LEDs = Bacon

PUSH BUTTON

RECEIVE BACON

By Shannon Strutz

Here is the scoop on LEDs

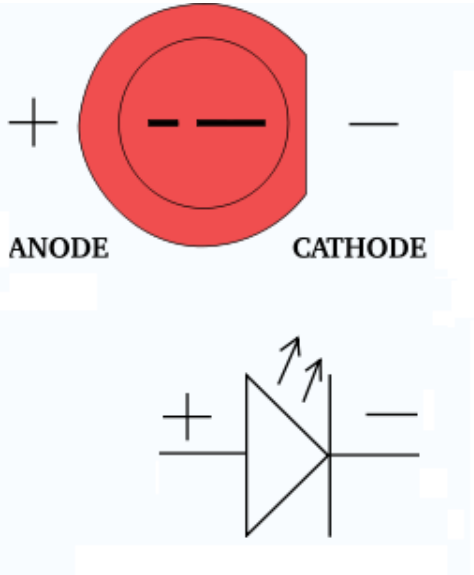
- LEDs are one of the most fundamental parts of prototyping as they are the most basic form of an indication.
- Many of the principles behind LEDs also play a role of many other components.
  - Capacitors Polarity
  - Diodes Voltage drop + Polarity
  - FETs relation to switching speed and power dissipation
- If you want to get into the actual physics of it, talk to me later or e-mail me.

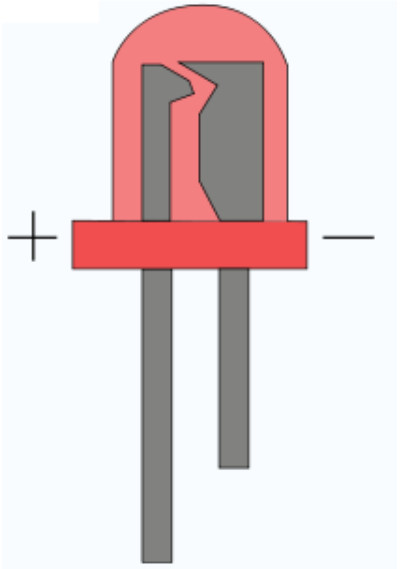
How they work

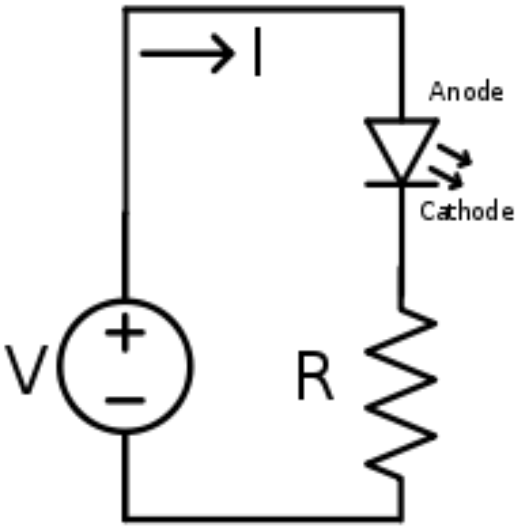
- Simply, High voltage in, Light out & Low voltage
- Like many other components, LEDs only work (as intended) in one direction.
- The higher voltage goes into the anode and the lower is on the cathode
- Voltages vary by color so watch out! (Samurai Jack):
  - Red = ~1.8V
  - Green = ~2.1V
  - Blue = ~3.8V

MAKE IT WORK

- Put a High voltage signal into the anode of the LED and connect the cathode in series with a resistor to ground.
- The resistor is found by doing a modified Ohms Law Equation R = (Input Voltage - LED Voltage Drop)/ Led Current (20 mA)
- Easy way to find cathode – There is a flat edge on the bulb, that side is the cathode







Few things to note

- Although an LED will usually fail safely, other components that use similar principles may not. Electrolytic capacitors will violently explode if used improperly.
- If you exceed the voltage of the LED, you need a resistor or else the LED will fail (basically burn out, maybe a little pop)
- Hooking an LED up backwards will generally not break it.
- If turning an LED on/off very fast, your resistor must be as close as possible to the calculated resistor value (from the previous slide)
- If you don’t have the right resistor value, use a higher resistance

Activities

All code is at my github : www.github.com/funkyguy4000/AVR-Programs/

Circuit	Simple LED On/Off	LED Button switcher	LED Fade circuit
Description:	Turns LEDs on then off using the ATmega16	Turns an LED on when the button is pressed	Fades an LED Just one
GitHub Location	AVR-Programs/Blink	AVR-Programs/RGB LED color changer button	AVR/PWM/PWM
What it demonstrates	Demonstrates basic use of an LED	Demonstrates taking an input and making a responsive output	Fades an LED (So cool)
What you need	ATmega16 Dev Kit Resistor LED	ATmega16 Dev Kit LED Resistors 1 10K Resistor RGB LED Button	ATmega16 Dev Kit Resistor LED
Further:	Use this to control many leds Try multiplexing!	Use the input to start an animation	IT'S A FADING LED! Just love it

Remaining workshops schedule.

- December 4th - Gitting Git: An introduction to the most popular project management platform
- December 18th – No Workshop, get back to studying
- The first few workshops next semester will be on Project design to introduce everybody to the prototyping process and how to design a professional circuit board:
  - 2nd Wed. Sp. 2014 : Design (TBD)
  - 4th Wed. Sp. 2014 : Design (TBD)
  - 6th Wed. Sp. 2014 : Intermediate Soldering Workshop (Large SMD Parts)
  - 8th Wed. Sp. 2014 : Interfacing Android with Bluetooth