

EE 186 LAB 2

- 1.
2. Push button
 - a. Explain how external interrupts work and how the ISR handles button presses. What happens to the main loop? When does the ISR get executed? What would happen if you did not clear the EXTI pending flag inside the ISR?
 - b. External interrupts work by triggering a flag (some signal) that the processor handles by stacking its current registers to process something more urgent in response to the button press. The button press raises a GPIO input and this triggers the program to call an interrupt handler function. This is known as the ISR (interrupt service routine). If the EXTI pending flag is not cleared then the interrupt will keep triggering over and over again until a higher priority interrupt comes along, processes, and then it will go right back to that first interrupt.
 - c. See video
3. Timer
 - a. A timer module works by incrementing or decrementing a counter on each clock cycle in the timer clock. The timer clock is affected by a prescaler value which only triggers every n chip clock cycle so as to optionally slow it down. The prescaler sets the resolution of the timer. Then when the counter reaches a certain value, it triggers an interrupt and also triggers a hardware reset of the counter.
 - b. The timer only needs to trigger every second with a frequency of 1Hz. The HSI frequency is 16 MHz. The prescaler can only be a 16-bit number, so I'll set the Prescaler to 64,000 and the ARR to 1,000 so that $PSC * ARR = 16 * 10^6$
 - c. 64,000 in binary is 0b1111101000000000, but since 0b0 counts as "1", we instead set the prescaler to 0b1111100111111111
 - d. The ARR will be 250 (so 249 in binary) = 0b11111001