**Sprint 3 - Agility Design Document**

**December 3, 2020**

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# Executive Summary

## Project Overview

“Your robot will run the obstacle course. The course will start in a square. Then the robot will encounter 3 objects which it must avoid. Next, the robot will go over the ramp. Finally, the robot will knock over as many pins as possible. Points added for each obstacle the robot completes, for each obstacle avoided and for each pin the robot topples.”

## Purpose and Scope of this Specification

This specification is meant to document Sprint 3 - Agility. The intended audience is Professor Eckert and the other students in CS104-03 Intro to Problem Solving.

In scope

This document addresses requirements related to Sprint 3 - Agility:

* Gantt Chart
* Requirements Table
* Requirements Sign-Off Table
* Algorithm
* Flowchart
* Block Code
* Sensor Data Diagram
* Test Table
* Staffing Plan
* System Design Document
* Robot Video (committed to GitHub repository)
* GitHub Repository

Out of Scope

The following items are out of scope:

* Everything relating to Sprint 1 – Endurance
* Everything relating to Sprint 2 – Accuracy

# Product/Service Description

## Product Context

This product is an independent and self-contained project.

## User Characteristics

Users will be Joe Colonna, John Costa, and Nicole Czerepak – students at Monmouth University. They have limited experience and technical expertise. Project will be graded by Professor Eckert. He has many years of experience and much technical knowledge.

## Assumptions

* Sphero EDU will be usable.
* The robot is in the possession of Nicole Czerepak.

## Constraints

* Must use Sphero EDU block code.
* Must test code on the robot.
* The room used for the tests has been scaled down due to lack of space.

## Dependencies

* Sphero EDU
* The robot

# Requirements

## Functional Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Requirement** | **Comments** | **Priority** | **Date Reviewed** | **SME Reviewed/ Approved** |
| AG1 | Robot encounters and avoids 3 objects. | Must do. | 1 | 11/29/20 | We do not have a SME (Systems Management Expert) besides Professor Eckert. |
| AG2 | Robot goes over a ramp. | Must do. | 1 | 11/29/20 |  |
| AG3 | Robot collides with pins. | Must do. Goal is to knock down as many pins as possible. | 1 | 11/29/20 |  |

## Security

### Protection

No protections needed for this school project.

### Authorization and Authentication

No authorization or authentication needed for this school project.

## Portability

Portability is not a requirement for this school project.

# Requirements Confirmation/Stakeholder Sign-Off

|  |  |  |
| --- | --- | --- |
| **Meeting Date** | **Attendees (name & role)** | **Comments** |
| 11/29/20 | Nicole Czerepak (coder/tester/robot owner)  Joe Colonna (algorithms/tables)  John Costa (GitHub/editor/SDD) | None |

# System Design

## Algorithm

1. Robot rolls forward.
2. Robot encounters the first obstacle and turns to avoid it.
3. Robot continues forward.
4. Robot encounters the second obstacle and turns to avoid it.
5. Robot continues forward.
6. Robot encounters the third obstacle and turns to avoid it.
7. Robot turns to align with ramp.
8. Robot rolls forward, picks up speed, and goes over the ramp.
9. Robot continues forward into the pins.
10. Robot stops after knocking down the pins.

## System Flow

Graphical user interface, text, application

Description automatically generated

## Software

The software used to develop and deploy this application is Sphero EDU. The code will be programmed using its block code program. The robot will be connected to Sphero, and then the code will be executed. Pictured below is the completed block code and sensor data.

Graphical user interface, chart

Description automatically generated

## Hardware

Besides a computer, the only hardware required is the robot that goes along with Sphero EDU.

## Test Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Date of Test** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail?** |
| Robot needs to successfully avoid obstacles. | 11/30/20 | Robot moves forward and avoids the obstacles. | Robot does not move straight. | Nicole | Fail |
| Robot needs to successfully avoid obstacles. | 11/30/20 | Robot moves forward and avoids the obstacles. | Robot avoids the first two obstacles but veers out of bounds before the third. | Nicole | Fail |
| Robot needs to successfully avoid obstacles. | 12/1/20 | Robot moves forward and avoids the obstacles. | Robot moves forward and avoids the obstacles. | Nicole | Pass |
| Robot needs to turn and go over the ramp. | 12/1/20 | Robot turns and goes over the ramp. | Robot turns and does not gain enough speed to go over ramp. | Nicole | Fail |
| Robot needs to turn and go over the ramp. | 12/1/20 | Robot turns and goes over the ramp. | Robot turns and goes over the ramp. | Nicole | Pass |
| Robot needs to knock over the pins. | 12/1/20 | Robot knocks over pins. | Robot knocks over pins. | Nicole | Pass |

## Task List/Gantt Chart

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sprint 3 - Agility** |  |  |  |  |
| **ACTIVITY** | **GROUP MEMBER(S)** | **PLANNING (Hours)** | **ACTUAL WORK TIME (Hours)** | **PERCENT COMPLETE** |
| **Develop a plan (Gantt chart)** | **All team members** | 1 | 2 | **100%** |
| **Build requirements table** | **Joe C.** | 0 | 1 | **100%** |
| **Requirements sign-off table** | **Joe C.** | 0 | 1 | **100%** |
| **Algorithm** | **Joe C.** | 1 | 1 | **100%** |
| **Flowchart** | **John C.** | 1 | 1 | **100%** |
| **Coding** | **Nicole C.** | 1 | 2 | **100%** |
| **Sensor data diagram** | **Nicole C.** | 1 | 3 | **100%** |
| **Test table/plan** | **Nicole C.** | 1 | 2 | **100%** |
| **Staffing plan** | **Joe C.** | 0 | 1 | **100%** |
| **Record video of robot** | **Nicole C.** | 0 | 1/2 | **100%** |
| **Set up GitHub repository** | **John C.** | 1 | 1 | **100%** |
| **Fill in, format, and edit system design doc** | **John C.** | 2 | 2 | **100%** |

## Staffing Plan

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Role** | **Responsibility** | **Reports To** |
| Joseph Colonna | Algorithm  Tables | Writes the algorithm and most tables | Each other |
| John Costa | GitHub Manager  Editor  System Design Documentation | Manages collaborative GitHub account, edits all materials, makes the flowchart, writes System Design Document | Each other |
| Nicole Czerepak | Coder  Tester  Robot Owner | Writes block code, owner of the robot, tests code on robot and documents results, records sensor data graph | Each other |