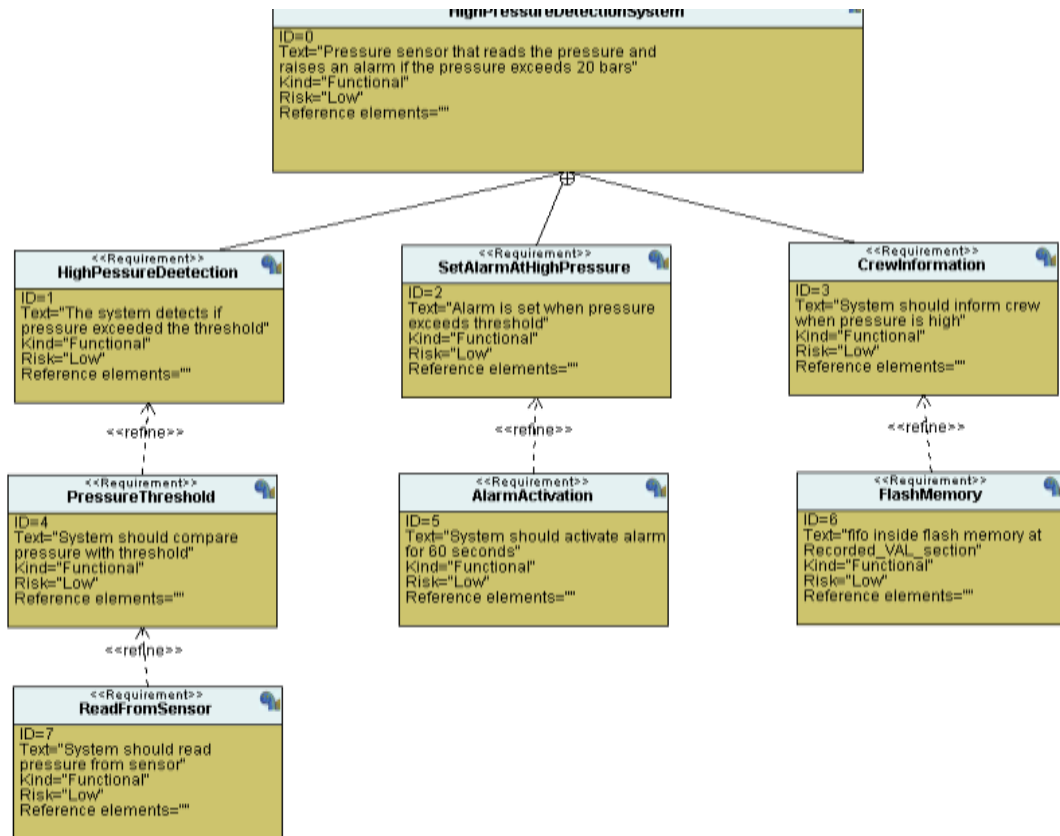# Ziad Ahmed Mohamed Saied Sakr

Project 1

Pressure Sensor

Specification:

- 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.
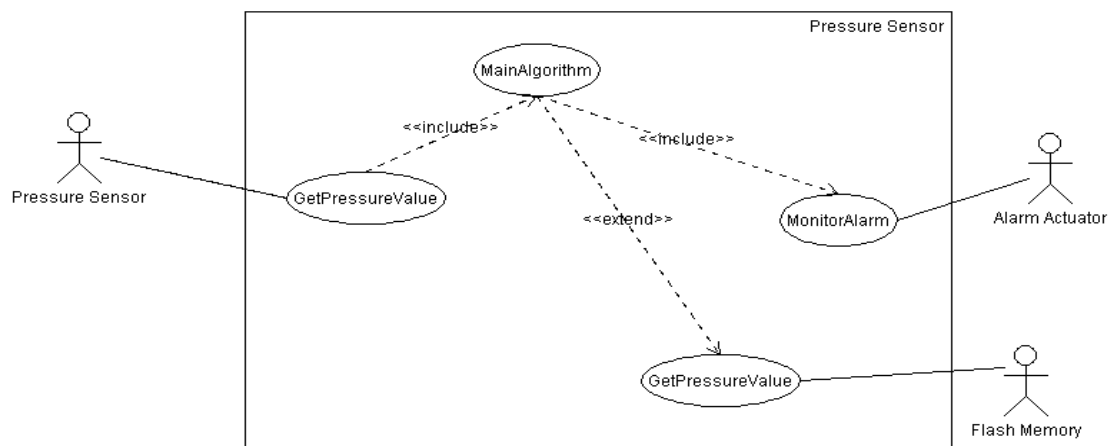- Save measured values on a flash memory.(optional)

Assumptions:

- Controller set up and shutdown procedures are not modeled.
- Maintenance is not modeled.
- Sensor/alarm never fails.
- Power never shuts down.
- Threshold value cannot be changed.

Requirement Diagram:

HighPressureDetectionSystem
ID=0
Text="Pressure sensor that reads the pressure and
raises an alarm if the pressure exceeds 20 bars"
Kind="Functional"
Risk="Low"
Reference elements=""

<<Requirement>>
HighPessureDeetection
ID=1
Text="The system detects if
pressure exceeded the threshold"
Kind="Functional"
Risk="Low"
Reference elements=""

<<Requirement>>
SetAlarmAtHighPressure
ID=2
Text="Alarm is set when pressure
exceeds threshold"
Kind="Functional"
Risk="Low"
Reference elements=""

<<Requirement>>
CrewInformation
ID=3
Text="System should inform crew
when pressure is high"
Kind="Functional"
Risk="Low"
Reference elements=""

<<refine>>

<<refine>>

<<refine>>

<<Requirement>>
PressureThreshold
ID=4
Text="System should compare
pressure with threshold"
Kind="Functional"
Risk="Low"
Reference elements=""

<<Requirement>>
AlarmActivation
ID=5
Text="System should activate alarm
for 60 seconds"
Kind="Functional"
Risk="Low"
Reference elements=""

<<Requirement>>
FlashMemory
ID=6
Text="fifo inside flash memory at
Recorded_VAL_section"
Kind="Functional"
Risk="Low"
Reference elements=""

<<refine>>

<<Requirement>>
ReadFromSensor
ID=7
Text="System should read
pressure from sensor"
Kind="Functional"
Risk="Low"
Reference elements=""

Use Case Diagram:

Activity Diagram:

evt
readPressureSensorVal

sig
StorePressureVal

[ ]   [else]

[Pressure>Threshold]

StartAlarm

sig
AlarmON

WaitForAlarm

sig
AlarmOFF
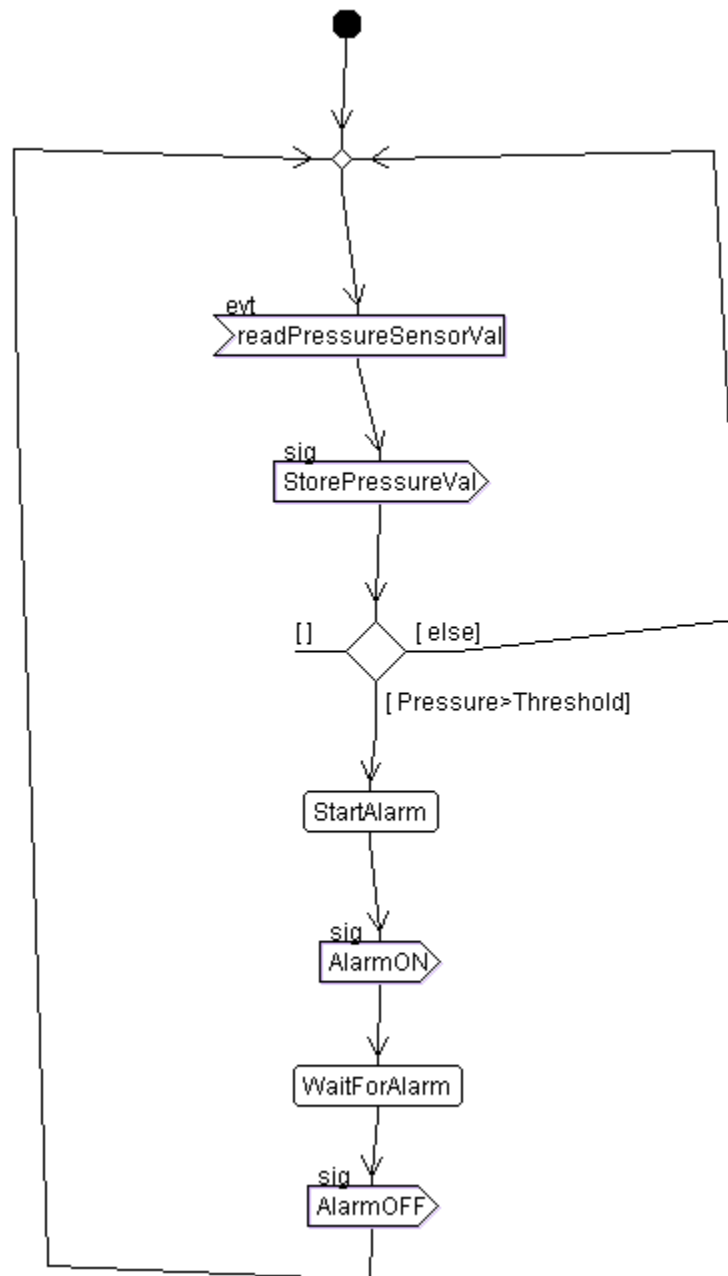
Sequence Diagram:
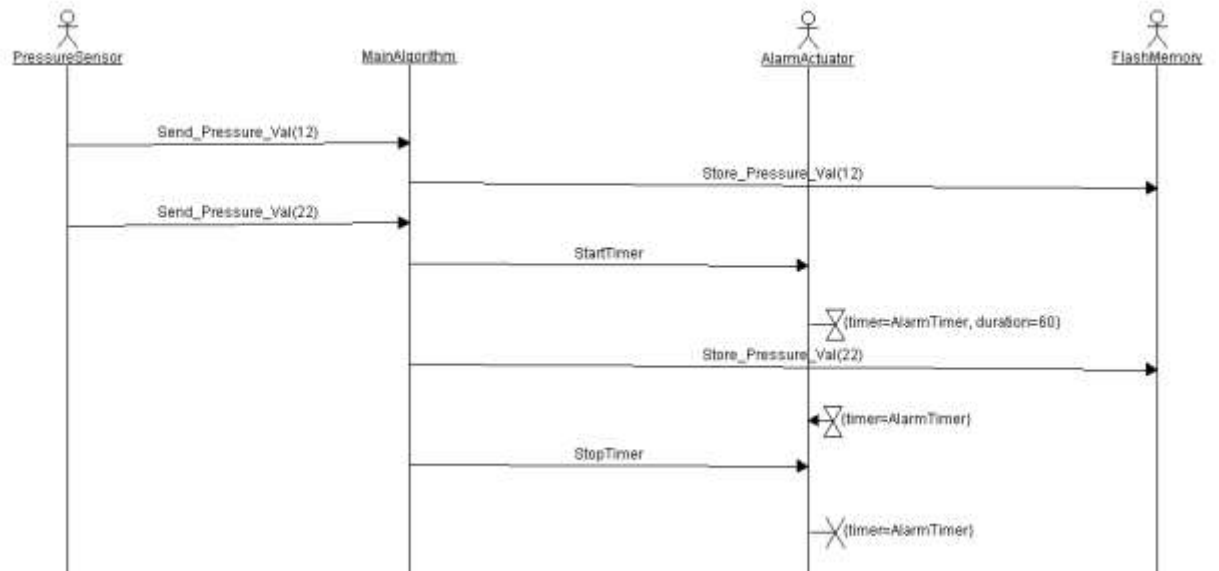
Class Diagram:

Pressure Sensor Driver:

```
      ●
      │
      ▼
  ┌─────────┐
  │  init   │
  ├─────────┤
  │         │
  └─────────┘
      │
      ▼
  ┌─────────┐
  │ reading │◄───────────┐
  ├─────────┤            │
  │         │            │
  └─────────┘            │
      │                  │
      ▼                  │
 ┌────────────────────┐  │
 │ pVal = RANDOM0[15, 25] │
 └────────────────────┘  │
      │                  │
      ▼                  │
 ┌──────────────────┐    │
 │ set_pressure_val(pVal)│
 └──────────────────┘    │
      │                  │
      ▼                  │
 ┌────────────────────┐  │
 │ setTimer(pull_period,100) │
 └────────────────────┘  │
      │                  │
      ▼                  │
  ┌─────────┐            │
  │ waiting │            │
  ├─────────┤            │
  │         │            │
  └─────────┘            │
      │                  │
      ▼                  │
 ┌──────────────────┐    │
 │ expire(pull_period) │  │
 └──────────────────┘    │
      │                  │
      ▼                  │
 ┌──────────────────┐    │
 │ reset(pull_period) │───┘
 └──────────────────┘
```
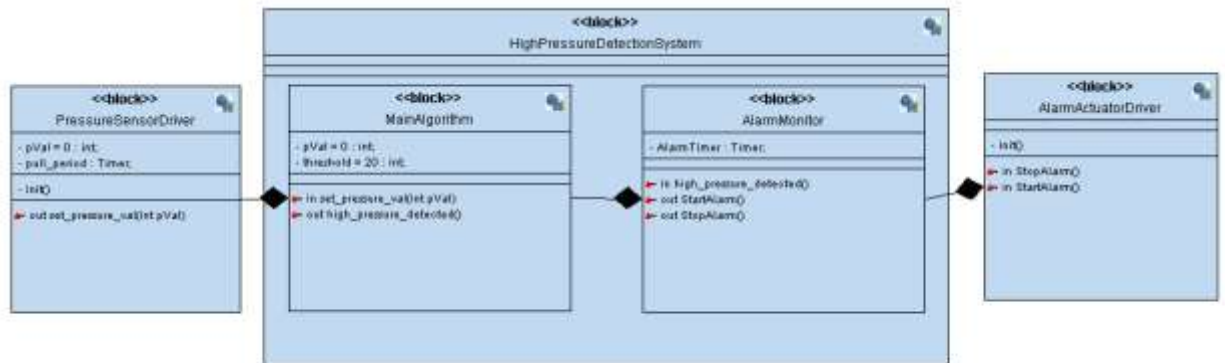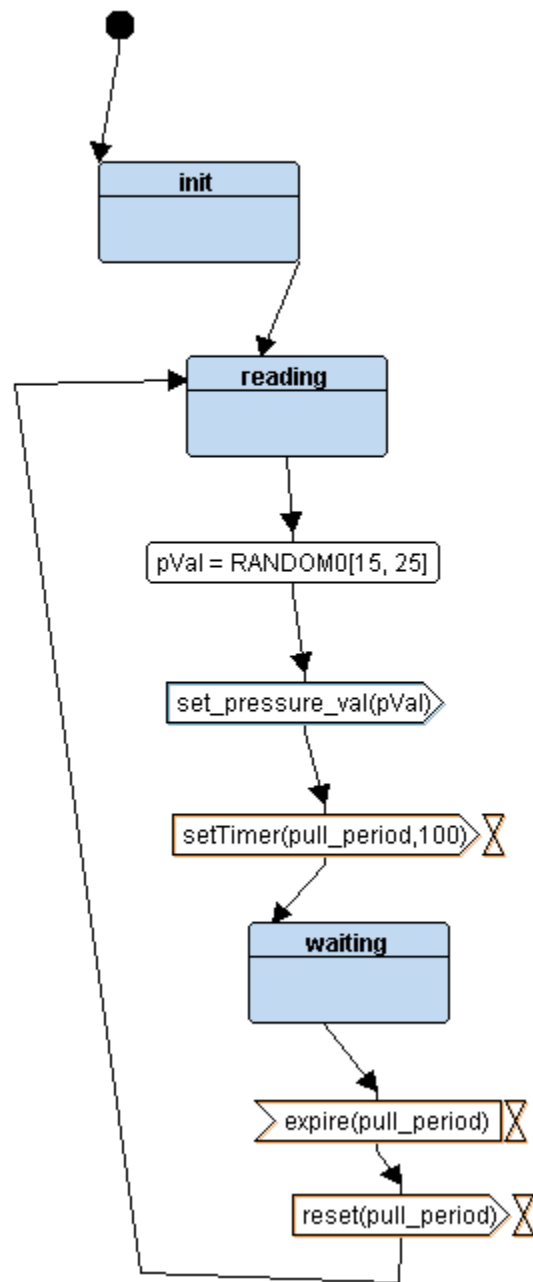
Alarm Actuator driver:
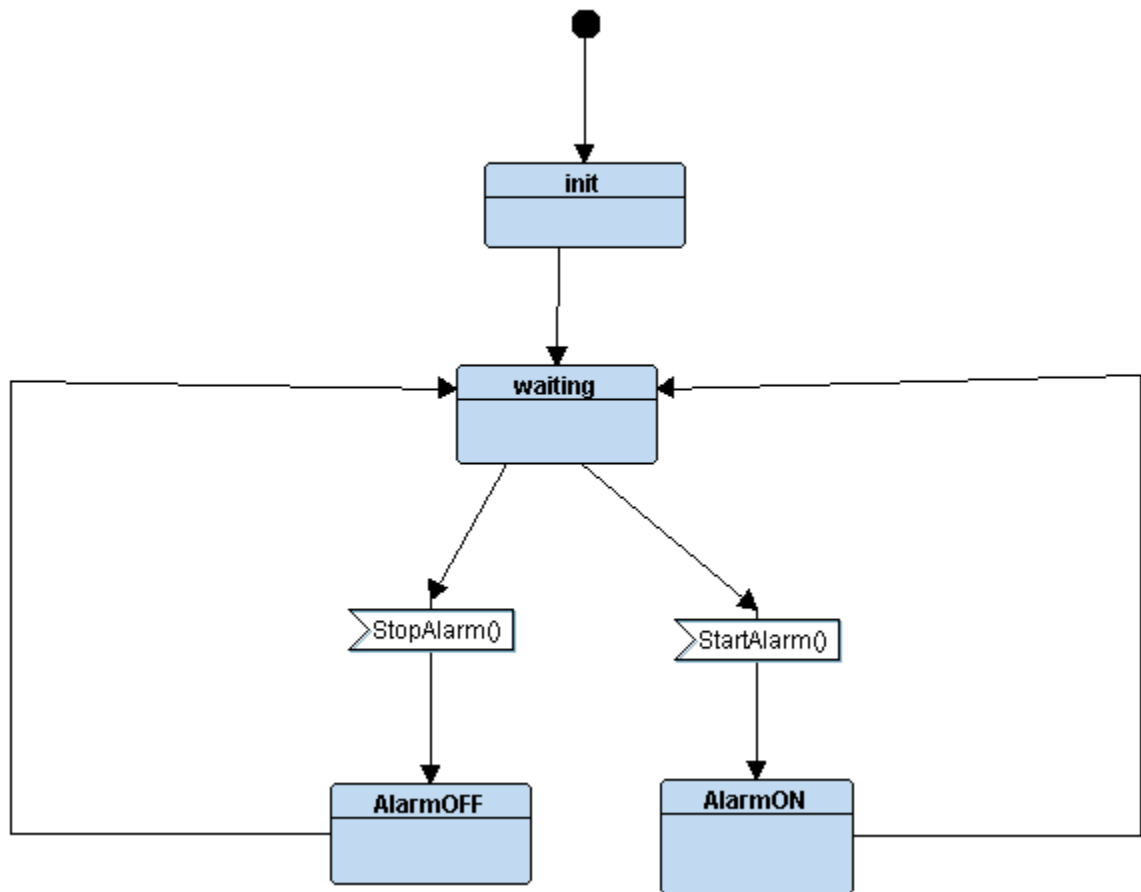
Main Algorithm:

Alarm Monitor:

```
        ●
        │
        ▼
  ⬡ StopAlarm()
        │
        ▼
  ┌──────────────┐
  │  AlarmOFF    │◄─────────────────────┐
  │              │                      │
  └──────────────┘                      │
        │                               │
        ▼                               │
  ◁ high_pressure_detected()            │
        │                               │
        ▼                               │
  ┌──────────────┐                      │
  │  AlarmON     │                      │
  │              │                      │
  └──────────────┘                      │
        │                               │
        ▼                               │
  ⬡ StartAlarm()                        │
        │                               │
        ▼                               │
  ⬡ setTimer(alarm_timer,60) ⋈          │
        │                               │
        ▼                               │
  ┌──────────────┐                      │
  │  waiting     │                      │
  │              │                      │
  └──────────────┘                      │
        │                               │
        ▼                               │
  ◁ expire(alarm_timer) ⋈               │
        │                               │
        ▼                               │
  ⬡ reset(alarm_timer) ⋈                │
        │                               │
        ▼                               │
  ⬡ StopAlarm()                         │
        │                               │
        └───────────────────────────────┘
```