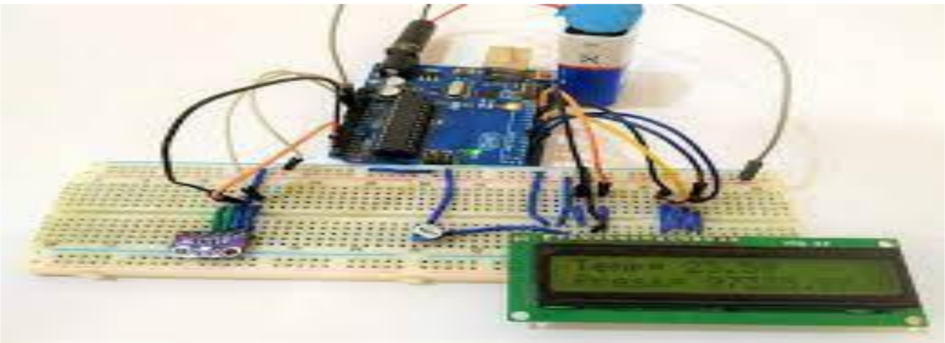


Name: Mina Sabry Abdelmessih

ID: 686876

Report: Pressure Sensor

Contents:

1.Case Study:

Problem:

There is a danger for the airplane if pressure is above than 20.

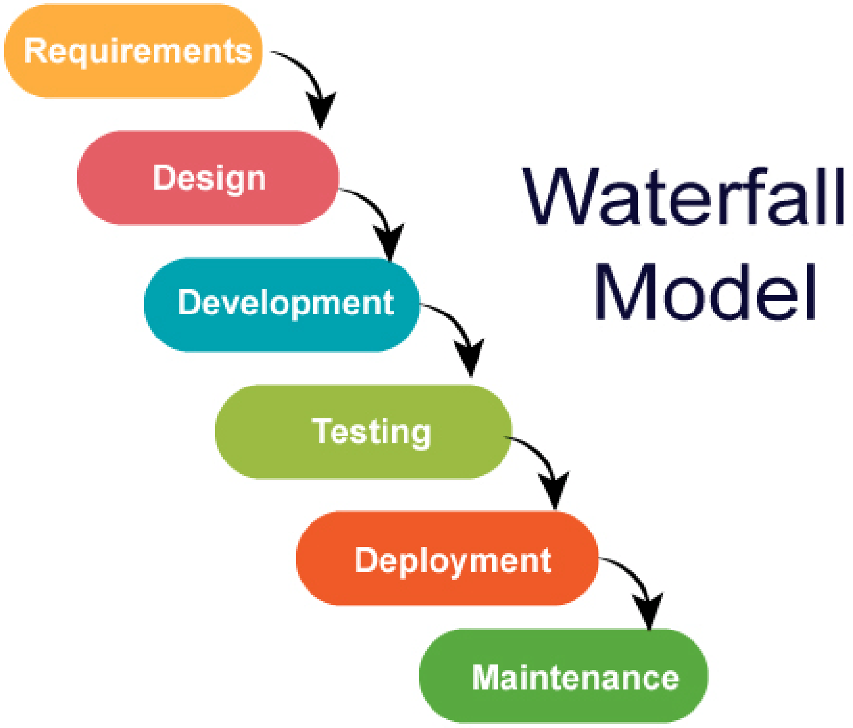
Target:

Build an embedded system to measure the pressure and make an alarm for a while if pressure more than Threshold.

How?:

We will make a pressure system using STM32 to measure pressure and and make alarm for a 60 seconds if above than 20.

2.Method

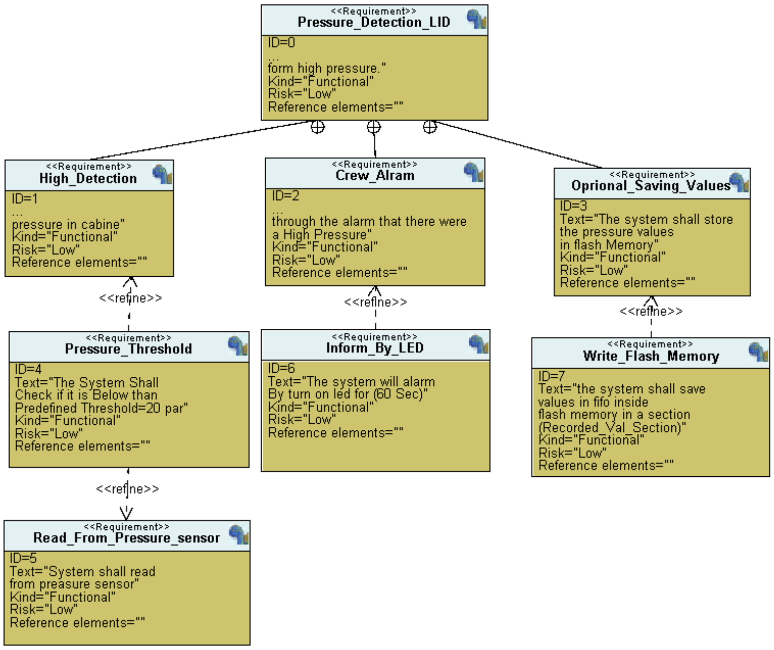


Using waterfall:

Why?

1. Requirements are clear and fixed that may not change.
2. There are no ambiguous requirements (no confusion).
3. It is good to use this model when the technology is well understood.
4. The project is short and cast is low.
5. Risk is zero or minimum.

3.Requirments



The Main is Pressure_Detection_LID: The system shall protect the crew form high pressure.

Pressure_Detection_LID contains: of High_Detection & Crew_Alram & Oprional_Saving_Values.

1.High_Detection: The system shall check pressure in cabine & contains: Pressure_Threshold & Read_From_Pressure_sensor.

Pressure_Threshold: The System Shall Check if it is Below than Predefined Threshold=20 par.

Read_From_Pressure_sensor: System shall read from preasure sensor.

2. Crew_Alram: The system shall infrom the crew through the alarm that there were a High Pressure & contains: Inform_By_LED.

Inform_By_LED: The system will alarm By turn on led for (60 Sec).

3. Oprional_Saving_Values. The system shall store the pressure values in flash Memory & contains: Write_Flash_Memory.

Write_Flash_Memory: the system shall save values in fifo inside flash memory in a section(Recorded_Val_Section).

4.Space Exploration:

Using:**STM32F103C6:**

Mainstream Performance line, Arm Cortex-M3 MCU with 32 Kbytes of Flash memory, 72 MHz CPU

1 Method: Scaling up number before and down after calculation. Yes Accuracy is down and Timing in micro seconds.

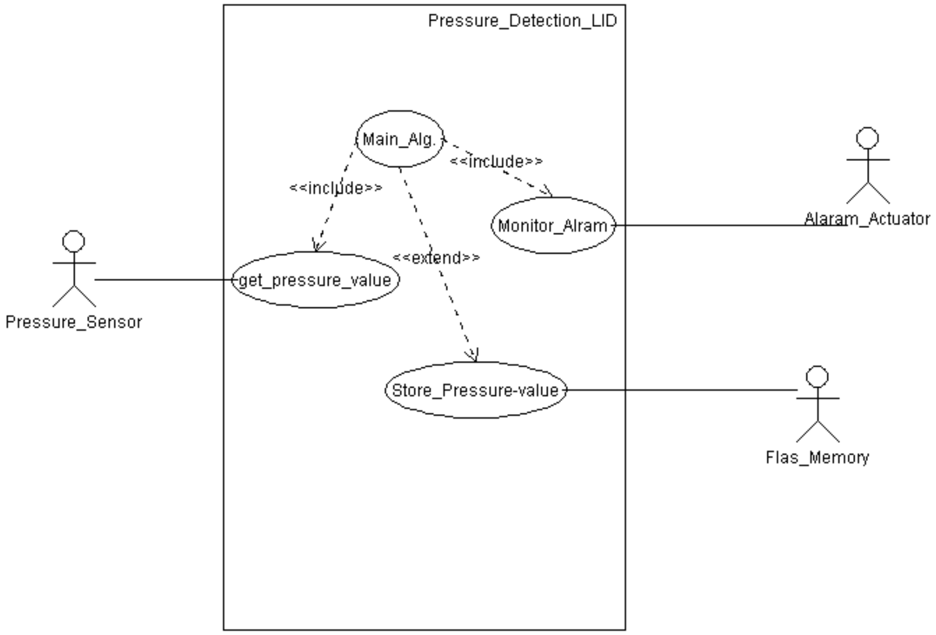
2 Method: Partition of float number into mantissa and fraction (Float to Fixed conversion) than do calculation. Accuracy is good but took too much time near 7-8 microsecond for single float multiplication.

For my requirements any method will be okay, condition-

Accuracy should be good and Float Multiplication time should below 1 microsecond.

5.System Analysis:

1. Use Case Diagram:



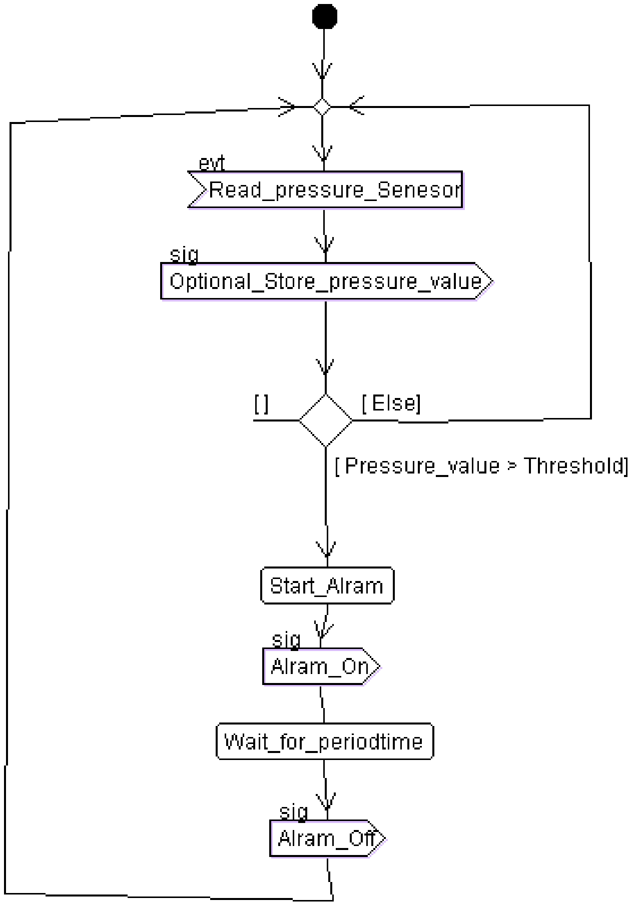
There are 3 actuators: 1.Pressure_Sensor

2. Alaram_Actuator

3. Flas_Memory

Main_Alg. Includes each of get_pressure_value & Monitor_Alram & extends Store_Pressure-value (because it is an optional).

