Sprint 1 - Accuracy Design Document

November 15, 2022

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1. Executive Summary

1.1 Project Overview

The robot accuracy project is a project for the CS-104 class. In the accuracy section of the project, a robot must travel around a figure 8 shape without colliding with anything or going off course. The intended audience of this project is CS-104 students, who are learning how to code, and instructors who are overseeing the students.

Purpose and Scope of this Specification

This document is intended for the accuracy section of the robot project

In scope

- Accuracy section of the robot project.

Out of Scope

- Agility section of the robot project.
- Endurance section of the robot project.

2. Product/Service Description

2.1 Product Context

The accuracy section of the robot project slightly differs from the other two sections. The main difference between each of the sections is the courses the robots are required to follow. Each section has a different aim, which the unique course addresses.

2.2 User Characteristics

- Students
- Instructors
- People interested in learning how to code
- People interested in learning Sphero robots

2.3 Assumptions

- We assume we will have a device that runs iOS.
- We assume the room will be available in order test the program

2.4 Constraints

- Block code is limited
- Sphero is very simple

2.5 Dependencies

- This project requires a Sphero robot
- The project requires users to download the Sphero interface
- Howard Hall room 208 must be available in order to test the program
- The user must be running iOS to view the sensor data

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ACCUR_01	Robot must complete figure 8 course 5 times		1	11/14	Approved
ACCUR_02	Robot must speak “I am finished” at end of course		1	11/14	Approved
ACCUR_03	After completion, robot must flash multicolored lights for 5 seconds		1	11/14	Approved
ACCUR_04	Robot must finish at the same place it started		1	11/14	Approved
ACCUR_05	Robot must not stray from the provided path		1	11/14	Approved

3.2 Security

3.2.1 Protection

- Must login in order to access the account which the code is on.

3.2.2 Authorization and Authentication

Must login in order to access the account which the code is on.

3.3 Portability

- Can access code on any device, given that you login
- Can only see certain aspects of program based on operating systems
    - Only iOS can view sensor data
- The robot will behave the same no matter which device it is controlled from

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	Attendees (name and role)	Comments
11/14/2022	Kevin, Emma, Vincent	confirmed all requirements

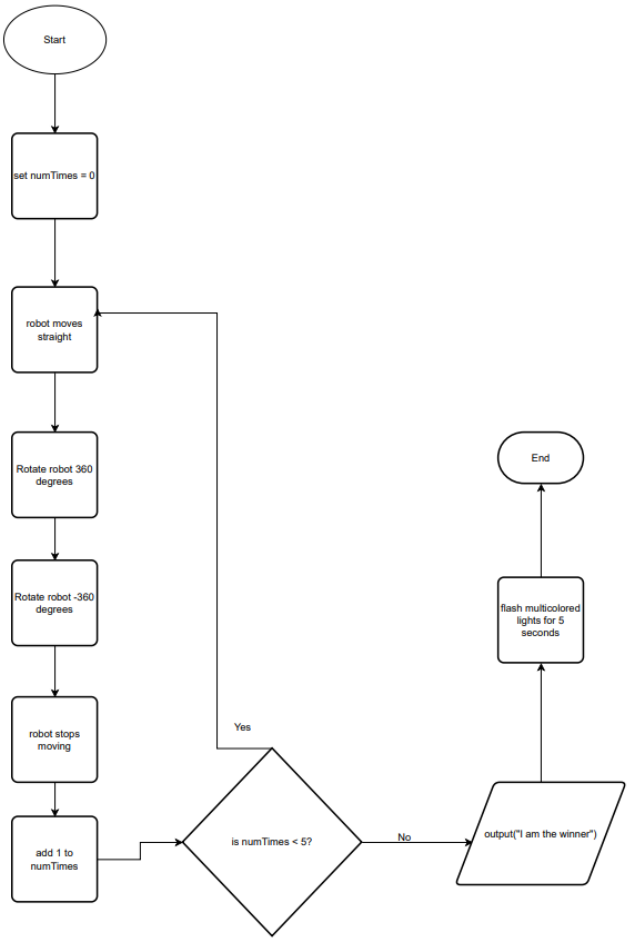
5. System Design

5.1 Algorithm

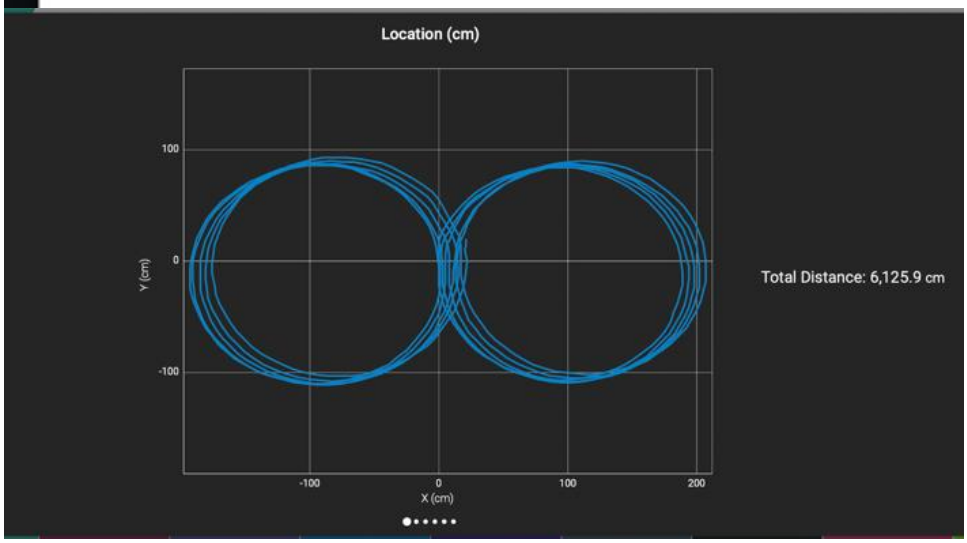
Robot Project Accuracy Algorithm

1. Set numTimes = 0
2. Make robot move straight
3. Rotate robot 360 degrees
4. Rotate robot -360 degrees
5. Make robot stop moving
6. Add 1 to numTimes
7. If numTimes < 5, repeat step 2-6
8. Speak "I am the winner"
9. Make lights flash multicolored for 5 seconds

5.2 System Flow



5.3 Block Code and Sensor Data



5.4 Software

The robot was programmed using block code.

5.5 Hardware

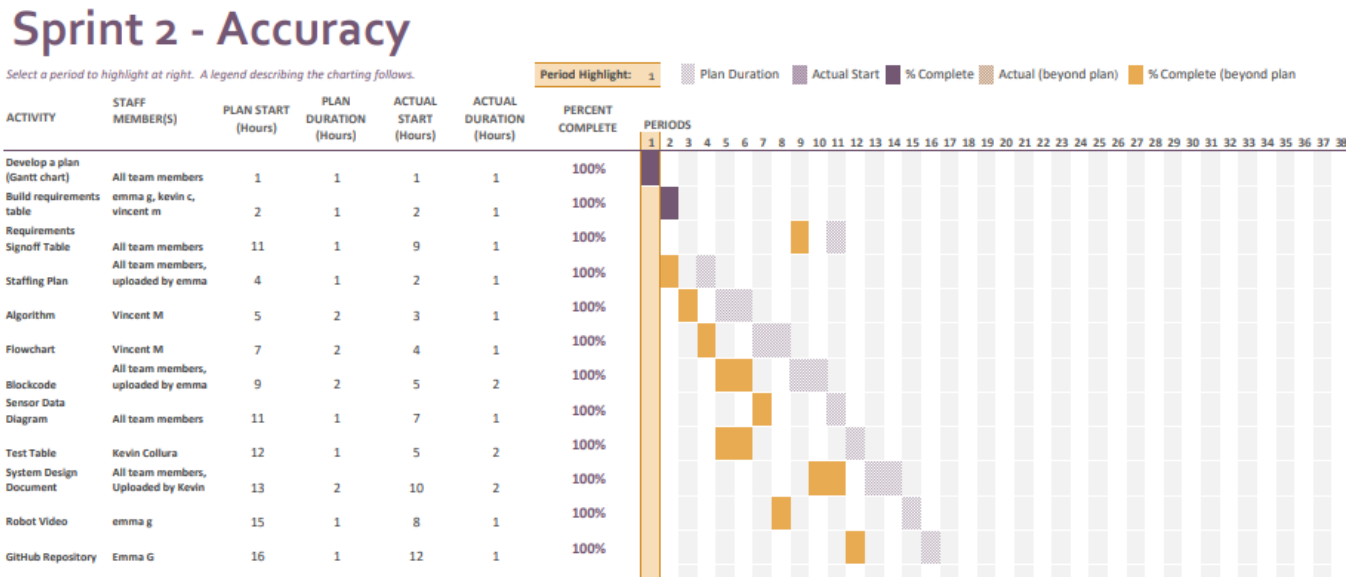
The robot was coded on the Sphero program.

5.6 Test Plan

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

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
To see if the robot will do one full circle	11/14/22	The robot will perform one full circle.	The robot was not on the tape, but did perform a full circle.	Kevin	Fail
Testing to see if the changes made make the robot complete one full circle	11/14/22	The robot will perform one full circle.	The robot stayed on the tape and performed one full circle.	Kevin	Pass
Testing to see if the robot completes one full figure 8	11/14/22	The robot should perform one full figure 8 then stop	The second circle of the figure 8 was a little off	Kevin	Fail
Testing to see if the changes made make the robot complete one full figure 8	11/14/22	The robot should perform one full figure eight and then stop	The robot performed one full figure eight and stayed on the tape.	Kevin	Pass
Testing to see if the robot can complete all 5 figure 8s	11/14/22	The robot should perform five figure eights and then stop.	The robot was able to perform five whole figure eights, but it kept going a little off course	Kevin	Fail
Testing to see if the changes made allow the robot to make five figures 8s	11/14/22	The robot should perform five figure 8s then stop	The robot completed the figure eights, but kept getting a little off course	Kevin	Fail
Testing to see if the changes made allow the robot to make five figures 8s	11/14/22	The robot should perform five figure 8s then stop	The robot completed the figure eights successfully	Kevin	Pass
Testing to see if the robot speaks once it finishes	11/14/22	The robot should perform five full figure eights and then say, “I am the winner”.	The robot successfully completed the task.	Kevin	Pass
Testing to see if the robot flashes multicolored lights at the end	11/14/22	The robot should complete the figure 8s, say, “I am the winner” then flash multicolored lights for 5 seconds.	The lights did not flash.	Kevin	Fail
Testing to see if the changes made to the code make the robot flash multicolored lights for 5 seconds	11/14/22	The robot will perform all five figure eights, speak and then flash different colors.	The robot was able to successfully complete the task.	Kevin	Pass

5.7 Task List/Gantt Chart



5.8 Staffing Plan

Name	Role	Responsibility	Reports To
Emma Green	Videographer, repository creator!	Make robot video, upload block code, create staff plan	Vincent
Kevin Collura	Documenter	Document items in the system design document, fill out test table during robot testing	Vincent
Vincent Macri	Manager	Manage the project, make sure everything gets done, commit to GitHub repository. Also working on flowchart.	Myself