

Sprint 3 - Agility Design Document

December 6, 2021

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1. Executive Summary

1.1. Project Overview

The purpose of this project is to test the capabilities the robot as to complete an obstacle course with tasks ranging from avoiding objects, to knocking down pins. It will test the ability of the programmer to create a code that allows the robot to complete these tasks.

1.2. Purpose and Scope of this Specification

The purpose of this project is to push the limits of the block code program provided to see if the robot is able to complete a set of obstacles implemented into the course. Intended audience would be those who are interested in how powerful the robot can be and how it may be able to complete complex tasks with the simple block code provided.

In scope

The document must complete all obstacle requirements

- It must be able to run the course
- It must avoid all three objects in it's path
- Must go over the ramp provided
- Must knock over pins
- Cannot interfere with objects not included in obstacles

Out of Scope

The following items in Sprint 3 are out of scope:

- Robot must be programmed in Sphero Edu
- Obstacles must be placed in their designated spots on a flat surface

2. Product/Service Description

2.1. Product Context

- This product is one of many that uses block code as the main system for programming a robot.
- Product is not self-independent as you must use Sphero Edu and an outside device to run program.

2.2. User Characteristics

Create general customer profiles for each type of user who will be using the product. Profiles should include:

- Used by student/faculty/staff/other
- No prior experience needed
- No technical expertise needed
- Must have obstacle course placed in exact way as intended

2.3. Assumptions

Some may assume that because it is a small object run by block code that it can only complete small and easy tasks, however this sprint will show that it can do more than simply follow a course.

2.4. Constraints

Describe any items that will constrain the design options, including

- Sphero edu up to date
- Outside device charged and up to date
- Sprk+ charged
- Space on outside device hard drive required

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2.5. Dependencies

List dependencies that affect the requirements. Examples:

- Requires robot to be charged
- Requires robot to link to outside device
- Requires Sphero Edu to be up to date
- Requires device to be charged

3. Requirements

Priority 1

- Robot must complete the course without straying from taped line
- Robot must complete all obstacles to the best accuracy

Priority 2

- Robot should stay in the bounds of the course.
- Should be aimed correctly

Priority 3

- Robot should complete course in timely manner.

3.1. Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
REQ 1	Power	Must be able to speed up to get over ramp and knock down pins	1	11/6	11/6
REQ 2	Movement	Must be able to move along tape to avoid obstacles	2	11/7	11/7
REQ 3	Orientation	Must change orientation to roll in correct direction	1	11/7	11/7

3.2. Security

3.2.1. Protection

Specify the factors that will protect the system from malicious or accidental access, modification, disclosure, destruction, or misuse. For example:

- Encryption via iPhone password
- Encryption via MacBook password
- Must be connected to Sprk+ robot
- Code only accessible through personal Sphero Edu account

3.2.2. Authorization and Authentication

- code only accessible by logging into password protected Sphero Edu account

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- Project documents only shared within group through protected email accounts

3.3. Portability

If portability is a requirement, specify attributes of the system that relate to the ease of porting the system to other host machines and/or operating systems. For example,

- Start and end of code are not host dependent
- Speed and time are host dependent
- Block code can be easily recreated but not copied exactly to another device
- Program is easily accessible

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
12/6/21	Bianca, Noah - algorithm and documentation	confirmed
12/7/21	Bianca, Noah - project manager, tester, coder	confirmed

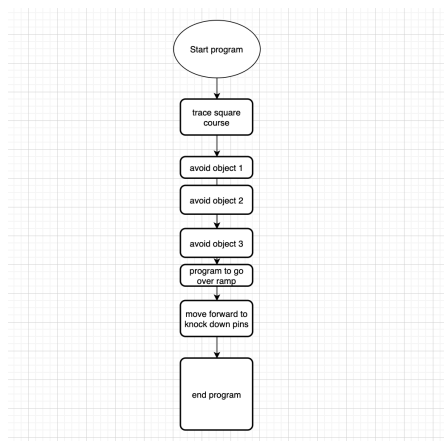
5. System Design

5.1. Algorithm

Develop and describe here the algorithm that will be used to provide the required performance of your software

