Team name:	*A1*
Homework number:	*HOMEWORK_02*
Due date:	29/09/2024

Contribution	NO	Partial	Full
Piombo			*x*
Fumagalli			*x*
Pierfederici			*x*
Zenoni			*x*
Ferraro			*x*
Notes:			

| Project name	GPIOs and Timers		
Not done	Partially done (major problems)	Partially done (minor problems)	Completed
			x

PART 1a:

We looked for the SND_IN wire (microphone) and we found out that it was connected to microcontroller's pin PA8, while the NUCLEO green LED is connected to PA5.

Then we set the microcontroller's pins using our GUI:
- PA5 as GPIO_Output
- PA8 as GPIO_EXTI8.
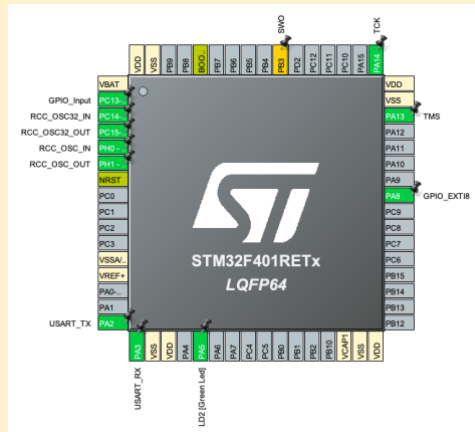
Then we needed to enable the microphone's interrupt (NVIC tab) and to correctly set it as only rising edge trigger detection (GPIO tab).
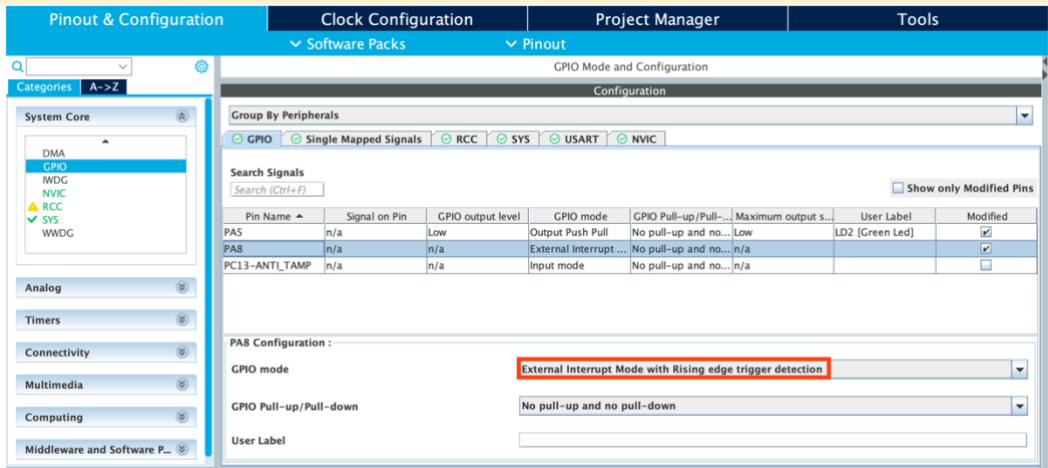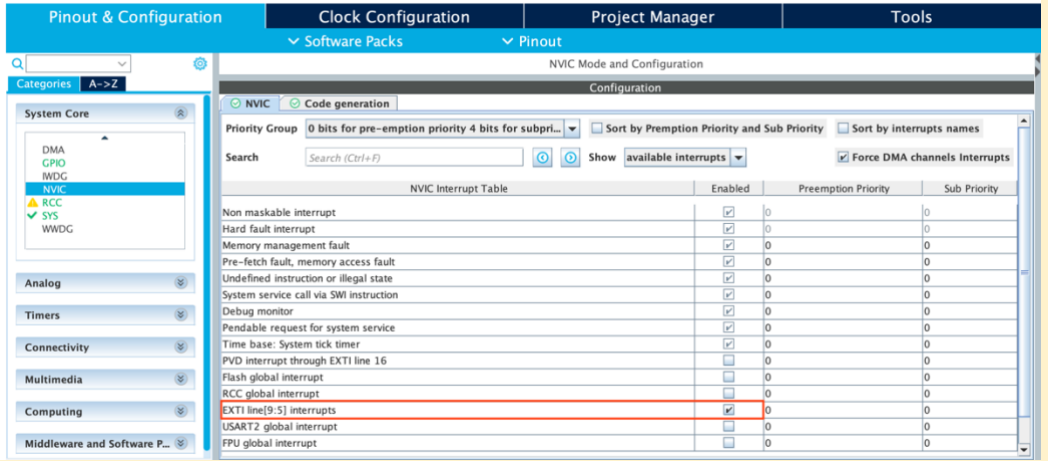
To handle the interrupt we wrote this portion of code (into our main.c file), where LED_PIN has been set by a define:

```
57⊖/* Private user code ---------------------------
58 /* USER CODE BEGIN 0 */
59⊖void HAL_GPIO_EXTI_Callback(uint16_t GPIO_Pin)
60 {
61     switch(GPIO_Pin){
62     case GPIO_PIN_8:
63         HAL_GPIO_TogglePin(LED_PIN);
64         break;
65     default:
66         break;
67     }
68 }
69 /* USER CODE END 0 */
```

When an interrupt occurs we check if pin 8 caused it, in this case we toggle the green led.

PART 1b:

To make green LED blink we need to connect it to a timer configured in PWM generation mode. In order to do this we checked which timer can be connected to our green LED (PA5): timer 2, channel 1.

Then we configured the timer registers to achieve our target frequency (1Hz) and duty cycle (50%), accordingly to these formulas:

PWM frequency:
$$f_{PWM} = \frac{f_{TIM}}{(ARR+1)\cdot(PSC+1)}$$

PWM Duty Cycle:
$$DC = \frac{CCRx+1}{ARR+1}$$

In the main.c file we started the PWM generation with the proper HAL function:

```
97     /* USER CODE BEGIN 2 */
98
99       HAL_TIM_PWM_Start(&htim2, TIM_CHANNEL_1);
100
101    /* USER CODE END 2 */
```

Professor comments: