

Implementing EDF Scheduler

Task	Periodicity(ms)	Deadline(ms)	Execution Time
Button_1_Monitor	50	50	13.5us
Button_2_Monitor	50	50	14us
Periodic_Transmitter	100	100	18.4us
Uart_Receiver	20	20	57us
Load_1_Simulation	10	10	5ms
Load_2_Simulation	100	100	12ms

- Calculate the system hyperperiod

Hyper Period = Least Common Multiple (100 ms)

- Calculate the CPU load

CPU Load = $((0.0135 * 2) + (0.014 * 2) + (0.0184 * 1) + (0.057 * 5) + (5 * 10) + (12 * 1)) / 100 = 0.6235$.
=62.35%

- Check system schedulability using URM and time demand analysis techniques

using URM

URM = Rate Monotonic Utilization

$$URM = n (2^{1/n} - 1)$$

$$URM = 6 * (2^{1/6} - 1) = 0.73477$$

*U = Total Utilization,
n = number of Tasks,
C = Execution time,
P = hyper Period*

Since Total Utilization (U) <= Rate-Monotonic utilization bound (URM),

$(0.623) <= (0.734)$, Therefore the system is schedulable

using time demand analysis

1st deadline (p = 10): Load_1_Simulation

$$w(10) = 5, w(10) < 10$$

Load_1_Simulation Task is schedulable

2nd deadline (p = 20): Uart_Receiver

$$w(20) = 0.057 + (20/10)5 = 10.057, w(20) < 20,$$

Uart_Receiver Task is schedulable

3rd deadline (p = 50): Button_1_Monitor

$$w(50) = 0.0135 + (50/20)0.057 + (50/10)5 = 25.156, w(50) < 50,$$

Button_1_Monitor Task is schedulable

3th deadline (p = 50): Button_2_Monitor

$$w(50) = 0.014 + 0.0135 + (50/20)0.057 + (50/10)5 = 25.17, w(50) < 50,$$

Button_2_Monitor Task is schedulable

4th deadline (p = 100): Periodic_Transmitter

$$w(100) = 0.0184 + (100/50)0.014 + (100/50)0.0135 + (100/20)0.057 + (100/10)5 = 50.3584$$

$$w(100) < 100,$$

Periodic_Transmitter Task is schedulable

4th deadline (p = 100): Load_2_Simulation

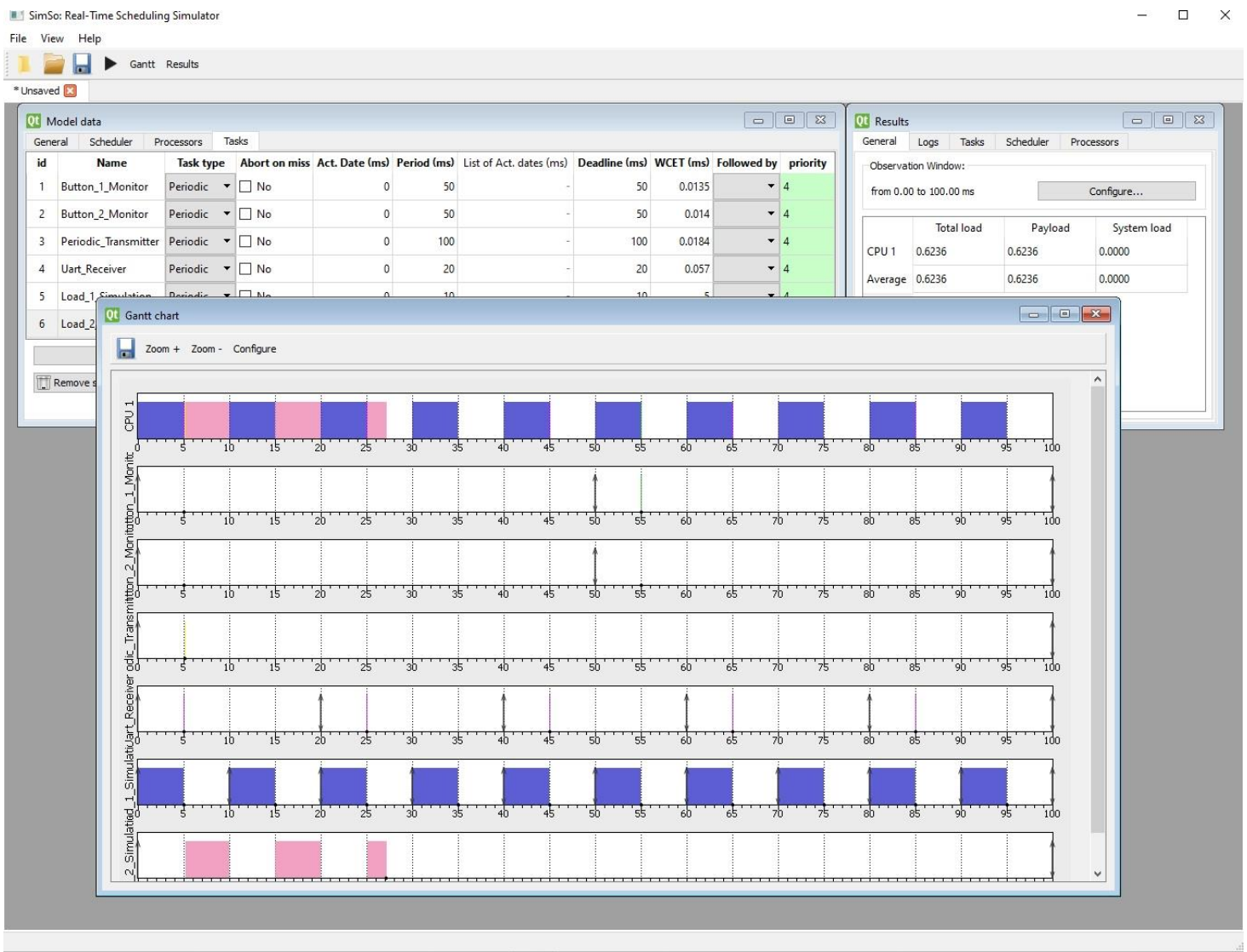
$$w(100) = 12 + 0.0184 + (100/50)0.014 + (100/50)0.0135 + (100/20)0.057 + (100/10)5 = 62.3584,$$

