VIETNAM NATIONAL UNIVERSITY - HCM
Ho Chi Minh City University of Technology
Faculty of Computer Science and Engineering

EMBEDDED SYSTEM (CO3053)

ESP32 LAB 02

ESP32 GPIO and FreeRTOS task

Name	Student's ID
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Contents

1 Create printing student ID task

These are some library that I included:

```c
#include <stdio.h>
#include "freertos/FreeRTOS.h"
#include "freertos/task.h"
#include "sdkconfig.h"
#include "driver/gpio.h"
```

A task printing my student ID every second is implemented as below:

```c
void task1(void *p){
    while(1){
        printf("1752392\n");
        vTaskDelay(1000/portTICK_PERIOD_MS);
    }
    vTaskDelete(NULL);
}
```

The "portTICK_PERIOD_MS" is a constant that has been defined before in the library. The value of "port_PERIOD_MS" is 10, which means that 1 port tick takes 10ms. Therefore 1000/portTICK_PERIOD_MS = 1000/10 = 100 port ticks. 100 port ticks will take 1000ms = 1 second.

2 Create pressing button task

I used button "BOOT" on the ESP32 as a button input. The GPIO of button "BOOT" is 0. Below is how I set up the push button:

```c
#define push_gpio 0

void setup_push(void){
    gpio_pad_select_gpio(push_gpio);
    gpio_set_direction(push_gpio, GPIO_MODE_INPUT);
    gpio_set_pull_mode(push_gpio, GPIO_PULLDOWN_ONLY);
}
```

Below is how I implemented the task to print ”ESP32” every when the button is pressed:

```c
void task2(void *p){
    unsigned int flag = 0;
    while(1){
        if(gpio_get_level(push_gpio) != 0){
            flag = 0;
            vTaskDelay(18/portTICK_PERIOD_MS);
        }

        if (gpio_get_level(push_gpio) == 0){
            vTaskDelay(27/portTICK_PERIOD_MS);

            if (gpio_get_level(push_gpio) == 0){
                if (flag == 0){
                    printf("ESP32\n");
                    flag = 1;
                }
            }
        }
    }
    vTaskDelete(NULL);
}
```

Two delay lines (line 6 and line 10) are used for debouncing button.

3 Full code

Below is my full code:

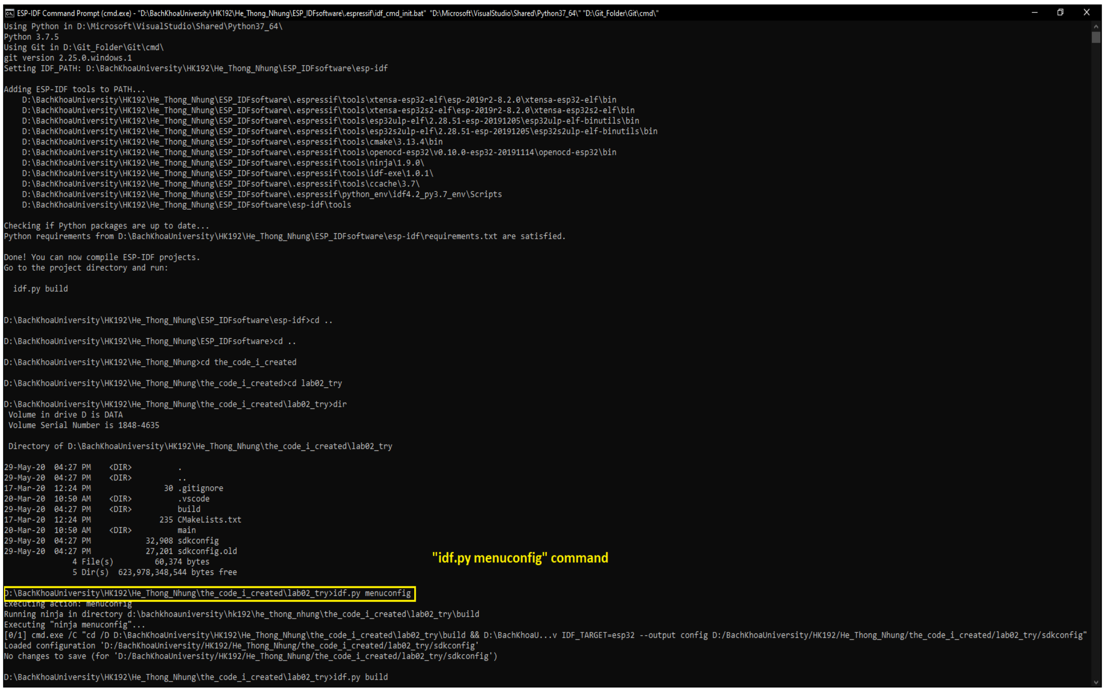
```c
#include <stdio.h>
#include "freertos/FreeRTOS.h"
#include "freertos/task.h"
#include "sdkconfig.h"
#include "driver/gpio.h"

#define push_gpio 0

void task1(void *p){
    while(1){
        printf("1752392\n");
        vTaskDelay(1000/portTICK_PERIOD_MS);
    }
    vTaskDelete(NULL);
}

void task2(void *p){
    unsigned int flag = 0;
    while(1){
        if(gpio_get_level(push_gpio) != 0){
            flag = 0;
            vTaskDelay(18/portTICK_PERIOD_MS);
        }

        if (gpio_get_level(push_gpio) == 0){
            vTaskDelay(27/portTICK_PERIOD_MS);

            if (gpio_get_level(push_gpio) == 0){
                if (flag == 0){
                    printf("ESP32\n");
                    flag = 1;
                }
            }
        }
    }
    vTaskDelete(NULL);
}

void setup_push(void){
    gpio_pad_select_gpio(push_gpio);
    gpio_set_direction(push_gpio, GPIO_MODE_INPUT);
    gpio_set_pull_mode(push_gpio, GPIO_PULLDOWN_ONLY);
}

void app_main()
{
    setup_push();
    xTaskCreate(&task1, "task1", 1024*2, (void*) 0, tskIDLE_PRIORITY + 1, NULL);
    xTaskCreate(&task2, "task2", 1024*2, (void*) 0, tskIDLE_PRIORITY + 2, NULL);

}
```

