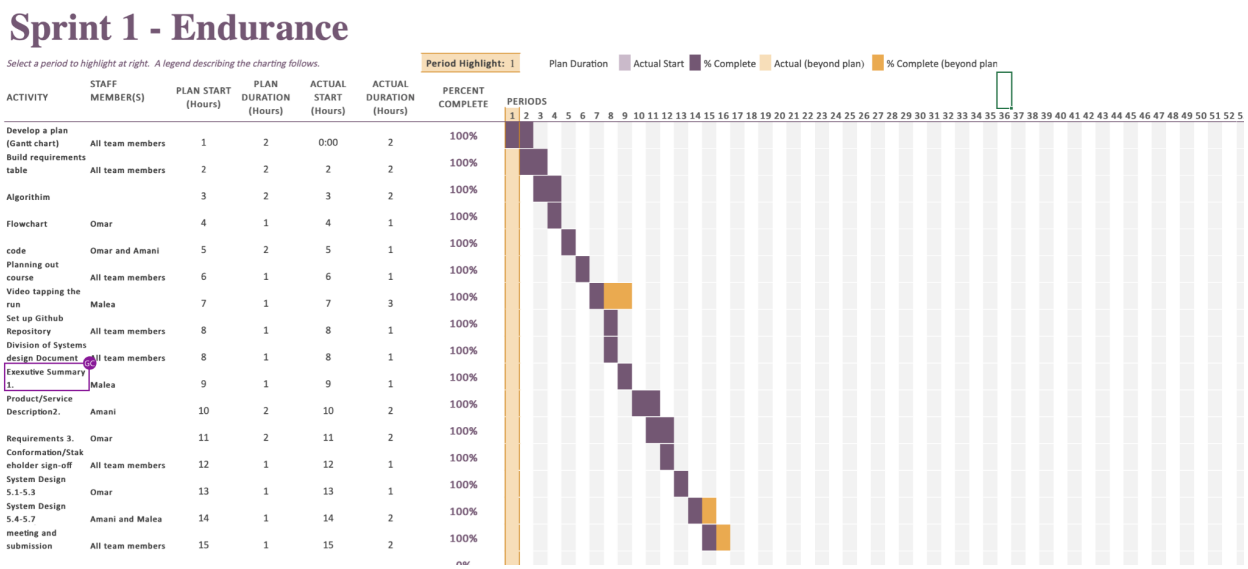
Sphero Sprk+ robot

5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Confirm functionality of code.	11/3	Robot should in a straight line and stop on the first corner	Robot drifted to the left upon starting.	Amani	Fail
Confirm functionality of code.	11/3	Robot should in a straight line and stop on the first corner	Robot drifted to the right off of the line.	Amani	Fail
Confirm functionality of code.	11/3	Robot should in a straight line and stop on the first corner	Robot moved in a straight line, following the course, and stopped on the first corner.	Amani	Pass
Confirm functionality of code.	11/3	Robot should follow the outlined course.	Robot went too far past the second arrow resulting in collision with furniture.	Malea	Fail
Confirm functionality of code.	11/3	Robot should follow the outlined course.	Robot stopped too short on the 3rd corner resulting in a	Malea	Fail

			stoppage in the wrong area.		
Confirm functionality of code.	11/3	Robot should follow the outlined course.	Robot deviated off course after the first straighway and hit the wall to the left of the course	Malea	Fail
Confirm functionality of code.	11/3	Robot followed the outlined course	When it hit someone's shoe it went off course	Malea	Fail
Confirm functionality of code.	11/4	Robot followed the outlined course	Robot started and drifted to the left hitting the wall	Omar	Fail
Confirm functionality of code.	11/4	Robot followed the outlined course	Robot go to 3rd corner but was to far off of the outlined course	Omar	Fail
Confirm functionality of code.	11/4	Robot followed the outlined course	Robot followed the outlined course. Went to every corner and made the turns where it should and ended up where it started	Omar	Pass
Confirm functionality of code.	11/4	Robot followed the outlined course	Robot followed the outlined course. Went to every corner and made the turns where it should and ended up where it started	Omar	Pass

5.6 *Task List/Gantt Chart*



5.7 *Staffing Plan*

Name	Role	Responsibility	Reports To
Amani Minaya	Organizer,	Organize algorithm, Organize Ghant chart, Organize powerpoint, Organize this document.	Omar Ahmed
Omar Ahmed	Programmer, Organizer,	Organize algorithm, Possessed Robot, Flowchart, Program code, Organize this document	
Malea Horn Attanasio	Organizer, Videographer,	Organize algorithm, Organize Ghant chart, Organize powerpoint, Organize this document.	Omar Ahmed