

Mastering Embedded System Online Diploma

First Term - Final Project 1

High Pressure Detection Project

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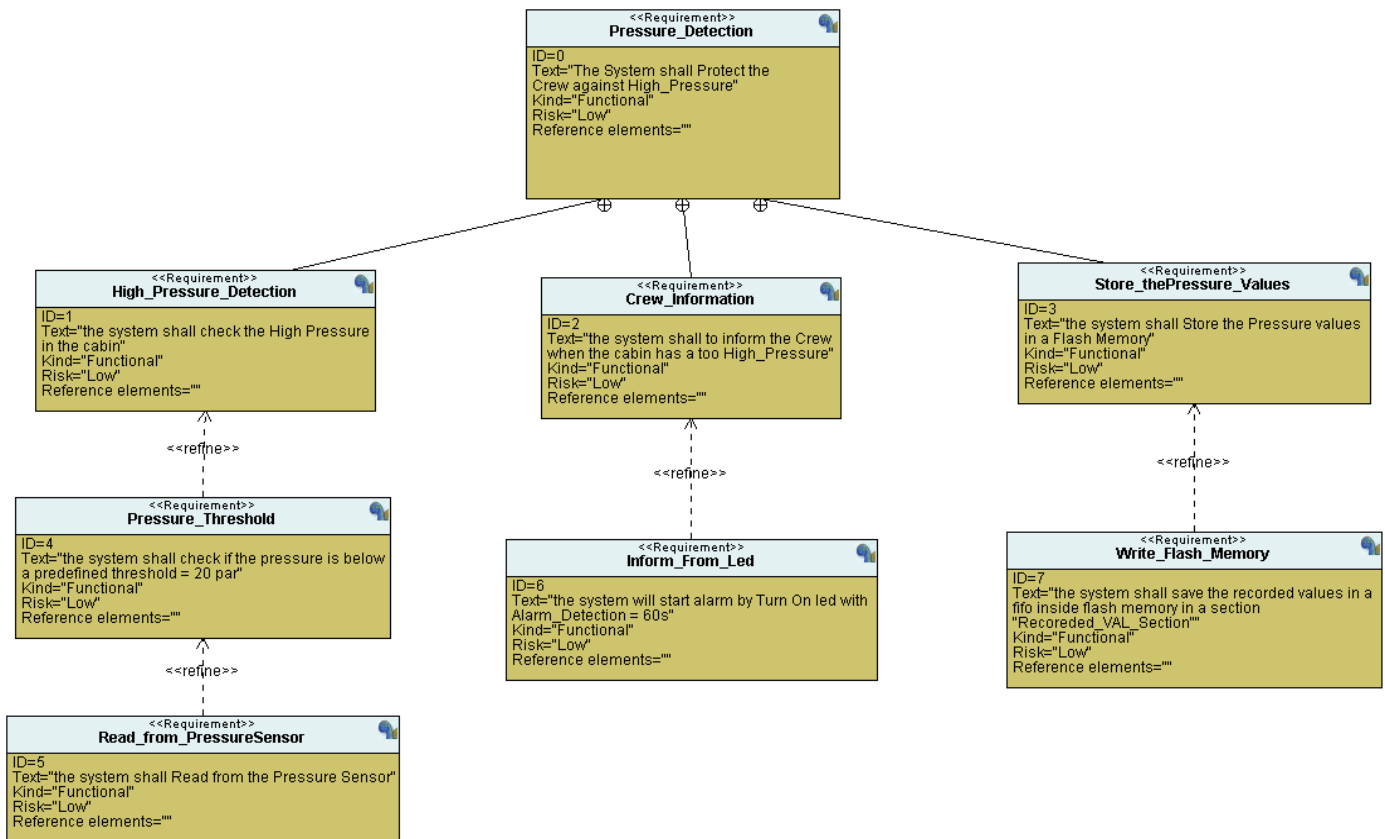
Case Study

- A Pressure Controller informs the crew of cabin with an alarm when the pressure exceeds 20 Bars in the cabin.
- The Alarm duration equals 60 Seconds.
- Keep track of the measured values.

