Sprint 3 - Agility Design Document

April 18, 2022

Table of Contents

1. Executive Summary

1.1 Project Overview

For this project, our robot, Sphero SPRK+, will follow the course of the blue tape in our classroom, thereby completing an obstacle course.

1.2 Purpose and Scope of this Specification

The purpose of this specification is to run an obstacle course that can be used by students.

In scope

This document addresses requirements related to the second sprint of a series of sprints.

Out of Scope

The following items in sprint 3 are out of scope:

- User modifications.
- Clients requesting more work done without paying extra.

2. Product/Service Description

The general factors that affect the product and its requirements are the pathway in the classroom and the placement of the robot. It will have to move along the path of the obstacle course and finish by knocking out pins at the end.

2.1 Product Context

This product is one of many products manufactured to be used by the Sphero robot. It can be used interchangeably with many products depending on the customer's needs. This particular product is part of a series of systems that will be used on the Sphero robot.

2.2 User Characteristics

- University students with minimal technical expertise.
- School tech teachers.
- Anyone with a simple understanding of robots.

2.3 Assumptions

This product requires software to be installed in our devices with a functional bluetooth connection. If the software is not available, the user will not be able to use the product.

2.4 Constraints

- The code design is constrained by the use of the Shero app's blockcode's pre-existing format.
- The product's functionality is constrained to the classroom it was tested in, with the exact measurements of the tape that is on the floor.

2.5 Dependencies

This product will require an environment that is similar to the one provided at the time of programming. This product will require an obstacle free surface to operate appropriately.

3. Requirements

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
AGIL_01	The robot has to run the obstacle course.	confirmed	Yes	18/04/2022	All
AGIL_02	The robot has to move in a square first.	confirmed	Yes	18/04/2022	All
AGIL_03	The robot has to avoid 3 objects.	confirmed	Yes	18/04/2022	All
AGIL_04	The robot has to go over the ramp.	confirmed	Yes	18/04/2022	All
AGIL_05	The robot has to knock over as many pins as possible.	confirmed	Yes	18/04/2022	All

3.2 Security

3.2.1 Protection

- The system is protected with a user login and password requirement.
- This system is also protected with a history log of all activity performed on it from logging in to logging out.
- The system requires verification from a human, therefore protecting it from malicious robots.

3.2.2 Authorization and Authentication

- Human authentication is required by CAPTCHA upon setting up the user profile.
- User authentication is also required through the mechanism PubCookie.

3.3 Portability

This product is very portable, the only thing you need is the Shpero robot, a device that has the Sphero app and a bluetooth feature, the blockcode on the sphero app, and the robot charging port.

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	Attendees	Comments
04/13/2022	Maheen (Project Planner and Programmer) Gina (Project Manager)	none confirmed.
04/18/2022	Maheen (Project Planner and Programmer) Gina (Project Manager)	all confirmed.

5. System Design

5.1 Algorithm

1. Start on start square
2. Avoid three objects
3. Move to stage 2 square
4. Speed up
5. Go over a ramp
6. Slow down
7. Move to stage 3 square
8. Knock over as many pins as possible
9. Finish at starting square

5.2 System Flow

5.3 Software

The software used to develop and deploy this system was the Sphero app which uses block codes and executes the program.

5.4 Hardware

The hardware platforms used to develop, test and demonstrate this application was the SPRK+ robot, an HP laptop, an ASUS laptop, A Xiaomi smartphone and a Motorola smartphone.

5.5 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
To see if the robot moves along the zig-zag pattern.	18/04/2022	The robot will move along the zig-zag pathway in the classroom.	The robot went in random directions.	Maheen Hanif-Ghafar Gina Elbanna	fail
To see if the robot moves along the zig-zag pattern after editing code..	18/04/2022	The robot will move along the zig-zag pathway in the classroom.	The robot moved along the zig-zag pattern in class.	Maheen Hanif-Ghafar Gina Elbanna	pass
To see if the robot goes over the ramp.	18/04/2022	The robot will go over the ramp.	The robot did not go over the ramp and stopped halfway before falling back.	Maheen Hanif-Ghafar Gina Elbanna	fail
To see if the robot goes over the ramp after increasing the speed.	18/04/2022	The robot will go over the ramp.	The robot went over the ramp.	Maheen Hanif-Ghafar Gina Elbanna	pass
To see if the robot is able to knock the pins.	18/04/2022	The robot will knock as many pins as possible.	The robot moved in a straight line and knocked over most of the pins.	Maheen Hanif-Ghafar Gina Elbanna	pass

5.6 Task List/Gantt Chart

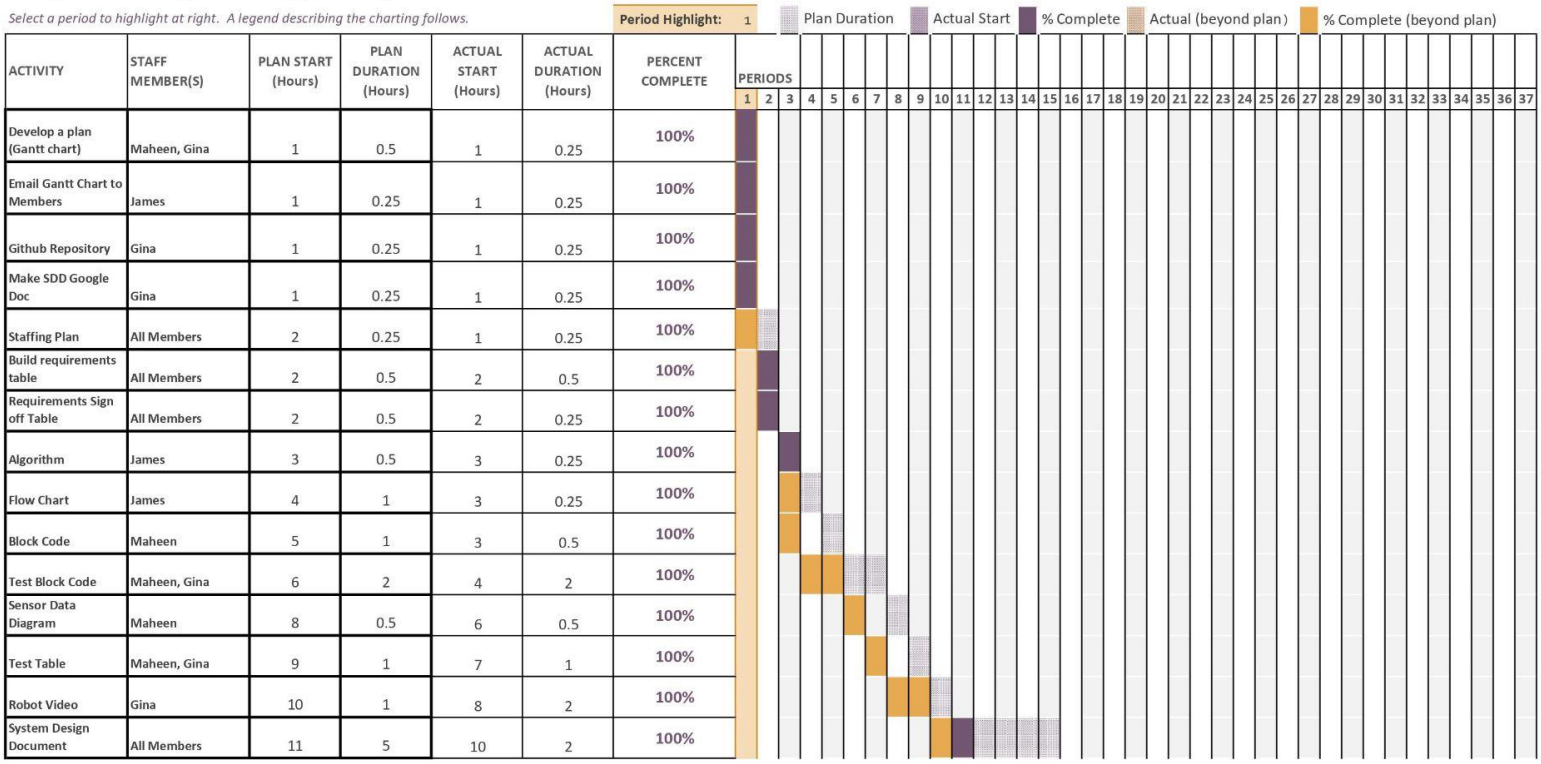
Sprint 3 - Agility

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

Period Highlight: 1 | Plan Duration | Actual Start | % Complete | Actual (beyond plan) | % Complete (beyond plan)

ACTIVITY	STAFF MEMBER(S)	PLAN START (Hours)	PLAN DURATION (Hours)	ACTUAL START (Hours)	ACTUAL DURATION (Hours)	PERCENT COMPLETE
Develop a plan (Gantt chart)	Maheen, Gina	1	0.5	1	0.25	100%
Email Gantt Chart to Members	James	1	0.25	1	0.25	100%
Github Repository	Gina	1	0.25	1	0.25	100%
Make SDD Google Doc	Gina	1	0.25	1	0.25	100%
Staffing Plan	All Members	2	0.25	1	0.25	100%
Build requirements table	All Members	2	0.5	2	0.5	100%
Requirements Sign off Table	All Members	2	0.5	2	0.25	100%
Algorithm	James	3	0.5	3	0.25	100%
Flow Chart	James	4	1	3	0.25	100%
Block Code	Maheen	5	1	3	0.5	100%
Test Block Code	Maheen, Gina	6	2	4	2	100%
Sensor Data Diagram	Maheen	8	0.5	6	0.5	100%
Test Table	Maheen, Gina	9	1	7	1	100%
Robot Video	Gina	10	1	8	2	100%
System Design Document	All Members	11	5	10	2	100%

PERIODS: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37



5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Gina Elbanna	Project Manager	Carrying out project tasks and motivating members to do work.	All members
Maheen Hanif Ghaffar	Project Planner and Programmer	Actively making sure things are going according to plan and setting up meetings with the members. Programming the robot and designing the code.	All members
James Voss	Project Reviewer	Creating the flowchart and rechecking the documents.	All members

5.8 Block Code:

5.9 Sensor Diagram: