Mastering Embedded System Online Diploma www.learn-in-depth.com First term (Final Project 1) Eng. Mohamed Adel My Profile https://www.learn-in-depth.com/online-

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		5.	In Case of Pressure value 30 (0001 1110) which is greater than the thresh	old 20 17

1. Chapter One : Requirement Diagram

1.1 Case Study:

- 1. Alarm when the pressure exceeds 20 bar
- 2. Alarm Works for 60 seconds
- 3. Optional the data is saved at runtime to flash memory

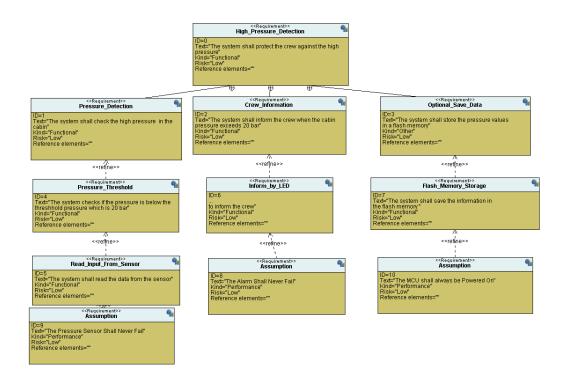
1.2 Requirement Diagram:

There are seven main blocks in the requirement diagram:

- 1. The system shall protect the crew against high pressure
- 2. The system shall check the high pressure in the cabin
- 3. The system shall check if the pressure is below the threshold
- 4. The system shall inform the crew in the cabin if the pressure exceeds 20bar
- 5. The system shall light up the LED to inform the crew
- 6. Optionally the system shall store the pressure values
- 7. Optionally the system shall store the pressure values in flash memory

There are three assumption blocks which are:

- 1. The Pressure Sensor will never fail
- 2. The Alarm will never fail
- 3. The MCU will always be powered On

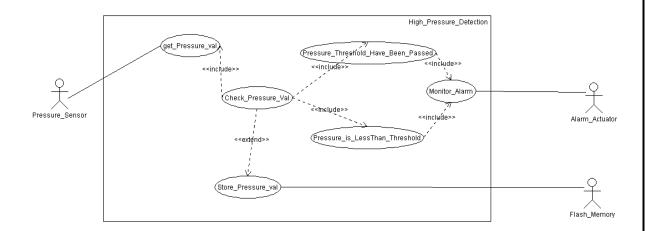


Chapter Two: System Analysis

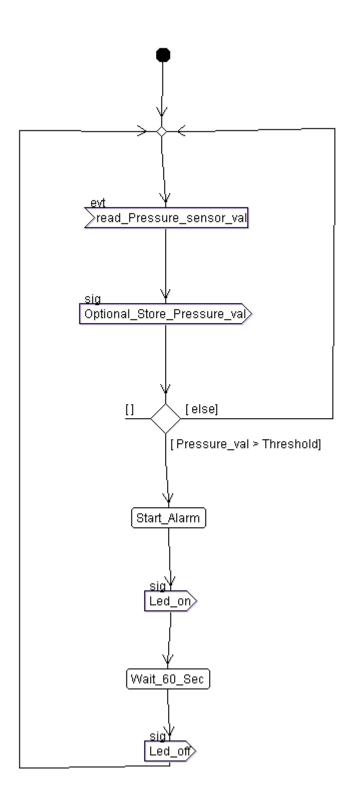
2.1 System Analysis:

2.2 Use Case Diagram

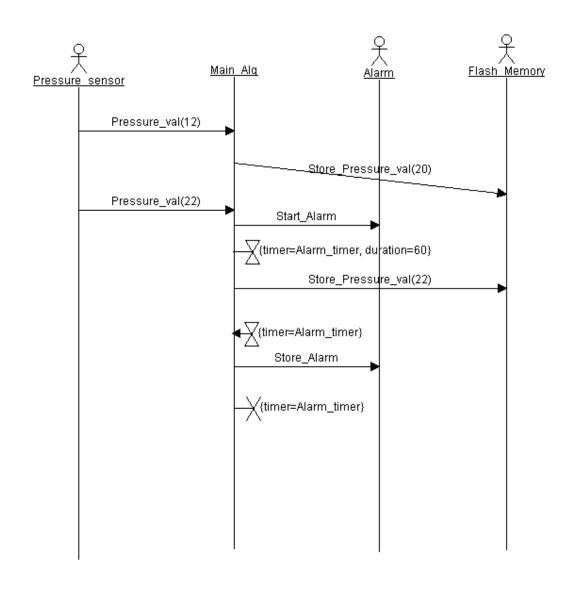
Here we consider the pressure sensor as an actor who have the role of getting the pressure value after that it sends the value to get checked if the pressure is more than the threshold then it goes to the alarm monitor to enable the alarm and it the pressure value is less than the threshold then the value is sent to the alarm monitor to disable the alarm



2.3 Activity Diagram

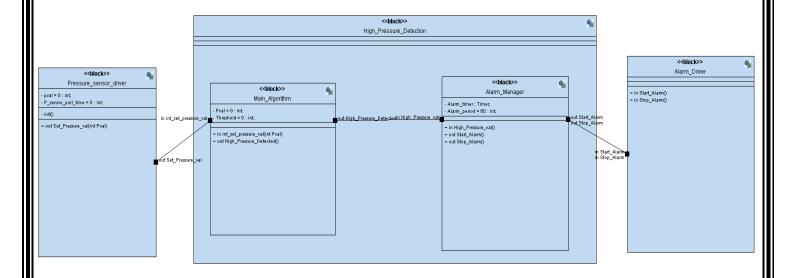


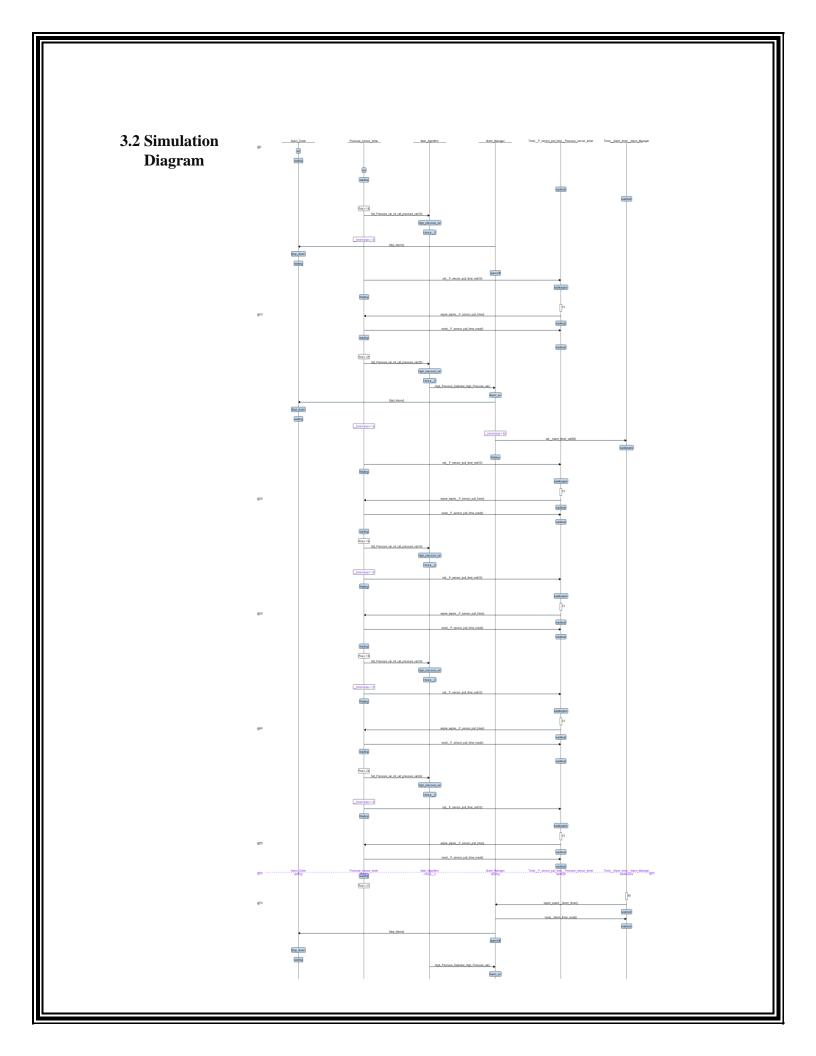
2.4 Sequence Diagram

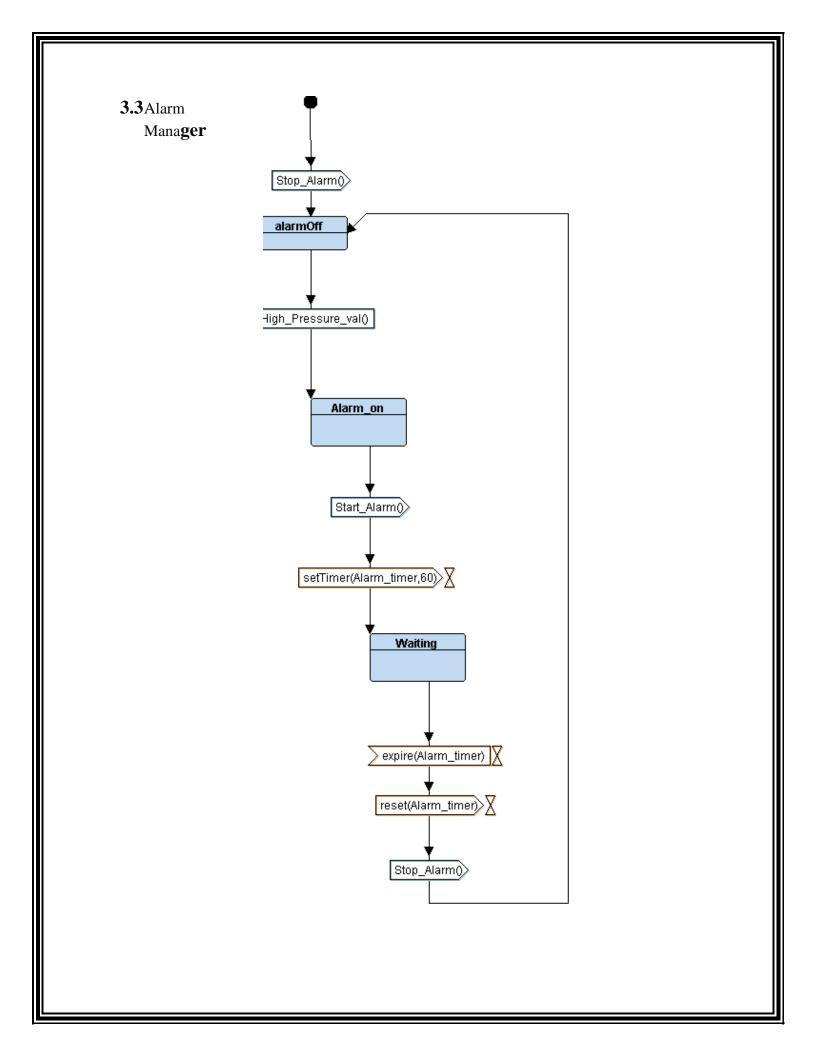


Chapter Three : System Design

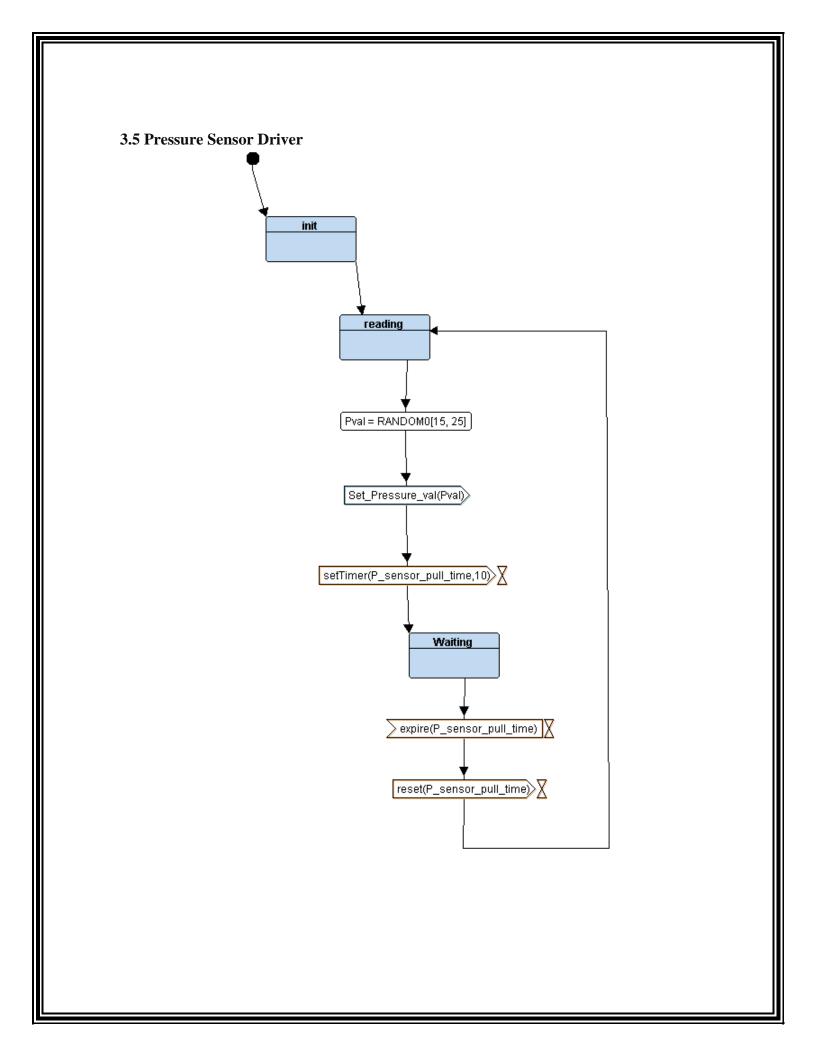
3.1 System Design







3.4 Main Algorithm int_set_pressure_val(Pval) high_pressure_val [Pval > Threshold] High_Pressure_Detected()> [Pval <= Threshold] int_set_pressure_val(Pval) int_set_pressure_val(Pval)



3.6 Alarm Driver init waiting Stop_Alarm() Start_Alarm() Stop_Alarm Start_Alarm

Chapter four : Code Analysis

4.1 Map File



4.2 Init Symbols

```
.01@DESKTOP-GBEG43H MINGW64 /e/Courses/Embedded_Systems_Course/Unit5/Proj1/Code/
 arm-none-eabi-objdump.exe -h init.o
            file format elf32-littlearm
Sections:
                                                     File off
Idx Name
                   Size
 0 .text
                   00000050
                              00000000
