

Sprint 3 - Agility Design Document

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1. Executive Summary

1.1. Project Overview

- This project has been conducted to test the agility of the Sphero robot. This project's intended audience consists of students and teachers.

1.2. Purpose and Scope of this Specification

- The purpose of this specification is to design and execute an algorithm that successfully makes the SPRK2 robot perform a series of tests. These tests involve a obstacle course that the robot must follow along with avoiding objects, rolling up and down a ramp, and knocking down pins. The intended audience of this experiment is our class and any outside individuals who may want to learn how to set up a SPRK2 and use it to create programs.

2. Product/Service Description

2.1. Product Context

- The SPRK2 is an independent product with the help of the operating system on your Apple or Android, phone and computer. The SPRK2 does interface with a lot of related systems as within the app there are all different types of products that can interface with the SPRK2. These relationships consist of building a flowchart after successfully using the app Sphero Edu. With the proper tools this agility test was rather simple in the regard of figuring out the interconnection of the SPRK2 with the app in order for it to run.

2.2. User Characteristics

- Students who are enrolled in computer science classes
- Faculty/staff who teach computer science courses
- Those working in the computer science field

2.3. Assumptions

- When entering the room to do the second sprint test on the SPRK2 we had doubts whether the room would be open or not do the test. Upon arriving we were granted access to the room. After that we both opened our SPRK2 we had no difficulty accessing the operating systems via phone or computer. Other than that we had no assumptions that made our test anymore difficult.

2.4. Constraints

- System resource constraints (e.g., limits on disk space or other hardware limitations)
- Block programming problems

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- Wifi / bluetooth availability
- Laptop / computer availability

2.5. Dependencies

- The dependencies needed in order to successfully carry out the SPRK2 endurance run involve minute amount of equipment. This equipment involved the SPRK2, a computer or phone with working Bluetooth, a clean path with no desks or other obstacles.

3. Requirements

3.1. Functional Requirements

Req#	Requirement	Date Rvwd	SME Reviewed / Approved
1	From the starting position, the robot must roll to and avoid touching the 1st object and turn right	4/20/21	Approved
2	The robot must then roll to and avoid touching the 2nd object and turn left	4/20/21	Approved
3	The robot must then roll to and avoid touching the 3rd object and turn right	4/20/21	Approved
4	Robot must go over ramp	4/20/21	Approved
5	Robot must continue to the last corner and turn right	4/20/21	Approved
6	Robot must roll to the finish where it will knock over the pins	4/20/21	Approved

3.2. Security

3.2.1. Protection

- We did not utilize any system protection.

3.2.2. Authorization and Authentication

We did not use any authorization and authentication factors (unless logging into the Sphero app counts).

3.3. Portability

When coming to Howard Hall 208 we had to bring both of our SPRK2 kits with charger and charging port. Upon arrival we had to turn on the lights and get the robot's set up with the correct lineage too the blue tape. When doing this we have completed transporting all goods from our homes to the class room.

4. Requirements Confirmation/Stakeholder sign-off

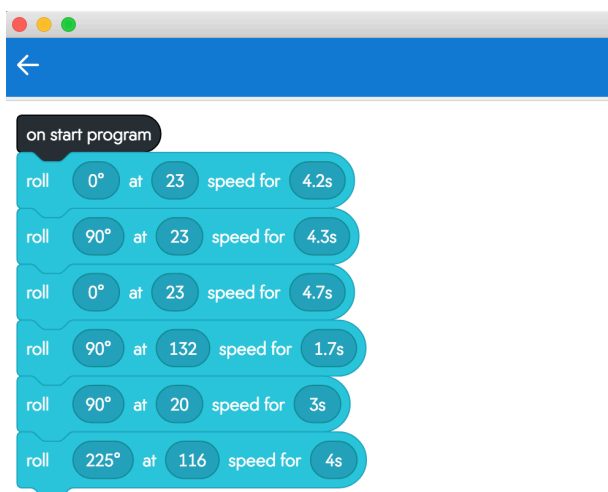
Meeting Date	Attendees (name and role)
4/20/21	Tom Carleo
4/20/21	Tim Corcoran

