Sprint 3 - Agility Design Document

December 2, 2020

Table of Contents

1.   Executive Summary

1. *Project Overview*

This product is intended to test our knowledge on software development. It is specifically designed to be an early project where we can gain a better understanding at coding and the development process as a whole.

2. *Purpose and Scope of this Specification*

In scope
Our project is meant to control a machine through software only.

Out of Scope
Our project can not obey other commands, as we develop its code the robot responds only to management.

2.   Product/Service Description

Our product is designed for the sole purpose of overcoming environmental obstacles. In this first instance, the robot must navigate the perimeter of HH208, while at the same time, say a few phrases. These requirements were outlined by our instructor.

1. *Product Context*

Compared to other products, ours is very easy to use. The specific block code was created in an app called Sphero Edu. In order for the user to use our particular code, they will need to download the app and look up the code we created. The user then simply selects the "Run" option at the top of the screen.

2. *User Characteristics*

- Student/faculty
- Experience: Beginner level
- Technical expertise:
    - Must know how to navigate the Sphero Edu application on either Windows/IOS

3. *Assumptions*

- User has some understanding/knowledge of navigating the Sphero Edu app
- User possesses the Sphero robot
- User has some basic knowledge on the type of block code consistent with the Sphero app
- User has a computer/phone

4. *Constraints*

- Must have IOS 10.0 or higher
- Must have space available for the robot to operate.
- Must have a Sphero account to access the code.
- Must have available space (67.4 MB of existing storage).
- Smooth surface is needed for the robot path.

5. ***Dependencies***

● Requires space for occasional updates to the applications
● Requires specific version of the Sphero robot (SPRK +)

3. Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
AGILIT_01	Travel in a square.		1st	12/2	12/2
AGILIT_02	Avoid 3 objects.		2nd	12/2	12/2
AGILIT_03	Travel over a ramp.		3rd	12/2	12/2
AGILIT_04	Knock over multiple "pins".		4th	12/2	12/2
ENDUR_XX					

Security

● All users are protected by the Sphero edu app's data protection software
● Users can only access code with their private account
● Uses Bluetooth
  ○ Can be accessed and remembered by the owners ios or windows device

Authorization and Authentication

User must link their device with the robot via bluetooth to be authorized access

Portability

● Robot can be used across multiple platforms, as long as it supports bluetooth
● Sphero app must be loaded on such device
● Code can be pulled up quickly via the Sphero app

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	Attendees (name and role)	Comments
12/1/2020	Connor Przelomski - SDD author / project director Vincent Loretta - Robot code author/ video recorder Moises Pomales - Gantt chart author/ flowchart maker	Completed every project requirement except ● Finish Gantt chart ● Finish SDD ● Flow chart not completed ● Video not recorded
12/2/2020	Connor Przelomski - SDD author / project director Vincent Loretta - Video recorder / robot user / Flowchart maker Moises Pomales - Gantt chart author/ flowchart maker	Confirmed…………. ● Finished Gantt chart ● Finished SDD ● Flow chart completed ● Video recorded

