

# LAB 12A

## INTERRUPT PROGRAMMING

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### OBJECTIVES:

- To write programs using the STM32F10x interrupts.

### REFERENCE:

- Mazidi & Naimi “The STM32F103 Arm Microcontroller and Embedded Systems,” Chapter 12

### MATERIALS:

- Keil IDE
- Blue pill or any other STM32F10x trainer board
- ST-Link V2

### ACTIVITY 1: SYSTEM TICK

Using the SysTick interrupt write a program that toggle PC13 four times a second.

### ACTIVITY 2: TIM2

Rewrite the code of Activity 1 using TIM2.

### ACTIVITY 3: TIM2 AND TIM3

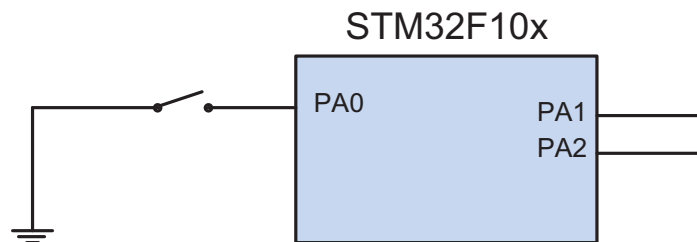
Write a program that blinks PA2 twice a second and blinks PA3 three times a second. Use the TIM2 interrupt for PA2 and TIM3 for PA3.

### ACTIVITY 4: EXTERNAL INTERRUPT

Using the external interrupt for PA0, write a program that makes PA2 high when PA0 becomes low and makes PA2 low when PA0 is high.

### ACTIVITY 5: TIMER AND EXTERNAL INTERRUPT

Using the external interrupt and the timer interrupt, write a program that when PA0 becomes low, PA1 becomes high immediately and after 2 seconds PA2 becomes high. When PA0 becomes high, both PA1 and PA2 become low immediately.



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### ACTIVITY 6: USART

Using the USART interrupt write a program that sends 'H' via serial to the PC with baud rate of 9600.

### ACTIVITY 7: USART

Using the USART interrupt write a program that sends "Hello world" via serial to the PC with baud rate of 9600.

(*Hint:* Store "Hello world" in an array. Define an integer variable naming *next*. The *next* variable is initiated with zero. In the USART ISR send `serialSendArray[next]` and increase *next*. Make the *next* variable zero when you send the last character of the array.)

