Sprint 2 - Accuracy Design Document

November 25th, 2020

Use this Requirements Specification template to document the requirements for your product or service, including priority and approval (Must do).

This document will also serve as a System Design Document (How to) and will include sections detailing system flow, algorithms, staffing plan, software/hardware, and Test Plan

This document contains instructions and examples which are for the benefit of the person writing the document and should be removed before the document is finalized.

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1. Executive Summary

1.1 Project Overview

This product is going to attempt to create a figure eight track course.

1.2 Purpose and Scope of this Specification

The purpose of this is to allow the instruction crew to make a perfect figure eight course for an easier way for contractors to measure the size of the course while creating financially cheaper costs to do the course.

In scope

The following items in phase 3 of Project A are in scope:

- The robot would be used for commercial use.
- It must be used for creating tracks.
- Intended for efficiently and feasibility in designing and manufacturing track courses.

Out of Scope

The following items in phase 3 of Project A are out of scope:

- This robot is not intended to be used as a lethal weapon.
- This is not to be designed for city roads.
- Robots are not intended for military use and The Department of Transportation.

2. Product/Service Description

This product is designed to create pathways for figure eight courses in a symmetrical format. Rathe then using human interaction that can possibly have inaccurate measurements of a figure eight tracks. It is for feasibility, efficiency and accuracy for creating figure eight style track courses that will be beneficial for NASCAR or other race like competitions.

2.1 Product Context

This product is to make figure eights in course so that it limits the possibility of inaccurate track courses. This will eliminate human interaction and mitigate those possibilities. The sole purpose of this machine is to help contractors design a figure eight course that will have little to 0 errors in measurement, flaws and abnormalities.

2.2 User Characteristics

Profiles should include:

- NASCAR
- Contractors
- Investors
- Car enthusiasts
- Racing clubs
- Racing leagues

2.3 Assumptions

- There must be a clear path on the ground, so nothing blocks the robot on its path.
- The path must be flat so the robot can get accurate reading.
- Contractors should have a general knowledge of the measurements needed for the course.

- Contractors should have a general understanding of the product at hand with IT departments to code the robot specifically tailored for the contracting team.

2.4 Constraints

Describe any items that will constrain the design options, including

- The code will not change until it is done manually.
- Once the code is written the robot will complete the code unless the measurements are changed.
- The program is only in block code.
- The robot must compare it to a blueprint electronically.

2.5 Dependencies

List dependencies that affect the requirements. Examples:

- The product will need to be charged daily.
- The robot must have an excellent GPS signal for accurate measurements.
- The ground must be smooth, flat, and not obstructed.

3. Requirements

Priority Definitions

The following definitions are intended as a guideline to prioritize requirements.

- Priority 1 – The requirement is a “must have” as outlined by policy/law
- Priority 2 – The requirement is needed for improved processing, and the fulfillment of the requirement will create immediate benefits
- Priority 3 – The requirement is a “nice to have” which may include new functionality

It may be helpful to phrase the requirement in terms of its priority, e.g., "The value of the employee status sent to DIS **must be** either A or I" or "It **would be nice** if the application warned the user that the expiration date was 3 business days away". Another approach would be to group requirements by priority category.

3.1 Functional Requirements

The following table is an example format for requirements.

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
ENDUR_01	The robot will travel a figure eight course five times.	It will be a loop; it will be a loop five times.	1	11/19	11/19
ENDUR_02	The robot will stop.	The robot will stop where it started.	2	11/19	11/19
ENDUR_02	The robot will speak, “I am the winner.”	The robot will speak as it is desired to do so.	1	11/19	11/19
ENDUR_03	The robot will flash multicolor lights for five seconds.	The robot will turn different colors.	1	11/19	11/19

3.2 Security

3.2.1 Protection

- All users - the robots will only work from the sphero.edu application
- It will have a pre-installed code that will only design figure eight styled courses.
- GPS tracking.