2. Activity Diagram:



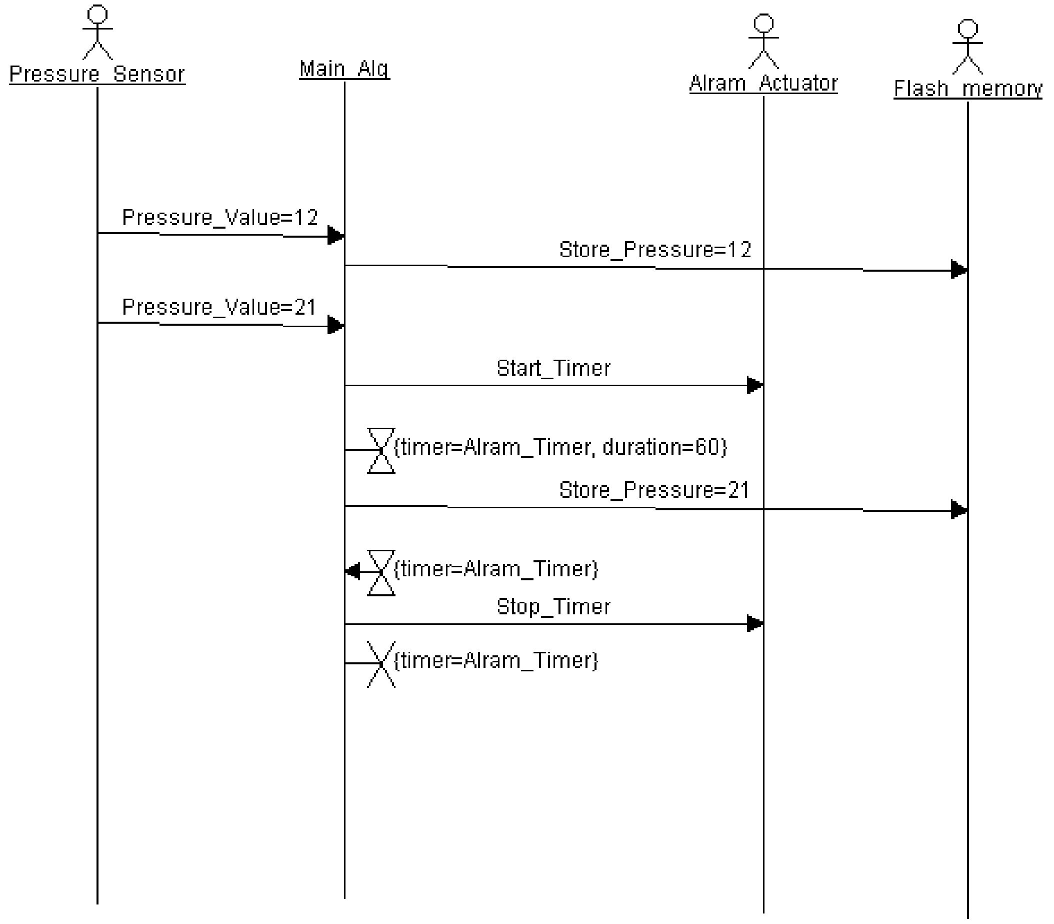
At first it is event Read_pressure_Senesor :measure the pressure degree .

and get signal Optional_Store_pressure_value:store the value at flash memory.

And there is a conditional test if [Pressure_value > Threshold] then send signal Alram_On and Wait_for_periodtime:wait for 60 sec. Then send signal Alram_Off then go to first step.

Else: Go to first step.

3. Sequence Diagram:



There are 3 Actuators: Pressure_Sensor & Alram_Actuator & Flash_memory.

Main_alg: is the code

First: Pressure_Sensor measure the pressure than

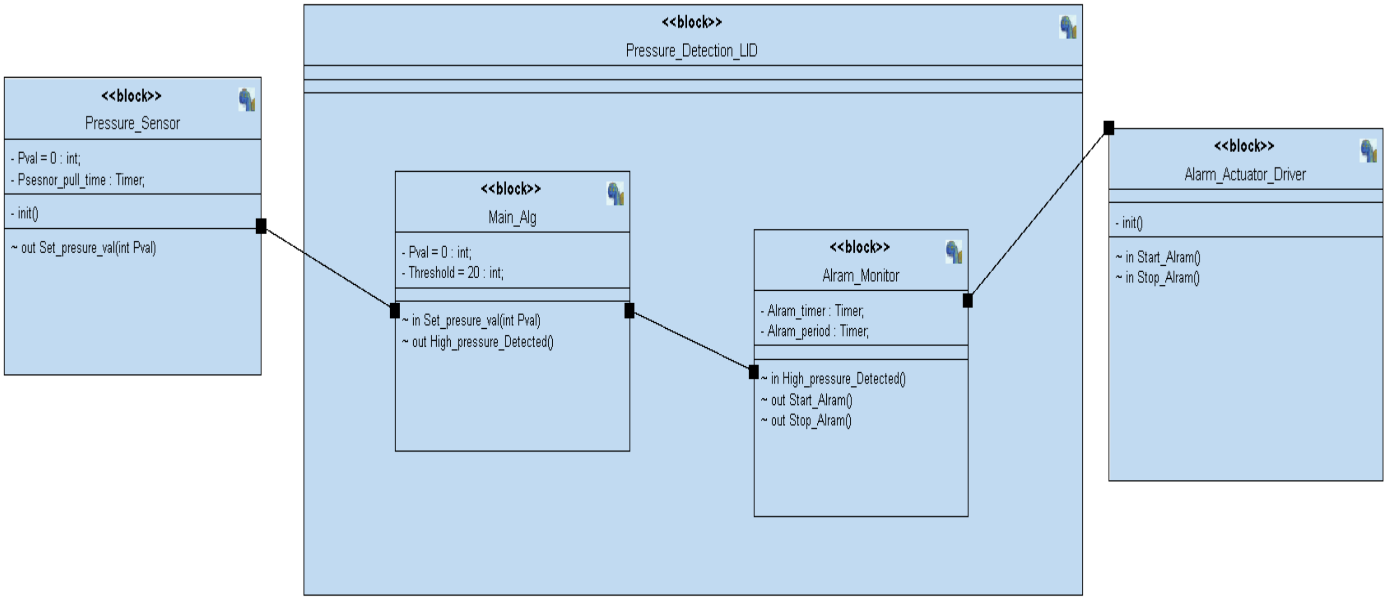
Send to Main_alg: compare it to 20

