**BỘ CÔNG THƯƠNG**

**TRƯỜNG ĐẠI HỌC CÔNG NGHIỆP TP. HCM**



**VI ĐIỀU KHIỂN**

**BÀI BÁO CÁO 3**

**NHÓM 1**

Giảng viên : **PHẠM QUANG TRÍ**

Sinh viên :

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**TP.HCM – 2022**

**Bài tập mức độ 3:**

1. **Sơ đồ nguyên lí kết nối phần cứng tối thiểu dùng STM32:**

Diagram, schematic

Description automatically generated

1. **Cách thiết lập chức năng trong phần mềm CubeMX:**

**Bước 1**: Khởi động phần mềm CubeMX, tạo New Project và chọn mã số STM32F103C8T6.

Graphical user interface, text, application

Description automatically generated

**Bước 2**: Chọn mạch nạp:

Graphical user interface

Description automatically generated

**Bước 3**: Chọn bộ mạch động:

Graphical user interface, application

Description automatically generated

**Bước 4:** Chọn tần số giao động:

Graphical user interface

Description automatically generated

**Bước 5**: Cấu hình chân GPIO Output và Input

* Chọn chân PB8 đến PB15 nối với led từ led0 đến led7
* Chọn chân PB3, PB4 là chân nối với nút nhấn KEY0, KEY1 và có chức năng ngắt

Graphical user interface

Description automatically generated

**Bước 6:** Cấu hình chức năng cho chân ngắt

Graphical user interface

Description automatically generated

Graphical user interface, application

Description automatically generated

**Bước 6:** Cho phép ngắt

Graphical user interface

Description automatically generated

**Bước 7**: Đặt tên cho Project và chọn nơi lưu trữ, chọn phần mềm viết chương trình

Graphical user interface, text, application, email

Description automatically generated

1. **Lưu đồ giải thuật:**

**Chương trình con:**

**Diagram

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Diagram

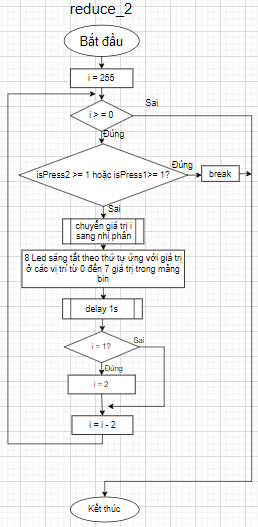
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**Chương trình ngắt:**

**Diagram

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**Chương trình chính:**

Diagram

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1. **Mã nguồn chương trình:**

**Chương trình ngắt:**

/\* USER CODE BEGIN PV \*/

extern int isPress2;

extern int isPress1;

/\* USER CODE END PV \*/

…

void EXTI3\_IRQHandler(void)

{

/\* USER CODE BEGIN EXTI3\_IRQn 0 \*/

/\* USER CODE END EXTI3\_IRQn 0 \*/

HAL\_GPIO\_EXTI\_IRQHandler(GPIO\_PIN\_3);

/\* USER CODE BEGIN EXTI3\_IRQn 1 \*/

isPress1++;

/\* USER CODE END EXTI3\_IRQn 1 \*/

}

void EXTI4\_IRQHandler(void)

{

/\* USER CODE BEGIN EXTI4\_IRQn 0 \*/

/\* USER CODE END EXTI4\_IRQn 0 \*/

HAL\_GPIO\_EXTI\_IRQHandler(GPIO\_PIN\_4);

/\* USER CODE BEGIN EXTI4\_IRQn 1 \*/

isPress2++;

/\* USER CODE END EXTI4\_IRQn 1 \*/

}

**Chương trình con:**

void chuyen\_he(int dec)

{

for(int i = 0; i < 8; i++)

{

bin[i] = dec%2;

dec/=2;

}

}

void increase\_1(void)

{

for(int i = 0; i <= 255; i++)

{

if(isPress2 >= 1||isPress1 >= 1)

{

break;

}

chuyen\_he(i);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_8, bin[0]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_9, bin[1]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_10, bin[2]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_11, bin[3]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_12, bin[4]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_13, bin[5]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_14, bin[6]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_15, bin[7]);

HAL\_Delay(1000);

}

}

void increase\_2(void)

{

for(int i = 0; i <= 255; i+=2)

{

if(isPress2 >= 1||isPress1 >= 1)

{

break;

}

chuyen\_he(i);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_8, bin[0]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_9, bin[1]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_10, bin[2]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_11, bin[3]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_12, bin[4]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_13, bin[5]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_14, bin[6]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_15, bin[7]);

HAL\_Delay(1000);

}

}

void reduce\_1(void)

{

for(int i = 255; i >=0; i--)

{

if(isPress2 >= 1||isPress1 >= 1)

{

break;

}

chuyen\_he(i);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_8, bin[0]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_9, bin[1]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_10, bin[2]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_11, bin[3]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_12, bin[4]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_13, bin[5]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_14, bin[6]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_15, bin[7]);

HAL\_Delay(1000);

}

}

void reduce\_2(void)

{

for(int i = 255; i >=0; i-=2)

{

if(isPress2 >= 1||isPress1 >= 1)

{

break;

}

chuyen\_he(i);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_8, bin[0]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_9, bin[1]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_10, bin[2]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_11, bin[3]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_12, bin[4]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_13, bin[5]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_14, bin[6]);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_15, bin[7]);

HAL\_Delay(1000);

if(i == 1)

{

i = 2;

}

}

}

void led\_off(void)

{

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_8, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_9, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_10, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_11, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_12, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_13, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_14, 0);

HAL\_GPIO\_WritePin(GPIOB, GPIO\_PIN\_15, 0);

}

void Toggle(void)

{

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_8);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_9);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_10);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_11);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_12);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_13);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_14);

HAL\_GPIO\_TogglePin(GPIOB, GPIO\_PIN\_15);

}

void Reset()

{

isPress1 = 0;

isPress2 = 0;

timePress1 = 0;

timePress2 = 0;

time\_double1 = 0;

time\_double2 = 0;

}

**Chương trình chính:**

**…**

/\* USER CODE BEGIN PV \*/

uint8\_t bin[8];

int isPress1 = 0;

int isPress2 = 0;

uint8\_t doublePress1 = 0;

uint8\_t doublePress2 = 0;

uint32\_t timePress1 = 0;

uint32\_t timePress2 = 0;

uint8\_t time\_double1 = 0;

uint8\_t time\_double2 = 0;

/\* USER CODE END PV \*/

…

int main(void)

{

/\* USER CODE BEGIN 1 \*/

/\* USER CODE END 1 \*/

/\* MCU Configuration--------------------------------------------------------\*/

/\* Reset of all peripherals, Initializes the Flash interface and the Systick. \*/

HAL\_Init();

/\* USER CODE BEGIN Init \*/

/\* USER CODE END Init \*/

/\* Configure the system clock \*/

SystemClock\_Config();

/\* USER CODE BEGIN SysInit \*/

/\* USER CODE END SysInit \*/

/\* Initialize all configured peripherals \*/

MX\_GPIO\_Init();

/\* USER CODE BEGIN 2 \*/

led\_off();

/\* USER CODE END 2 \*/

/\* Infinite loop \*/

/\* USER CODE BEGIN WHILE \*/

while (1)

{

/\* USER CODE END WHILE \*/

/\* USER CODE BEGIN 3 \*/

if(isPress1 >= 1)

{

while(1)

{

HAL\_Delay(1);

timePress1+=1;

if(isPress1 >= 2)

{

for(int i = 0; i < 7; i++)

{

HAL\_Delay(150);

time\_double1 += 1;

if(isPress1>=3)

{

break;

}

}

break;

}

}

}

if(isPress2 >= 1)

{

while(1)

{

HAL\_Delay(1);

timePress2+=1;

if(isPress2 >= 2)

{

for(int i = 0; i < 7; i++)

{

HAL\_Delay(150);

time\_double2 += 1;

if(isPress2>=3)

{

break;

}

}

break;

}

}

}

if(time\_double1 >= 7 && timePress1 > 0 && timePress1 < 1000)

{

Reset();

Toggle();

}

if(time\_double1 >= 7 && timePress1 >= 1000 && timePress1 <= 5000)

{

Reset();

increase\_1();

}

if(time\_double1 >= 7 && timePress1 > 5000)

{

Reset();

reduce\_1();

}

if(time\_double1 < 7 && isPress1>=4)

{

Reset();

increase\_2();

}

if(isPress2 >= 4 && time\_double2 < 7)

{

Reset();

reduce\_2();

}

if(isPress2 >= 2 && time\_double2 >= 7)

{

Reset();

led\_off();

}

}

/\* USER CODE END 3 \*/

}

…

1. **Video minh chứng:**

Link youtube: <https://www.youtube.com/watch?v=U7L0f0cCE0I>