# Electrical Engineering 101

Energy - "ability to do work" (heat) (Joules), **J**

Electric Charge - positive/negative force (Coulombs), **C**

Voltage - potential of electric charge (Volts = Joules/Coulomb), **V**

Current - flow of electric charge (Amps = Coulombs/sec), **I**

Resistance - resist flow of current (Ohms =  (Joules x sec) / (C^2), **R**

Power - work per time (Watts = Joules/sec ), **P**

**V =  I R (Ohm's Law)**

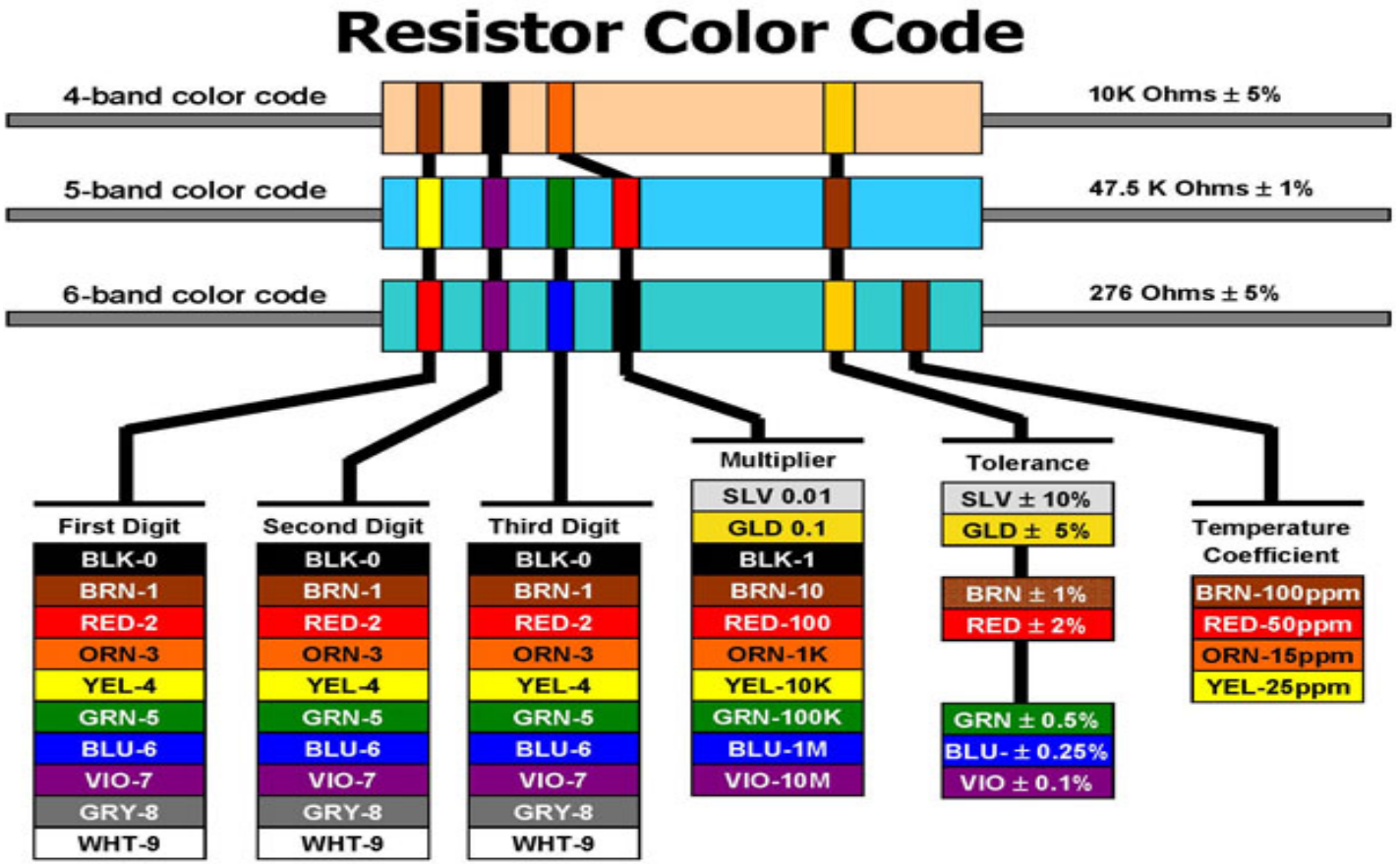
**P = I V**

# Electrical Engineering 101

Resistors - resist flow of current, dissipate energy as heat (power rating)