- There is a hard protection shell around the robot.
- The robot can only be accessed with the account associated with it.

3.2.2 Authorization and Authentication

- You must sign into sperho.edu on the app.

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,

- Percentage of components with host-dependent code: 100%
- Percentage of code that is host dependent: 50%.
- Use of proven portable language: Block Code
- Use of a particular operating system: Robot/ Block code.
- The product will work the same for any environment, but the application will differ between each type of use.

4. Requirements Confirmation/Stakeholder sign-off

Meeting Date	Attendees (name and role)	Comments
11/19/2020	Mia Lizzo, Vincent Negri	Confirmed all.

5. System Design

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

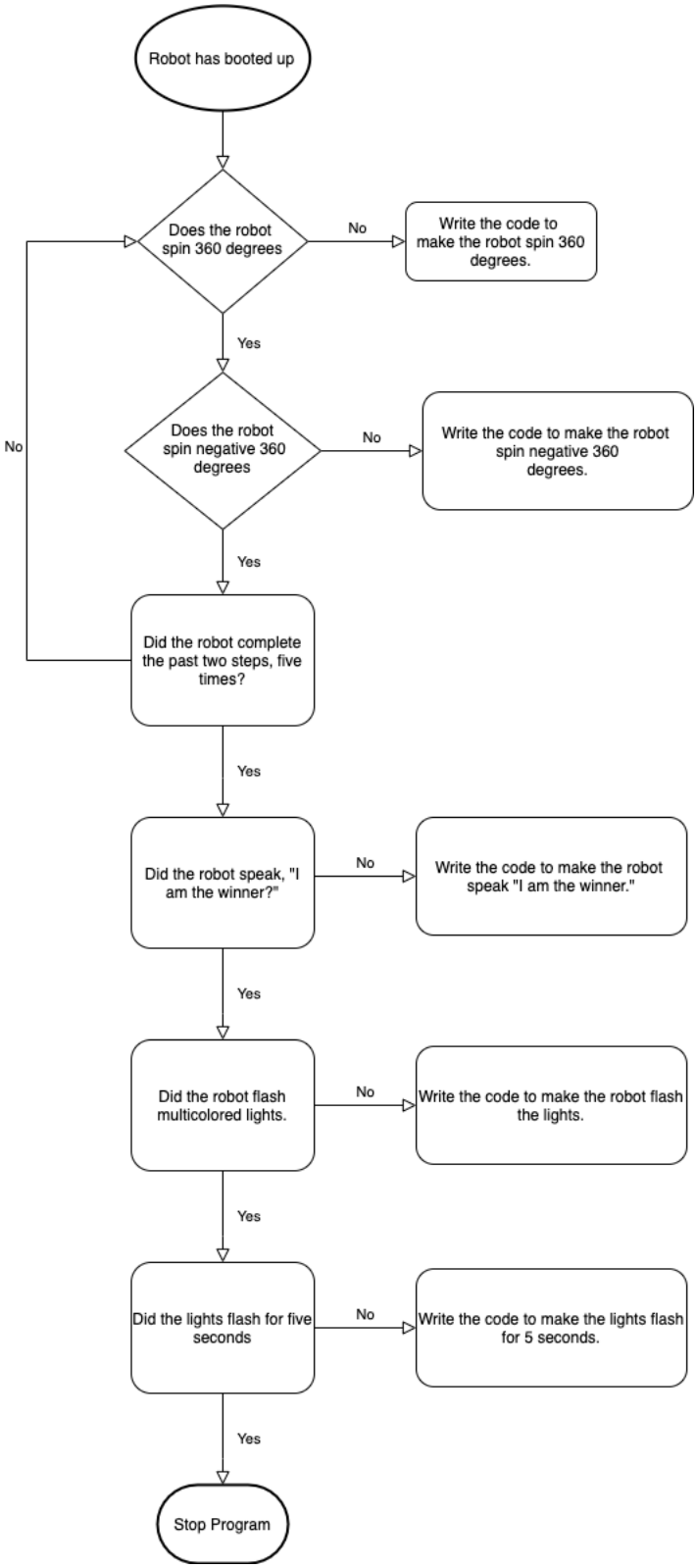
5.1 Algorithm

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

- Step 1: The robot will travel in a 360 for 8.4 seconds.
- Step 2: The robot will travel in a –360 for 8.4 seconds.
- Step 3: This will loop five times.
- Step 4: The robot will stop.
- Step 5: The robot will speak, “I am the winner.”
- Step 6: The robot will flash multicolor lights.

5.2 System Flow

Develop a flowchart (and show here) that accurately depicts how your software application will act to fulfil the algorithm


Robot has booted up
Does the robot spin 360 degrees
No
Write the code to make the robot spin 360 degrees.
Yes
Does the robot spin negative 360 degrees
No
Write the code to make the robot spin negative 360 degrees.
No
Yes
Did the robot complete the past two steps, five times?
Yes
Did the robot speak, "I am the winner?"
No
Write the code to make the robot speak "I am the winner."
Yes
Did the robot flash multicolored lights.
No
Write the code to make the robot flash the lights.
Yes
Did the lights flash for five seconds
No
Write the code to make the lights flash for 5 seconds.
Yes
Stop Program

5.3 Software

5.4 Hardware

- We used sphero.edu to develop, test and demonstrate this application.

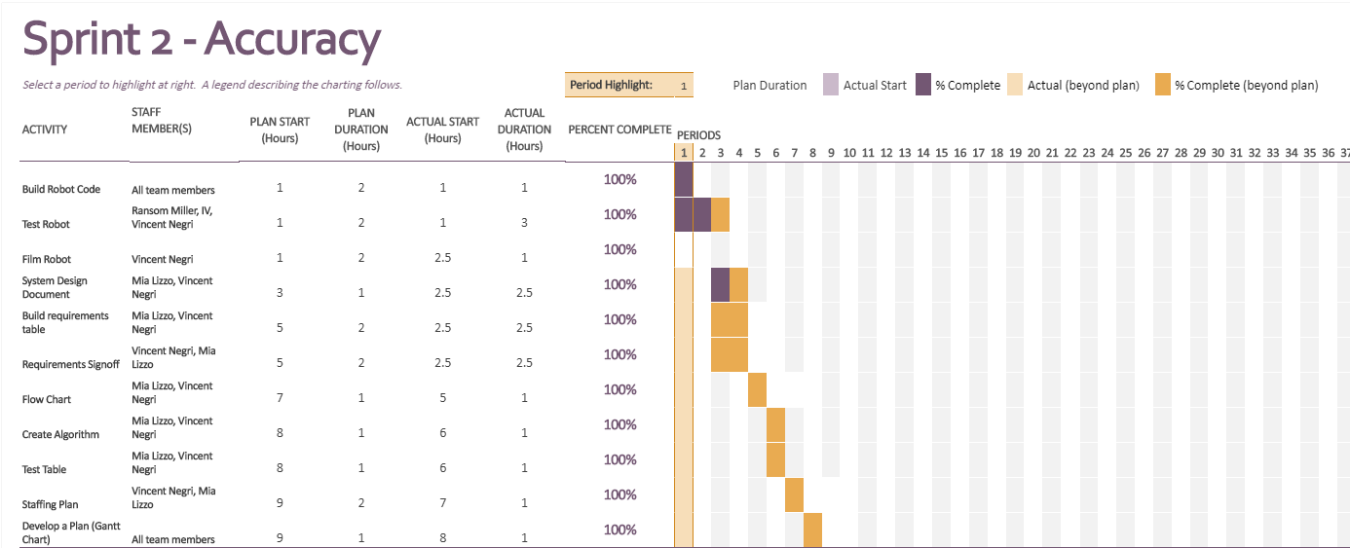
5.5 Test Plan

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

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Calibration Test	11/18	The robot will follow the figure eight for the first half.	The robot did not follow the path correctly.	Ransom + Vinnie	Fail
Calibration Test – Increased the delay to one second	11/18	The robot will follow the full figure eight one time.	The robot successfully completed the course.	Ransom + Vinnie	Pass
Will the robot complete the course five times	11/18	The robot will follow the full figure eight five time.	The robot completed the course, but it strayed from the path.	Ransom + Vinnie	Pass
Will the robot complete the course five times	11/18	The robot will follow the full figure eight five time.	The robot completed the course, but it strayed from the path.	Ransom + Vinnie	Pass
Will the robot complete the course five times	11/18	The robot will follow the full figure eight five time.	The robot completed the course, but it strayed from the path.	Ransom + Vinnie	Pass
Will the robot complete the course five time accurately and speak the desired phrase.	11/18	The robot will complete the course and speak the desired phrase.	The robot successfully completed the course, but the robot did not stop here it started the first time.	Ransom + Vinnie	Fail

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
Will the robot complete the course five times accurately and speak?	11/18	The robot will complete the course and speak the desired phrase.	The robot successfully completed the course, but the robot drifted and strayed from the pass	Ransom + Vinnie	Fail
Will the robot complete the course five time accurately and speak?	11/18	The robot will complete the course and speak the desired phrase.	The robot completed the course accurately and spoke the desired phrase.	Ransom + Vinnie	Pass
