Sprint 2 - Accuracy Design Document

November 10th, 2022

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1. Executive Summary

1.1 Project Overview

The purpose of this project is to test the Sphero's physical endurance and speed around the obstacle course. It is intended to show the project members' own skills in planning, working together, coding, and the ability to have the robot do as calculated.

1.2 Purpose and Scope of this Specification

In scope:

- Accuracy: An obstacle course with 2 circles shaped like a figure-8 the robot is meant to go through

Out of Scope:

- Agility: An obstacle course the robot must speed through and make it to the end.
- Endurance: An obstacle course shaped like a square the robot must circumnavigate through

2. Product/Service Description

2.1 Product Context

There are multiple people working on the same product, but in different groups. Although we are all aiming for the same output, there are different decisions that everyone will make to solve and finish the Accuracy part of the obstacle course. We are documenting the data we observe and creating plans based on our own judgment.

2.2 User Characteristics

- Professor Eckert: He has experience in computer science and teaches at Monmouth University. He went to Kean University and received a bachelor of science from Stockton State College. He's a certified network engineer and has done research on simulations, data analysis, algorithmic development, and quality control.

2.3 Assumptions

- The times each group member can meet up
- The availability of room HH 208
- If the sphere robot is capable of being used
- Group members abilities to code and work as a team

2.4 Constraints

- Access to robot
- Management
- Time
- Resources to Coding

2.5 Dependencies

- Every team member should be assigned accordingly
- We will need multiple testing days in order to make sure the robot works perfectly
- Algorithm and Flowchart are needed beforehand
- Robot must be halfway programmed to at least start Test Case

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ACCUR_01	Start in middle of figure-8	Easy place. We set it down right in the middle, slightly upwards	Maintaining correct placing	11/15/22	11/15/22
ACCUR_02	Go around circle clockwise	Robot has to go 360 degrees accurately in one loop in order for it to be perfect.	Stay in lane and make full loop	11/15/22	11/16/22
ACCUR_03	Go around other circle counterclockwise	Basically it is the same as clockwise rotation, just had to be negative degrees, so it was easy to do.	Follow the second circle full loop	11/15/22	11/16/22
ACCUR_04	Repeat ACCUR_02 and ACCUR_03 five times	It was hard to keep the robot on the lines, but it would make both circle loops completely	Keep the robot on track all 5 times	11/15/22	11/16/22
ACCUR_05	Stop in middle of figure-8	The robot slides forward after every full figure-8, but it would at least be in line with the original spot.	Have the robot end where it started	11/15/22	11/16/22
ACCUR_06	Speak “I am the winner”	It was just a small code that you have to write to make it speak	Have to keep your volume louder	11/15/22	11/16/22
ACCUR_07	Flash multicolored lights	There wasn’t a block of code that was letting you able to change it to a different color but you have to add a delay for each time it changes the color	Just has to be different colors	11/15/22	11/16/22

3.2 Security

3.2.1 Protection

- Constant checks from team members
- Saving System
- No leaking or sharing with anyone outside of the group

3.2.2 Authorization and Authentication

- Authorization to Camryn, Sahmi, and Nathan, as well as Professor Gil Eckert

3.3 Portability

- Sent to Github into Repository: https://github.com/sahmin89/Accuracy
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- Shared along group members
- Use in English
- Use of a clear, clean, and straight environment at the correct length

4. Requirements Confirmation/Stakeholder sign-off

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

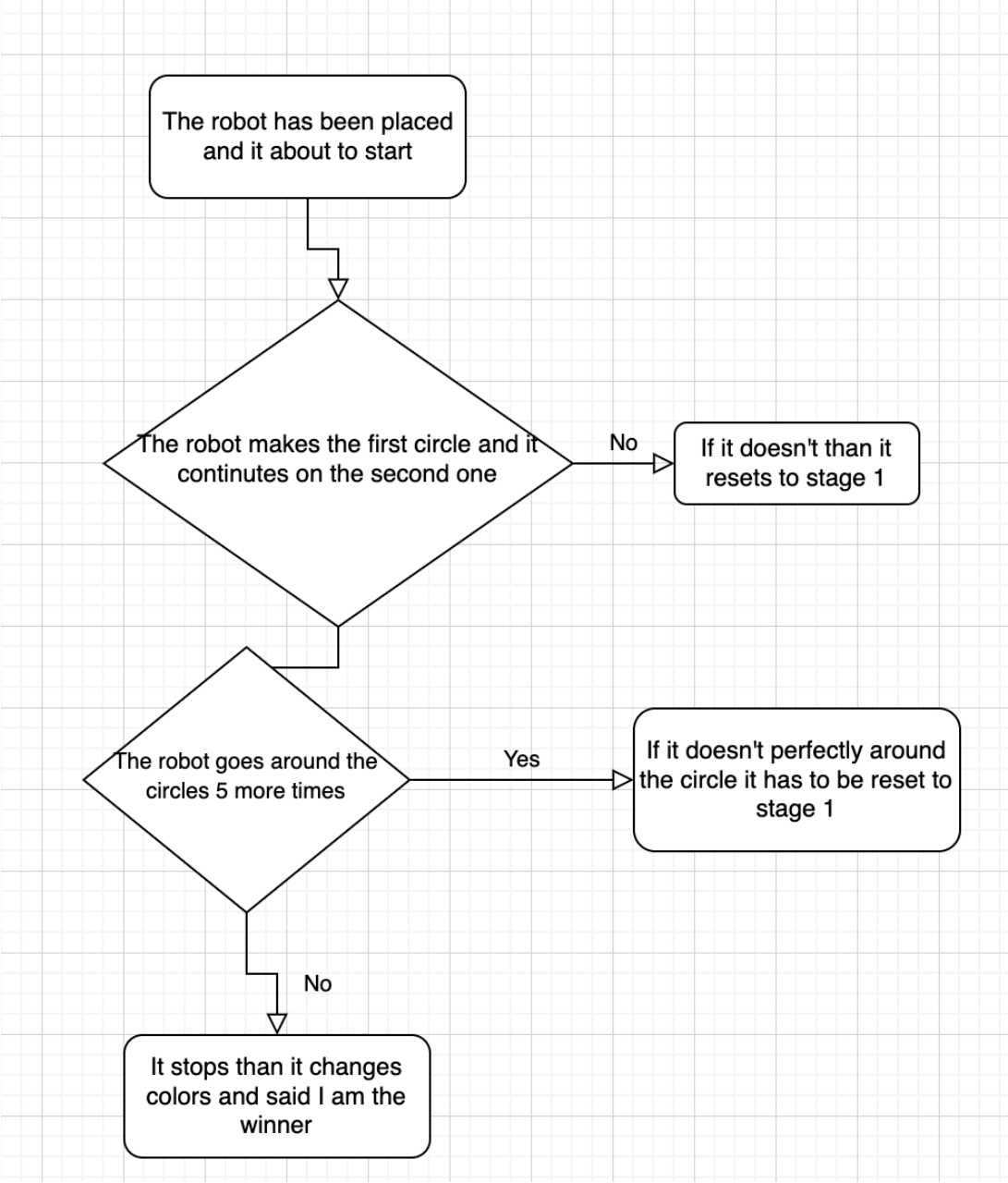
Meeting Date	Attendees (name and role)	Comments
11/15/22	Camryn, Sahmi, Nathan	Coding was finished and tested accordingly.
11/16/22	Camryn, Sahmi, Nathan	Video/Sensor data was taken, everything was added to Github Repository. SDD was checked through and completed.

5. System Design

5.1 Algorithm

- Robot starts in the middle of figure-8
- The robot will go around the first 5’1” circle fully clockwise back to starting point
- The robot will move on to second 5’1” circle moving counterclockwise back to starting point
- Steps repeat five times
- Robot stops in middle/starting point
- Robot will speak “I am the winner”
- Multicolored lights will flash for 5 seconds

5.2 System Flow



5.3 Software

The software we are using is called Sphero Edu. It is a drag and drop code.

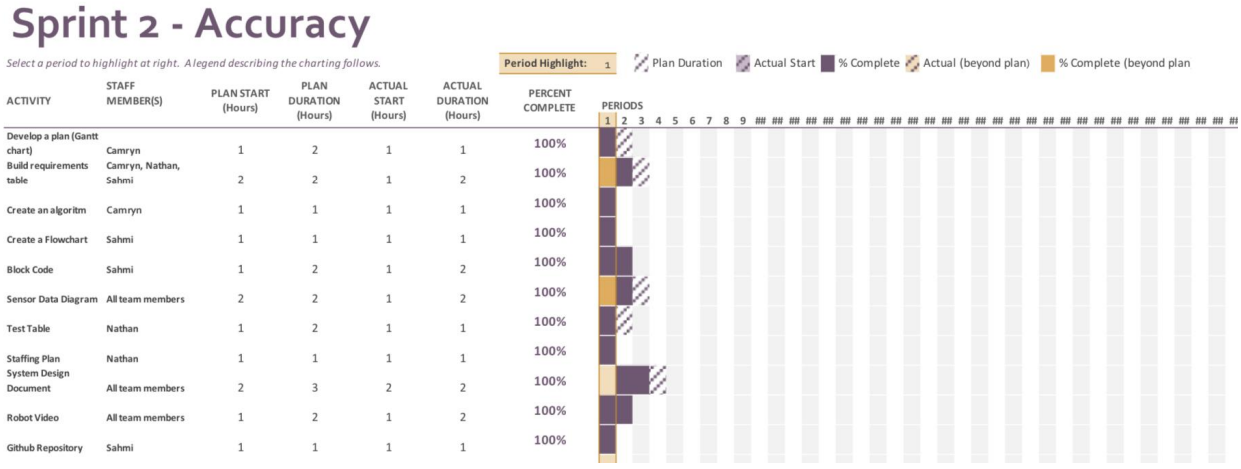
5.4 Hardware

The hardware is the Sphero robot that our professor provided for us.

5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Make the robot complete the circle	11/15/22	Robot will complete first circle	Robot completed circle but did not stop moving afterwards	Nathan	Fail
Make the robot complete the circle	11/15/22	Robot will complete first circle	Robot completed circle	Nathan	Pass
Make sure robot stays within the circle	11/15/22	Robot will follow the correct guidelines and stays in bounds	Robot moved too fast and did not stay in bounds	Nathan	Fail
Make sure robot stays within the circle	11/15/22	Robot will follow the correct guidelines and stays in bounds	Robot sensor was pointed in the wrong direction	Nathan	Fail
Make sure robot stays within the circle	11/15/22	Robot will follow the correct guidelines and stays in bounds	Robot sensor was pointed the right direction and stayed in bounds	Nathan	Pass
Make sure Robot completes second circle	11/15/22	Robot will complete second circle	Robot completed the second circle (minor delay needed to be added)	Nathan	Pass
Make sure robot completes the full figure eight 1 time	11/15/22	Robot will complete figure eight and follow guidelines	Robot completed figure eight and strayed in bounds	Nathan	Pass
Added flashing lights and voice line at the end of trial	11/15/22	Robot will flash lights and say coded voice line	Robot flashed lights and said coded voice line	Nathan	Pass
Make sure robot completes the circle 5 times	11/15/22	Robot will follow procedure and complete figure eight 5 times	Robot followed procedure and completed figure eight 5 times	Nathan	Pass

5.6 Task List/Gantt Chart



5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Sahmi	Software Design	Creates code, takes measurements, creates algorithms, and has the lead on making sure the robot follows the correct procedures.	Camryn
Nathan	System Design	Provide all details concerning the technical design, staffing, coding, and testing the system	Camryn
Camryn	Project Manager	Receives and gives instructions, suggests changes that should be made to better the tests. Filled out Gantt chart and project summary.	Professor Eckert