

Mastering Embedded System Diploma.

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First term (Final Project 1).

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1. Case Study.

The client wants the software of the following system with this

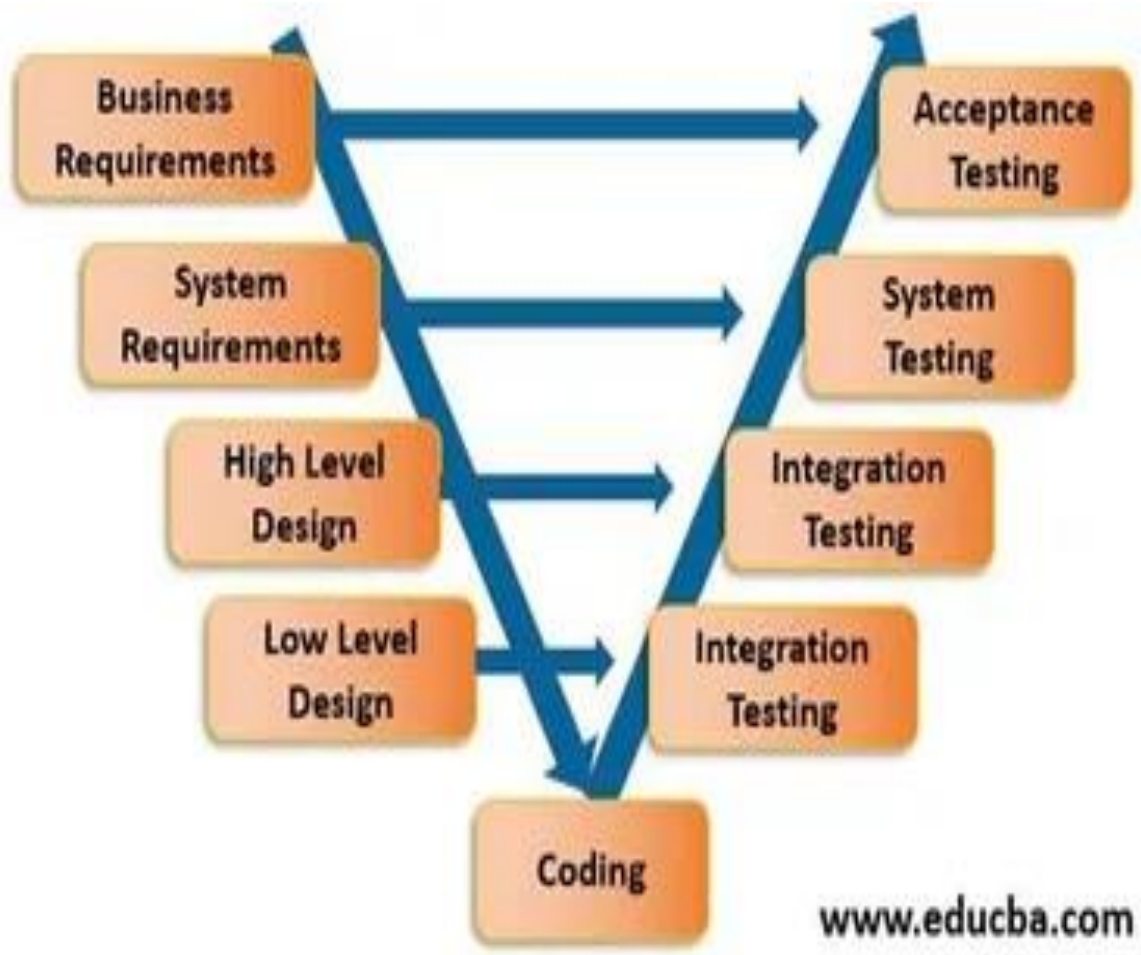
- **Specifications :**
 - **Pressure controller informs the crew of cabin with an alarm when the pressure exceeds 20 bars in the cabin.**
 - **The alarm duration equals 60 seconds.**
- **Assumptions :**
 - **Microcontroller used is STM32F103xxx.**
 - **Alarm will be buzzer and led indicator.**
 - **The cabin must be closed to appropriate measuring**
- **Versioning :**
 - **Version1 : the output will not save the value of pressure at each instance and all in the cabin can not know the instance pressure.**
 - **Version2 : the output will save the pressure values in flash memory and can be traced.**
 - **Version3 : the output will save the pressure values and showed it on console (LCD or Monitor in the cabin).**

2. Method.

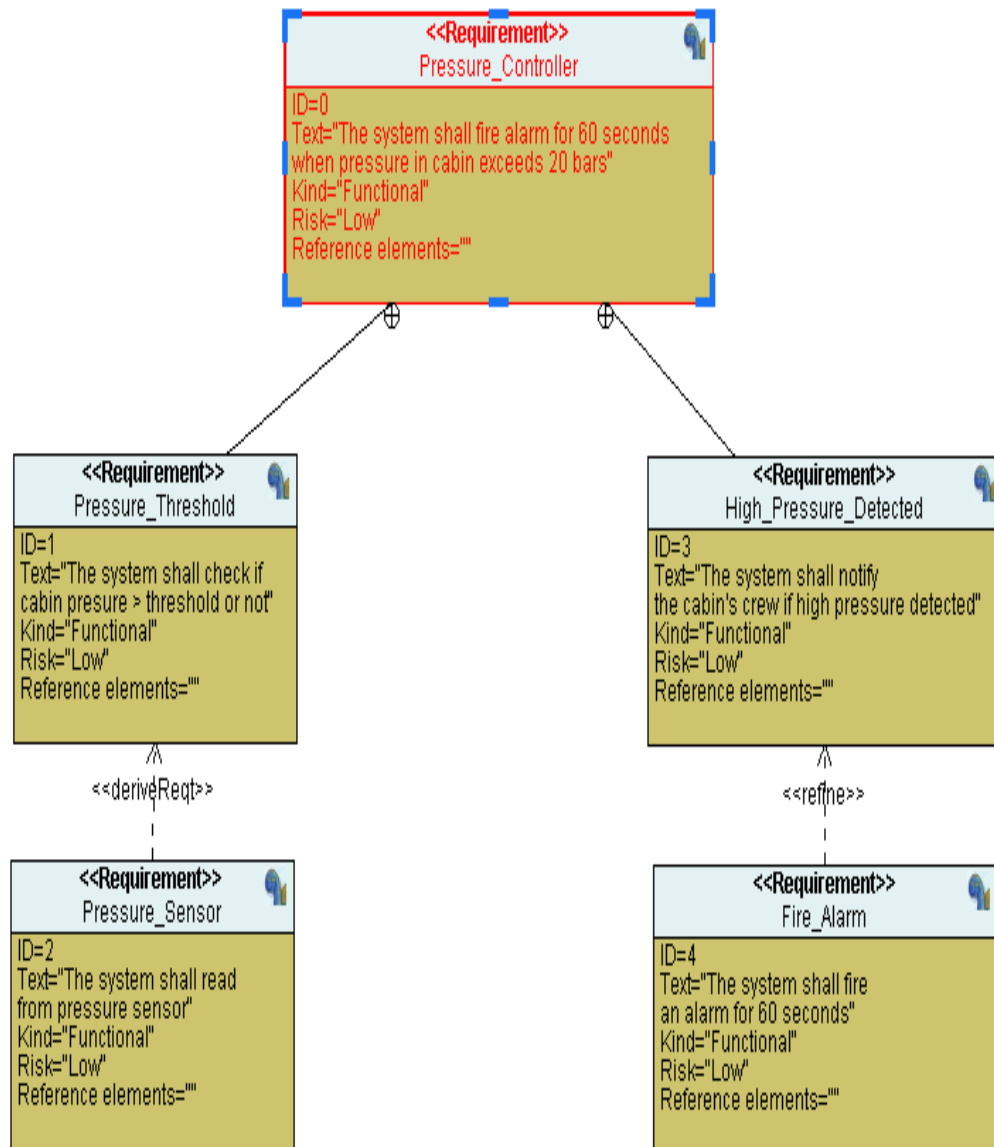
We will use V-model to Software Development Life Cycle (SDLC) and Software Testing Life Cycle (STLC)

Advantages of V-model :

- **Straightforward and easy for the development of software.**
- **Helps to save a lot of time compared to the general process of implementation.**
- **Provides a proactive error tracking feature for developers.**
- **No problem with the downward data flow.**



3. System Requirements.



4. HW/SW Partitioning & Design Space Exploration.

Implements a specification on some sort of multiprocessor architecture to speed up the software and reduce energy.