                                         00000000
                   CONTENTS,
                              ALLOC, LOAD, READONLY, CODE
 1 .data
                   00000000 00000000 00000000
                                                     00000084
                              ALLOC, LOAD, DATA
00000000 00000000
                   CONTENTS,
                                                    00000084 2**0
 2 .bss
                   00000000
                   ALLOC
 3 .debug_info
                   000009a0 00000000 00000000 00000084
                                                                2**0
 CONTENTS, RELOC, READONLY, DEBUGGING
4 .debug_abbrev 00000176 00000000 00000000 000000a24 2**0
                   CONTENTS, READONLY, DEBUGGING
00000044 00000000 00000000
                                                    00000b9a 2**0
 5 .debug_loc
 CONTENTS, READONLY, DEBUGGING 6 .debug_aranges 00000020 00000000 000000000
                                                     00000bde 2**0
                   CONTENTS, RELOC, READONLY, DEBUGGING
 7 .debug_line
                   00000144
                              00000000 00000000 00000bfe
                   CONTENTS, RELOC, READONLY, DEBUGGING
                              00000000 00000000 00000d42
 8 .debug_str
                   00000533
                                         DEBUGGING
                   CONTENTS,
                              READONLY,
 9 .comment
                   0000007f
                              00000000
                                         00000000
                                                    00001275
                   CONTENTS, READONLY
10 .debug_frame
                   00000030 00000000 00000000 000012f4
CONTENTS, RELOC, READONLY, DEBUGGING
11 .ARM.attributes 00000033 00000000 00000000 00001324 2**0
                   CONTENTS, READONLY
```

4.3 Pressure Sensor Driver Symbols

```
O1@DESKTOP-GBEG43H MINGW64 /e/Courses/Embedded_Systems_Course/Unit5/Proj1/Code/
 arm-none-eabi-objdump.exe -h Pressure_Sensor_Driver.o
                                        file format elf32-littlearm
ressure Sensor Driver.o:
ections:
                        Size VMA LMA File off Algn
00000048 00000000 00000000 00000034 2**2
CONTENTS, ALLOC, LOAD, RELOC, READONLY, CODE
dx Name
0 .text
 1 .data
                        00000000 00000000 00000000
CONTENTS, ALLOC, LOAD, DATA
                                                                  0000007c
 2 .bss
                        00000000 00000000 00000000 0000007c 2**0
                        ALLOC
000009f4 00000000 00000000 0000007c 2**0
 3 .debug_info
 $ 00000020 00000000 00000000 00000c9b 2**(
CONTENTS, RELOC, READONLY, DEBUGGING
00000175 00000000 00000000 00000cbb 2**0
                                                     00000000 00000c9b 2**0
 6 .debug_aranges 00000020
 7 .debug_line
                        00000173 00000000 00000000 00000000 2***0
CONTENTS, READONLY, DEBUGGING
0000074 00000000 00000000 00001404 2***0
CONTENTS, READONLY
00000075 00000000 00000000 00001404 2***0
 8 .debug_str
                        0000004C 00000000 00000000 00002.

CONTENTS, RELOC, READONLY, DEBUGGING

25 00000033 00000000 00000000 000014d0 2**0
10 .debug frame
11 .ARM.attributes 00000033
```

4.4 Startup Symbols

```
l01@DESKTOP-GBEG43H MINGW64 /e/Courses/Embedded_Systems_Course/Unit5/Proj1/Code,
V2
$ arm-none-eabi-objdump.exe -h startup.o
startup.o:
               file format elf32-littlearm
Sections:
                                                          Algn
Idx Name
                  Size
                            VMA
                                      LMA
                                                File off
                                                          2**2
 0 .text
                  00000090
                            00000000
                                     00000000
                                                00000034
                  CONTENTS, ALLOC, LOAD, RELOC,
                                                READONLY, CODE
                  00000000
                           00000000 00000000
                                                000000c4

    data

                  CONTENTS, ALLOC, LOAD, DATA
                            00000000 00000000
                                                000000c4
  2 .bss
                  00000000
                                                          2**0
                  ALLOC
                  0000001c
                           00000000 00000000
                                                000000c4
  3 .vectors
                  CONTENTS, ALLOC, LOAD, RELOC, DATA
  4 .debug_info
                  00000190 00000000 00000000
                                                000000e0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  5 .debug_abbrev 000000d6 00000000 00000000
                                                00000270
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_loc
                  0000007c 00000000 00000000
                                                00000346
                  CONTENTS, READONLY, DEBUGGING
  7 .debug_aranges 00000020 00000000 00000000
                                                000003c2
                                                           2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
                  000000ff 00000000 00000000 000003e2
  8 .debug_line
                                                          2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  9 .debug_str
                  000001b8 00000000 00000000
                                                000004e1
                                                          2**0
                  CONTENTS, READONLY, DEBUGGING
 10 .comment
                  0000007f 00000000
                                     00000000
                                                00000699
                  CONTENTS, READONLY
                 00000050 00000000
 11 .debug_frame
                                     00000000
                                                00000718
                  CONTENTS, RELOC, READONLY, DEBUGGING
 12 .ARM.attributes 00000033 00000000 00000000 00000768 2**0
                  CONTENTS, READONLY
```

4.5 Alarm Manger Symbols

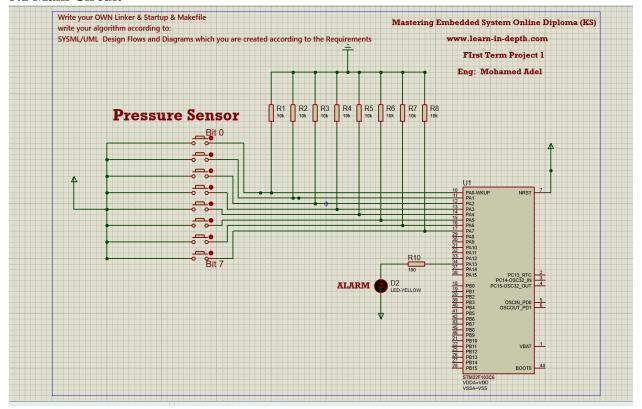
```
.01@DESKTOP-GBEG43H MINGW64 /e/Courses/Embedded_Systems_Course/Unit5/Proj1/Co
 arm-none-eabi-objdump.exe -h Alarm_Manager.o
                     file format elf32-littlearm
Alarm_Manager.o:
Sections:
Idx Name
                            VMA
                                      LMA
                                                File off
                  Size
                  0000007c
                            00000000
                                      00000000
                                                00000034
  0 .text
                  CONTENTS, ALLOC, LOAD, RELOC,
                                                READONLY, CODE
                  00000004
                            00000000 00000000
                                                000000b0
  1 .data
                  CONTENTS, ALLOC, LOAD, DATA
                  00000000
                                                          2**0
  2 .bss
                            00000000 00000000
                                                000000b4
                  ALLOC
  3 .debug_info
                  00000a60
                            00000000 00000000
                                                000000b4
                                                          2**0
                  CONTENTS, RELOC, READONLY, DEBUGGING
  4 .debug_abbrev 000001e2
                            00000000 00000000
                                                00000b14
                  CONTENTS, READONLY, DEBUGGING
  5 .debug_loc
                  000000cc
                           00000000 00000000
                                                00000cf6
                  CONTENTS, READONLY, DEBUGGING
  6 .debug_aranges 00000020 00000000 00000000
                                                 00000dc2
                  CONTENTS, RELOC, READONLY, DEBUGGING
                  00000171 00000000 00000000 00000de2
  7 .debug_line
                  CONTENTS, RELOC, READONLY, DEBUGGING
  8 .debug_str
                  00000590 00000000 00000000
                                               00000f53
                  CONTENTS, READONLY, DEBUGGING
                  0000007f
                           00000000
                                      00000000 000014e3
  9 .comment
                                                          2**0
                  CONTENTS, READONLY
                 00000074 00000000
 10 .debug_frame
                                      00000000 00001564
                  CONTENTS, RELOC, READONLY, DEBUGGING
 11 .ARM.attributes 00000033 00000000 00000000 000015d8
                  CONTENTS, READONLY
```

4.6 Main Symbols

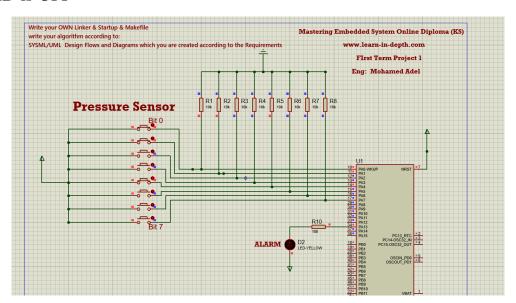
```
ses/Embedded_Systems_Course/Unit5/Proj1/Code
arm-none-eabi-objdump.exe -h main.o
           file format elf32-littlearm
nain.o:
Sections:
                                      LMA
                                                 File off
                                                           Algn
Idx Name
                            VMA
                  Size
0 .text
                  00000028 00000000 00000000
                                                 00000034
                                                           2**1
                 CONTENTS, ALLOC, LOAD, RELOC,
                                                 READONLY. CODE
 1 .data
                 00000000 00000000 00000000
                                                 0000005c
                 CONTENTS,
                            ALLOC, LOAD, DATA
 2 .bss
                                                 0000005c 2**0
                 00000000 00000000 00000000
                  ALLOC
                 000009ba 00000000 00000000 0000005c 2**0
 3 .debug_info
                  CONTENTS, RELOC, READONLY, DEBUGGING
 4 .debug_abbrev 000001a3 00000000 00000000 00000a16
                 CONTENTS, READONLY, DEBUGGING
 5 .debug_loc
                 0000002c 00000000 00000000 00000bb9 2**0
                 CONTENTS, READONLY, DEBUGGING
 6 .debug_aranges 00000020 00000000 00000000 00000be5
                                                            2**0
                 CONTENTS, RELOC, READONLY, DEBUGGING 00000101 00000000 00000000 00000005
 7 .debug_line
                 CONTENTS, RELOC, READONLY, DEBUGGING
 8 .debug_str
                  00000571 00000000 00000000 00000d06
                 CONTENTS, READONLY, DEBUGGING 0000007f 00000000 00000000
 9 .comment
                                      00000000 00001277
                  CONTENTS, READONLY
10 .debug_frame
                 0000002c 00000000 00000000 000012f8
                 CONTENTS, RELOC, READONLY, DEBUGGING
11 .ARM.attributes 00000033 00000000 00000000 00001324 2**0
                 CONTENTS, READONLY
```

Chapter Five: Simulation

5.1 Main Circuit



5.2 In Case of Pressure value less than 19 (0001 0011) Which is less than the threshold (20) The LED is OFF



5.3 In Case of Pressure value 30 (0001 1110) which is greater than the threshold 20 The LED is $\ensuremath{\mathsf{ON}}$