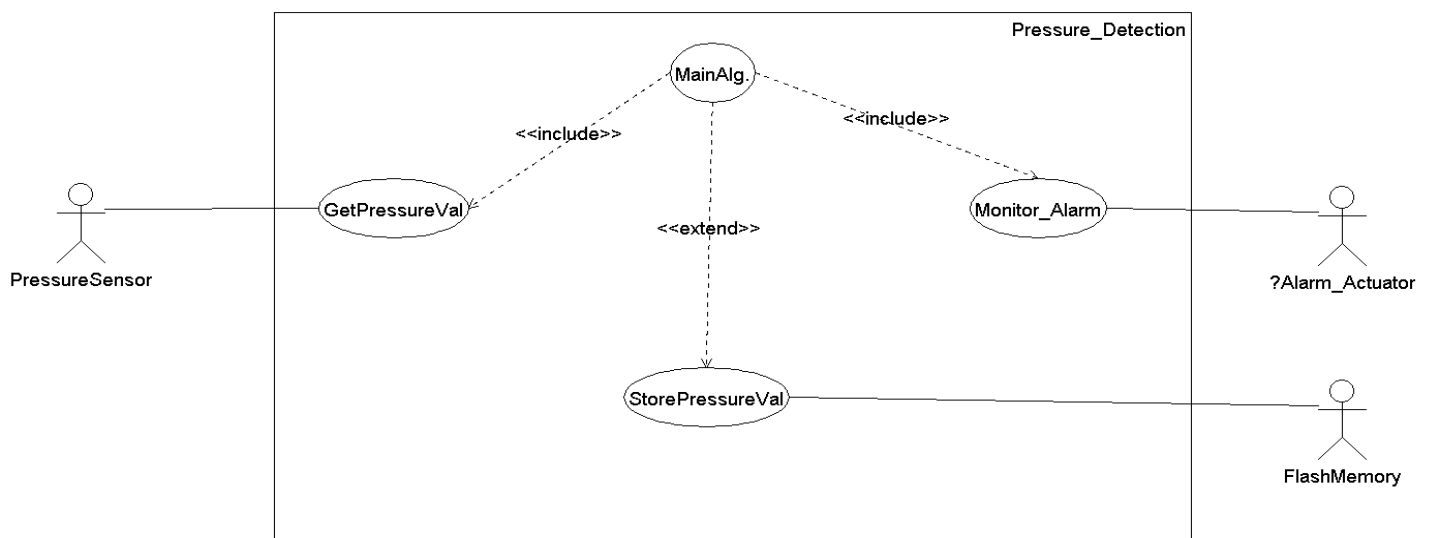
Assumptions

- The System setup and shutdown procedures are not modeled.
- The System maintenance is not modeled.
- The Pressure Sensor never fails.
- The Alarm never fails.
- The System never faces power cut.

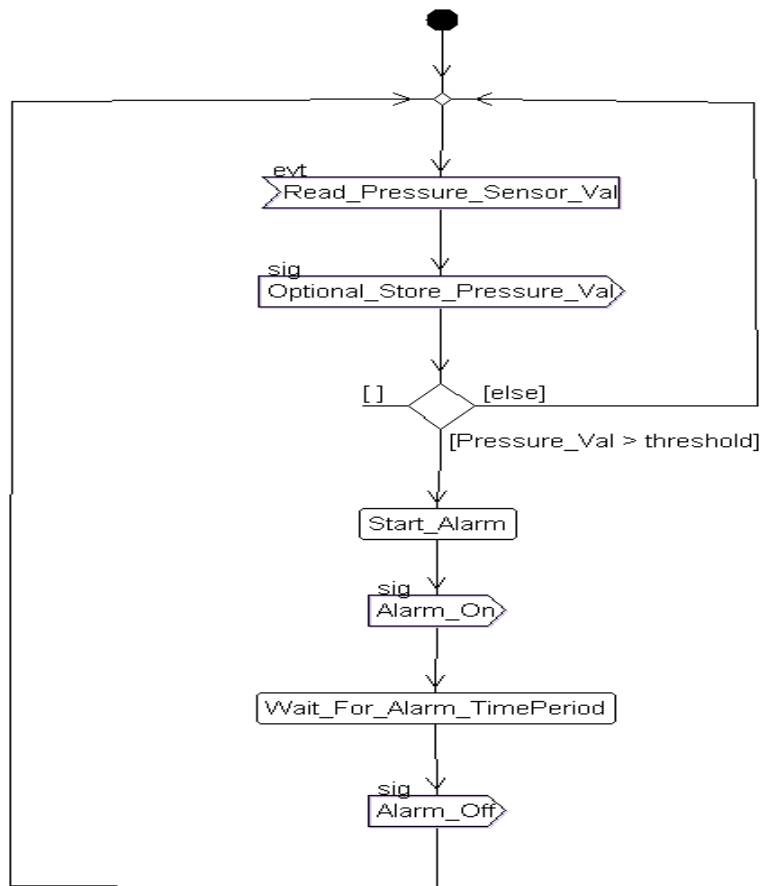
Requirements



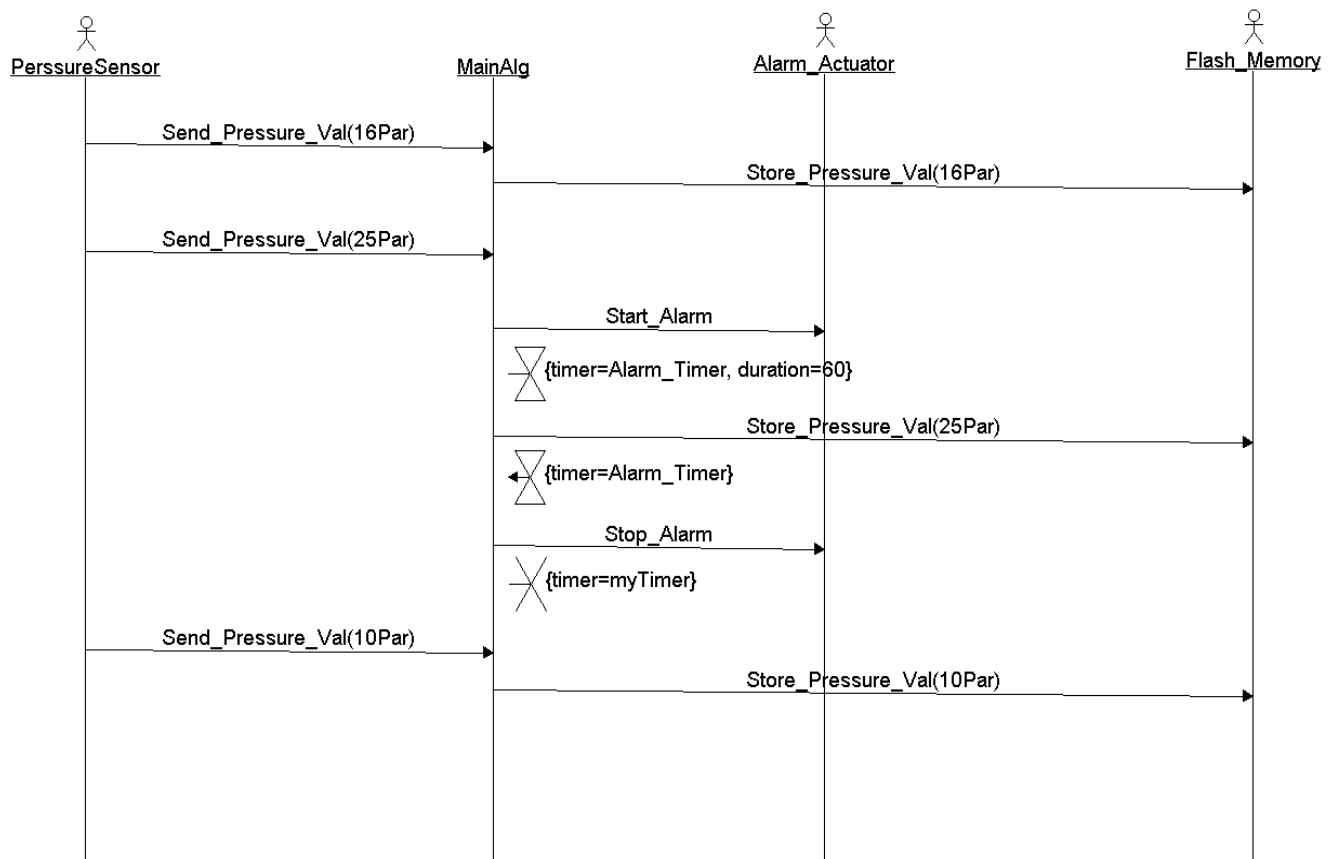
System Analysis : Use Case Diagram



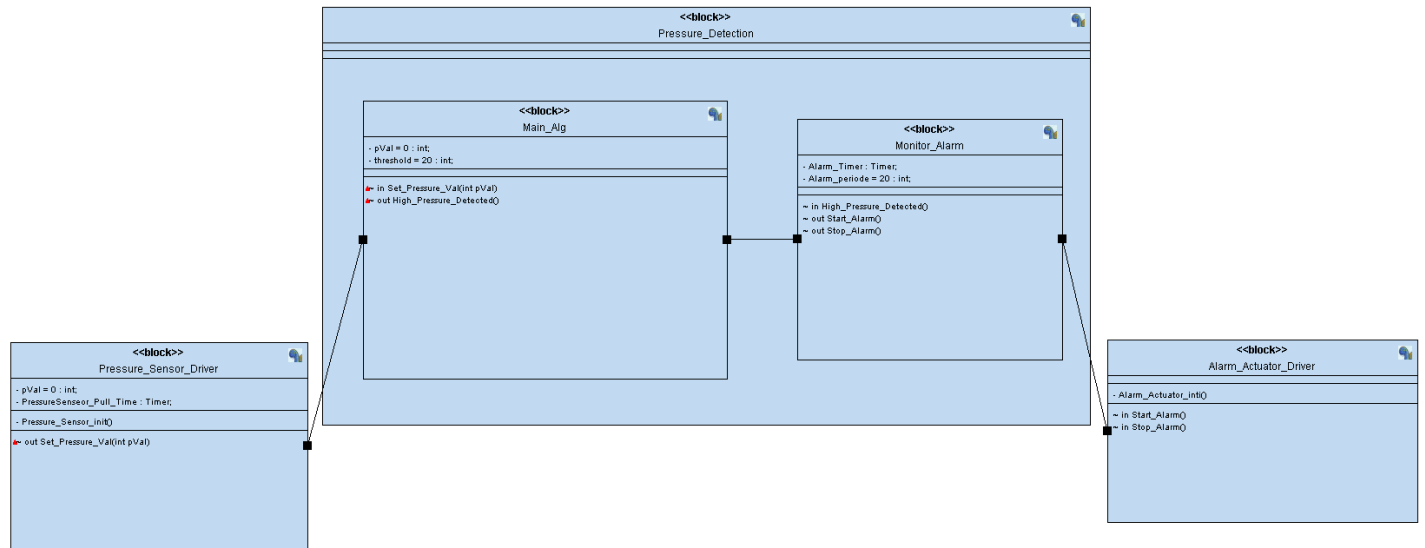
System Analysis : Activity Diagram



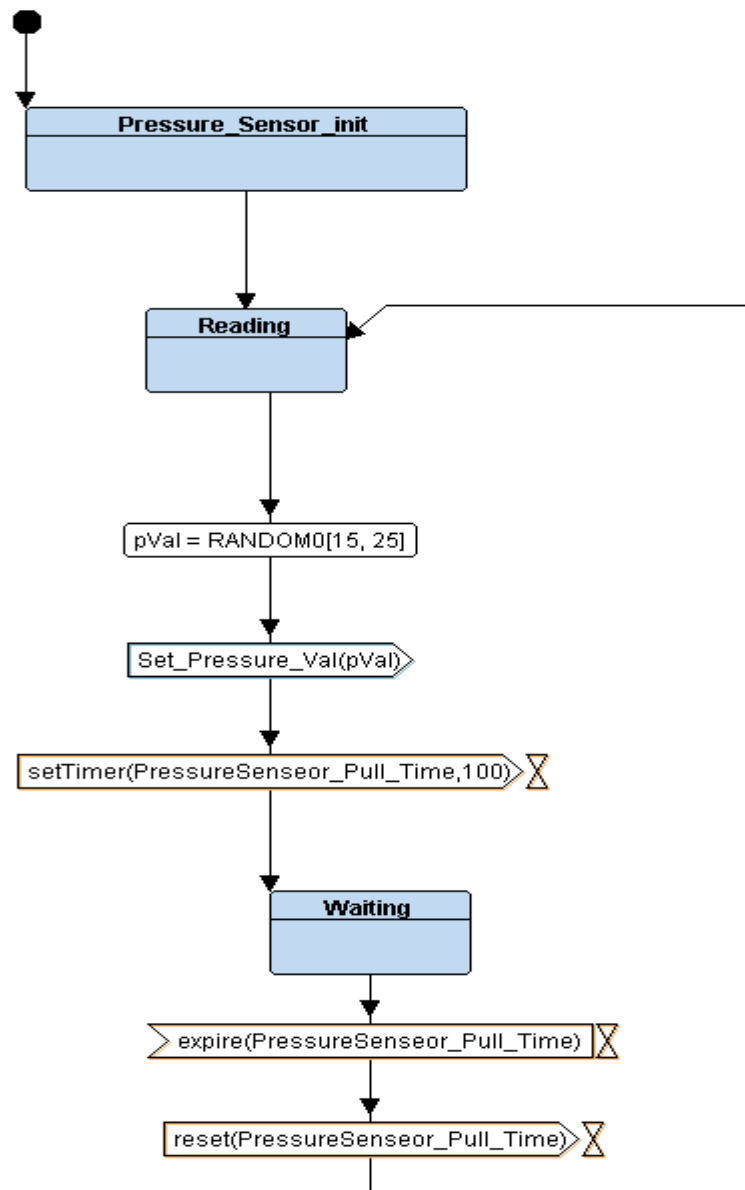
