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Professor Gil Eckert
CS 104

Sprint 2 - Accuracy Design Document

November 18, 2021

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1. Executive Summary

1.1 Project Overview

The Robot must successfully run the figure eight course 5 times. The robot must stay within the path provided. The robot will start and finish in the square provided. Upon finishing, the robot will say 'I am the winner' and flash multicolored lights for 5 seconds. The robot must stop where it started, the robot must not deviate off the course, and must not collide with any obstacles.

1.2 Purpose and Scope of this Specification

In scope

- Testing for Agility course

Out of Scope

- Testing for Endurance course
  Testing of accuracy course

2. Product/Service Description

2.1 Product Context

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

2.2 User Characteristics

- Students will use this product to fulfil course needs.

. The professor will use the product to check functionality.

. Could be used to map out a course for figure ice skaters.

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

- 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

- 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**
AGIL_01	Robot must start on the allotted square.		1	11/15/21	Yes-Omar
AGIL_02	Robot must roll 360 degrees then roll -360 completing one figure eight.		1	11/15/21	Yes-Omar
AGIL_03	Robot must repeat AGIL_02 four more times.		1	11/15/21	Yes- Omar
AGIL_04	Robot must say “I am the winner” and flash multicolored lights for 5 seconds.		1	11/15/21	Yes-Omar

AGIL_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 starting square	2	11/15/21	Yes- Omar
AGIL_07	Aim robot in correct position	Code doesn't have to change as long as the aim is right.	2	11/15/21	Yes- Omar
AGIL_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	11/15/21	Yes-Omar
AGIL_09	Robot has to be placed in the middle of the starting square of the blue tape	Tape might affect the direction of the robot slightly. Resulting in the whole course being affected	2	11/15/21	Yes-Omar

3.2 Security

3.2.1 Protection

- 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

- 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

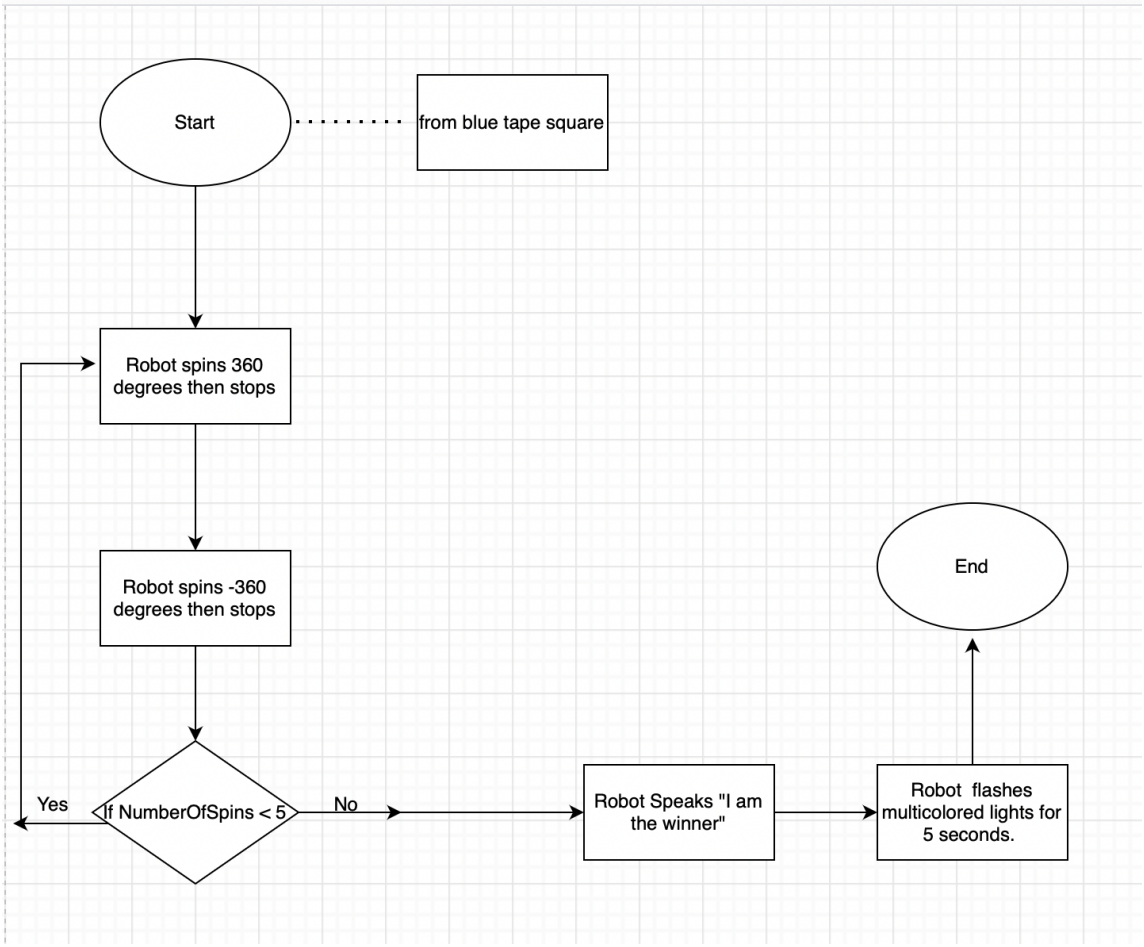
Meeting Date	**Attendees (name and role)**	**Comments**
11/10/21	Amani (organizer) , Omar (organizer), Malea (organizer)	Worked on Gantt chart, algorithm, SDD
11/12/21	Amani(organizer/programmer) , Omar (organizer) , Malea(organizer)	Worked on algorithm, Gantt chart, flow chart, SDD, code, course
11/15/21	Amani(organizer/programmer) , Omar (organizer) , Malea(organizer)	Worked on Gantt chart, flow chart, SDD, Code, course.
11/17/21	Amani(organizer) , Omar (organizer) , Malea(organizer)	Worked on algorithm, Gantt chart, flow chart, SDD, Code, course.