5. System Design

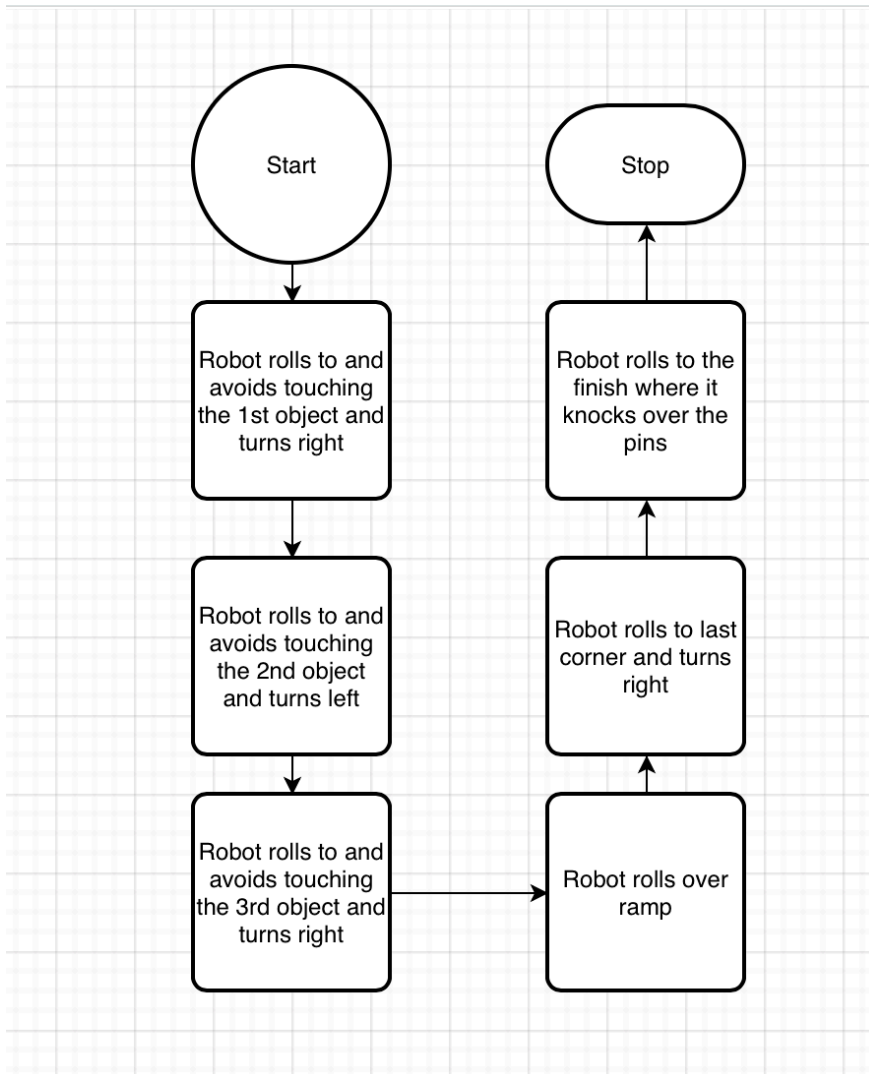
This section will provide all details concerning the technical design, staffing, coding, and testing the system

5.1. Algorithm

1. Robot rolls to and avoids touching the 1st object and turns right
2. Robot rolls to and avoids touching the 2nd object and turns left
3. The robot rolls to and avoids touching the 3rd object and turns right
4. Robot rolls over ramp
5. Robot rolls to the last corner and turns right
6. Robot rolls to the finish where it knock over the pins



