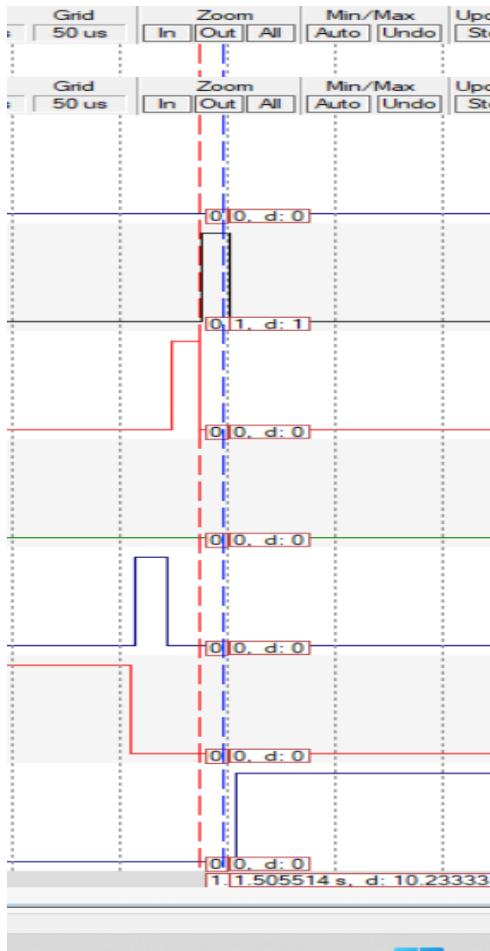


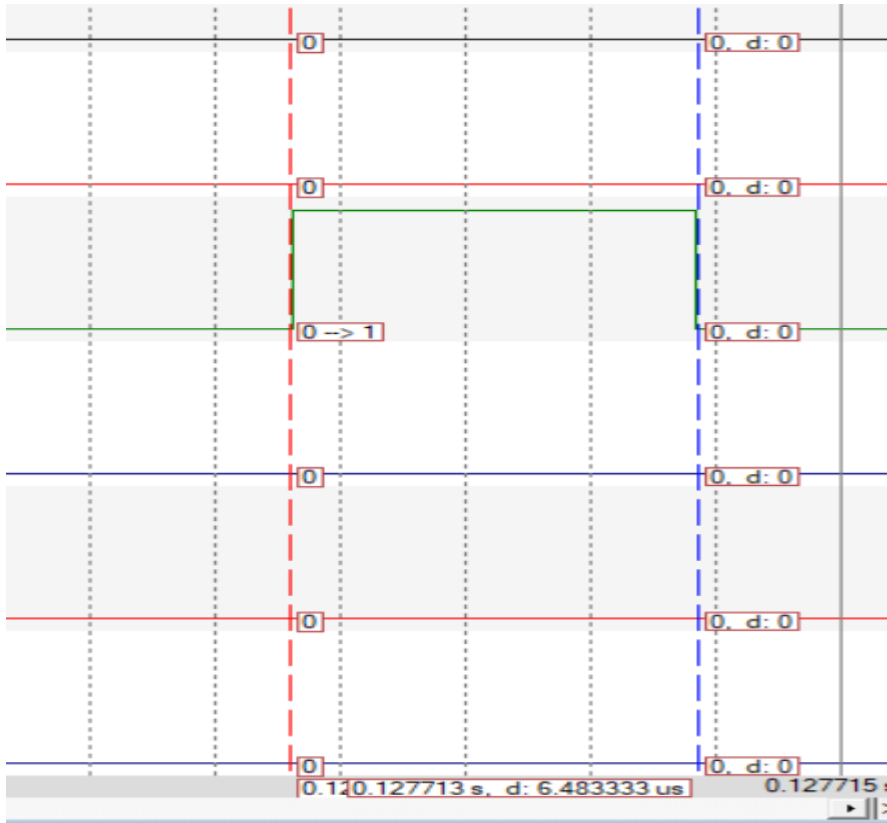
EDF SCHEDULER

we Should first Calculate the Execution Time Of each Task :

BUTTON_1_MONITOR -----> About 10 us.

BUTTON_2_MONITOR -----> About 10 us.

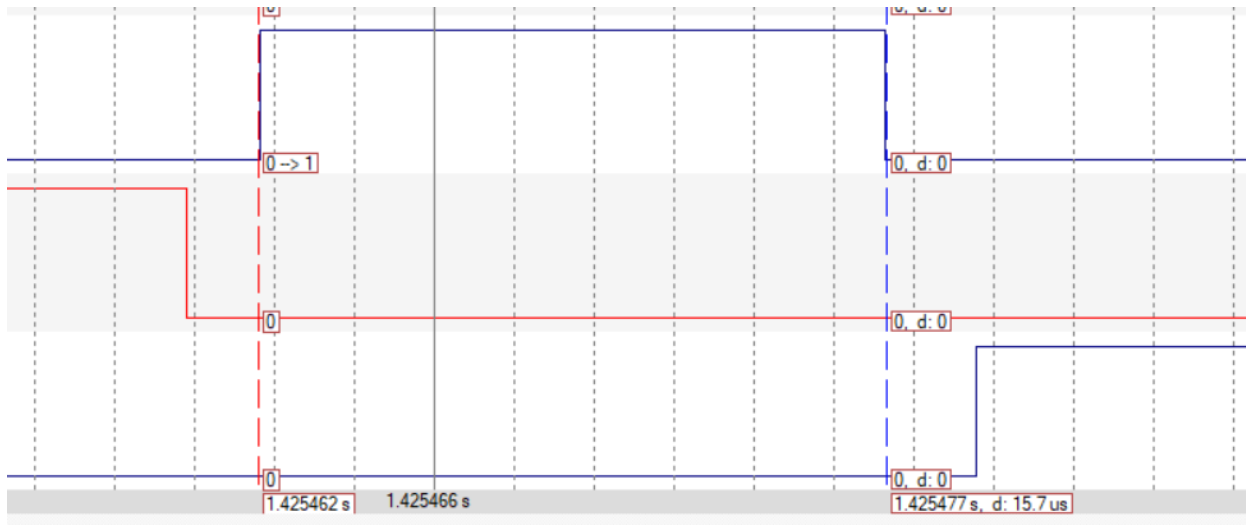




PERIODIC TRANSMITTER ----->

About 6 to 7 us

Uart_Receiver ---> About 15 us



Task 5: ""Load_1_Simulation"", {Periodicity: 10, Deadline: 10}, Execution time: **5ms**

Task 6: ""Load_2_Simulation"", {Periodicity: 100, Deadline: 100}, Execution time: **12ms**

Using Analytical Method :

Using Rate-monotonic-Scheduler

③ Button 1 task $[P: 50, E: 0.01, D: 50]$ ← Periodicity 50
 ④ Button 2 task $[P: 50, E: 0.01, D: 50]$ ← Priority 50
 ⑤ Periodic trans. $[P: 100, E: 0.007, D: 100]$ ← Hyper period = 100
 ② UART Receiver $[P: 20, E: 0.015, D: 20]$
 ① Load 1 $[P: 10, E: 5ms, D: 10]$
 ⑥ Load 2 $[P: 100, E: 12ms, D: 100]$

Test 1

Calculate URM

$$URM = \frac{n}{2^{\frac{1}{n}} - 1} = \frac{6}{2^{\frac{1}{6}} - 1} \approx 0.244924$$

$$U = \sum_{i=1}^n \frac{C_i}{P_i} = \frac{0.01}{50} + \frac{0.01}{50} + \frac{0.007}{100} + \frac{0.015}{20} + \frac{5}{10} + \frac{12}{100} \approx 0.62122$$

$U > URM$ system guaranteed not schedulable

Test 2

Time Demand Analysis $\rightarrow w_i(t) = e_i + \sum_{k=1}^{i-1} \left\lceil \frac{t}{P_k} \right\rceil e_k$
 \rightarrow From higher priority to lower priority

