Mastering Embedded System Online Diploma

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First Term (Final Project 1)

Pressure Controller

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Case Study

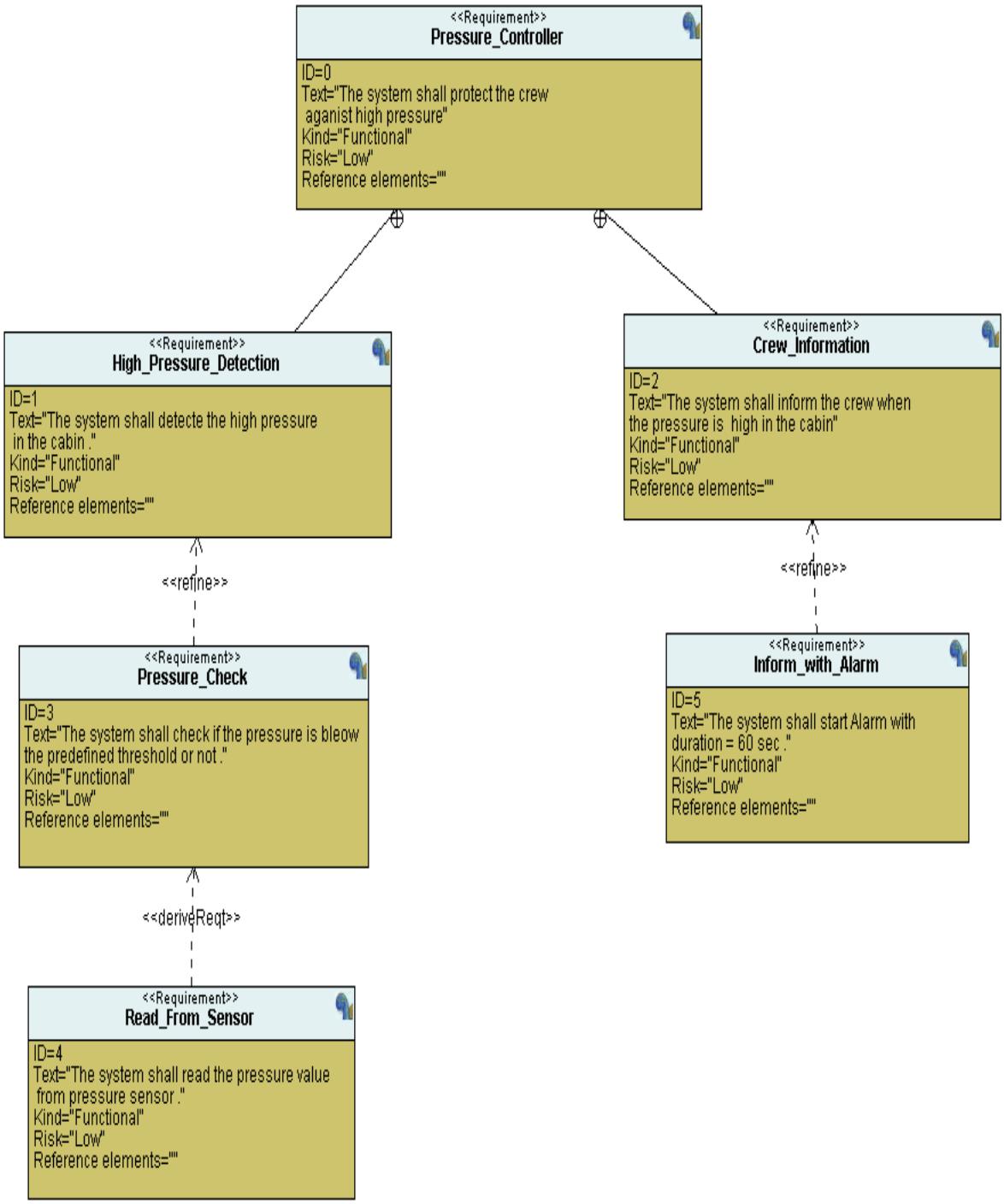
➢ Specification

- 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.

➢ Assumptions :

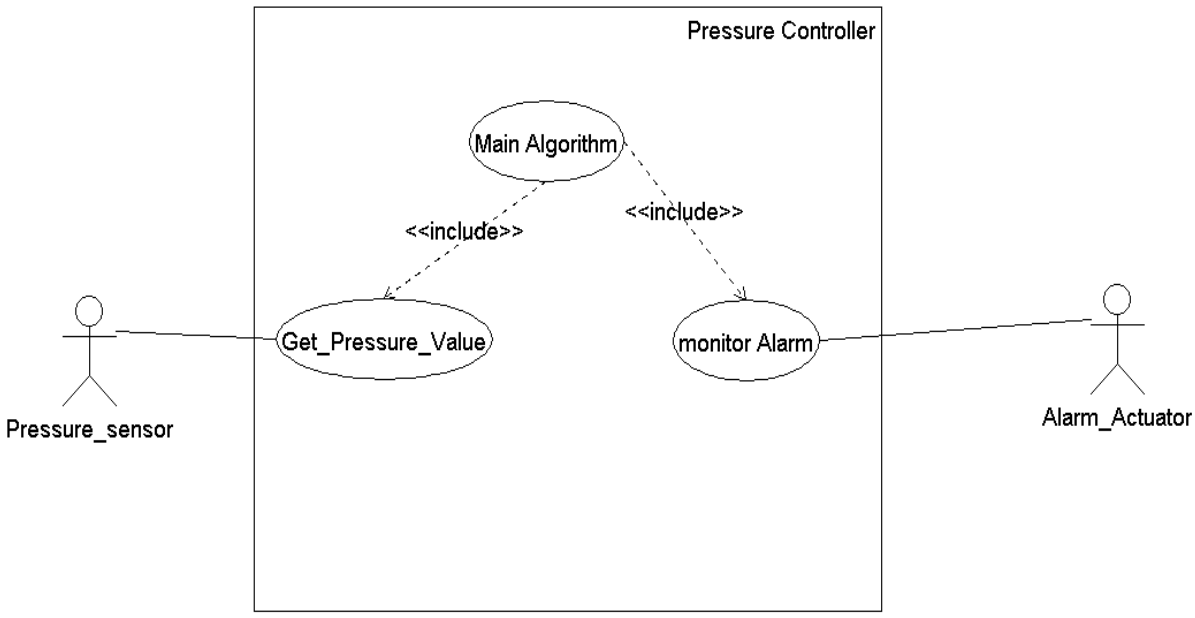
- The controller set up and shutdown procedures are not modeled
- The controller maintenance is not modeled
- The pressure sensor never fails ∪ The alarm never fails
- The controller never faces power cut

Requirements Diagram

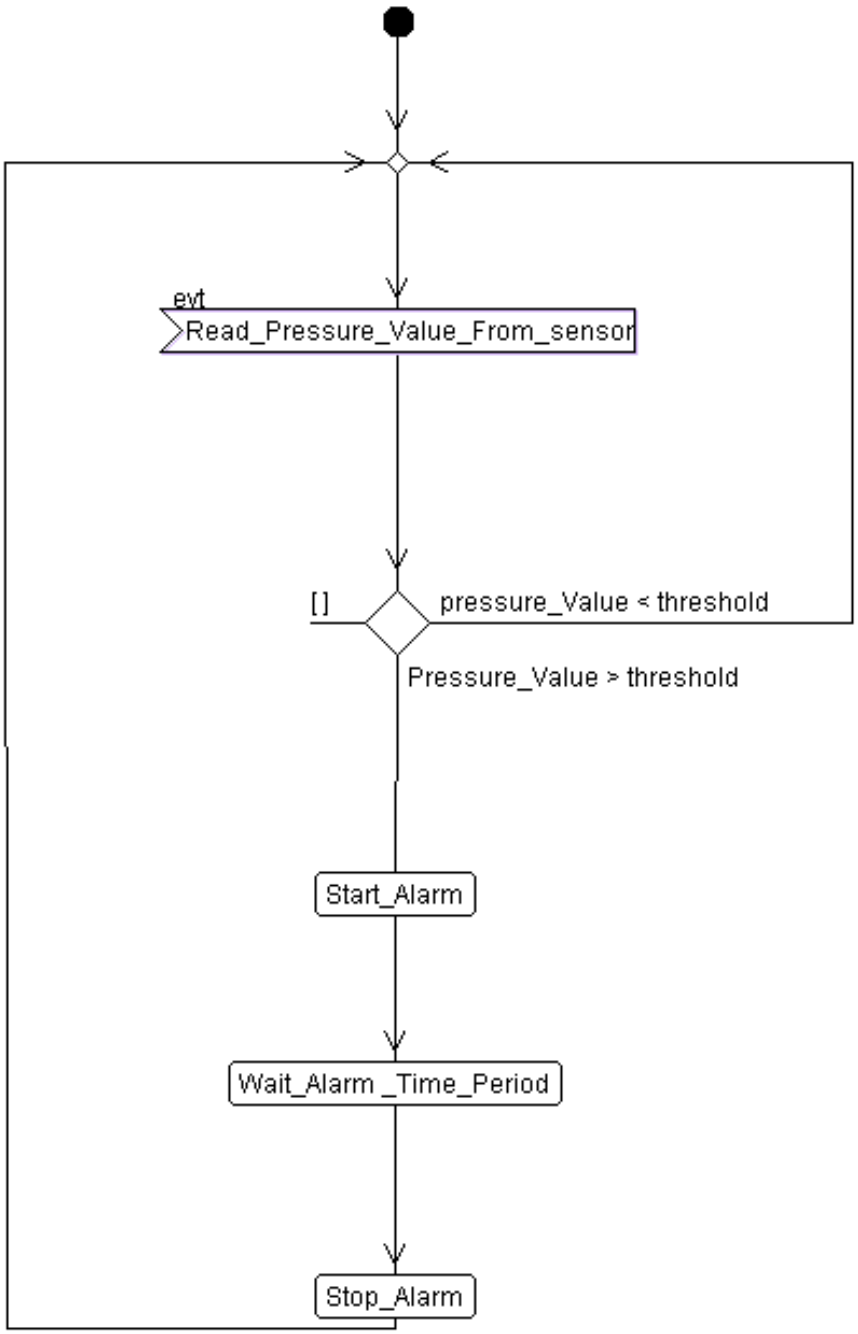


System Analysis

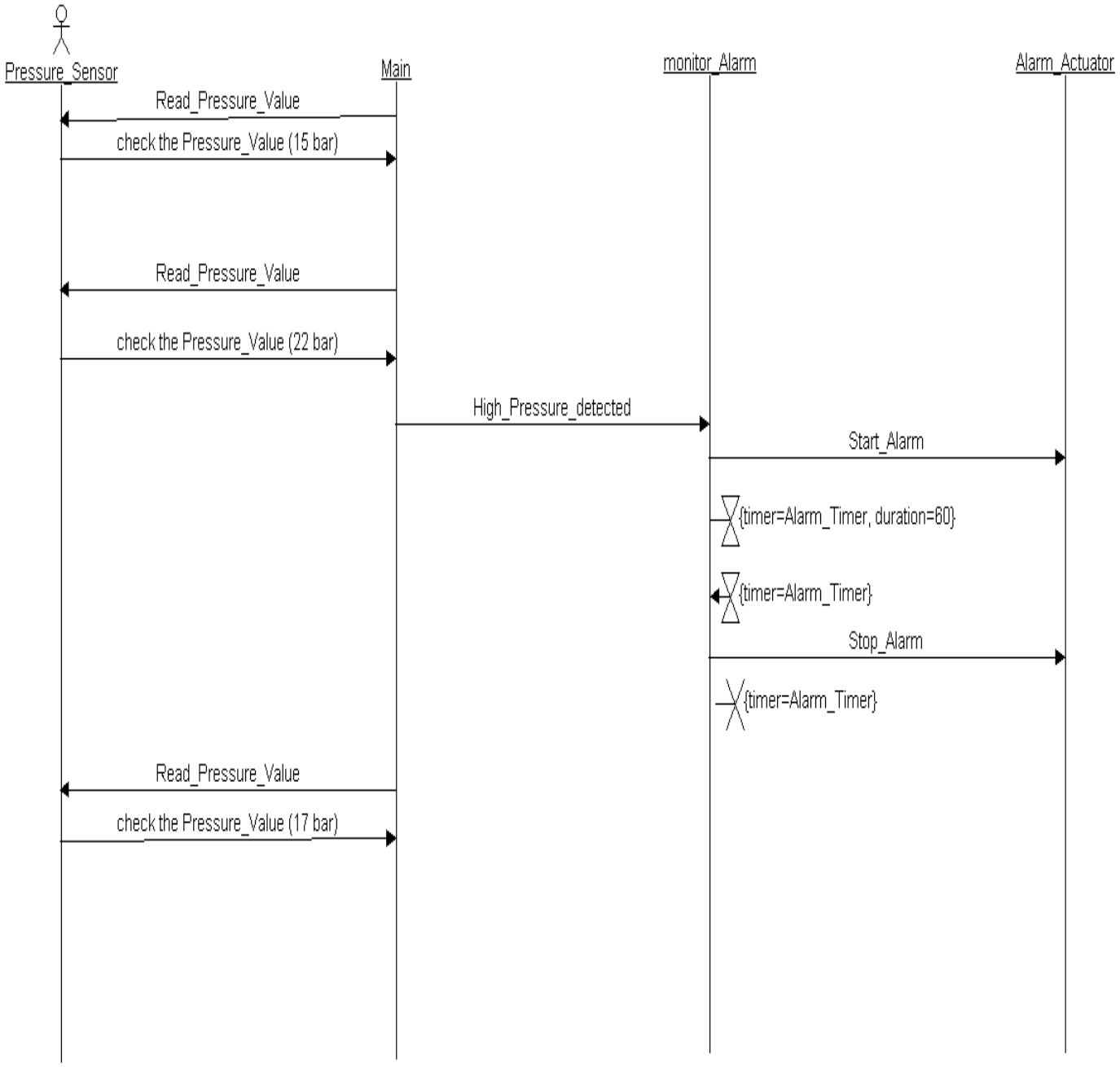
1. Use Case Diagram :



