Digital I/O

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Digital Interfacing with the outside world

◆ On or off? That is the question.
  ❖ Often want to know if a device or sensor is in one state or another
  ❖ Often want to turn something on or off
    • motor
    • lamp
    • alarm
General purpose I/O on the 68HC11

- 5 ports, A through E
  - Lab boards
    - Only A, D, and E can be used for I/O
      - B and E are used for extended memory addressing
    - We will use port A for general digital I/O and port E for A/D interfacing

Memory mapped ports

- Read and write to ports just like memory locations
  - 64K address space \(2^{16}\)
    - ex. Port A address is 0x1000
Example of digital IO

- Turn on an LED when a switch closes

```c
#define PORTA *(unsigned char *) (0x1000) /* gets the 1 byte integer pointed to at location 0x1000 */

main()
{
    unsigned char sw1; /* define a 1-byte variable for reading the port */
    while (1)
    {
        sw1=PORTA; /* read PORT A and assign bit values to sw1 */
        if ((sw1 & 0x2) == 0X2) /* test for switch closure */
            PORTA = 0; /* keep PA4 low */
        else
            PORTA=0x10; /* turn LED on if switch is closed */
    }
}
```

How would you modify the program to turn the LED on after you press and release SW1, and turn it off after you press and release SW1 again?