Project 1

Pressure Controller Report

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Introduction

Project Description

A pressure controller informs the crew of a cabin with an alarm when the pressure exceeds 20 bars in the cabin

System Architecting/Design Sequence

System Architecting and design follow this sequence:

1. Case Study and Method
2. Requirements
3. Space Exploration/partitioning
4. System Analysis
5. System Design

Case Study and Method

Software Life Cycle model used

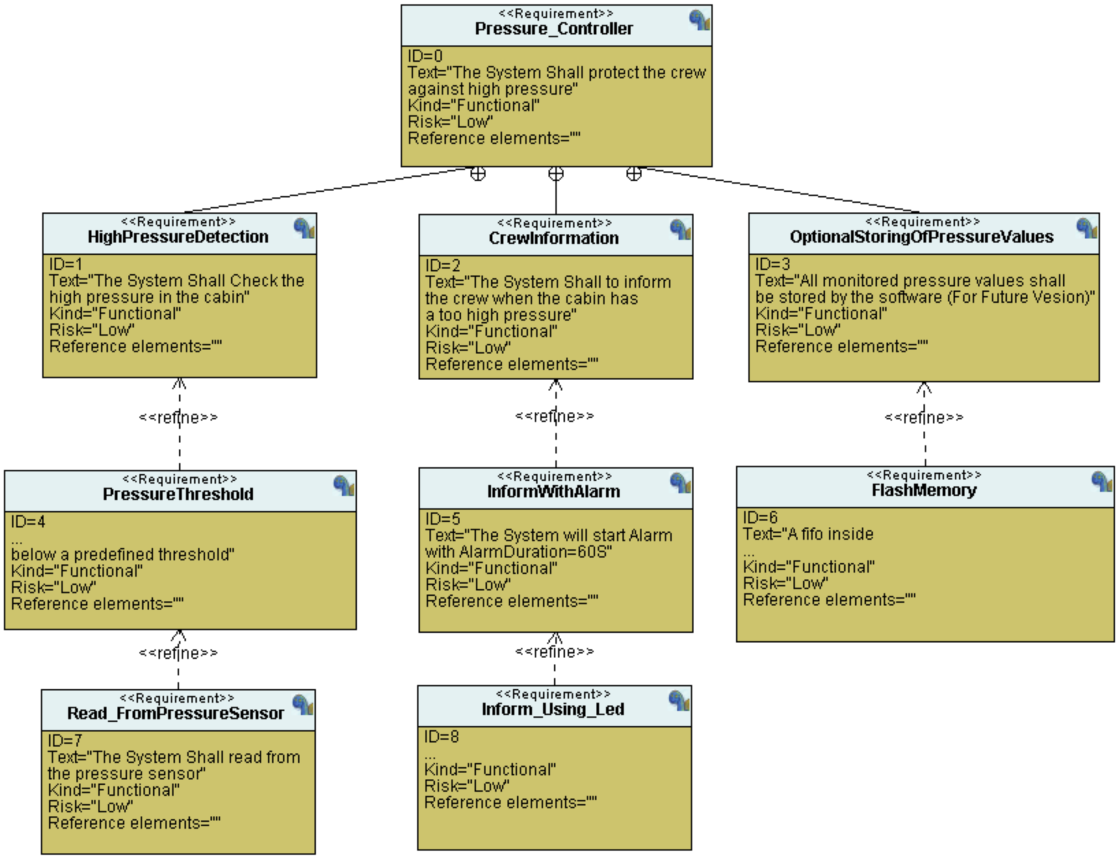
The software life cycle model will be used is V model

Requirements

Customer Requirements

Create a Pressure Controller and it should contain all necessary diagrams

Requirement Diagram



Space Exploration/partitioning

Microcontroller

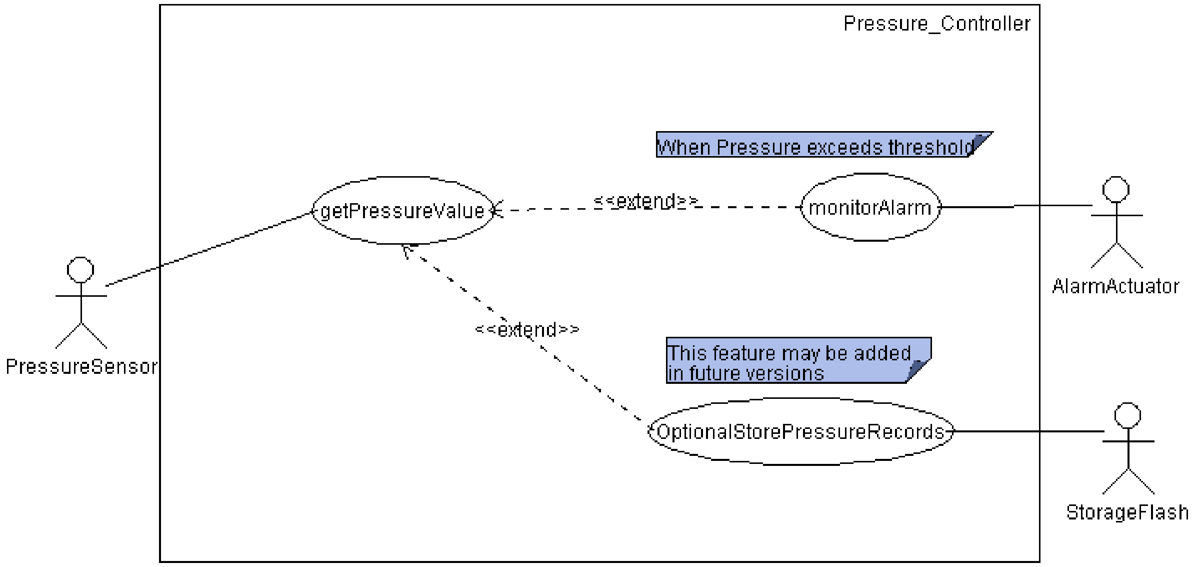
The microcontroller that will be used at this project is stm32