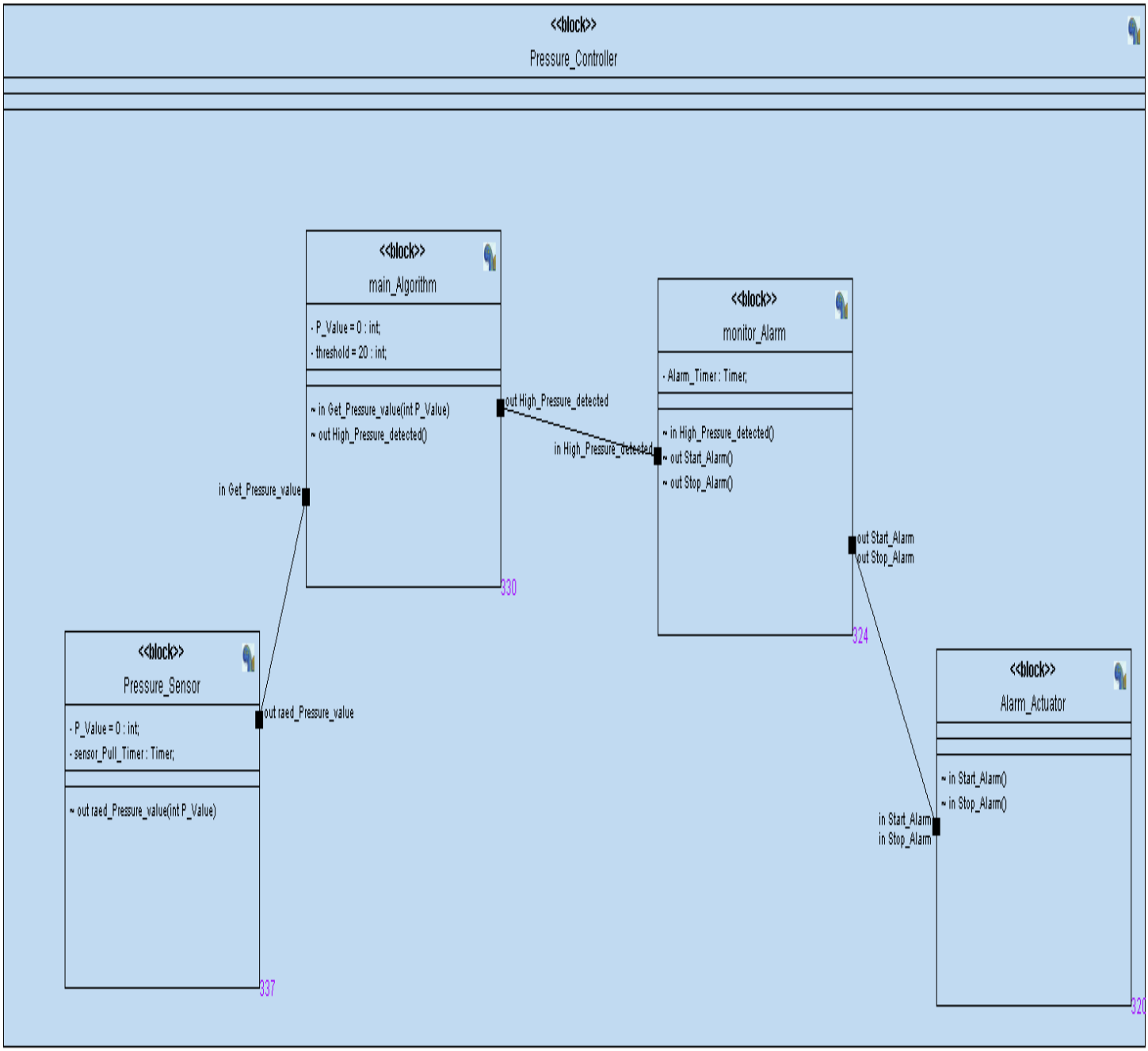
2. Activity Diagram :



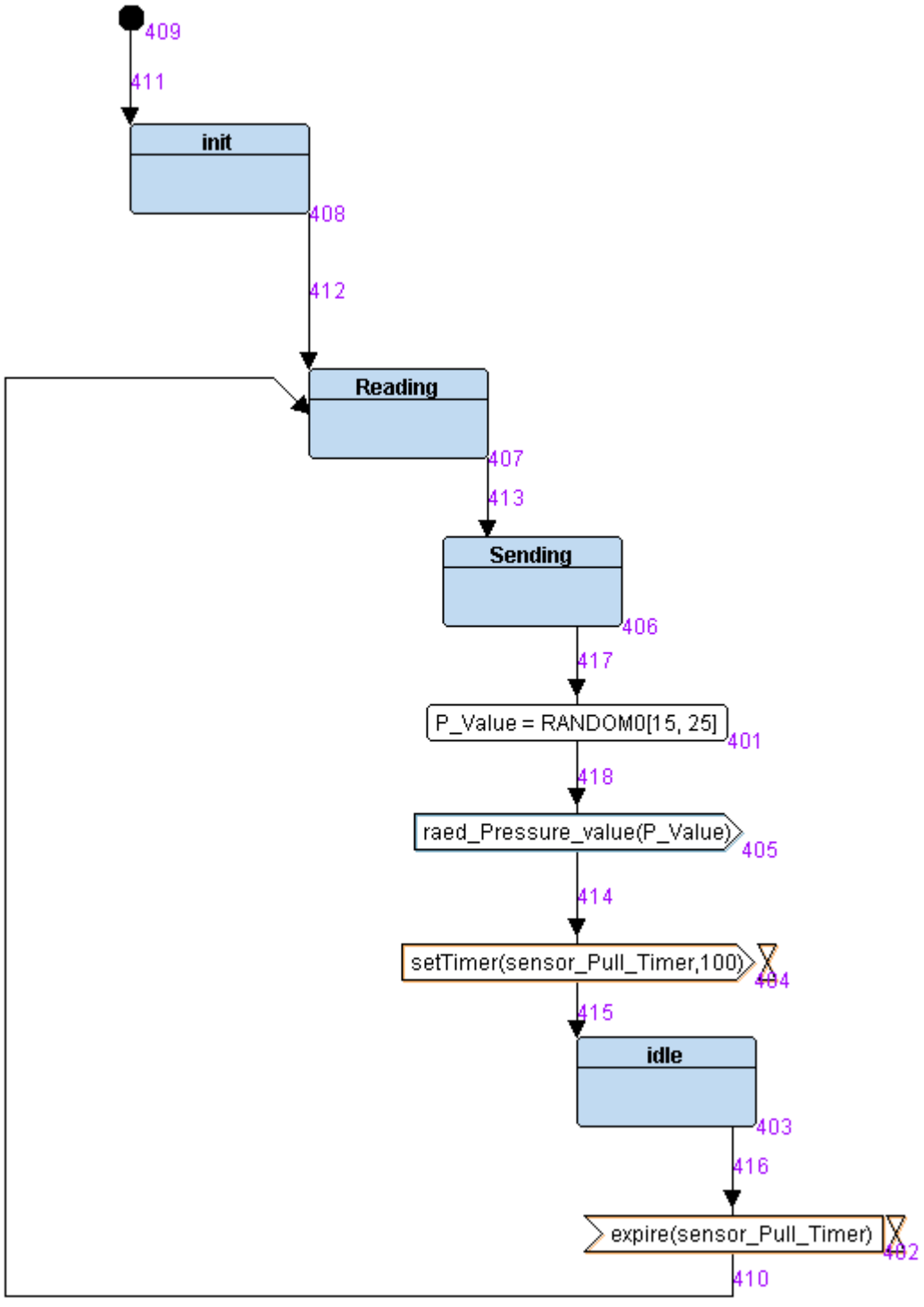
3. Sequence Diagram :