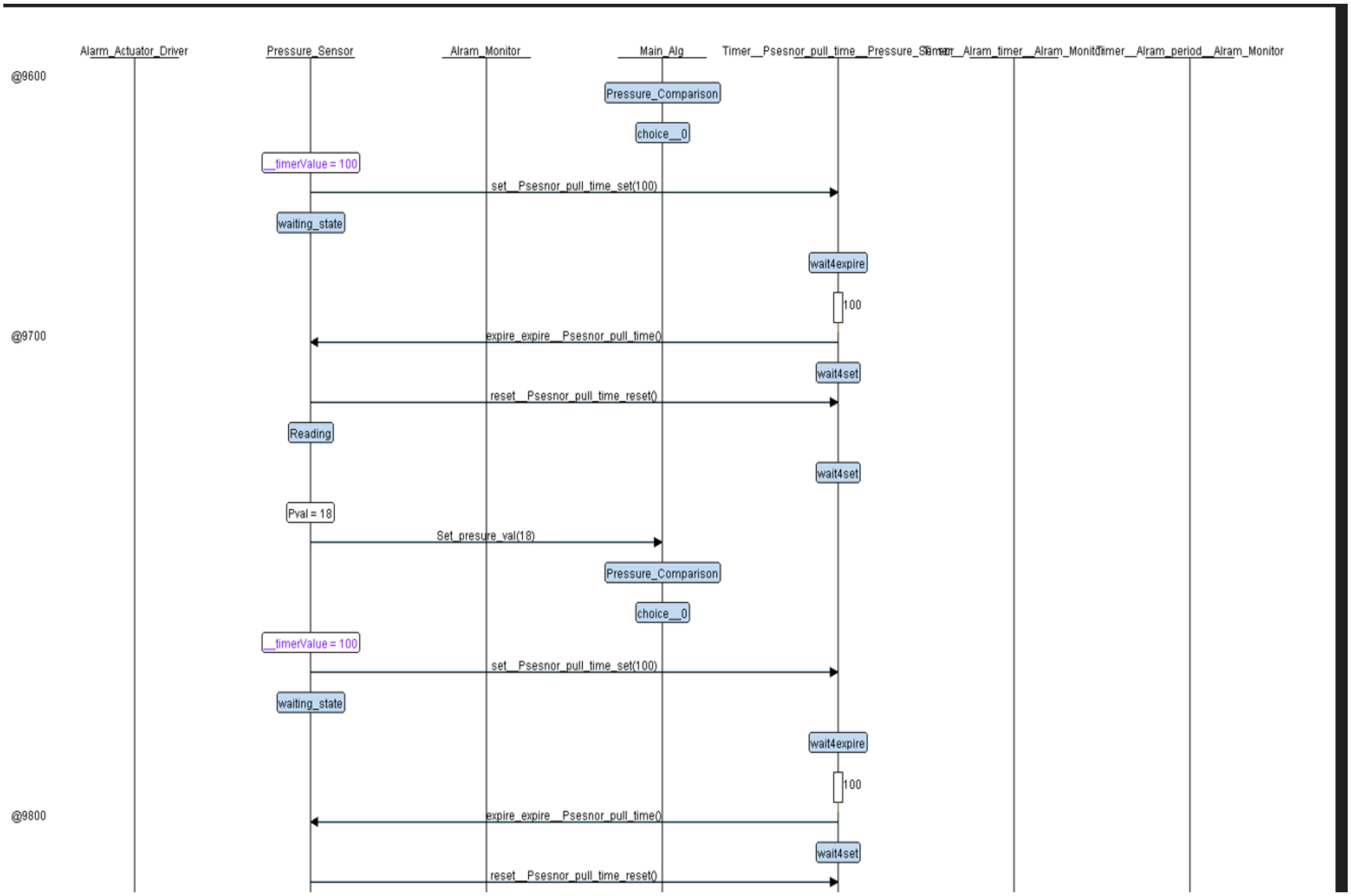
IF Greater than 20: will send to Alram_Actuator to start timer for 60 secs then send to Flash_memory to store the value than

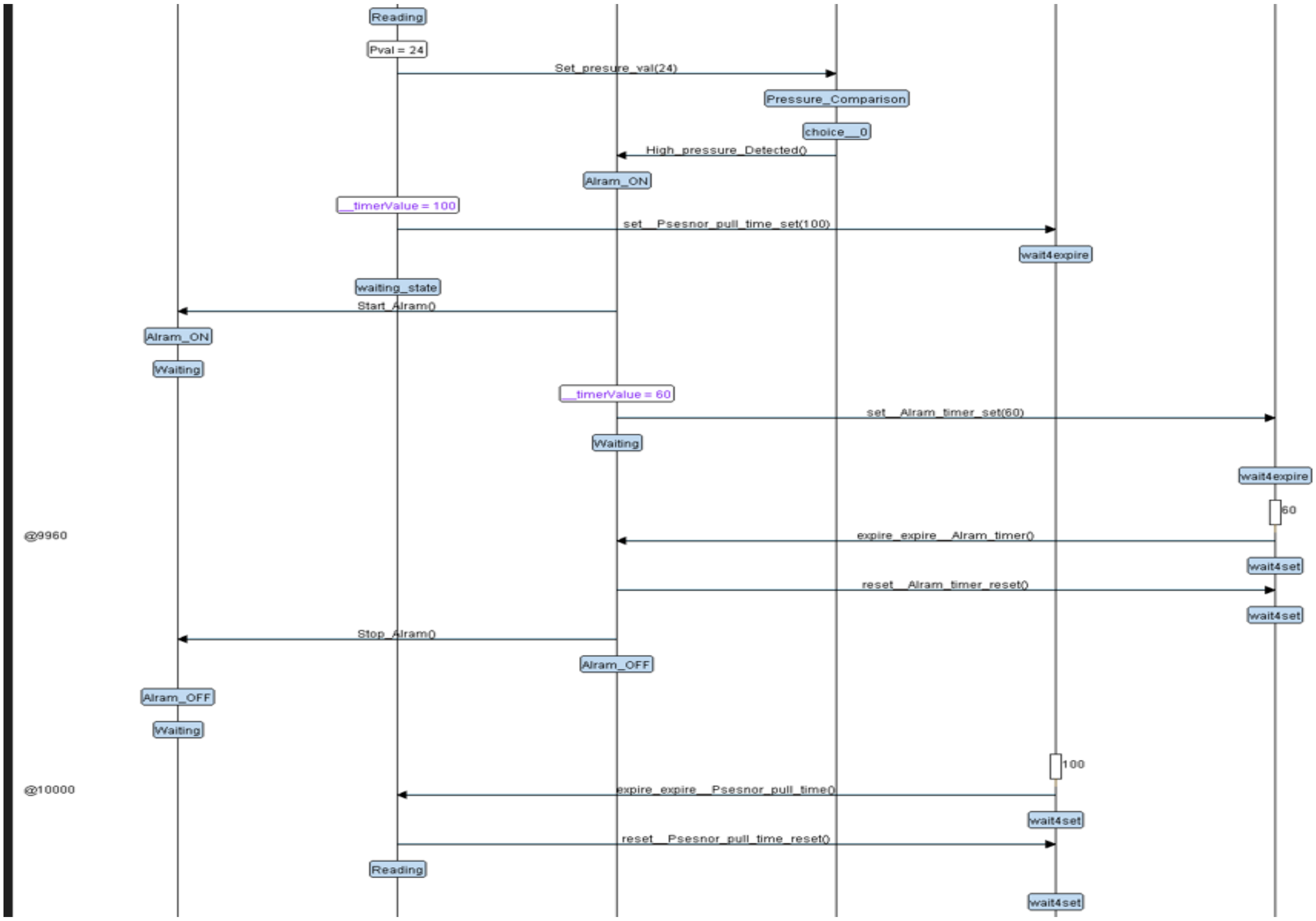
Alram_Actuator send to Main_alg that’s time is finished and Main_alg send to it back to rest timer.

Else: Send to Flash_memory to store the value.

6.System Design:




Alarm_Actuator_Driver
Pressure_Sensor
Alram_Monitor
Main_Alg
Timer__Psesnor_pull_time__Pressure_S
Timer__Alram_timer__Alram_Monit
Timer__Alram_period__Alram_Monitor
@9600
Pressure_Comparison
choice__0
__timerValue = 100
set__Psesnor_pull_time_set(100)
waiting_state
wait4expire
100
@9700
expire_expire__Psesnor_pull_time()
wait4set
reset__Psesnor_pull_time_reset()
Reading
wait4set
Pval = 18
Set_presure_val(18)
Pressure_Comparison
choice__0
__timerValue = 100
set__Psesnor_pull_time_set(100)
waiting_state
wait4expire
100
@9800
expire_expire__Psesnor_pull_time()
wait4set
reset__Psesnor_pull_time_reset()



Steps:

1.Pressure_Sensor sends Random value to Main_Alg.

2.Main_Alg compare the random value.

[IF it is morethan 20]

. Main_Alg sends (High_pressure_Detection) to Alram_Monitor

.Alram_Monitor sends (Alram_ON) to

Alram_Actuator.

. Pressure_Sensor start timer of 100 Seconds.

.Alram_Monitor starts timer of 60 seconds.

Alram_Monitor sends to Alram_Driver (Alram_ON)

.Alram_Monitor timer expires.

.Alram_Monitor timer reset.

.Alram_Monitor sends to Alram_Driver (Alram_OFF)

.Pressure_Sensor timer expires.

.Pressure_Sensor timer reset.

[Else]

. Pressure_Sensor start timer of 100 Seconds.

.Pressure_Sensor timer expires.

.Pressure_Sensor timer reset.