Sprint 3 - Agility Design Document

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# Executive Summary

## Project Overview

This project is to test our knowledge of software engineering. We test our knowledge of making algorithms, testing code, and making flow charts. Each group is assigned a robot that must do the following: Go around the Agility course. There are a series of requirements the robot must do while doing this course. Like speaking, and staying on the path, as well as maneuvering around obstacles.

## Purpose and Scope of this Specification

In scope

Modification of the third sprint, give a good deep analysis of sprint 3. It shows our knoledge from the previous sprints and how well we add it to the final sprint.

Out of Scope

It helps show our knowledge from the previous sprints. Gets us ready for future projects we have with a group.

# Product/Service Description

Some General factors that can affect the product and its requirements are:

* Robot battery
* Room availability
* Group member availability
* Other groups working on at the same time

## Product Context

It relates to other products because we are basically in our own software engineering group, working on a project. It relates to real world scenarios for future software engineers because you work in a group, and each member must do their part.

## User Characteristics

* Professors
* Students
* Group members
* Kids
* No experience required
* People do not need any technical expertise

## Assumptions

We would assume:

* that the rooms would be available on the times listed
* Our group will meet when scheduled too
* The robot block code will work when started
* The Robot is fully functioning and charged

## Constraints

* The room is not available
* The robot isn’t charged
* The block code doesn’t work
* Only one member of the group can meet
* The course tape is ripped

## Dependencies

* Robot must be charged
* Door to room must be unlocked
* Building must be open
* Sphero Edu app must be available with the code
* Lights in the room must work
* Area must be clear

Requirements

* In the following table there are a list of requirements that must be met to successfully complete the project. The robot must start on the x of the Agility course. The robot must successfully maneuver around each bottle, then jump over the binder and knock down all the pins(markers). The robot must do this while staying within the path required. When the robot successfully gets around the obstacles and jumps over the binder it knocks down markers.

Priority Definitions

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

* Priority 1 – States the requirements that must be met to achieve the goal
* Priority 2 – States certain secondary needs that can help make the robots path of travel and code more accurate.
* A good requirement is:
  + Making sure the robot stays within the path

## Functional Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Req# | Requirement | Comments | Priority | Date Reviewed | SME Reviewed/Approved |
| Agility\_01 | Blue light faces opposite direction of initial | Not required, however, to go on the right path alignment is vital | 2 | 4/13/2022 | Approved |
| Agility\_02 | Robot Starts on the x at the beginning of the path |  | 1 | 4/13/2022 | Approved |
| Agility\_03 | Robot goes along first line without hitting the glass bottle |  | 1 | 4/13/2022 | Approved |
| Agility\_04 | Robot stops and delays for one second | Helps make the robot more accurate on its path of travel | 2 | 4/13/2022 | Approved |
| Agility\_05 | Robot turns right and continues the line without hitting the second glass bottle |  | 1 | 4/13/2022 | Approved |
| Agility\_06 | Robot stops and delays for one second | Helps make the robot more accurate on path of travel | 2 | 4/13/2022 | Approved |
| Agility\_07 | Robot turns left and continues the path of travel without hitting the third glass bottle |  | 1 | 4/13/2022 | Approved |
| Agility\_08 | Robot stops and delays for one second | Helps make the robot more accurate on path of travel | 2 | 4/13/2022 | Approved |
| Agility\_09 | Robot turns right and goes down the path jumping over the binder and stopping at the corner. |  | 1 | 4/13/2022 | Approved |
| Agility\_10 | Robot stops and delays for one second | Helps make the robot more accurate on path of travel | 2 | 4/13/2022 | Approved |
| Agility\_11 | Robot turns right and goes straight hitting down all the markers |  | 1 | 4/13/2022 | Approved |

## Security

### Protection

* We all have our own emails and passwords that aren’t shared
* Our laptops and devices are locked with passcodes so no one can get in
* The Sphero Edu app is linked up to our personal emails where only we can view our code
* Our Git Hub is private so no one can see

### Authorization and Authentication

* Only we can work on our code and test the robot
* The Professor has access to the robot’s code
* Git Hub has authorization and requires you to sign in

## Portability

* Our laptops are portable
* Our Sphero Robot is portable
* The Sphero Edu app is on every device, so we always have access to it

# Requirements Confirmation/Stakeholder sign-off

|  |  |  |
| --- | --- | --- |
| Meeting Date | Attendees Name and Role | Comments |
| 4/13/2022 | Brandon, Xabien  (Block code program) | Successful meeting. The robot hit the bottle a couple of times, however after finding out the perfect times for the robot to go along each path we got it to not hit a single object and knock down all except one marker. |

# System Design

## Algorithm:

* Algorithm:
* Set robot speed to 55
* Roll straight for 1.7 seconds
* Stop
* Delay for 1 second
* Set speed to 59
* Turn right and roll for 1.97 seconds
* Stop
* Delay for 1 second
* Set speed to 55
* Turn left and roll for 2.18 seconds
* Stop
* Delay for 1 second
* Set speed to 150
* Turn right and roll for 1.97 seconds
* Stop
* Delay for 2 seconds
* Turn right and roll for 3 seconds
* Stop
* End program

Graphical user interface, text, application, chat or text message

Description automatically generated

## System Flow

Diagram

Description automatically generated

## Software

The software language used in this program was block code from Sphero Edu

## Hardware

The Hardware platforms that were used to design and test this, was Sphero Edu app as well as Draw.io

## Test Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Reason for Test Case | Test Date | Expected Output | Observed Output | Staff Name | Pass/Fail |
| Robot move in zig zag line | 4/13 | Robot moved in zig zag line with the course | Robot moved in zig zag line with the course but went off track slightly | Xabien | Pass |
| Robot moved through the course to the ramp | 4/13 | Robot moved through the course to the ramp | Robot went way off course | Xabien | Fail |
| Robot moved through the course to the ramp | 4/13 | Robot moved through the course to the ramp | Robot collided with obstacles | Xabien | Fail |
| Robot moved through the course to the ramp | 4/13 | Robot moved through the course to the ramp | Robot moved through the course to the ramp without hitting obstacles | Brandon | Pass |
| Have robot go through course and make the jump over the ramp towards pins | 4/13 | Have robot go through course and make the jump over the ramp towards pins | Robot did not make it over ramp | Brandon | Fail |
| Have robot go through course and make the jump over the ramp towards pins | 4/13 | Have robot go through course and make the jump over the ramp towards pins | Robot made it over the ramp but went wrong direction | Brandon | Fail |
| Have robot go through course and make the jump over the ramp towards pins | 4/13 | Have robot go through course and make the jump over the ramp towards pins | Robot only hit two pins after going over ramp | Xabien | Fail |
| Have robot go through course and make the jump over the ramp towards pins | 4/13 | Have robot go through course and make the jump over the ramp towards pins | Robot went through course and made the jump over the ramp towards pins | Xabien | Pass |
| Go through course and knock over all pins | 4/13 | Go through course and knock over all pins | Only knocked over 3 pins | Brandon | Fail |
| Go through course and knock over all pins | 4/13 | Go through course and knock over all pins | Robot knocked over all pins and finished course | Brandon | Pass |

## Task List/Gantt Chart

Chart, bar chart

Description automatically generated

## Staffing Plan

|  |  |  |
| --- | --- | --- |
| Name | Role | Responsibility |
| Develop a plan (Gantt chart) | Planning | All team members |
| Build Requirements table | Planning | Brandon |
| Requirements Sign Off Table | Planning | Brandon |
| Algorithm | Provide the required performance of our software | Brandon |
| Flowchart | accurately depicts how our software application will act to fulfill the algorithm | Brandon |
| Block code | Instructs the robot to complete the course | All team members |
| Sensor Data Diagram | Data | Xabien |
| Test Table | Data | Joshua |
| Staffing Plan | a chart/table that depicts the roles and responsibilities of each member | Xabien |
| System Design Document | detailing system flow, algorithms, staffing plan, software/hardware, and Test Plan | Brandon |
| Robot video | Video showing robot fulfilling the correct instructions | Xabien |
| GitHub Repository | All members submit their work here | Joshua |