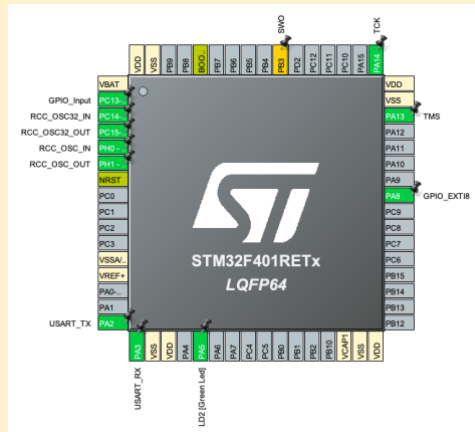


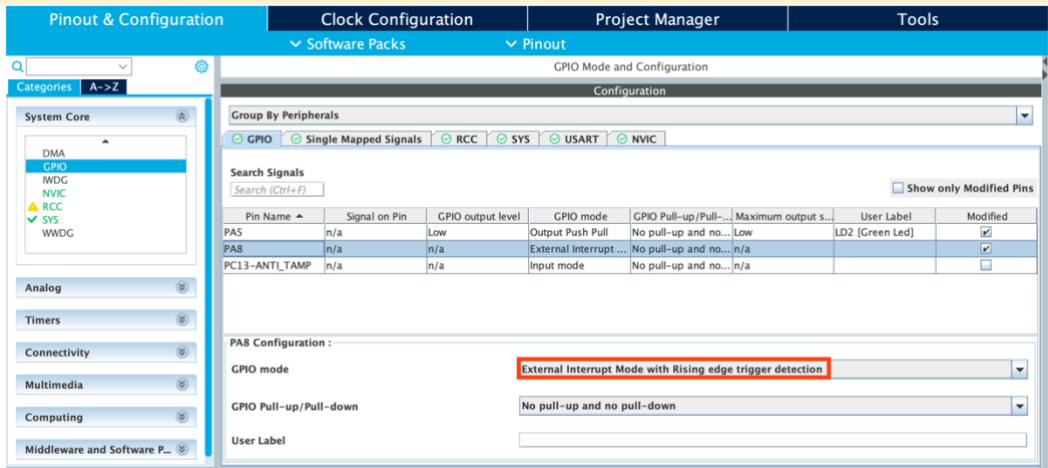
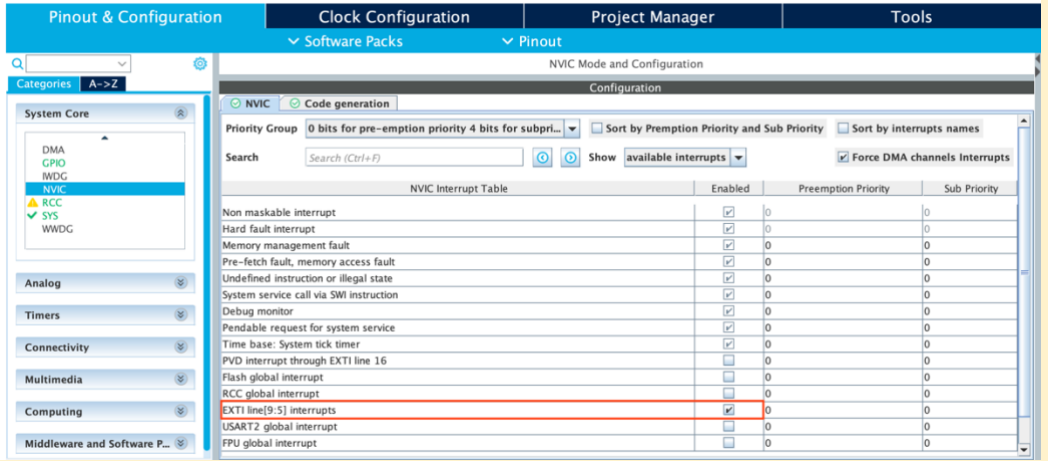
Mark	1/11
------	------

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
<p><b>PART 1a:</b></p> <p>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.</p> <p>Then we set the microcontroller's pins using our GUI:</p> <ul style="list-style-type: none"> <li>- PA5 as GPIO_Output</li> <li>- PA8 as GPIO_EXTI8.</li> </ul>			



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:

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

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

The screenshot shows the STM32CubeMX Pinout & Configuration window. The left sidebar shows the System Core components (DMA, GPIO, IWDG, NVIC, RCC, SYS, WWDG) and the Timers section with TIM2 selected. The main window displays the TIM2 Mode and Configuration settings. The Mode section shows Slave Mode set to Disable, Trigger Source set to Disable, Clock Source set to Internal Clock, Channel1 set to PWM Generation CH1, and Channel2 set to Disable. The Configuration section shows the Reset Configuration button and the Parameter Settings tab. The Counter Settings section shows Prescaler (PSC - 16 bits value) set to 8400-1, Counter Mode set to Up, Counter Period (AutoReload Register - 32 bits value) set to 10000-1, Internal Clock Division (CKD) set to No Division, and auto-reload preload set to Disable. The Trigger Output (TRGO) Parameters section shows Master/Slave Mode (MSM bit) set to Disable (Trigger input effect not delayed) and Trigger Event Selection set to Reset (UG bit from TIMx\_EGR). The PWM Generation Channel 1 section shows Mode set to PWM mode 1, Pulse (32 bits value) set to 5000-1, Output compare preload set to Enable, Fast Mode set to Disable, and CH Polarity set to High.

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: