

Sprint 1 - Accuracy Design Document

November 16th, 2022

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1. Executive Summary

1.1 Project Overview

This project is focused on how well the Sphero can move around HH208. Endurance is to see whether or not the robot is capable of enduring moving in long distances between the four corners of the room. The accuracy portion is to see how well it can mimic figure eight on the guiding tape. Lastly, the agility portion is to depict how well the Sphero can be programmed to find ways around obstacles and how well it can move. Sphero is a robot that can be controlled remotely and can be given an algorithm to move in certain directions, speak, and even change colors.

1.2 Purpose and Scope of this Specification

In Scope

- The Main point of the accuracy portion is to see if Sphero is capable of during 5 figure 8 motions on the tape provided on the floor of HH208
- Staying within the lines and not running off or being sloppy is within the scope as well.

Out of Scope

- Two parts of this 3 part project that are out of scope are the agility and endurance portions.
- Additional code will be added for agility which involves knocking some pins over.

2. Product/Service Description

Some factor that may affect the outcome of the product is how the floor is not completely smooth, causing the Sphero to somewhat go off track but as a whole, the product will come out to the end result that is desired.

2.1 Product Context

Sphero is related to other products which involve robotics. It is a programmable robot in a ball that also can be remotely controlled. It is self-contained, having all of the processors and boards inside the ball itself while also having a motor to allow the ball to move around.

2.2 User Characteristics

Professor Eckert who works at Monmouth University, has a bachelor of science at Stockton State College and a Master of Science from Kean University. He has plenty of years of experience when it comes to technology and is technologically savvy when it comes to programming and using the Sphero robot.

2.3 Assumptions

Even though as a group we have all used and programmed a Sphero once does not make us experts. There is still some practice that needs to be had before we are fully capable of using all of its distinct features to effectively go through the course(s).

2.4 Constraints

There are not really any design options when it comes to a fully-built robot. Not really any hardware limitations, but one constraint that exists would be the use of block code.

2.5 Dependencies

The dependent required for the robot to work is the block code that will be programmed with the appropriate website. The block code and algorithm must be completed before the robot is capable of completing the endurance task.

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ACCUR_01	Robot must successfully run the figure eight course 5 times.	Points will be taken off it we don't meet this requirement	1	11/15/22	Approved
ACCUR_02	Robot must stay within the path provided.	Points will be taken off it we don't meet this requirement	1	11/15/22	Approved
ACCUR_03	Robot must start and finish in the square provided.	Points will be taken off it we don't meet this requirement	1	11/15/22	Approved
ACCUR_04	Robot must say "I am the winner" and multicolored lights for 5 seconds.	Points will be taken off it we don't meet this requirement	1	11/15/22	Approved
ACCUR_05	Robot cannot collide with any obstacles on the track and stray from the path.	Points will be taken off it we don't meet this requirement	2	11/15/22	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.

1. Activity logging, historical data sets
2. Data integrity checks
3. Keep the robot away from others to decrease the chance of destroying the robot
4. Do not tell others your login information to Sphero EDU or github
5. Keep the robot away from dangerous environments
6. If your going to use the robot let the other group members know

3.2.2 Authorization and Authentication

Specify the Authorization and Authentication factors. Consider using standard tools such as PubCookie.

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

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Meeting Date	Attendees (name and role)	Comments
11/15/2022	Aidan M(Documenter), Raul(Programmer), Olivia(Data Collector)	

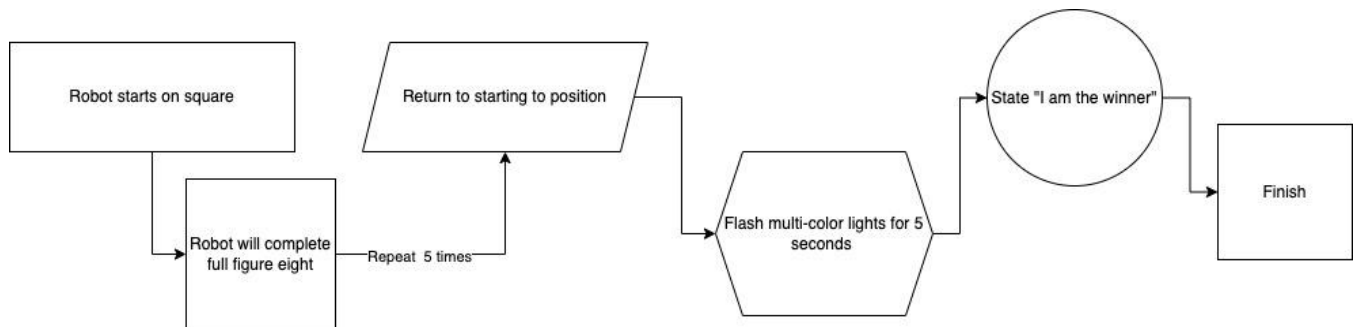
4. System Design

4.1 Algorithm

1. Robot starts on square
2. Robot will complete full figure eight
3. Repeat 5 times
4. Return to starting position
5. Flash multi-color lights for 5 seconds
6. State "I am the winner"
7. End program

4.2 System Flow

Develop a flowchart (and show here) that accurately depicts how your software application will act to fulfill the algorithm



4.3 Software

Describe software languages/platforms/api's used to develop and deploy this application

- Sphero EDU application to connect and program our robot
- Google Docs used to organize plans on SDD
- Microsoft Excel to create a chart for testing.

4.4 Hardware

Describe hardware platforms that were used to develop, test and demonstrate this application

- Laptop
- Robot

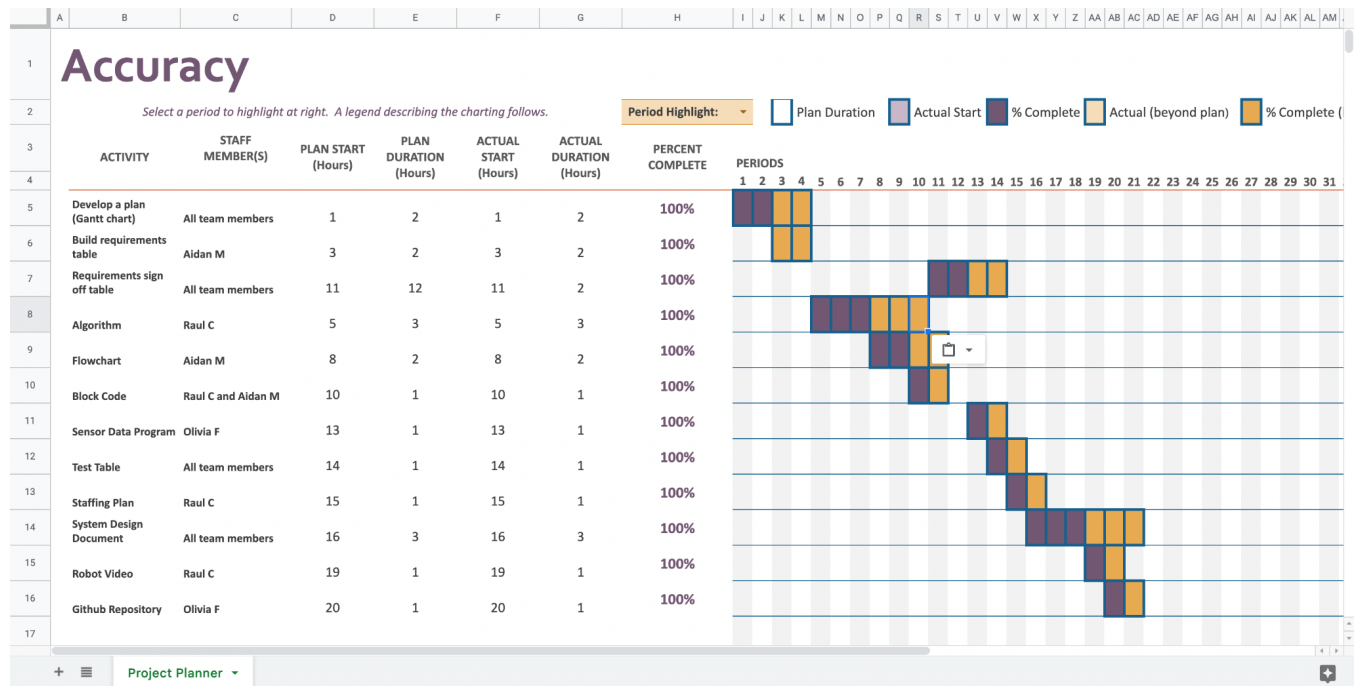
4.5 Test Plan

Include a test plan showing all unit tests performed for this application, Include test rational, test date, staff member, pass/fail status

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Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
See whether it will complete figure 8 at least once.	11/15/2022	Will complete full figure 8, at least one time	Missed second circle	Raul Aidan Olivia	Fail
See whether it will complete figure 8 at least once.	11/15/2022	Will complete full figure 8, at least one time	Completed	Raul Aidan Olivia	Pass
See whether it will complete figure 8 at least 5 times	11/15/2022	Will complete full figure 8, minimum 5 times	Completed twice but went off track	Raul Aidan Olivia	Fail
See whether it will complete figure 8 at least 5 times	11/15/2022	Will complete full figure 8, minimum 5 times	Completed but did not stop after 5 times	Raul Aidan Olivia	Fail
See whether it will complete course fully, and end with "I am the winner"	11/15/2022	Will complete entire course and stop	Completed entire course and met all requirements for sprint 2	Raul Aidan Olivia	Pass

4.6 Task List/Gantt Chart



4.7 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
Raul C	Programmer / Management	Executive Summary page / Algorithm / Block Code / Robot Video	

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Name	Role	Responsibility	Reports To
Aidan M	Documenter / Programmer	Requirements table / Flowchart / Block Code	
Olivia F	Documenter / Data collector	Github Repositories / Sensor Data Program	