It's all about allocation and scheduling of the system and it's response to different architecture.

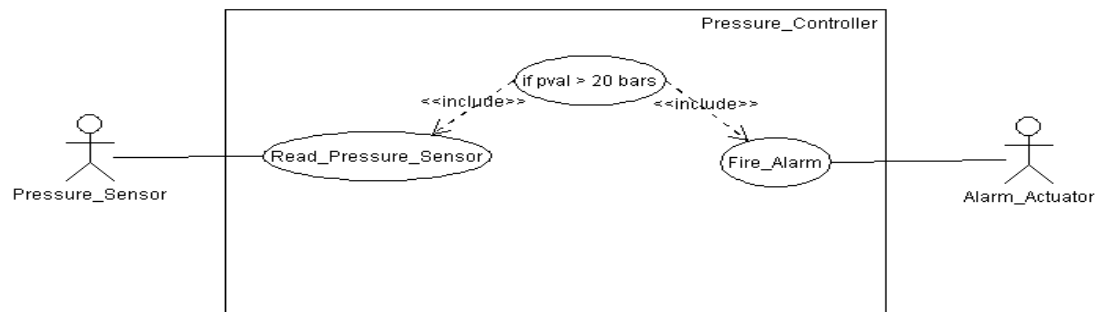
Analysing various functions equivalent implementation alternatives

To affects in these parameters :

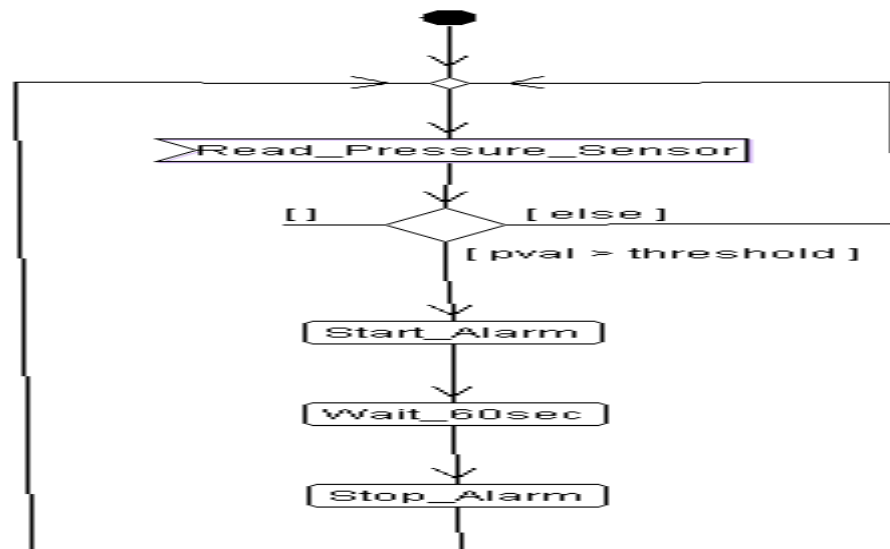
- **Speed.**
- **Power consumption.**
- **Silicon area.**
- **Generation of heat.**
- **Development effort.**

