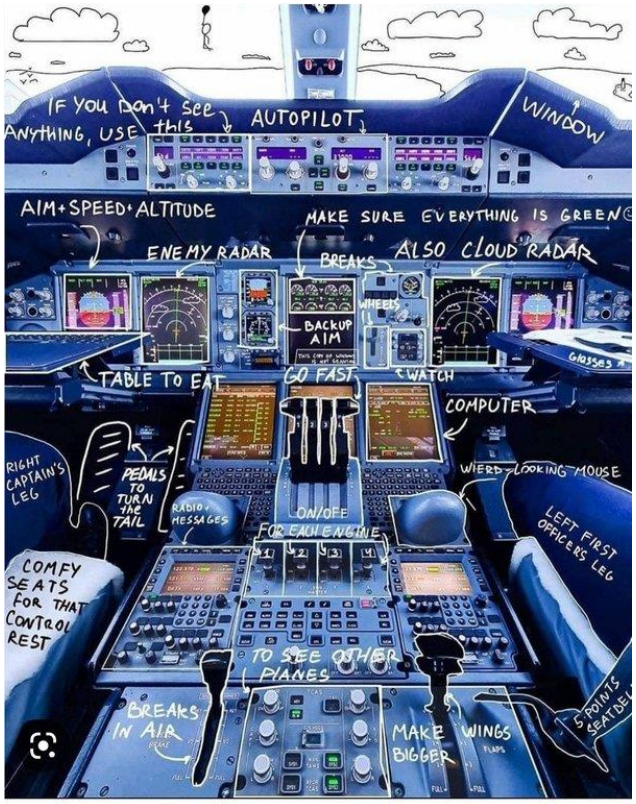


FIRST TERM (PROJECT 1)

[Pressure controller]

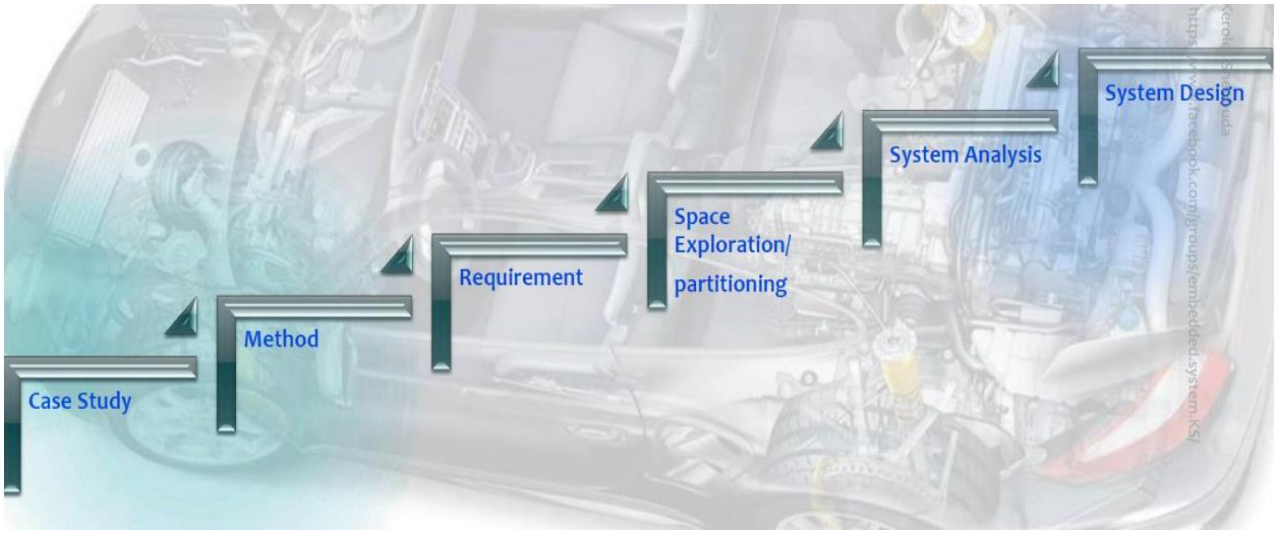
SUBJECT

[A project to measure the pressure value in the cockpit and notify the pilot through an alarm if the pressure exceeds 20 bars.]

mohammed shawki
[Learn-in-depth]

[Githup repo: https://github.com/mohammedshawki/embedded_System_Online_Diploma]

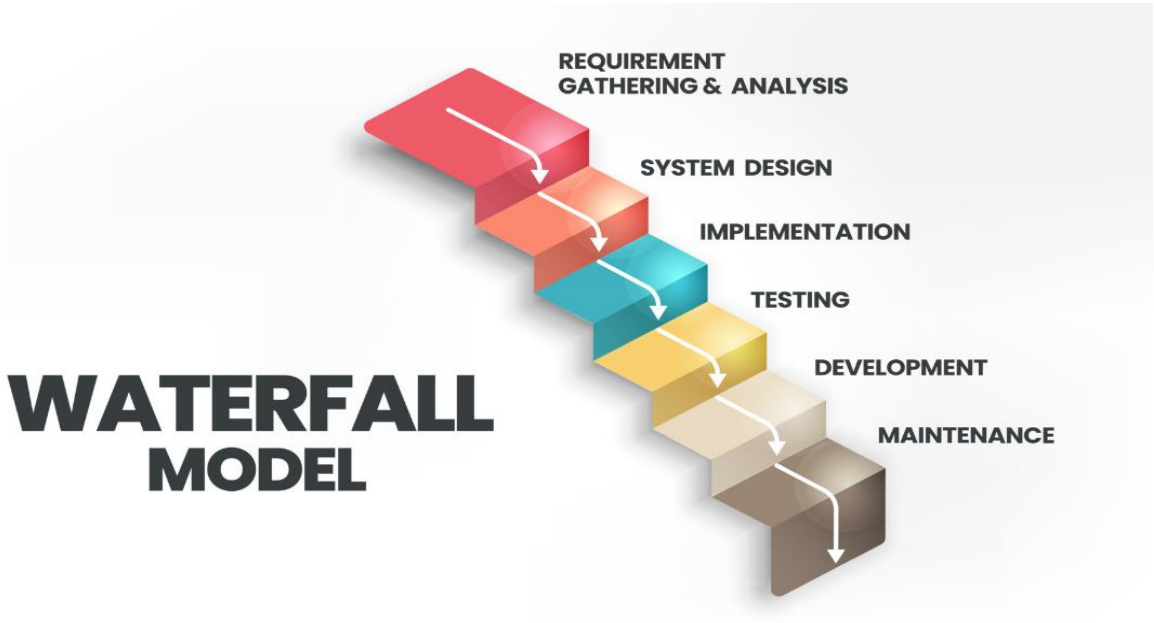
The sequence to model the system



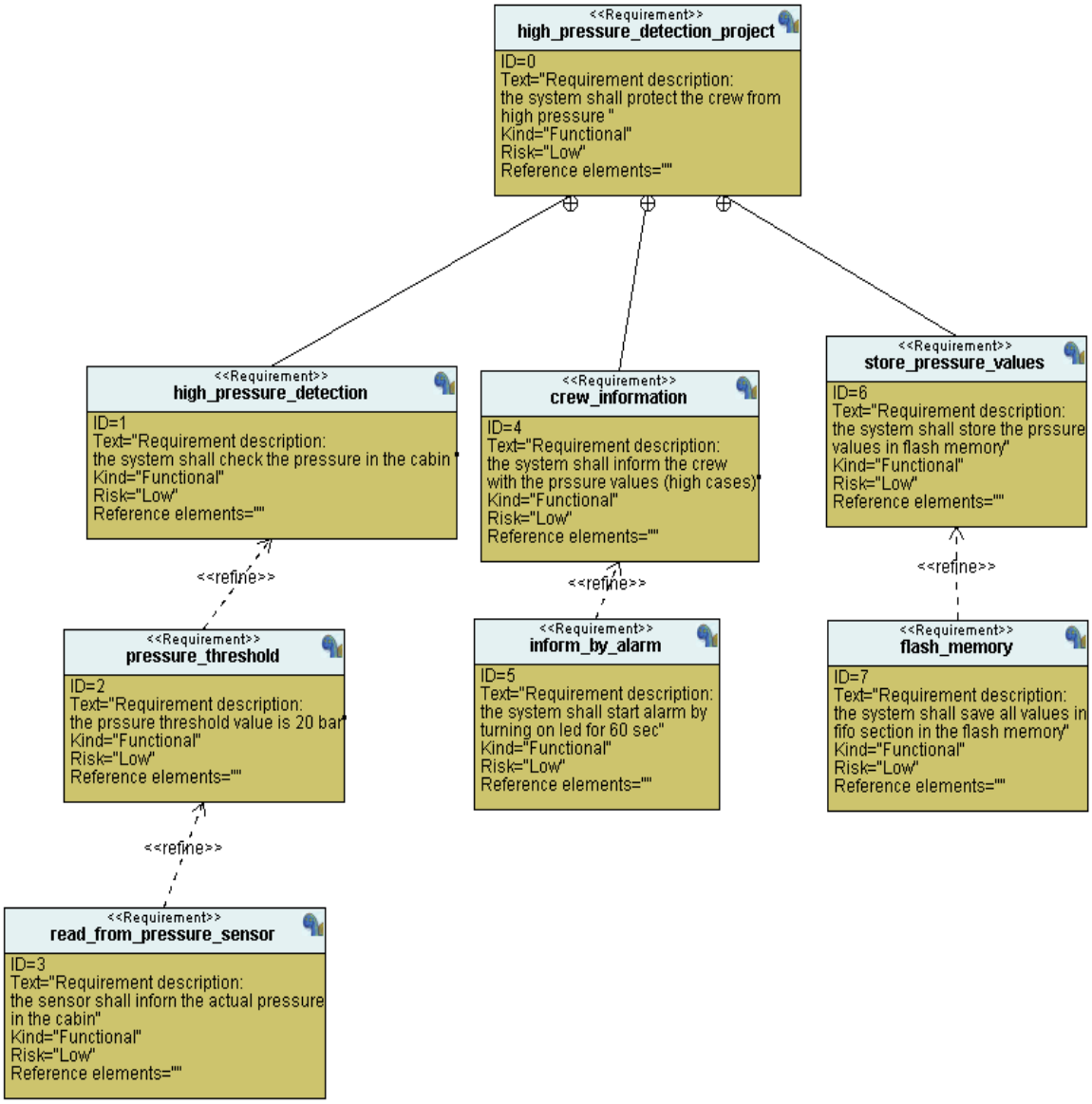
Case study:

"The task is to develop software for a system that includes a pressure controller for alerting the crew of a cabin if the pressure exceeds 20 bars. The alarm should last for 60 seconds."

Method:



System requirements:



System analysis:

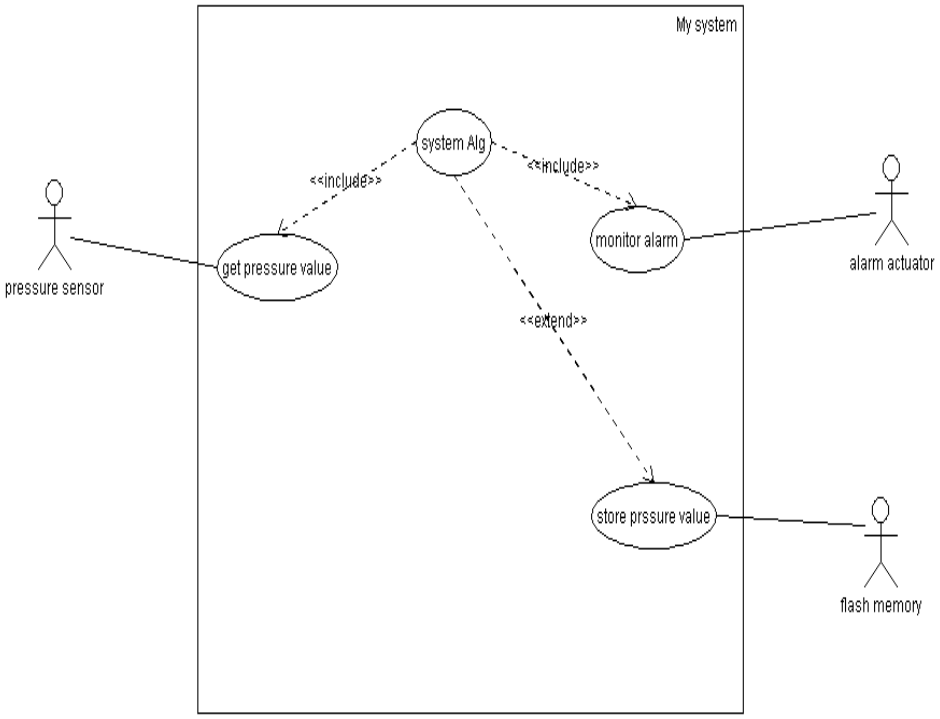
There are three ways:

1- Use Case Diagram.

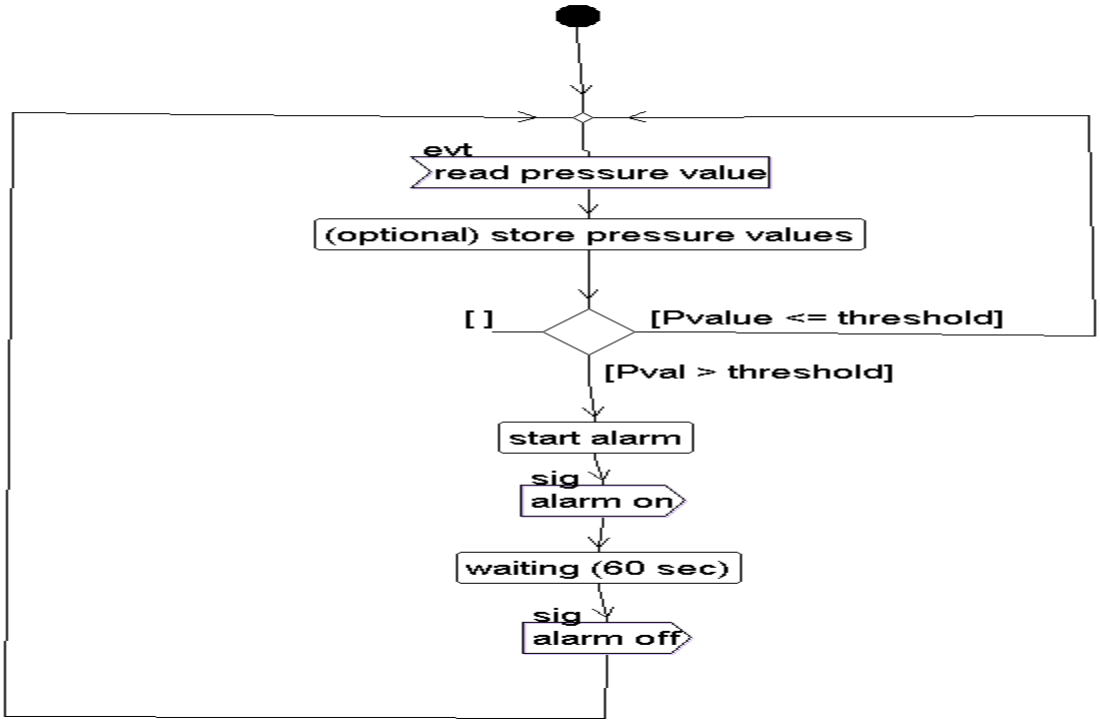
2- Activity Diagram.

3- Sequence Diagram.

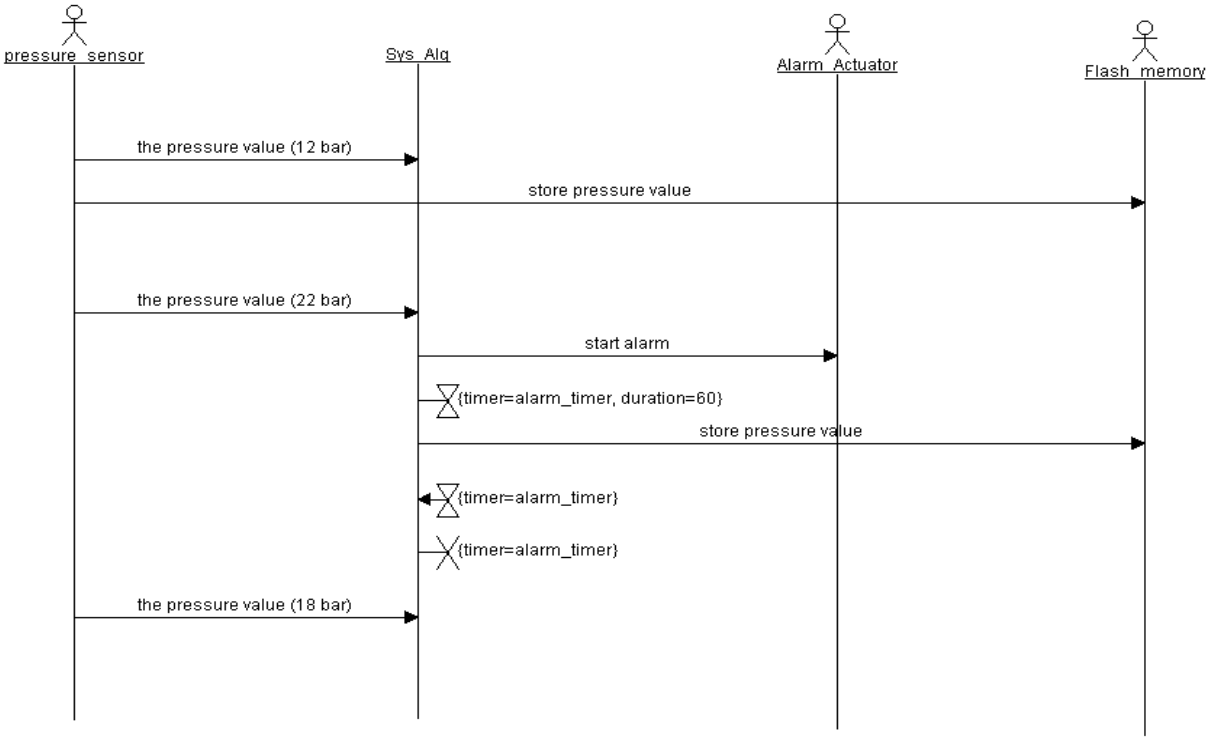
1- Use Case Diagram:



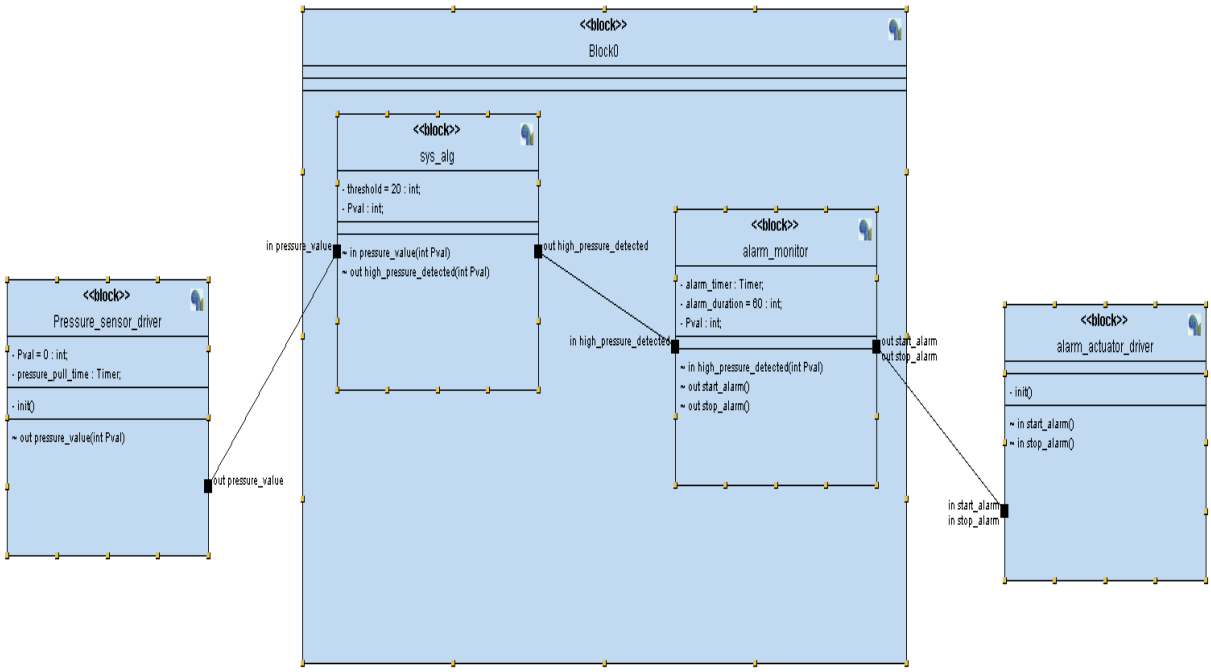
2- Activity Diagram:



3- Sequence Diagram:

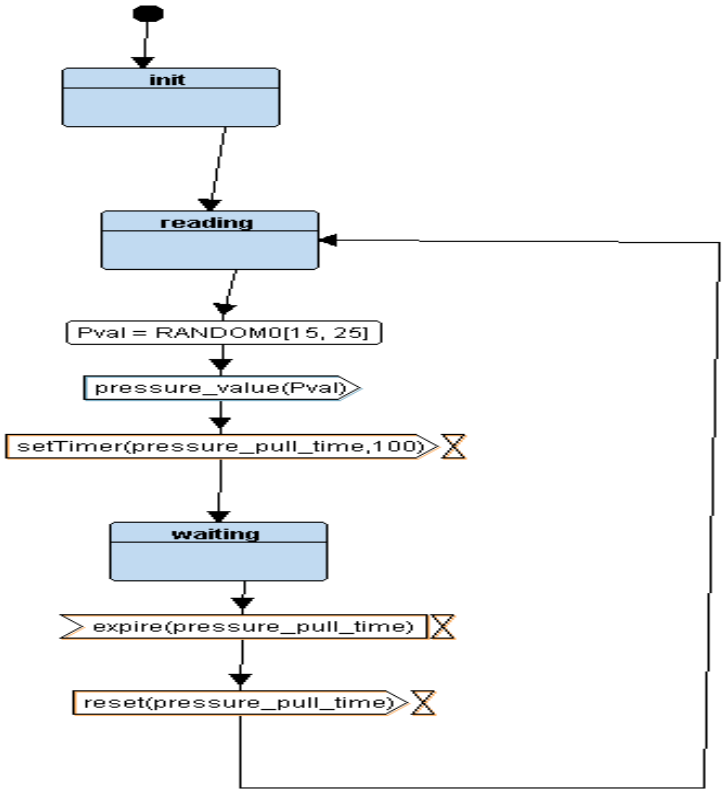


System design:

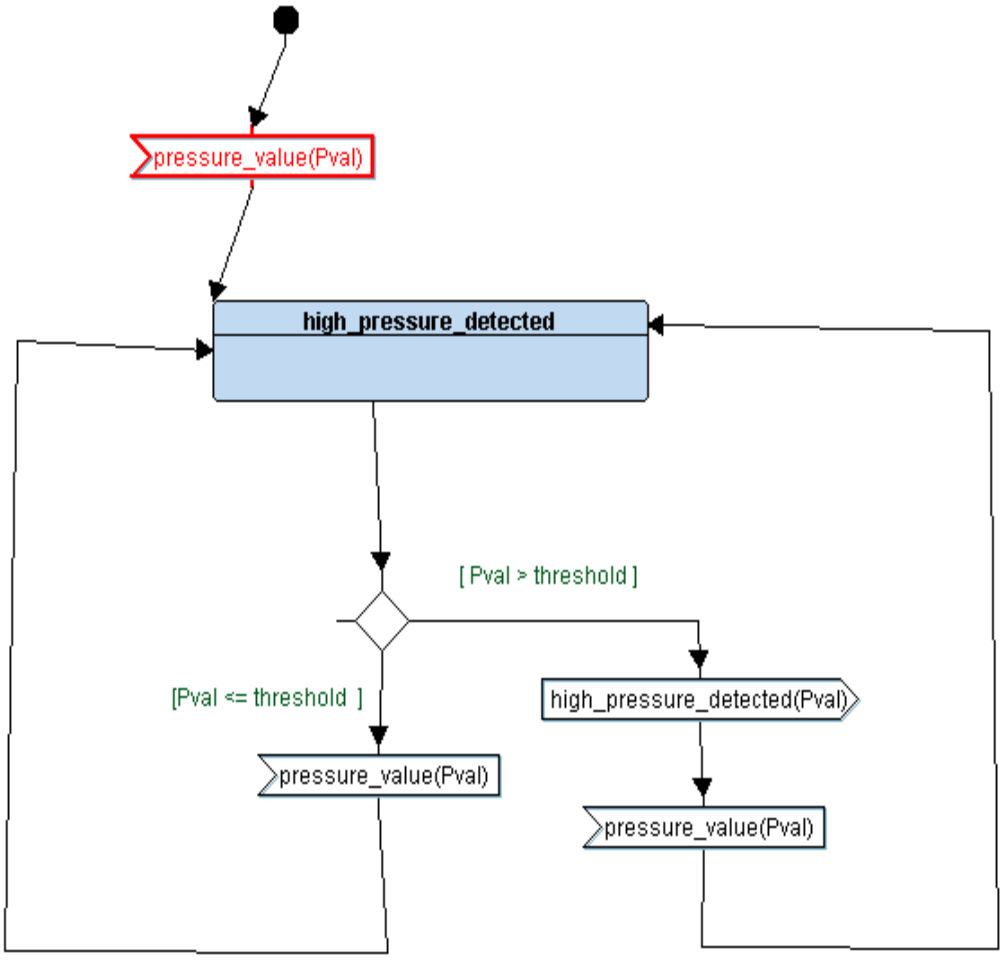


State machine of design diagram

1- Pressure sensor driver

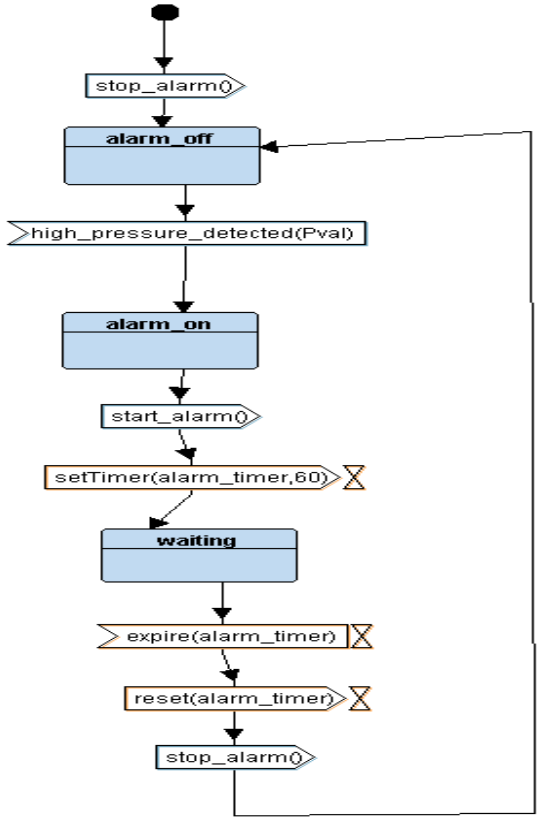


2- System algorithm

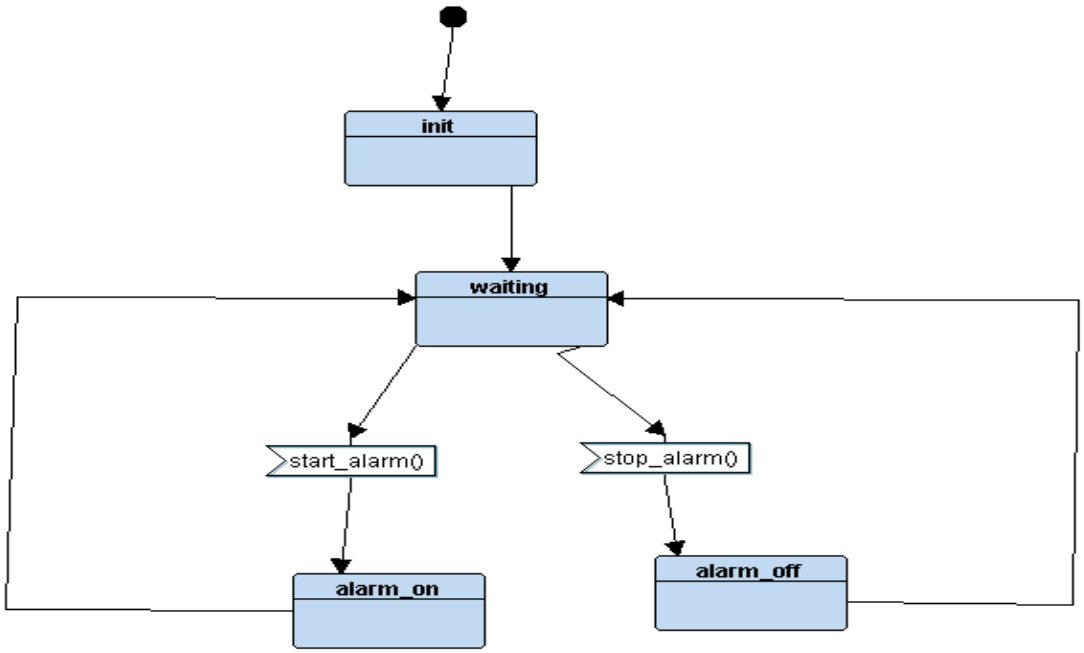


3-

3- Alarm monitor



4- Alarm actuator driver

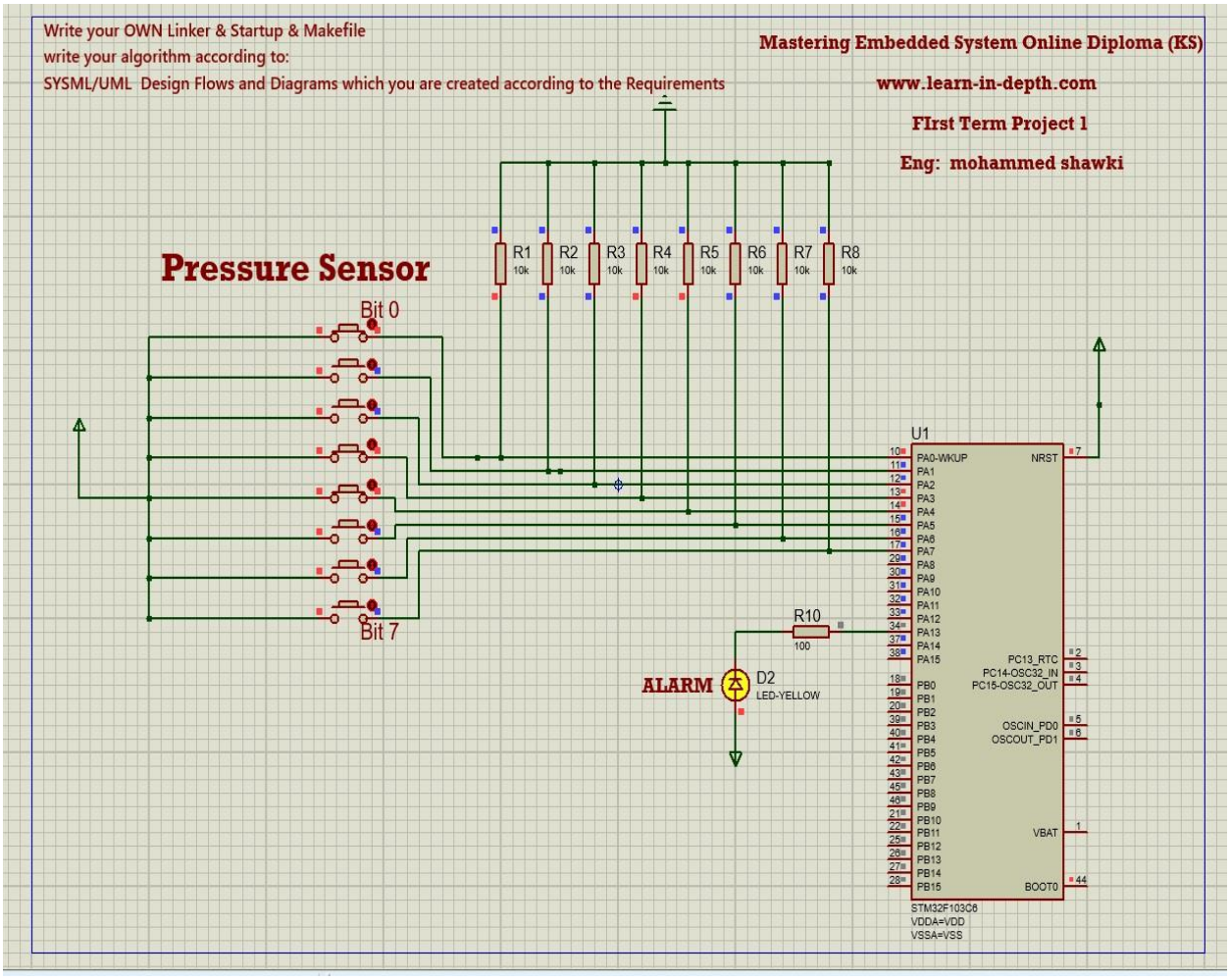


Symbol table:

```
smartypc@DESKTOP-H4LORAV MINGW32 /e/my courses/EM/projects/high pressure project
$ arm-none-eabi-nm.exe high_pressure_detection.elf
20000018 B _E_bss
20000014 D _E_data
000003b8 T _E_text
20000014 B _S_bss
20000000 D _S_data
20001018 B _stack_top
20001018 B alarm_act_id
00000010 T alarm_act_init
20001019 B alarm_monitor_id
000002bc T Default_handler
00000148 T Delay
00000168 T getPressureVal
000001bc T GPIO_INITIALIZATION
000002bc W H_fault_Handler
000000c4 T high_pressure_detected
0000020c T main
000002bc W NMI_Handler
2000000c D P_alarm_act
20000008 D P_alarm_mon_state
20000000 D P_PSD_state
20000004 D P_sysalg_state
2000101c B Pressure_value
20000014 B pressure_value_
2000101b B PS_state_id
0000023c T PSD_init
000002c8 T Reset_Handler
0000034c T send_Pval
00000180 T Set_Alarm_actuator
000000e0 T st_alarm_off
000000f8 T st_alarm_on
00000378 T st_high_pressure_detected
000000a0 T st_led_off
0000007c T st_led_on
00000258 T st_PS_reading
00000294 T st_PS_waiting
0000002c T st_waiting
00000124 T st_waiting_alarm_mon
00000060 T start_alarm
00000044 T stop_alarm
2000101a B sys_alg_id
20000010 D threshold
00000000 T vectors
```

At pressure = 25 bar >> binary: 0001 1001

We can see the alarm is on and the led is turned on.



Interactive simulation: