How to sense 12V or higher circuitry with the Arduino

**Method 1: transistor level converter**

- Arduino +5
- R4: 4.7 or 10K
- R2: 1K to 3.3K
- I2: 2N3904 or BC547
- Arduino GND

5 to 12V input

**Method 2: optoisolator level converter**

- Arduino +5
- R3: 4.7K or 10K
- 2K to 3.3K
- I2: 4N33
- Arduino GND

5V to 12V input

Notes:
- Change R1 or R2 to 10K ohms for volages inputs higher than 12V
- OK to connect 12V ground to Arduino, but not positive 12V source!
- Optoisolator version gives excellent noise isolation, as there is no current path through Arduino Circuitry
- Lots of optoisolators will work: 4N33, TL117, 6N138... check the data sheet
- Diodes only required if input is AC, or swings below 9V