Health Monitoring System

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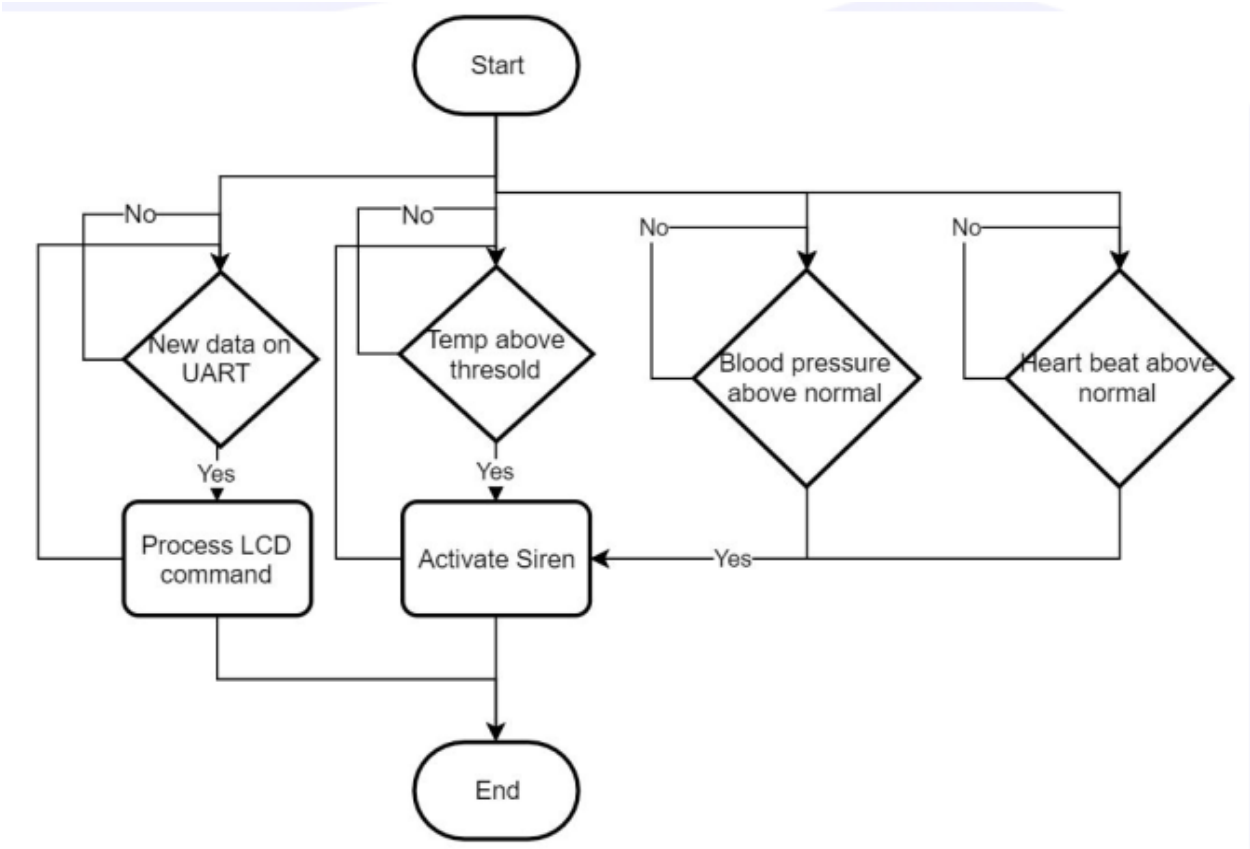
Sprints

Requirements

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. The LCD is connected to the microcontroller 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)

System's Flowchart



Implementation

I. Number of tasks required in the system

The number of tasks we decided upon for the functionality of the system are **5 tasks,** and these are as follows:

Task Name	Periodicity	Execution Time	Deadline
LCD Task	100mS	2mS	100mS
Blood Pressure Sensor	25mS	3mS	25mS
Heart Beat Sensor	100mS	1.5mS	100mS
Temperature Sensor	10mS	2.5mS	10mS
Alert Siren	10mS	1mS	10mS

II. Parameters Calculations

System Tick:

Σ Execution Time = 2 + 3 + 1.5 + 2.5 + 1 = 10mS

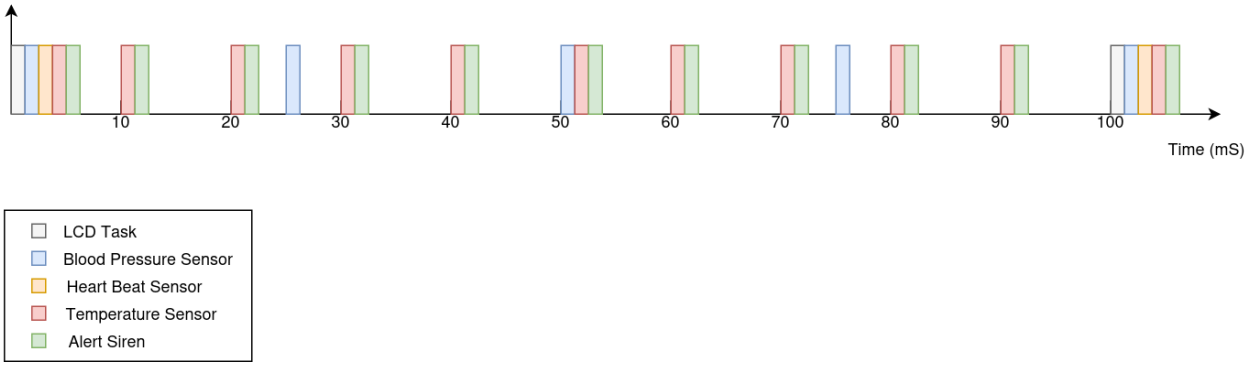
Hyperperiod

LCM (Periodicity) = 100

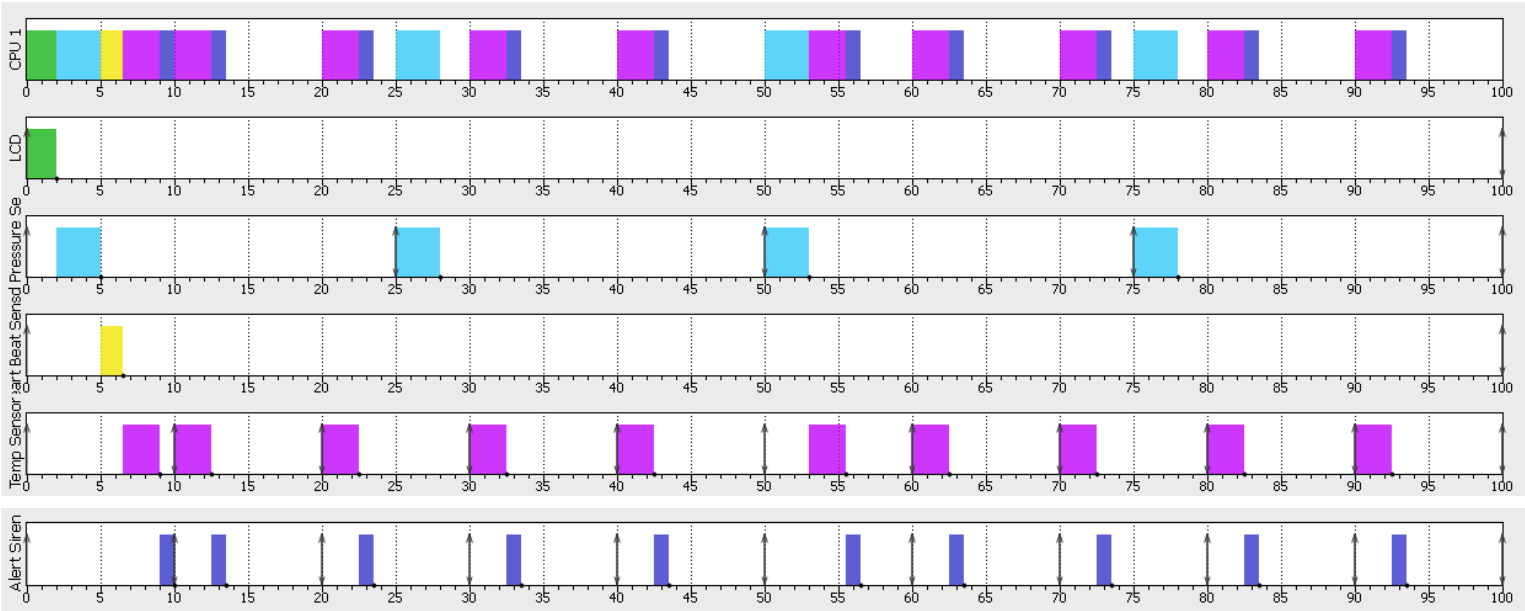
CPU Load

CPU Load = Busy Time / Total Time = $\frac{(2 * 1) + (1.5 * 1) + (2.5 * 10) + (20 * 1)}{100} = 60.5\%$

Timeline Manually Drawn



Modeling the system in Simso and verify that the design is schedulable.



Results of the simulation

	Total Time	Pay Load	System Load
CPU 1	0.5050	0.5050	0
Average	0.5050	0.5050	0