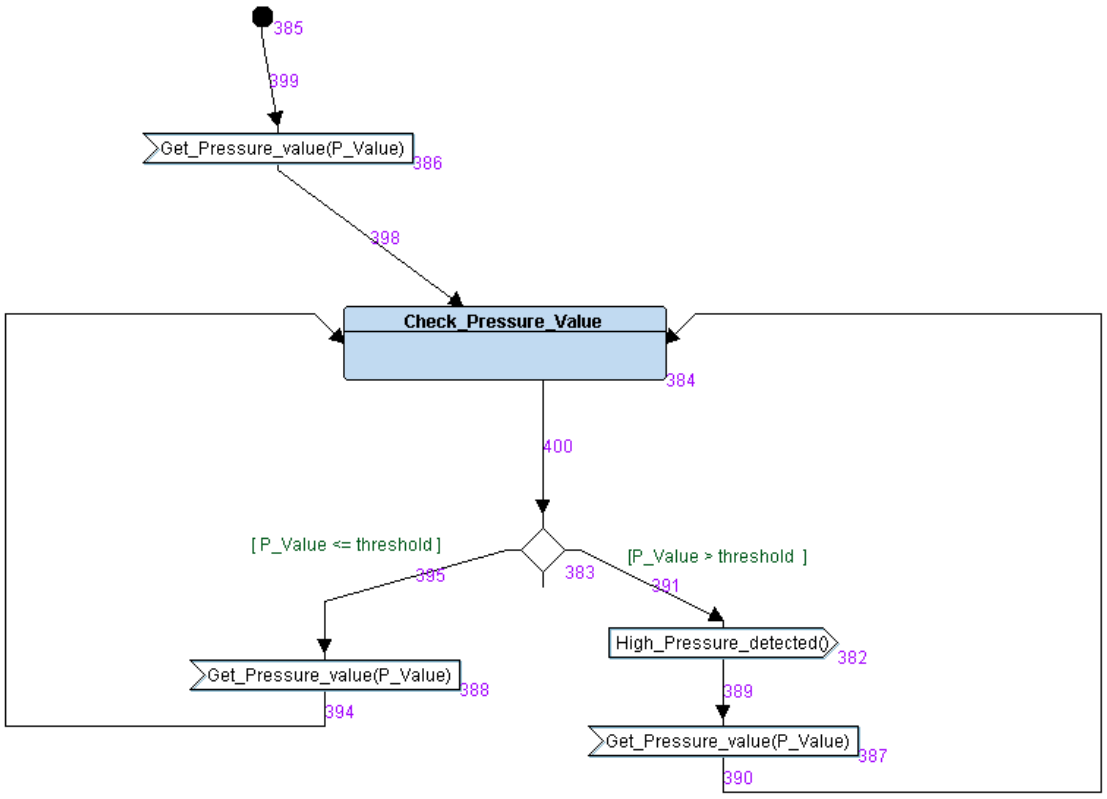
System Design



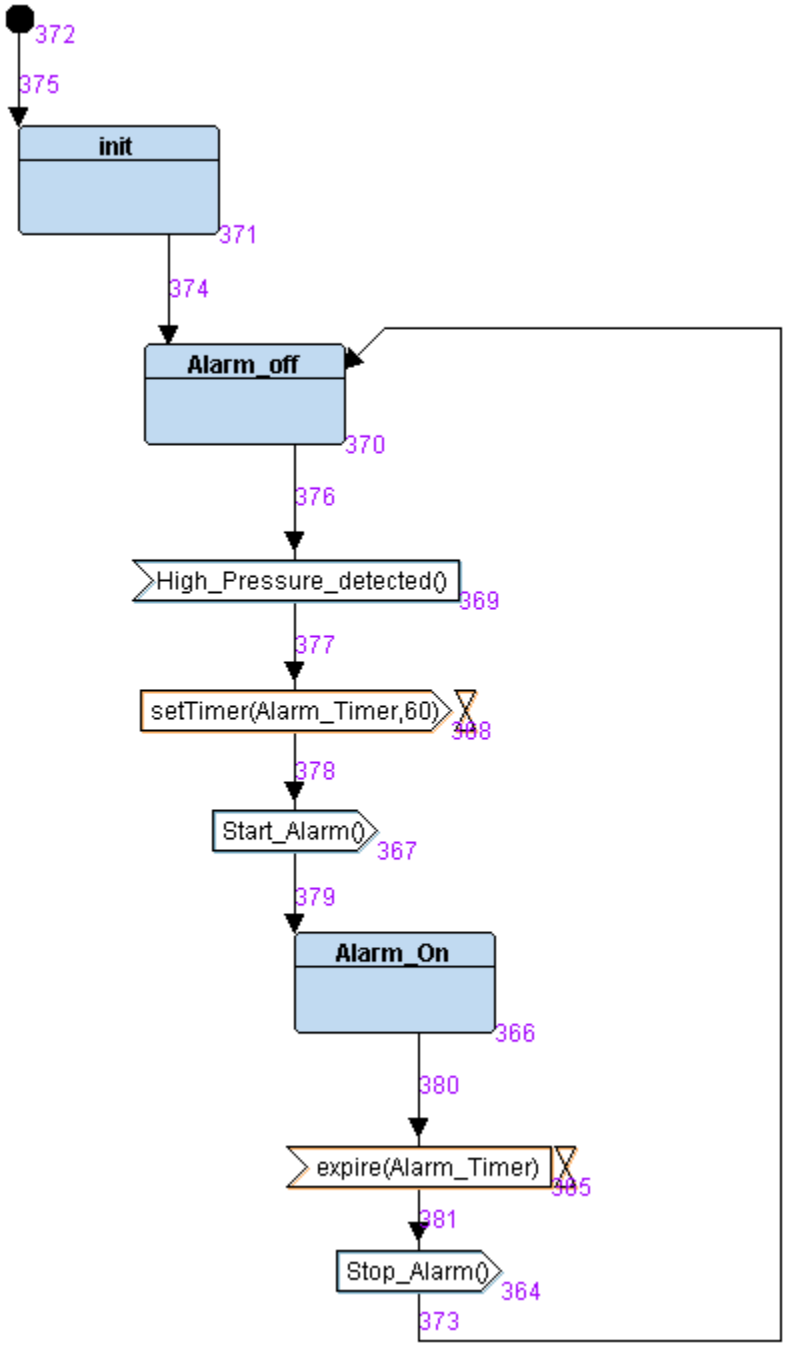
1. Pressure Sensor :



