Icall3 Controller Software Performance Analysis

Summary

Desired Freq	1000	Hz

Worse case time	225.60	us

Fmax	4433	Hz

Test 1

Encoder ISR with port read

Trial	Time [us]
1	8
2	4
3	4
4	8
5	4
6	4
7	8
8	4
9	4
10	8
Average	5.6

Clock frequency	1.60E+07	Hz
Clock period	6.25E-08	s

Minimum cycles	64	
Maximum cycles	128	
Average cycles	90	
Average exec time	5.60	us
Max frequency	1.25E+05	Hz

Test 2

Encoder ISR with digitalRead

Trial	Time [us]
1	8
2	8
3	8
4	8
5	8
6	8
7	8
8	8
9	12
10	8
Average	8.4

Minimum cycles	128	
Maximum cycles	192	
Average cycles	134	
Average exec time	8.40	us
Max frequency	8.33E+04	Hz

Test 3

float to int conversion

Trial	Time [us]
1	0
2	4
3	4
4	4
5	4
6	4
7	0
8	4
9	4
10	4
Average	3.2

Minimum cycles	0	
Maximum cycles	64	
Average cycles	51	
Average exec time	3.20	us
Max frequency	2.50E+05	Hz

Test 4

Serial print 10 characters

Trial	Time [us]
1	760
2	760
3	764
4	760
5	760
6	764
7	764
8	760
9	764
10	760
Average	761.6

Minimum cycles	12160	
Maximum cycles	12224	
Average cycles	12186	
Average exec time	761.60	us
Max frequency	1.31E+03	Hz

Test 5

Timer 1 ISR (single motor)

Trial	Time [us]
1	8
2	8
3	4
4	8
5	8
6	4
7	8
8	4
9	8
10	8
Average	6.8

Minimum cycles	64	
Maximum cycles	128	
Average cycles	109	
Average exec time	6.80	us
Max frequency	1.25E+05	Hz

Test 6

Timer 1 ISR (dual motor)

Trial	Time [us]
1	8
2	8
3	8
4	12
5	8
6	12
7	8
8	8
9	8
10	8
Average	8.8

Minimum cycles	128	
Maximum cycles	192	
Average cycles	141	
Average exec time	8.80	us
Max frequency	8.33E+04	Hz

Test 7

Single motor test

Trial	Time [us]
1	20
2	20
3	16
4	28
5	24
6	16
7	28
8	16
9	20
10	16
Average	20.4

Minimum cycles	256	
Maximum cycles	448	
Average cycles	326	
Average exec time	20.40	us
Max frequency	3.57E+04	Hz

Test 8

Dual motor PID control test

Trial	Time [us]
1	188
2	184
3	184
4	196
5	196
6	184
7	184
8	192
9	188
10	192
Average	188.8

Minimum cycles	2944	
Maximum cycles	3136	
Average cycles	3021	
Average exec time	188.80	us
Max frequency	5.10E+03	Hz