Sprint 2 - Accuracy Design Document

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# Executive Summary

## Project Overview

This project will demonstrate to Professor Eckert, the sphero robot following the path of a figure eight, five times.

## Purpose and Scope of this Specification

Sphero robot will perform a figure eight, five times to show to Professor Eckert.

In scope

This document addresses requirements related to Accuracy Sprint of Robot Project :

* Robot must start in square provided.
* Robot must travel first have of figure eight.
* Robot must then travel second half of figure eight.

Out of Scope

The following items in Accuracy Phase of Robot Project are out of scope:

* Robot must end back where it started.
* Robot must complete figure eight, five times.
* Robot must speak “I am the winner” when done.
* Robot must also flash multicolored lights for five seconds when done.

# Product/Service Description

Robot must perform a figure eight, fives times, following the blue tape and arrows or general shape due to inability to access specific outline. This robot must spin on ground and avoid hitting obstacles as well as staying on the path.

## Product Context

This robot is one of many different types produced by the company Sphero. The robot is independent of other robots and is self-contained within its ball form. It can be connected and utilized by anything that has a bluetooth connection and has the Sphero.edu app. The device connected to the robot can use remote controls or code to control what the robot does and how it moves.

## User Characteristics

General customer profiles:

* Can be used by almost anyone, i.e.: teachers, students, adults, kids, average joe.
* Little experience is needed to learn and understand how to control robot.
* User must have basic understanding of using a computer and minimal background in coding.
* Not for toddlers, will break if thrown or handled too roughly.

## Assumptions

Robot is properly charged, usage of floor space or designated area, and device with Bluetooth compatibility and the Sphero.edu application.

## Constraints

Constraints of design options:

* Updated version of bluetooth
* Updated version of Sphero.edu app
* Workspace due to social distancing and other safety precautions
* Personal devices, such as laptops or phones
* Required use of predesigned block codes on Sphero.edu app

## Dependencies

Dependencies that affect the requirements:

* Require occasionally updates to system software
* Must be the specific Sphero robot provided by university
* Block code must be completed first

# Requirements

* Robot must follow path of figure eight and complete it five times.
* Priority 1:
  + Must start in designated square
  + Must successfully travel circumference of first circle
  + Must successfully travel circumference of second circle in opposite direction to complete figure eight
  + Must complete figure eight a total of five times
  + Must finish in same square it started in
  + When done, must say, “I am the winner”
  + Must flash multicolored lights for five seconds

## Functional Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Req# | Requirement | Comments | Priority | Date Rvwd | SME Reviewed/approved |
| Accuracy\_1 | Start in square | Should be in starting position for best results | 1 | 11/12/20 | 11/23/20 |
| Accuracy\_2 | Run the figure 8 course five times | Sphero must stick to the path provided by the figure eight | 1 | 11/12/20 | 11/23/20 |
| Accuracy\_3 | Finish in starting square | If the sphero followed the path correctly it should end up at the starting square | 1 | 11/12/20 | 11/23/20 |
| Accuracy\_4 | Speak “I am the winner” and flash multicolored lights for 5 seconds | These two are necessary to show that we followed the guidelines | 1 | 11/12/20 | 11/23/20 |

## Security

### Protection

Factors that will protect the system:

* Keep account information for github.com and Sphero.edu secret
* Logging activity
* Historical data sets
* Charting roles and who does specific jobs

### Authorization and Authentication

Use of Github.com and Sphero.edu and Microsoft Office products through our accounts

## Portability

Specify attributes of the system that relate to the ease of porting:

* Host dependent code is used for entire block code in controlling robot
* Used JavaScript in block code form on Sphero.edu
* Works with specific block code set up on any compatible device
* Works anywhere there is enough space

# Requirements Confirmation/Stakeholder sign-off

|  |  |  |
| --- | --- | --- |
| Meeting Date | Attendees (Names and Roles) | Comments |
| 11/12/20 | Michael (Co-manager)  Daniel (Co-manager) | Called to finalize block code and confirm all requirements have been met. |

Include documentation of the approval or confirmation of the requirements here. For example:



# System Design

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

## Algorithm

* Start in the designated square
* Travel the circumference of first circle
* Travel circumference of second circle in opposite direction that the first was completed
* Complete figure eight a total of five times
* Finish in same square it started
* Speak: “I am the winner”
* Flash multicolored lights for five seconds

## System Flow

Diagram

Description automatically generated

## 

## Software

Block code that is a representation of JavaScript which was controlled through the Sphero Edu software.

Graphical user interface, application

Description automatically generated

Graphical user interface

Description automatically generated

## Hardware

Sphero Edu was used to control the Sphero robot which was version SPRK+. This was done through Bluetooth from a personal laptop that allowed connection between the SPRK+ and the Sphero Edu app to access the block code.

## Test Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| First test | 11/23/20 | A few errors and unknown factors that we have failed to consider | The sphero did not follow the figure eight rather it just made two separate circles | Michael and Daniel | Fail |
| Make the sphero follow the path of one circle | 11/23/20 | Traveled the full circle without errors | The sphero did make the full circle with no errors | Michael and Daniel | pass |
| Make the sphero follow the path of the second circle | 11/23/20 | Travels the second circle with no problems | Followed the second circles path with no issues | Michael and Daniel | Pass |
| Make sure the sphero follows the entire figure eight | 11/23/20 | Some slight adjustments to speed or timing depending on margin of error | The sphero was off by a little bit so we must fix speed | Michael and Daniel | Fail |
| The sphero should run the figure eight course five times and complete all requirements | 11/23/20 | Should be no errors overall | The sphero completed the figure eight five times and completed all requirements | Michael and Daniel | Pass |

## Task List/Gantt Chart

Full Gnatt chart on GitHub <here>

Chart

Description automatically generated



## Staffing Plan

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Role | Responsibility | Reports To |
| Michael | Co-manager | Oversee and complete all parts of assignment | Professor Eckert |
| Daniel | CO-manager | Oversee and complete all parts of assignment | Professor Eckert |