$$w(100) < 100,$$

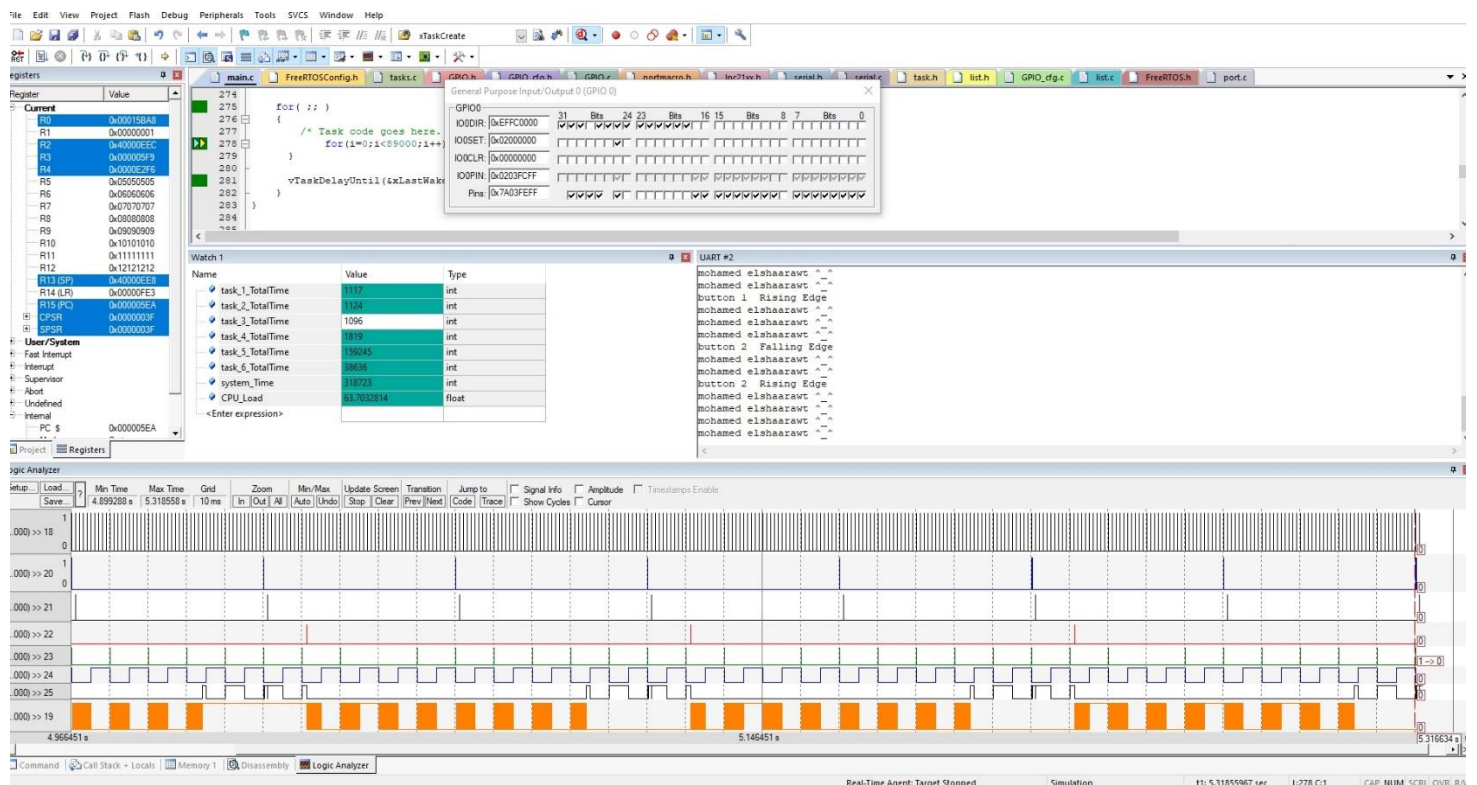
Load_2_Simulation Task is schedulable

Based on time Demand Analysis the System is Schedulable.

- Using Simso offline simulator

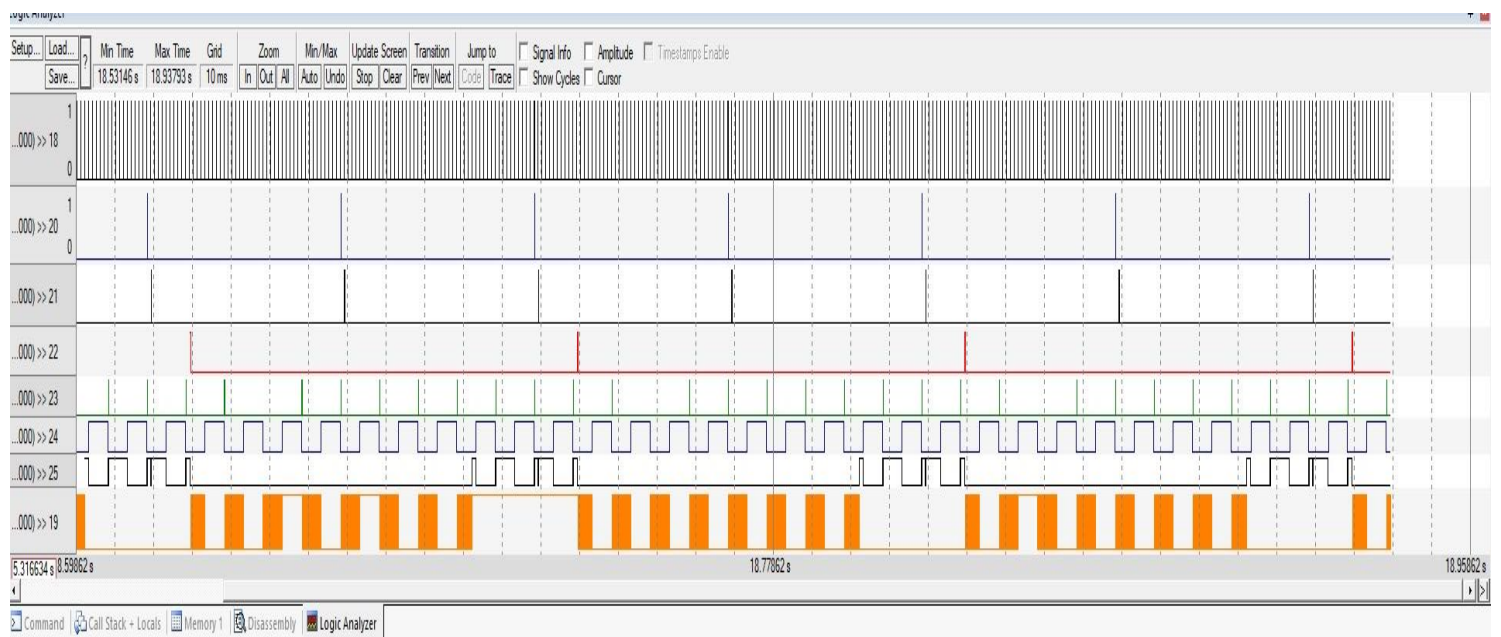


- Using Keil simulator in run-time



CPU usage time

Watch 1		
Name	Value	Type
task_1_TotalTime	1336	int
task_2_TotalTime	1351	int
task_3_TotalTime	1243	int
task_4_TotalTime	3882	int
task_5_TotalTime	565845	int
task_6_TotalTime	136998	int
system_Time	1135061	int
CPU_Load	62.6094093	float
<Enter expression>		



PIN2(18)
 PIN4(20)
 PIN5(21)
 PIN6(22)
 PIN7(23)
 PIN8(24)
 PIN9(25)
 PIN3(19)

Tick Hook
 Button 1 Task
 Button 2 Task
 Periodic Transmitter Task
 UART Receiver Task
 Load 1 Simulation Task
 Load 2 Simulation Task
 Idle Task