

Sprint 1 - Endurance Design Document

November 12, 2020

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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 (5.5 ft x 3 ft).
- 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**

- Robot must travel in a rectangle with length:5.5ft and width:3ft. (space constrictions)
- Robot must start with a green light and say "Ready, set, go!"
- Robot must travel 5.5ft and take a right.
- Robot must travel 3ft and continue on the rectangle's length and back up it's width.
- Robot must not collide with any objects as it goes around the room.
- Robot must return to it's starting location.
- Robot must say "I'm done and I need water."

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ENDUR_01	Travel in a rectangle with length:5.5ft and 3ft width.	A bit of difficulty here but nothing we weren't able to figure out.	1st	11/11	
ENDUR_02	Speak "Ready, set, go!" at the start and "I'm done and I need water." when finished.	Some trouble when it came to having the robot speak the last term, easily fixed with trial and error.	2nd	11/11	
ENDUR_03	Flash proper colors, Green at start and Red at end.	Red light would not flash at end along with phrase left unspoken. Fixed.	3rd	3rd	
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

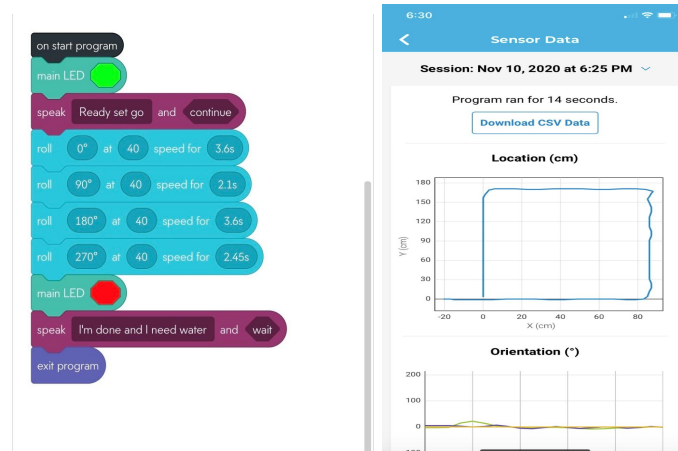
- Robot can be used across multiple platforms, as long as it supports bluetooth
- Sphero app must be loaded on such device
- Code can be pulled up quickly via the Sphero app

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	Attendees (name and role)	Comments
11/10/2020	Connor Przelomski - SDD author / project director Vincent Loretta - Robot code author Moises Pomaes - Gantt chart organizer	Completed every project requirement except <ul style="list-style-type: none"> • Finish Gantt chart • Finish SDD • Flow chart not completed • Video not recorded
11/11/2020	Connor Przelomski - SDD author / project director Vincent Loretta - Video recorder / robot user / Flowchart maker Moises Pomaes - Gantt chart organizer	Confirmed..... <ul style="list-style-type: none"> • Finished Gantt chart • Finished SDD • Flow chart completed • Video recorded

5. System Design

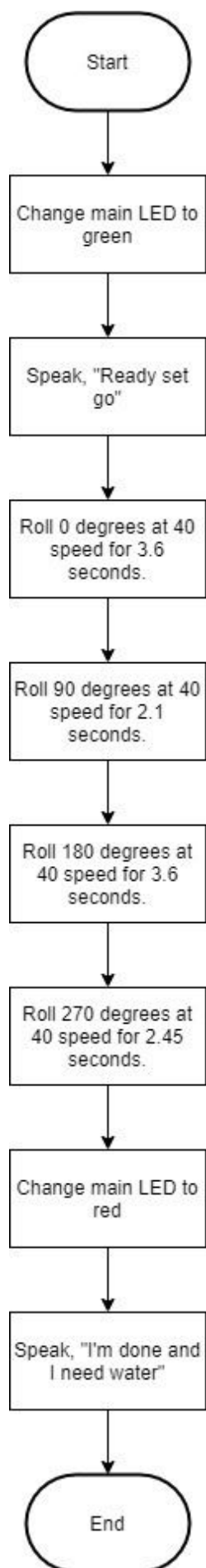
1. Algorithm/Sensory Data



Our algorithm is simple. Using Sphero Edu's block code formatting, we simply dragged and dropped the block code that worked best for fulfilling all of the requirements for this project. First, the robot speaks "Ready, set, go!" and then blinks green to signify that the robot has started its course. The consistent speed that we used was 40, and the robot would roll +90 degrees each time. The duration that the robot is rolling is also consistent, except for the instances where the robot is rolling along the short length of the rectangle. After the robot returns to its initial position, the LED will now change to red and it will say "I'm done and I need water." That is when the program ends.

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2. ***System Flow***



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
Rectangle	11/10	Straight for 5.5ft	Wrong way	Vincent	Fail
Rectangle	11/10	Straight for 5.5ft	Right way	Vincent	Pass
Rectangle	11/10	Straight for 3ft	Right way	Vincent	Pass
Rectangle	11/10	Straight for 5.5ft	Hit wall	Vincent	Fail
Rectangle	11/10	Straight for 3ft	Hit wall	Vincent	Fail
Rectangle	11/10	Straight for 5.5ft	Hit wall	Vincent	Fail
Rectangle	11/10	Straight for last 3 ft	Did not finish	Vincent	Fail
Rectangle	11/10	Straight for last 3 ft	Went too far	Vincent	Fail
Rectangle	11/10	Makes rectangle with proper proportions	Went for 6 ft instead of 5.5 ft	Vincent	Fail
Rectangle	11/10	Makes rectangle with proper proportions	Went for 3.4 ft instead of 3	Vincent	Fail
Rectangle	11/10	Straight for 5.5 ft	Went for 5.5 ft	Vincent	Pass
Rectangle	11/10	Makes rectangle with proper proportions	Went for 3.2 ft instead of 3	Vincent	Fail
Rectangle	11/10	Go forward	Hit wall	Vincent	Fail
Rectangle	11/10	Makes rectangle with proper proportions	Went for 3 ft	Vincent	Pass
Rectangle	11/10	Speak at the end and turn red	Did not speak at the end or turn red	Vincent	Fail
Rectangle	11/10	Makes rectangle with proper proportions	Went for 3 ft and spoke	Vincent	Pass

Rectangle	11/10	Make a 5.5 ft by 3 ft rectangle with correct speaking commands and led changes.	Went for 5.5 ft by 3 ft rectangle with correct speaking commands and led changes.	Vincent	Pass
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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 Pomaes	Gantt chart organizer/Requirements Outliner	Responsible for organizing and completing the gantt chart so that the group is on schedule for the next step in the project. Outlines the requirements that the algorithm must fulfill.	Project Manager