4 Answer the question

Does the ESP-IDF need the vTaskStartScheduler() routine?
Answer: According to what I have done in this lab, vTaskStartSchedular() function is not neccessary to be called, everything worked just fine.

5 Result Snapshot

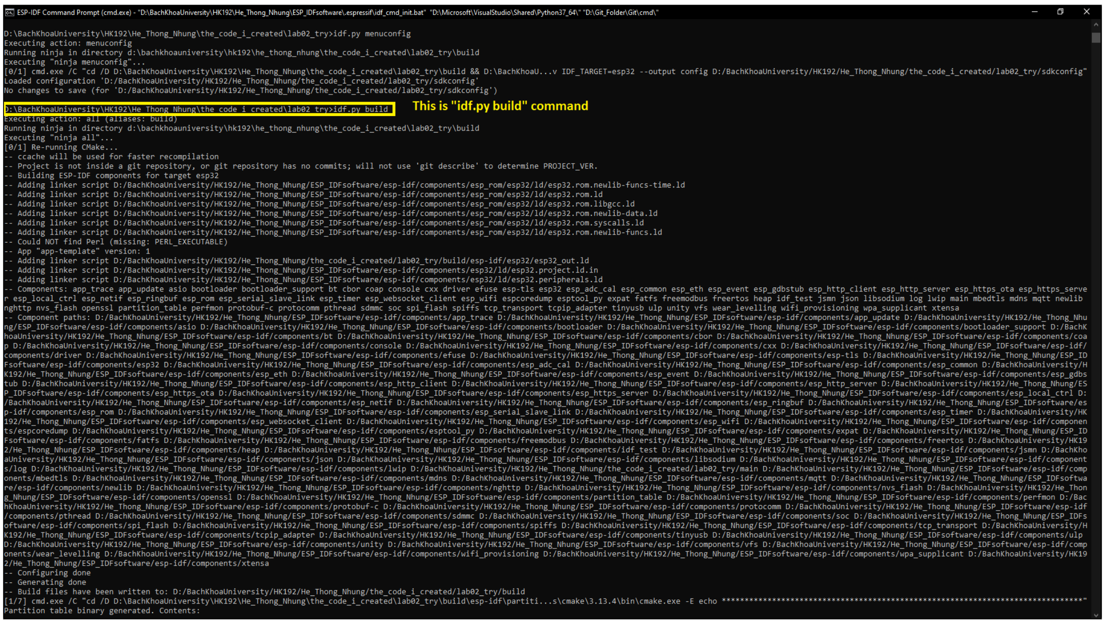
Please zoom in to see more clearly



ESP-IDF Command Prompt (cmd.exe) - "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\idf_cmd_init.bat" "D:\Microsoft\VisualStudio\Shared\Python37_64\" "D:\Git_Folder\Git\cmd\"
"idf.py menuconfig" command

```
Using Python in D:\Microsoft\VisualStudio\Shared\Python37_64\
Python 3.7.5
Using Git in D:\Git_Folder\Git\cmd\
git version 2.25.0.windows.1
Setting IDF_PATH: D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf

Adding ESP-IDF tools to PATH...
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\xtensa-esp32-elf\esp-2019r2-8.2.0\xtensa-esp32-elf\bin
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\xtensa-esp32s2-elf\esp-2019r2-8.2.0\xtensa-esp32s2-elf\bin
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\esp32ulp-elf\2.28.51-esp-20191205\esp32ulp-elf-binutils\bin
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\esp32s2ulp-elf\2.28.51-esp-20191205\esp32s2ulp-elf-binutils\bin
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\cmake\3.13.4\bin
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\openocd-esp32\v0.10.0-esp32-20191114\openocd-esp32\bin
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\ninja\1.9.0\
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\idf-exe\1.0.1\
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\tools\ccache\3.7\
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\python_env\idf4.2_py3.7_env\Scripts
    D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf\tools

Checking if Python packages are up to date...
Python requirements from D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf\requirements.txt are satisfied.

Done! You can now compile ESP-IDF projects.
Go to the project directory and run:

  idf.py build


D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf>cd ..

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware>cd ..

D:\BachKhoaUniversity\HK192\He_Thong_Nhung>cd the_code_i_created

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created>cd lab02_try

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try>dir
 Volume in drive D is DATA
 Volume Serial Number is 1848-4635

 Directory of D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try

29-May-20  04:27 PM    <DIR>          .
29-May-20  04:27 PM    <DIR>          ..
17-Mar-20  12:24 PM                30 .gitignore
20-Mar-20  10:50 AM    <DIR>          .vscode
29-May-20  04:27 PM    <DIR>          build
17-Mar-20  12:24 PM               235 CMakeLists.txt
20-Mar-20  10:50 AM    <DIR>          main
29-May-20  04:27 PM            32,908 sdkconfig
29-May-20  04:27 PM            27,201 sdkconfig.old
               4 File(s)         60,374 bytes
               5 Dir(s)  623,978,348,544 bytes free

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try>idf.py menuconfig
Executing action: menuconfig
Running ninja in directory d:\bachkhoauniversity\hk192\he_thong_nhung\the_code_i_created\lab02_try\build
Executing "ninja menuconfig"...
[0/1] cmd.exe /C "cd /D D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try\build && D:\BachKhoaU...v IDF_TARGET=esp32 --output config D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/sdkconfig"
Loaded configuration 'D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/sdkconfig'
No changes to save (for 'D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/sdkconfig')

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try>idf.py build
```

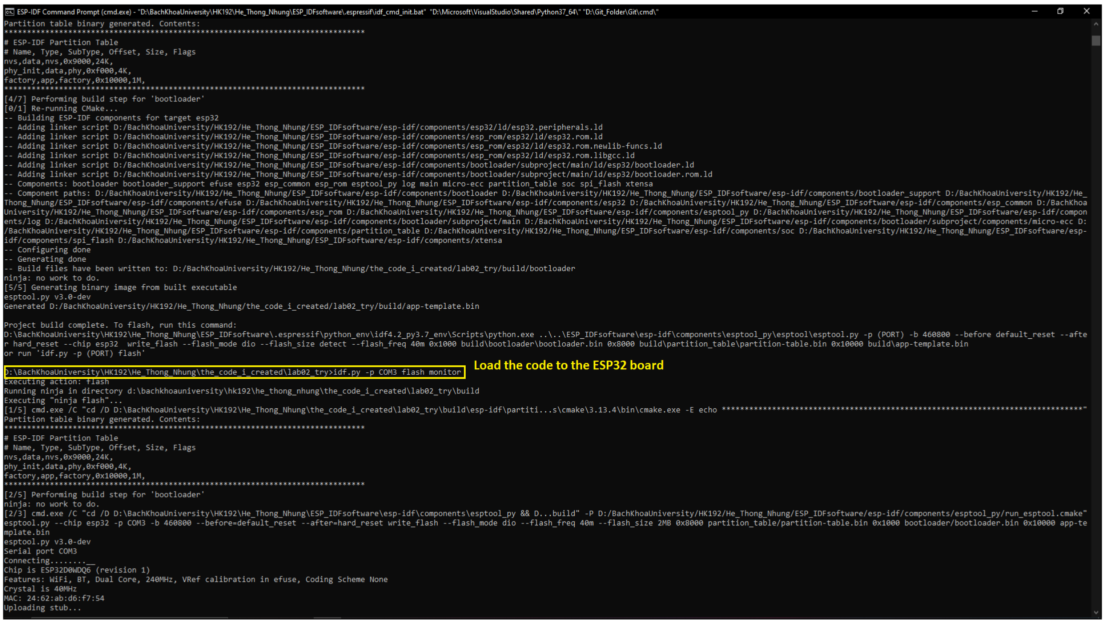
Figure 1


ESP-IDF Command Prompt (cmd.exe) - "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\idf_cmd_init.bat" "D:\Microsoft\VisualStudio\Shared\Python37_64\" "D:\Git_Folder\Git\cmd\"

```
D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try>idf.py menuconfig
Executing action: menuconfig
Running ninja in directory d:\bachkhoauniversity\hk192\he_thong_nhung\the_code_i_created\lab02_try\build
Executing "ninja menuconfig"...
[0/1] cmd.exe /C "cd /D D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try\build && D:\BachKhoaU...v IDF_TARGET=esp32 --output config D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/sdkconfig"
Loaded configuration 'D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/sdkconfig'
No changes to save (for 'D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/sdkconfig')

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try>idf.py build
Executing action: all (aliases: build)
Running ninja in directory d:\bachkhoauniversity\hk192\he_thong_nhung\the_code_i_created\lab02_try\build
Executing "ninja all"...
[0/1] Re-running CMake...
-- ccache will be used for faster recompilation
-- Project is not inside a git repository, or git repository has no commits; will not use 'git describe' to determine PROJECT_VER.
-- Building ESP-IDF components for target esp32
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.newlib-funcs-time.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.libgcc.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.newlib-data.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.syscalls.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.newlib-funcs.ld
-- Could NOT find Perl (missing: PERL_EXECUTABLE)
-- App "app-template" version: 1
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/build/esp-idf/esp32/esp32_out.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp32/ld/esp32.project.ld.in
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp32/ld/esp32.peripherals.ld
-- Components: app_trace app_update asio bootloader bootloader_support bt cbor coap console cxx driver efuse esp-tls esp32 esp_adc_cal esp_common esp_eth esp_event esp_gdbstub esp_http_client esp_http_server esp_https_ota esp_https_serve
r esp_local_ctrl esp_netif esp_ringbuf esp_rom esp_serial_slave_link esp_timer esp_websocket_client esp_wifi espcoredump esptool_py expat fatfs freemodbus freertos heap idf_test jsmn json libsodium log lwip main mbedtls mdns mqtt newlib
nghttp nvs_flash openssl partition_table perfmon protobuf-c protocomm pthread sdmmc soc spi_flash spiffs tcp_transport tcpip_adapter tinyusb ulp unity vfs wear_levelling wifi_provisioning wpa_supplicant xtensa
-- Component paths: D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/app_trace D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/app_update D:/BachKhoaUniversity/HK192/He_Thong_Nhu
ng/ESP_IDFsoftware/esp-idf/components/asio D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader_support D:/BachK
hoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bt D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/cbor D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/coa
p D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/console D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/cxx D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/
components/driver D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/efuse D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp-tls D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_ID
Fsoftware/esp-idf/components/esp32 D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_adc_cal D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_common D:/BachKhoaUniversity/H
K192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_eth D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_event D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_gdbs
tub D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_http_client D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_http_server D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ES
P_IDFsoftware/esp-idf/components/esp_https_ota D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_https_server D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_local_ctrl D:
/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_netif D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_ringbuf D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/es
p-idf/components/esp_rom D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_serial_slave_link D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_timer D:/BachKhoaUniversity/HK
192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_websocket_client D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_wifi D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/componen
ts/espcoredump D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esptool_py D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/expat D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_ID
Fsoftware/esp-idf/components/fatfs D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/freemodbus D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/freertos D:/BachKhoaUniversity/HK19
2/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/heap D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/idf_test D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/jsmn D:/BachKho
aUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/json D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/libsodium D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/component
s/log D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/lwip D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/main D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/comp
onents/mbedtls D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/mdns D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/mqtt D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftwa
re/esp-idf/components/newlib D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/nghttp D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/nvs_flash D:/BachKhoaUniversity/HK192/He_Thon
g_Nhung/ESP_IDFsoftware/esp-idf/components/openssl D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/partition_table D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/perfmon D:/Bac
hKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/protobuf-c D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/protocomm D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf
/components/pthread D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/sdmmc D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/soc D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFs
oftware/esp-idf/components/spi_flash D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/spiffs D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/tcp_transport D:/BachKhoaUniversity/H
K192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/tcpip_adapter D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/tinyusb D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/ulp
D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/unity D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/vfs D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/comp
onents/wear_levelling D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/wifi_provisioning D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/wpa_supplicant D:/BachKhoaUniversity/HK19
2/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/xtensa
-- Configuring done
-- Generating done
-- Build files have been written to: D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/build
[1/7] cmd.exe /C "cd /D D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try\build\esp-idf\partiti...s\cmake\3.13.4\bin\cmake.exe -E echo ********************************************************************************"
Partition table binary generated. Contents:
```

This is "idf.py build" command

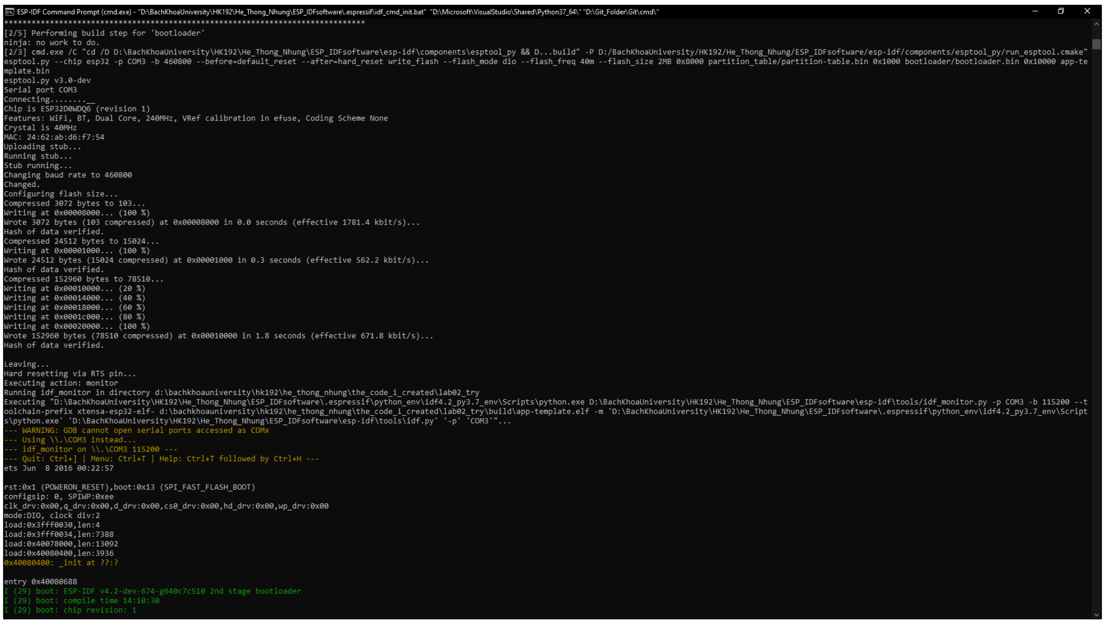
Figure 2


ESP-IDF Command Prompt (cmd.exe) - "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\idf_cmd_init.bat" "D:\Microsoft\VisualStudio\Shared\Python37_64\" "D:\Git_Folder\Git\cmd\"

```
Partition table binary generated. Contents:
*******************************************************************************
# ESP-IDF Partition Table
# Name, Type, SubType, Offset, Size, Flags
nvs,data,nvs,0x9000,24K,
phy_init,data,phy,0xf000,4K,
factory,app,factory,0x10000,1M,
*******************************************************************************
[4/7] Performing build step for 'bootloader'
[0/1] Re-running CMake...
-- Building ESP-IDF components for target esp32
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp32/ld/esp32.peripherals.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.newlib-funcs.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom/esp32/ld/esp32.rom.libgcc.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader/subproject/main/ld/esp32/bootloader.ld
-- Adding linker script D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader/subproject/main/ld/esp32/bootloader.rom.ld
-- Components: bootloader bootloader_support efuse esp32 esp_common esp_rom esptool_py log main micro-ecc partition_table soc spi_flash xtensa
-- Component paths: D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader_support D:/BachKhoaUniversity/HK192/He_
Thong_Nhung/ESP_IDFsoftware/esp-idf/components/efuse D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp32 D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_common D:/BachKhoa
University/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp_rom D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esptool_py D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/compon
ents/log D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader/subproject/main D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/bootloader/subproject/components/micro-ecc D:
/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/partition_table D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/soc D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-
idf/components/spi_flash D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/xtensa
-- Configuring done
-- Generating done
-- Build files have been written to: D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/build/bootloader
ninja: no work to do.
[5/5] Generating binary image from built executable
esptool.py v3.0-dev
Generated D:/BachKhoaUniversity/HK192/He_Thong_Nhung/the_code_i_created/lab02_try/build/app-template.bin

Project build complete. To flash, run this command:
D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\python_env\idf4.2_py3.7_env\Scripts\python.exe ..\..\ESP_IDFsoftware\esp-idf\components\esptool_py\esptool\esptool.py -p (PORT) -b 460800 --before default_reset --afte
r hard_reset --chip esp32  write_flash --flash_mode dio --flash_size detect --flash_freq 40m 0x1000 build\bootloader\bootloader.bin 0x8000 build\partition_table\partition-table.bin 0x10000 build\app-template.bin
or run 'idf.py -p (PORT) flash'

D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try>idf.py -p COM3 flash monitor
Executing action: flash
Running ninja in directory d:\bachkhoauniversity\hk192\he_thong_nhung\the_code_i_created\lab02_try\build
Executing "ninja flash"...
[1/5] cmd.exe /C "cd /D D:\BachKhoaUniversity\HK192\He_Thong_Nhung\the_code_i_created\lab02_try\build\esp-idf\partiti...s\cmake\3.13.4\bin\cmake.exe -E echo ********************************************************************************"
Partition table binary generated. Contents:
*******************************************************************************
# ESP-IDF Partition Table
# Name, Type, SubType, Offset, Size, Flags
nvs,data,nvs,0x9000,24K,
phy_init,data,phy,0xf000,4K,
factory,app,factory,0x10000,1M,
*******************************************************************************
[2/5] Performing build step for 'bootloader'
ninja: no work to do.
[2/3] cmd.exe /C "cd /D D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf\components\esptool_py && D...build" -P D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esptool_py/run_esptool.cmake"
esptool.py --chip esp32 -p COM3 -b 460800 --before=default_reset --after=hard_reset write_flash --flash_mode dio --flash_freq 40m --flash_size 2MB 0x8000 partition_table/partition-table.bin 0x1000 bootloader/bootloader.bin 0x10000 app-te
mplate.bin
esptool.py v3.0-dev
Serial port COM3
Connecting........__
Chip is ESP32D0WDQ6 (revision 1)
Features: WiFi, BT, Dual Core, 240MHz, VRef calibration in efuse, Coding Scheme None
Crystal is 40MHz
MAC: 24:62:ab:d6:f7:54
Uploading stub...
```

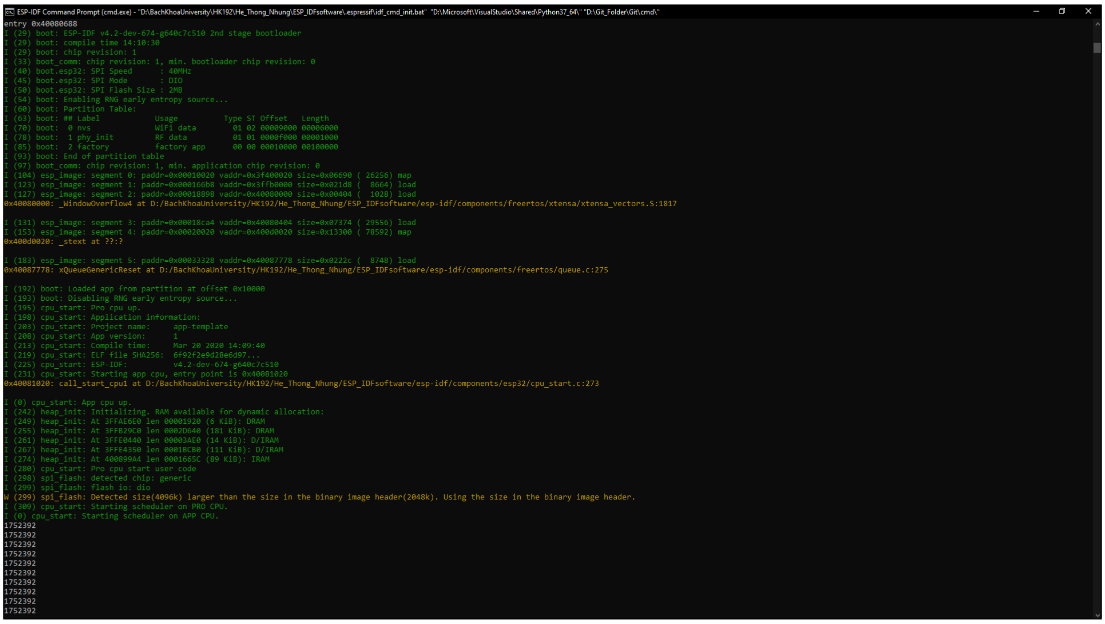
Load the code to the ESP32 board

Figure 3


ESP-IDF Command Prompt (cmd.exe) - "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\idf_cmd_init.bat" "D:\Microsoft\VisualStudio\Shared\Python37_64\" "D:\Git_Folder\Git\cmd\"

```
********************************************************************************
[2/5] Performing build step for 'bootloader'
ninja: no work to do.
[2/3] cmd.exe /C "cd /D D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf\components\esptool_py && D...build" -P D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esptool_py/run_esptool.cmake"
esptool.py --chip esp32 -p COM3 -b 460800 --before=default_reset --after=hard_reset write_flash --flash_mode dio --flash_freq 40m --flash_size 2MB 0x8000 partition_table/partition-table.bin 0x1000 bootloader/bootloader.bin 0x10000 app-te
mplate.bin
esptool.py v3.0-dev
Serial port COM3
Connecting........__
Chip is ESP32D0WDQ6 (revision 1)
Features: WiFi, BT, Dual Core, 240MHz, VRef calibration in efuse, Coding Scheme None
Crystal is 40MHz
MAC: 24:62:ab:d6:f7:54
Uploading stub...
Running stub...
Stub running...
Changing baud rate to 460800
Changed.
Configuring flash size...
Compressed 3072 bytes to 103...
Writing at 0x00008000... (100 %)
Wrote 3072 bytes (103 compressed) at 0x00008000 in 0.0 seconds (effective 1781.4 kbit/s)...
Hash of data verified.
Compressed 24512 bytes to 15024...
Writing at 0x00001000... (100 %)
Wrote 24512 bytes (15024 compressed) at 0x00001000 in 0.3 seconds (effective 562.2 kbit/s)...
Hash of data verified.
Compressed 152960 bytes to 78510...
Writing at 0x00010000... (20 %)
Writing at 0x00014000... (40 %)
Writing at 0x00018000... (60 %)
Writing at 0x0001c000... (80 %)
Writing at 0x00020000... (100 %)
Wrote 152960 bytes (78510 compressed) at 0x00010000 in 1.8 seconds (effective 671.8 kbit/s)...
Hash of data verified.

Leaving...
Hard resetting via RTS pin...
Executing action: monitor
Running idf_monitor in directory d:\bachkhoauniversity\hk192\he_thong_nhung\the_code_i_created\lab02_try
Executing "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\python_env\idf4.2_py3.7_env\Scripts\python.exe D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf\tools/idf_monitor.py -p COM3 -b 115200 --t
oolchain-prefix xtensa-esp32-elf- d:\bachkhoauniversity\hk192\he_thong_nhung\the_code_i_created\lab02_try\build\app-template.elf -m 'D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\python_env\idf4.2_py3.7_env\Script
s\python.exe' 'D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\esp-idf\tools\idf.py' '-p' 'COM3'"...
--- WARNING: GDB cannot open serial ports accessed as COMx
--- Using \\.\COM3 instead...
--- idf_monitor on \\.\COM3 115200 ---
--- Quit: Ctrl+] | Menu: Ctrl+T | Help: Ctrl+T followed by Ctrl+H ---
ets Jun  8 2016 00:22:57

rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:4
load:0x3fff0034,len:7388
load:0x40078000,len:13092
load:0x40080400,len:3936
0x40080400: _init at ??:?

entry 0x40080688
I (29) boot: ESP-IDF v4.2-dev-674-g640c7c510 2nd stage bootloader
I (29) boot: compile time 14:10:30
I (29) boot: chip revision: 1
```

Figure 4


ESP-IDF Command Prompt (cmd.exe) - "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\idf_cmd_init.bat" "D:\Microsoft\VisualStudio\Shared\Python37_64\" "D:\Git_Folder\Git\cmd\"

```
entry 0x40080688
I (29) boot: ESP-IDF v4.2-dev-674-g640c7c510 2nd stage bootloader
I (29) boot: compile time 14:10:30
I (29) boot: chip revision: 1
I (33) boot_comm: chip revision: 1, min. bootloader chip revision: 0
I (40) boot.esp32: SPI Speed      : 40MHz
I (45) boot.esp32: SPI Mode       : DIO
I (50) boot.esp32: SPI Flash Size : 2MB
I (54) boot: Enabling RNG early entropy source...
I (60) boot: Partition Table:
I (63) boot: ## Label            Usage          Type ST Offset   Length
I (70) boot:  0 nvs              WiFi data        01 02 00009000 00006000
I (78) boot:  1 phy_init         RF data          01 01 0000f000 00001000
I (85) boot:  2 factory          factory app      00 00 00010000 00100000
I (93) boot: End of partition table
I (97) boot_comm: chip revision: 1, min. application chip revision: 0
I (104) esp_image: segment 0: paddr=0x00010020 vaddr=0x3f400020 size=0x06690 ( 26256) map
I (123) esp_image: segment 1: paddr=0x000166b8 vaddr=0x3ffb0000 size=0x021d8 (  8664) load
I (127) esp_image: segment 2: paddr=0x00018898 vaddr=0x40080000 size=0x00404 (  1028) load
0x40080000: _WindowOverflow4 at D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/freertos/xtensa/xtensa_vectors.S:1817

I (131) esp_image: segment 3: paddr=0x00018ca4 vaddr=0x40080404 size=0x07374 ( 29556) load
I (153) esp_image: segment 4: paddr=0x00020020 vaddr=0x400d0020 size=0x13300 ( 78592) map
0x400d0020: _stext at ??:?

I (183) esp_image: segment 5: paddr=0x00033328 vaddr=0x40087778 size=0x0222c (  8748) load
0x40087778: xQueueGenericReset at D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/freertos/queue.c:275

I (192) boot: Loaded app from partition at offset 0x10000
I (193) boot: Disabling RNG early entropy source...
I (195) cpu_start: Pro cpu up.
I (198) cpu_start: Application information:
I (203) cpu_start: Project name:     app-template
I (208) cpu_start: App version:      1
I (213) cpu_start: Compile time:     Mar 20 2020 14:09:40
I (219) cpu_start: ELF file SHA256:  6f92f2e9d28e6d97...
I (225) cpu_start: ESP-IDF:          v4.2-dev-674-g640c7c510
I (231) cpu_start: Starting app cpu, entry point is 0x40081020
0x40081020: call_start_cpu1 at D:/BachKhoaUniversity/HK192/He_Thong_Nhung/ESP_IDFsoftware/esp-idf/components/esp32/cpu_start.c:273

I (0) cpu_start: App cpu up.
I (242) heap_init: Initializing. RAM available for dynamic allocation:
I (249) heap_init: At 3FFAE6E0 len 00001920 (6 KiB): DRAM
I (255) heap_init: At 3FFB29C0 len 0002D640 (181 KiB): DRAM
I (261) heap_init: At 3FFE0440 len 00003AE0 (14 KiB): D/IRAM
I (267) heap_init: At 3FFE4350 len 0001BCB0 (111 KiB): D/IRAM
I (274) heap_init: At 400899A4 len 0001665C (89 KiB): IRAM
I (280) cpu_start: Pro cpu start user code
I (298) spi_flash: detected chip: generic
I (299) spi_flash: flash io: dio
W (299) spi_flash: Detected size(4096k) larger than the size in the binary image header(2048k). Using the size in the binary image header.
I (309) cpu_start: Starting scheduler on PRO CPU.
I (0) cpu_start: Starting scheduler on APP CPU.
1752392
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1752392
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```
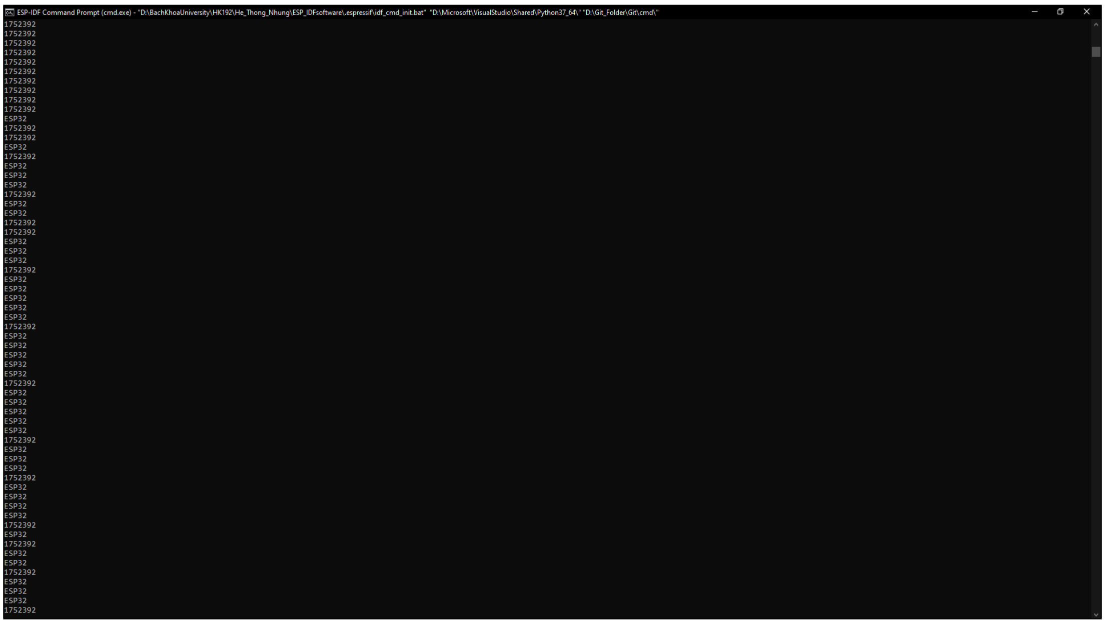

Figure 5



ESP-IDF Command Prompt (cmd.exe) - "D:\BachKhoaUniversity\HK192\He_Thong_Nhung\ESP_IDFsoftware\.espressif\idf_cmd_init.bat" "D:\Microsoft\VisualStudio\Shared\Python37_64\" "D:\Git_Folder\Git\cmd\"

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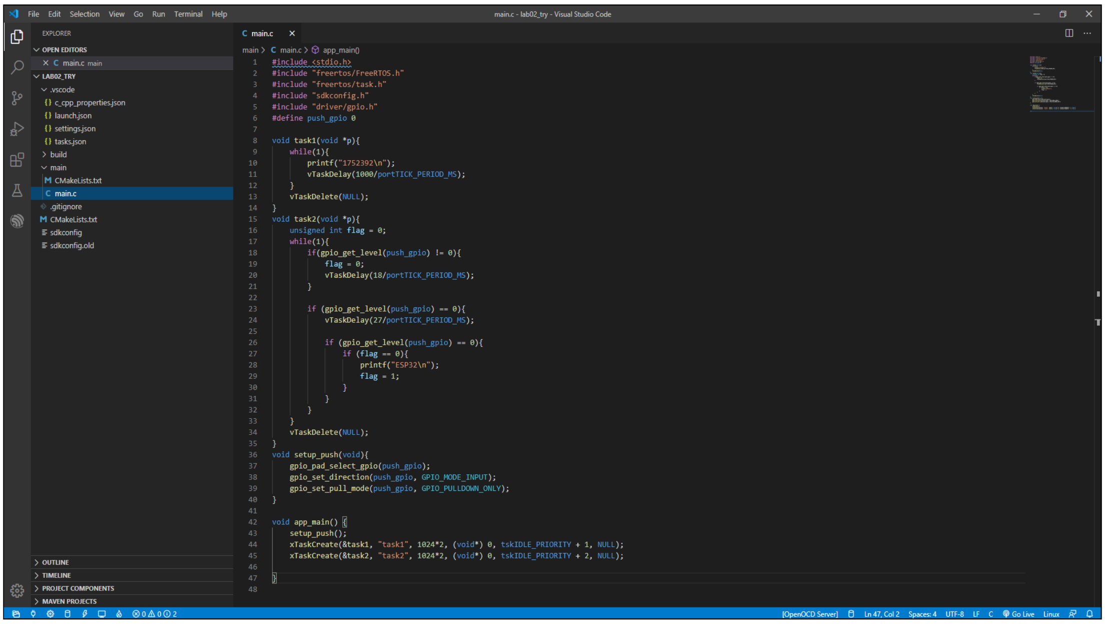
Figure 6



```c
#include <stdio.h>
#include "freertos/FreeRTOS.h"
#include "freertos/task.h"
#include "sdkconfig.h"
#include "driver/gpio.h"
#define push_gpio 0

void task1(void *p){
    while(1){
        printf("1752392\n");
        vTaskDelay(1000/portTICK_PERIOD_MS);
    }
    vTaskDelete(NULL);
}
void task2(void *p){
    unsigned int flag = 0;
    while(1){
        if(gpio_get_level(push_gpio) != 0){
            flag = 0;
            vTaskDelay(18/portTICK_PERIOD_MS);
        }

        if (gpio_get_level(push_gpio) == 0){
            vTaskDelay(27/portTICK_PERIOD_MS);

            if (gpio_get_level(push_gpio) == 0){
                if (flag == 0){
                    printf("ESP32\n");
                    flag = 1;
                }
            }
        }
    }
    vTaskDelete(NULL);
}
void setup_push(void){
    gpio_pad_select_gpio(push_gpio);
    gpio_set_direction(push_gpio, GPIO_MODE_INPUT);
    gpio_set_pull_mode(push_gpio, GPIO_PULLDOWN_ONLY);
}

void app_main() {
    setup_push();
    xTaskCreate(&task1, "task1", 1024*2, (void*) 0, tskIDLE_PRIORITY + 1, NULL);
    xTaskCreate(&task2, "task2", 1024*2, (void*) 0, tskIDLE_PRIORITY + 2, NULL);

}
```

Figure 7: A snapshot of my work space