5. System Design

1. ***Algorithm/Sensory Data***

●
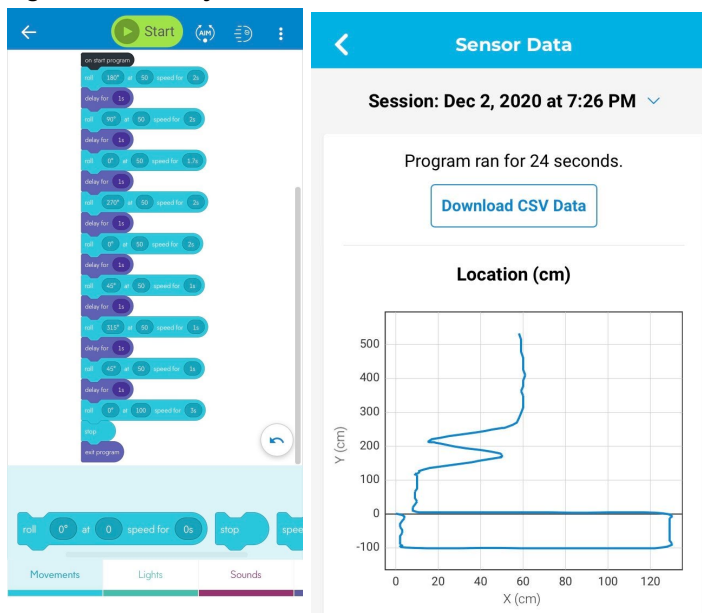
This algorithm encompasses part of what happened in sprint 1 where the robot had to travel in a rectangular shape. This is what happens here, except now the robot will travel in a zigzag formation. It will do this while also avoiding obstacles planted on the floor. Eventually, after the 3 obstacles regarding the zig zag, it will speed up over the ramp and crash into the dominoes on the floor. The program then ends and the robot stops moving.

●

2. ***System Flow***

```
Start
  │
  ▼
Set speed to 50
and roll 180
degrees for 2s.
  │
  ▼
Delay for 1s
  │
  ▼
Roll 90 degrees for
2s.
  │
  ▼
Delay for 1s
  │
  ▼
Roll 0 degrees for
1.7s.
  │
  ▼
Delay for 1s
  │
  ▼
Roll 270 degrees
for 2s.
  │
  ▼
Delay for 1s
  │
  ▼
Roll 0 degrees for   →   Delay for 1s   →   Roll 45 degrees for   →   Delay for 1s
2s.                                          1s.                         │
                                                                        ▼
End Program                                                        Roll 315 degrees
  ▲                                                                 for 1s.
Set speed to 100                                                       ▲
and roll 0 degrees                                                Delay for 1s
for 1s.                                                               ▲
  ▲                                                               Roll 45 degrees for
Delay for 1s                                                      1s.
  ▲                                                                  ▲
Roll 45 degrees for                                               Delay for 1s
1s.
```

3. *Software*

Sphero Edu - We used the Sphero Edu app on IOS and the Microsoft Store to develop and deploy this application using block code as the primary language.

4. *Hardware*

- Sphero Sprk +
- ASUS Laptop
- iPhone XR

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

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Agility	12/2/20	Make a square	Hit wall	Vincent	Fail
Agility	12/2/20	Go through whole course successfully	Hit wall	Vincent	Fail
Agility	12/2/20	Zig through obstacles	Hit first obstacle	Vincent	Fail
Agility	12/2/20	Zig through obstacles	Hit second obstacle	Vincent	Fail
Agility	12/2/20	Zig through obstacles	Hit third obstacle	Vincent	Fail
Agility	12/2/20	Go over ramp	Went to the left of ramp	Vincent	Fail
Agility	12/2/20	Go over ramp	Went over ramp	Vincent	Pass
Agility	12/2/20	Go through full course with no interruptions	Missed ramp	Vincent	Fail
Agility	12/2/20	Go through full course with no interruptions	Hit first obstacle	Vincent	Fail
Agility	12/2/20	Go through full course with no interruptions	Hit third obstacle	Vincent	Fail
Agility	12/2/20	Go through full course with no interruptions	Went through full course with no interruptions	Vincent	Pass

6. ***Task List/Gantt Chart***

View Repository

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
Connor Przelomski	Project Manager/SDD Author	Responsible for making sure all members understand their roles and the project gets done on time Responsible for writing and organizing the System Design Document	Gil Eckert (Professor)
Vincent Loretta	Sphero code author/video recorder	Responsible for designing the robot's algorithm and recording the robots's run in action	Project Manager
Moises Pomales	Gantt chart organizer/writer	Responsible for making sure that each task within the project is being completed on time. Makes sure that the production schedules	Project Manager