Tasks required

I have divided the system into 5 tasks:

1. UART & LCD Task
2. Temperature sensor
3. Blood pressure sensor
4. Heartbeat sensor
5. Siren

Task parameters

In this application no specific deadline was specified so we can assume that the deadline will be the periodicity. I assumed that checking the UART every 100ms is sufficient to check and process if the user has touched the screen.

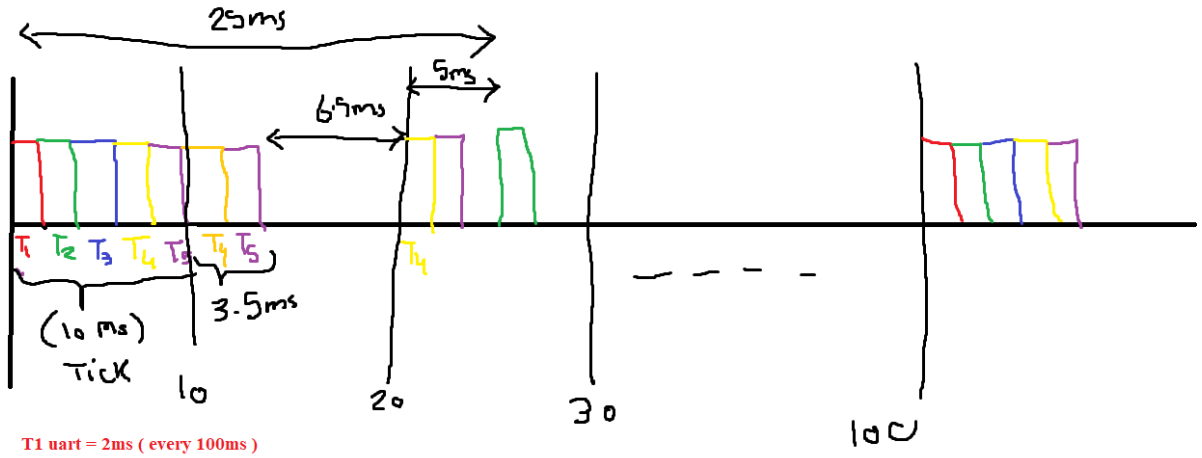
Task	Priority	Periodicity	Deadline
Temperature		10ms	10ms
Blood Pressure		25ms	25ms
Heartbeat		100ms	100ms
Siren		On event	
UART & LCD		100ms	100ms

System tick rate

The chosen system tick rate is 10ms (It should be higher than the execution time of all tasks if they arrive together, in this case it is equal all the tasks' execution time, and it should also be higher than the least periodicity that we have which is also 10ms in this case)

Hyperperiod

The hyperperiod is the least common multiple of the above tasks which is 100ms



T1 uart = 2ms (every 100ms)
T2 pressure = 3ms (every 25ms)
T3 heart beat = 1.5ms (every 100ms)
T4 Temp = 2.5ms (every 10ms)
T5 siren = 1ms every 10 (worst case here)

Simso

Starting with all the systems without preemption and all at the same priority

- Assuming a worst case and that the siren alarm is on every 10ms because of high temperature

id	Name	Task type	Abort on miss	Act. Date (ms)	Period (ms)	List of Act. dates (ms)	Deadline (ms)	WCET (ms)	Followed by	
1	Beat	Periodic	No	0.0	100.0	-	100.0	1.5		1
2	Pressure	Periodic	No	0.0	25.0	-	25.0	3.0		1
3	Temp	Periodic	No	0.0	10.0	-	10.0	2.5		1
4	UART	Periodic	No	0.0	100	-	100	2		1
5	Siren	Periodic	No	0.0	10.0	-	10.0	1.0		1

We get a cpu load of about 50%

	Total load	Payload	System load
CPU 1	0.5050	0.5050	0.0000
Average	0.5050	0.5050	0.0000

If we calculate the cpu load manually,

For heart beat we have: (1 time per hyper * 1.5 execution time) = 1.5
For blood pressure: (4*3) = 12
For Temp: (10*2.5) = 25
For UART = (1*2) = 2
For siren = (10*1) = 10

So total CPU load = Total load / hyperperiod = (1.5+12+25+2+10) / 100 = 50.5/100 = 0.505
as calculated in the Simso

If we plot the Gantt chart, we can see that the system can be scheduled in the designed way with no task missing its deadline in the 100ms span of the hyperperiod