PD Gains - Orange - Data Chart

PWM	GAINS	50 CM COUNTS
100	3.1	
105	3.12	
110	3.13	
115	3.1425	
120	3.155	
125	3.17	
130	3.18	
135	3.1885	
140	3.193	
145	3.197	
150	3.22	
155	3.225	
160	3.24	
165	3.2475	
170	3.25	

GAINS vs. PWM

- GAINS
- Trendline for GAINS R² = 0.993
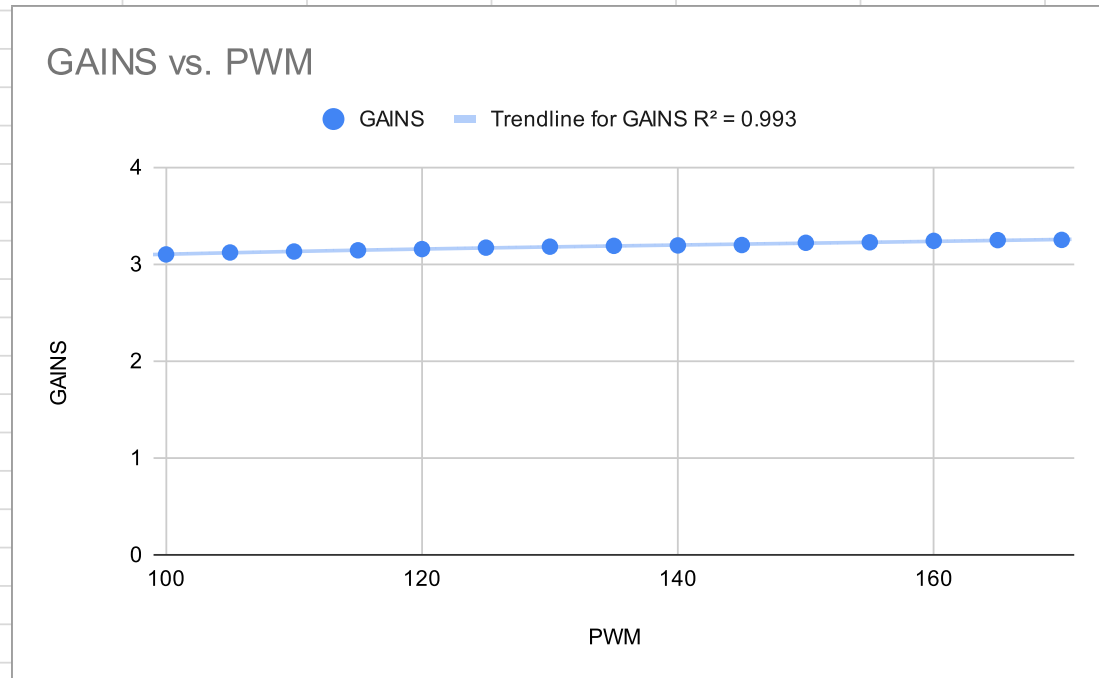
PD Gains - Green - Data Chart

PWM	GAINS	50 CM COUNTS
100		
105		
110		
115		
120		
125		
130		
135		
140		
145		
150		
155		
160		
165		
170		

Counts - Data Chart

PWM	Counter A	Counter B	Difference:	
50	4892	4890	GREAT - 2	
60	4897	4751	FINE/DECENT - 146	
70	4886	3860	CRITICAL - 1026	
80	4885	3655	CRITICAL - 1230	
90	4898	3979	CRITICAL - 919	
100	4898	4561	MODERATE - 337	
110	4883	4604	FINE/DECENT - 279	
120	4892	4412	ISSUE - 480	
130	4888	4319	ISSUE- 569	

STATUS:			DIFFERENCE:	
	Note		GREAT	< 100
	Checked		FINE/DECENT	100 - 299
	Working on - Potential Issue		MODERATE	300 - 399
	Projected		ISSUE	400- 650
	Issue - Check Times Sheet		CRITICAL	> 650

1 Second - Counts - Data Chart

PWM	Counter A	Counter B	Counter C	Counter D	Difference A-C:	Difference B-D:			Trial 1:	Trial 2:	Average
100					0	0		Counter A			0
105					0	0		Counter B			0
110					0	0		Counter C			0
115					0	0		Counter D			0
120					0	0					
125					0	0					
130					0	0					
135					0	0					
140					0	0					
145					0	0					
150					0	0					
155					0	0					
160					0	0					
165					0	0					
170					0	0					

STATUS:			DIFFERENCE:	
	Note		GREAT	< 100
	Checked		FINE/DECENT	100 - 299
	Working on - Potential Issue		MODERATE	300 - 399
	Projected		ISSUE	400- 650
	Issue - Check Times Sheet		CRITICAL	> 650

Requirements:
On the Ground
No PID
1 Second

1.5 Second - Counts - Data Chart

PWM	Counter A	Counter B	Counter C	Counter D	Difference A-C:	Difference B-D:			Trial 1:	Trial 2:	Average
100					0	0		Counter A			0
105					0	0		Counter B			0
110					0	0		Counter C			0
115					0	0		Counter D			0
120					0	0					
125					0	0					
130					0	0					
135					0	0					
140					0	0					
145					0	0					
150					0	0					
155					0	0					
160					0	0					
165					0	0					
170					0	0					

STATUS:

		DIFFERENCE:	
	Note	GREAT	< 100
	Checked	FINE/DECENT	100 - 299
	Working on - Potential Issue	MODERATE	300 - 399
	Projected	ISSUE	400- 650
	Issue - Check Times Sheet	CRITICAL	> 650

Requirements:
On the Ground
No PID
1 Second

2 Seconds - Counts - Data Chart

PWM	Counter A	Counter B	Counter C	Counter D	Difference A-C:	Difference B-D:			Trial 1:	Trial 2:	Average
100					0	0		Counter A			0
105					0	0		Counter B			0
110					0	0		Counter C			0
115					0	0		Counter D			0
120					0	0					
125					0	0					
130					0	0					
135					0	0					
140					0	0					
145					0	0					
150					0	0					
155					0	0					
160					0	0					
165					0	0					
170					0	0					

STATUS:			DIFFERENCE:	
	Note		GREAT	< 100
	Checked		FINE/DECENT	100 - 299
	Working on - Potential Issue		MODERATE	300 - 399
	Projected		ISSUE	400- 650
	Issue - Check Times Sheet		CRITICAL	> 650

Requirements:
On the Ground
No PID
1 Second

Counts - Data Chart

PWM	Counter A	Counter B	Counter C	Counter D	Difference A-C:	Difference B-D:
100	1668	1662	1656	1704	12	-42
105	1821	1820	1807	1840	14	-20
110	1932	1923	1919	1957	13	-34
115	2042	2033	2026	2078	16	-45
120	2165	2154	2151	2205	14	-51
125	2273	2270	2271	2274	2	-4
130	2392	2370	2392	2427	0	-57
135	2500	2480	2506	2544	-6	-64
140	2587	2591	2610	2663	-23	-72
145	2670	2651	2677	2723	-7	-72
150	2791	2771	2798	2854	-7	-83
155	2896	2870	2903	2953	-7	-83
160	3019	2985	3021	3049	-2	-64
165	3099	3081	3057	3162	42	-81
170	3177	3169	3184	3245	-7	-76

	Trial 1:	Trial 2:	Average
Counter A	3169	3186	3177
Counter B	3156	3183	3169
Counter C	3172	3196	3184
Counter D	3238	3253	3245

STATUS:		DIFFERENCE:	
	Note	GREAT	< 100
	Checked	FINE/DECENT	100 - 299
	Working on - Potential Issue	MODERATE	300 - 399
	Projected	ISSUE	400- 650
	Issue - Check Times Sheet	CRITICAL	> 650

Difference B-D: — Trendline for series 1 R² = 0.684

Difference A-C: — Trendline for series 1 R² = 0.483
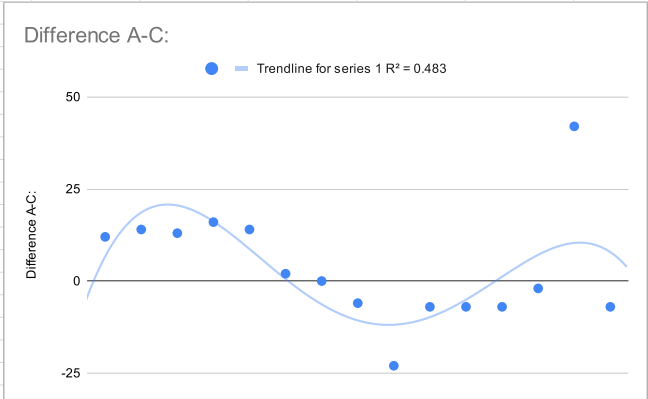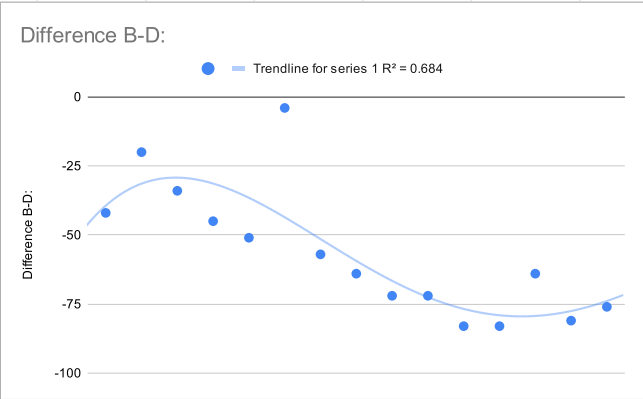
Counts/Distance without PID - Data Chart

PWM	Count A - Try 1	Count B - Try 1	Difference:	Distance:
50	4897	4834	GREAT - 63	85 Inches
60	4890	4631	FINE - 259	80.5 Inches
70	4884	3601	CRITICAL - 1283	65.75 Inches
80	4894	3605	CRITICAL- 1289	63.25 Inches
90				
100				
110				
120				
130				

STATUS:			DIFFERENCE:	
	Note		GREAT	< 100
	Checked		FINE/DECENT	100 - 299
	Working on - Potential Issue		MODERATE	300 - 399
	Projected		ISSUE	400- 650
	Issue - Check Times Sheet		CRITICAL	> 650

50CM - Data Chart

PWM	Count Req
50	1127
55	1115
60	1097
65	1078
70	1062
75	1040
80	1028
85	1006
90	989
95	965
100	937
105	915
110	892
115	869
120	844

Count Req vs. PWM

● ── $1230 + -1.19x + -0.0177x^2 + 5.2E{-}06x^3$ $R^2 = 0.999$

Data points: 1127, 1115, 1097, 1078, 1062, 1040, 1028, 1006, 989, 965, 937, 915, 892, 869, 844

X-axis: PWM (60, 80, 100, 120)
Y-axis: Count Req (0, 250, 500, 750, 1000, 1250)

STATUS:

	Note
	Checked
	Working on - Potential Issue
	Projected
	Issue - Check Times Sheet

Task

Measure Counts

ReCalibration For North-South and East-West

Change Gyro Logic

Impliment Functions and Logics

Notes

Make Table for Measure Counts

Note: The Motor Orientation is where A is facing North, C is facing South, B is facing East, and D is facing West.

Remember that turning it left in perspective to A will increase the angle and turning it right towards A orientation will decrease the angle.

We can easily do North-South PID with this because when angle increase, power of D should increase

And as angle decreases, power of B should Increase (I need to also calibrate North-South)

Now for East-West PID, we have to do it individually because its very confusing to do PID when the sensor is really facing North (Which I have to create a new logic)

I have to recalibrate East-West and Calibrate North-South

I need to change the gyro logic once I get all my PID calibrated because gyro detection cannot happen for each function called. It has to be in void setup so we always know the benchmark angle

If i can get all my gyro ready, I will start implimenting into maze solving

The Plan

Go easy and start with measuring counts from the powers we determined last time

Then recalibrate the PID for each pair again

Change the Gyro Logic

Impliment Functions and Logic

Difficulty

Easy Difficulty

Medium Difficulty

Moderate Difficulty

Hard Difficulty

Count Calibrater - Data Chart

PWM	50 CM COUNTS	GAINS
50	1150	4.12
55	1138	4.22
60	1120	4.315
65	1107	4.425
70	1081	4.545
75	1062	4.66
80	1049	4.78
85	1024	4.895
90	1015	5.02
95	990	5.135
100	975	5.25
105	950	5.375
110	930	5.4875

50 CM COUNTS vs. PWM

$1301 + -2.64x + -6.61\text{E-}03x^2$ $R^2 = 0.998$

Data points (50 CM COUNTS): 1150, 1138, 1120, 1107, 1081, 1062, 1049, 1024, 1015, 990, 975, 950, 930 plotted against PWM (50 to 110)
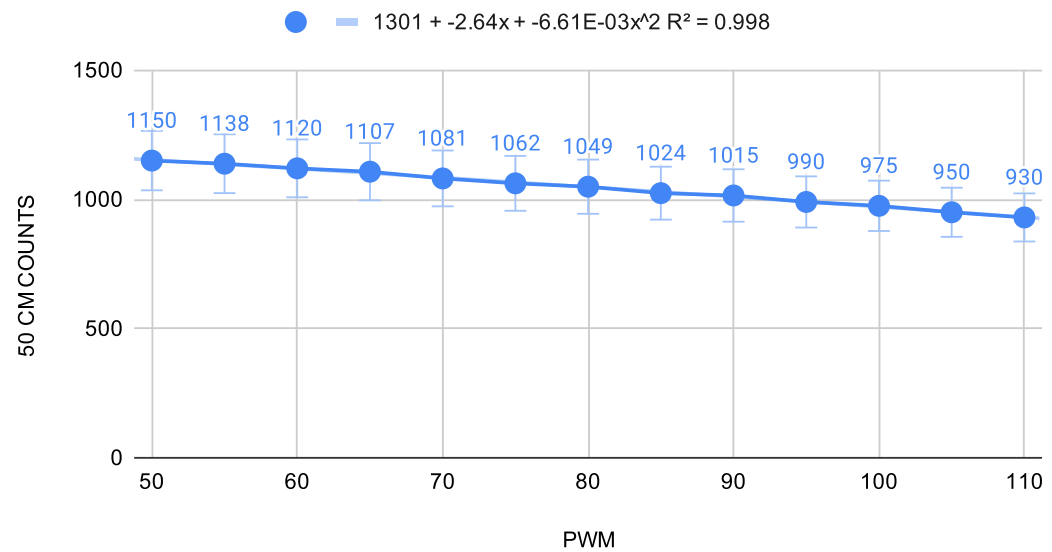
CM/SECONDS - Data Chart

