**Sprint 1 - Endurance Design Document**

**November 12, 2020**

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# Executive Summary

## Project Overview

“Your robot must successfully travel around the periphery of HH208 (circumnavigate). A clear path will be provided from each outside wall. Robot will start from the yellow square with blue tape. Robot should start with a green light and speak ‘ready set go’ and stop with a red light and speak ‘I’m done and I need water’. Robot must travel to each of the yellow floor tiles and turn right at the center of each tile. Robot must return to its starting location. Robot should not collide with any objects as it goes around the room. Points deducted if robot does not light and speak at start and finish, if it collides with anything, or if it does not finish in the square where it started. (you may scale down the course for this sprint if space is an issue)”

## Purpose and Scope of this Specification

This specification is meant to document Sprint 1 - Endurance. 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 1 - Endurance:

* 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 2 - Accuracy
* Everything relating to Sprint 3 - Agility

# 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.
* The room used for the tests has been scaled down due to inability to make it to campus.

## Constraints

* Must use Sphero EDU block code.
* Must test code on the robot.

## Dependencies

* Sphero EDU
* The robot

# Requirements

## Functional Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Requirement** | **Comments** | **Priority** | **Date Reviewed** | **SME Reviewed/ Approved** |
| E1 | Robot starts with a green light. | Must do. | 1 | 11/11/20 | We do not have a SME (Systems Management Expert) besides Professor Eckert. |
| E2 | Robot speaks “ready set go” before moving. | Must do. | 1 | 11/11/20 |  |
| E3 | Robot circumnavigates the room with no collisions. | Must do. We can scale the room down if need be. | 1 | 11/11/20 |  |
| E4 | Robot stops with a red light after finishing moving. | Must do. | 1 | 11/11/20 |  |
| E5 | Robot says “I’m done and I need water” at the end. | Must do. | 1 | 11/11/20 |  |

## Security

### Protection

No protections needed since this is a school project.

### Authorization and Authentication

No authorization or authentication needed since this is a school project.

## Portability

Portability is not a requirement.

# Requirements Confirmation/Stakeholder sign-off

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

# System Design

## Algorithm

* 1. Activate green light.
  2. Speak “Ready, set, go.”
  3. Move Forward 2m.
  4. Turn right 90 degrees.
  5. Move forward 1m.
  6. Turn right 90 degrees.
  7. Move forward 2m.
  8. Turn right 90 degrees.
  9. Move forward 1m.
  10. Activate red light.
  11. Speak “I’m done and I need water.”

## System Flow

Graphical user interface, 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.

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 navigate room. | 11/11/20 | The robot moves along the perimeter | Robot does not move straight. | Nicole | Fail |
| Robot needs to successfully navigate room. | 11/11/20 | The robot moves straight | The robot crosses over boundaries. | Nicole | Fail |
| Robot needs to successfully navigate room. | 11/11/20 | The robot moves straight and does not go over boundaries | The robot shakes, then crosses over boundaries. | Nicole | Fail |
| Robot needs to successfully navigate room. | 11/11/20 | Moves straight and does not go over boundaries, speaks and changes color | Completed all tasks. | Nicole | Pass |

## Task List/Gantt Chart

Table

Description automatically generated

## 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, 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 |