System Analysis : Sequence Diagram



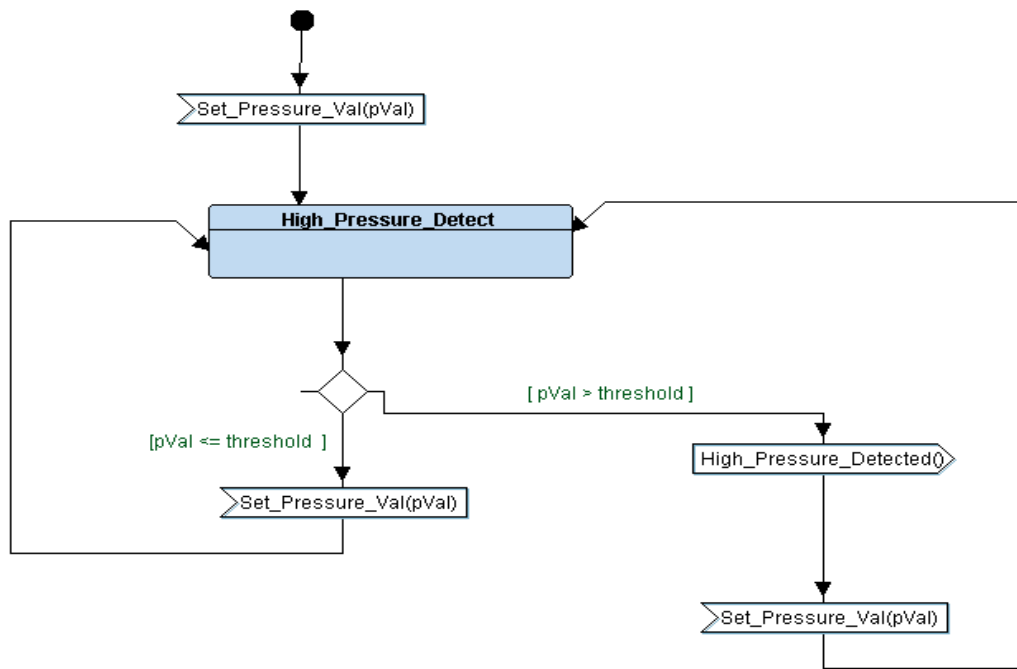
System Design



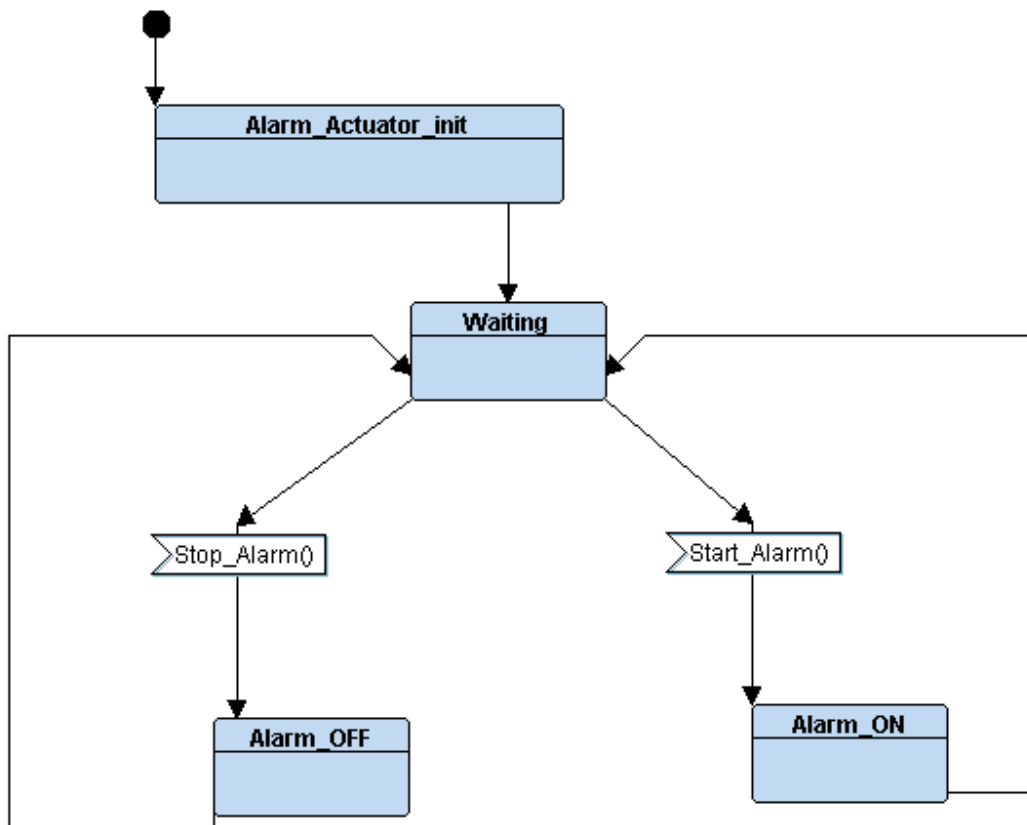
Pressure Sensor



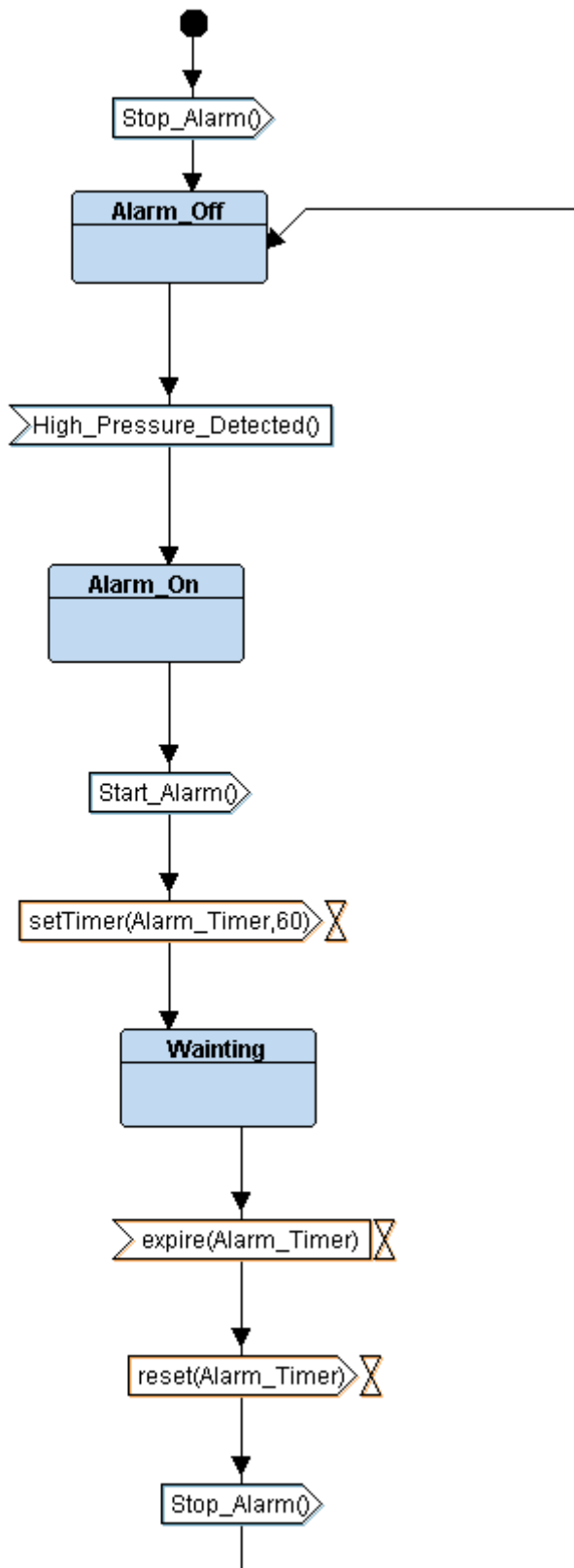
Main Algorithm



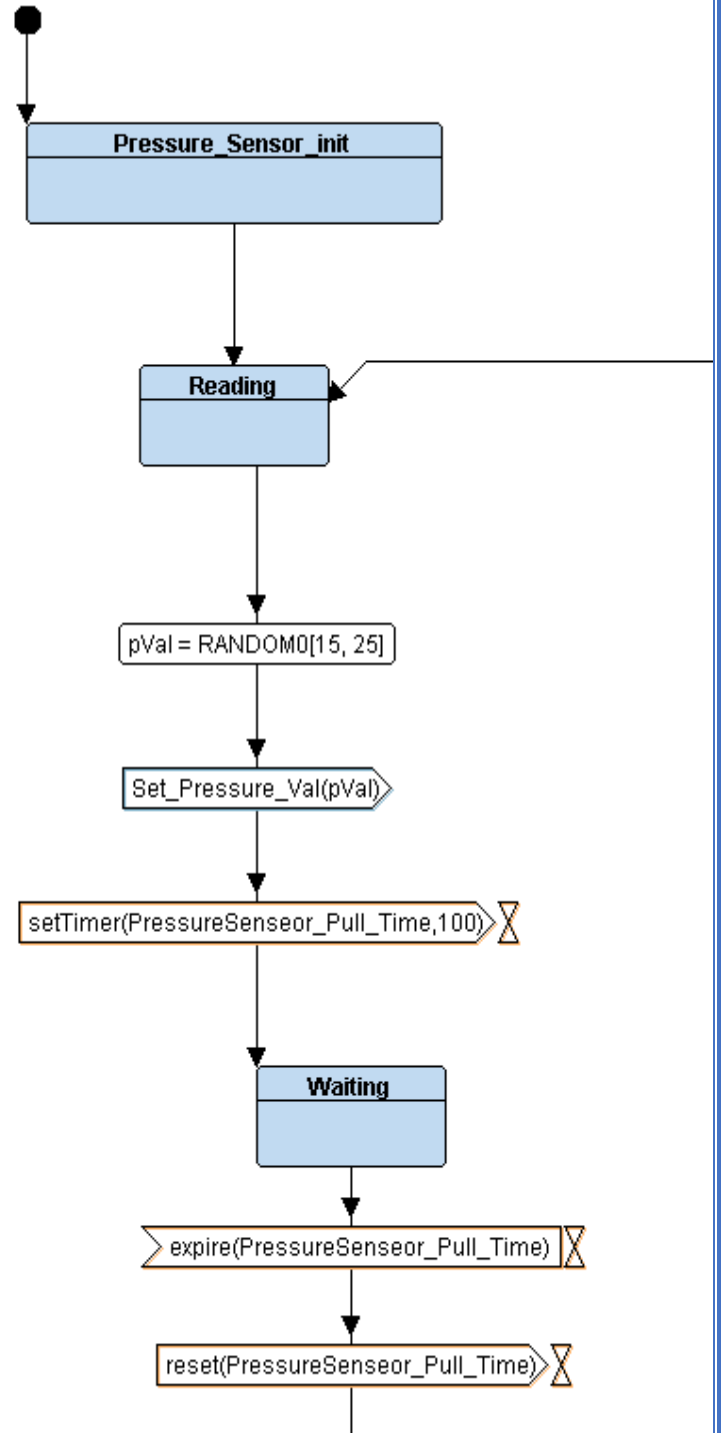
Alarm Actuator



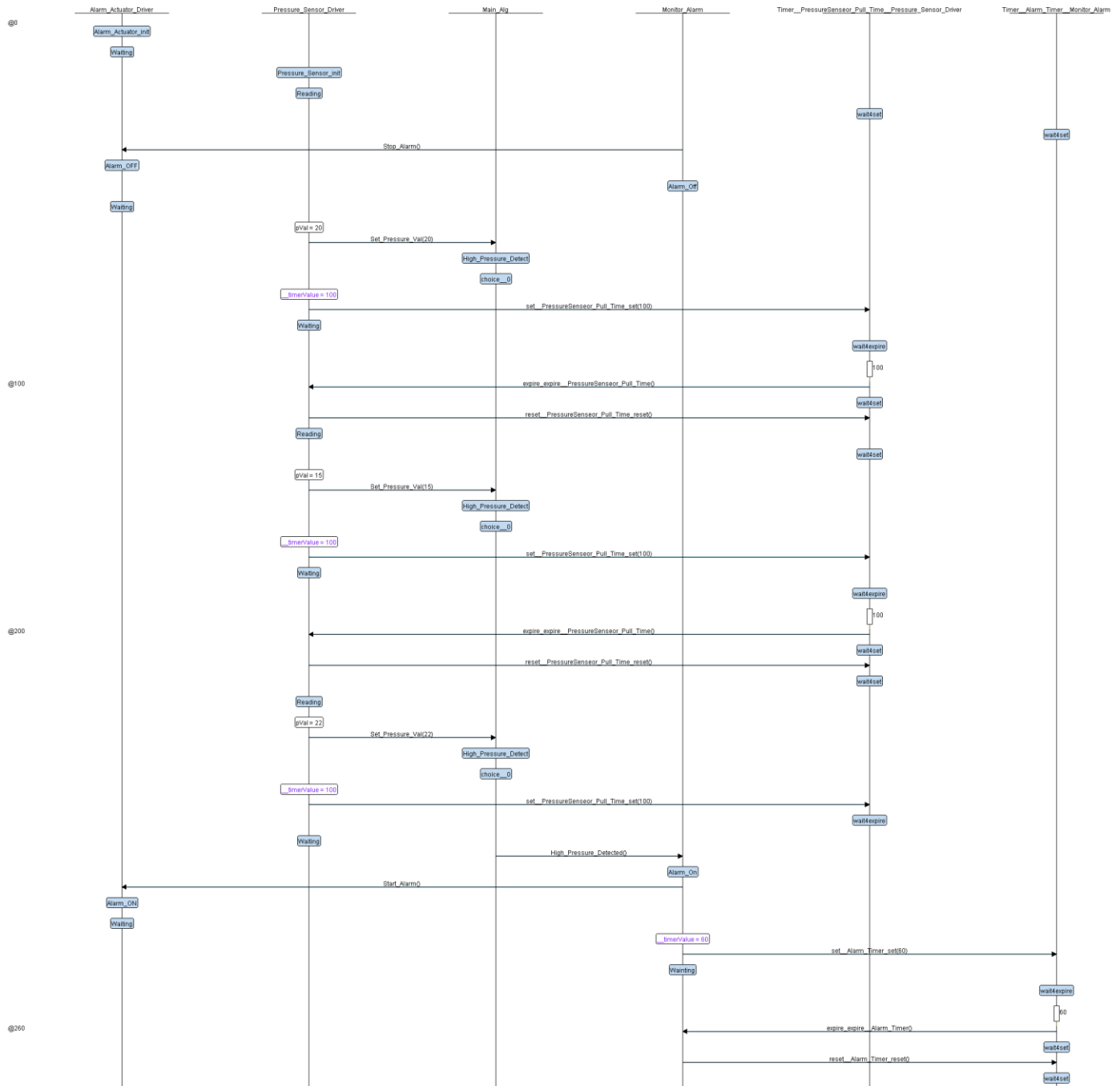
Monitor Alarm



Pressure Sensor



Simulation trace from ttool



Implementation

[Press the Link below.](#)

