Final Project 1

Report

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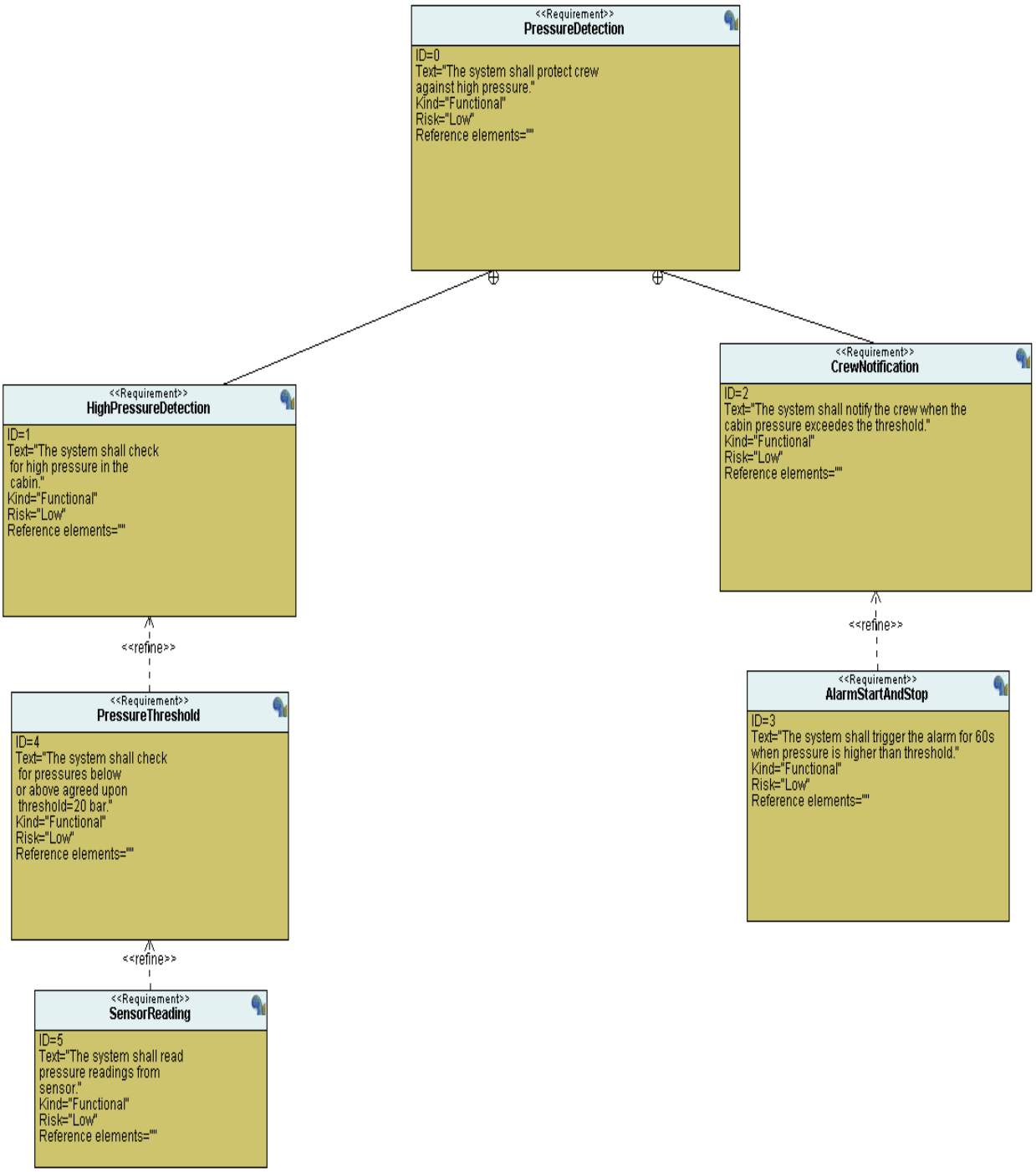
Case Study:

- The following system is supposed to contain 3 devices which are:
    - Alarm Actuator
    - Alarm Monitor
    - Pressure Sensor
- The pressure sensor is programmed to measure cabin pressure once per 100 seconds.
- In case of pressure higher than a certain threshold (20 bars in this case), the system should notify the cabin crew by sounding an alarm for 60 seconds (the alarming method is a LED light in our case).
- The alarm should turn off after 60 seconds.

UML Diagrams:

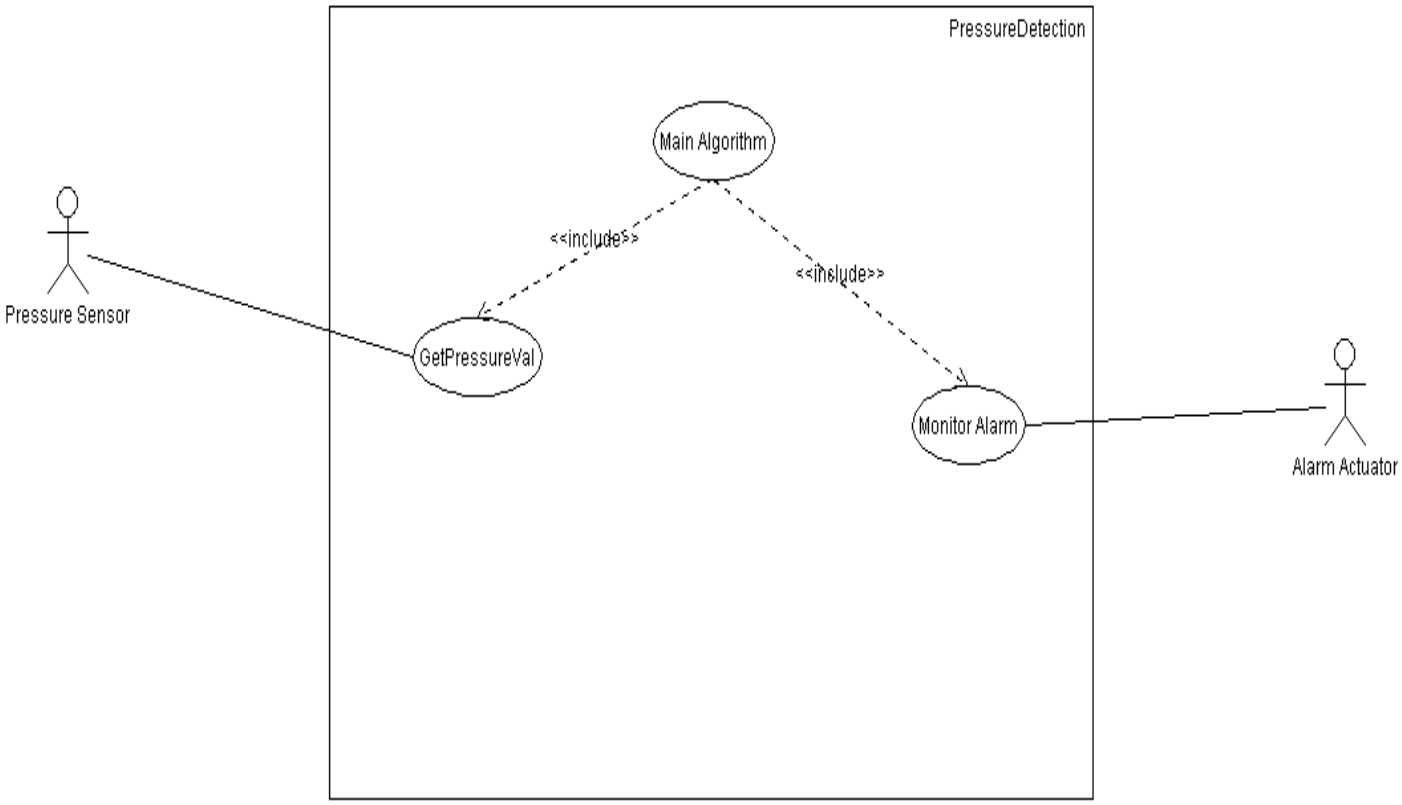
Requirements

Requirements Diagram:

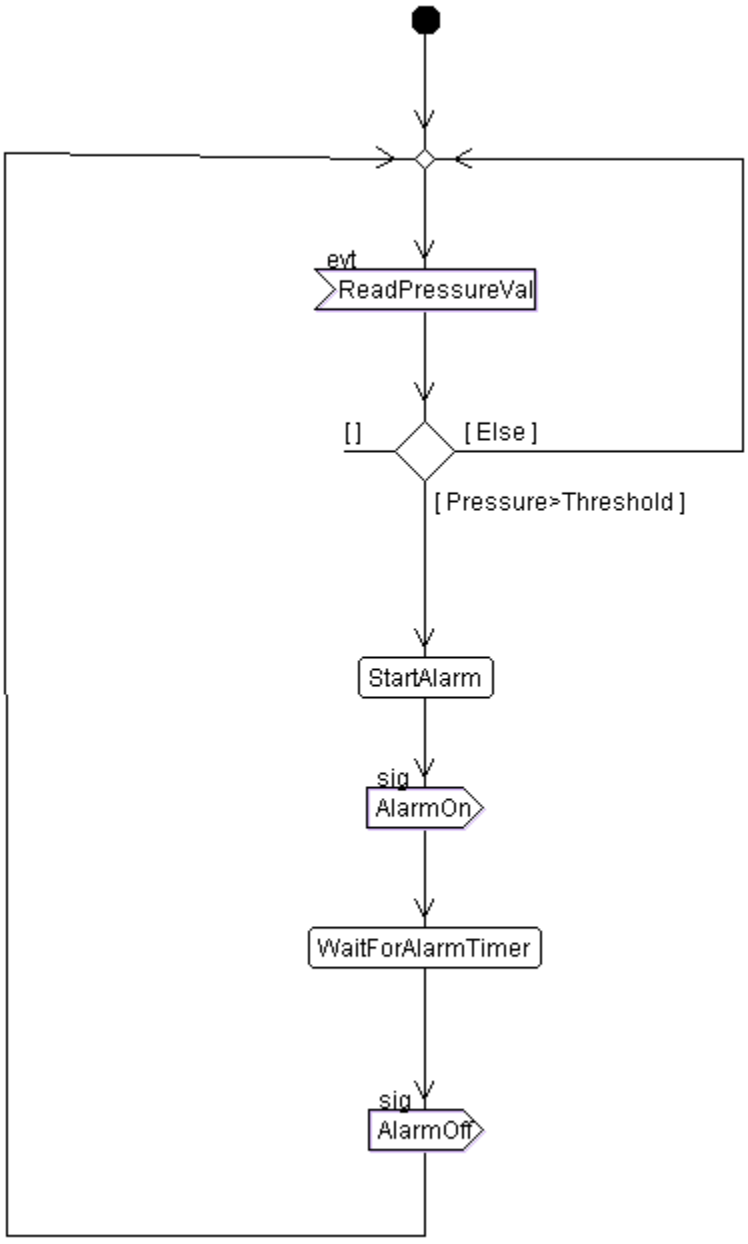


System Analysis

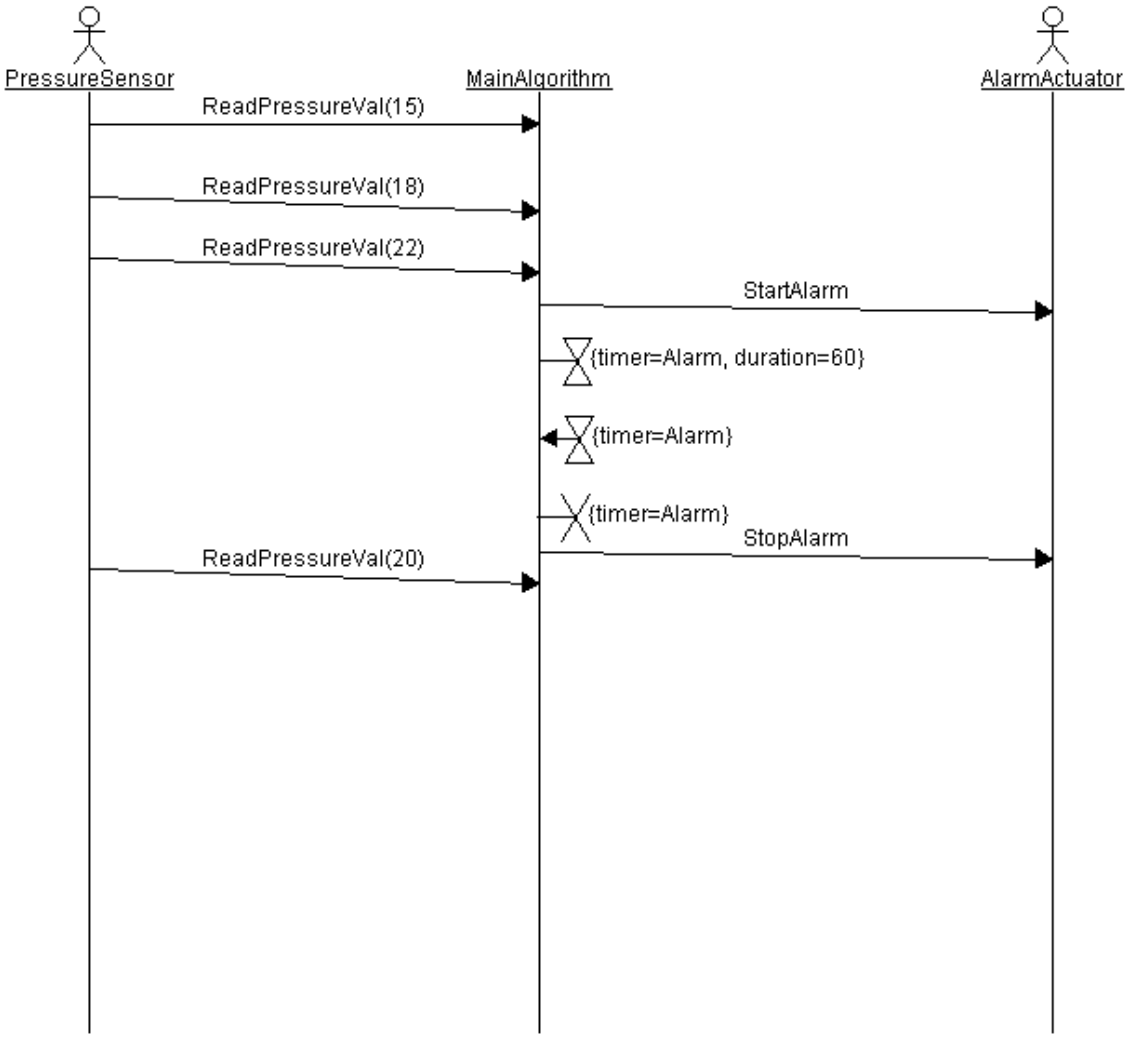
Use Case Diagram:



Activity Diagram:

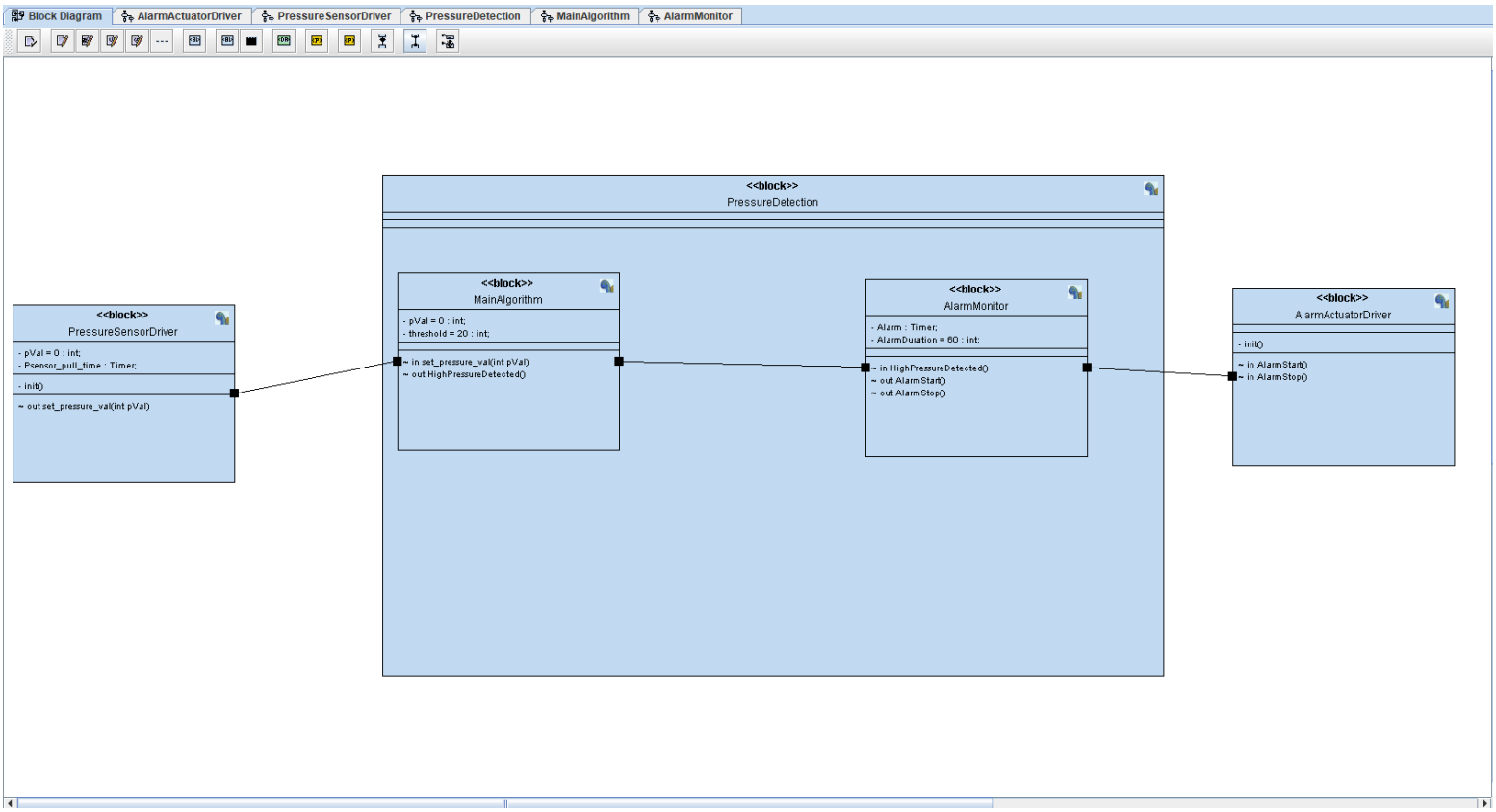


Sequence Diagram:

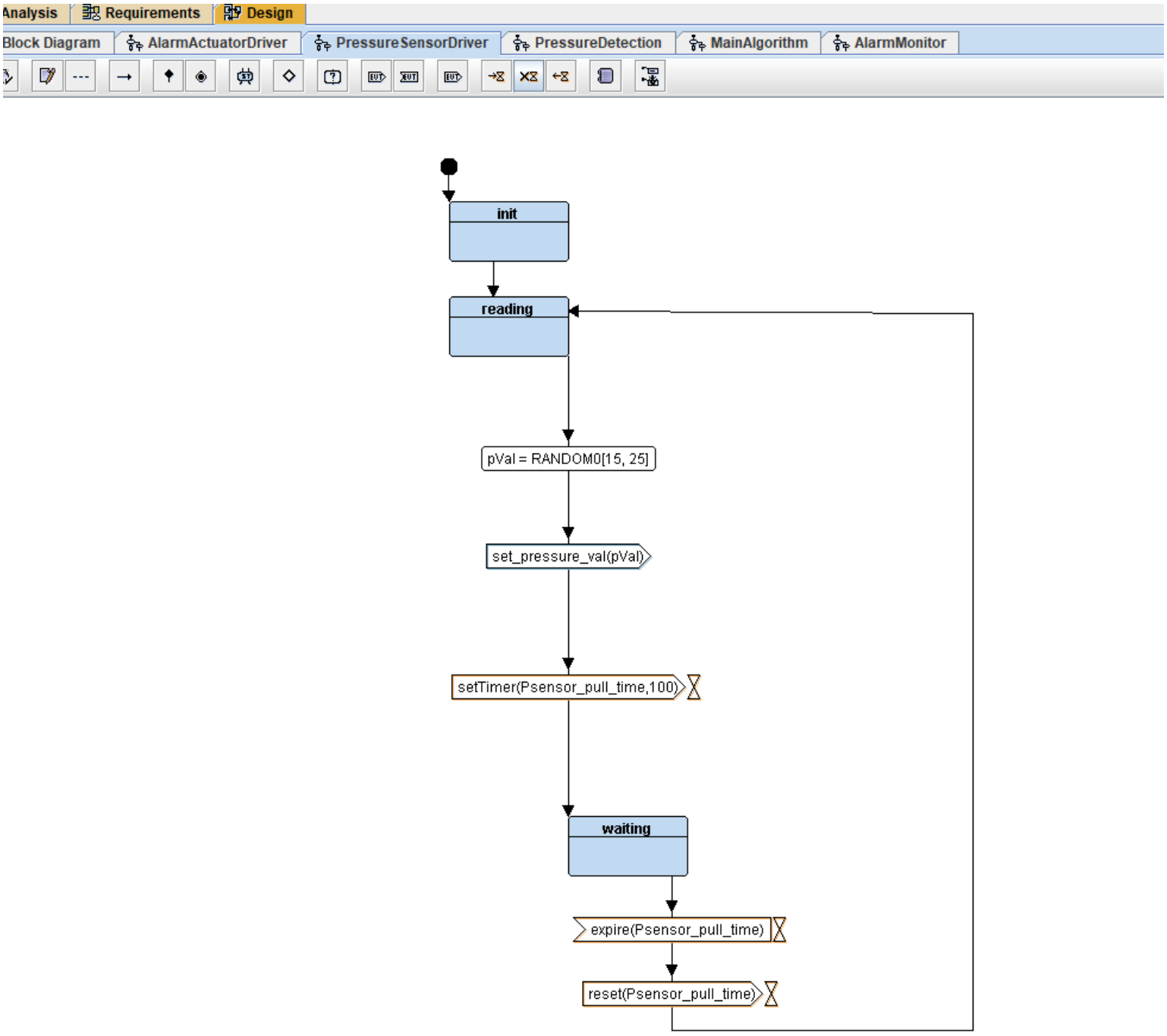


System Design

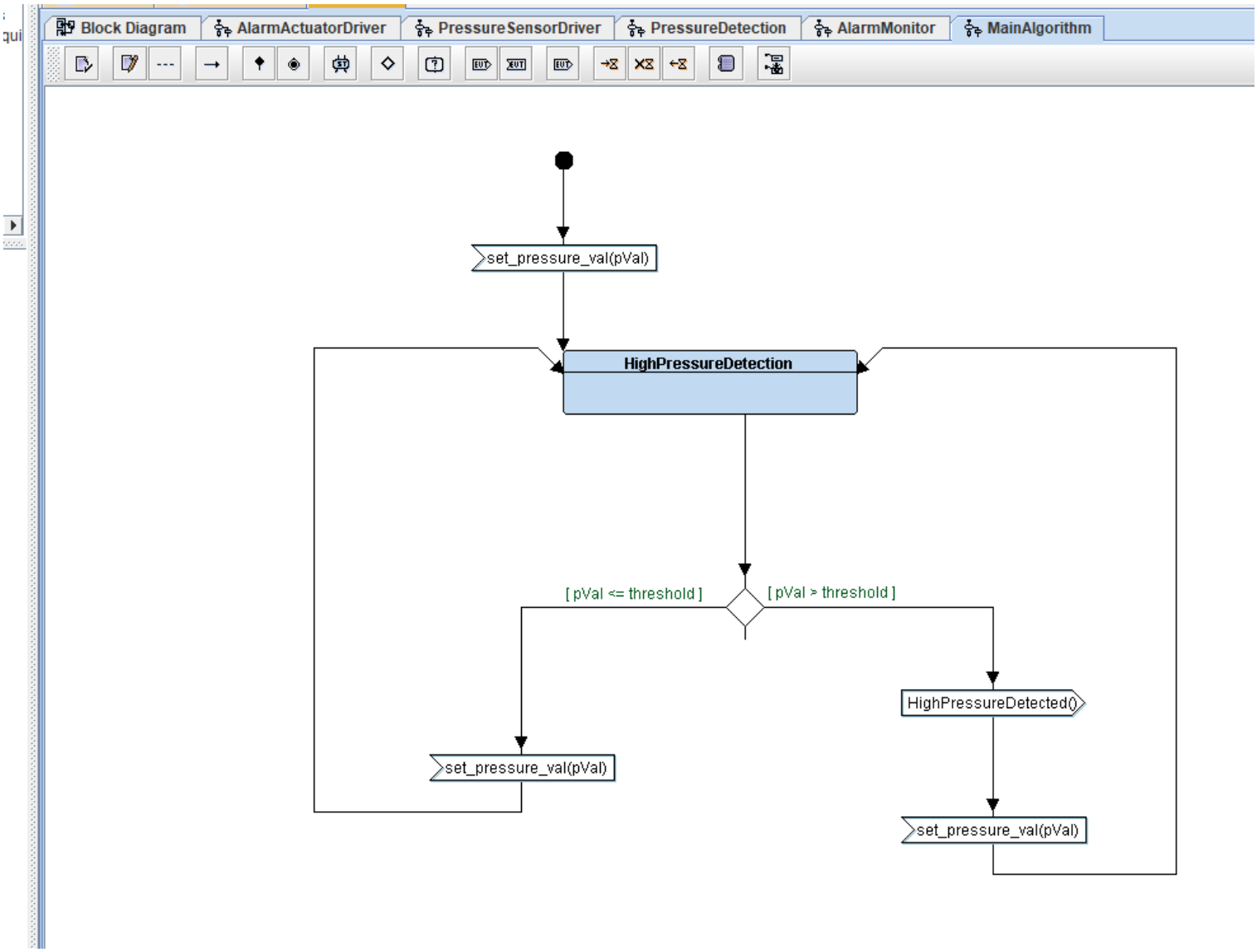
Block Diagram:



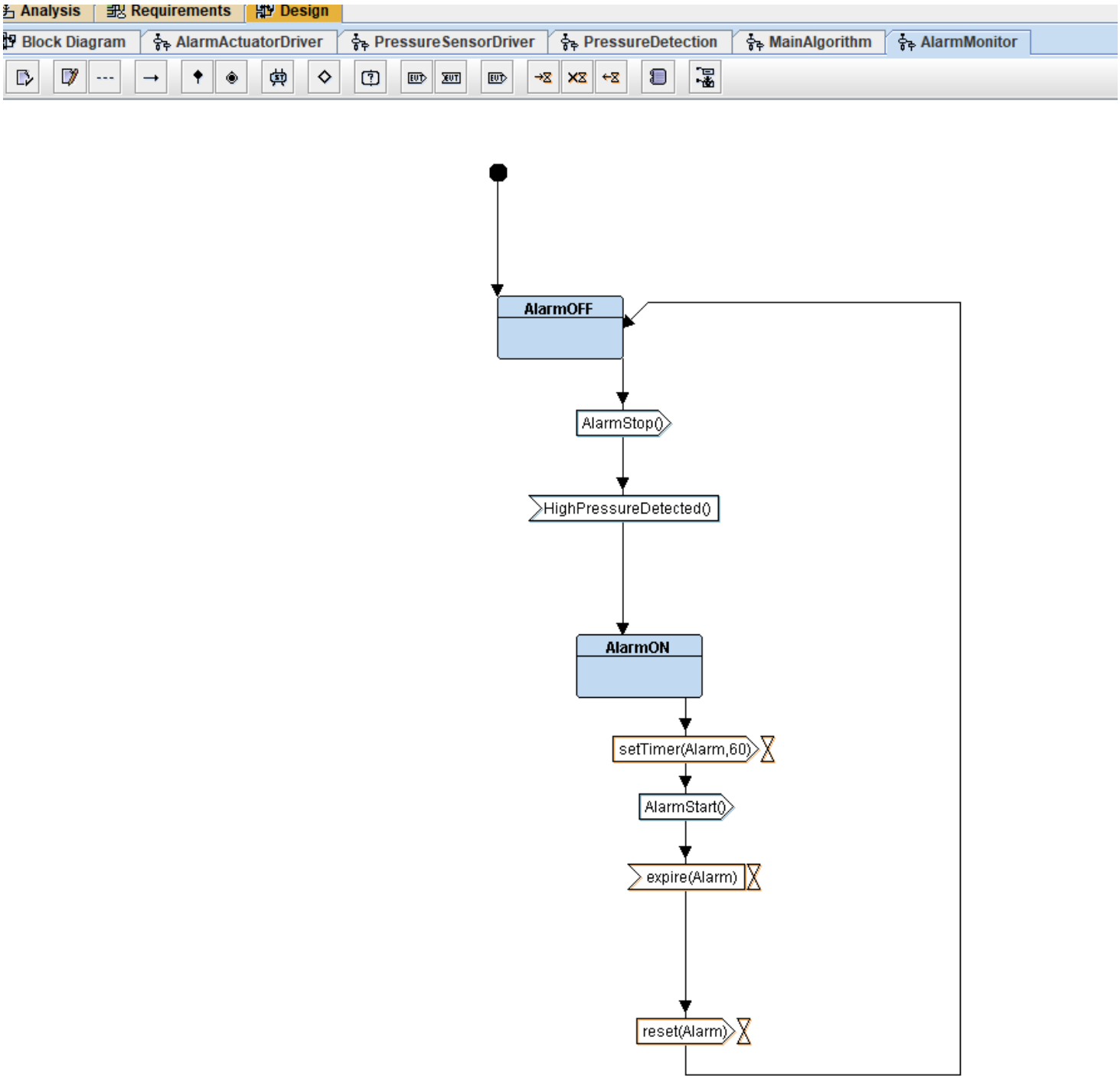
Pressure Sensor State Machine:



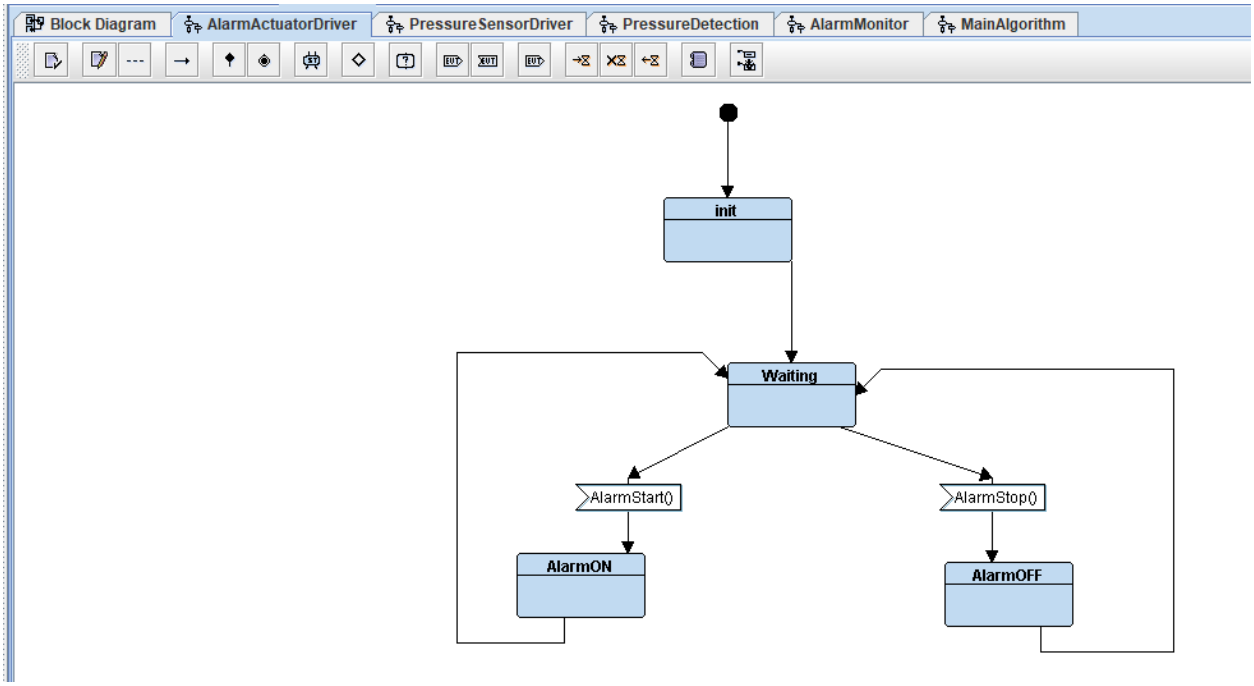
Main Algorithm State Machine:



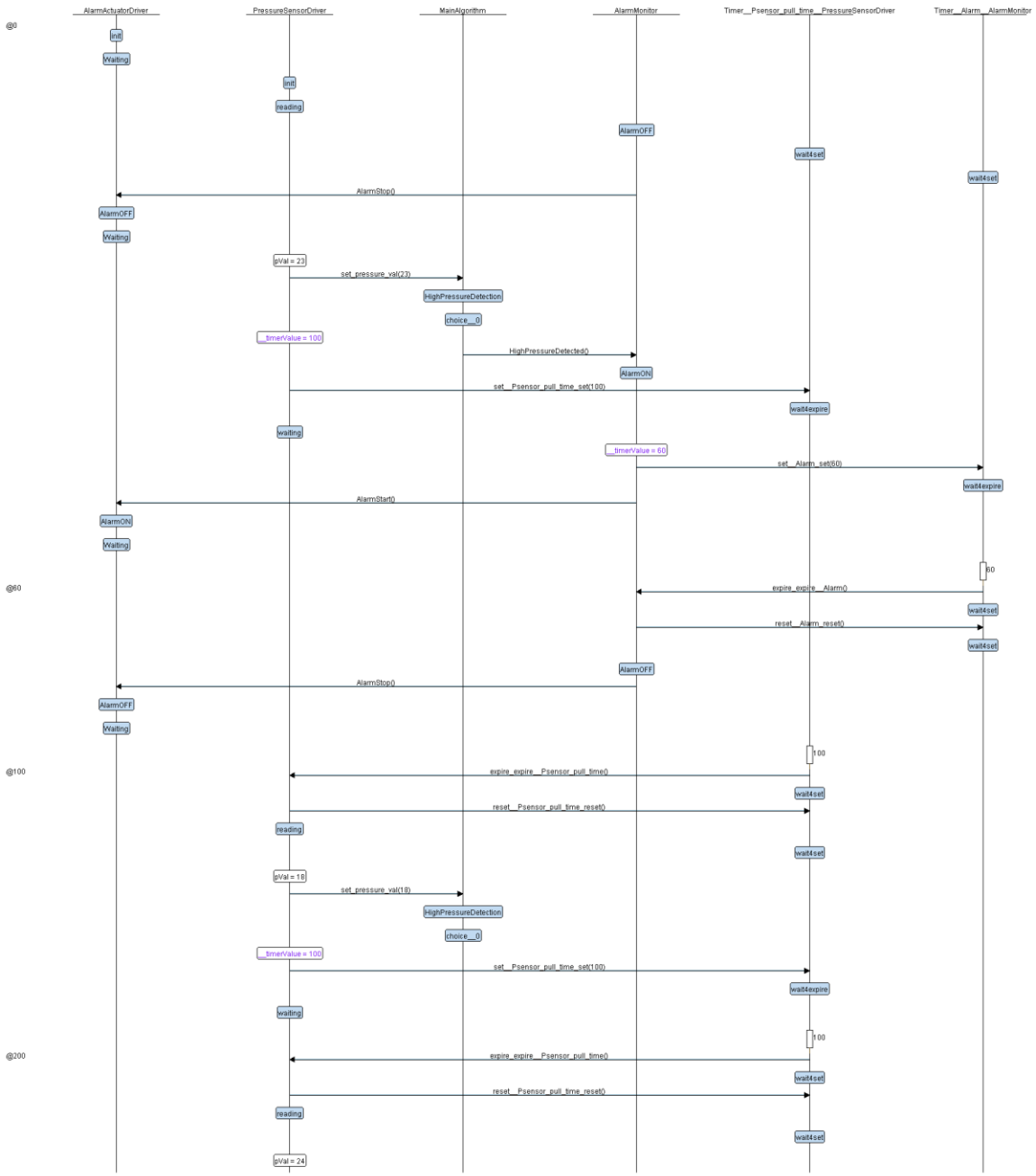
Alarm Monitor State Machine:



Alarm Actuator State Machine:

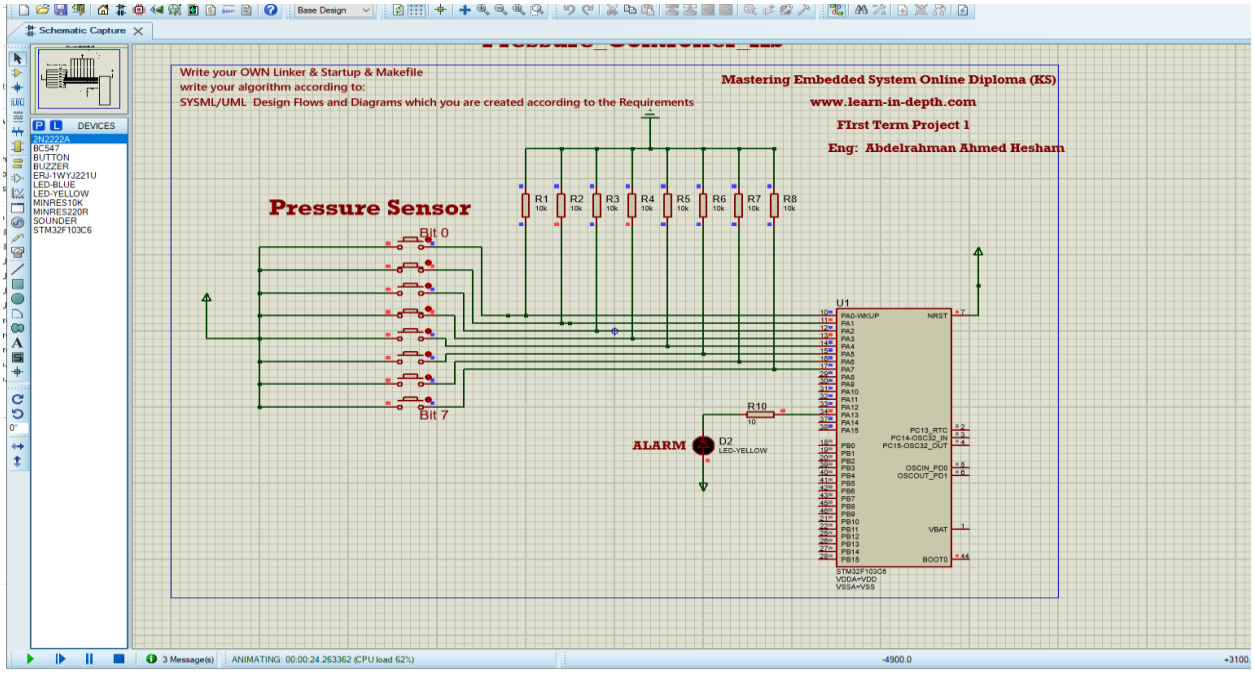


TTOOL Interactive Simulation

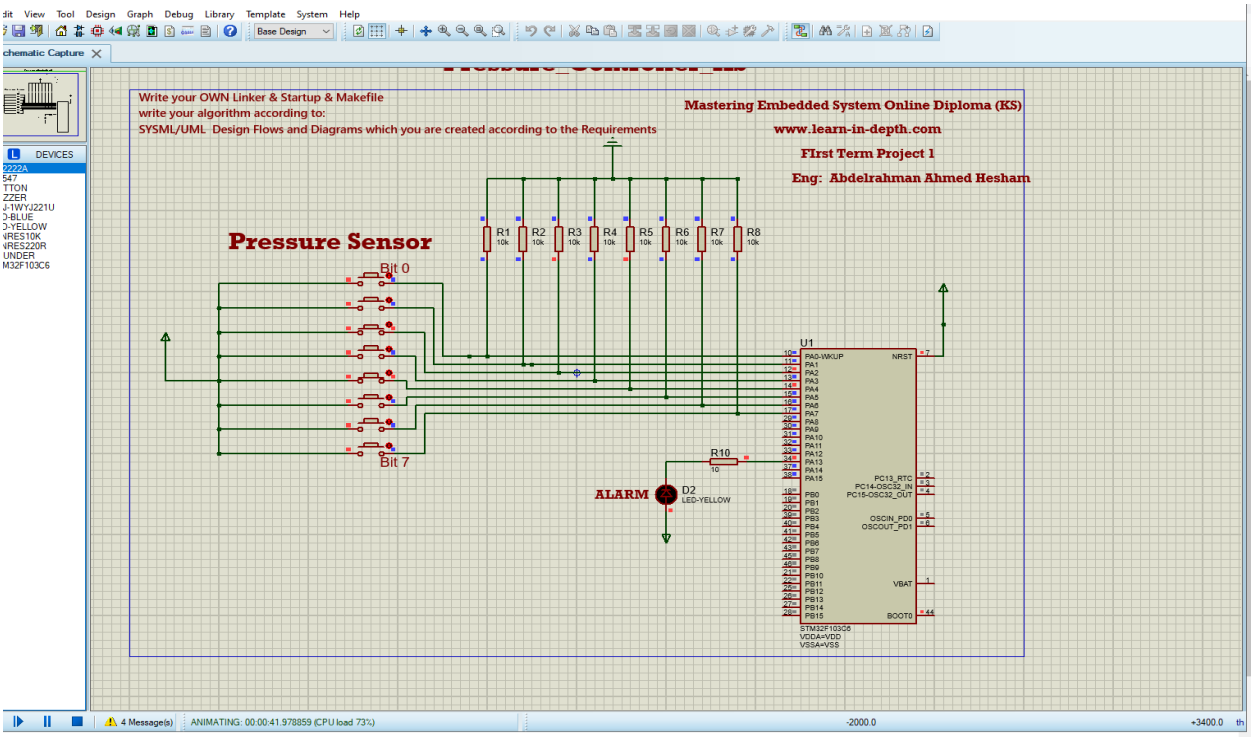


Proteus Simulation

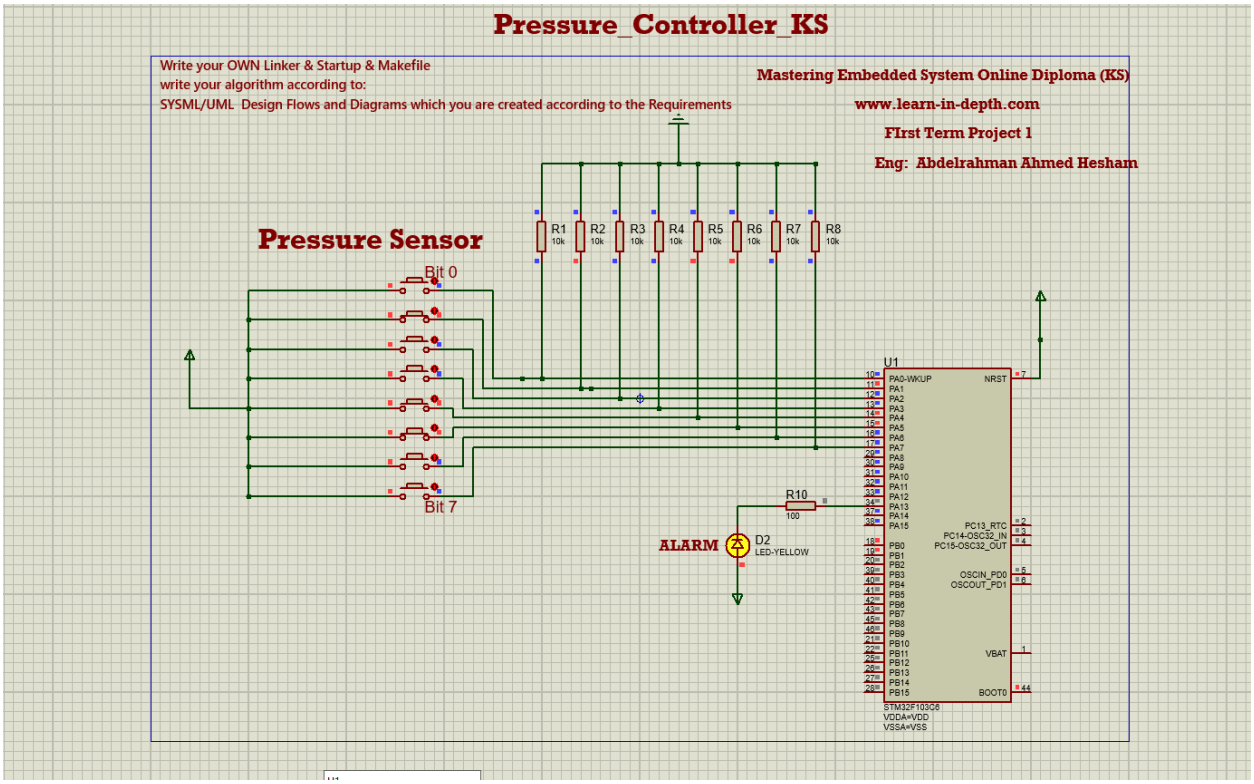
Pressure = 10 <20



Pressure = threshold =20



Pressure = 50 > 20



Symbol Table for project .elf file

```
D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe PRESSURE_DETECTION.elf
2000041c B _E_BSS
2000000c D _E_DATA
000002f8 T _E_TEXT
2000000c B _S_BSS
20000000 D _S_DATA
20000000 D AlarmDuration
2000000c B AM_state_id
00000268 W Bus_Fault_Handler
00000268 T Default_handler
000000c0 T Delay
20000010 B flag
000000e2 T getPressureVal
00000134 T GPIO_INITIALIZATION
00000268 W Hard_fault_Handler
00000038 T HighPressureDetected
0000019a T HighPressureDetection
00000184 T main
00000268 W MM_fault_Handler
00000268 W NMI_Handler
00000000 T p_f_vectors
20000014 B PS_state_id
20000008 D Psensor_pull_time
20000018 B pVal
00000274 T Rest_Handler
000000f8 T Set_Alarm_actuator
000001dc T set_pressure_val
0000002a T ST_AC_off
0000001c T ST_AC_on
00000090 T ST_AlarmOFF
00000070 T ST_AlarmON
000001f4 T ST_reading
00000210 T ST_waiting
2000001c b Stack_top
20000004 D threshold
00000268 W Usage_Fault_Handler
```

Symbol table for each object file

C:\Windows\System32\cmd.exe

```
D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe PressureSensorDriver.o
         U Delay
         U flag
         U getPressureVal
00000000 B PS_state_id
00000000 D Psensor_pull_time
00000004 B pVal
00000000 T set_pressure_val
00000018 T ST_reading
00000034 T ST_waiting
         U threshold

D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe main.o
00000000 B flag
         U GPIO_INITIALIZATION
         U HighPressureDetected
00000016 T HighPressureDetection
00000000 T main
         U pVal
         U ST_AC_off
         U ST_reading
00000000 D threshold

D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe AlarmMonitor.o
00000000 D AlarmDuration
00000000 B AM_state_id
         U Delay
         U flag
00000000 T HighPressureDetected
         U Psensor_pull_time
         U ST_AC_off
         U ST_AC_on
00000058 T ST_AlarmOFF
00000038 T ST_AlarmON

D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe AlarmActuatorDriver.o
         U Set_Alarm_actuator
0000000e T ST_AC_off
00000000 T ST_AC_on

D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe startup.o
         U _E_BSS
         U _E_DATA
         U _E_TEXT
         U _S_BSS
         U _S_DATA
00000000 W Bus_Fault_Handler
00000000 T Default_handler
00000000 W Hard_fault_Handler
         U main
00000000 W MM_fault_Handler
00000000 W NMI_Handler
00000000 R p_f_vectors
0000000c T Rest_Handler
00000000 b Stack_top
00000000 W Usage_Fault_Handler

D:\desktop junk\Embedded stuff\project 1 content\software>arm-none-eabi-nm.exe driver.o
00000000 T Delay
00000022 T getPressureVal
00000074 T GPIO_INITIALIZATION
00000038 T Set_Alarm_actuator
```