***[Robotics Project] Design Document***

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October 28, 2019

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**1.Executive Summary**

***1.1Project Overview***

In this project we will code a Sphero+ robot to three different tasks. The first task being and Endurance test where the robot will drive around the edges of Howard Hall 208 five feet away from the wall. The second task is the Speed test where the robot will drive in a figure eight starting and ending in the same location. The final being an obstacle course where the robot will do certain tasks and end on an X on the ground. Its intended audience is for our teacher Professor Eckert and the rest of our Intro to problem solving class.

***1.2Purpose and Scope of this Specification***

This specification is for our Professor, Professor Eckert and for the rest of our computer science class.

**2.Product/Service Description**

There are a few different factors that apply to the robot. First the robot moves differently depending on how charged it is. Second the robot moves differently depending if the plastic cover is on or not. Third the robot is heavily affected by the floor it is on and may move because of it.

***2.1Product Context***

This product is a pretty good product compared to other projects. It is fairly easy to use and can be used with different devices such as a computer, and phone. It is set up so that you can drag and drop you code and download other people's codes if you need help.

***2.2User Characteristics***

Student/Faculty/Staff- can use this to see how we made our robot go around the room.

***2.3Assumptions***

We assume that we have a device that can run the Sphero program. We also assume that we have access to room 208 to test the robot. We also assume that we have a Sphero robot and some knowledge of coding.

***2.4Constraints***

There are not many constraints besides if you do not have enough space to hold the code or if your robot is not charged.

***2.5Dependencies***

Some dependencies are that the robot needs 3 hours to charge, it needs to update every so often, and you need the specific software for it to work

**3.Requirements**

* The robot must start with a green light
* The robot must say “Ready Set go”
* The robot must go around the room 5 feet from the wall
* The robot must stop on the X
* The robot must end with a red light
* The robot must end and say “Im done and I need Water”

**Priority Definitions**

Priority 1 requirement- The robot must go around the room and stay 5 feet from the wall

Priority 2 requirement- The robot must stop on the X

Priority 3- the Robot must start with a Green light and end with a red light

Priority 3- the robot must start by saying ready set go and end by saying I’m done and I need a drink.

***3.1Functional Requirements***

In the example below, the requirement numbering has a scheme - BR\_LR\_0## (BR for Business Requirement, LR for Labor Relations). For small projects simply BR-## would suffice. Keep in mind that if no prefix is used, the traceability matrix may be difficult to create (e.g., no differentiation between '02' as a business requirement vs. a test case)

The following table is an example format for requirements. Choose whatever format works best for your project.

For Example:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req#** | **Requirement** | **Comments** | **Priority** | **Date Rvwd** | **SME Reviewed / Approved** |
| BR\_LR\_05 | The system should associate a supervisor indicator with each job class. | Business Process = “Maintenance | 3 | 7/13/04 | Bob Dylan, Mick Jagger |
| BR\_LR\_08 | The system should handle any number of fees (existing and new) associated with unions. | Business Process = “Changing Dues in the System”  An example of a new fee is an initiation fee. | 2 | 7/13/04 | Bob Dylan, Mick Jagger |
| BR\_LR\_10 | The system should capture and maintain job class status (i.e., active or inactive) | Business Process = “Maintenance”  Some job classes are old and are no longer used. However, they still need to be maintained for legal, contract and historical purposes. | 2 | 7/13/04 | Bob Dylan, Mick Jagger |
| BR\_LR\_16 | The system should assign the Supervisor Code based on the value in the Job Class table and additional criteria as specified by the clients. | April 2005 – New requirement. It is one of three new requirements from BR\_LR\_03. | 2 |  |  |
| BR\_LR\_18 | The system should provide the Labor Relations office with the ability to override the system-derived Bargaining Unit code and the Union Code for to-be-determined employee types, including hourly appointments. | April 2005 – New requirement. It is one of three new requirements from BR\_LR\_04.  5/11/2005 – Priority changed from 2 to 3. | ~~2~~  3 |  |  |

***3.2Security***

N/A

**3.2.1Protection**

N/A

**3.2.2Authorization and Authentication**

N/A

***3.3Portability***

N/A

**4.Requirements Confirmation/Stakeholder sign-off**

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

|  |  |  |
| --- | --- | --- |
| **Meeting Date** | **Attendees (name and role)** | **Comments** |
| 10/25/19 | Joseph DeRosa, Group Member  Elijah Barnes, Group Member  Mujeeb Ali, Group Member | Tested Code and worked on Design Document |
| 10/28/19 | Joseph DeRosa, Group Member  Mujeeb Ali, Group Member  Elijah Barnes, Group Member | Finished Design Document |

**5.System Design**

***5.1Algorithm***

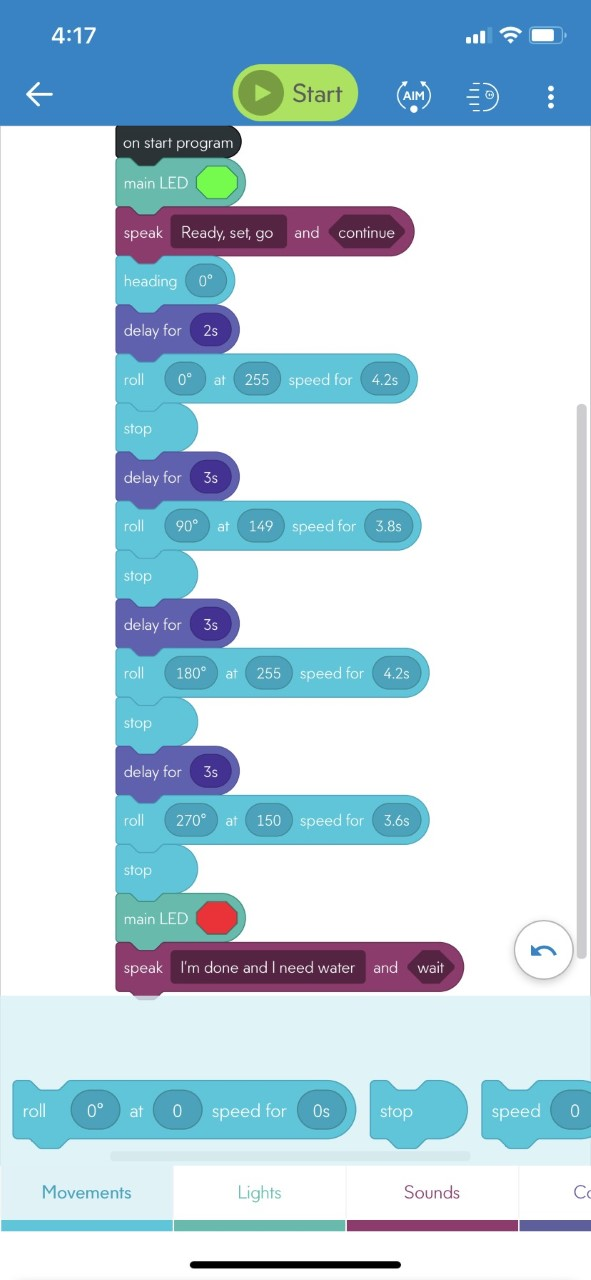
1. Place robot at the start of the race on the X
2. Start Code
3. Robot says “Ready, set, go” and a green light turns on
4. Robot rolls forward to almost the end of the room
5. Robot stops in corner of the room and turns right
6. Robot rolls forward to almost the end of the room
7. Robot stops on the corner and turns right
8. Robot rolls forward to almost the end of the room
9. Robot stops on corner and turns right
10. Robot rolls forward and stops on the X that it started on
11. Robot says, “I’m done and i need water” and a red light turns on

***5.2System Flow***

On another Document

***5.3Software***

In order to code the robot we used the Sphero Edu program which was a drag and drop block code. This made it very easy to code the robot because all you needed to do was drag and drop blocks.



***5.4Hardware***

We used our computers and Phones to run the app that allowed the robot to run the code.

***5.5Test Plan***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reason for Test Case** | **Test Date** | **Expected Output** | **Observed Output** | **Staff Name** | **Pass/Fail** |
| Test the robot to see if we could eyeball making it to the corner | 10/25/19 | The robot to make it on the yellow corner where we wanted it | The robot went to far and hit into the wall | Joseph, Elijah, Mujeeb | Fail |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner | The robot stopped short of the yellow corner | Joseph, Elijah, Mujeeb | Fail |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner | The robot stopped on the yellow corner | Joseph, Elijah, Mujeeb | Pass |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner than go right and stop on the next yellow corner | The robot did not go far enough to go onto the second corner | Joseph, Elijah, Mujeeb | Fail |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner than go right and stop on the next yellow corner | The robot stopped on the second yellow corner | Joseph, Elijah, Mujeeb | Pass |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner than go right and stop on the next yellow corner than turn right again and go onto the third yellow corner | The robot turned and stopped on the third yellow corner | Joseph, Elijah, Mujeeb | Pass |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner than go right and stop on the next yellow corner than turn right again and go onto the third yellow corner than finally turn and land on the X it started on | The robot went to the far left of the X | Joseph, Elijah, Mujeeb | Fail |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner than go right and stop on the next yellow corner than turn right again and go onto the third yellow corner than finally turn and land on the X it started on | The robot went past the X and hit the wall | Joseph, Elijah, Mujeeb | Fail |
| Test to see if our code worked | 10/25/19 | The robot to stop on the yellow corner than go right and stop on the next yellow corner than turn right again and go onto the third yellow corner than finally turn and land on the X it started on | The robot stopped on the X. | Joseph, Elijah, Mujeeb | Pass |
| Test if our code worked | 10/25/19 | The robot to start by saying “Ready Set Go” and a green light to turn on”and to stop on the yellow corner than go right and stop on the next yellow corner than turn right again and go onto the third yellow corner than finally turn and land on the X it started on | The robot did everything we wanted it to | Joseph,  Elijah,  Mujeeb | Pass |
| Test if our code worked | 10/25/19 | The robot to start by saying “Ready Set Go” and a green light to turn on”and to stop on the yellow corner than go right and stop on the next yellow corner than turn right again and go onto the third yellow corner than finally turn and land on the X it started on than stop and say “Im done and I need water” and turn a red light on. | The robot did everything we wanted it to | Joseph,  Elijah,  Mujeeb | Pass |

***5.6Task List/Gantt Chart***

On another Document

***5.7Staffing Plan***

Insert a chart/table that depicts the roles and responsibilities of each team member that worked on this project

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Role** | **Responsibility** | **Reports To** |
| Joseph DeRosa | Group Member | Code, some questions | Mujeeb, Elijah |
| Mujeeb Ali | Group Member | Gantt Chart, some questions | Joseph, Elijah |
| Elijah Barnes | Group Member | Flow Chart, some questions | Joseph, Mujeeb |