① Time Demand [Load 1]

$$\rightarrow w_1(10) = 5 + 0 = 5 \rightarrow \text{Task is scheduled}$$

② Time Demand [UART Receiver]

$$w_2(20) = 0.015 + \left\lceil \frac{20}{10} \right\rceil (5) = 10.015 \Rightarrow \text{Task is scheduled}$$

③ Time Demand [Button-1-Task]

$$w_3(50) = 0.01 + \left\lceil \frac{50}{10} \right\rceil (5) + \left\lceil \frac{50}{20} \right\rceil (0.015) = 25.0475 \Rightarrow \text{Task is scheduled}$$

④ Time Demand [Button-2-Task] is same delay

$$w_4(50) = 0.01 + \left\lceil \frac{50}{10} \right\rceil (5) + \left\lceil \frac{50}{20} \right\rceil (0.015) + \left\lceil \frac{50}{50} \right\rceil (0.01) = 25.0575 \Rightarrow \text{Task is scheduled}$$

⑤ Time Demand [Periodic Transmitter]

$$w_5(100) = 0.007 + \left\lceil \frac{100}{10} \right\rceil (5) + \left\lceil \frac{100}{20} \right\rceil (0.015) + \left\lceil \frac{100}{50} \right\rceil (0.01) + \left\lceil \frac{100}{100} \right\rceil (0.007) = 50.122 \Rightarrow \text{Task is scheduled}$$

⑥ Time Demand [load 2]

$$w_6(100) = 12 + \left\lceil \frac{100}{10} \right\rceil (5) + \left\lceil \frac{100}{20} \right\rceil (0.015) + \left\lceil \frac{100}{50} \right\rceil (0.01) + \left\lceil \frac{100}{100} \right\rceil (0.007)$$

$$= 62.122 \Rightarrow \text{Task is scheduled}$$

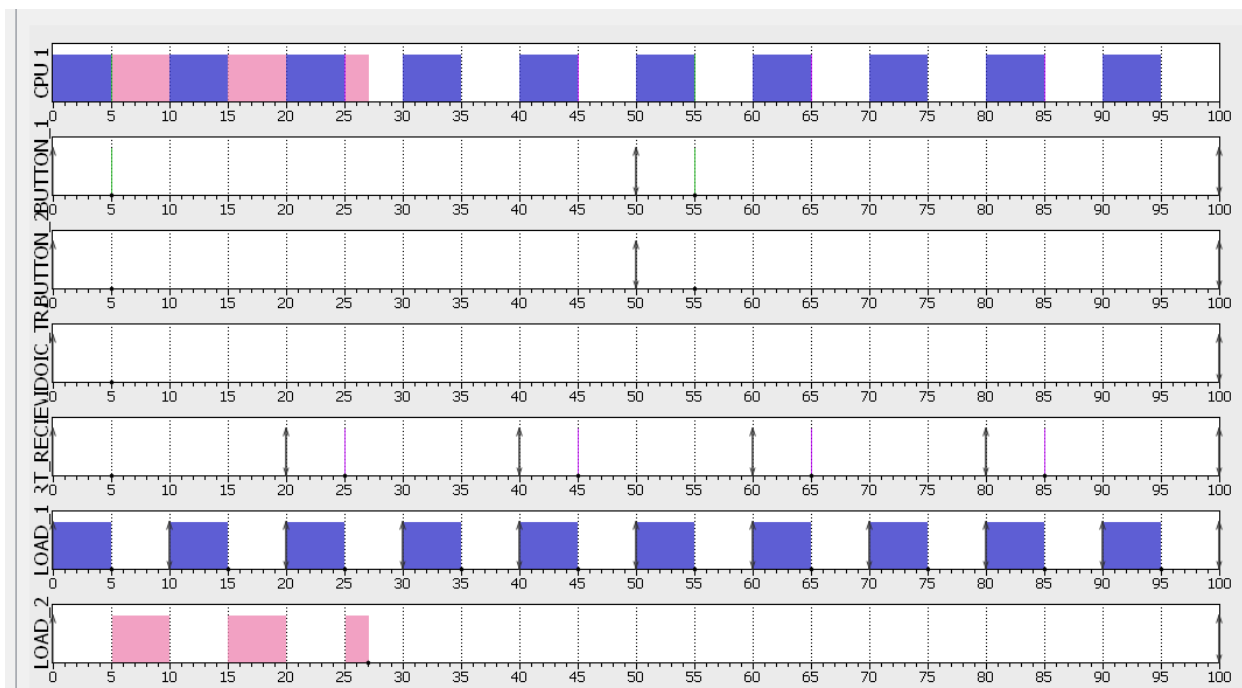
Test 2

Using Simso offline simulator

* FILE.xml								
General	Scheduler	Processors	Tasks					
id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)
1	BUTTON_1	Periodic	<input type="checkbox"/> No	0.0	50.0	-	50.0	0.01
2	BUTTON_2	Periodic	<input type="checkbox"/> No	0.0	50.0	-	50.0	0.01
3	PERIDOIC_TRANS	Periodic	<input type="checkbox"/> No	0.0	100.0	-	100.0	0.007
4	UART_RECIEVER	Periodic	<input type="checkbox"/> No	0.0	20.0	-	20.0	0.015
5	LOAD_1	Periodic	<input checked="" type="checkbox"/> No	0.0	10.0	-	10.0	5.0
6	LOAD_2	Periodic	<input type="checkbox"/> No	0.0	100.0	-	100.0	12.0

Scheduler ----> Rate_Monotonic

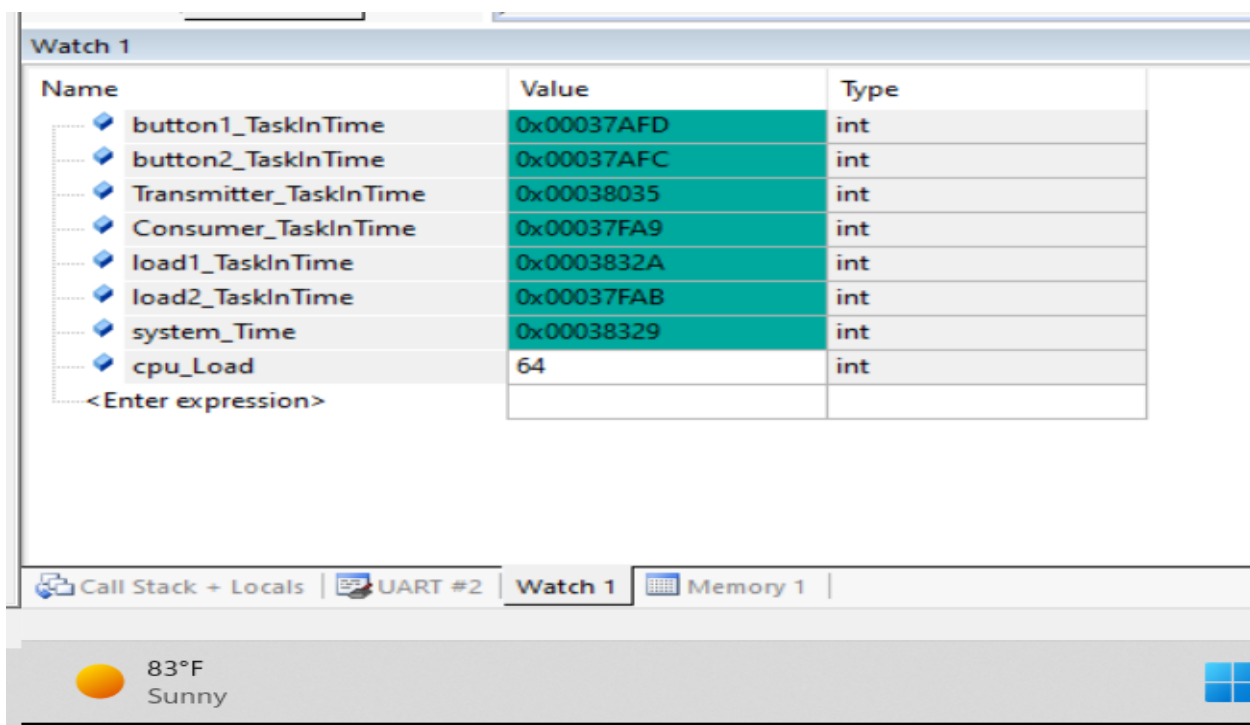
Simulation :



Load_2_Simulation Task is preempted by Load_1_Simulation Task as it has lower periodicity

The Execution Time of the rest is too small.

Using Keil simulator in run-time



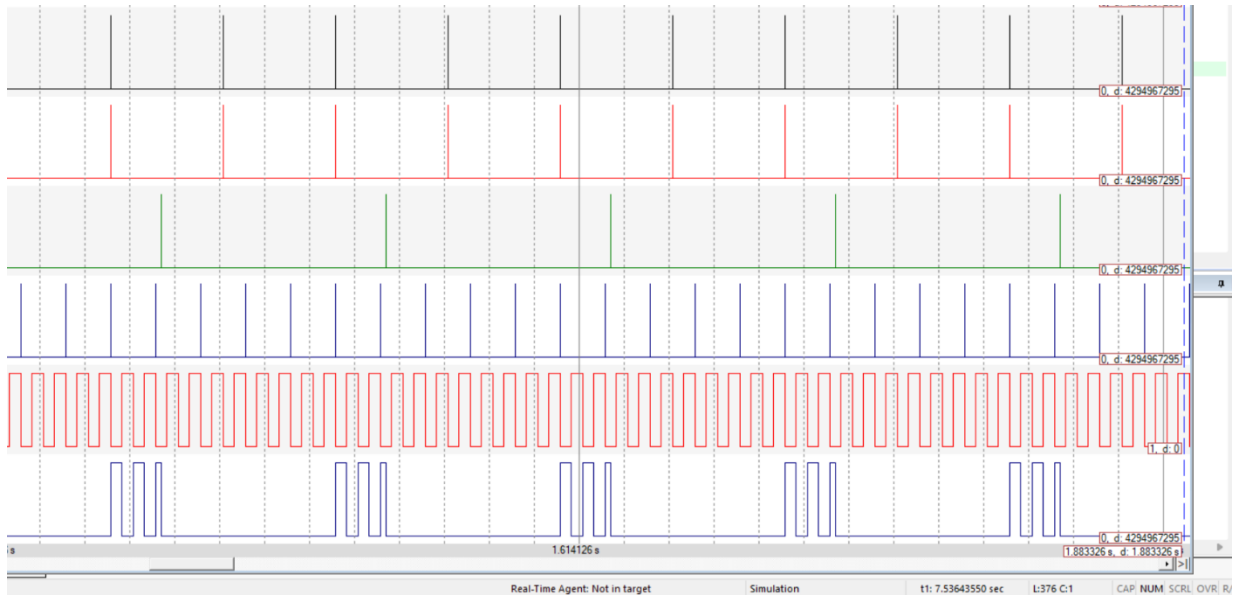
The image shows the 'Watch 1' window in the Keil simulator. It displays a list of variables being monitored during the execution of a program. Each variable is preceded by a small blue diamond icon. The variables and their current values are as follows:

Name	Value	Type
button1_TaskInTime	0x00037AFD	int
button2_TaskInTime	0x00037AFC	int
Transmitter_TaskInTime	0x00038035	int
Consumer_TaskInTime	0x00037FA9	int
load1_TaskInTime	0x0003832A	int
load2_TaskInTime	0x00037FAB	int
system_Time	0x00038329	int
cpu_Load	64	int
<Enter expression>		

At the bottom of the simulator window, there is a status bar showing a yellow sun icon, the temperature '83°F', and the weather 'Sunny'. The Windows logo is also visible in the bottom right corner.

CPU_LOAD is from 62% to 64% then System Implementation is Successful

Using Gpios



Load_1_Simulation Task is executed first as it has the Earliest DeadLine then Uart_Receiver

Then Button_1_Monitor & Button_2_Monitor (Same Deadline) then Periodic_Transmitter.

Thanks A lot