5. System Analysis.

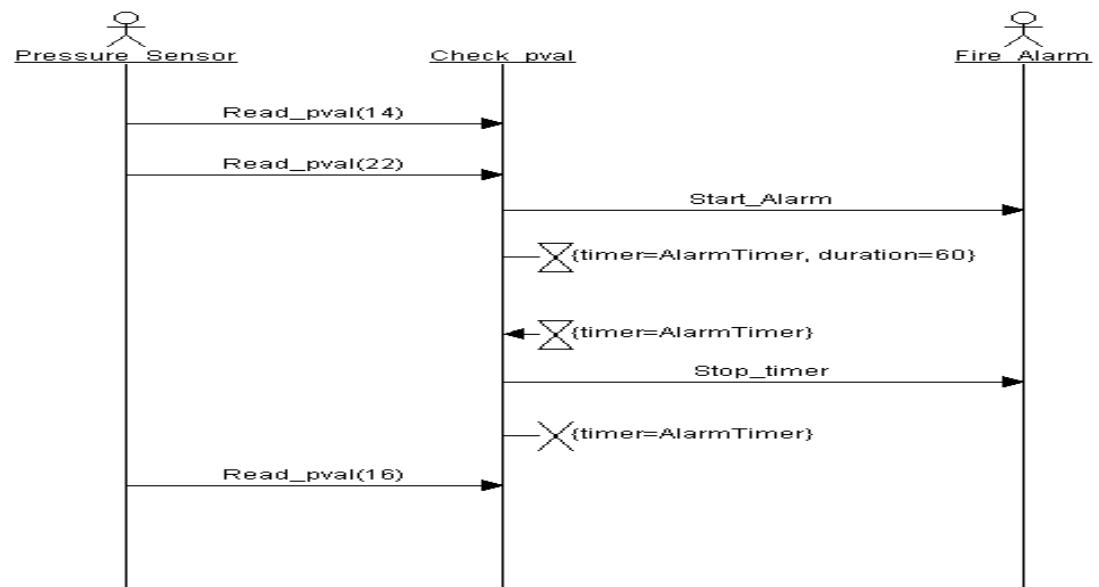
Use Case Diagram.



Activity Diagram.

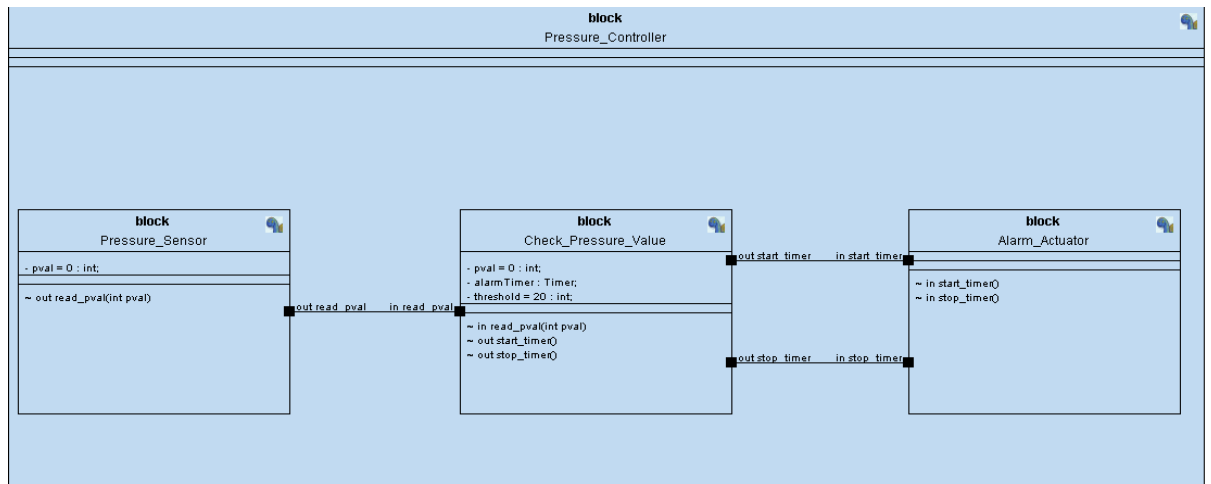


Sequence Diagram.

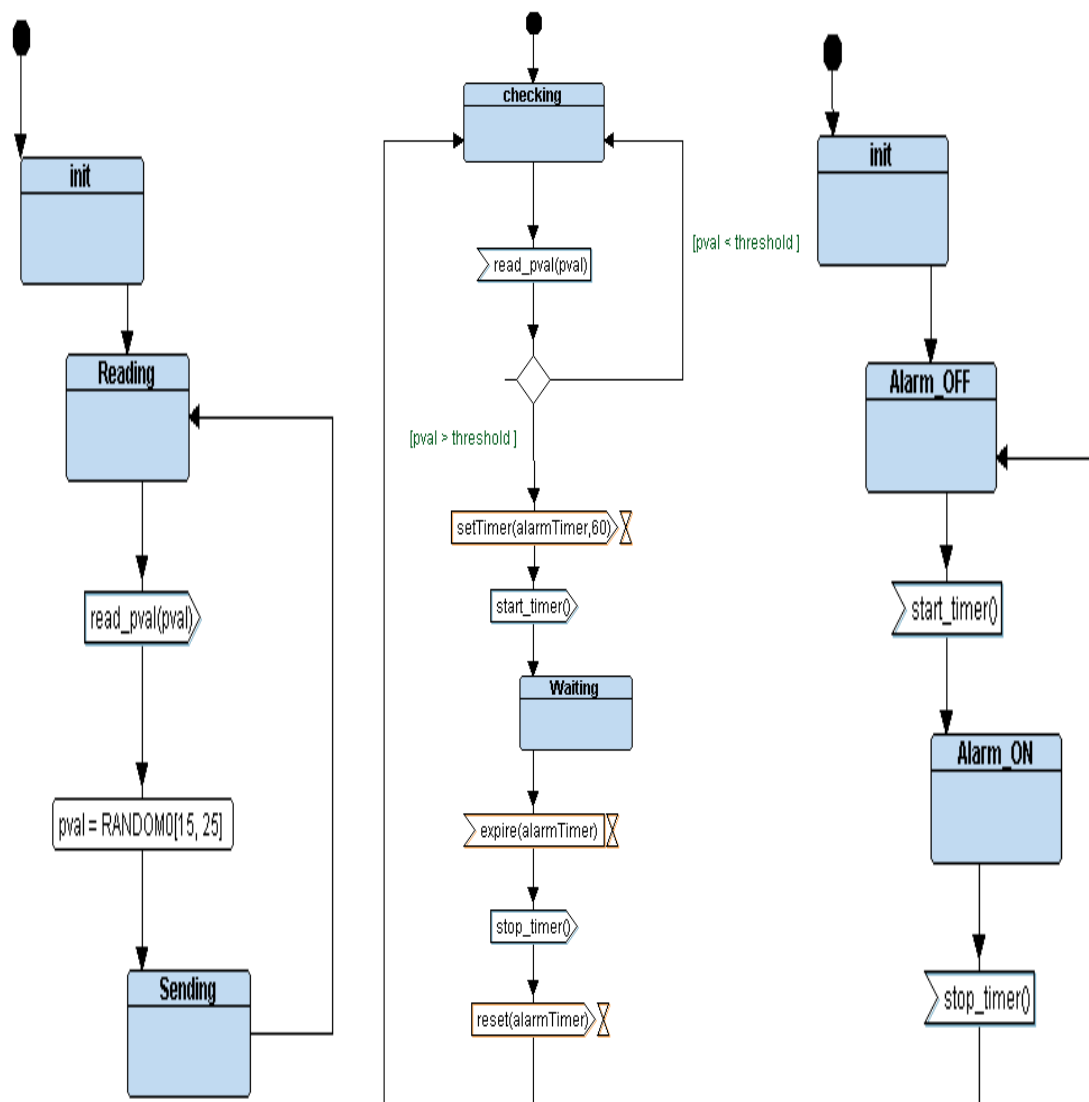


6. System Design.

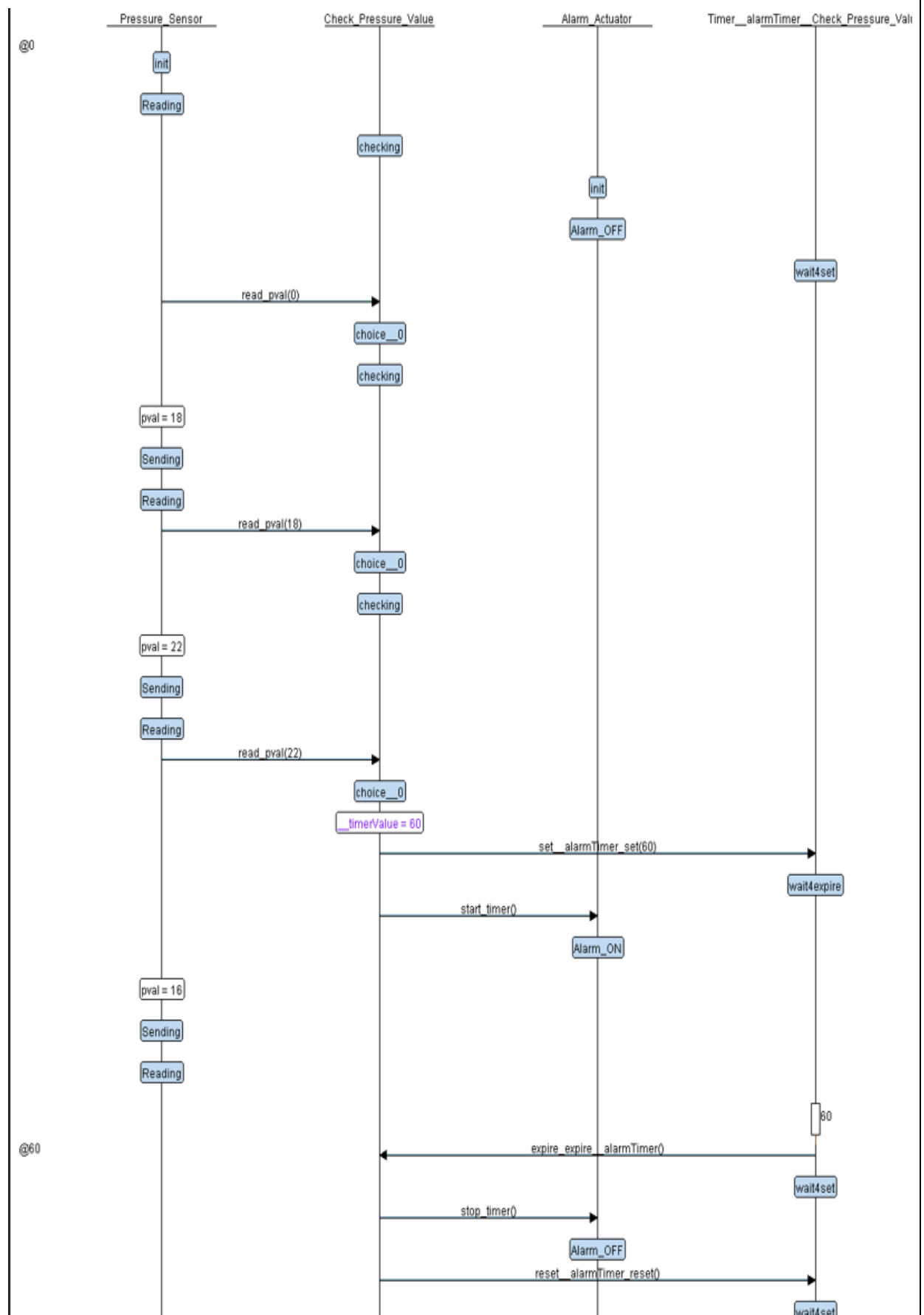
State Machine Diagram.



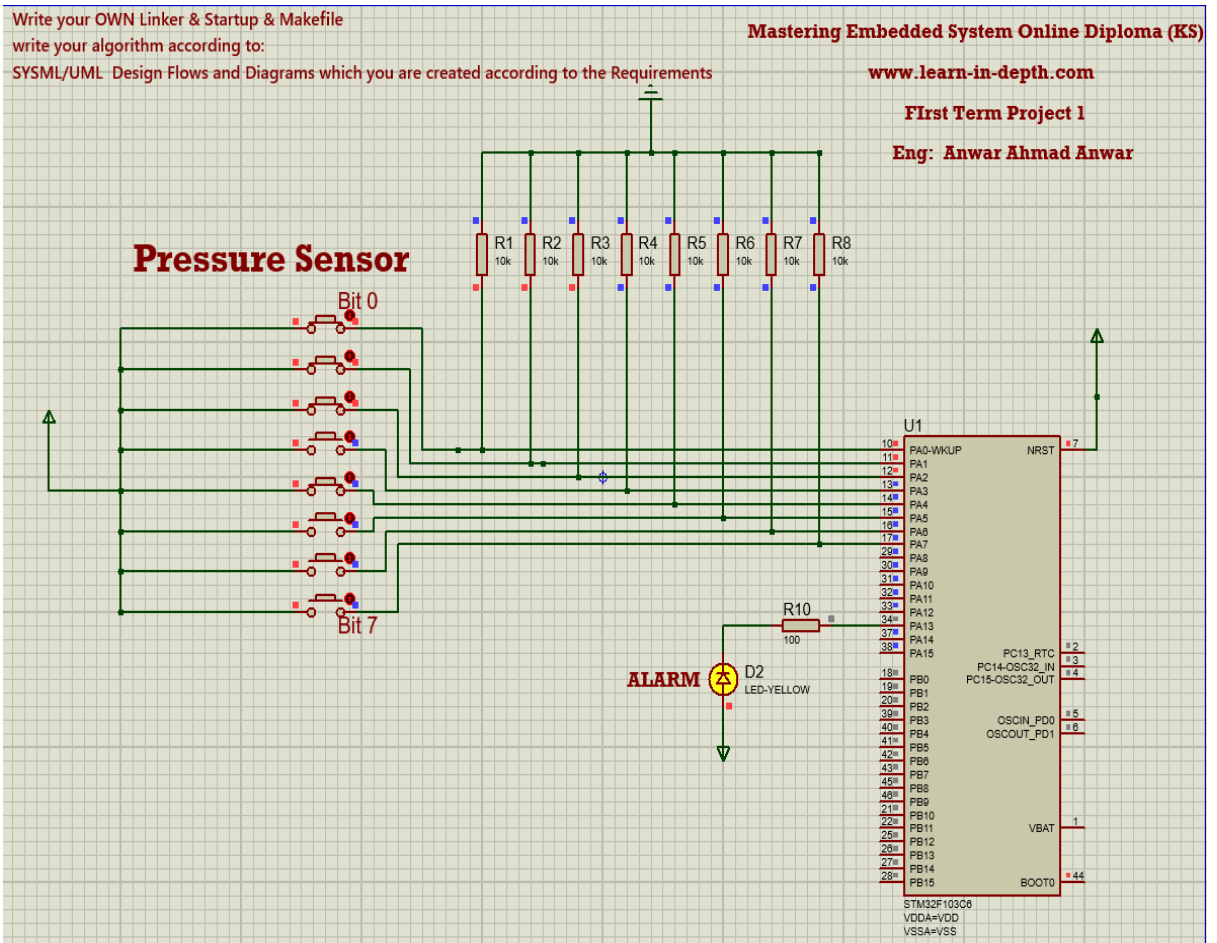
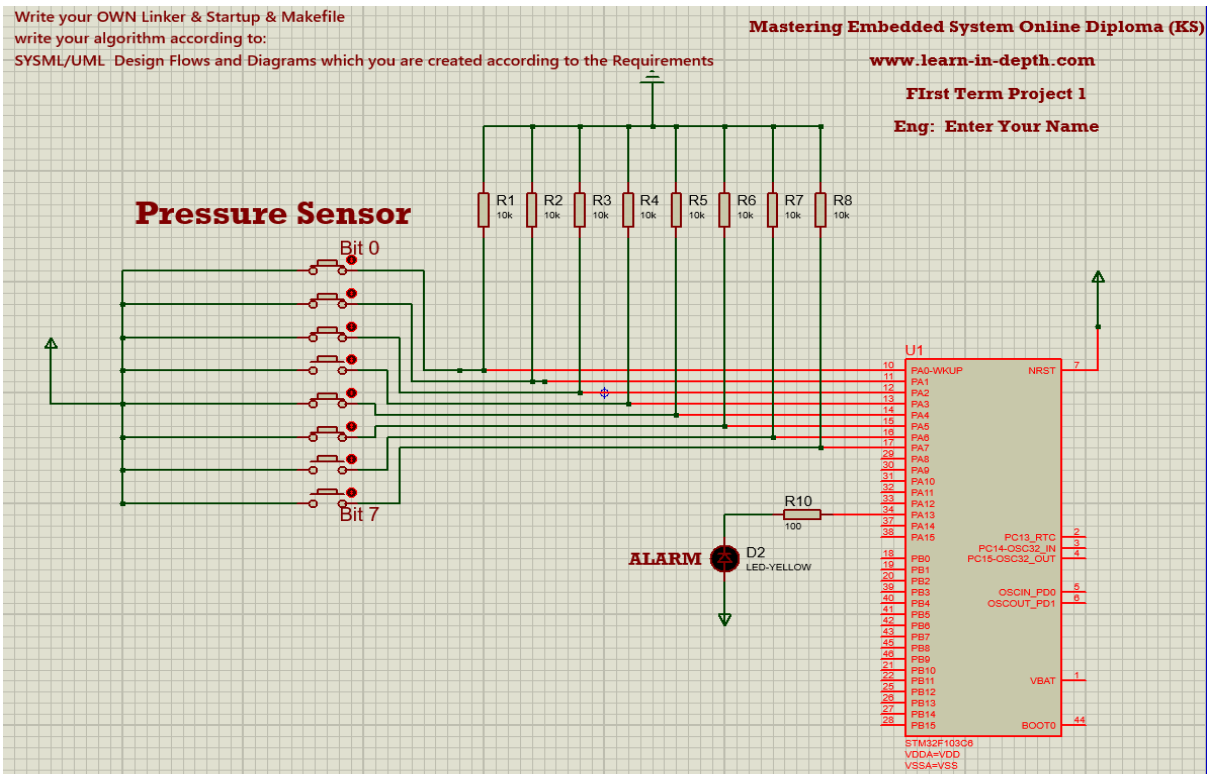
Flowcharts.



Interactive Simulation.



7. Simulation.



Mapfile.

```

12  Memory Configuration
13
14  Name          Origin          Length          Attributes
15  flash         0x08000000      0x00020000      xr
16  ram           0x20000000      0x00005000      xrw
17  *default*     0x00000000      0xffffffff
18
19  Linker script and memory map
20
21
22  .text         0x08000000      0x408
23  *(.vectors)
24  .vectors      0x08000000      0x10 startup.o
25               0x08000000      g_p_fn_Vectors
26  *(.text)
27  .text         0x08000010      0xbc startup.o
28               0x08000010      Hfault_handler
29               0x08000010      Default_handler
30               0x08000010      NMI_handler
31               0x0800001c      Reset_handler
32  .text         0x080000cc      0x10c GPIO.o
33               0x080000cc      Delay
34               0x080000f0      getPressureVal
35               0x08000108      Set_Alarm_actuator
36               0x08000158      GPIO_INITIALIZATION
37  .text         0x080001d8      0x78 app.o
38               0x080001d8      setup
39               0x08000220      main
40  .text         0x08000250      0x8c Alarm.o
41               0x08000250      start_timer
42               0x0800026c      stop_timer
43               0x08000288      AL_init
44               0x080002a4      ST_Alarm_OFF
45               0x080002c0      ST_Alarm_ON
46  .text         0x080002dc      0xac CheckPval.o
47               0x080002dc      read_pval
48               0x08000338      ST_CP_Checking
49               0x08000350      ST_CP_Waiting
50  .text         0x08000388      0x80 PSensor.o
51               0x08000388      PS_init
52               0x080003a4      ST_PS_Reading
53               0x080003dc      ST_PS_Sending
54               0x08000408      _E_text = .
55

```