

Pressure Detection Project

**Mastering Embedded System Online Diploma**

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**First Term Project ( Final Project 1 )**

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# 1. case study

## Requirements

1. Pressure detector that informs the cabin crew when pressure exceeds a threshold of 20 Bar.

2. The system informing is acting by a Led-alarm which should last for 60 sec.

3. The system should keep tracking for pressure values.

## Assumptions

1. No setup or shut down for micro-controller.

2. No maintenance for micro-controller.

3. Pressure sensor provides accurate readings.

4. Both sensor & actuator never fail.

5. No power constrains

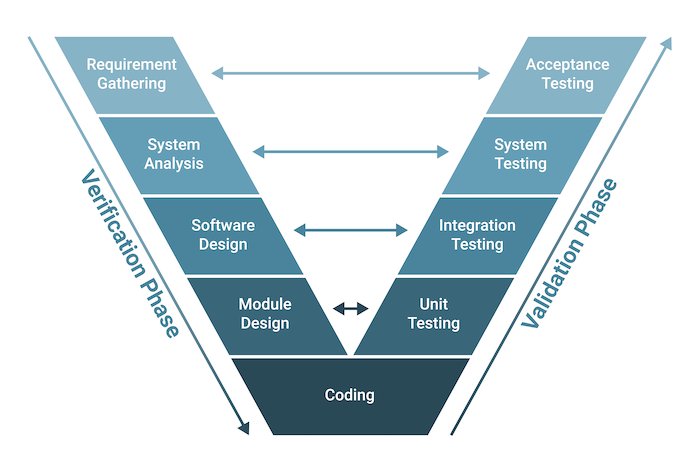
## Versioning

The probability of adding a feature to store pressure values versus time in a flash memory in the next version.

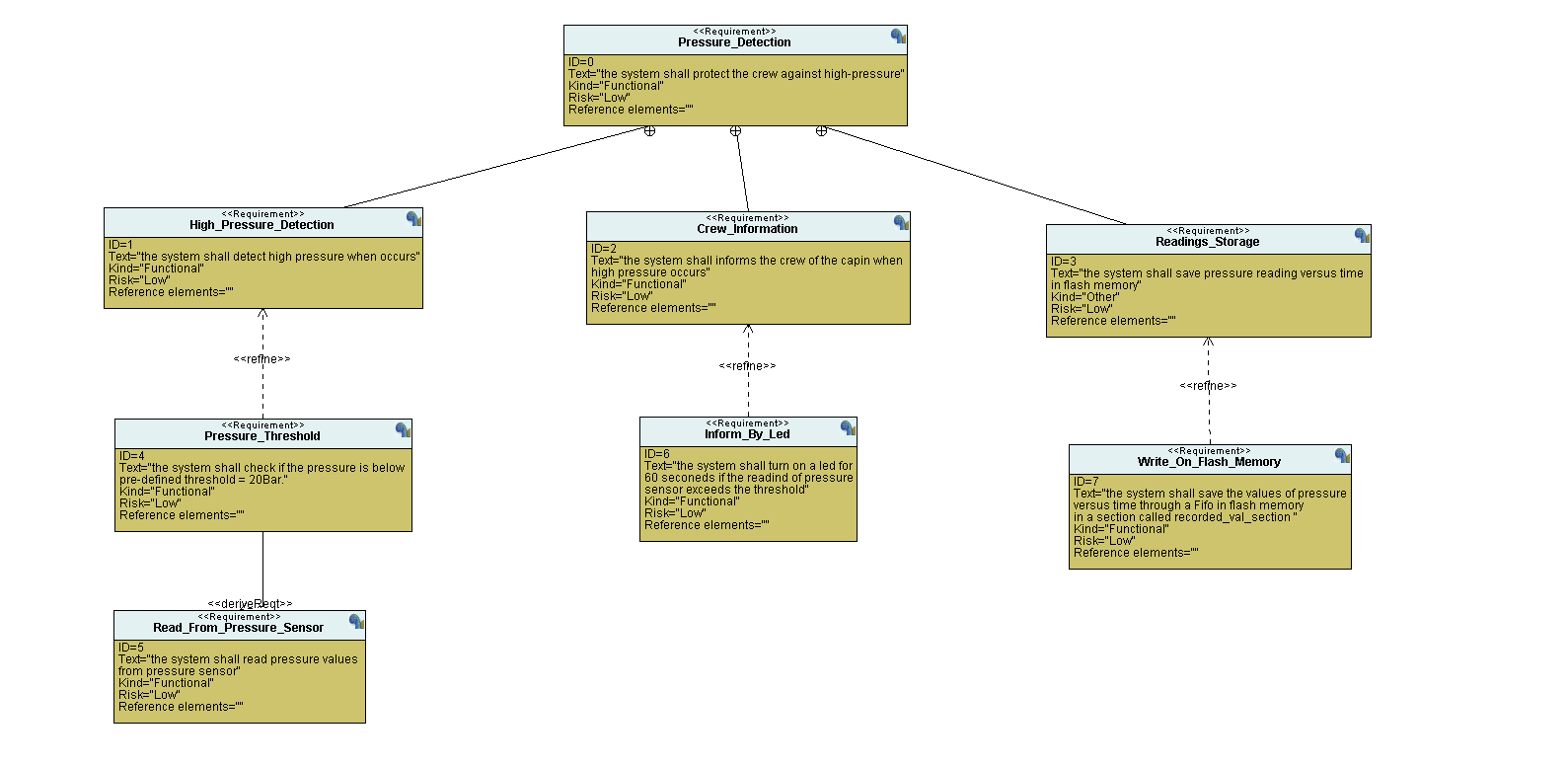
# 2. Method

## Software developing life cycle & software testing life cycle

The ( SDLC ) & ( STLC ) will be approached according to the V-Model.



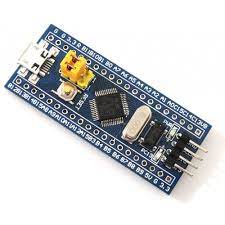
# 3. Requirement Diagram



# 4. Space Exploration

Micro-controller : **stm32f103c8t6** SoC as it meets all technical requirments needed for this project as it is marked by : small size and contains acceptable flash memory as well as being cost efficient and have a suitable processor which is : **ARM Cortex-M3** 32bit with 72 MHz operating frequency.

## Features

operating voltage range -> 2 : 3.6 V.

64Kbytes Flash memory.

20KbytesSRam.

CRC calaculation unit , 96bit unique id.

Two 12bit, 1µs A/D converter (up to 10 channels).

7 channel DMA controller , 3 genral purpose timer & 1 advanced

Controller timer.

37 fast I/O ports.

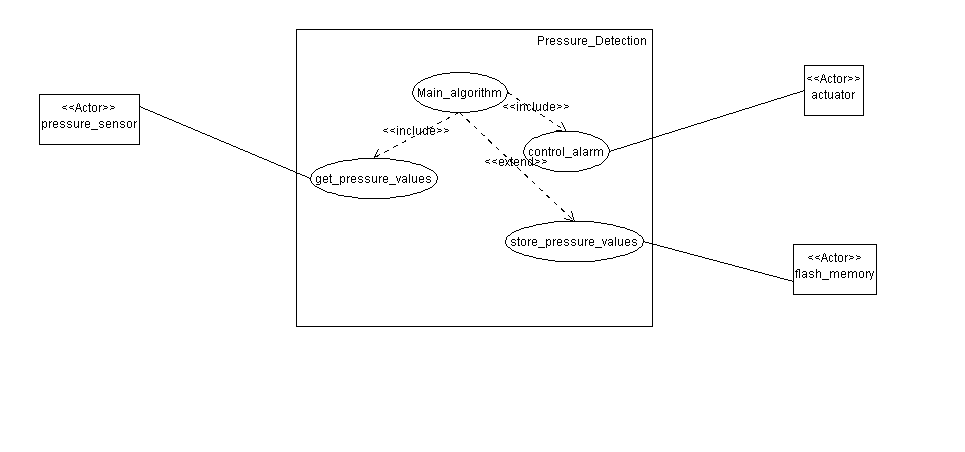
Serial wire debug (SWD) & JTAG Interfaces .

Two SPI , two I2C , three USART , one USB & one CAN interfaces.

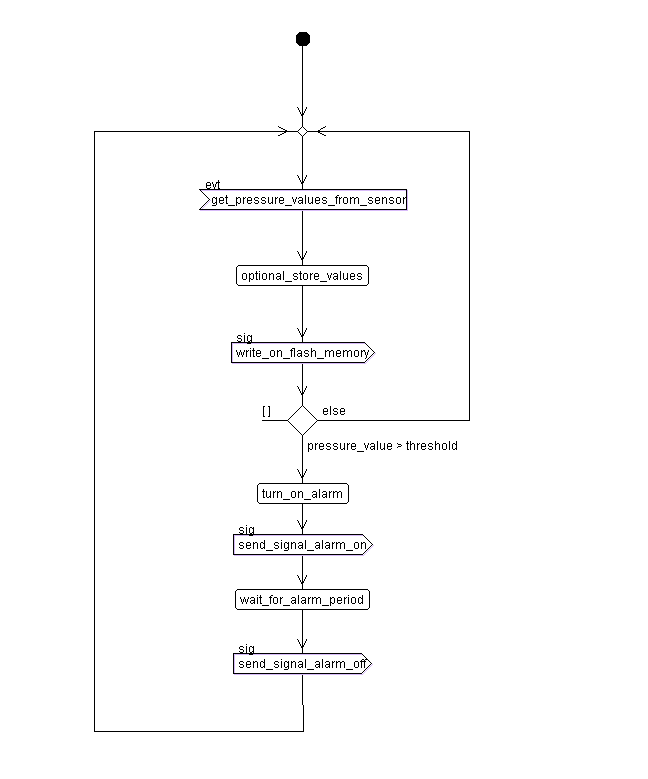
Ambient operating temperature range from -40˚C to 85˚C.

# 5. System Analysis

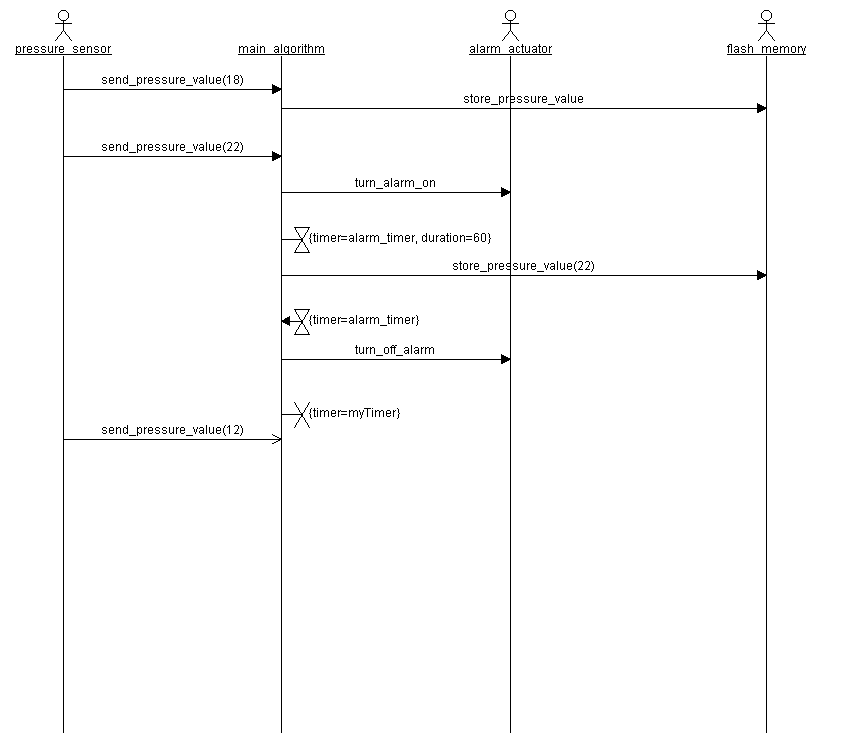
## Use Case Diagram



## Activity Diagram

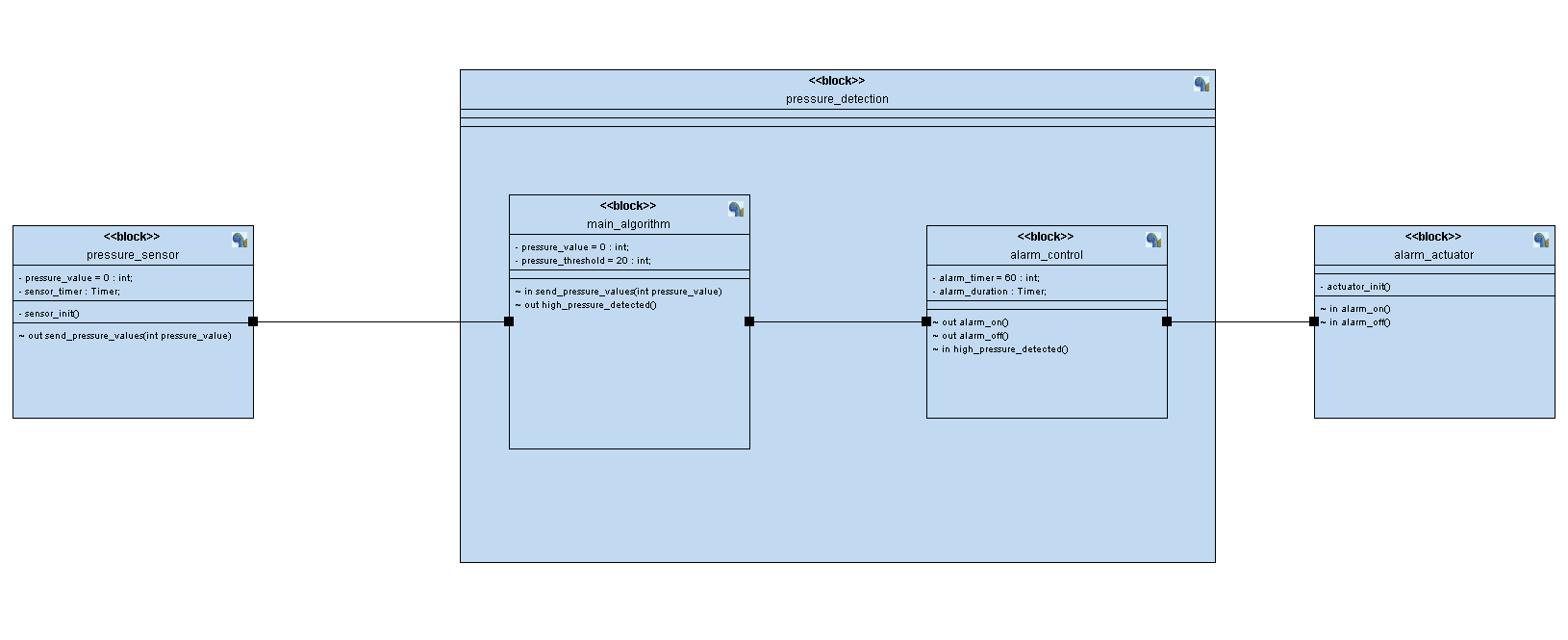


## Sequence Diagram

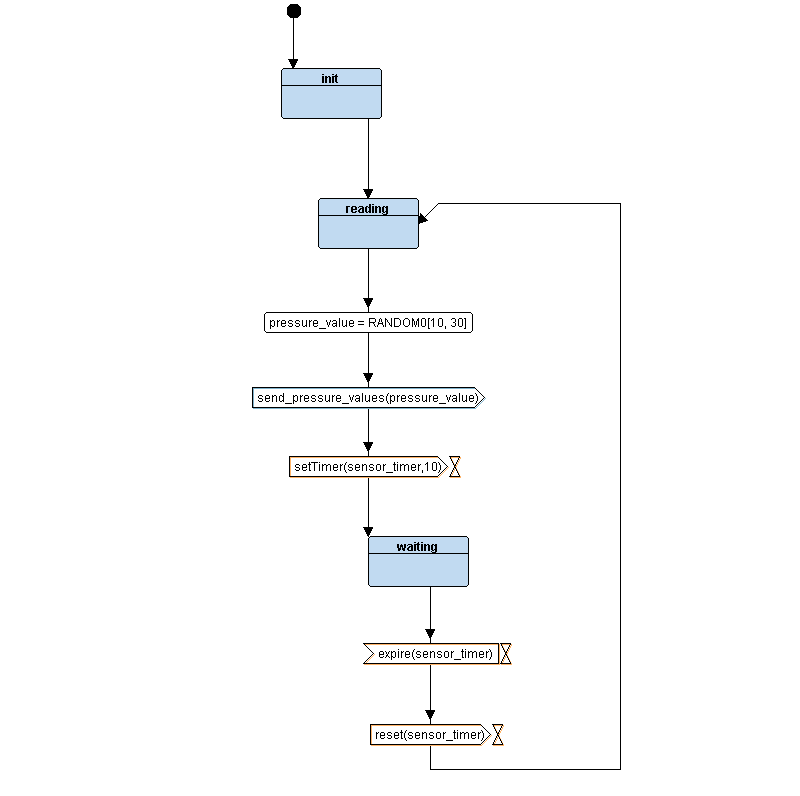


