Sprint 3 - Agility Design Document

11/30/22

Melissa Abad, Thomas Farrell, and Derek Boyle

1. *User Characteristics*

Student/faculty/staff/other	experience/technical expertise	
Derek Boyle	experience with coding	
Melissa Abad	no experience	
Thomas Farrell	experience with coding and robots	

1.1 Assumptions

Derek and Thomas will have a better idea of how to work the robot.

1.2 Constraints

- Chairs
- Tables
- Floor isn't flat.
- obstacles
- Ramp

1.3 Dependencies

- Code
- Robot being charged
- Clear path

2. Requirements

2.1 Functional Requirements

Req#	**Requirement**	**Comments**	**Priority**	**Date Rvwd**	**SME Reviewed / Approved**
Agility _01: Agility	Your robot must run the agility course successfully.			11/30	
Agility_02: Obstacles	Your robot must avoid hitting any obstacles			11/30	
Agility_03: Path	Robot must stay on the path.			11/30	
Agility_04: Ramp	Robot has to go over the ramp			11/30	

Req#	Requirement	Comments	Priority	Date Rvwd	SME Reviewed / Approved
Agility_05: Pins	Robot has to attempt to knock down as many pins as possible			11/30	

2.2 Portability

Portability is effortless as the robot is very small and you can bring it with you along with a laptop or just use your phone and you are able to make code for it to follow.

3. Requirements Confirmation/Stakeholder sign-off

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

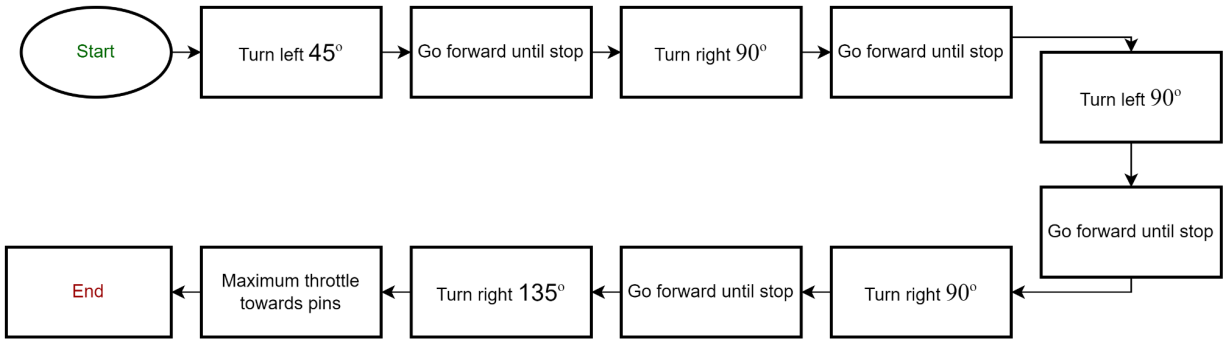
Meeting Date	Attendees (name and role)	Comments
11/29/22	Derek and Melissa and Thomas	Worked on Gant chart
11/30/22	Derek, Melissa, and Thomas	Worked with robot

4. System Design

4.1 Algorithm

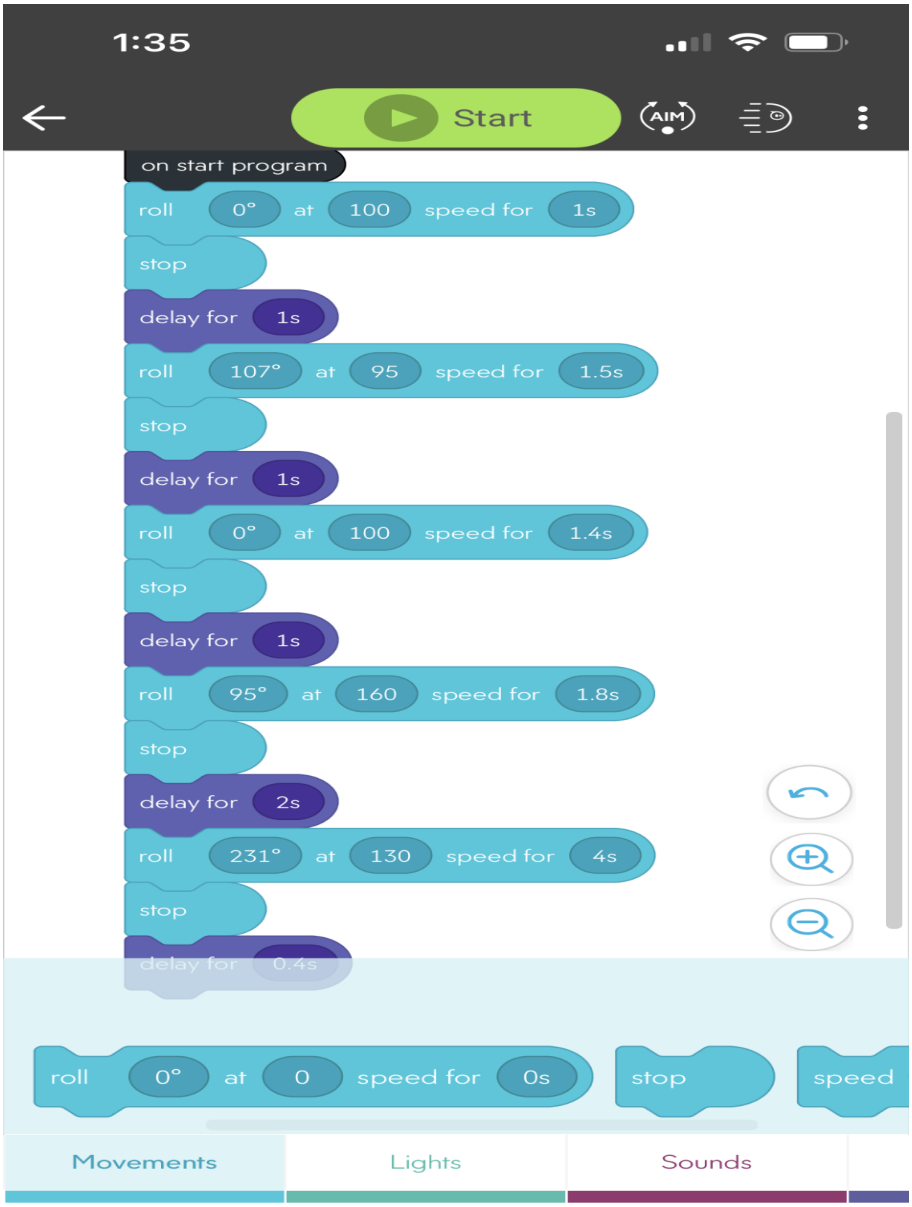
5. Start
6. Turn 45º left
7. Go forward until stop
8. Turn 90º right
9. Go forward until stop
10. Turn 90º left
11. Go forward until stop
12. Turn 90º right
13. Go forward until stop
14. Turn 135º right
15. Maximum throttle towards pins (markers)
16. End

16.1 System Flow



16.2 Software

We used block coding in sphero.edu to create the robot's movement using the coding below.



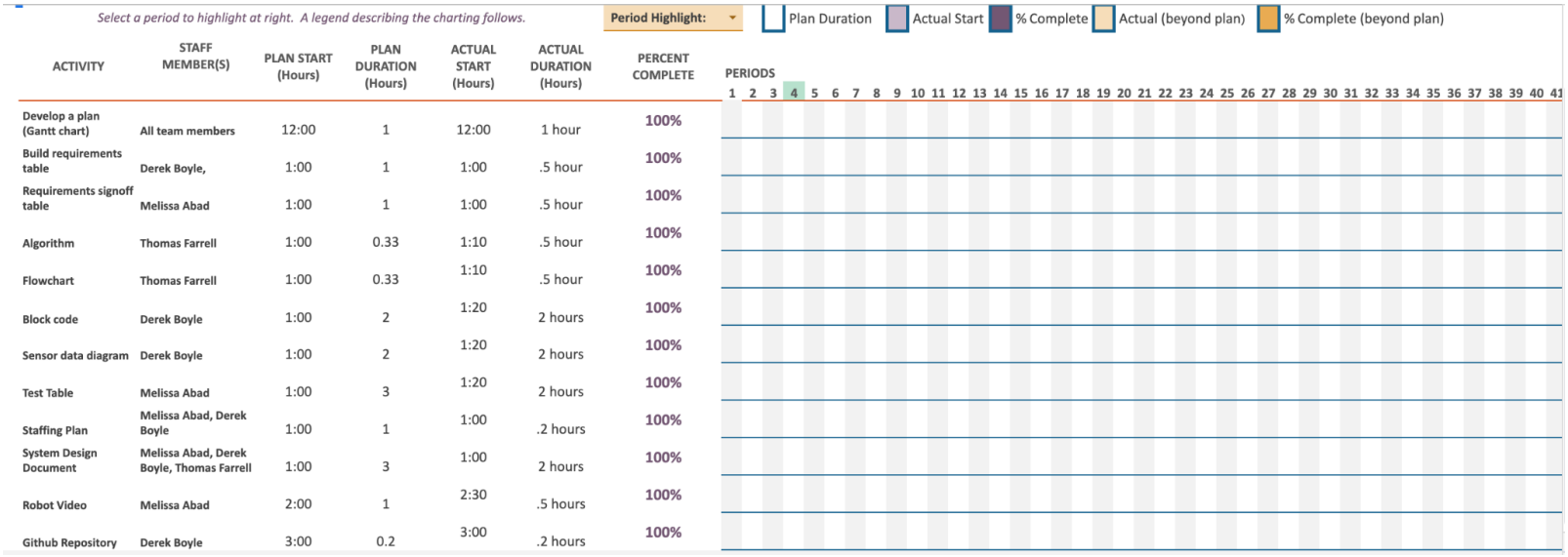
16.3 Hardware

For hardware we used the sphere robot and a computer to code along with a phone to record what we did with the robot once we successfully completed the task.

16.4 Test Plan

Reason for Test Case	Test Date	Expected Output	Observed Output	Staff Name	Pass/Fail
to achieve expected output: robot must avoid three objects, go over the ramp, and knock down as many pins as possible.	11/30	Robot must avoid three objects, go over the ramp, and knock down as many pins as possible	Robot went too fast	melissa derek thomas	Fail
To see if robot can avoid three objects by going at a slower pace	11/30	Robot must go slower so it can avoid the three objects	Robot missed one obstacle but stopped	melissa derek thomas	Fail
To get robot to miss all three obstacles	11/30	Robot must avoid all three obstacles	Robot missed two obstacles	melissa derek thomas	Fail
To get robot to miss all three obstacles	11/30	Robot must avoid all three obstacles and go over the ramp	Robot avoided all three obstacles but didn't go over the ramp	melissa derek thomas	Fail
To get robot to go over the ramp	11/30	Robot must go over the ramp	Robot went over the ramp to fast and went to far	melissa derek thomas	Fail
To get robot to go over the ramp	11/30	Robot must go over the ramp and knock down all pins	Robot went over the ramp and but missed the pins	melissa derek thomas	Fail
To get robot to hit as many pins as possible	11/30	Robot must knock down as many pins as possible	Robot missed the pins again	melissa derek thomas	Fail
To get robot to avoid all three obstacles, go over ramp and hit as many pins as possible	11/30	Robot must avoid all three obstacles, go over the ramp and knock down as many pins as possible	Robot avoided all three obstacles, went over the ramp and hit all the pins	Melissa derek thomas	Pass

16.5 Task List/Gantt Chart



Select a period to highlight at right. A legend describing the charting follows. Period Highlight: Plan Duration Actual Start % Complete Actual (beyond plan) % Complete (beyond plan)

ACTIVITY	STAFF MEMBER(S)	PLAN START (Hours)	PLAN DURATION (Hours)	ACTUAL START (Hours)	ACTUAL DURATION (Hours)	PERCENT COMPLETE
Develop a plan (Gantt chart)	All team members	12:00	1	12:00	1 hour	100%
Build requirements table	Derek Boyle,	1:00	1	1:00	.5 hour	100%
Requirements signoff table	Melissa Abad	1:00	1	1:00	.5 hour	100%
Algorithm	Thomas Farrell	1:00	0.33	1:10	.5 hour	100%
Flowchart	Thomas Farrell	1:00	0.33	1:10	.5 hour	100%
Block code	Derek Boyle	1:00	2	1:20	2 hours	100%
Sensor data diagram	Derek Boyle	1:00	2	1:20	2 hours	100%
Test Table	Melissa Abad	1:00	3	1:20	2 hours	100%
Staffing Plan	Melissa Abad, Derek Boyle	1:00	1	1:00	.2 hours	100%
System Design Document	Melissa Abad, Derek Boyle, Thomas Farrell	1:00	3	1:00	2 hours	100%
Robot Video	Melissa Abad	2:00	1	2:30	.5 hours	100%
Github Repository	Derek Boyle	3:00	0.2	3:00	.2 hours	100%

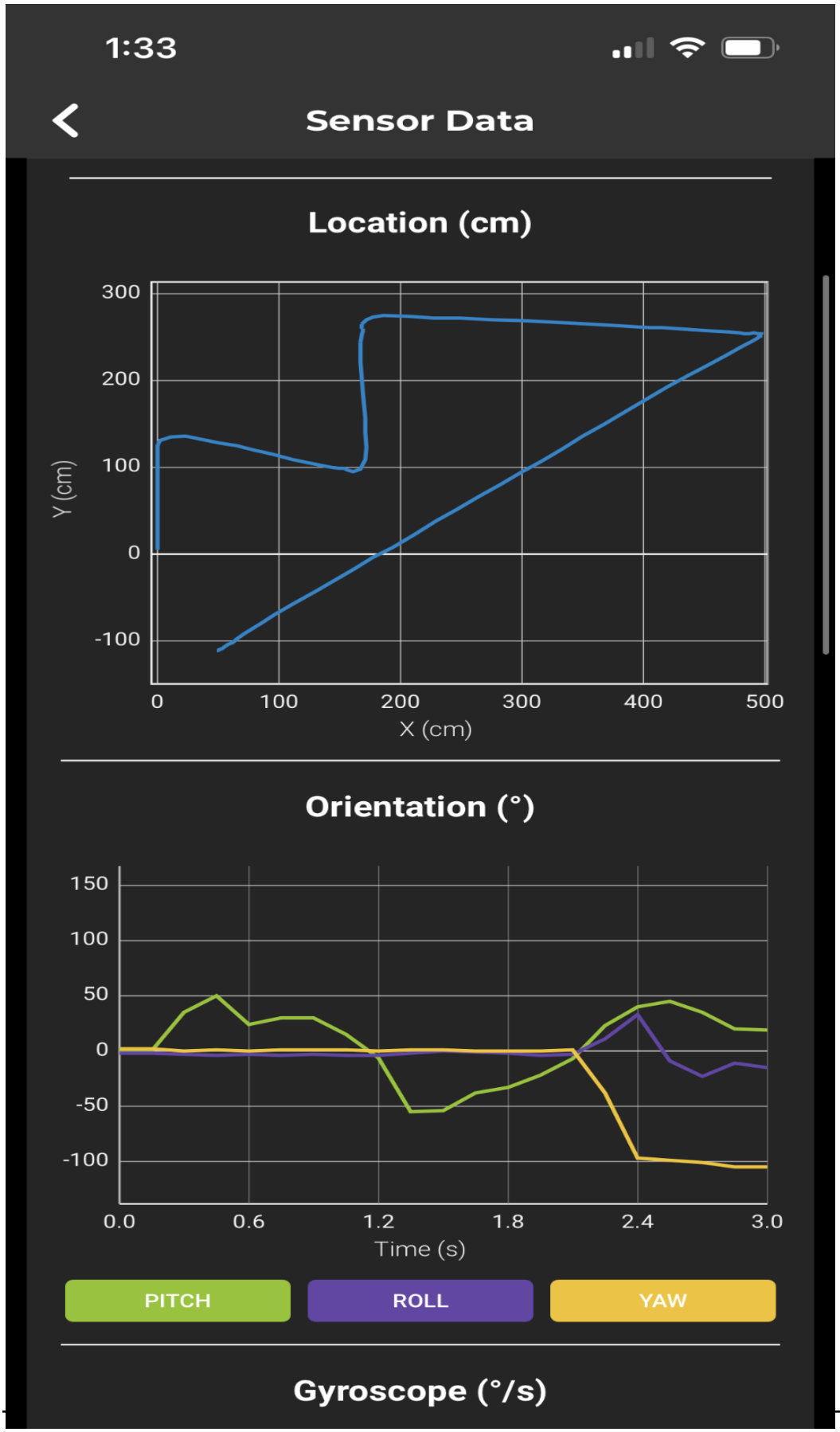
PERIODS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41

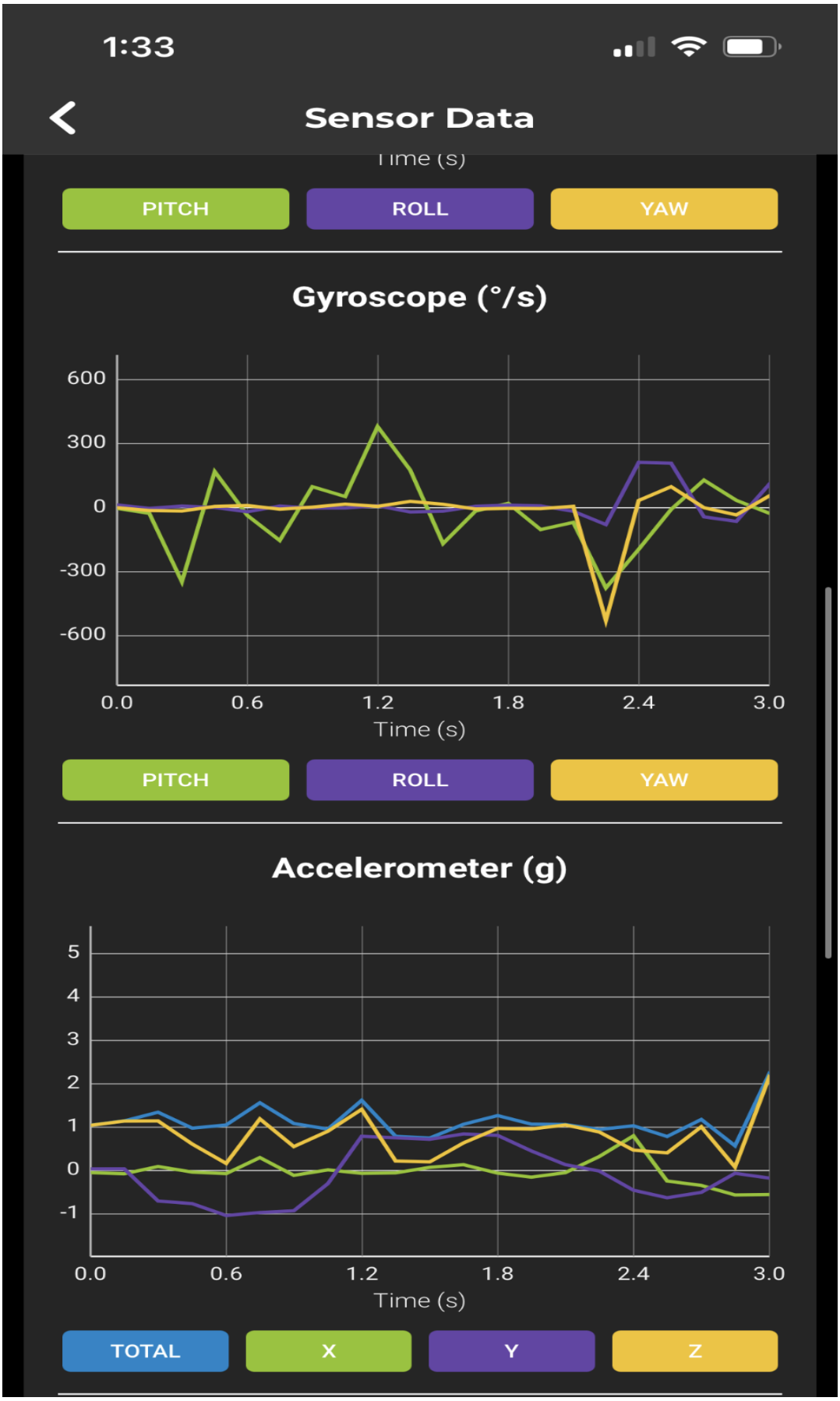
16.6 Staffing Plan

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

Name	Role	Responsibility	Reports To
Melissa Abad	Documenter	Documenting data and tests	
Derek Boyle	Programmer	Coding the robot	
Thomas Farrell	Documenter	Create flowchart and algorithm	

Sensor Data Diagram




1:33
Sensor Data
Time (s)
PITCH
ROLL
YAW
Gyroscope (°/s)
600
300
0
-300
-600
0.0
0.6
1.2
1.8
2.4
3.0
Time (s)
PITCH
ROLL
YAW
Accelerometer (g)
5
4
3
2
1
0
-1
0.0
0.6
1.2
1.8
2.4
3.0
Time (s)
TOTAL
X
Y
Z