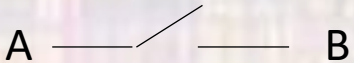
Button Basics

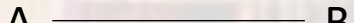
Last updated 11/4/20

Button Basics

- 2 pin Button
  - Button not pushed – open circuit between the pins

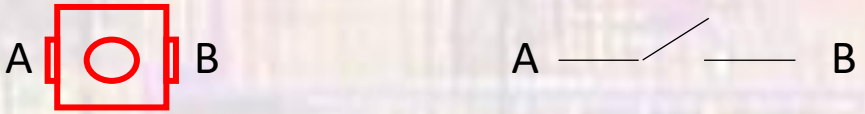


  - Button pushed – short circuit between the pins

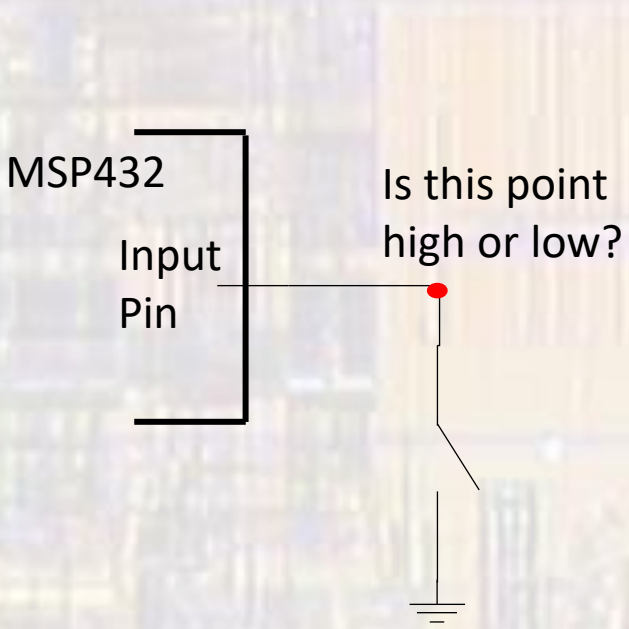


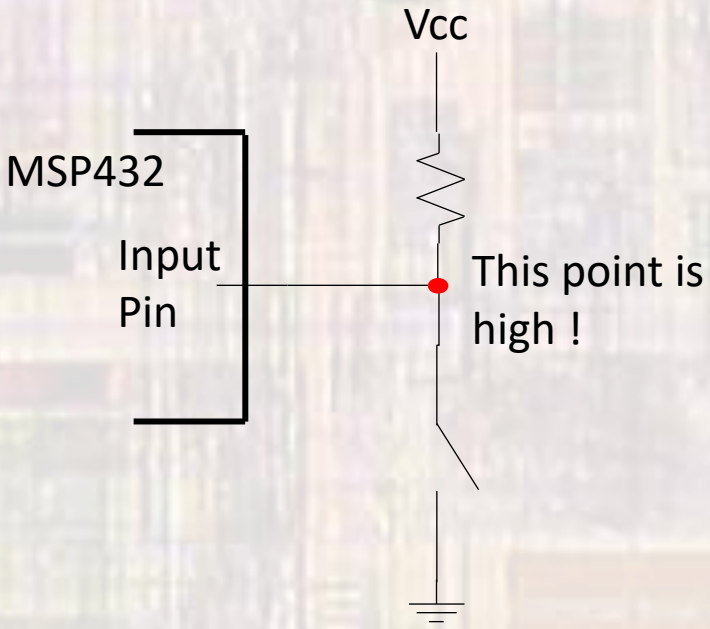
Button Basics

- 2 pin Button



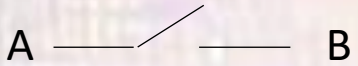
  - Need some kind of resistor in our design to ensure we know what state the MSP432 pin is in





Button Basics

- 2 pin Button

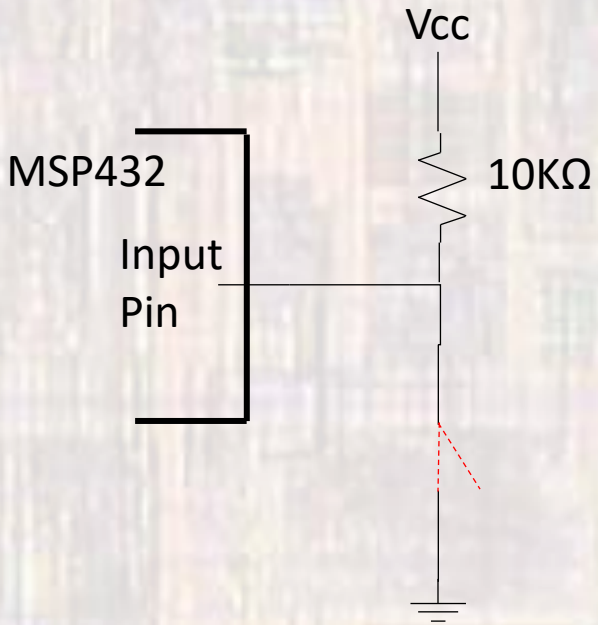


  - What resistor value?
    - Too small → wasted current (power)
    - Typically several KΩ
  - Example
    - 10KΩ
    - Switch open → no current (pin high)
    - Switch closed →

      (Vcc – Gnd)/10,000Ω =

      3.3V / 10,000Ω = 330uA

      (pin low)



