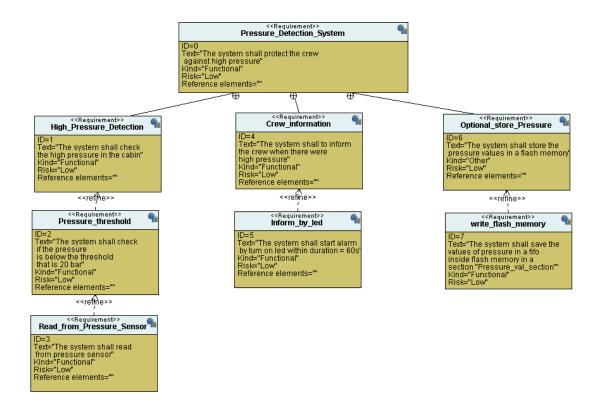# Pressure Detection Project

First Project – First Term

By: Eng. **Ahmed Samy**
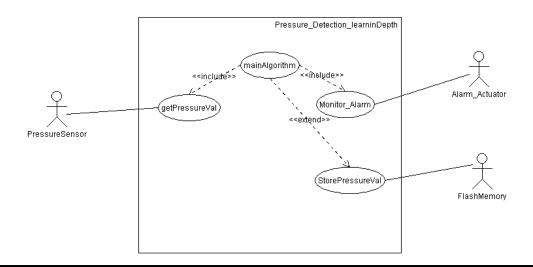
❖ System Architecture & Design

➢ Requirements

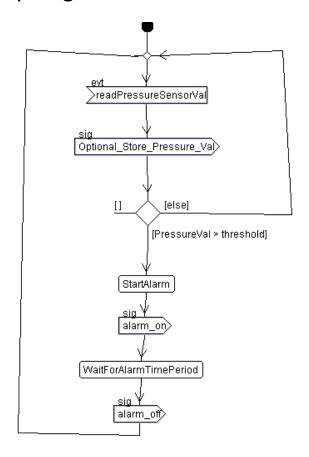```
<<Requirement>>
Pressure_Detection_System
ID=0
Text="The system shall protect the crew
 against high pressure"
Kind="Functional"
Risk="Low"
Reference elements=""
```

```
<<Requirement>>
High_Pressure_Detection
ID=1
Text="The system shall check
the high pressure in the cabin"
Kind="Functional"
Risk="Low"
Reference elements=""
```

```
<<Requirement>>
Crew_information
ID=4
Text="The system shall to inform
the crew when there were
high pressure"
Kind="Functional"
Risk="Low"
Reference elements=""
```

```
<<Requirement>>
Optional_store_Pressure
ID=6
Text="The system shall store the
 pressure values in a flash memory"
Kind="Other"
Risk="Low"
Reference elements=""
```

<<refine>>

```
<<Requirement>>
Pressure_threshold
ID=2
Text="The system shall check
if the pressure
is below the threshold
that is 20 bar"
Kind="Functional"
Risk="Low"
Reference elements=""
```

```
<<Requirement>>
Inform_by_led
ID=5
Text="The system shall start alarm
 by turn on led within duration = 60s"
Kind="Functional"
Risk="Low"
Reference elements=""
```

```
<<Requirement>>
write_flash_memory
ID=7
Text="The system shall save the
values of pressure in a fifo
inside flash memory in a
section "Pressure_val_section""
Kind="Functional"
Risk="Low"
```

<<refine>>

```
<<Requirement>>
Read_from_Pressure_Sensor
ID=3
Text="The system shall read
 from pressure sensor"
Kind="Functional"
Risk="Low"
Reference elements=""
```

❖ System Analysis
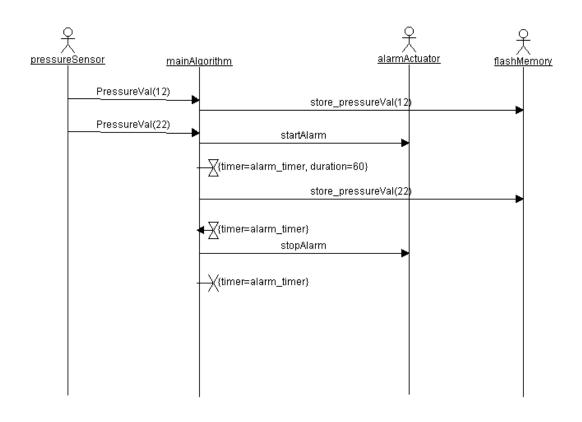
➢ Use Case Diagram

➢ Activity Diagram
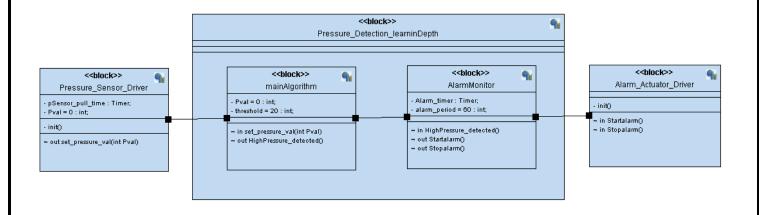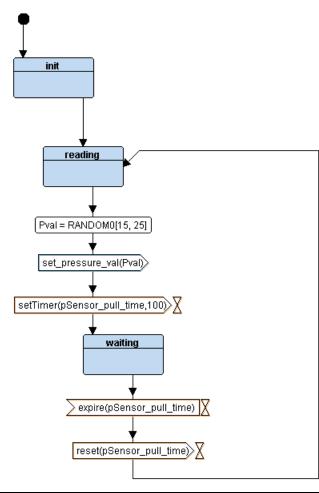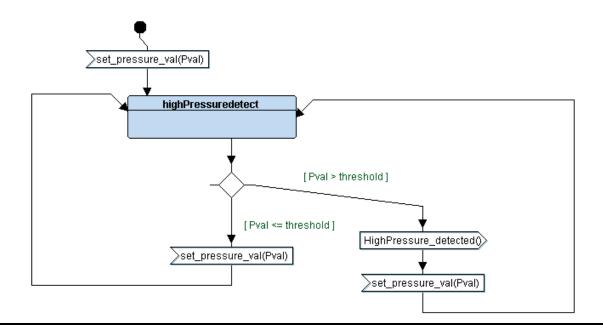
➢ Sequence Diagram

❖ System Design

➢ Block Diagram
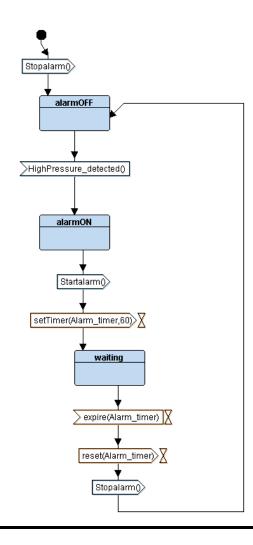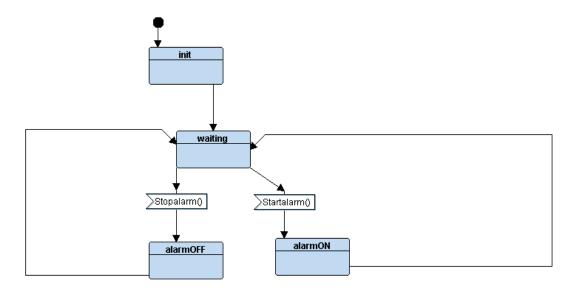

➢ pressure_sensor

➢ main_algorithm
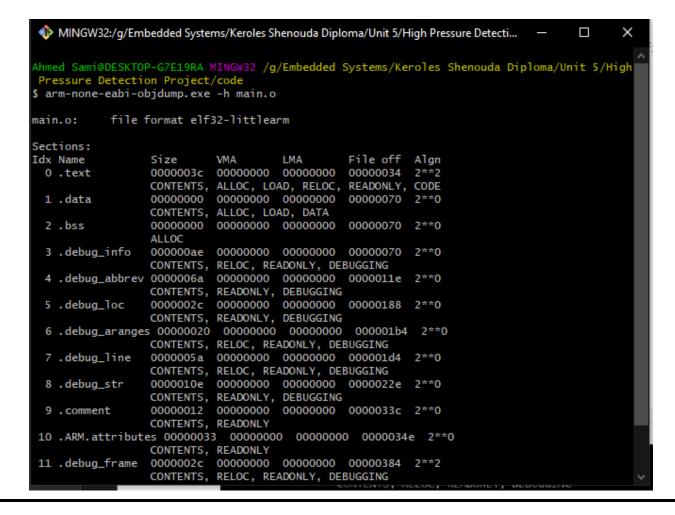

➢ alarm_monitor

➢ alarm_actuator

❖ Header Sections of files


```
MINGW32:/g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High Pressure Detecti...    —    □    ×

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/
Unit 5/High Pressure Detection Project/code
$ arm-none-eabi-objdump.exe -h pressure_detected_project.elf

pressure_detected_project.elf:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         000001f4  08000000  08000000  00008000  2**2
                  CONTENTS, ALLOC, LOAD, READONLY, CODE
  1 .bss          0000000c  20000000  080001f4  00010000  2**2
                  ALLOC
  2 .debug_info   00000348  00000000  00000000  000081f4  2**0
                  CONTENTS, READONLY, DEBUGGING
  3 .debug_abbrev 000001e2  00000000  00000000  0000853c  2**0
                  CONTENTS, READONLY, DEBUGGING
  4 .debug_loc    000001a4  00000000  00000000  0000871e  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_aranges 00000080  00000000  00000000  000088c2  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_line   00000189  00000000  00000000  00008942  2**0
                  CONTENTS, READONLY, DEBUGGING
  7 .debug_str    00000190  00000000  00000000  00008acb  2**0
                  CONTENTS, READONLY, DEBUGGING
  8 .comment      00000011  00000000  00000000  00008c5b  2**0
                  CONTENTS, READONLY
  9 .ARM.attributes 00000033  00000000  00000000  00008c6c  2**0
                  CONTENTS, READONLY
 10 .debug_frame  00000134  00000000  00000000  00008ca0  2**2
                  CONTENTS, READONLY, DEBUGGING
```



```
MINGW32:/g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High Pressure Detecti...    —    □    ×

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-objdump.exe -h main_algorithm.o

main_algorithm.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000068  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  0000009c  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000004  00000000  00000000  0000009c  2**2
                  ALLOC
  3 .debug_info   000000d4  00000000  00000000  0000009c  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 00000075  00000000  00000000  00000170  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    00000058  00000000  00000000  000001e5  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  0000023d  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   00000051  00000000  00000000  0000025d  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    00000138  00000000  00000000  000002ae  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      00000012  00000000  00000000  000003e6  2**0
                  CONTENTS, READONLY
 10 .ARM.attributes 00000033  00000000  00000000  000003f8  2**0
                  CONTENTS, READONLY
 11 .debug_frame  00000048  00000000  00000000  0000042c  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
```

```
Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-objdump.exe -h Alarm_monitor.o

Alarm_monitor.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         00000044  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000078  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000078  2**0
                  ALLOC
  3 .debug_info   000000c3  00000000  00000000  00000078  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 00000066  00000000  00000000  0000013b  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    00000058  00000000  00000000  000001a1  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  000001f9  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   00000045  00000000  00000000  00000219  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    00000127  00000000  00000000  0000025e  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      00000012  00000000  00000000  00000385  2**0
                  CONTENTS, READONLY
 10 .ARM.attributes 00000033  00000000  00000000  00000397  2**0
                  CONTENTS, READONLY
 11 .debug_frame  00000048  00000000  00000000  000003cc  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
```

```
Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-objdump.exe -h main.o

main.o:     file format elf32-littlearm

Sections:
Idx Name          Size      VMA       LMA       File off  Algn
  0 .text         0000003c  00000000  00000000  00000034  2**2
                  CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
  1 .data         00000000  00000000  00000000  00000070  2**0
                  CONTENTS, ALLOC, LOAD, DATA
  2 .bss          00000000  00000000  00000000  00000070  2**0
                  ALLOC
  3 .debug_info   000000ae  00000000  00000000  00000070  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 0000006a  00000000  00000000  0000011e  2**0
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc    0000002c  00000000  00000000  00000188  2**0
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020  00000000  00000000  000001b4  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  7 .debug_line   0000005a  00000000  00000000  000001d4  2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str    0000010e  00000000  00000000  0000022e  2**0
                  CONTENTS, READONLY, DEBUGGING
  9 .comment      00000012  00000000  00000000  0000033c  2**0
                  CONTENTS, READONLY
 10 .ARM.attributes 00000033  00000000  00000000  0000034e  2**0
                  CONTENTS, READONLY
 11 .debug_frame  0000002c  00000000  00000000  00000384  2**2
                  CONTENTS, RELOC, READONLY, DEBUGGING
```
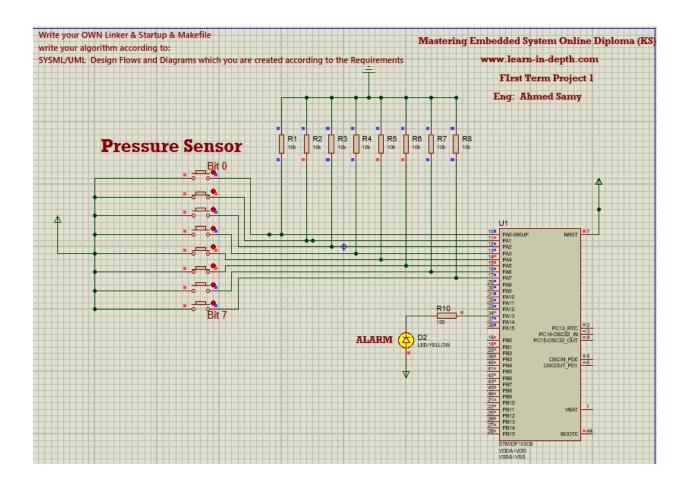
❖ Symbols table of files


```
MINGW32:/g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High Pressure Detecti...    —    □    ✕

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-nm.exe pressure_detected_project.elf
2000000c B _E_bss
20000000 T _E_DATA
080001f4 T _E_text
20000000 B _S_bss
20000000 T _S_DATA
2000100c B _stack_top
20000008 B alarmPtr
080000a4 T Delay
080000c8 T getPressureVal
08000130 T GPIO_INITIALIZATION
08000088 T High_pressure_detected
08000000 T main
20000004 B P_main_ptr
20000000 b P_val
080000e0 T Set_Alarm_actuator
080001b0 T Start_alarm
080001e4 T Stop_alarm
0800003c T waiting

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ |
```

```
MINGW32:/g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High Pressure Detection Project/code    —    □    ✕

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-nm.exe main_algorithm.o
         U getPressureVal
0000004c T High_pressure_detected
00000004 C P_main_ptr
00000000 b P_val
         U Start_alarm
00000000 T waiting

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-nm.exe main.o
         U Delay
         U GPIO_INITIALIZATION
00000000 T main
         U P_main_ptr
         U Set_Alarm_actuator
         U waiting

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-nm.exe driver.o
00000000 T Delay
00000024 T getPressureVal
0000008c T GPIO_INITIALIZATION
0000003c T Set_Alarm_actuator

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ arm-none-eabi-nm.exe Alarm_monitor.o
00000004 C alarmPtr
         U Delay
         U Set_Alarm_actuator
00000000 T Start_alarm
00000034 T Stop_alarm

Ahmed Sami@DESKTOP-G7E19RA MINGW32 /g/Embedded Systems/Keroles Shenouda Diploma/Unit 5/High
 Pressure Detection Project/code
$ |
```

❖ Proteus

➢ Alarm ON: when pressure value is above 20 par

➤ Alarm OFF: when pressure value is under 20 par