- Program robot to follow square obstacle course
- Program to avoid object one
- Program to avoid object two
- Program to avoid object three
- Program to go over ramp
- Program to knock down pins

5.2. System Flow



5.3. Software

- Sphero Edu to create block code
- Excel to develop gantt chart
- Pages to created System Design Document
- Draw io to develop flow chart

5.4. Hardware

- MacBook Air
- iPhone to record
- Sprk+ robot

5.5. Test Plan

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

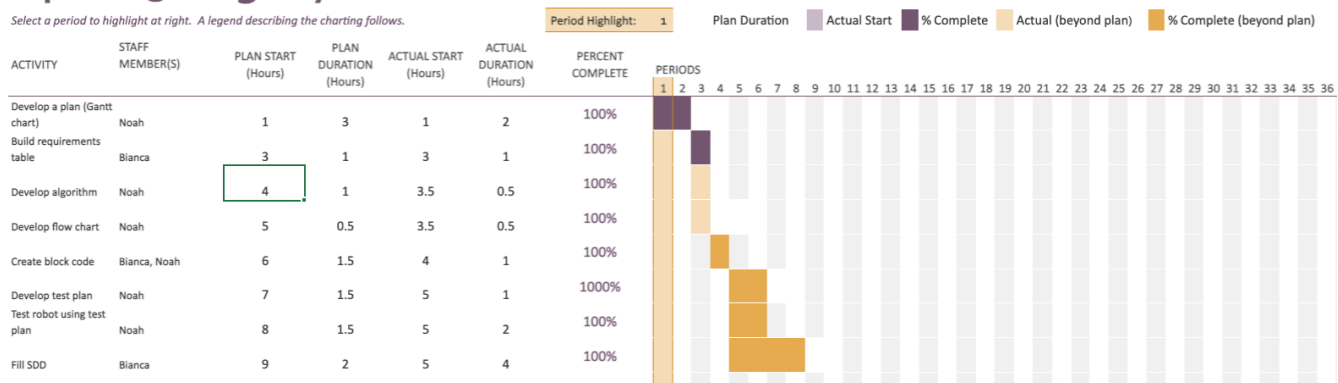
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Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Program to follow square tape	11/7	Robot will reach corner	Robot fell short	Bianca	Fail
Program to follow square	11/7	Robot will reach corner	Robot reached corner	Bianca	Pass
Program to avoid obstacle	11/7	Robot will go around obstacle	Robot went wrong direction	Bianca	Fail
Program to avoid obstacle	11/7	Robot will go around obstacle	Robot fell short	Bianca	Fail
Program to avoid obstacle	11/7	Robot will go around obstacle	Robot hit object 2	Bianca	Fail
Program to avoid obstacle	11/7	Robot will go around obstacle	Robot avoided all 3 obstacles	Bianca	Pass
Make go over ramp	11/7	Robot will clear ramp	Robot didn't go over ramp	Bianca	Fail
Make go over ramp	11/7	Robot will clear ramp	Robot went over but didn't reach tape	Bianca	Fail
Reach tape after clearing ramp	11/7	Robot will reach tape	Robot overshoot tape	Bianca	Fail
Program to roll fast to hit pins	11/7	Robot will hit pins	Robot knocks down all but 1 pin	Bianca	Pass

5.6. Task List/Gantt Chart

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Select a period to highlight at right. A legend describing the charting follows.



5.7. Staffing Plan

Insert a chart/table that depicts the roles and responsibilities of each team member that worked on this project

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Name	Role	Responsibility	Reports To
Bianca	Project leader/coder/documentation	Complete SDD, program robot	Noah
Noah	Tester/algorithm	Test robot and create gantt chart/flowchart	Bianca