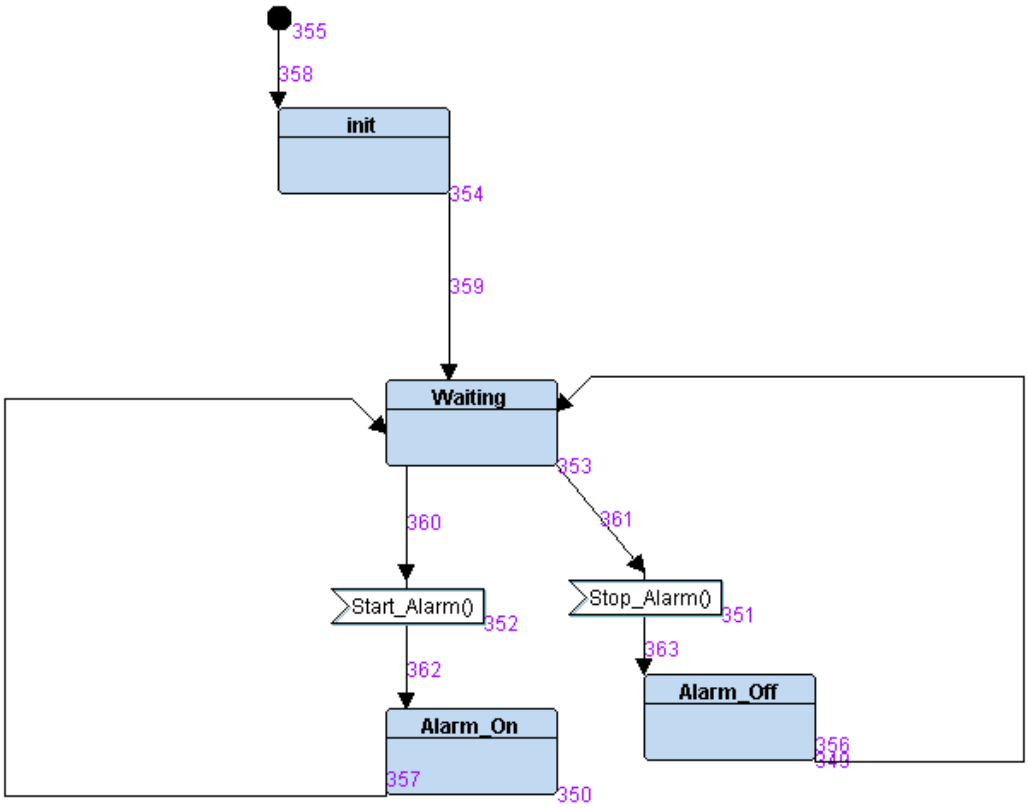
2. Main Algorithm :



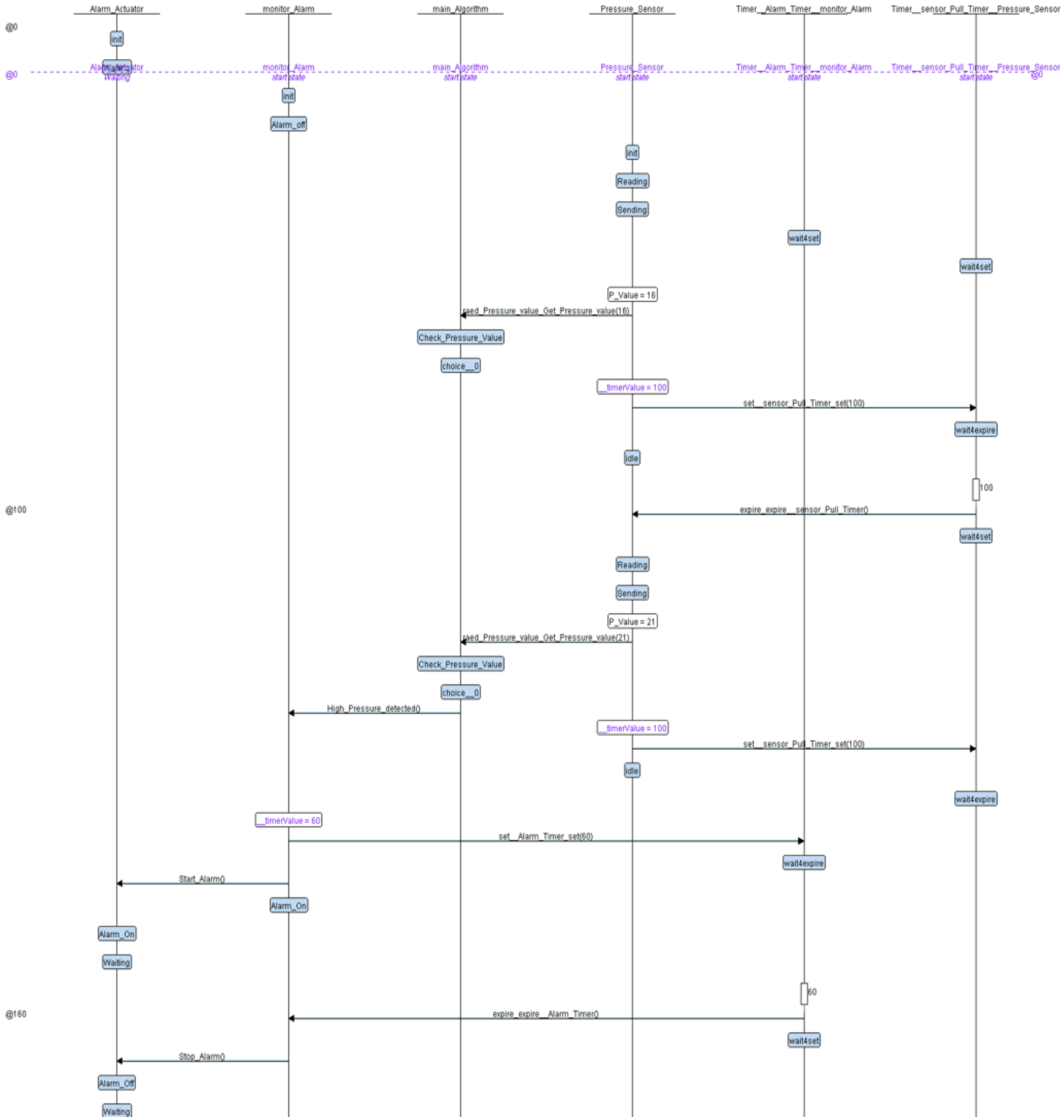
3. Monitor Alarm :



4. Alarm Actuator :



SW Logical Verification



Analyze the executable file

Main.o Sections :

```
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000098  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000004  00000000  00000000  000000cc  2**2
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000004  00000000  00000000  000000d0  2**2
                  ALLOC
  3 .debug_info   00000aad  00000000  00000000  000000d0  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 00000206  00000000  00000000  00000b7d  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    000000b4  00000000  00000000  00000d83  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  00000e37  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   00000221  00000000  00000000  00000e57  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    00000611  00000000  00000000  00001078  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      0000007c  00000000  00000000  00001689  2**0
                  CONTENTS, READONLY
 10 .debug_frame  00000070  00000000  00000000  00001708  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 11 .ARM.attributes 00000033  00000000  00000000  00001778  2**0
                  CONTENTS, READONLY
```

Pressure_sensor.o sections :

```
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000070  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  000000a4  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  000000a4  2**0
                  ALLOC
  3 .debug_info   00000a18  00000000  00000000  000000a4  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 000001f2  00000000  00000000  00000abc  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    0000009c  00000000  00000000  00000cae  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  00000d4a  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   00000200  00000000  00000000  00000d6a  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    000005a7  00000000  00000000  00000f6a  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      0000007c  00000000  00000000  00001511  2**0
                  CONTENTS, READONLY
 10 .debug_frame  00000068  00000000  00000000  00001590  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 11 .ARM.attributes 00000033  00000000  00000000  000015f8  2**0
```