5. System Design

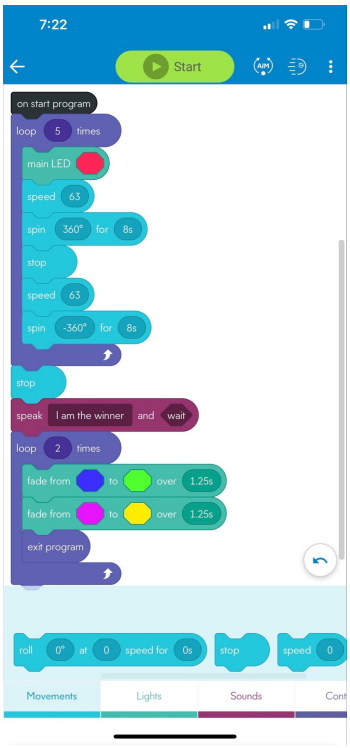
5.1 Algorithm ()

1. Start(#from blue tape square)
2. If NumberOfSpins < 5
    a. Robot spins 360 degrees
        i. Stop
    b. Robot spins -360 degrees
        i. Stop
3. Robot speaks “I am the winner”
4. Robot flashes multicolored lights for 5 seconds

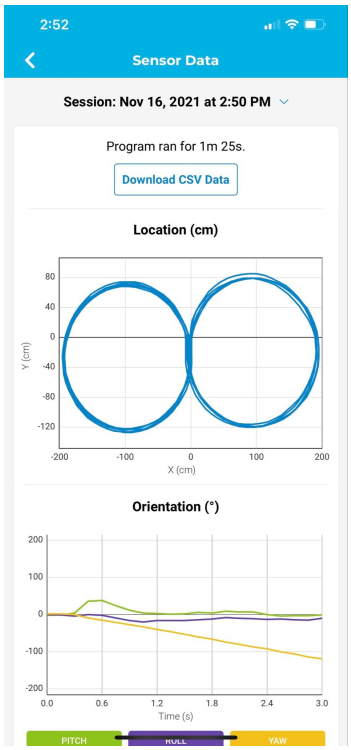
5.2 System Flow


Start
from blue tape square
Robot spins 360 degrees then stops
Robot spins -360 degrees then stops
If NumberOfSpins < 5
Yes
No
Robot Speaks "I am the winner"
Robot flashes multicolored lights for 5 seconds.
End

5.3 Software



Sphero Edu Block Code



Sphero Edu Sensor Data

5.4 Hardware

Sphero Sprk+ robot

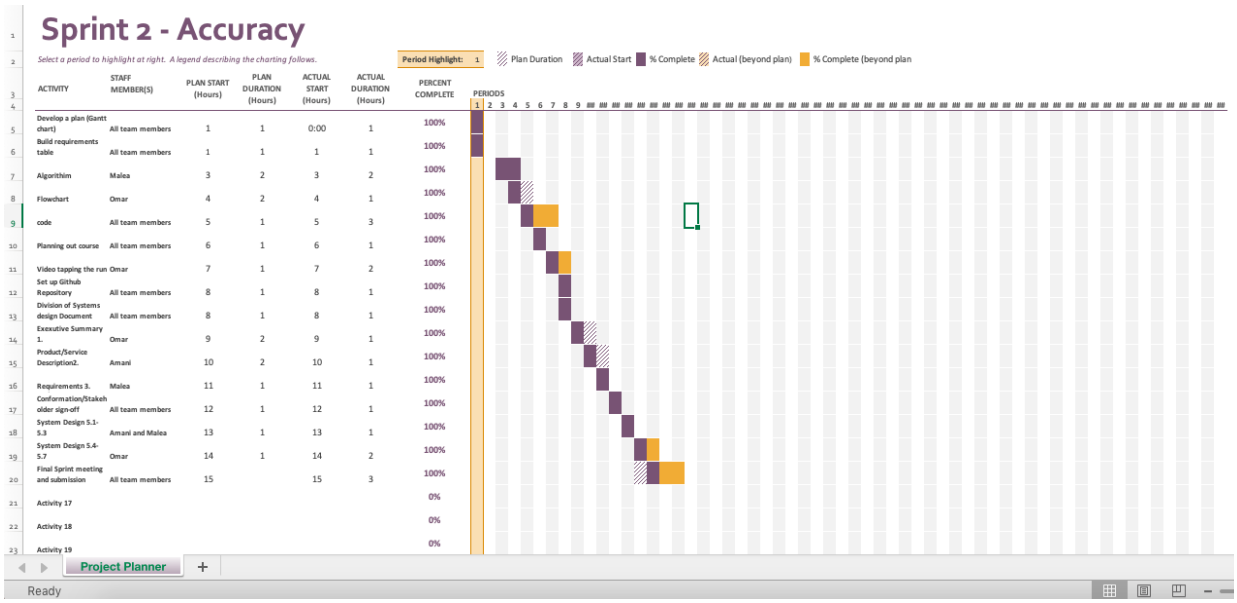
5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
To check if the robot will complete one of the circles and stop on the middle line.	11/15	Robot should travel radius of first circle and stop on middle line	Robot cut through the middle of the circle and did not complete the full circle.	Amani	Fail

Confirm that code for the first circle has the correct seconds and speed to complete the full first circle.	11/15	Robot should travel the outside of the first circle and stop on the middle line	8 seconds at 63 speed	Omar	Pass
Confirm that the first circle stops in the middle and completes the opposite circle and stops in the middle to complete full figure 8.	11/15	Robot should end on the middle lone after one full figure 8	Robot completed the first circle and stopped, but rolled too wide on the second circle resulting in collision with a chair.	Malea	Fail
Check the initial speed is correct with the relevant time in seconds	11/15	Robot should complete 1 full figure 8	Robot completed 1 figure 8. 8 seconds and 63 speed	Amani	Pass
Check if the robot flashes lights and speaks after 1 figure 8	11/15	Robot should say I am the winner and flash the lights for 5 seconds	Robot spoked and flashed lights upon stopping.	Malea	Pass
Check if the robot completes 5 full figure eights and	11/15	Robot should complete 5 full figure 8's, speak and flashlights upon stopping.	Robot completed 2 figure 8's, then was pushed off course by uneven tape.	Omar	Fail

flashes lights and speaks.					
Check if aiming the robot slightly outward will help avoid the uneven tape	11/15	Robot should complete the course	Aim did help avoid collision, but the robot had rolled too far wide on the 3rd figure 8.	Malea	Fail
Minor adjustments to aim and check if robot completes course	11/15	Robot should complete course	Robot completed the course, spoke the correct statement,and flashed lights for 5 seconds.	Omar	Pass
Another trial to see if robot will travel amore exact course	11/15	Robot should complete course	Robot completed course while rolling more aligned with the blue tape	Amani	Pass

5.6 Task List/Gantt Chart



5.7 Staffing Plan

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

Malea Horn Attanasio	Organizer,	Organize algorithm, Organize Ghant chart, Organize powerpoint, Organize this document.	Amani Minaya