EDF SCHEDULAR ON FREE RTOS

EG_FWD

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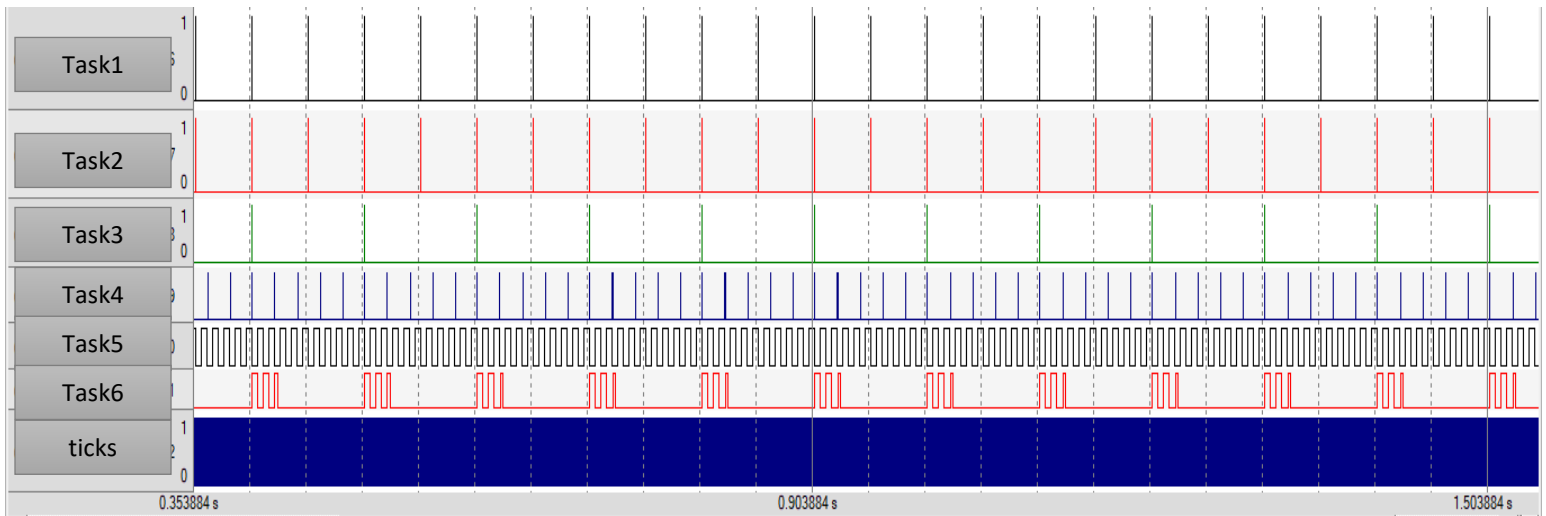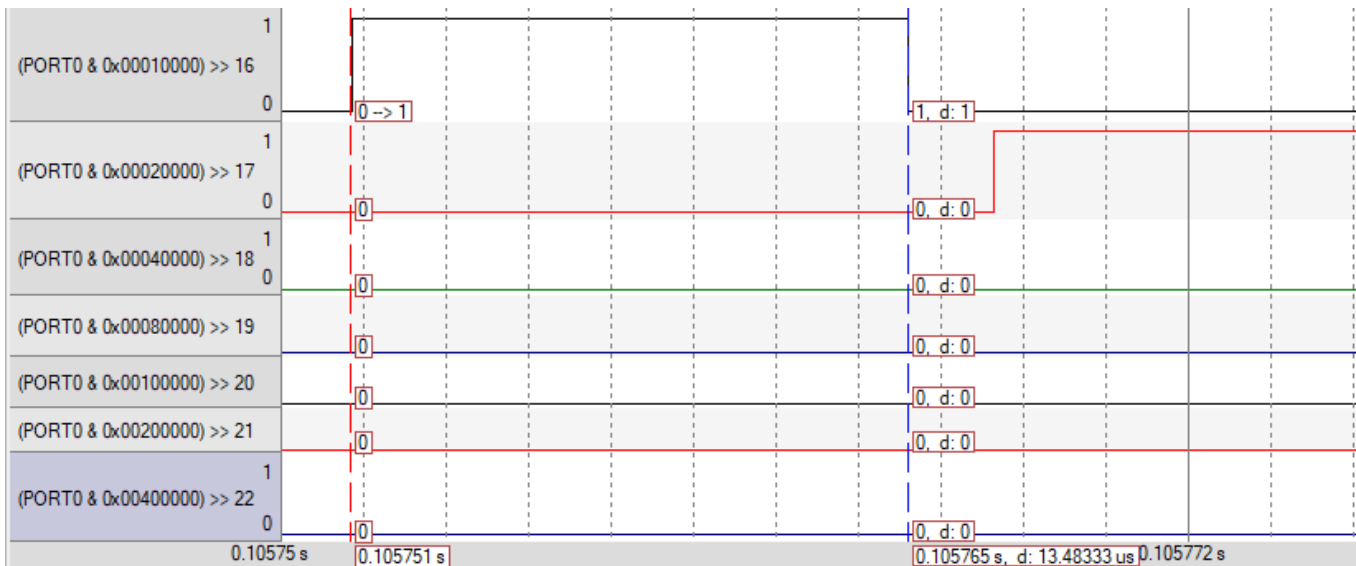
Contents

1.   Analytical Method

The hyper loop of the system is 100ms as the lowest common factor LCM for (10, 20 ,50, 100) is 100
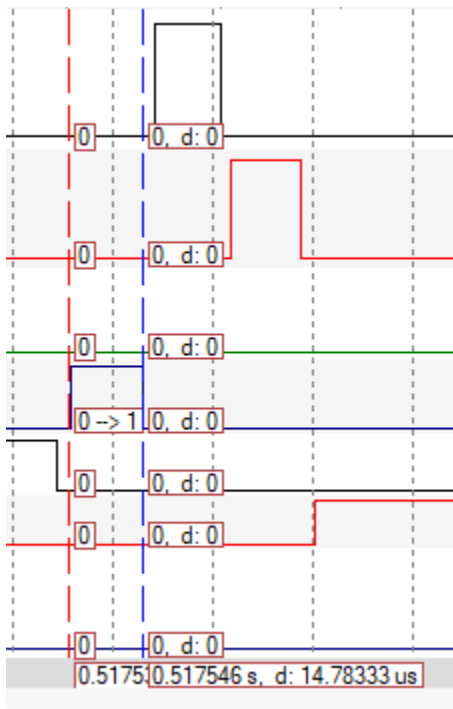
I. Task scheduling using the GPIO's

II. Task 1

III. Task 2

IV. Task 3

V. Task 4

The CPU load is calculated by the CPU utilization time percentage per hyper period

Task	execution time	periodicity and deadline	CPU		
task 1	13.48us	50ms	((13.3)us/50ms)	*100ms	= 0.0026%
task 2	13.95us	50ms	(14us/50ms)	*100ms	= 0.0029%
task 3	20.93us	100ms	(20.9us/100ms)	*100ms	= 0.0020%
task 4	14.78us	20ms	(14.8us/50ms)	*100ms	=0.0015%
task 5	5000us	10ms	(5ms / 10ms)	*100ms	=50 %
task 6	12000us	100ms	(12.08ms/100ms)*100ms		=12 %

Total CPU load about 62.01%

2. Practical method

By using vTaskGetRunTimeStats((char *)state_Buffer);

```
Uart_rec  <1%
periodic  <1%
load_2    12%
button_1  <1%
button_2  <1%
load 1    51%
```

So
total 63%

3. Checking system Schedulability using URM and time demand analysis

I. Using URM method:

As calculated before the CPU load is 0.621
$U = 0.621$, $n = 6$, $n*(2^{(1/n)}-1) = 6*(2^{(1/6)}-1) = 0.73477$
$0.621 < 0.73477 \rightarrow U < URM$, **THE SYSTEM IS SCHEDULABLE.**

II. Using Time demand analysis:

Task 1: {P: 50 , E: 0.00135, D:50 } Priority: 4
Task 2: {P: 50 , E: 0.00140 , D:50 } Priority: 3
Task 3: {P: 100, E: 0.00209, D:100} Priority: 2
Task 4: {P: 20 , E: 0.0015 , D:20 } Priority: 5
Task 5: {P: 10 , E: 5   , D:10 } Priority: 6
Task 6: {P: 100, E: 12   , D:100} Priority: 1

1. Task 5:

W(1) = 5 + 0 = 5
W(2) = 5 + 0 = 5
W(3) = 5 + 0 = 5
W(4) = 5 + 0 = 5
W(5) = 5 + 0 = 5 w(5)<T5 (10) so task 5 is feasible

2. Task 4:

W(1) to w(10) = 0.0015 +)1/10)*5 = 5.0015

W(11) to W(20) = 0.0015 + (n/10)*5 = 10.0015

w(20)<T4 (20) so task 4 is feasible
Task 1:
W(1) = 0.00135   + (1/10)*5 + (1/20)*0.0015   = 5.00285
W(11) = 0.00135 + (11/10)*5 + (11/20)*0.0015 = 10.00285
W(21) = 0.00135 + (21/10)*5 + (21/20)*0.0015 = 10.00435
...
W(50) = 0.00135 + (50/10)*5 + (50/20)*0.0015 = 25.00585
w(50)<T1 (50) so task 1 is feasible

3. **Task 2:**

W(1) = 0.00140+ (1/10)*5 + (1/20)*0.0015 + (1/50)*0.00135= 5.00425

...

W(50) = 0.00140+ (50/10)*5 + (50/20)*0.0015 + (50/50)* 0.00135= 25.00725

w(50)<T2 (50) so task 2 is feasible

4. **Task 3:**

W(1) = 0.00209+ (1/10)*5 + (1/20)*0.0015 + (1/50)* 0.00135+ (1/50)* 0.00140= 5.00634

...

W(100) = 0.00209+ (100/10)*5 + (100/20)*0.0015 + (100/50)*0.0015 + (100/50)* 0.00140= 50.01539
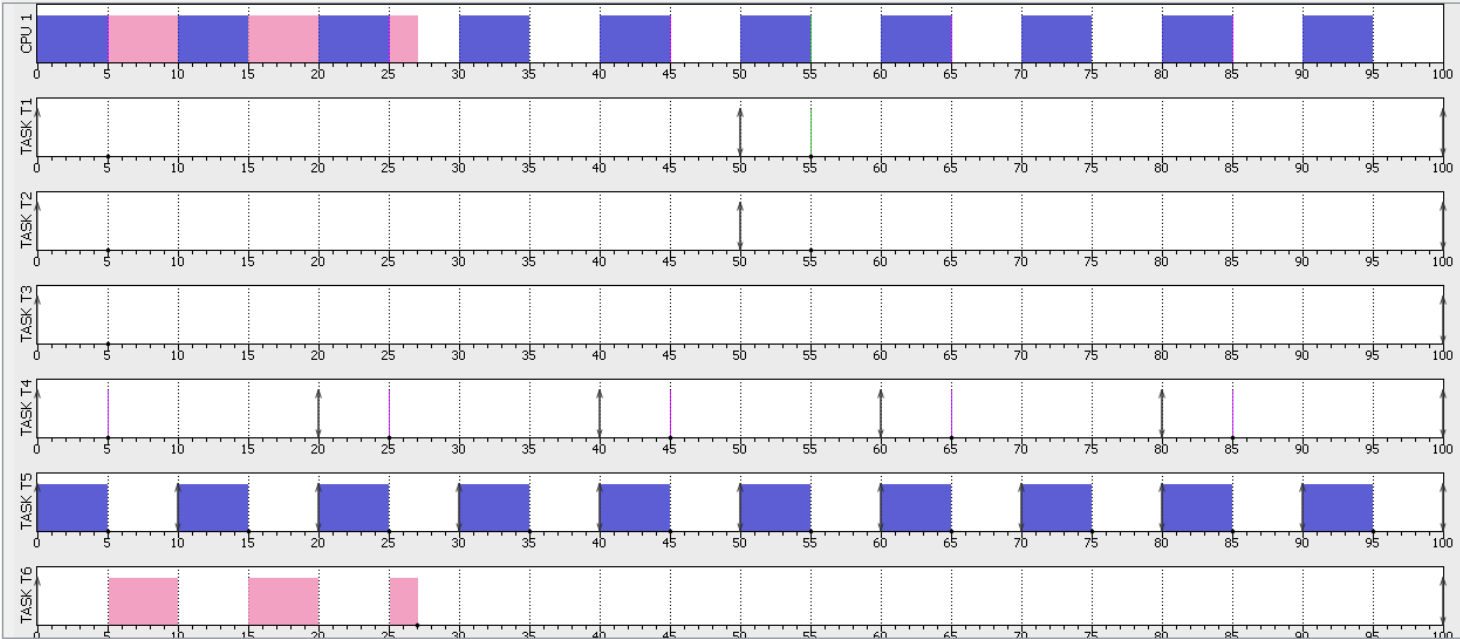
w(100)<T3 (100) so task 3 is feasible

5. **Task 6:**

W(1) = 12+ (1/10)*5 + (1/20)*0.0015 + (1/50)*0. 00135+ (1/50)* 0.00140+ (1/100)* 0.00209= 17.00634

...

W(100) = 12+ (100/10)*5 + (100/20)*0.0015 + (100/50)*0. 00135+ (100/50)*0. 00140+(100/100) * 0. 00209 = 62.01539

w(100)<T6 (100) so task 6 is feasible

4. SIMSO SIMULATION

	Total load	Payload	System load
CPU 1	0.6202	0.6202	0.0000
Average	0.6202	0.6202	0.0000

5. CONCLUSION

The EDF implementation working exactly as it should be and as calculated by hand and using SimSo simulation