Monitor_Alarm.o sections :

```
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000070  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  000000a4  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  000000a4  2**0
                  ALLOC
  3 .debug_info   00000a1c  00000000  00000000  000000a4  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 000001e1  00000000  00000000  00000ac0  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    000000c8  00000000  00000000  00000ca1  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  00000d69  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   000001ff  00000000  00000000  00000d89  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    000005c2  00000000  00000000  00000f88  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      0000007c  00000000  00000000  0000154a  2**0
                  CONTENTS, READONLY
 10 .debug_frame  00000084  00000000  00000000  000015c8  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 11 .ARM.attributes 00000033  00000000  00000000  0000164c
```

Alarm Actuator.o sections :

```
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000060  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000094  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000094  2**0
                  ALLOC
  3 .debug_info   00000a31  00000000  00000000  00000094  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 000001e1  00000000  00000000  00000ac5  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    000000f4  00000000  00000000  00000ca6  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  00000d9a  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   00000200  00000000  00000000  00000dba  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    000005c0  00000000  00000000  00000fba  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      0000007c  00000000  00000000  0000157a  2**0
                  CONTENTS, READONLY
 10 .debug_frame  000000a0  00000000  00000000  000015f8  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 11 .ARM.attributes 00000033  00000000  00000000  00001698  2**0
```

Drive.o sections :

```
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         000000c4  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .data         00000000  00000000  00000000  000000f8  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  000000f8  2**0
                  ALLOC
  3 .debug_info   00000a05  00000000  00000000  000000f8  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 000001de  00000000  00000000  00000afd  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    00000140  00000000  00000000  00000cdb  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  00000e1b  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   000002ca  00000000  00000000  00000e3b  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    000005a4  00000000  00000000  00001105  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      0000007c  00000000  00000000  000016a9  2**0
                  CONTENTS, READONLY
 10 .debug_frame  000000a0  00000000  00000000  00001728  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
 11 .ARM.attributes 00000033  00000000  00000000  000017c8  2**0
```

the sections of executable file

```
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000348  08000000  08000000  00010000  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .data         00000004  20000000  08000348  00020000  2**2
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          0000101c  20000004  0800034c  00020004  2**2
                  ALLOC
  3 .debug_info   0000347c  00000000  00000000  00020004  2**0
                  CONTENTS, READONLY, DEBUGGING
  4 .debug_abbrev 00000a5a  00000000  00000000  00023480  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    000004c8  00000000  00000000  00023eda  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 000000c0  00000000  00000000  000243a2  2**0
                  CONTENTS, READONLY, DEBUGGING
  7 .debug_line   00000b67  00000000  00000000  00024462  2**0
                  CONTENTS, READONLY, DEBUGGING
  8 .debug_str    00000724  00000000  00000000  00024fc9  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      0000007b  00000000  00000000  000256ed  2**0
                  CONTENTS, READONLY
 10 .ARM.attributes 00000033  00000000  00000000  00025768  2**0
                  CONTENTS, READONLY
 11 .debug_frame  000002ec  00000000  00000000  0002579c  2**2
```

The symbols

Main symbols

```
         U Alarm_init
00000001 C Alarm_State_id
         U Alarm_State_P
         U GPIO_INITIALIZATION
         U High_Pressure_detected
         U MA_init
00000001 C MA_state_id
         U MA_State_P
0000005c T main
00000000 B P_Value
         U PS_init
00000001 C PS_state_id
         U PS_State_P
00000040 T Set_Pressure_Value
00000000 T Setup
         U ST_Alarm_OFF
         U ST_MA_Alarm_OFF
         U ST_PS_reading
00000000 D threshold
```

Pressure Sensor symbols

```
         U Delay
         U getPressureVal
00000000 T PS_init
00000001 C PS_state_id
00000004 C PS_State_P
00000004 C pv
         U Set_Pressure_Value
0000000c T ST_PS_reading
00000044 T ST_PS_Waiting
```

Monitor Alarm symbols

```
         U Delay
0000003c T High_Pressure_detected
00000000 T MA_init
00000001 C MA_state_id
00000004 C MA_State_P
0000000c T ST_MA_Alarm_OFF
00000024 T ST_MA_Alarm_ON
         U Start_Alarm
         U Stop_Alarm
```

Alarm Actuator

```
00000000 T Alarm_init
00000001 C Alarm_State_id
00000004 C Alarm_State_P
         U Set_Alarm_actuator
0000001a T ST_Alarm_OFF
0000000c T ST_Alarm_ON
00000028 T Start_Alarm
00000044 T Stop_Alarm
```

Executable file symbols

```
20000008 B _E_bss
20000004 D _E_Data
08000348 T _E_text
20000004 B _S_bss
20000000 D _S_Data
20001008 B _stack_top
0800001c T Alarm_init
20001008 B Alarm_State_id
2000100c B Alarm_State_P
080002b8 W Bus_Fault
080002b8 T Default_Handler
0800007c T Delay
0800009c T getPressureVal
080000f0 T GPIO_INITIALIZATION
080002b8 W H_Fault_Handler
08000214 T High_Pressure_detected
080001d8 T MA_init
20001010 B MA_state_id
20001014 B MA_State_P
0800019c T main
080002b8 W MM_Fault_Handler
080002b8 W NMI_Handler
20000004 B P_Value
08000248 T PS_init
20001011 B PS_state_id
20001018 B PS_State_P
2000101c B pv
080002c4 T Rest_Handler
080000b4 T Set_Alarm_actuator
08000180 T Set_Pressure_Value
08000140 T Setup
08000036 T ST_Alarm_OFF
08000028 T ST_Alarm_ON
080001e4 T ST_MA_Alarm_OFF
080001fc T ST_MA_Alarm_ON
08000254 T ST_PS_reading
0800028c T ST_PS_Waiting
08000044 T Start_Alarm
08000060 T Stop_Alarm
20000000 D threshold
080002b8 W Usage_Fault_Handler
08000000 T Vectors
```

The readelf Binary utilities

```
ELF Header:
  Magic:   7f 45 4c 46 01 01 01 00 00 00 00 00 00 00 00 00
  Class:                             ELF32
  Data:                              2's complement, little endian
  Version:                           1 (current)
  OS/ABI:                            UNIX - System V
  ABI Version:                       0
  Type:                              EXEC (Executable file)
  Machine:                           ARM
  Version:                           0x1
  Entry point address:               0x8000000
  Start of program headers:          52 (bytes into file)
  Start of section headers:          156468 (bytes into file)
  Flags:                             0x5000200, Version5 EABI, <unknown>
  Size of this header:               52 (bytes)
  Size of program headers:           32 (bytes)
  Number of program headers:         2
  Size of section headers:           40 (bytes)
  Number of section headers:         16
  Section header string table index: 15

Section Headers:
  [Nr] Name              Type            Addr     Off    Size   ES Flg Lk Inf Al
  [ 0]                   NULL            00000000 000000 000000 00      0   0  0
  [ 1] .text             PROGBITS        08000000 010000 000348 00  AX  0   0  4
  [ 2] .data             PROGBITS        20000000 020000 000004 00  WA  0   0  4
  [ 3] .bss              NOBITS          20000004 020004 00101c 00  WA  0   0  4
  [ 4] .debug_info       PROGBITS        00000000 020004 00347c 00      0   0  1
  [ 5] .debug_abbrev     PROGBITS        00000000 023480 000a5a 00      0   0  1
  [ 6] .debug_loc        PROGBITS        00000000 023eda 0004c8 00      0   0  1
  [ 7] .debug_aranges    PROGBITS        00000000 0243a2 0000c0 00      0   0  1
  [ 8] .debug_line       PROGBITS        00000000 024462 000b67 00      0   0  1
  [ 9] .debug_str        PROGBITS        00000000 024fc9 000724 01  MS  0   0  1
  [10] .comment          PROGBITS        00000000 0256ed 00007b 01  MS  0   0  1
  [11] .ARM.attributes   ARM_ATTRIBUTES  00000000 025768 000033 00      0   0  1
  [12] .debug_frame      PROGBITS        00000000 02579c 0002ec 00      0   0  4
  [13] .symtab           SYMTAB          00000000 025a88 0005c0 10     14  50  4
  [14] .strtab           STRTAB          00000000 026048 00024c 00      0   0  1
  [15] .shstrtab         STRTAB          00000000 026294 00009d 00      0   0  1
Key to Flags:
  W (write), A (alloc), X (execute), M (merge), S (strings)
  I (info), L (link order), G (group), T (TLS), E (exclude), x (unknown)
  O (extra OS processing required) o (OS specific), p (processor specific)

There are no section groups in this file.

Program Headers:
  Type           Offset   VirtAddr   PhysAddr   FileSiz MemSiz  Flg Align
  LOAD           0x010000 0x08000000 0x08000000 0x00348 0x00348 R E 0x10000
  LOAD           0x020000 0x20000000 0x08000348 0x00004 0x01020 RW  0x10000

 Section to Segment mapping:
  Segment Sections...
   00     .text
   01     .data .bss

There is no dynamic section in this file.

There are no relocations in this file.

There are no unwind sections in this file.
```

```
Symbol table '.symtab' contains 92 entries:
Num:    Value  Size Type    Bind   Vis      Ndx Name
0: 00000000     0 NOTYPE  LOCAL  DEFAULT  UND
1: 08000000     0 SECTION LOCAL  DEFAULT    1
2: 20000000     0 SECTION LOCAL  DEFAULT    2
3: 20000004     0 SECTION LOCAL  DEFAULT    3
4: 00000000     0 SECTION LOCAL  DEFAULT    4
5: 00000000     0 SECTION LOCAL  DEFAULT    5
6: 00000000     0 SECTION LOCAL  DEFAULT    6
7: 00000000     0 SECTION LOCAL  DEFAULT    7
8: 00000000     0 SECTION LOCAL  DEFAULT    8
9: 00000000     0 SECTION LOCAL  DEFAULT    9
10: 00000000     0 SECTION LOCAL  DEFAULT   10
11: 00000000     0 SECTION LOCAL  DEFAULT   11
12: 00000000     0 SECTION LOCAL  DEFAULT   12
13: 00000000     0 FILE    LOCAL  DEFAULT  ABS startup.c
14: 080002b8     0 NOTYPE  LOCAL  DEFAULT    1 $t
15: 08000000     0 NOTYPE  LOCAL  DEFAULT    1 $d
16: 08000334     0 NOTYPE  LOCAL  DEFAULT    1 $d
17: 00000000     0 FILE    LOCAL  DEFAULT  ABS Alarm_Actuator.c
18: 0800001c     0 NOTYPE  LOCAL  DEFAULT    1 $t
19: 08000058     0 NOTYPE  LOCAL  DEFAULT    1 $d
20: 08000060     0 NOTYPE  LOCAL  DEFAULT    1 $t
21: 08000074     0 NOTYPE  LOCAL  DEFAULT    1 $d
22: 00000000     0 FILE    LOCAL  DEFAULT  ABS driver.c
23: 0800007c     0 NOTYPE  LOCAL  DEFAULT    1 $t
24: 080000b0     0 NOTYPE  LOCAL  DEFAULT    1 $d
25: 080000b4     0 NOTYPE  LOCAL  DEFAULT    1 $t
26: 080000ec     0 NOTYPE  LOCAL  DEFAULT    1 $d
27: 080000f0     0 NOTYPE  LOCAL  DEFAULT    1 $t
28: 08000134     0 NOTYPE  LOCAL  DEFAULT    1 $d
29: 00000000     0 FILE    LOCAL  DEFAULT  ABS main.c
30: 20000004     0 NOTYPE  LOCAL  DEFAULT    3 $d
31: 20000000     0 NOTYPE  LOCAL  DEFAULT    2 $d
32: 08000140     0 NOTYPE  LOCAL  DEFAULT    1 $t
33: 08000168     0 NOTYPE  LOCAL  DEFAULT    1 $d
34: 08000180     0 NOTYPE  LOCAL  DEFAULT    1 $t
35: 08000198     0 NOTYPE  LOCAL  DEFAULT    1 $d
36: 0800019c     0 NOTYPE  LOCAL  DEFAULT    1 $t
37: 080001c8     0 NOTYPE  LOCAL  DEFAULT    1 $d
38: 00000000     0 FILE    LOCAL  DEFAULT  ABS monitor_Alarm.c
39: 080001d8     0 NOTYPE  LOCAL  DEFAULT    1 $t
40: 080001f8     0 NOTYPE  LOCAL  DEFAULT    1 $d
41: 080001fc     0 NOTYPE  LOCAL  DEFAULT    1 $t
42: 08000210     0 NOTYPE  LOCAL  DEFAULT    1 $d
43: 08000214     0 NOTYPE  LOCAL  DEFAULT    1 $t
44: 0800023c     0 NOTYPE  LOCAL  DEFAULT    1 $d
45: 00000000     0 FILE    LOCAL  DEFAULT  ABS Pressure_sensor.c
46: 08000248     0 NOTYPE  LOCAL  DEFAULT    1 $t
47: 0800027c     0 NOTYPE  LOCAL  DEFAULT    1 $d
48: 0800028c     0 NOTYPE  LOCAL  DEFAULT    1 $t
49: 080002ac     0 NOTYPE  LOCAL  DEFAULT    1 $d
50: 20001008     1 OBJECT  GLOBAL DEFAULT    3 Alarm_State_id
51: 08000181    28 FUNC    GLOBAL DEFAULT    1 Set_Pressure_Value
52: 08000045    28 FUNC    GLOBAL DEFAULT    1 Start_Alarm
53: 20000000     4 OBJECT  GLOBAL DEFAULT    2 threshold
54: 080000f1    80 FUNC    GLOBAL DEFAULT    1 GPIO_INITIALIZATION
55: 080002b9    12 FUNC    WEAK   DEFAULT    1 NMI_Handler
56: 080002b9    12 FUNC    WEAK   DEFAULT    1 H_Fault_Handler
57: 20000004     4 OBJECT  GLOBAL DEFAULT    3 P_Value
58: 0800028d    44 FUNC    GLOBAL DEFAULT    1 ST_PS_Waiting
59: 20001018     4 OBJECT  GLOBAL DEFAULT    3 PS_State_P
60: 20000000     0 NOTYPE  GLOBAL DEFAULT    2 _S_Data
61: 20000008     0 NOTYPE  GLOBAL DEFAULT    3 _E_bss
62: 08000255    56 FUNC    GLOBAL DEFAULT    1 ST_PS_reading
63: 08000061    28 FUNC    GLOBAL DEFAULT    1 Stop_Alarm
64: 080002b9    12 FUNC    WEAK   DEFAULT    1 MM_Fault_Handler
65: 20001008     0 NOTYPE  GLOBAL DEFAULT    3 _stack_top
66: 08000249    12 FUNC    GLOBAL DEFAULT    1 PS_init
67: 080002b9    12 FUNC    WEAK   DEFAULT    1 Bus_Fault
68: 20001014     4 OBJECT  GLOBAL DEFAULT    3 MA_State_P
69: 2000100c     4 OBJECT  GLOBAL DEFAULT    3 Alarm_State_P
70: 0800009d    24 FUNC    GLOBAL DEFAULT    1 getPressureVal
71: 080002b9    12 FUNC    GLOBAL DEFAULT    1 Default_Handler
72: 080001fd    24 FUNC    GLOBAL DEFAULT    1 ST_MA_Alarm_ON
73: 20000004     0 NOTYPE  GLOBAL DEFAULT    3 _S_bss
74: 08000000    28 OBJECT  GLOBAL DEFAULT    1 Vectors
75: 0800001d    12 FUNC    GLOBAL DEFAULT    1 Alarm_init
76: 080000b5    60 FUNC    GLOBAL DEFAULT    1 Set_Alarm_actuator
77: 0800019d    60 FUNC    GLOBAL DEFAULT    1 main
78: 20001010     1 OBJECT  GLOBAL DEFAULT    3 MA_state_id
```

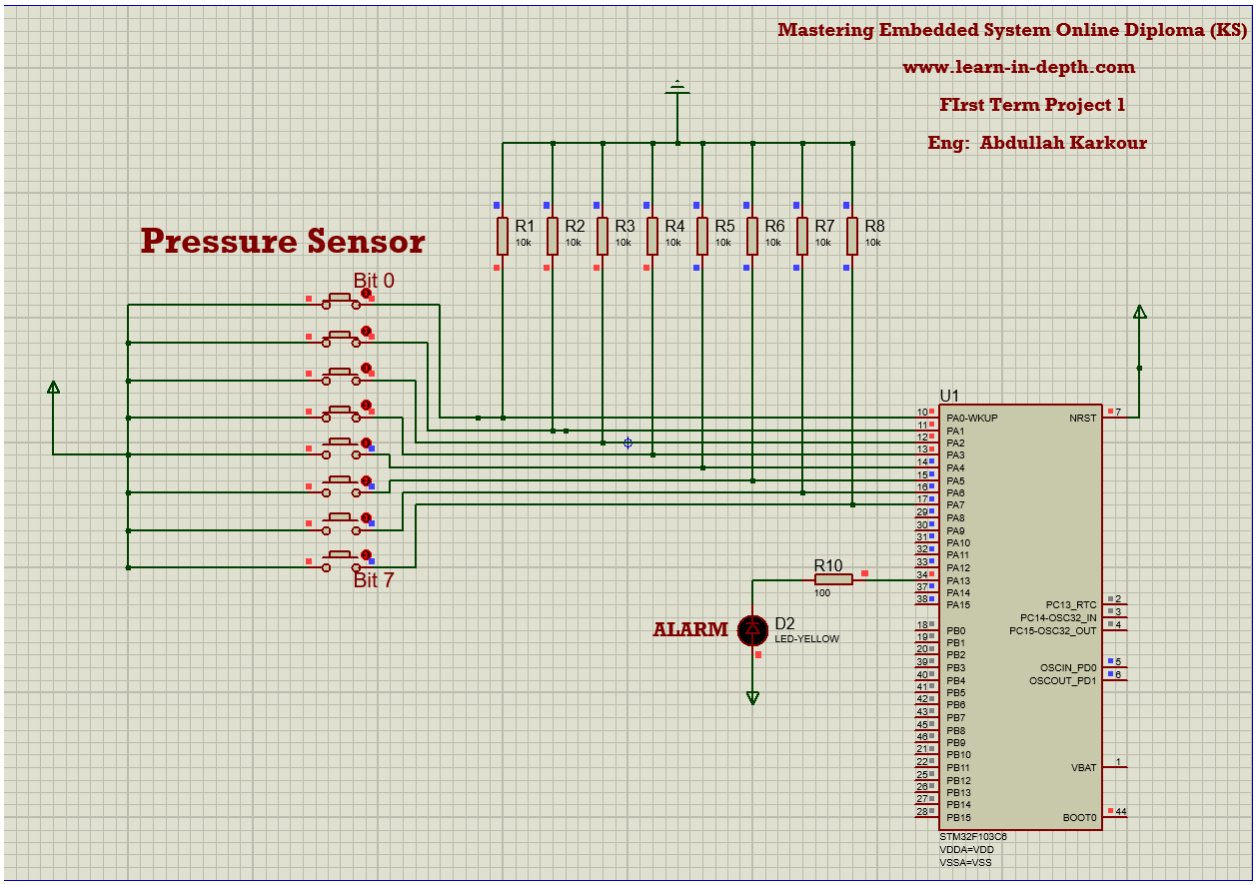
```
79: 080002b9    12 FUNC    WEAK   DEFAULT    1 Usage_Fault_Handler
80: 08000141    64 FUNC    GLOBAL DEFAULT    1 Setup
81: 080002c5   132 FUNC    GLOBAL DEFAULT    1 Rest_Handler
82: 20000004     0 NOTYPE  GLOBAL DEFAULT    2 _E_Data
83: 20001011     1 OBJECT  GLOBAL DEFAULT    3 PS_state_id
84: 0800007d    32 FUNC    GLOBAL DEFAULT    1 Delay
85: 2000101c     4 OBJECT  GLOBAL DEFAULT    3 pv
86: 080001e5    24 FUNC    GLOBAL DEFAULT    1 ST_MA_Alarm_OFF
87: 080001d9    12 FUNC    GLOBAL DEFAULT    1 MA_init
88: 08000348     0 NOTYPE  GLOBAL DEFAULT    1 _E_text
89: 08000037    14 FUNC    GLOBAL DEFAULT    1 ST_Alarm_OFF
90: 08000029    14 FUNC    GLOBAL DEFAULT    1 ST_Alarm_ON
91: 08000215    52 FUNC    GLOBAL DEFAULT    1 High_Pressure_detected

No version information found in this file.
Attribute Section: aeabi
File Attributes
  Tag_CPU_name: "Cortex-M3"
  Tag_CPU_arch: v7
  Tag_CPU_arch_profile: Microcontroller
  Tag_THUMB_ISA_use: Thumb-2
  Tag_ABI_PCS_wchar_t: 4
  Tag_ABI_FP_denormal: Needed
  Tag_ABI_FP_exceptions: Needed
  Tag_ABI_FP_number_model: IEEE 754
  Tag_ABI_align_needed: 8-byte
  Tag_ABI_align_preserved: 8-byte, except leaf SP
  Tag_ABI_enum_size: small
  Tag_ABI_optimization_goals: Aggressive Debug
  Tag_CPU_unaligned_access: v6
```

the Simulation results

Case one

When the pressure value is less than 20 bar , that mean the cabin have not a high pressure so the alarm is OFF .

- Pressure value = 15 < 20 bar (Alarm OFF)



Case Two

When the pressure value is bigger than 20 bar , that mean the cabin have a high pressure so the alarm is ON

- Pressure value = 22 > 20 bar (Alarm ON)