Reason:

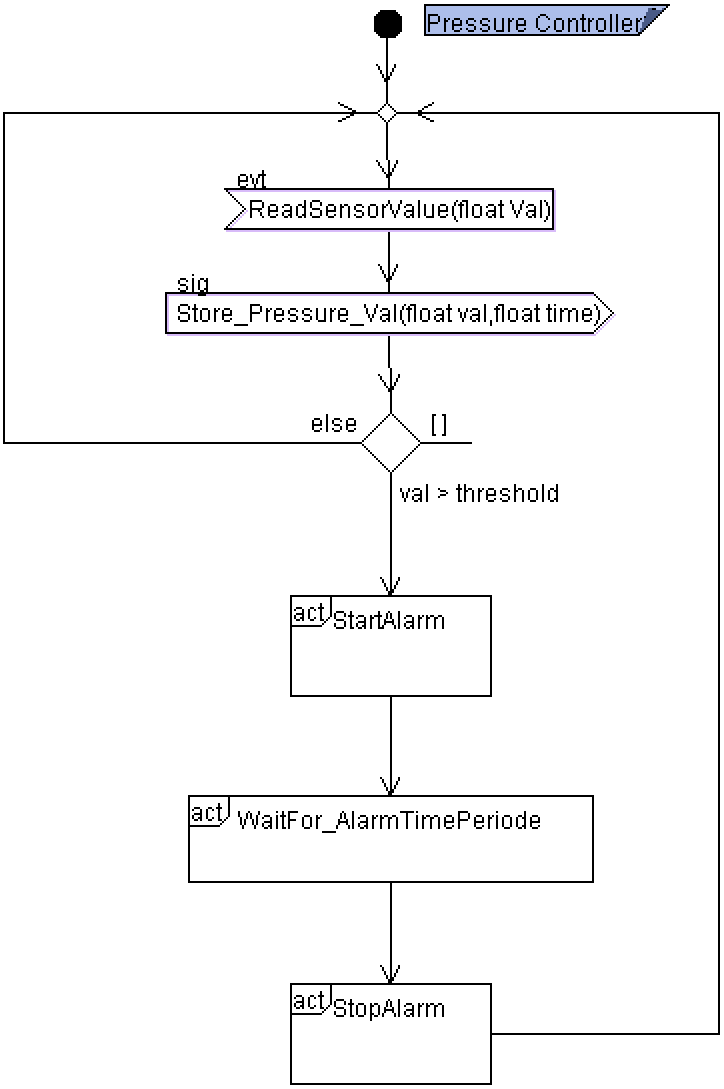
In a pressure controller project using STM32, the exploration and partitioning of tasks is crucial for ensuring that the system operates efficiently and effectively. This involves breaking down the project into manageable components or modules, each responsible for specific functions. Below is a structured approach to project exploration and partitioning, focusing on the key tasks and subsystems involved.

System Analysis

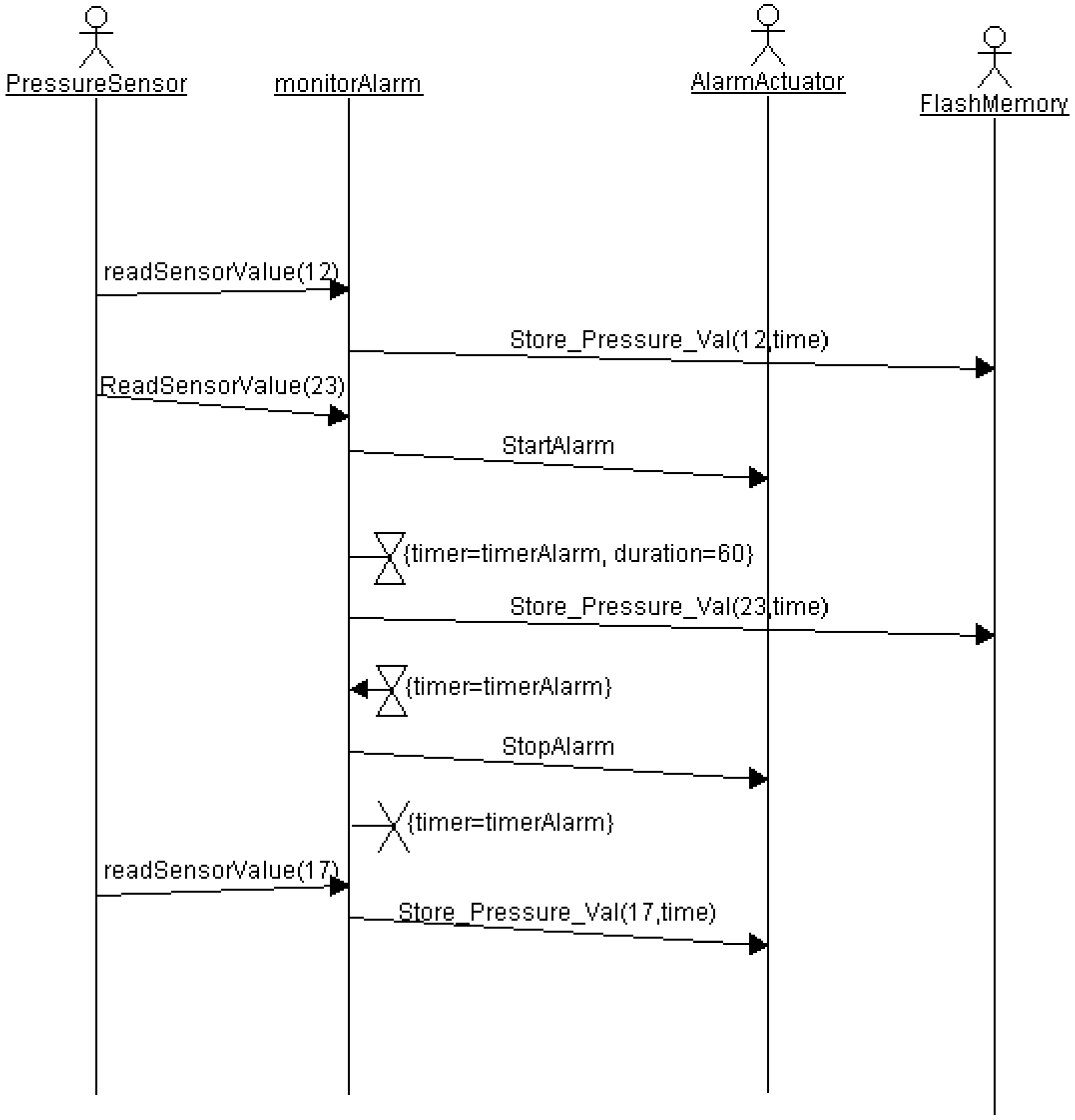
Use case Diagram



Activity Diagram

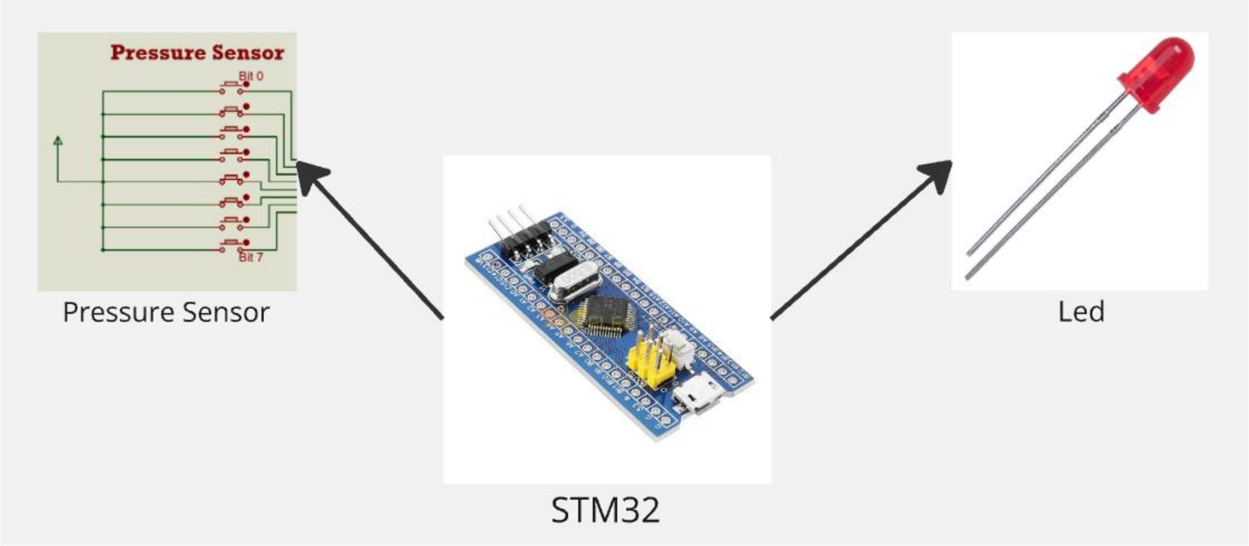


Sequence Diagram

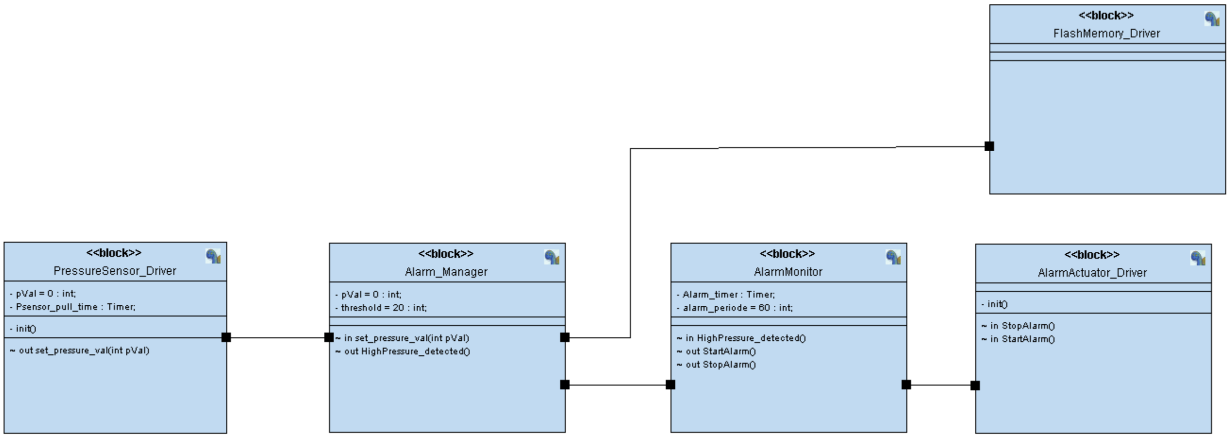


System Design

Hardware Components

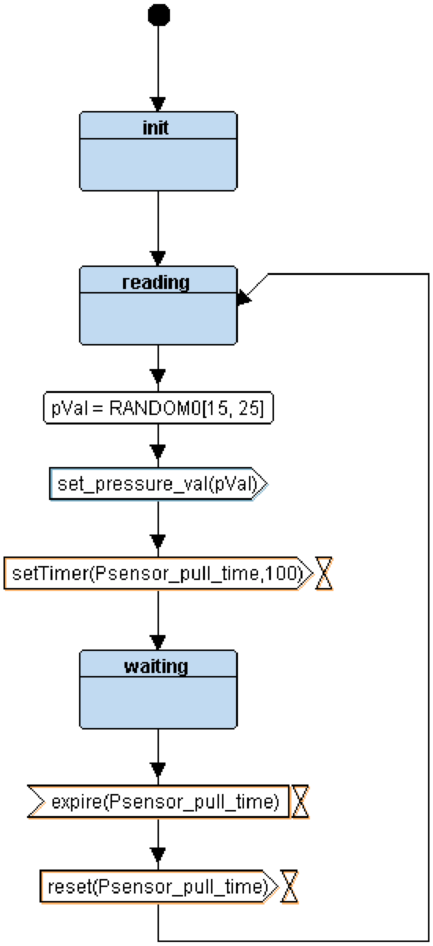


Block Diagram

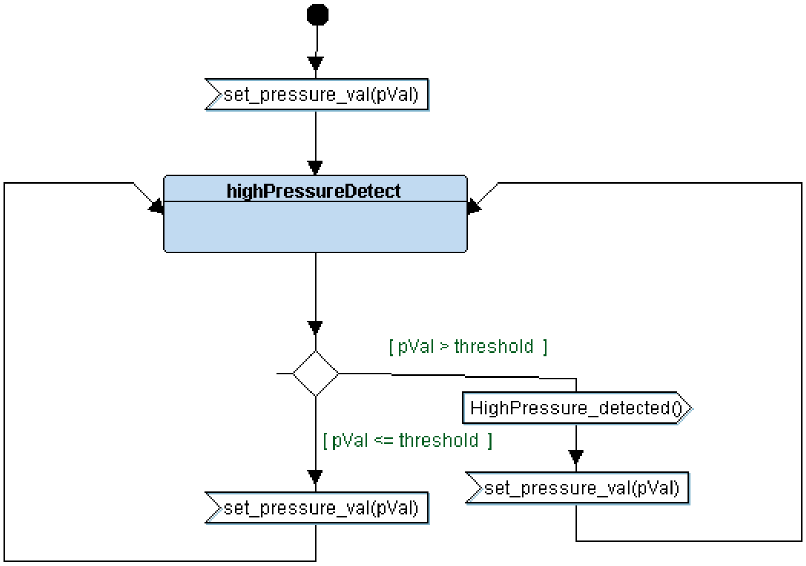


State Machines for Every diagram

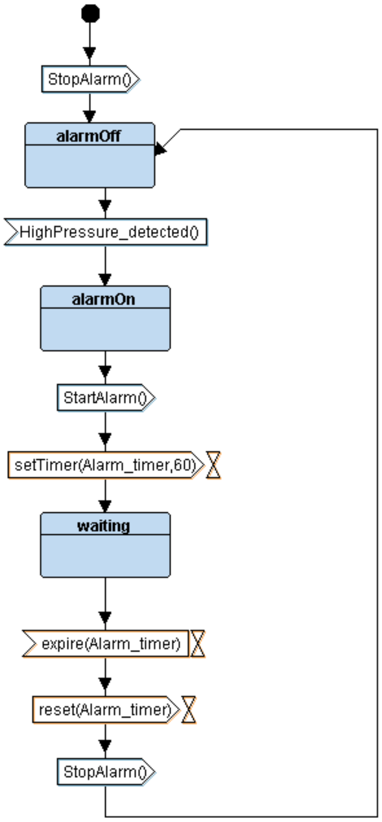
State Machine for Pressure Sensor Driver



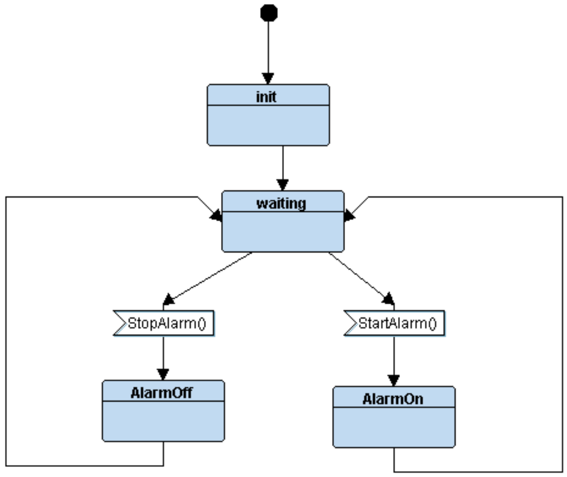
State Machine for Alarm Manager



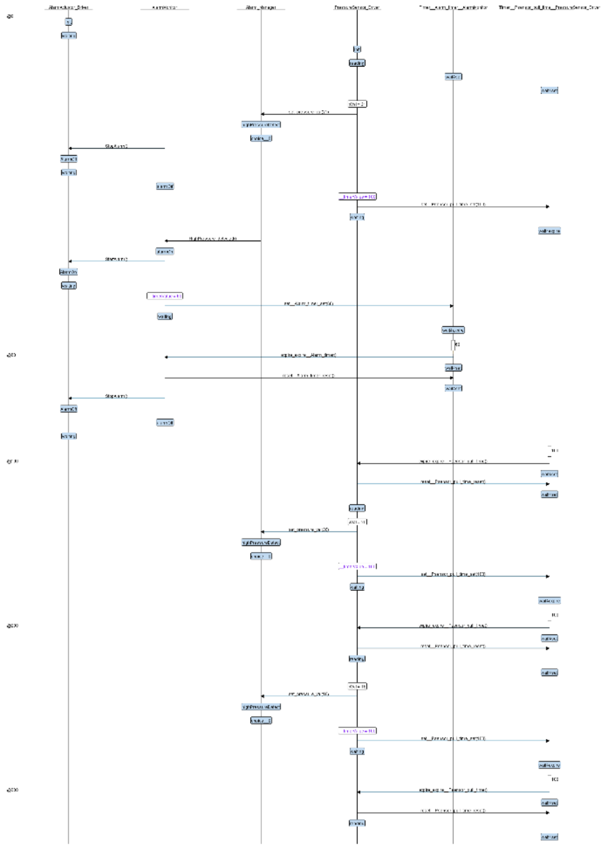
State Machine for Alarm Monitor

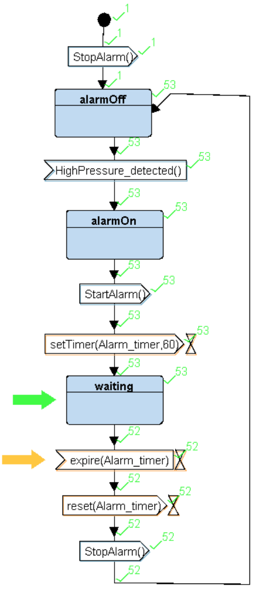


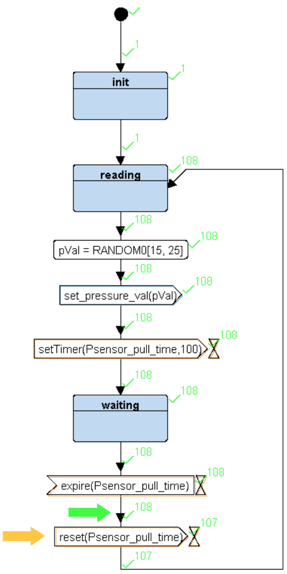
State Machine for Alarm Actuator Driver



System Testing

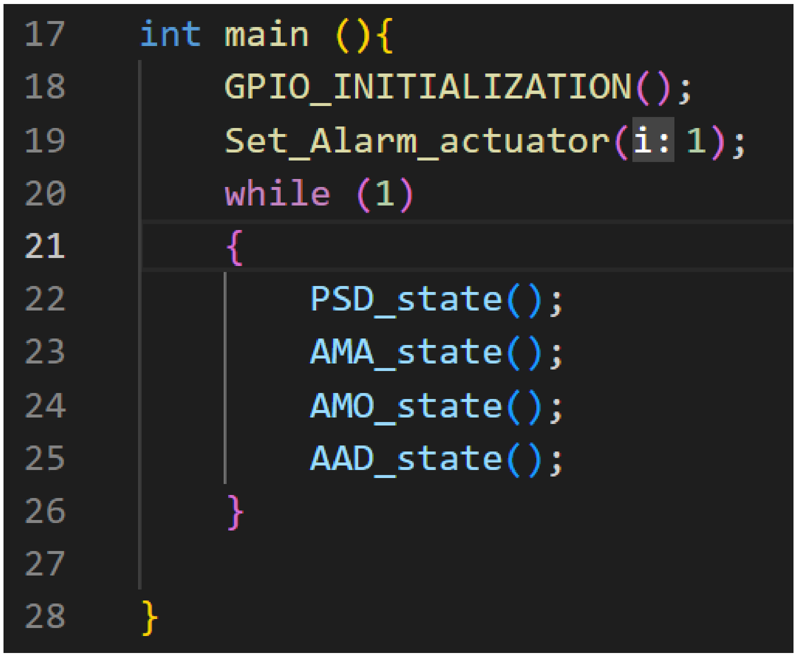






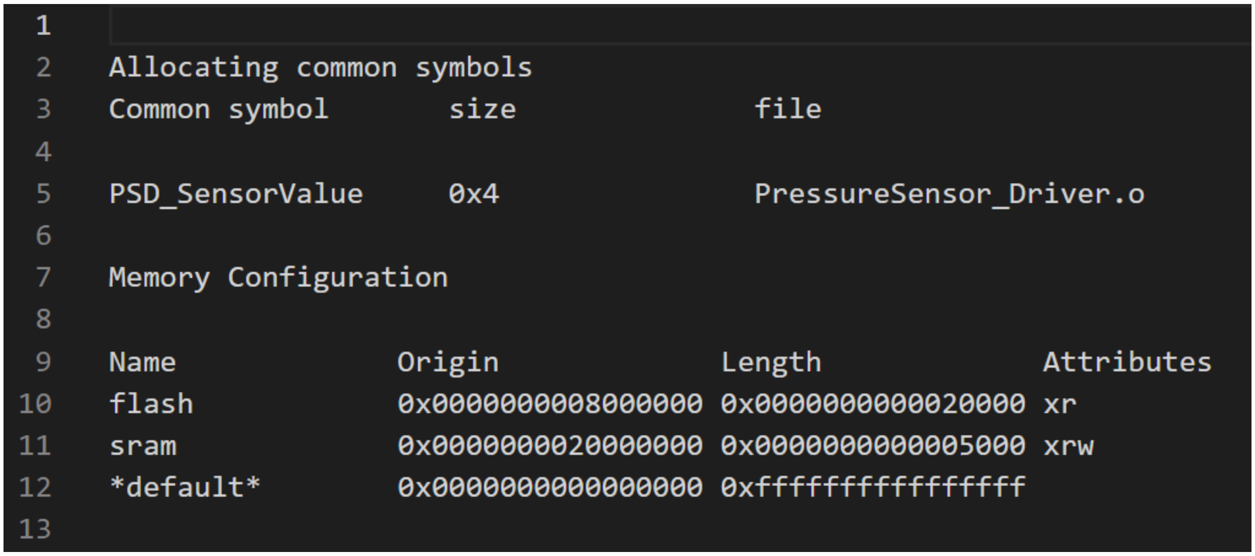
Implementation

Code



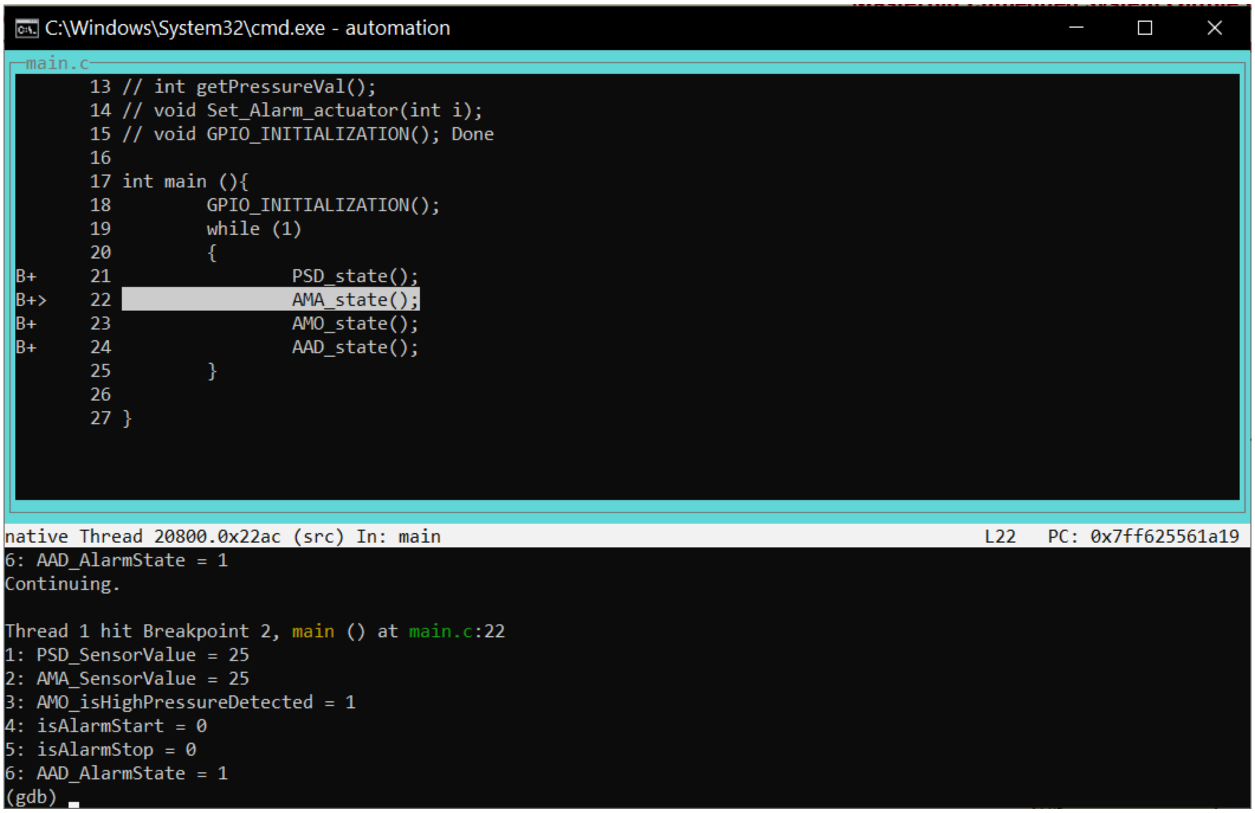
```c
int main (){
    GPIO_INITIALIZATION();
    Set_Alarm_actuator(i: 1);
    while (1)
    {
        PSD_state();
        AMA_state();
        AMO_state();
        AAD_state();
    }

}
```

Map File Sections



```

Allocating common symbols
Common symbol       size              file

PSD_SensorValue     0x4               PressureSensor_Driver.o

Memory Configuration

Name             Origin             Length             Attributes
flash            0x0000000008000000 0x0000000000020000 xr
sram             0x0000000020000000 0x0000000000005000 xrw
*default*        0x0000000000000000 0xffffffffffffffff

```

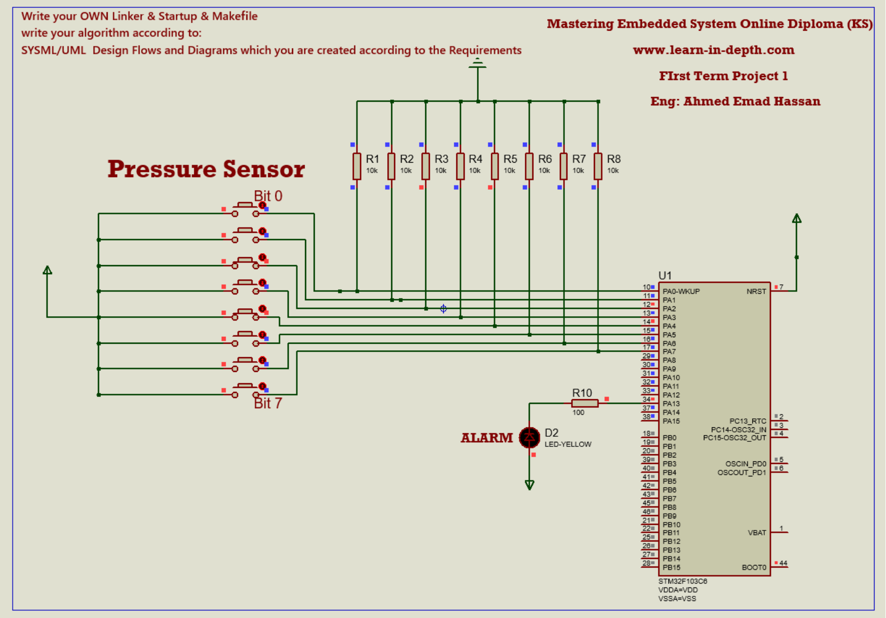
Debugging



```
main.c
        13 // int getPressureVal();
        14 // void Set_Alarm_actuator(int i);
        15 // void GPIO_INITIALIZATION(); Done
        16
        17 int main (){
        18         GPIO_INITIALIZATION();
        19         while (1)
        20         {
B+      21                 PSD_state();
B+>     22                 AMA_state();
B+      23                 AMO_state();
B+      24                 AAD_state();
        25         }
        26
        27 }

native Thread 20800.0x22ac (src) In: main                                            L22   PC: 0x7ff625561a19
6: AAD_AlarmState = 1
Continuing.

Thread 1 hit Breakpoint 2, main () at main.c:22
1: PSD_SensorValue = 25
2: AMA_SensorValue = 25
3: AMO_isHighPressureDetected = 1
4: isAlarmStart = 0
5: isAlarmStop = 0
6: AAD_AlarmState = 1
(gdb) _
```

Simulation Results

1. At beginning Sensor Reads normal pressure


Write your OWN Linker & Startup & Makefile
write your algorithm according to:
SYSML/UML Design Flows and Diagrams which you are created according to the Requirements
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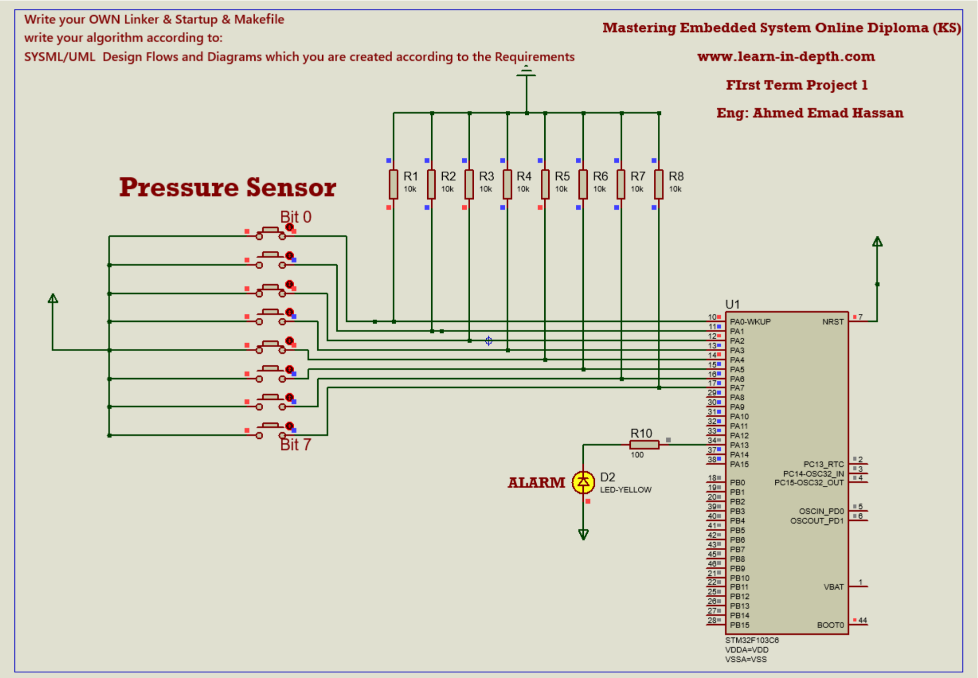
FIrst Term Project 1
Eng: Ahmed Emad Hassan
Pressure Sensor
Bit 0
Bit 7
R1
R2
R3
R4
R5
R6
R7
R8
10k
R10
100
ALARM
D2
LED-YELLOW
U1
PA0-WKUP
NRST
STM32F103C8
VDDA=VDD
VSSA=VSS

2. When Sensor reads value above threshold the alarm starts for 60 seconds



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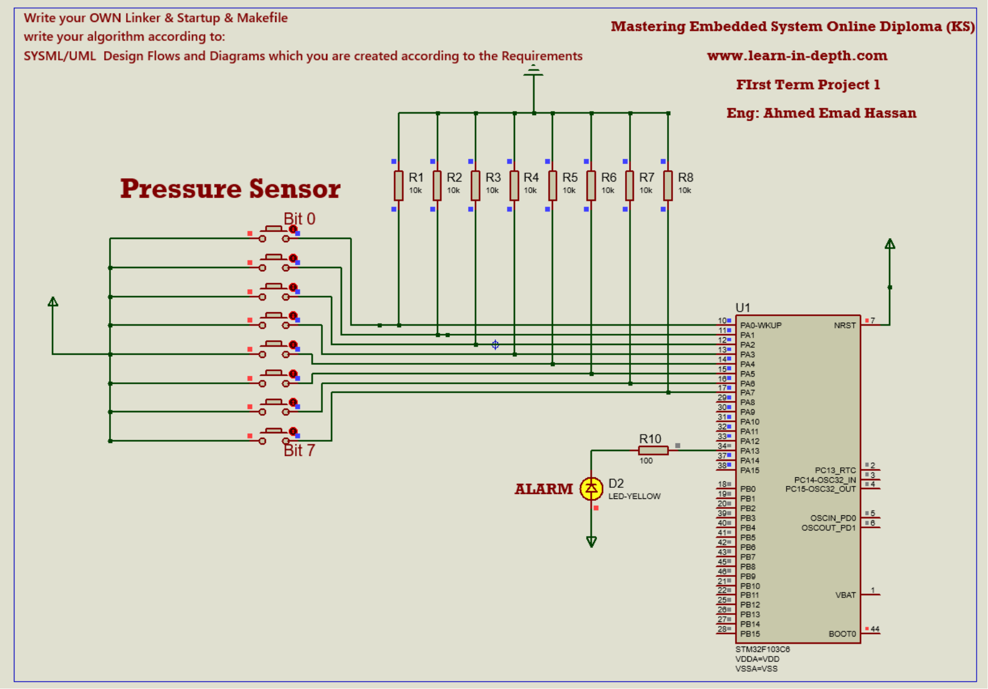
Eng: Ahmed Emad Hassan
Pressure Sensor
Bit 0
Bit 7
R1 10k
R2 10k
R3 10k
R4 10k
R5 10k
R6 10k
R7 10k
R8 10k
R10 100
ALARM
D2 LED-YELLOW
U1
STM32F103C6
VDDA=VDD
VSSA=VSS

3. When the sensor doesn't detect anything the alarm still working



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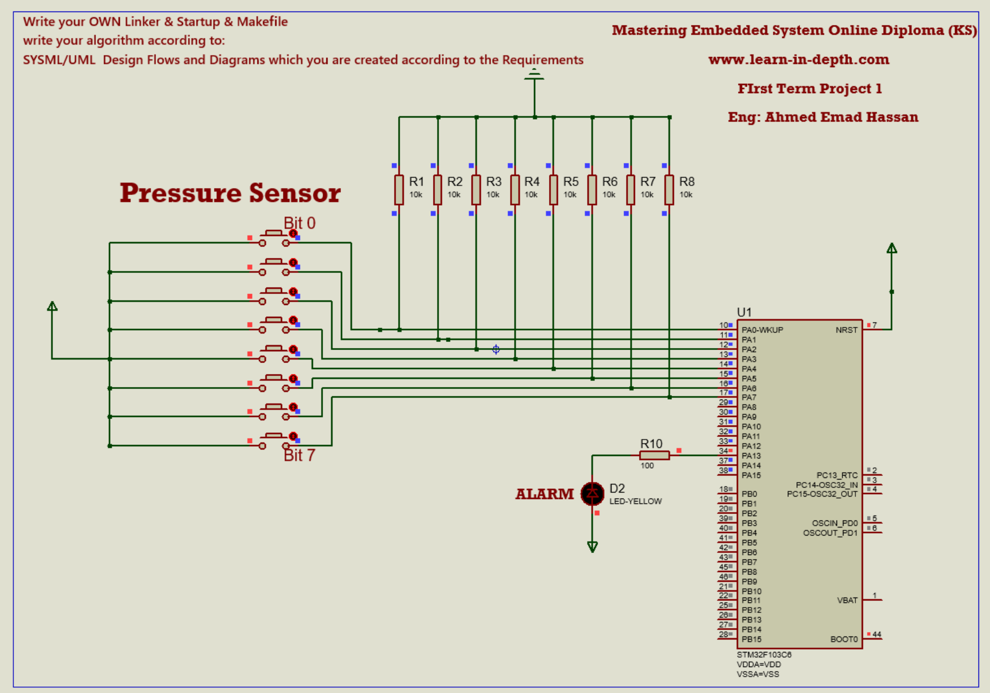
Bit 0
Bit 7
R1 10k
R2 10k
R3 10k
R4 10k
R5 10k
R6 10k
R7 10k
R8 10k
R10 100
ALARM
D2 LED-YELLOW
U1
STM32F103C6
VDDA=VDD
VSSA=VSS

4. When the 60 seconds passed the alarm stops if the pressure is normal



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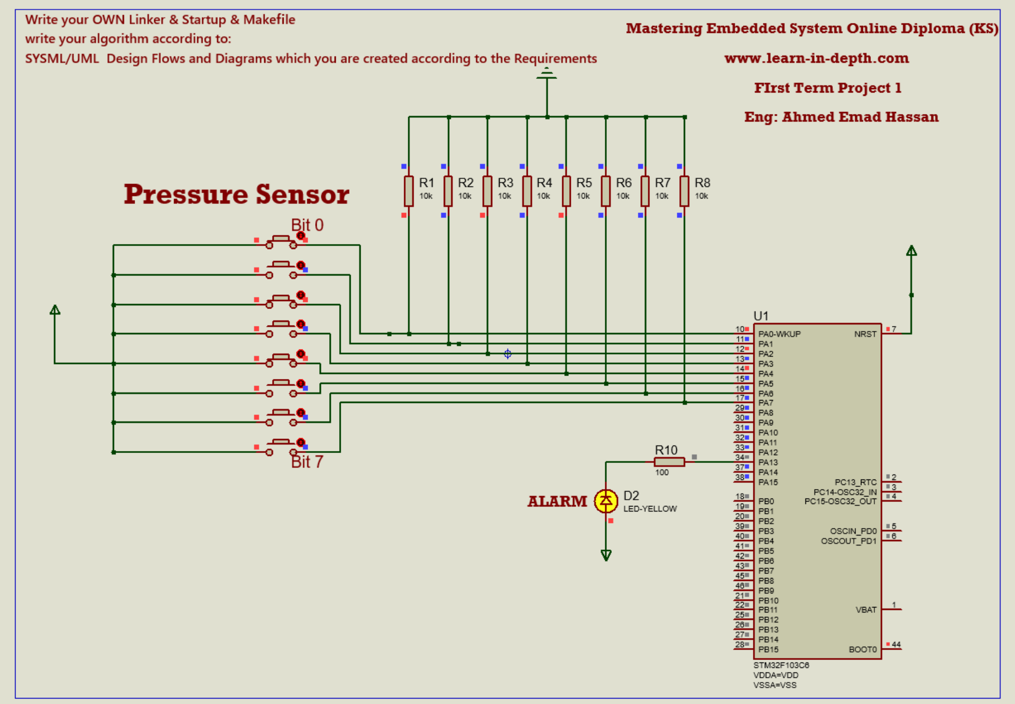
5. When the pressure still high the alarm will renew 60 seconds



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