

Pressure Controller

Mastering Embedded System Online Diploma

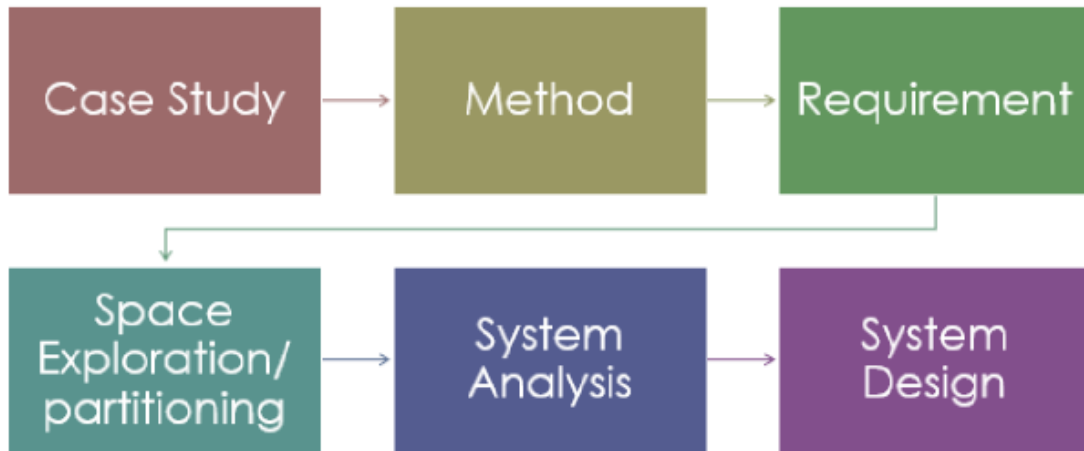


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First Term (Final Project 1)

Learn in Depth

System Architecting/Design Sequence:



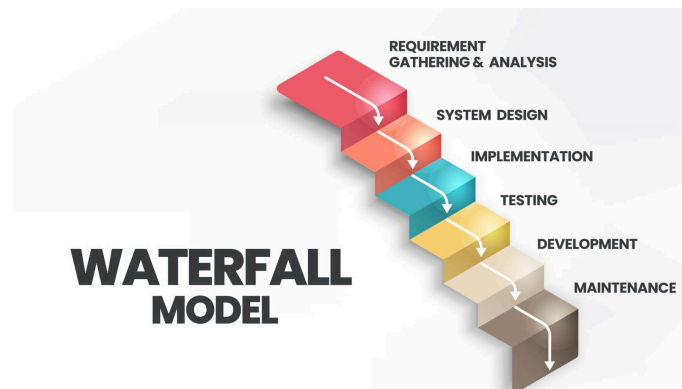
Case Study:

The client Needs:

- A pressure controller informs the crew of a cabin with an alarm when the pressure exceeds 20 bars in the cabin.
- The alarm duration equals 60 seconds.

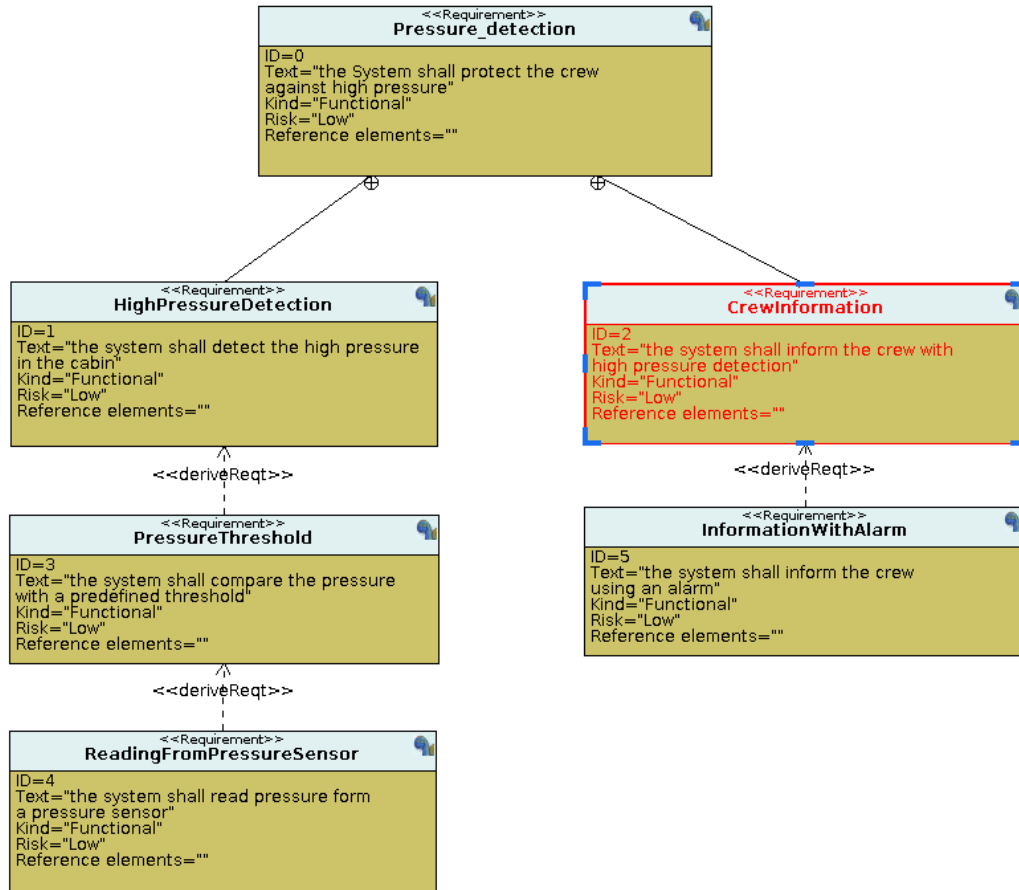
Method:

- The method used is waterfall methodology



Requirement

- The system has 2 main requirement which are:
 - A pressure controller informs the crew of a cabin with an alarm when the pressure exceeds 20 bars in the cabin.
 - The alarm duration equals 60 seconds.



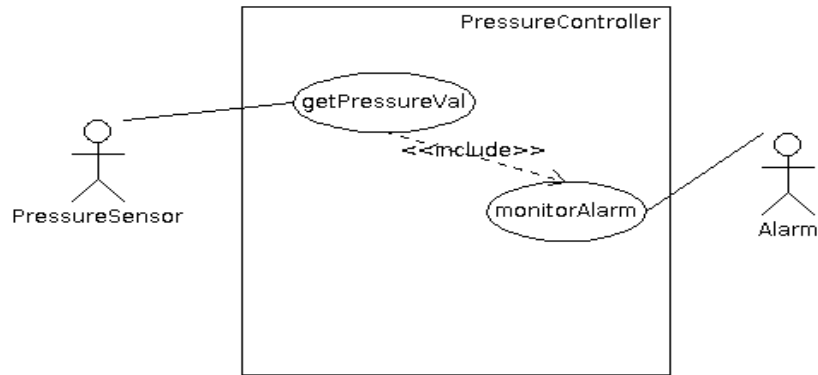
Space Exploration/ partitioning

By Searching For optimal solution:

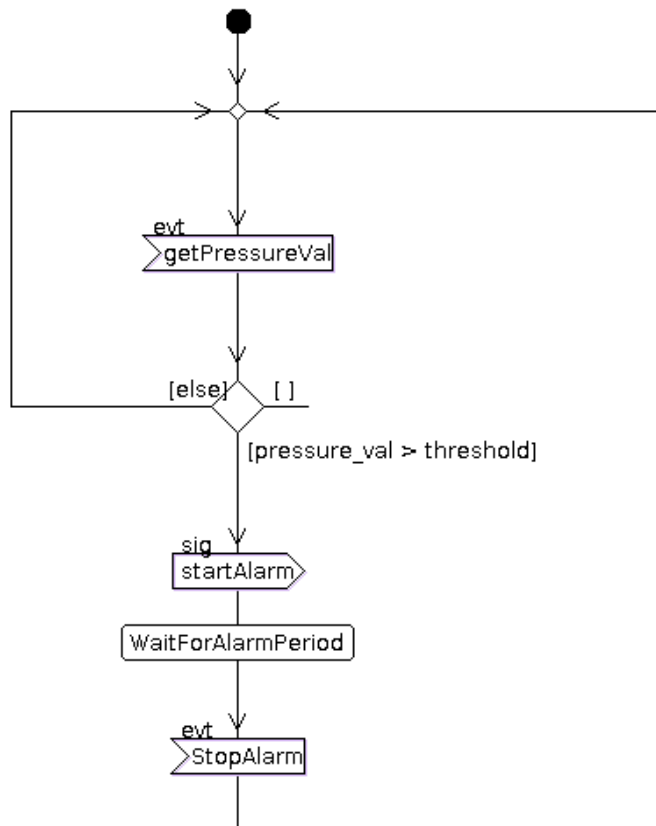
- We Found That STM32F103 Perfect Choice to Work On as it has:
 - Low Cost
 - Low Power Consumption
 - Good performance.

System Analysis

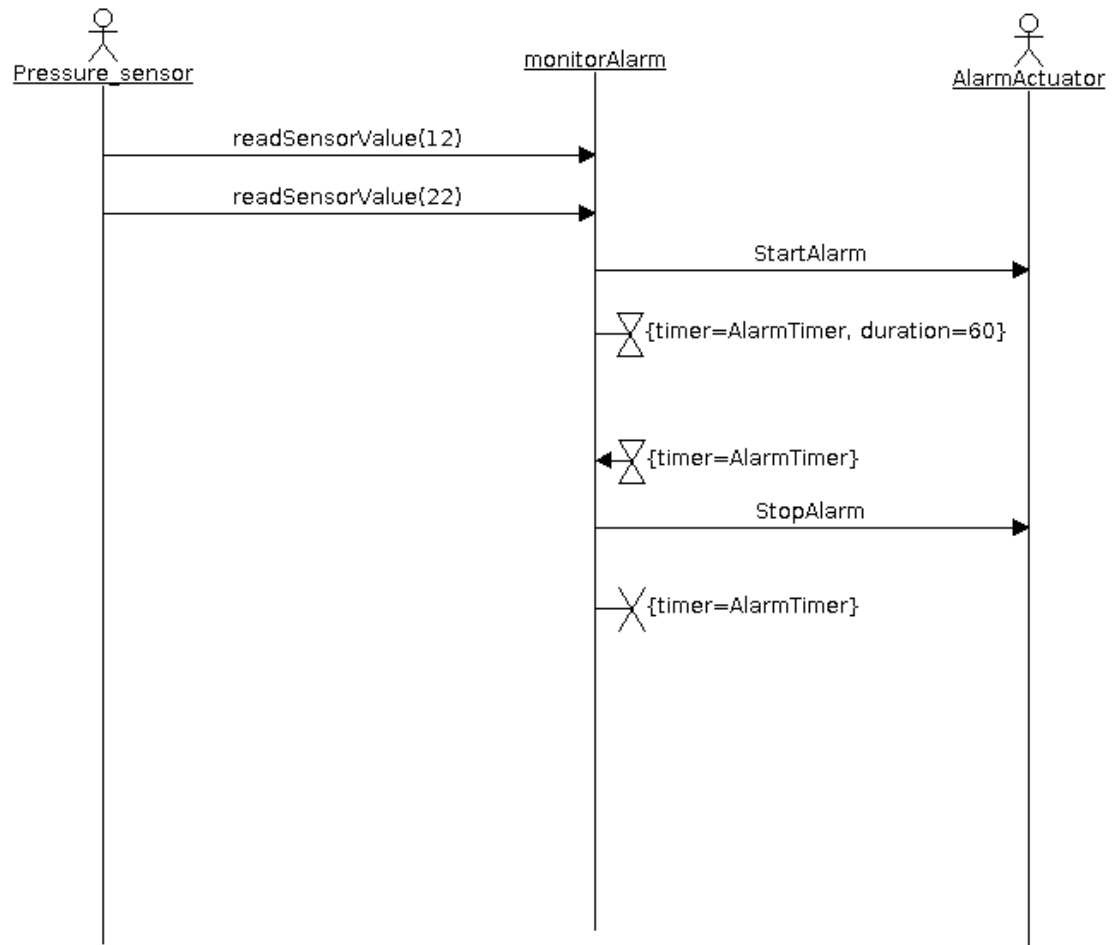
- Use case diagram



- Activity diagram

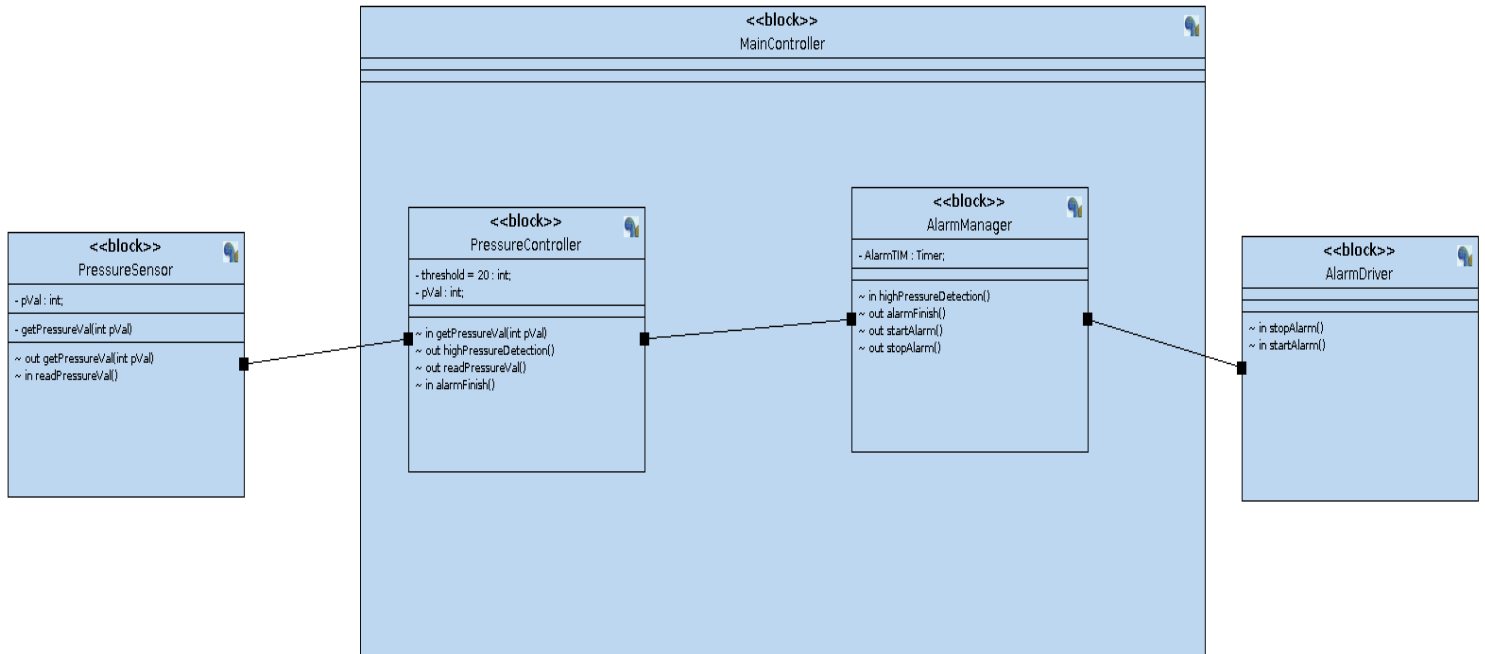


- Sequence diagram

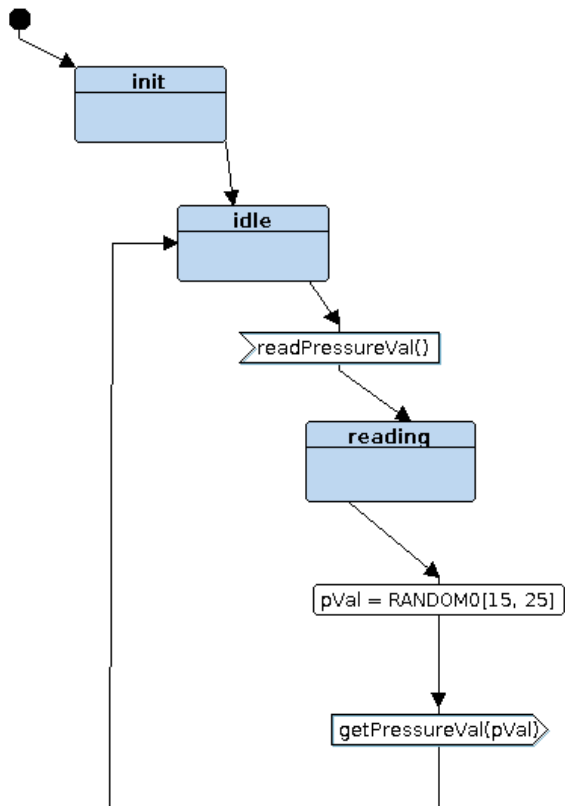
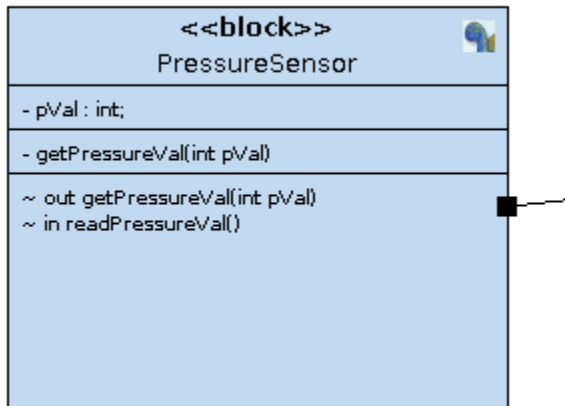


System design

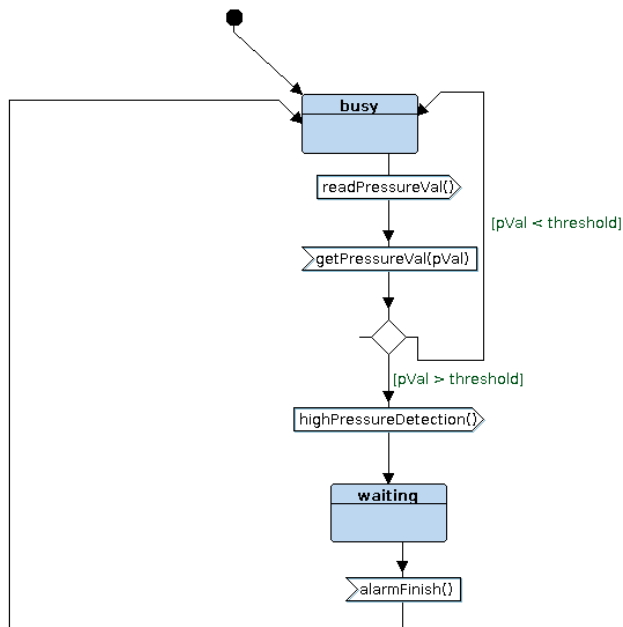
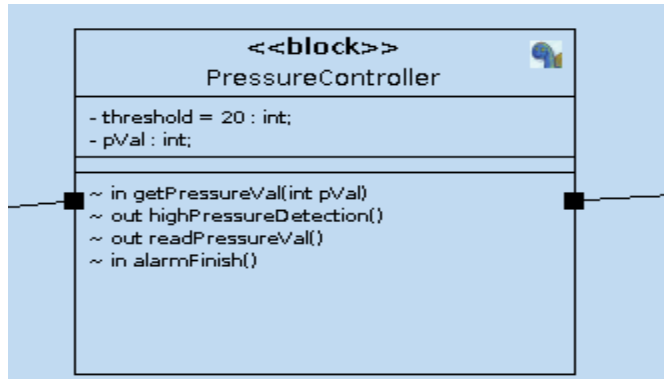
- Whole system design



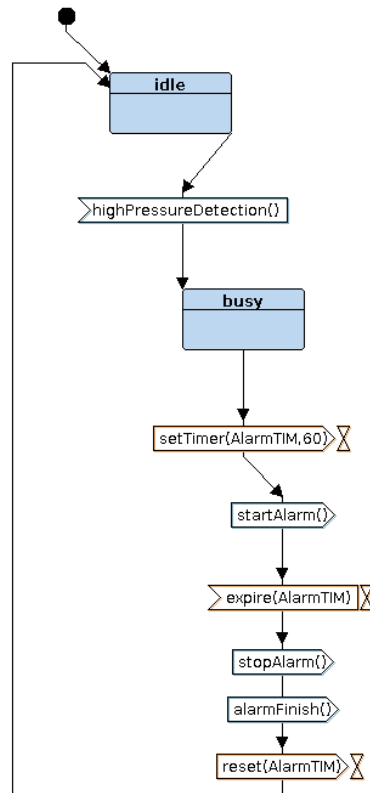
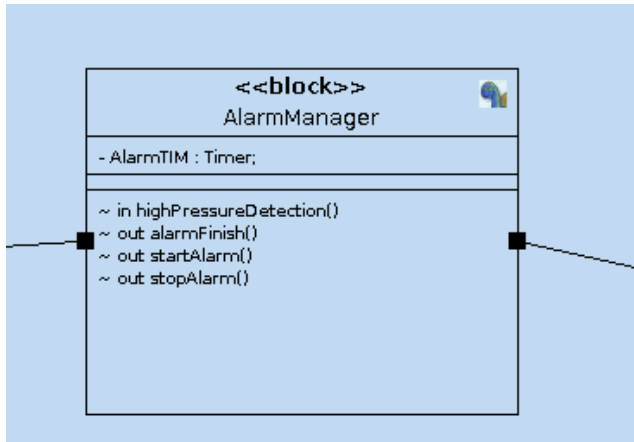
- Pressure sensor module
 - This module is responsible for reading the pressure sensor value and signal the pressure controller in case high pressure is detected



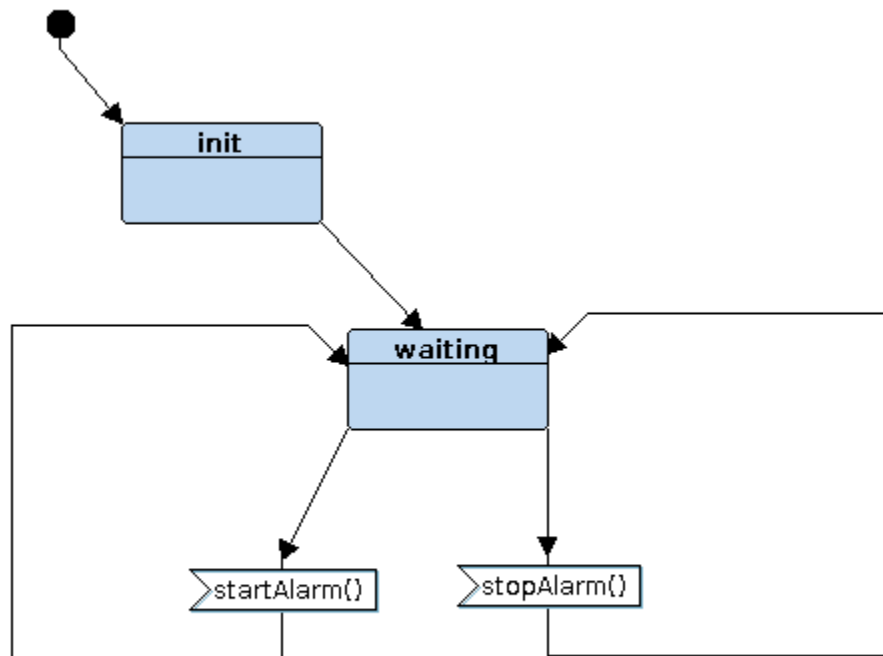
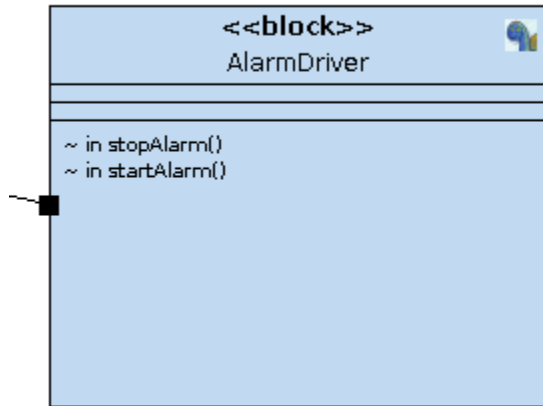
- Pressure controller module
 - This module is responsible for signaling the alarm driver in case of high pressure detected and also manage state of pressure sensor to stop it in case the alarm is on so that save it's power consumption while no readings is needed



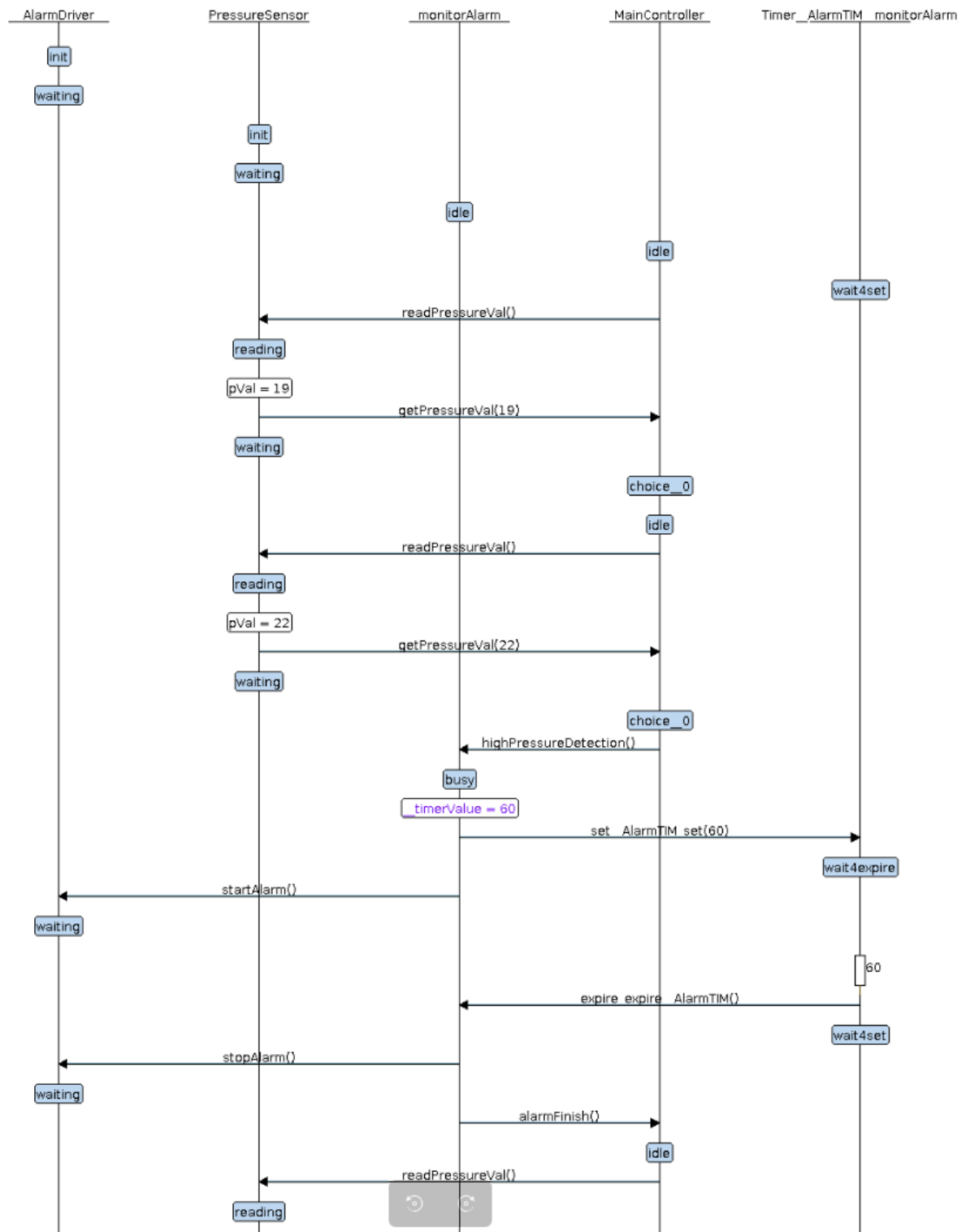
- Alarm monitor module
 - This module is signaled from the pressure controller through changing its state from idle to high pressure detection so that it starts the alarm then waits for 60 seconds and stops it.



- Alarm driver module
 - Alarm driver is used by alarm manager to start or stop the alarm



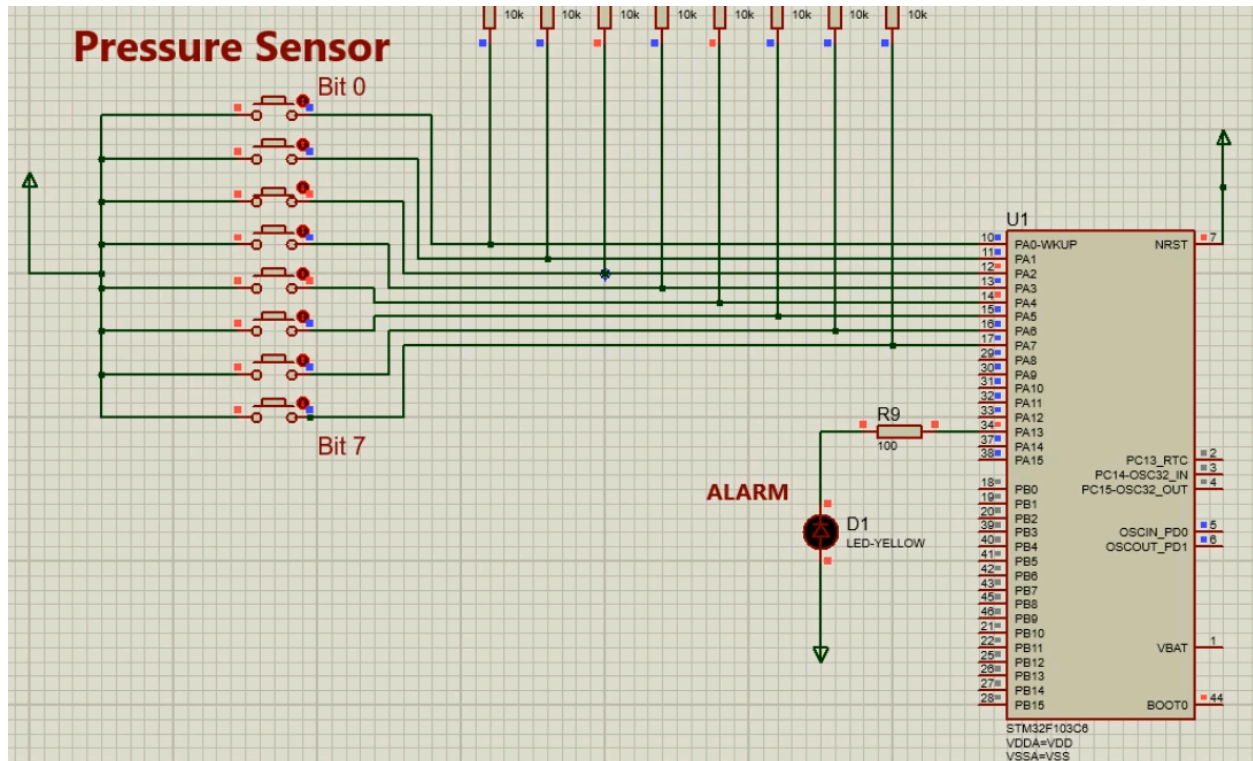
Analysis and Timing Diagram on TTool



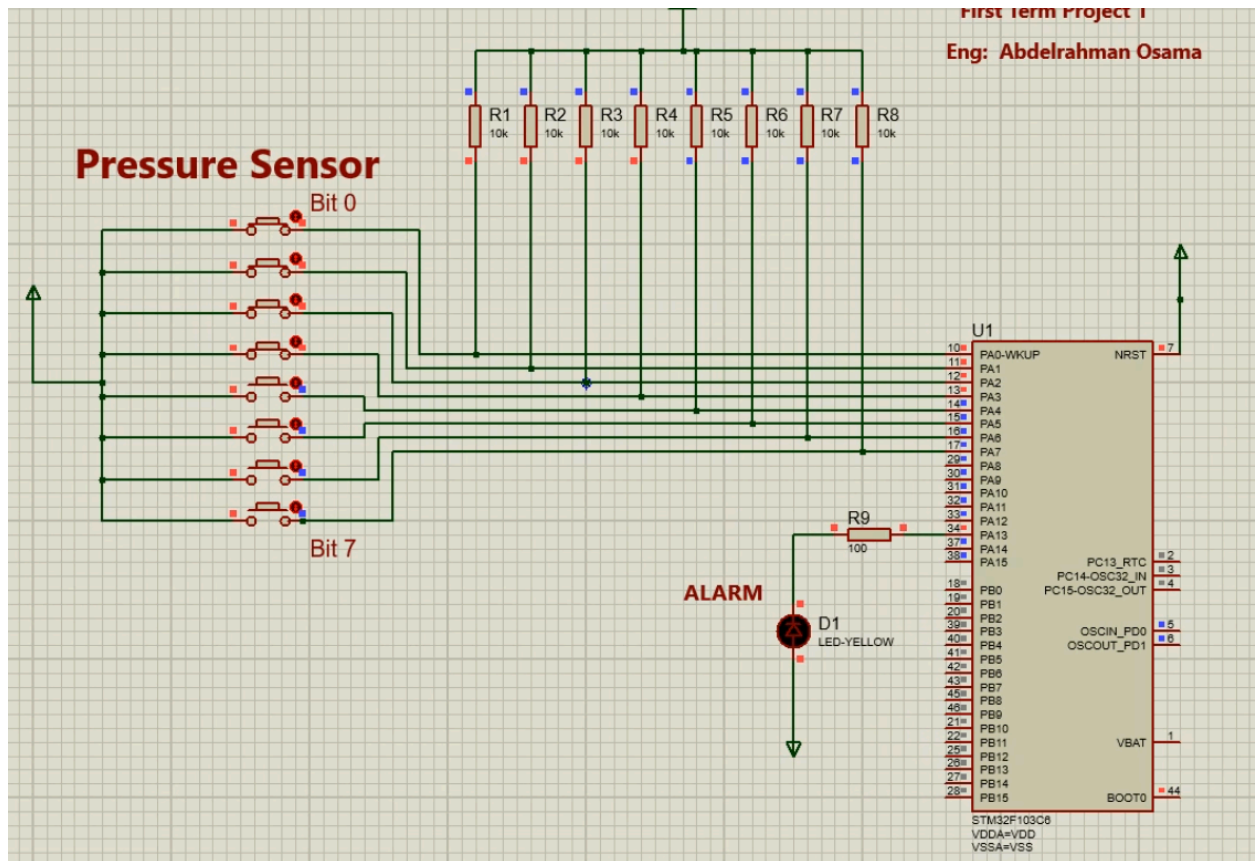
Simulation on Proteus:

Case1:

- If the pressure Value is less than or equal Threshold (20 bar), the Led is off.
- Here pressure sensor reading is 20



- Here pressure sensor reading is 15



Case2:

- If the pressure Value is more than Threshold (20 bar), the Led is on.
- Here pressure sensor reading is 128