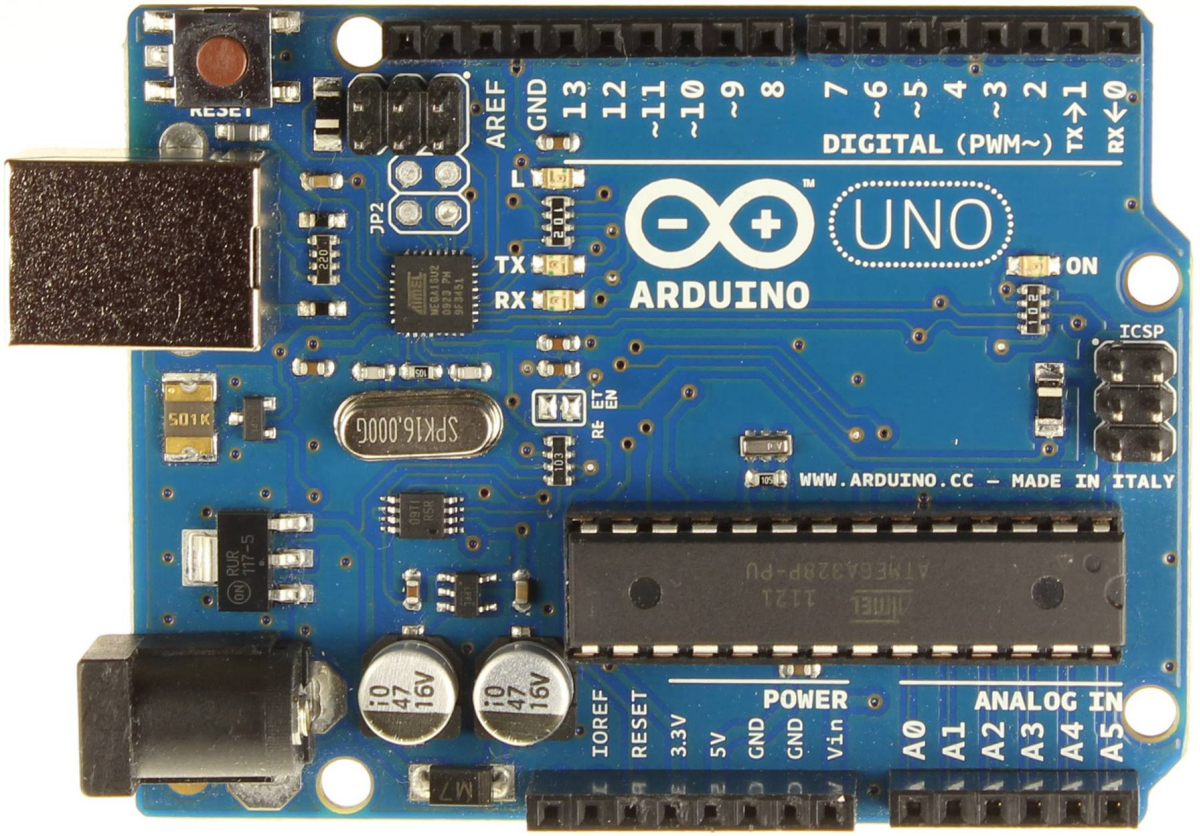
Diodes - one way current flow (ideally inf/0 resistance)

Light-Emitting Diodes (LED) - diode that lights when current flows (voltage drop)