5.2. System Flow



5.3. Software

- Excel, Draw io, Sphero Edu, Google docs

5.4. Hardware

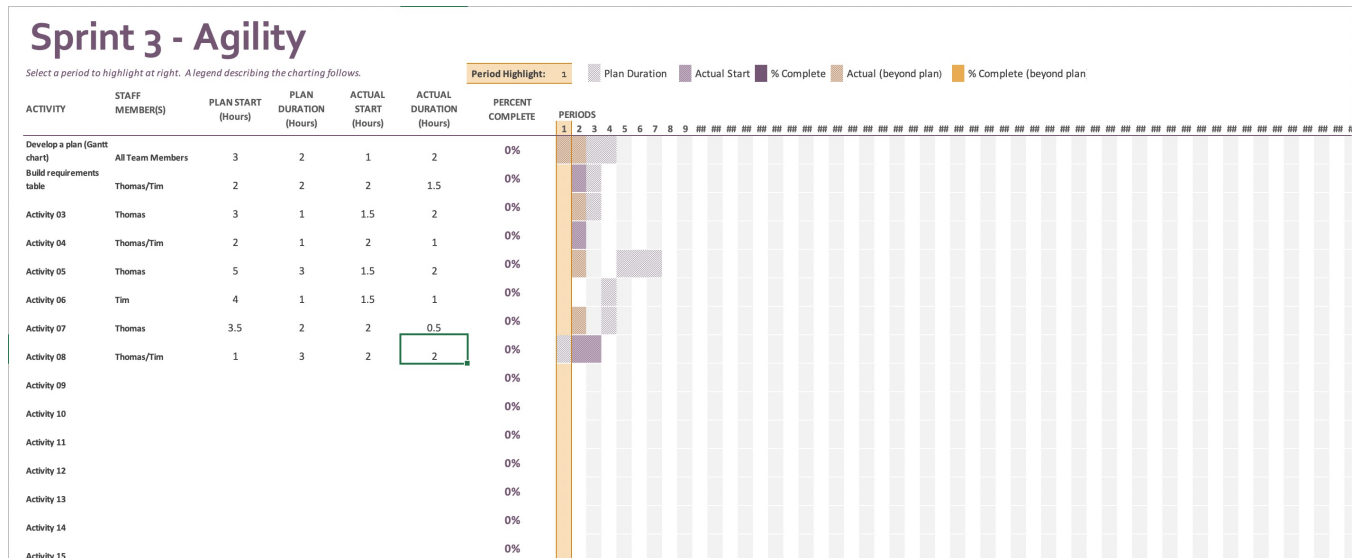
- SPRK2 robot, Two Macbook laptops, chargers

5.5. Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Make robot reach first corner and turn right	4/20/21	Robot reaches first corner, turns right and avoids touching the object	Robot avoided object but turned right too late	Tim and Tom	Fail
Make robot reach first corner and turn right	4/20/21	Robot reaches first corner, turns right and avoids touching the object	Robot successfully turned right, avoiding the object	Tim and Tom	Pass
Make robot reach 2nd corner and turn left	4/20/21	Robot reaches 2nd corner, turns left and avoids touching the object	Robot avoided object but swayed off track and turned left too late	Tim and Tom	Fail
Make robot reach 2nd corner and turn left	4/20/21	Robot reaches 2nd corner, turns left and avoids touching the object	Robot successfully turned left, avoiding the object	Tim and Tom	Pass
Make robot reach 3rd corner and turn right	4/20/21	Robot reaches 3rd corner, turns right and avoids touching the object	Robot hit object, did not reach the corner	Tim and Tom	Fail
Make robot reach 3rd corner and turn right	4/20/21	Robot reaches 3rd corner, turns right and avoids touching the object	Robot avoided object but turned the wrong direction	Tim and Tom	Fail
Make robot reach 3rd corner and turn right	4/20/21	Robot reaches 3rd corner, turns right and avoids touching the object	Robot successfully reached 3rd corner, turned right and avoided touching the object	Tim and Tom	Pass
Make robot go over ramp	4/20/21	Robot rolls over the ramp	Robot successfully rolled over the ramp	Tim and Tom	Pass
Make robot roll to last corner and turn right	4/20/21	Robot rolls to last corner and turns right	Robot turned right but rolled past the corner	Tim and Tom	Fail
Make robot roll to last corner and turn right	4/20/21	Robot rolls to last corner and turns right	Same result as previous test	Tim and Tom	Fail
Make robot roll to last corner and turn right	4/20/21	Robot rolls to last corner and turns right	Robot successfully rolled to the corner and turned right	Tim and Tom	Pass
Make robot roll to the finish and knock over the pins	4/20/21	Robot rolls to the finish, knocks over pins	Robot successfully rolled to the finish and knocked over the pins	Tim and Tom	Pass

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5.6. Task List/Gantt Chart



5.7. Staffing Plan

Name	Role	Responsibility	Reports To
Tim	Gantt Chart/ Summary	To complete the responsibilities needed to pass this accuracy test	Gil Eckert
Tom	Programmer/ FlowChart	To complete the responsibilities needed to pass this accuracy test	Gil Eckert