SPRINTS

DESIGN HEALTH CARE SYSTEM REPORT

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TASK REQUIREMENTS

- **Task:** Design a healthcare system using RTOS with the following requirements:
  - A touch LCD as input that can control the system and give commands. Every LCD command is represented in 4 bytes. LCD is connected to the micro-controller through UART with speed 9600 bps [Bit per second]. (Reading 4 bytes and processing the command takes 2 ms)
  - Blood pressure sensor with new data every 25ms. (Reading the sensor and processing its data takes 3 ms)
  - Heart beat detector with new data every 100ms. (Reading the sensor and processing its data takes 1.5 ms)
  - Temperature sensor with new data every 10ms. (Reading the sensor and processing its data takes 2.5 ms)
  - Alert siren. (Activate or Deactivate the siren takes 1 ms)

TASKS DETAILS

Task Name	Period	WCET	Deadline	Priority
LCD & UART (T1)	**100**	**2**	**100**	**1**
Blood Pressure (T2)	**20**	**3**	**20**	**3**
Heart Beat **(T3)**	50	1.5	50	2
Temperature Sensor (T4)	10	2.5	10	4
Alert Siren (T5)	On Event	1	-	-

Warning :High Priority Go To Task With Low Period Like Rate Monotonic Schedule Policy Please Note That Lower Priority Value Mean That Task Priority Is Lower Than Others

SYSTEM CALCULATIONS

System Tick Rate:

System Tick Rate > Execution Time Of All Tasks

Sum Of Execution Time = 2+3+1.5+2.5 = 9ms

So I choose systick to be 10 ms because it is bigger than 9ms

Hyperperiod :

LCM(100,20,50,10) = 100ms

CPU Load :

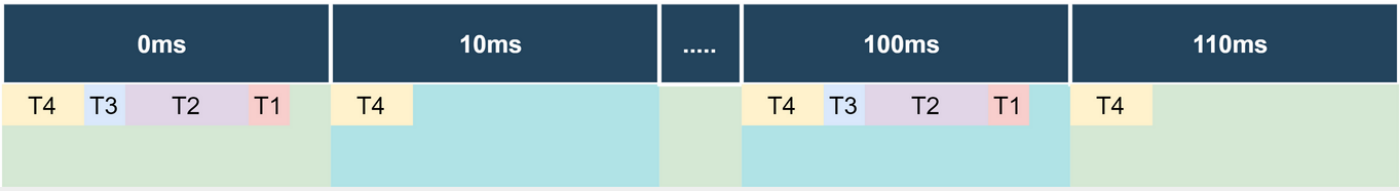
Every Tasks Repeat Number :
T1 = 1 , T2 = 5 , T3 = 2 , T4 = 10 , T5 = On Event

Cpu Load Without T5 = (1*2) + (5*3) + (2*1.5) + (2.5*10) = 45/100 = 0.45 = 45%

Cpu Load With T5 = (1*2) + (5*3) + (2*1.5) + (2.5*10) + 1 = 46/100 = 0.46 = 46%

TIMELINE

	Task Name	Priority	Periodicity	Execution	Deadline	Color
1	LCD & UART	1	100 ms	2 ms	100 ms	T3
2	Blood Pressure	3	20 ms	3 ms	20 ms	T2
3	Heart Beat	2	50 ms	1.5 ms	50 ms	T1
4	Temperature Sensor	4	10 ms	2.5 ms	10 ms	T4
5	Alert Siren	On Event	On Event	1 ms	5ms	On Event



hyperperiod is every 100 ms so as we see that all tasks run every 100ms according to its priority & systick come every 10ms to make sure that all tasks is execute successfully

SIMSO SIMULATION RESUALT

Model data

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)	Followed by	priority
1	TASK T1	Periodic	Yes	0.0	100.0	-	100	2.0		1
2	TASK T2	Periodic	Yes	0.0	20	-	20	3.0		3
3	TASK T3	Periodic	Yes	0.0	50	-	50	1.5		2
4	TASK T4	Periodic	Yes	0.0	10	-	10	2.5		4

Edit data fields...

Remove selected task(s) | Add task | Generate Task Set

Results

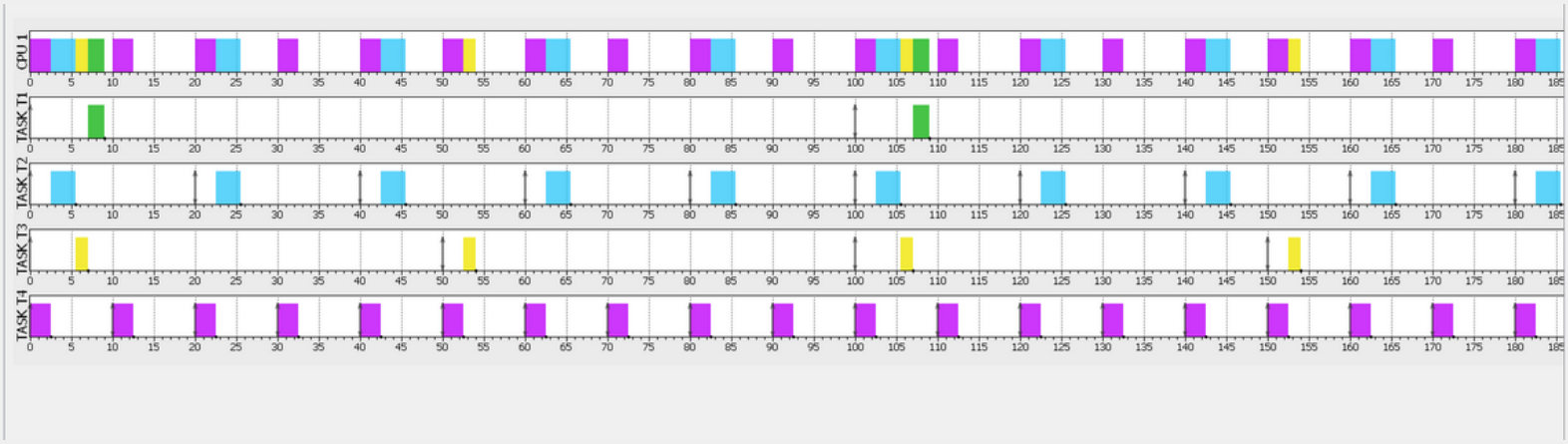
General | Logs | Tasks | Scheduler | Processors

Observation Window:

from 0.00 to 200.00 ms | Configure...

	Total load	Payload	System load
CPU 1	0.4500	0.4500	0.0000
Average	0.4500	0.4500	0.0000

SIMSO SIMULATION RESUALT



SIMSO SIMULATION CONCLUSION

As we see from simso result all match the system calculation CPU Load is 45% and cycle come again every 100 ms as the value of the hyperperiod each task execute do not miss its deadline