PWM	DIstance Travelled in cm		Time	KP	KI	KD
50	16.46	82.3	5000	0.2875	0.1075	0.3175
55	18.4	92	5000	0.2886	0.108	0.3178
60	20.01	100.05	5000	0.29	0.10825	0.318
65	21.66	108.3	5000	0.2905	0.1087	0.3183
70	23.64	118.2	5000	0.2915	0.109	0.3185
75	25.4	127	5000	0.29152	0.10902	0.3185
80	27.4	137	5000	0.292	0.10905	0.31855
85	29.2	146	5000	0.29205	0.10913	0.3186
90	31.36	156.8	5000	0.2925	0.109075	0.318575
95			5000	0.29239	0.10911	0.318625
100	34.4	172	5000	0.293	0.1091	0.3186
105			5000	0.29289	0.1091	0.3186
110	39.2	196	5000	0.2935	0.1091125	0.3186125

PWM vs. DIstance Travelled in cm

● ── -0.829 + 3.25x + -0.0104x^2 R² = 0.999

$$-0.829 + 3.25x + -0.0104x^2 \quad R^2 = 0.999$$

STATUS:
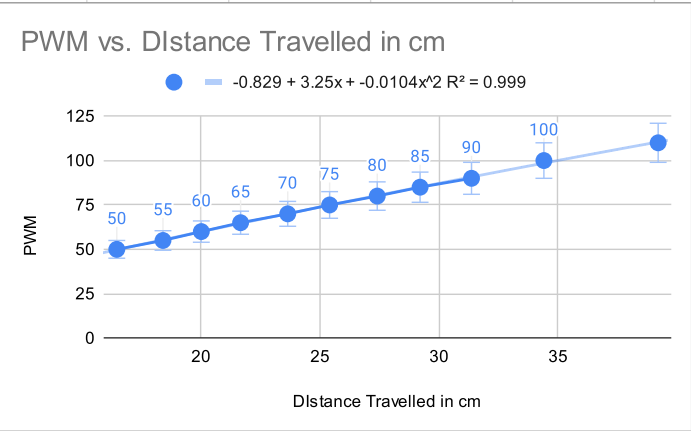
(cyan)	Note
(green)	Checked
(yellow)	Working on - Potential Issue
(orange)	Projected
(red)	Issue - Check Times Sheet

DIstance Travell	PWM
16.46	50
18.4	55
20.01	60
21.66	65
23.64	70
25.4	75
27.4	80
29.2	85
31.36	90
	95
34.4	100
	105
39.2	110

Back Inconsistency - Data Chart

PWM	COUNT MM				
50					
55					
60	2 mm				
65	GOOD				
70	7 mm	Inconsistent and Good Sometimes			
75					
80					
85					
90					
95					
100					
105					
110					

STATUS:

	Note
	Checked
	Working on - Potential Issue
	Projected
	Issue - Check Times Sheet

Times: Straight Moves - Data Chart

PWM (Old Set)	Time (200 cm):	Est. Track Time:
50	TBD	TBD
60	TBD	TBD
70	ISSUE	ISSUE
80	ISSUE	ISSUE
90	ISSUE	ISSUE
100	5.86 Seconds	~64 Seconds
110	5.55 Seconds	~62 Seconds
120	5.05 Seconds	~58 Seconds
130	4.33 Seconds	~53 Seconds

Notes for Est: Take 30 Block Track with 20 Turns into consideration, where each turn is 1 second. Each block is 50 cm long + 25 for starting point

STATUS:

	Note
	Checked
	Working on - Potential Issue
	Projected
	Issue: Undertravelling and bad drift. Count issue

PWM (New Set)	Time (200 cm):	Est. Track Time:
50	TBD	TBD
60	TBD	TBD
70	TBD	TBD
80	TBD	TBD

90	TBD	TBD						
100	TBD	TBD						
110	TBD	TBD						
120	TBD	TBD						
130	TBD	TBD						