

# Design a code module

This article demonstrates how to design a new code module.

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## Header File

A header file:

- Shall have `#pragma` once attribute (google it for the reason)
- Shall NEVER have variables defined

```
// - Note: Remove all lines from your code that start with //-  
// - Put this line as the very first line in your header module  
#pragma once  
  
// - #include all header files that THIS header needs  
// - Do not include headers here that are not needed  
// - For example, we do not need gpio.h file here, but maybe you can move this to switch_led.c  
#include "gpio.h"  
  
  
// - DO NOT put any variables here, like so:  
static int do_not_do_this;  
int definitely_do_not_do_this;  
// - All functions without parameters should be marked as (void)  
void switch_led_logic__initialize(void);  
void switch_led_logic__run_once(void);
```

`#pragma` once is a replacement of

```
#ifndef YOUR_FILE_NAME__  
#define YOUR_FILE_NAME__  
  
void your_api(void);
```

```
#endif
```

Intent of `#pragma` once and `#ifndef`

- When other code modules `#include` your header file, you only want functions to be declared once
- The name of `#ifndef` can be anything unique, but must not conflict with other files
- `#include` literally copies and pastes the contents of the file in the file wherever you have the `#include`

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## Source File

A source file:

- Shall have all variables defined as static; this will keep their visibility private to their file

```
// - Note: Remove all lines from your code that start with //-  
// - Include the header file for which this code modules belongs to  
#include "switch_led_logic.h"  
// - Declare all variables as STATIC  
static gpio_s my_led;  
// - Define your public functions (part of this module's header file)  
void switch_led_logic__initialize(void) {  
    my_led = gpio__construct_as_output(GPIO__PORT_2, 0);  
}  
void switch_led_logic__run_once(void) {  
    gpio__set(my_led);  
}
```

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## Unit Test file

A unit-test file:

- Shall `#include` the headers that you want (those that should not be "mocked")
- Shall `#include` Mock headers to generate stubs (rather than the full implementation)

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## Useful stuff

Clang auto-formatter will format the source code for you. It will also sort the #includes, so it is recommended to put an empty line such that it sorts the #includes more elegantly. For example, you can separate the FreeRTOS includes, system includes, and other includes.

```
//- Note: Remove all lines from your code that start with //-  
//- Include system includes first  
#include <stdio.h>  
//- FreeRTOS requires this header file inclusion before any of its source code  
//- This only applies to code included from FreeRTOS  
#include "FreeRTOS.h"  
#include "semphr.h"  
#include "task.h"  
//- Clang will sort these  
#include "abc.h"#include "def.h"
```

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## Try the following

- Have two code modules, such as `main.c` and `periodic_callbacks.c` include a header file that does not have `#pragma once` and observe what happens when you compile

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