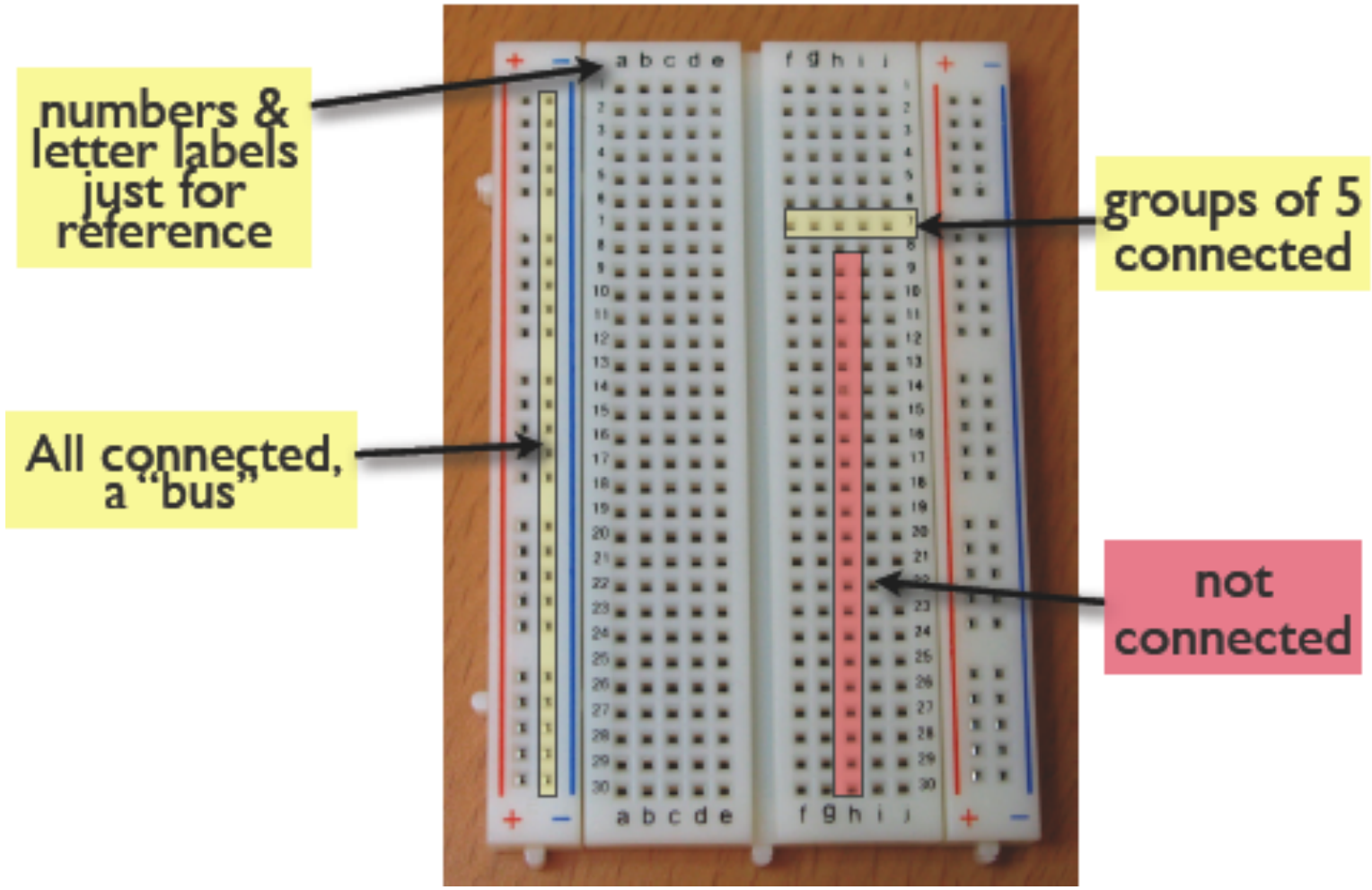


**Digital (0/1) Read/Write and**
**Analog Write via PWM ~ (0 to 255) (0 to 5V)**

40 mA max
per I/O pin!




**Analog Read (0 to 1023)**
**(0 to 5V)**


numbers & letter labels just for reference
All connected, a "bus"
groups of 5 connected
not connected