# 6. System Design

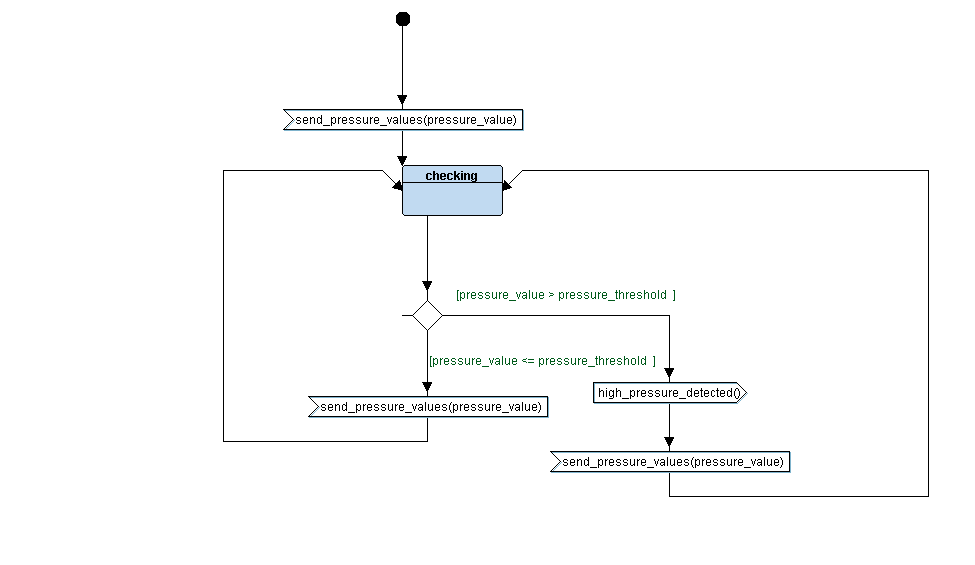
## Block Diagram



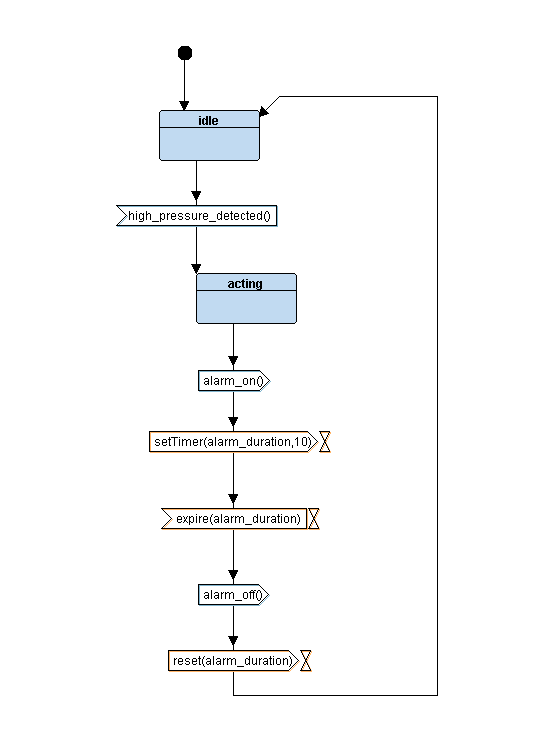
## State Machine For Pressure\_Sensor



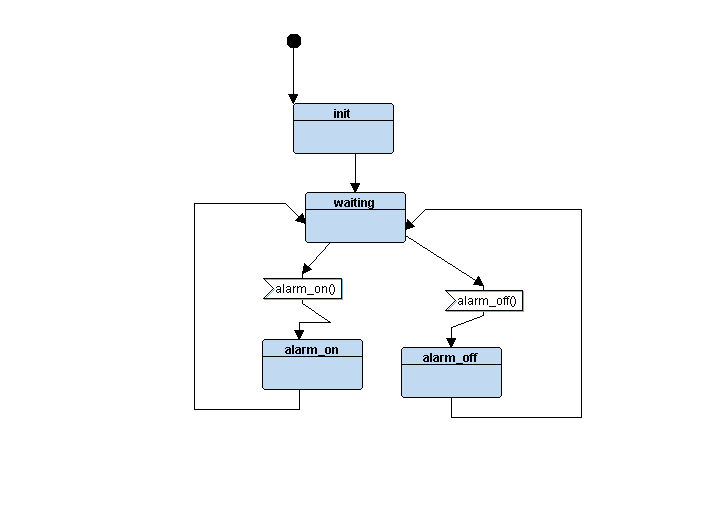
