TI-RSLK MAX

Texas Instruments Robotics System Learning Kit

Texas Instruments

Module 8

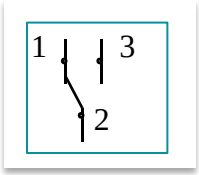
Activity: Interfacing Input and Output

Activity: Interfacing input and output devices using LEDs and Switches

Question 1

You are given a double-pole switch that has three pins, labeled 1, 2, and 3. If the switch is not pressed, pins 1 and 2 are connected (0Ω resistance) and pins 2 and 3 are not connected (infinite resistance). If the switch is pressed, pins 2 and 3 are connected (0Ω resistance) and pins 1 and 2 are not connected (infinite resistance). Pins 1 and 3 are never connected (it is a break-before-make switch). Interface this switch to the microcontroller, such that input pin is high (3.3V) if the switch is pressed and input pin is low (0V) if the switch is not pressed.

You do not need to debounce the switch. Label all chip numbers and resistor values. No software is required. The best solution will not require any resistors.



Question 2

Interface a positive logic switch to P1.5 without an external resistor. Write code to configure Port 1 bit 5 as needed. Write code that waits for the switch to be touched, and then released.

Part a) Develop a solution assuming the switch does not bounce.
Part b) Develop a solution assuming there is 2ms of switch bounce

Question 3

Interface a negative logic switch to P2.6 without an external resistor. Write code to configure Port 2 bit 6 as needed. Write code that waits for the switch to be touched, and then released.

Part a) Develop a solution assuming the switch does not bounce.
Part b) Develop a solution assuming there is 2ms of switch bounce.

Question 4

Interface an LED that requires 1 mA at 2.5 V. A digital output high on the microcontroller turns on the LED. Assume V_{OH} = 3.2V. I.e., this interface is positive logic.

Question 5

Interface an LED that requires 2 mA at 2.0 V. A digital output low on the microcontroller turns on the LED. I.e., this interface is negative logic. Because of the direct connection to the microcontroller, you should use 3.3V to power the LED (and not 5V). Assume V_{OL} = 0.3V.

Question 6

Interface an LED that requires 15 mA at 2.5 V. Use a LM7405 driver and a current limiting resistor. A digital output high on the microcontroller turns on the LED as this interface is positive logic. The LM7405 output voltage V_{OL} is 0.5V. At this current you can safely use either 3.3V or 5V to power the LED.

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