Will the robot complete the course five time accurately and speak. While also flashing multicolored lights.	11/18	The robot will complete the entire course accurately, speak the phrase, and flash multicolored lights	The robot did not flash the lights, but completed the course and spoke	Ransom + Vinnie	Fail
Will the robot complete the course five time accurately and speak. While also flashing multicolored lights.		The robot will complete the entire course accurately, speak the phrase, and flash multicolored lights	The robot did not flash the lights, but completed the course and spoke	Ransom + Vinnie	Fail
Will the robot complete the course five time accurately and speak. While also flashing multicolored lights.		The robot will complete the entire course accurately, speak the phrase, and flash multicolored lights	The robot completed everything it was desired to do so.	Ransom + Vinnie	Pass

5.6 Task List/Gantt Chart



ACTIVITY	STAFF MEMBER(S)	PLAN START (Hours)	PLAN DURATION (Hours)	ACTUAL START (Hours)	ACTUAL DURATION (Hours)	PERCENT COMPLETE
Build Robot Code	All team members	1	2	1	1	100%
Test Robot	Ransom Miller, IV, Vincent Negri	1	2	1	3	100%
Film Robot	Vincent Negri	1	2	2.5	1	100%
System Design Document	Mia Lizzo, Vincent Negri	3	1	2.5	2.5	100%
Build requirements table	Mia Lizzo, Vincent Negri	5	2	2.5	2.5	100%
Requirements Signoff	Vincent Negri, Mia Lizzo	5	2	2.5	2.5	100%
Flow Chart	Mia Lizzo, Vincent Negri	7	1	5	1	100%
Create Algorithm	Mia Lizzo, Vincent Negri	8	1	6	1	100%
Test Table	Mia Lizzo, Vincent Negri	8	1	6	1	100%
Staffing Plan	Vincent Negri, Mia Lizzo	9	2	7	1	100%
Develop a Plan (Gantt Chart)	All team members	9	1	8	1	100%

5.7 Staffing Plan

Name	Role	Responsibility	Reports To
Mia Lizzo	Writer	To document the project and write the necessary definitions. Since she lives in Florida this is the only way possible.	Vincent Negri
Vincent Negri	Leader	To organize, plan and execute this project. Keep the necessary items on track to be completed. Stay on top of team members and himself.	Mia Lizzo & Ransom Miller
Ransom Miller, IV	Coder	To keep the robot and write the necessary code within the Sphero program.	Mia Lizzo & Vincent Negri