Memory Sections

```
MINGW64:/e/New folder/New folder/SourceCode/bin
Mohamed Nagy@LAPTOP-R4QD4OLM MINGW64 /e/New folder/New folder/SourceCode/bin
$ arm-none-eabi-objdump -h Pressure_Controller.elf

Pressure_Controller.elf:      file format elf32-littlearm

Sections:
Idx Name          Size      VMA           LMA           File off  Algn
  0 .text          0000041c  08000000      08000000      00010000  2**2
    CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .data          0000000c  20000000      0800041c      00020000  2**2
    CONTENTS, ALLOC, LOAD, DATA
  2 .bss           00001020  2000000c      08000428      0002000c  2**2
    ALLOC
  3 .debug_info     00003f49  00000000      00000000      0002000c  2**0
    CONTENTS, READONLY, DEBUGGING, OCTETS
  4 .debug_abbrev   00000c1f  00000000      00000000      00023f55  2**0
    CONTENTS, READONLY, DEBUGGING, OCTETS
  5 .debug_loc      00000568  00000000      00000000      00024b74  2**0
    CONTENTS, READONLY, DEBUGGING, OCTETS
  6 .debug_aranges  000000e0  00000000      00000000      000250dc  2**0
    CONTENTS, READONLY, DEBUGGING, OCTETS
  7 .debug_line     00000ad1  00000000      00000000      000251bc  2**0
    CONTENTS, READONLY, DEBUGGING, OCTETS
  8 .debug_str      00000777  00000000      00000000      00025c8d  2**0
    CONTENTS, READONLY, DEBUGGING, OCTETS
  9 .comment        0000007e  00000000      00000000      00026404  2**0
    CONTENTS, READONLY
 10 .ARM.attributes 00000033  00000000      00000000      00026482  2**0
    CONTENTS, READONLY
 11 .debug_frame     00000340  00000000      00000000      000264b8  2**2
    CONTENTS, READONLY, DEBUGGING, OCTETS

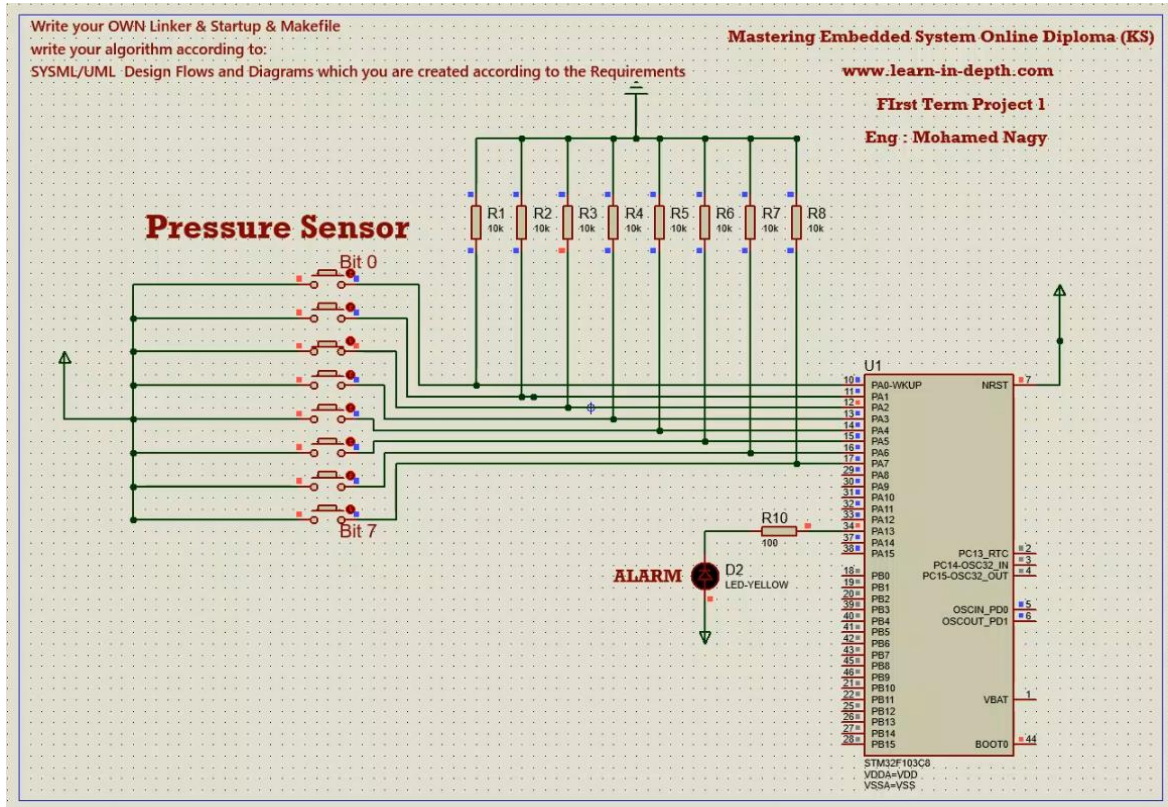
Mohamed Nagy@LAPTOP-R4QD4OLM MINGW64 /e/New folder/New folder/SourceCode/bin
$
```

Symbol Table

```
MINGW64:/e/New folder/New folder/SourceCode/bin
Mohamed Nagy@LAPTOP-R4QD40LM MINGW64 /e/New folder/New folder/SourceCode/bin
$ arm-none-eabi-nm Pressure_Controller.elf
20000014 B _E_Bss
2000000c D _E_Data
0800041c T _E_Text
2000000c B _S_Bss
20000000 D _S_Data
20001014 B _Stack_Top
0800001c T AC_init
20001018 B AC_State
20001014 B AC_State_id
0800038c W Bus_Fault
0800038c T Default_Handler
080000d4 T Delay
080000f4 T getPressureVal
08000148 T GPIO_INITIALIZATION
0800038c W H_Fault_Handler
08000284 T High_Pressure_Detected
20000000 D MA_Pressure_Threshold
2000000c B MA_Pressure_Value
20001020 B MA_State
2000101c B MA_State_id
080001e0 T main
0800038c W MM_Fault_Handler
20000004 D MoA_Periode
20001024 B MoA_State
2000101e B MoA_State_id
0800038c W NMI_Handler
0800031c T PS_init
20000008 D PS_Pull_Time
20001028 B PS_State
2000101d B PS_State_id
20000010 B PS_Value
08000398 T Reset_Handler
0800010c T Set_Alarm_actuator
08000218 T Set_Pressure_Value
08000198 T Setup
080000ac T ST_AC_Alarm_OFF
08000084 T ST_AC_Alarm_ON
08000060 T ST_AC_Waiting
08000244 T ST_MA_High_Pressure_Detect
080002a0 T ST_MoA_Alarm_OFF
080002c4 T ST_MoA_Alarm_ON
080002e8 T ST_MoA_Waiting
08000328 T ST_PS_Reading
08000364 T ST_PS_Waiting
08000044 T Start_Alarm
08000028 T Stop_Alarm
0800038c W Usage_Fault_Handler
08000000 T vectors
Mohamed Nagy@LAPTOP-R4QD40LM MINGW64 /e/New folder/New folder/SourceCode/bin
$
```

PROTEUS

The output in case of Low-Pressure value, so the alarm is OFF



The output in case of High-Pressure value, so the alarm is ON