## State Machine For Main Algorithm



## State Machine For Alarm\_Control



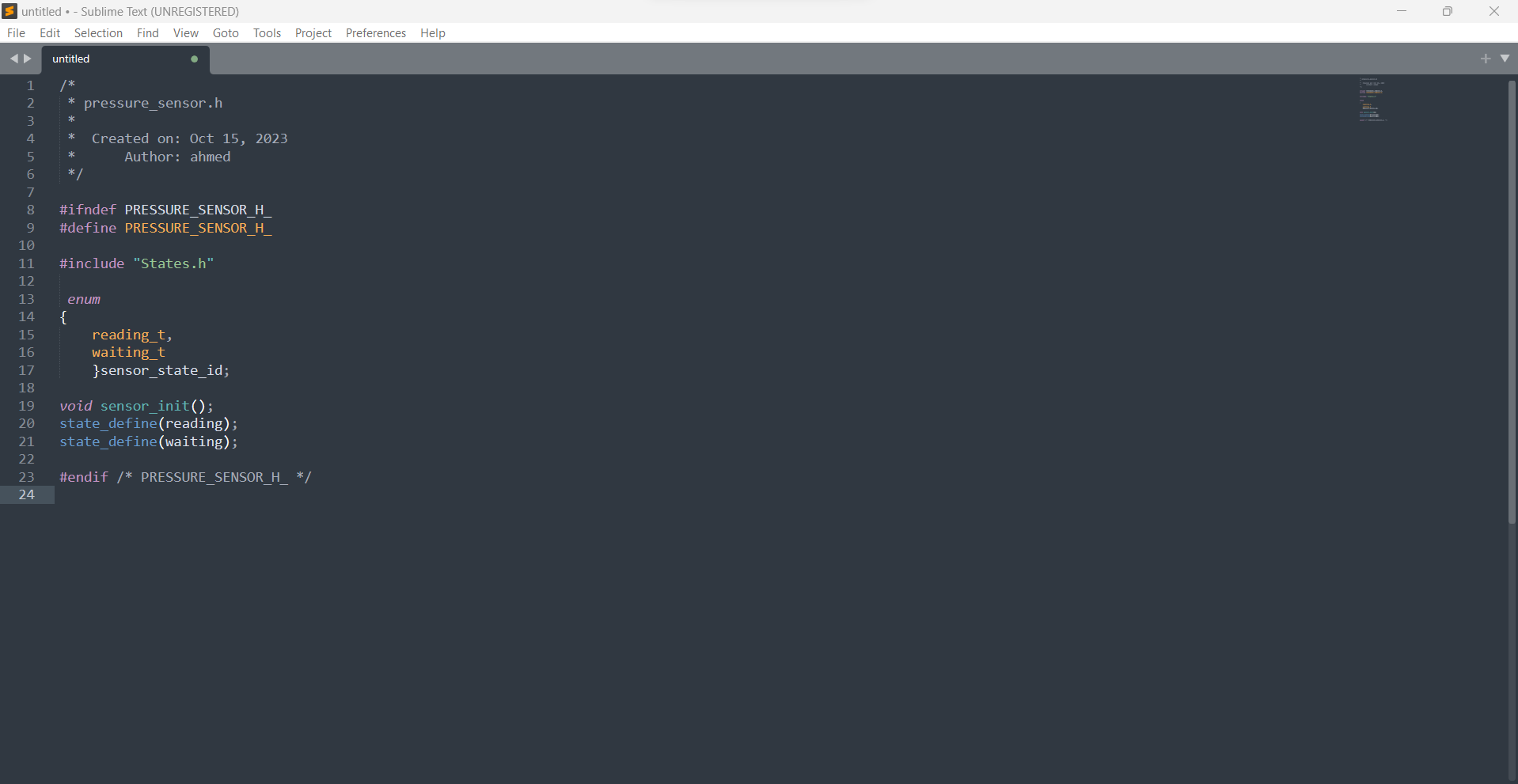
## State Machine For Alarm\_Actuator

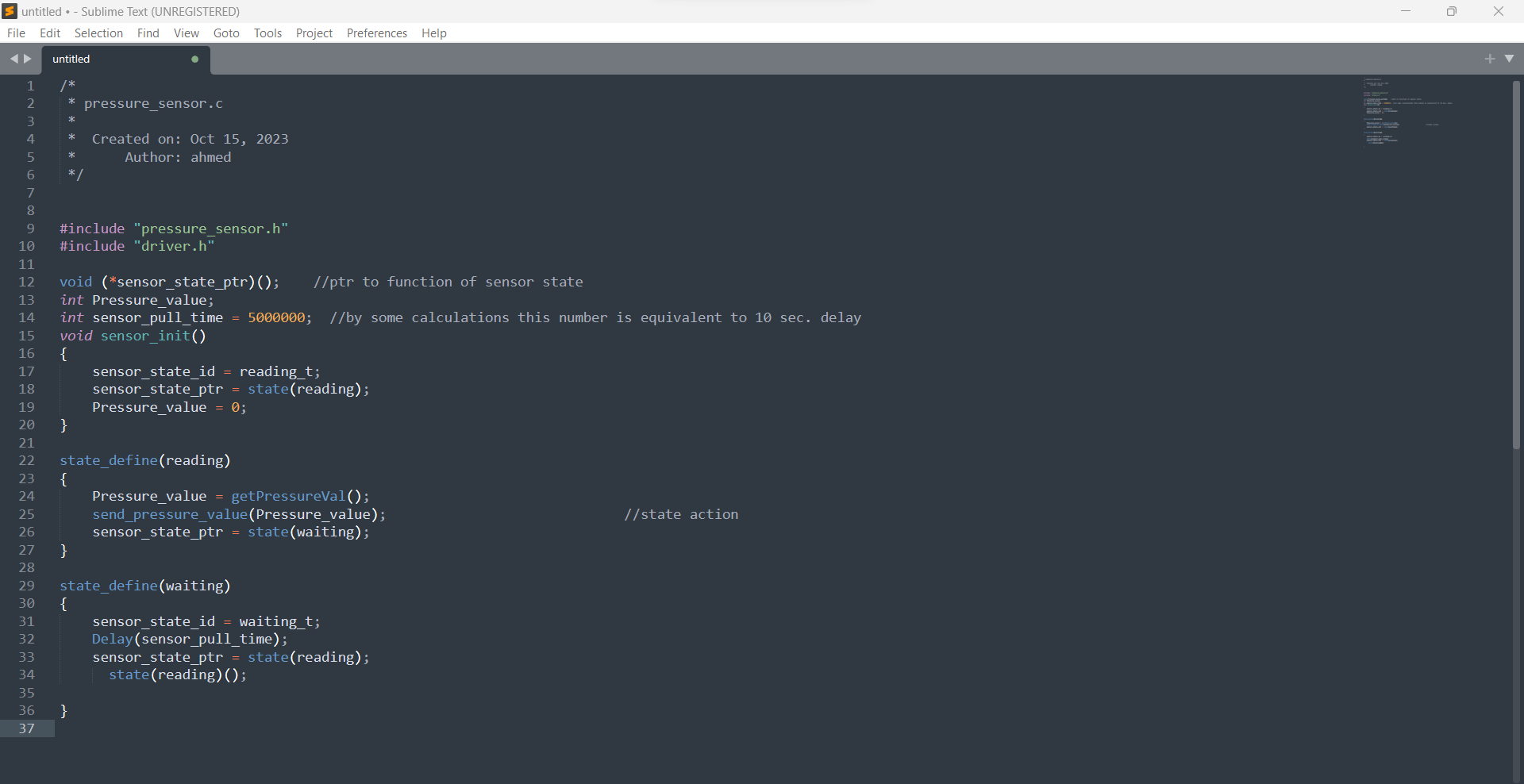


# 7. C codes

## Pressure\_sensor\_.c/.h

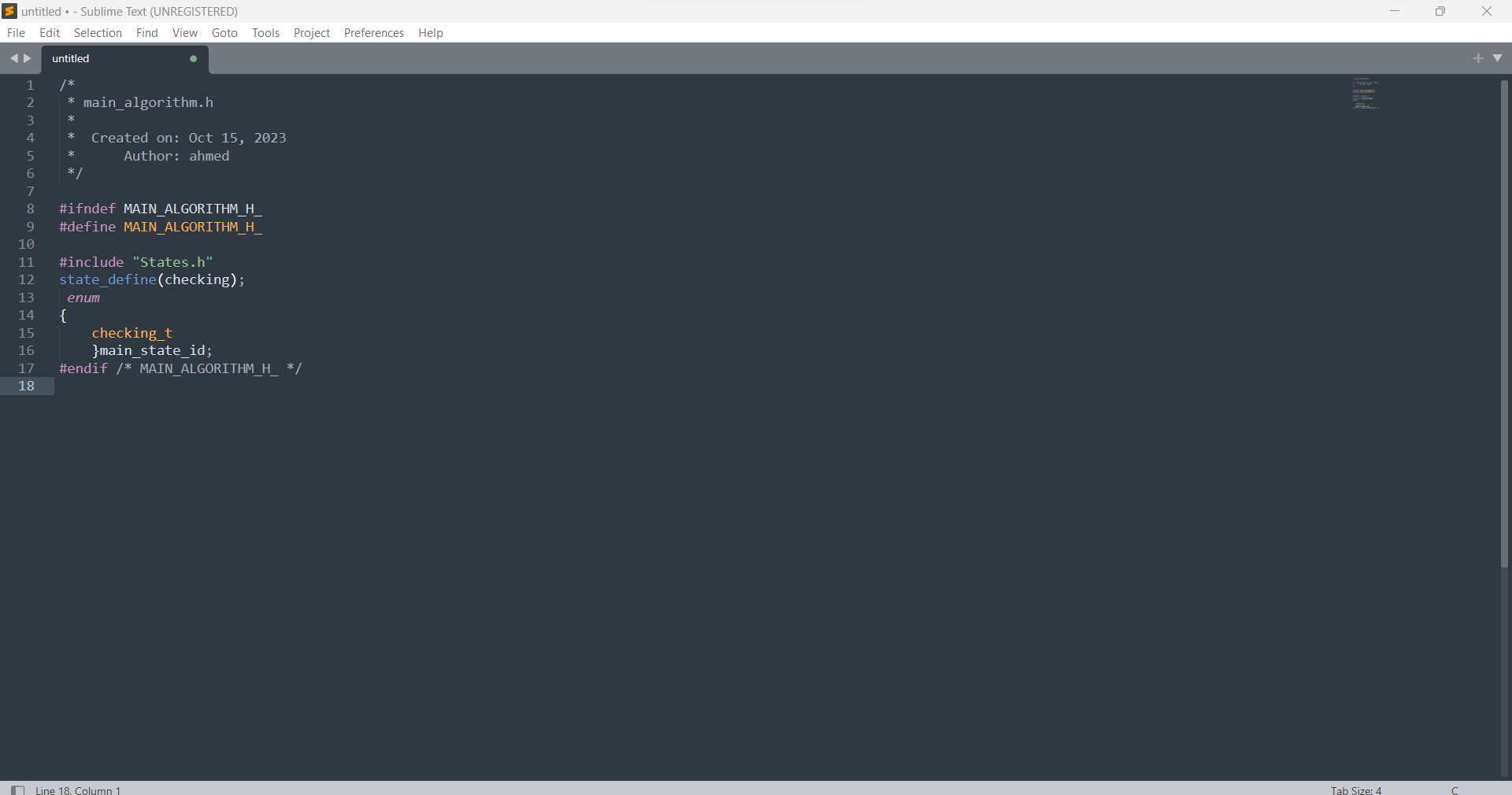
.h file

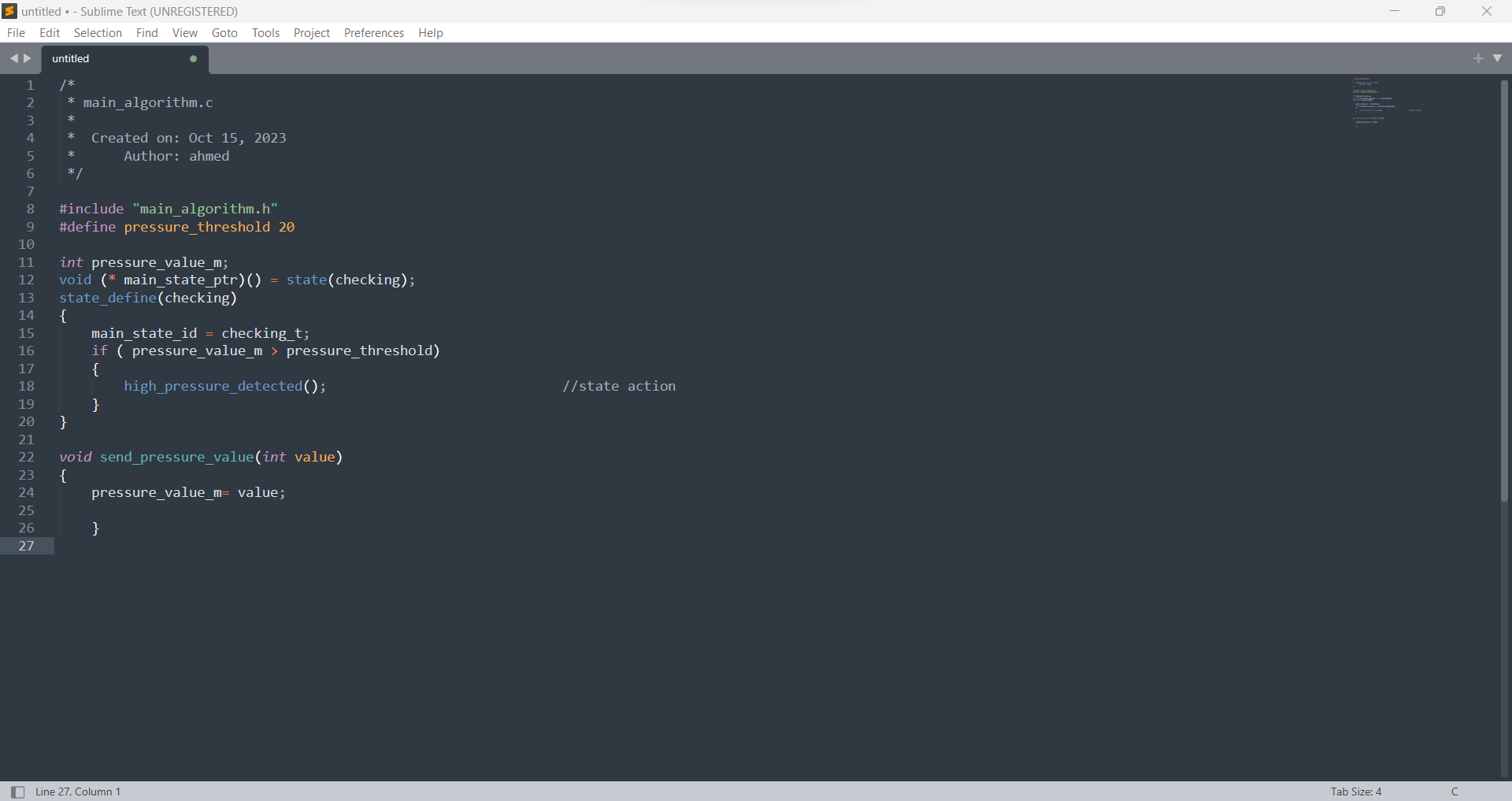


.c file

## Main\_algorithm\_.c/.h

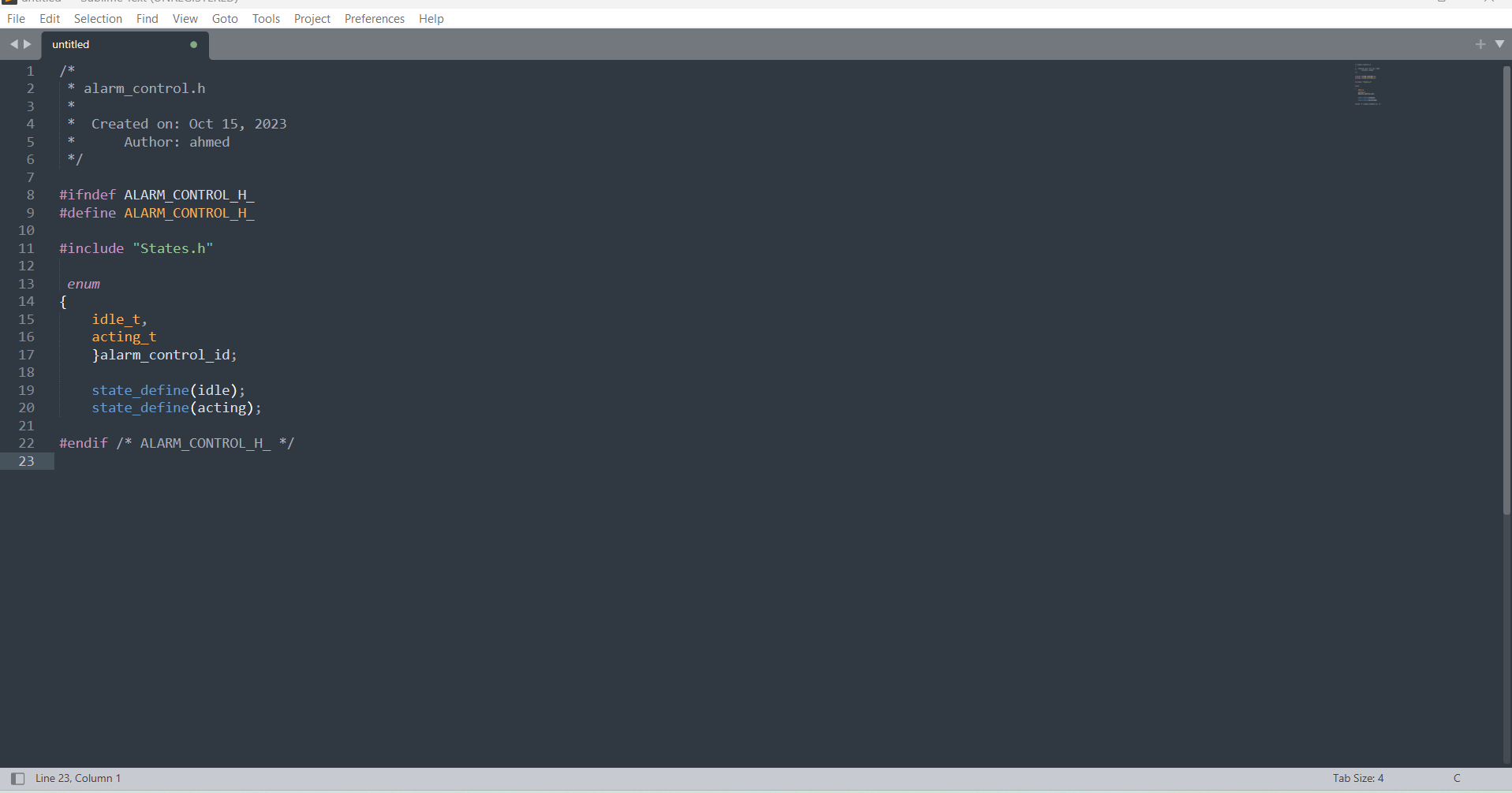
.h file



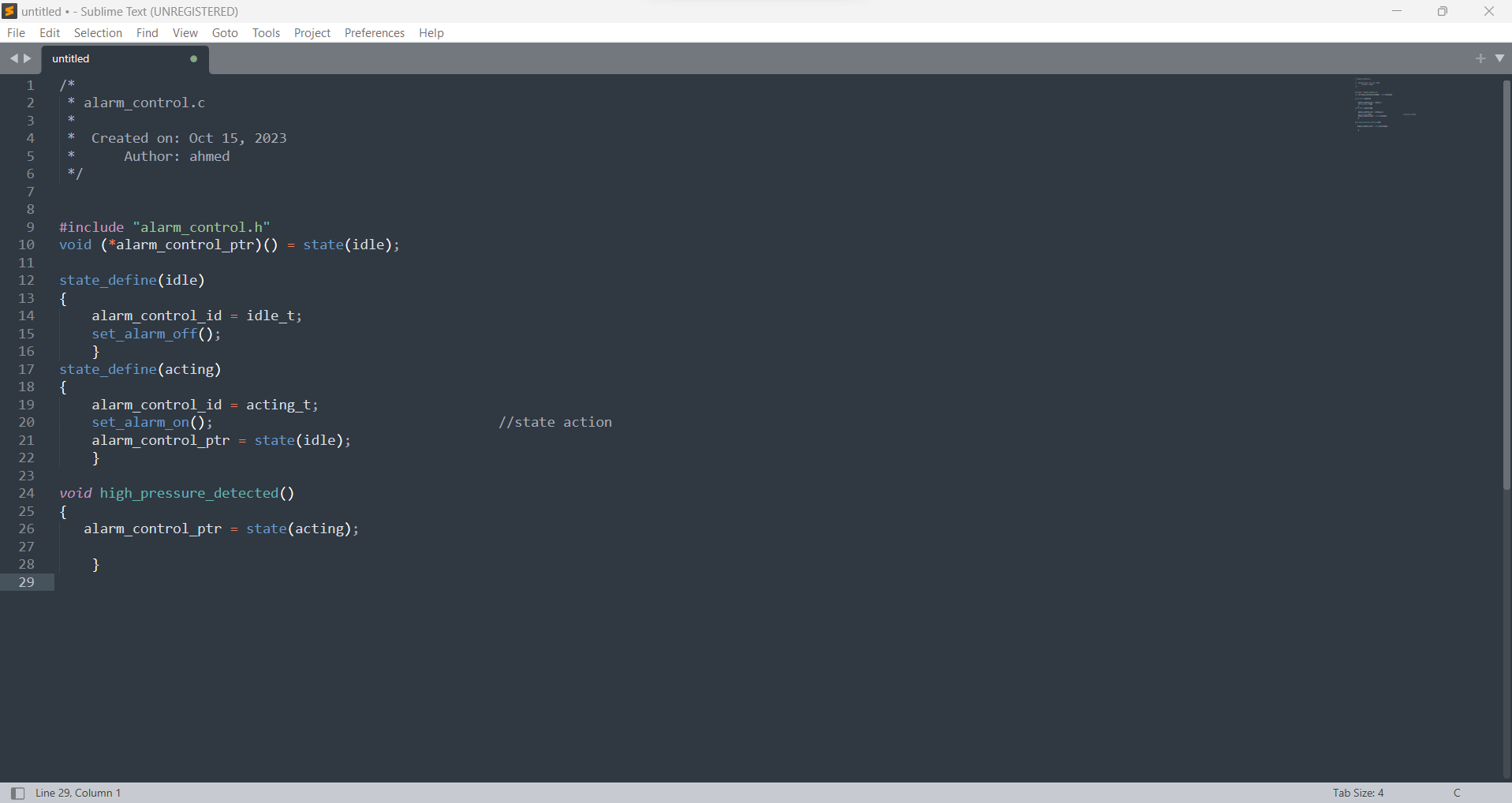
.c file

## Alarm\_control\_.c/.h

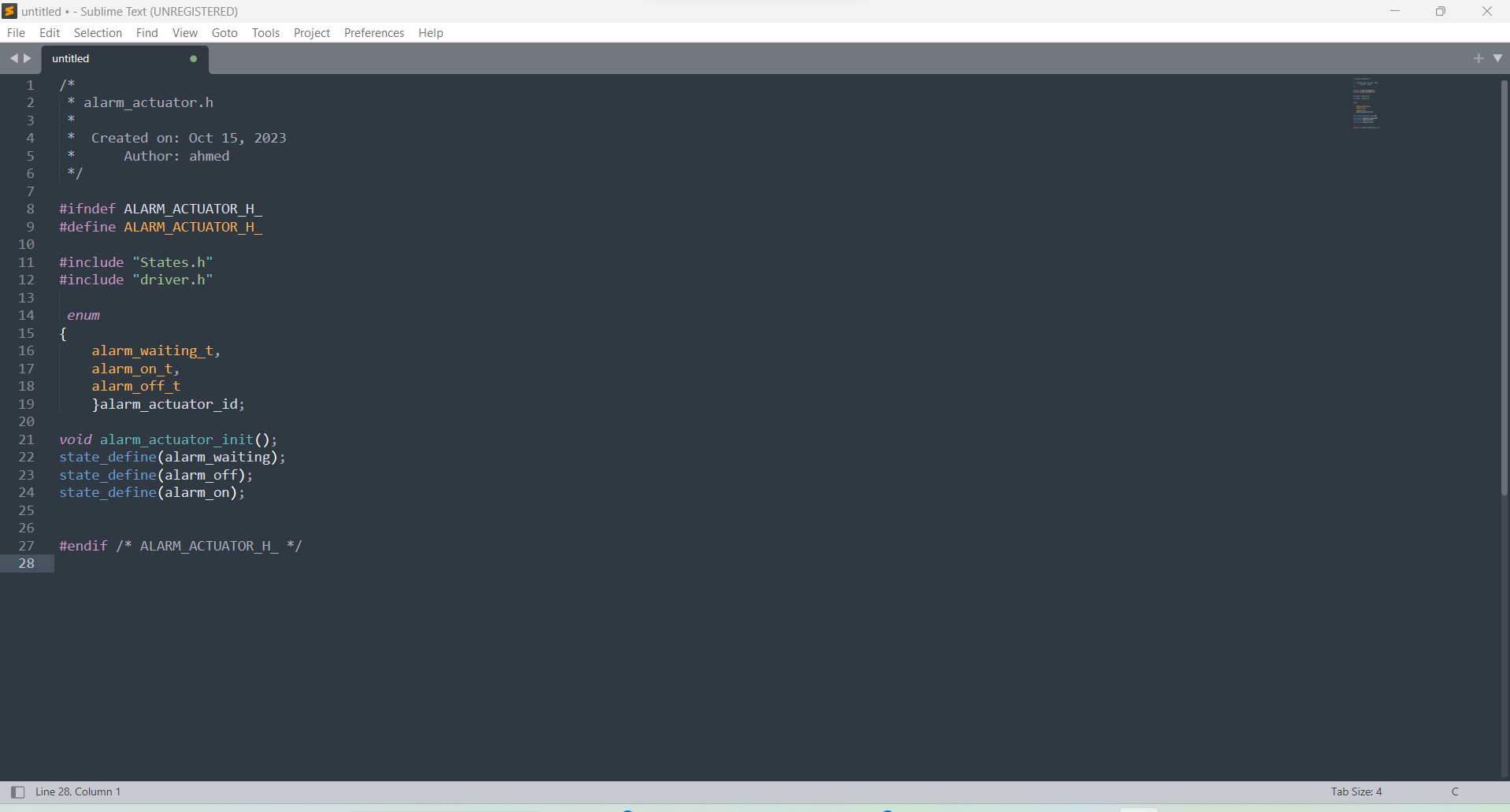
.h file



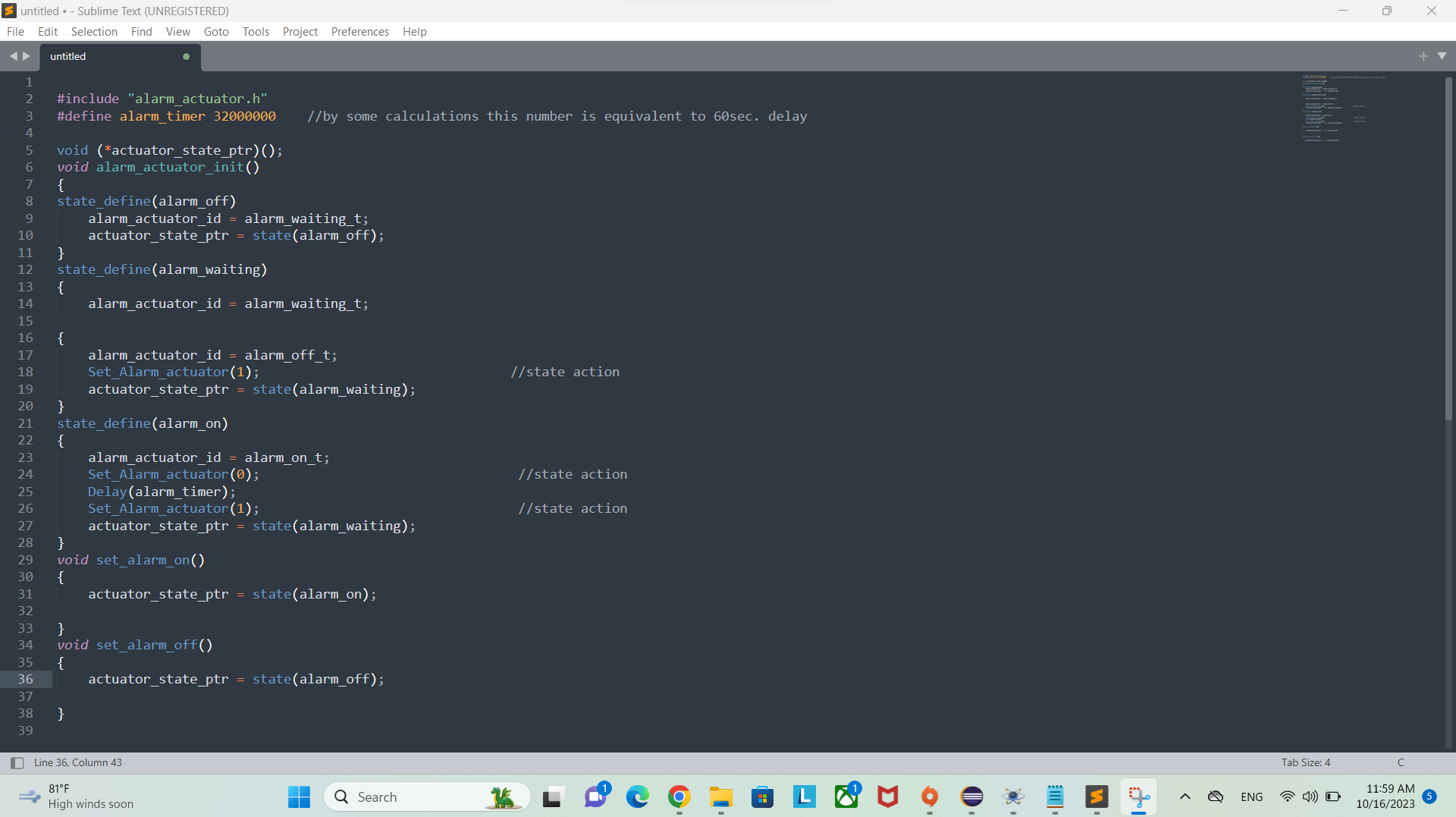
.c file



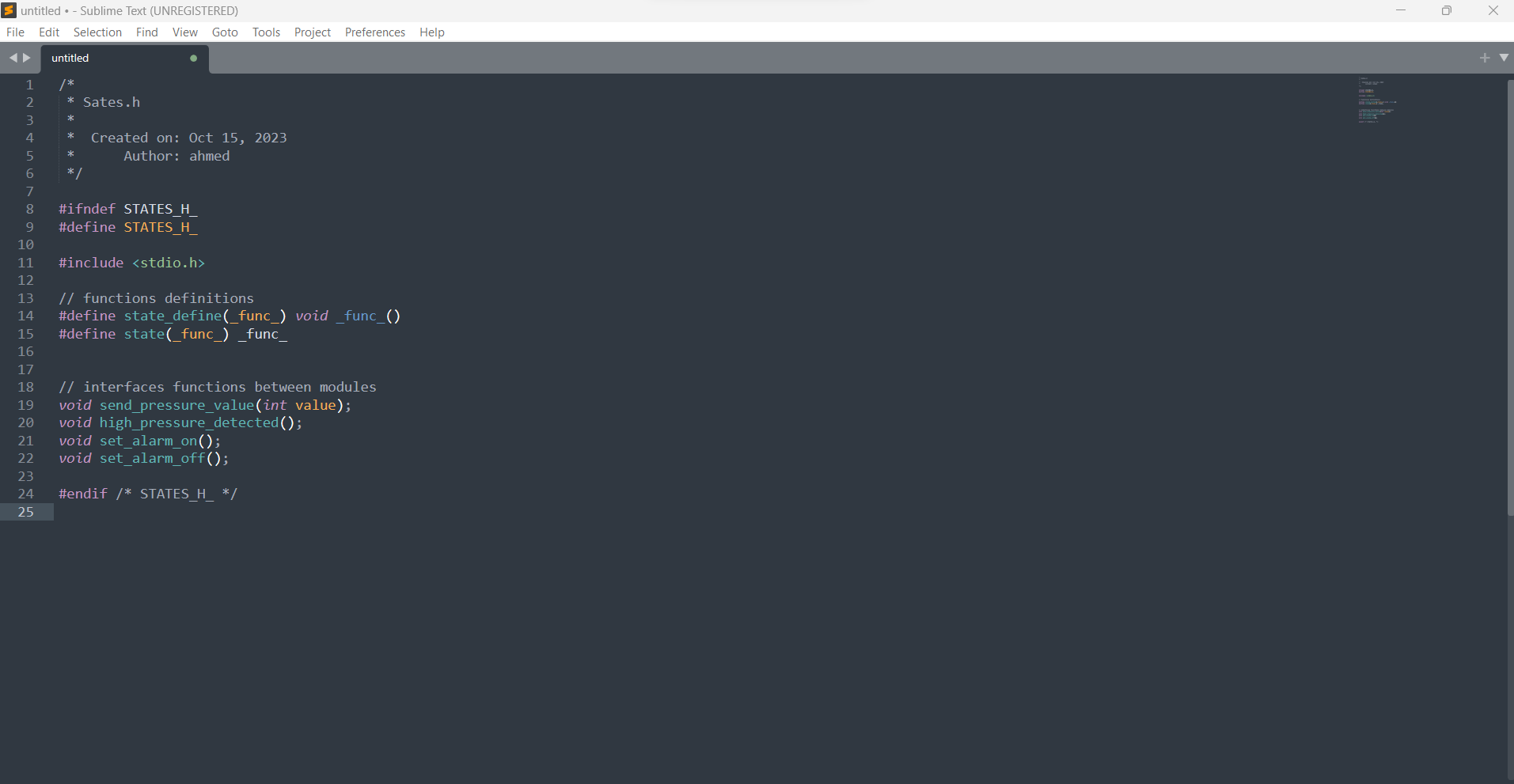
## Alarm\_actuator\_.c/.h

.h file

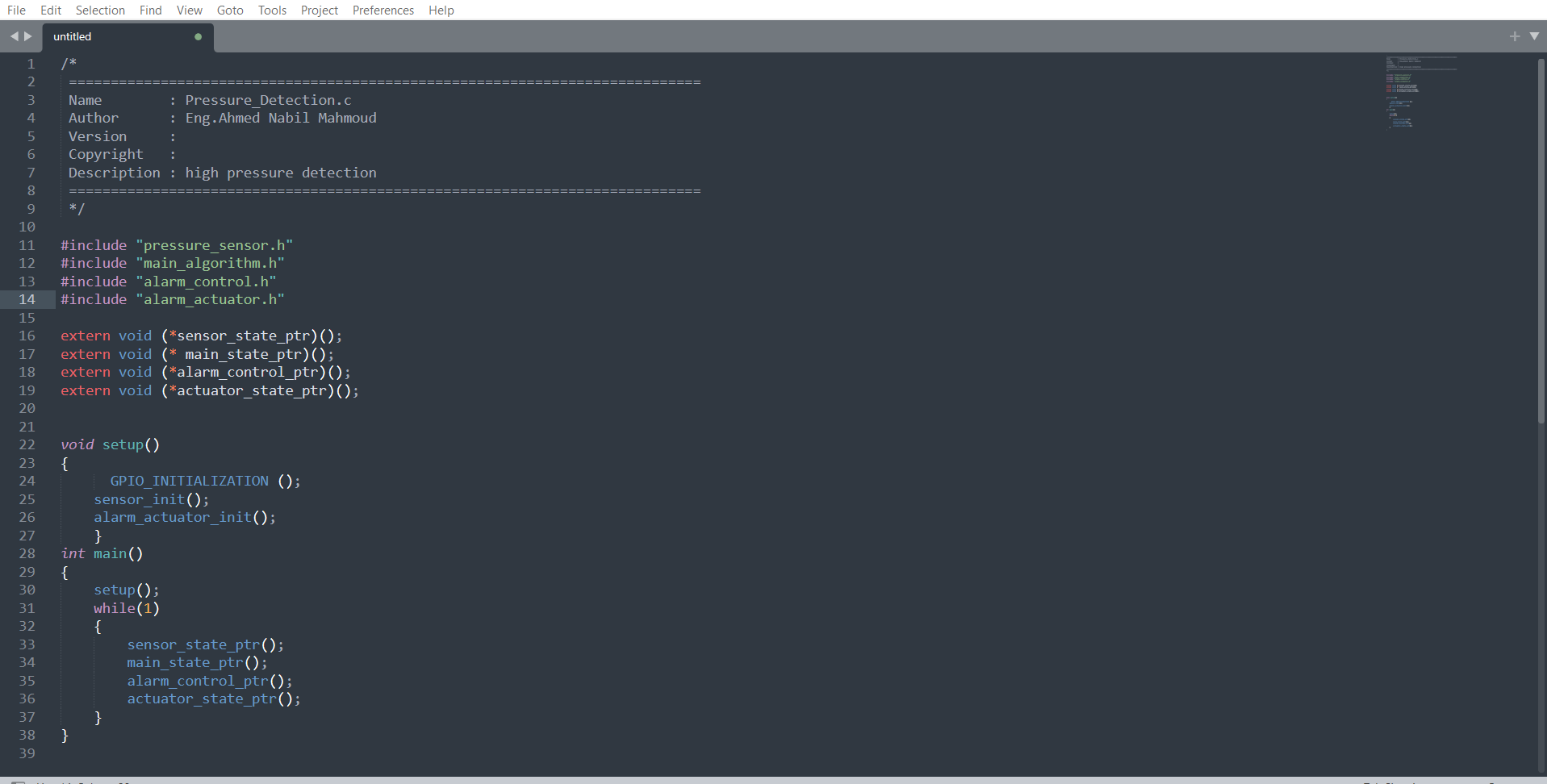
.c file



## States.h

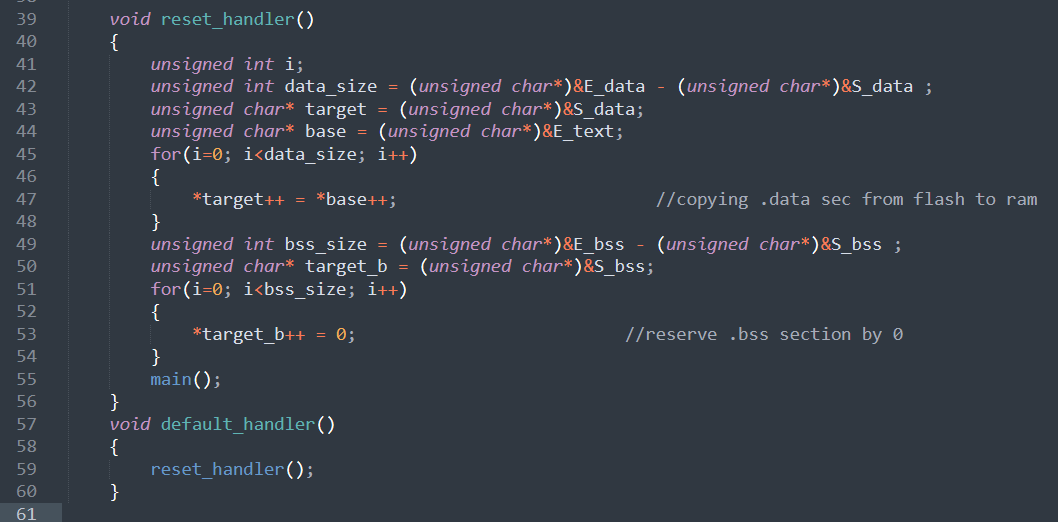
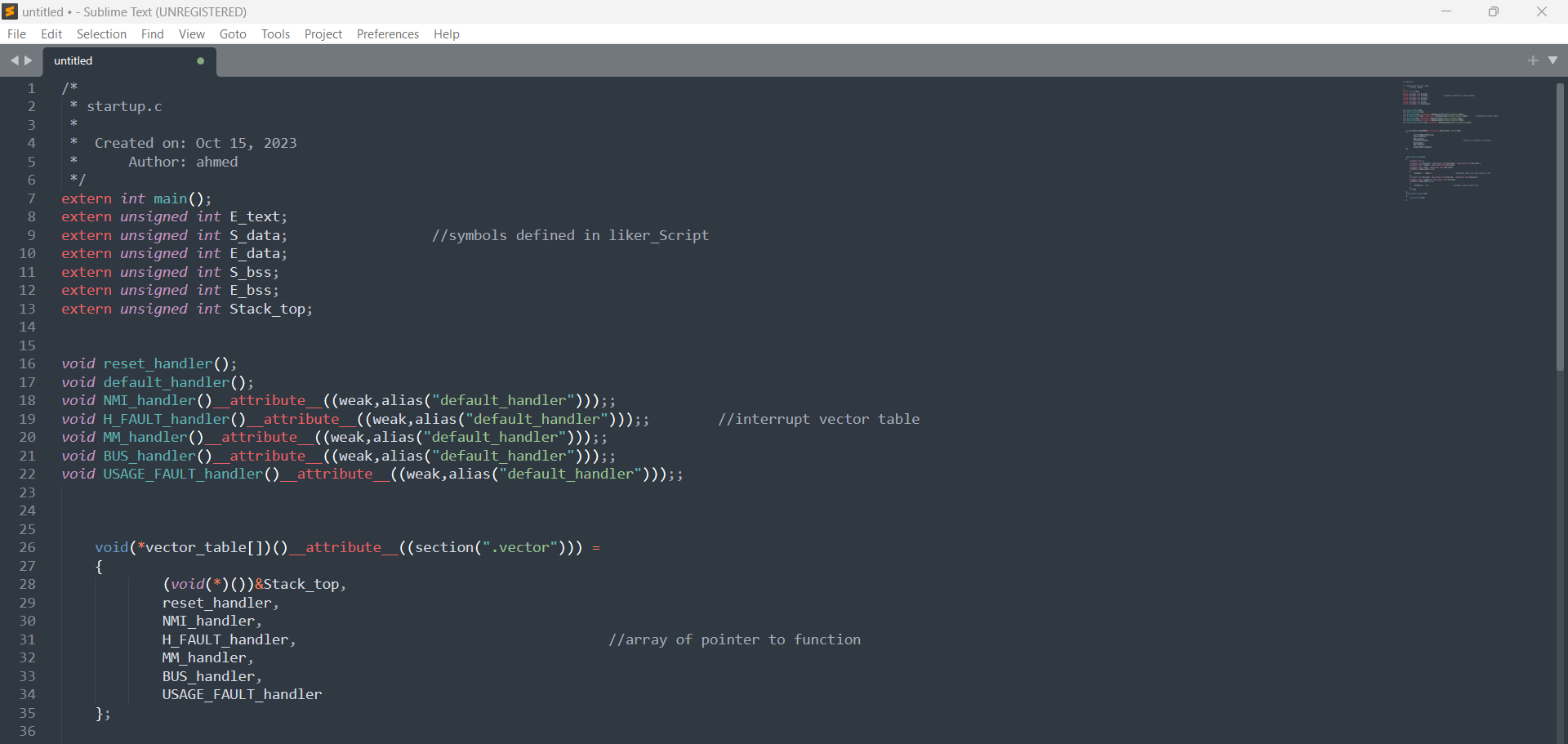


## App.c

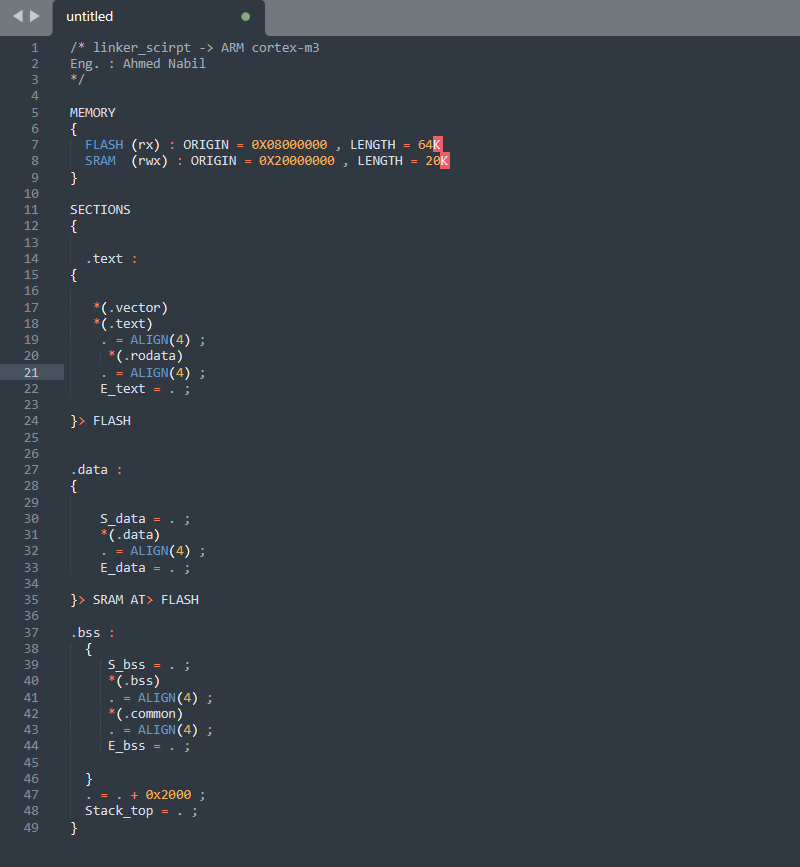


# 8. Building\_Files

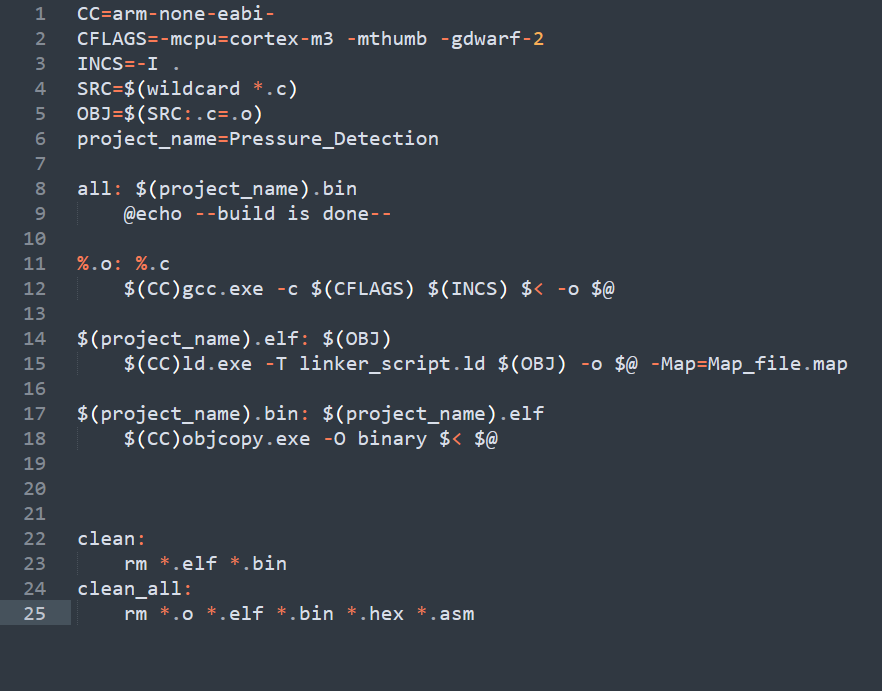
## startup.c



## linker\_script

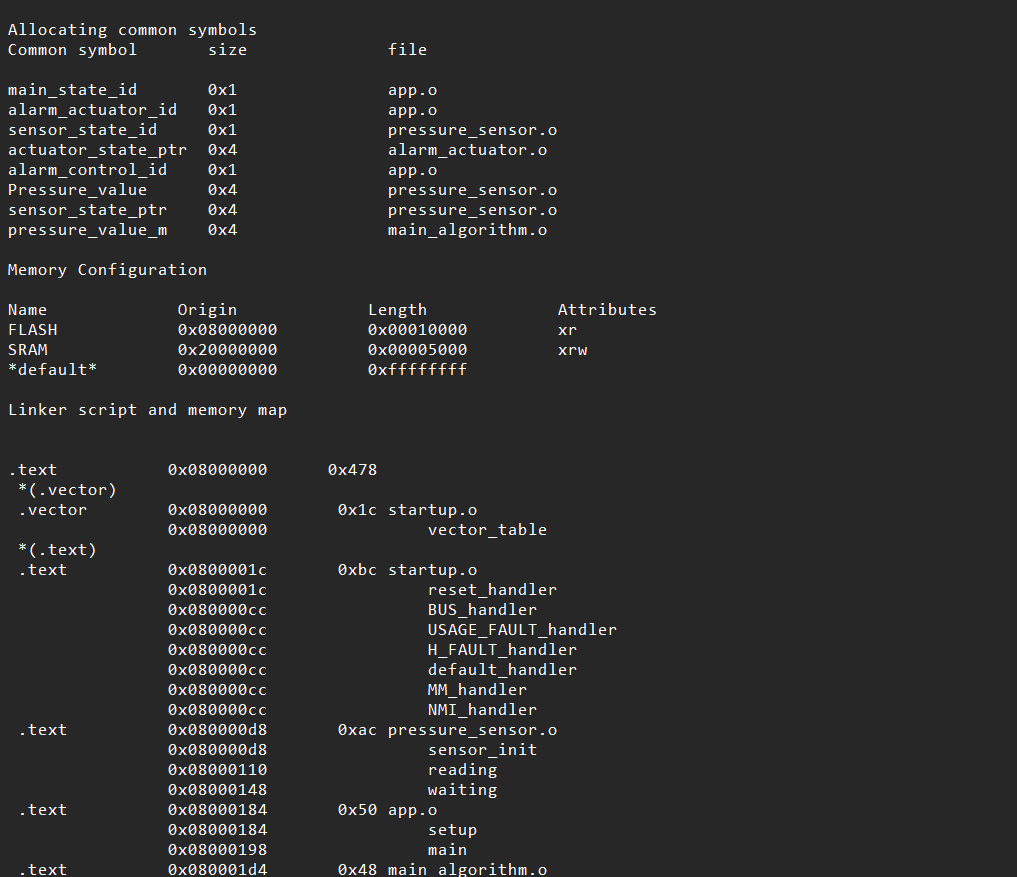


## makefile

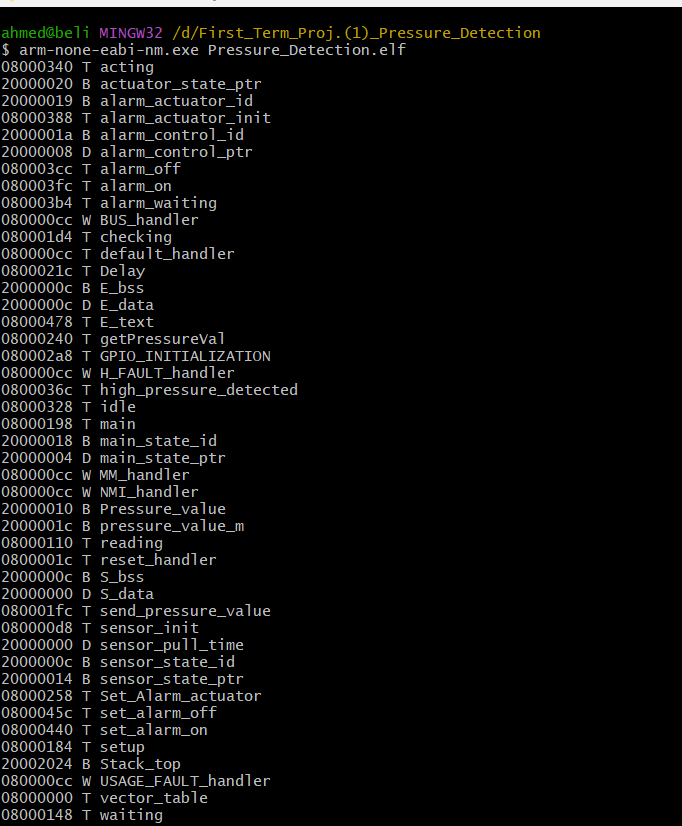


# 9. Software\_analysis

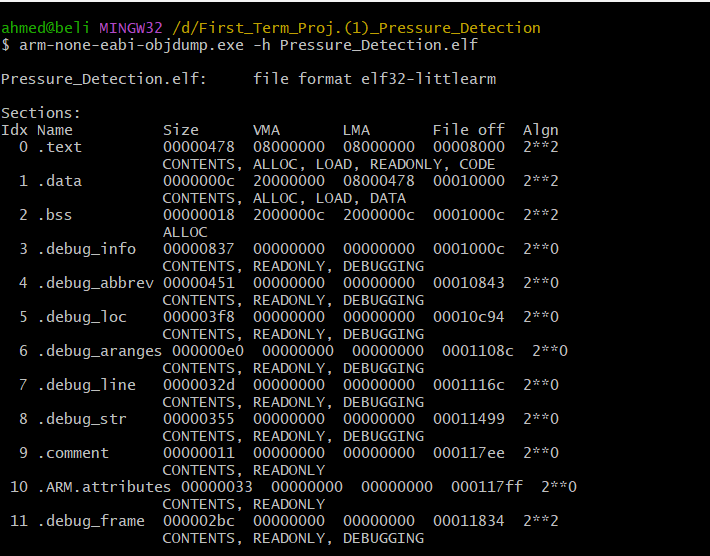
## .map file



## Symbols table

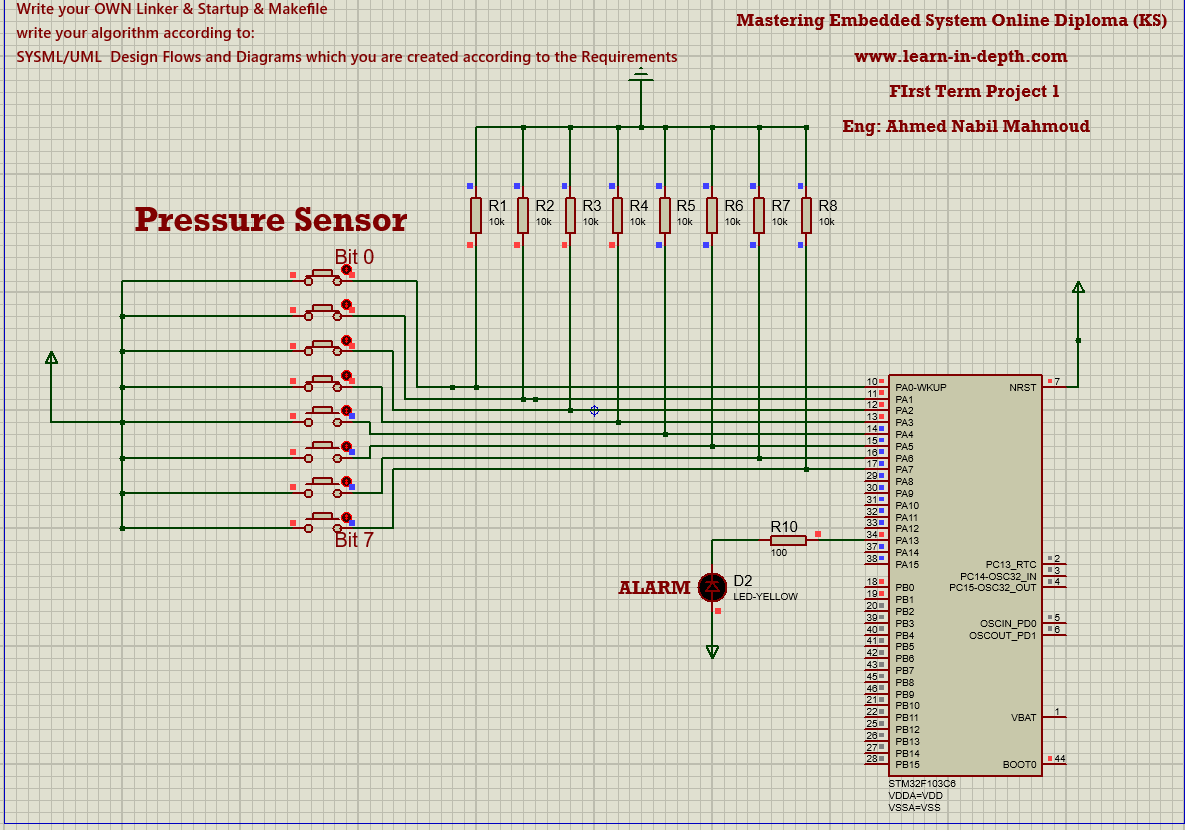


## Sections table



# 10. Simulation

## Pressure less than threshold



## 

## Pressure more than threshold

