

Design Healthcare System

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Team2

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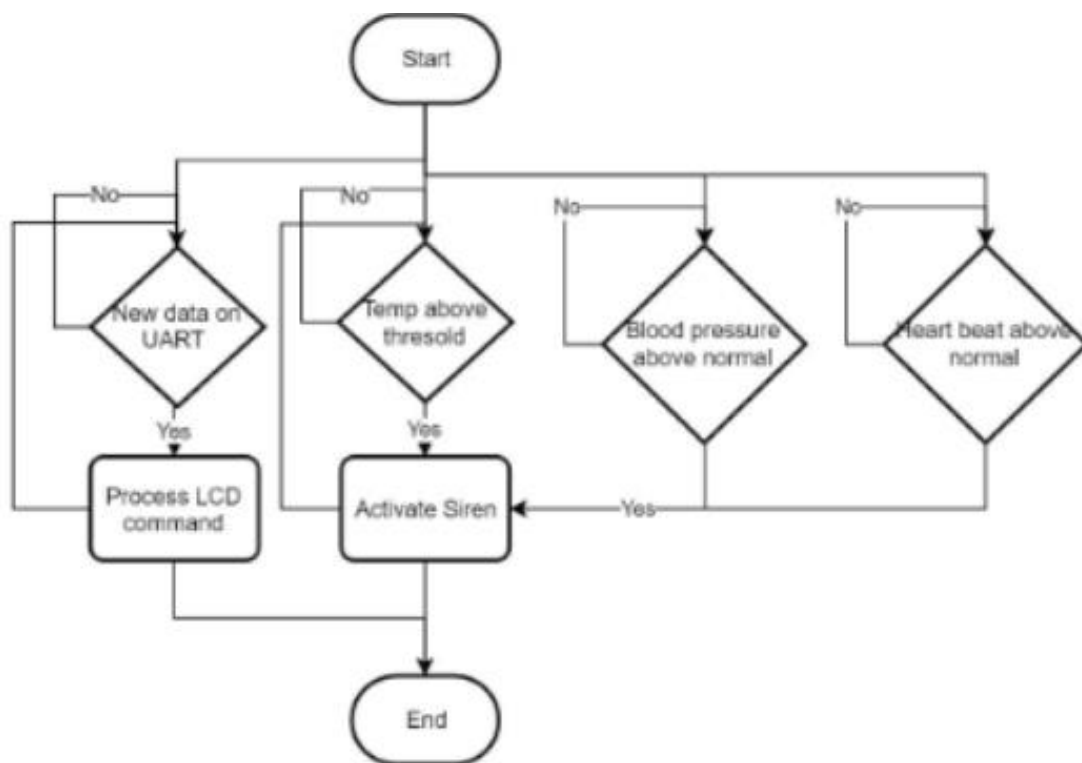
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1- Introduction

• **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)

2- Flow Chart



3- Design

We have 5 Tasks as follow:

Task	Periodicity (ms)	Execution time (ms)	Deadline (ms)	Priority
1-Display	100	2	100	1
2-Blood Pressure sensor	25	3	25	2
3-Heartbeat Detector	100	1.5	100	3
4-Temperature Sensor	10	2.5	10	4
5-Alert Serin	Based on event	1	-	5

Calculations:

- summation of execution time = $2+3+1.5+2.5+1 = 10\text{ms}$
- systick = 10ms (as systick \geq summation of execution time)
- Hyper period = 100
- CPU load = (summation of E)/H = $[2+(3*4)+1.5+(2.5*10)]/100 = 40.5$

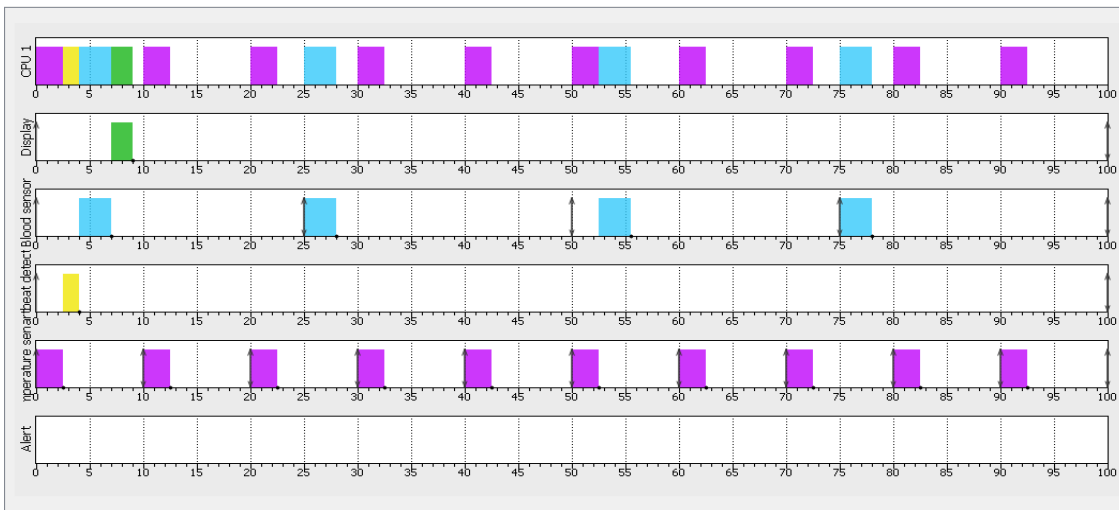
4- Simos

Qt Model data

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	Display	Periodic	<input checked="" type="checkbox"/> Yes	0	100	-	100	2		1
2	Blood sensor	Periodic	<input checked="" type="checkbox"/> Yes	0	25	-	25	3		2
3	heartbeat detector	Periodic	<input checked="" type="checkbox"/> Yes	0	100	-	100	1.5		3
4	Temperature sensor	Periodic	<input checked="" type="checkbox"/> Yes	0	10	-	10	2.5		4
5	Alert	APeriodic	<input checked="" type="checkbox"/> Yes	-	-	-	100	1		5

Edit data fields...

Remove selected task(s) Add task Generate Task Set



Qt Results

Observation Window:			
from 0.00 to 100.00 ms		Configure...	
	Total load	Payload	System load
CPU 1	0.4050	0.4050	0.0000
Average	0.4050	0.4050	0.0000

Comment:

- the manual calculations are exactly like Simos
- All tasks successfully meet their deadline