Button Basics

- 2 pin Button
  - Setting up the input pin (pin 5 example)

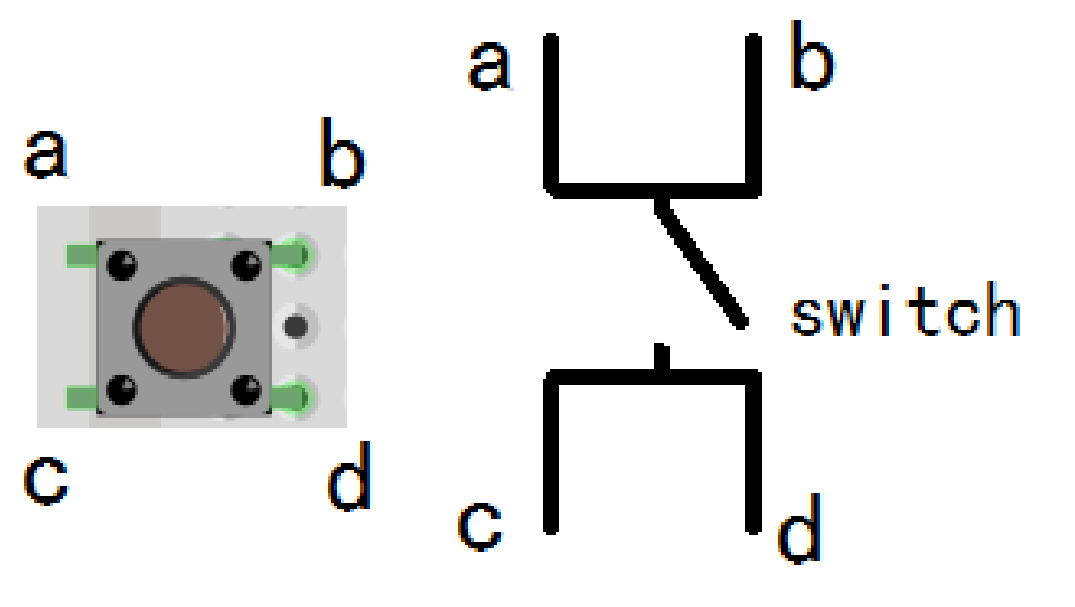
```
// Hardware setup
// Note: pin 5 is Port 4 bit 1
// 0 on the direction bit indicates an Input
P4->DIR &= ~0x02;                    // Input
```

  - Reading the pin (pin 5 example)

```
// Note: pin 5 is Port 4 bit 1
int pin5State;
…
pin5State = P4->IN & 0x02;                    // reads 0 or 4
// or
pin5State = ((P4->IN & 0x02) != 0);           // reads 0 or 1//
// or
pin5State = ((P4->IN & 0x02) && 1);           // logical and - reads 0 or 1//
```

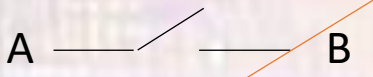
Button Basics

- 4 pin Button

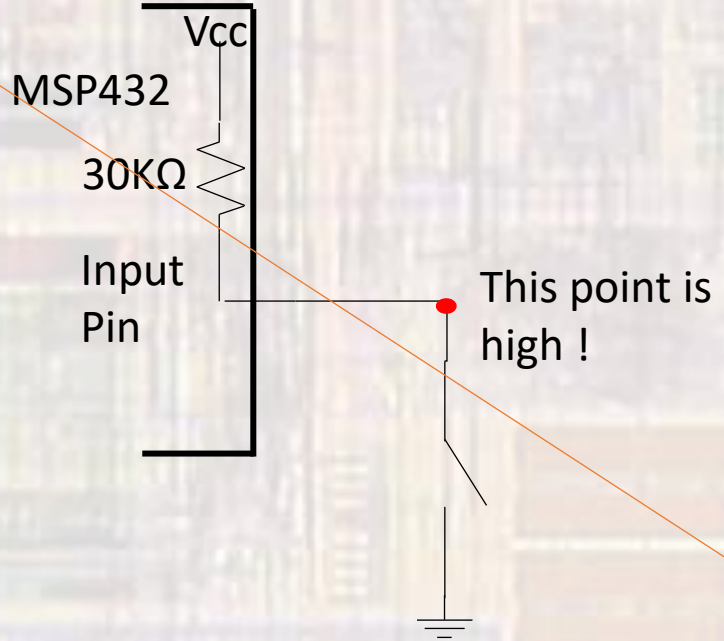


Button Basics

- 2 pin Button



  - Pull-up alternative
    - If we make our pin an INPUT with the pull-up enabled an internal resistor is tied from the pin to Vcc



Button Basics

- 2 pin Button
  - Setting up the input pin (pin 5 example)
    - Internal pullup

```
// Hardware setup
// Note: pin 5 is Port 4 bit 1
P4->DIR &= ~0x02;          // Input
P4->REN |= 0x02;           // Pull U/D enabled
P4->OUT |= 0x02;           // Connect Pull UP
```

  - Reading the pin (pin 5 example)

```
// Note: pin 5 is Port 4 bit 1
int pin5State;
…
pin5State = P4->IN & 0x02;              // reads 0 or 4
// or
pin5State = ((P4->IN & 0x02) != 0);     // reads 0 or 1
// or
pin5State = ((P4->IN & 0x02) && 1);     // logical and - reads 0 or 1//
```