Sprint 1 - Endurance Design Document

November 7, 2023

This document contains instructions and examples which are for the benefit of the person writing the document. All text in RED should be removed and replaced with information pertinent to your project.

Text in the finalized document must be **BLACK**.

This is the System Design Document (SDD) and will include sections detailing system flow, algorithms, staffing plan, software/hardware, and Test Plan

You must complete all sections of this document.

Where required by the Sprint Checklist you must embed images of some artifacts in this SDD
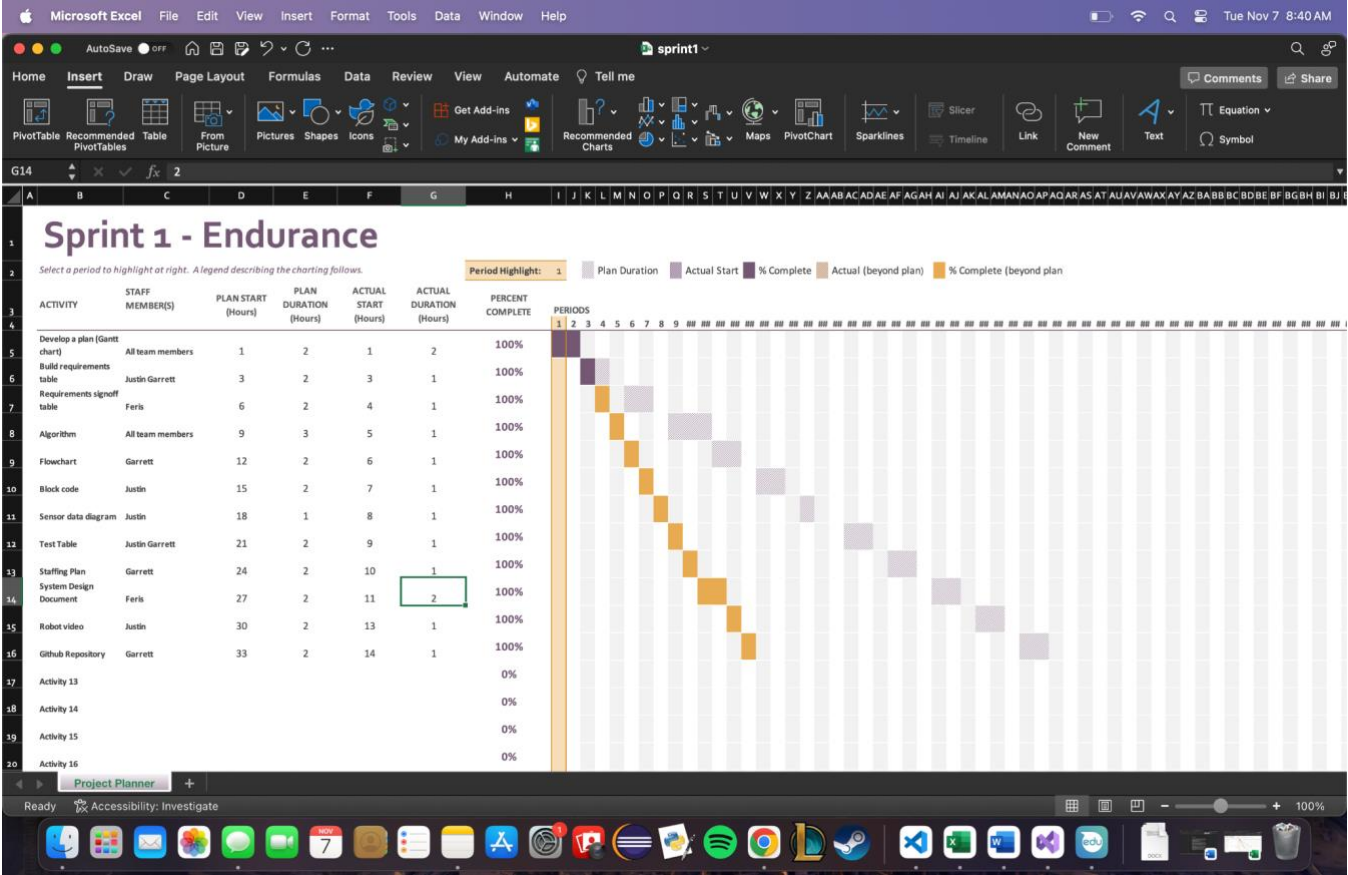
To regenerate the TOC in Word, select all (CTL-A) and press F9.

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5.6 Task List/Gantt Chart

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1. Executive Summary

1.1 Project Overview

This product is designed to circumnavigate around the classroom in a rectangle. The intended audience is the teacher of the class.

1.2 Purpose and Scope of this Specification

● The intended audience was chosen because that is who is grading this project

2. Product/Service Description

Factors that affect the product is the surface that the robot is placed on. If it is a rough or unbalanced surface the robot won't be able to circumnavigate properly.

2.1 Product Context

This product is related to other products created by the same company Sphero. It is not independent because in order for the robot to be programmed to move, the Sphero Edu application must be downloaded.

2.2 User Characteristics

● Faculty / Student
● No experience required
● Small amount of technical experience

2.3 Assumptions

There is a computer with the Sphero Edu application downloaded on a computer with bluetooth on it. The person operating the computer must have some understanding on how to boot up and run the program.

2.4 Constraints

● Different software being used to run the code
● Old or damaged models of the robot
● Computer that doesn't have bluetooth

2.5 Dependencies

● The project must be used on a Mac to show the sensor data
● The floor must be a flat area so that the robot runs straight
● The robot must be on and connected using bluetooth to the Mac computer

3. Requirements

● The robot must go in a perfect rectangle around the classroom PRIO 1
● Justin is the tester that is going to verify that the system satisfies the requirements
● Once the program starts the robot is going to start moving in the rectangle shape
● Check to make sure the robot doesn't go far over the distance it is supposed to go

3.1 Functional Requirements

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ENDUR_01	Light up Green		2	11/4	11/6
ENDUR_02	Say "Ready to Go"	make sure computer column is on	3	11/4	11/6
ENDUR_03	Move along the path of Blue tape	22ft, turn 90 degrees right, 11'8, turn 90 degrees right, 21'6ft, turn 90 degrees right, 11'11ft	1	11/4	11/6
ENDUR_04	Light up Red		2	11/4	11/6
EDDUR_5	Say "I'm done and I need water"	make sure the statement is said before program ends	3	11/4	11/6
ENDUR_XX					

3.2 Security

3.2.1 Protection

- One person's computer will have the program so no one can access it except the owner of that computer

3.2.2 Authorization and Authentication

In order to make sure no unauthorized people get access to the program, only the members of the group and professor will be able to see the code.

3.3 Portability

- The Sphero has host-dependent code and it is the only component;
- All written code is dependent on usage of the Sphero;
- The computer must have the Sphero Edu IDE
- The environment around must be a flat surface or else the robot won't move correctly

4. Requirements Confirmation/Stakeholder sign-off

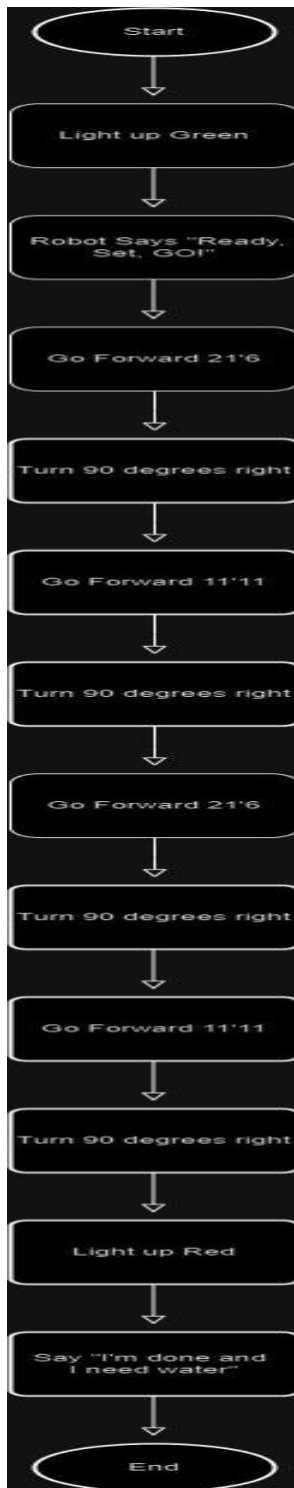| Meeting Date	Attendees (name and role)	Comments
10/30/23	Justin Job Manager, Garrett Meeting Organizer, Fares Problem solver	confirmed jobs/ assigned work
11/06/23	Justin programmer, Garrett problem solver	Programmed and tested robot.

5. System Design

5.1   Algorithm
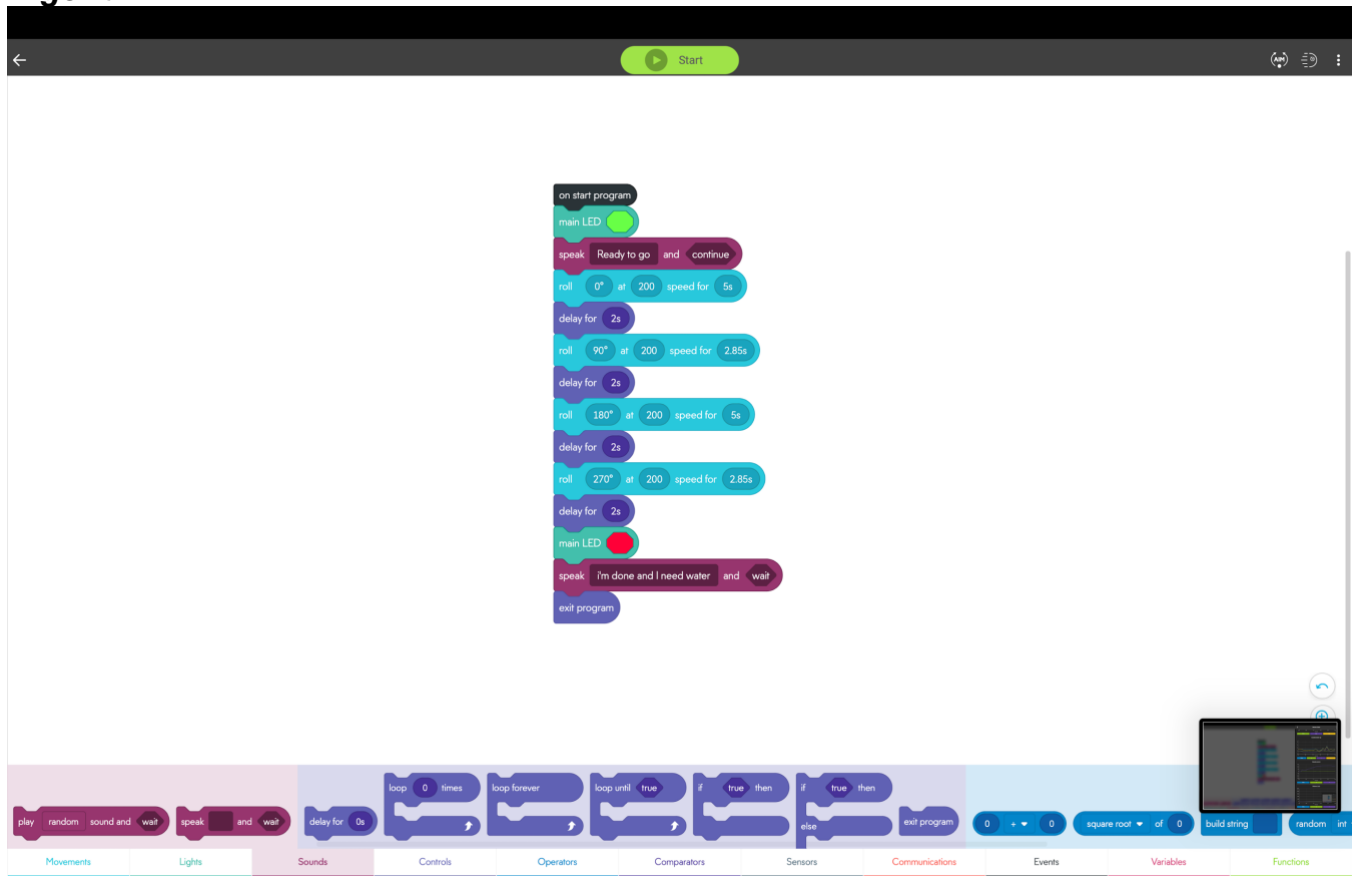
- This algorithm will start with the ball lighting up green
- Then the ball will say "Ready to go"
- The ball will then move forward
- Turn right
- repeat steps 3 & 4 four times
- light up red
- say "I'm done and I need water"

5.2 System Flow

-
```
Start
  │
  ▼
Light up Green
  │
  ▼
Robot Says "Ready,
Set, GO!"
  │
  ▼
Go Forward 21'6
  │
  ▼
Turn 90 degrees right
  │
  ▼
Go Forward 11'11
  │
  ▼
Turn 90 degrees right
  │
  ▼
Go Forward 21'6
  │
  ▼
Turn 90 degrees right
  │
  ▼
Go Forward 11'11
  │
  ▼
Turn 90 degrees right
  │
  ▼
Light up Red
  │
  ▼
Say "I'm done and
I need water"
  │
  ▼
End
```

5.3 Software

We used block code as our language on the API, Sphero edu.

5.4 Hardware
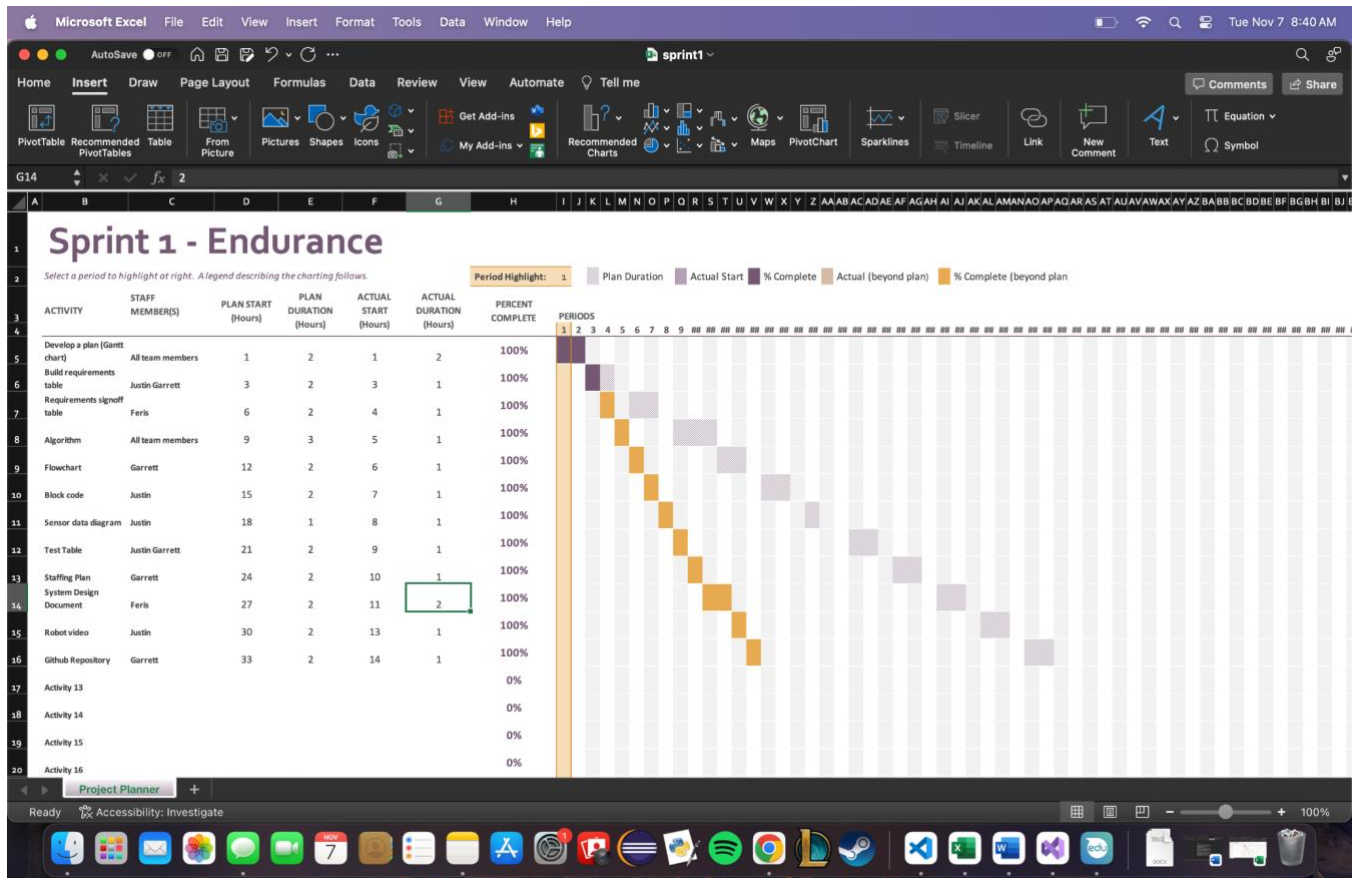
We used Mac and windows laptops

5.5   Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Test forward movement (Time)	11/6	To reach the end of the forward movement	Came up short	Justin	Fail
Adjust forward movement (Time/Speed)	11/6	To reach the end of the forward movement	Came up too far	Justin	Fail
Adjust forward movement (Time)	11/6	To reach the end of the forward movement	Perfect length of forward movement	Justin	Pass
Test sideways movement (Turning/Time)	11/6	To turn and reach the end of the sideways movement	Turned wide and came up too short	Garrett	Fail
Adjust sideways movement (Time)	11/6	To reach the end of the sideways movement	Came up too short	Garrett	Fail
Adjust sideways movement (Time)	11/6	To reach the end of the sideways movement	Perfect length of sideways movement	Garrett	Pass
Test full endurance run	11/6	To fully complete the endurance test	Completed the rectangle with no issues	Justin / Garrett	Pass

5.6

5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Garrett Boag	Test Organizer	Organize the Meetings/Tests	Garrett
Justin Veltri	Job Manager	Designates tasks to others	Garrett / Fares
Fares	Problem Solver	Determines issues in code and	Garrett