

## Lighting Up

- why Leds
- types of Leds

## arduino

- why arduino
- why arduino
- types

## power

- batteries
- tradeoffs

## Lighting Up

- EL Wire
- Bulbs
- LEDs

## EL Wire



## EL Wire

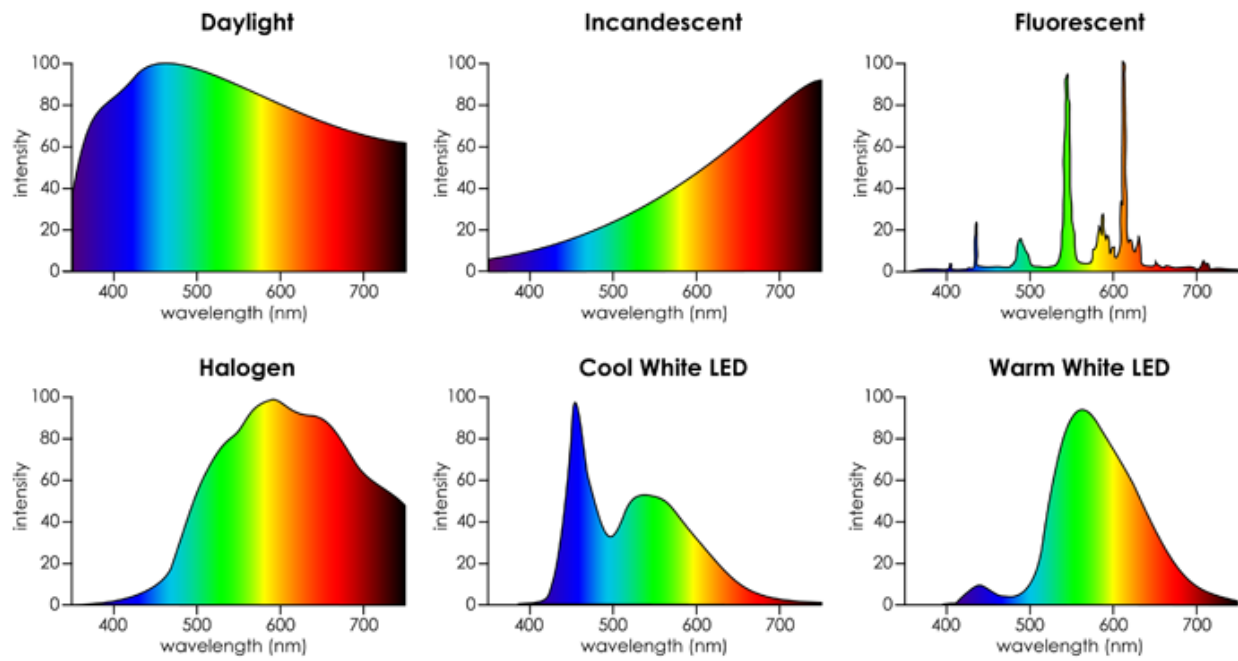
pros: diffuse light, flexible

## cons:

- high power
- few colors
- not very bright
- cost

## Incandescent Bulbs





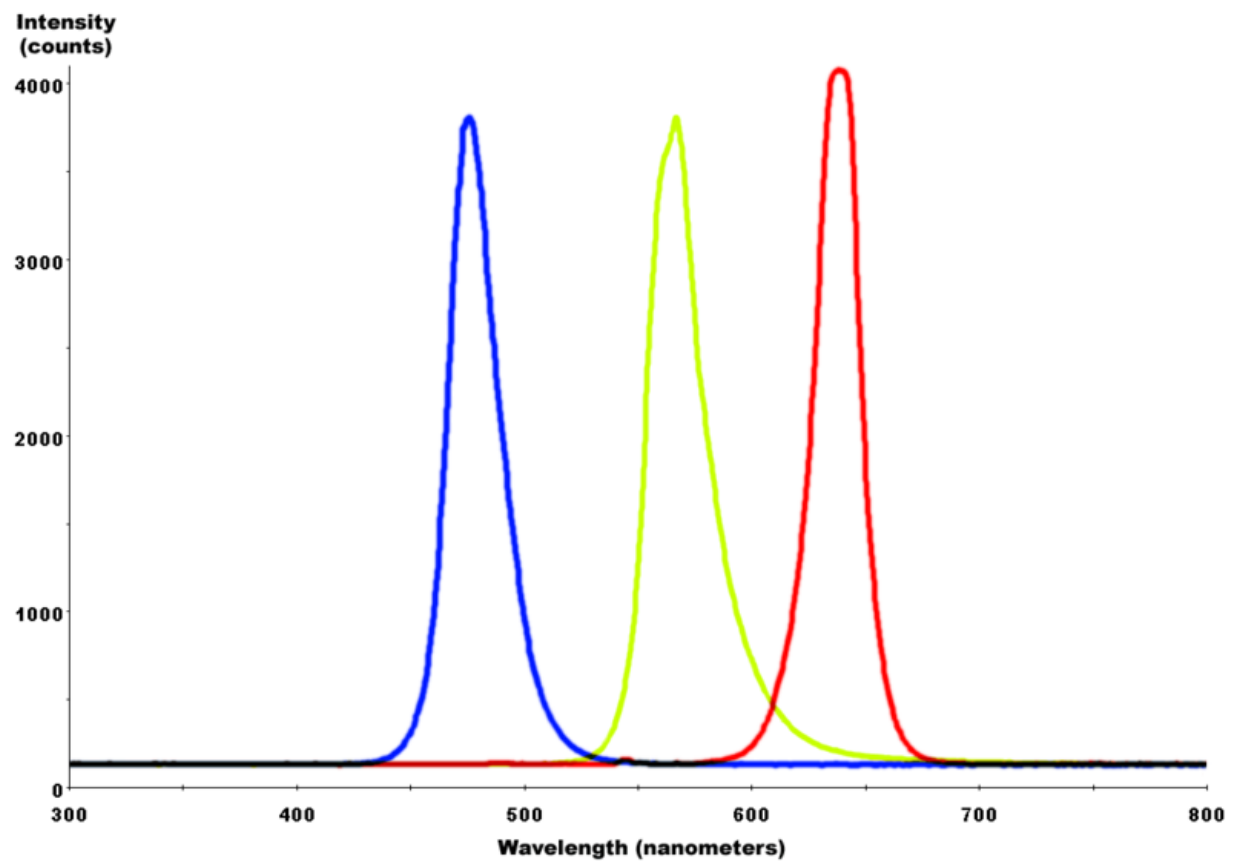
Incandescent Bulbs

pros: beautiful!

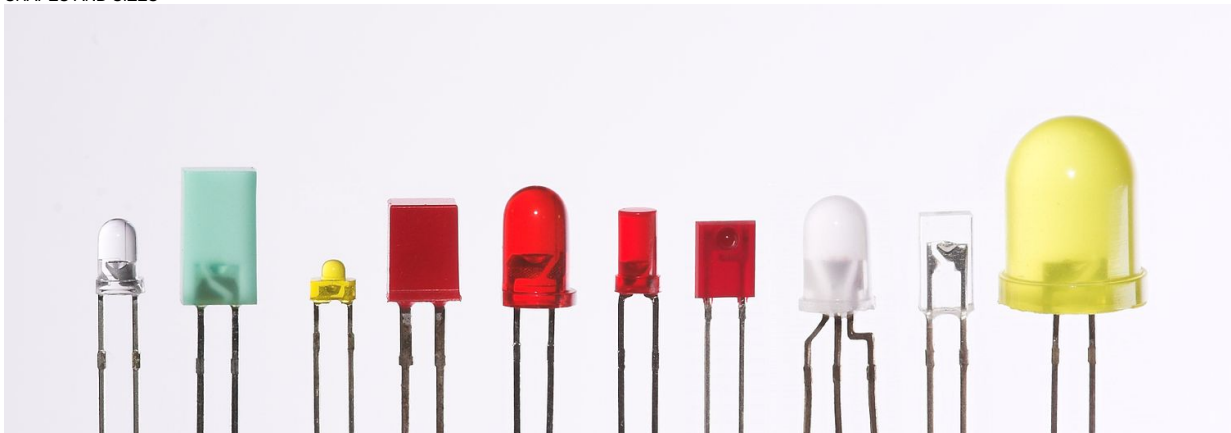
cons:

- many colors
- hot
- high power

LEDs



SHAPES AND SIZES



ALL THE SAME COLOR



## LEDs

### pros:

- MANY shapes and sizes
- low power and cool
- bright!

### cons:

- very few colors
- binary
- complex
- ugly

## VERY FEW COLORS

LED Semiconductors and Their Resulting Colors		
Semiconductor Material	Wavelength	Color
<b>GaAs</b>	<b>850-940nm</b>	<b>Infra-Red</b>
<b>GaAsP</b>	<b>630-660nm</b>	<b>Red</b>
<b>GaAsP</b>	<b>605-620nm</b>	<b>Amber</b>
<b>GaAsP:N</b>	<b>585-595nm</b>	<b>Yellow</b>
<b>AlGaP</b>	<b>550-570nm</b>	<b>Green</b>
<b>SiC</b>	<b>430-505nm</b>	<b>Blue</b>
<b>GaInN</b>	<b>450nm</b>	<b>White</b>

The scientific notations above are as follows:

Gallium Arsenide (GaAs) - infra-red

Gallium Arsenide Phosphide (GaAsP) - red, orange, amber

Gallium arsenide phosphide doped with nitrogen (GaAsP:N) - yellow

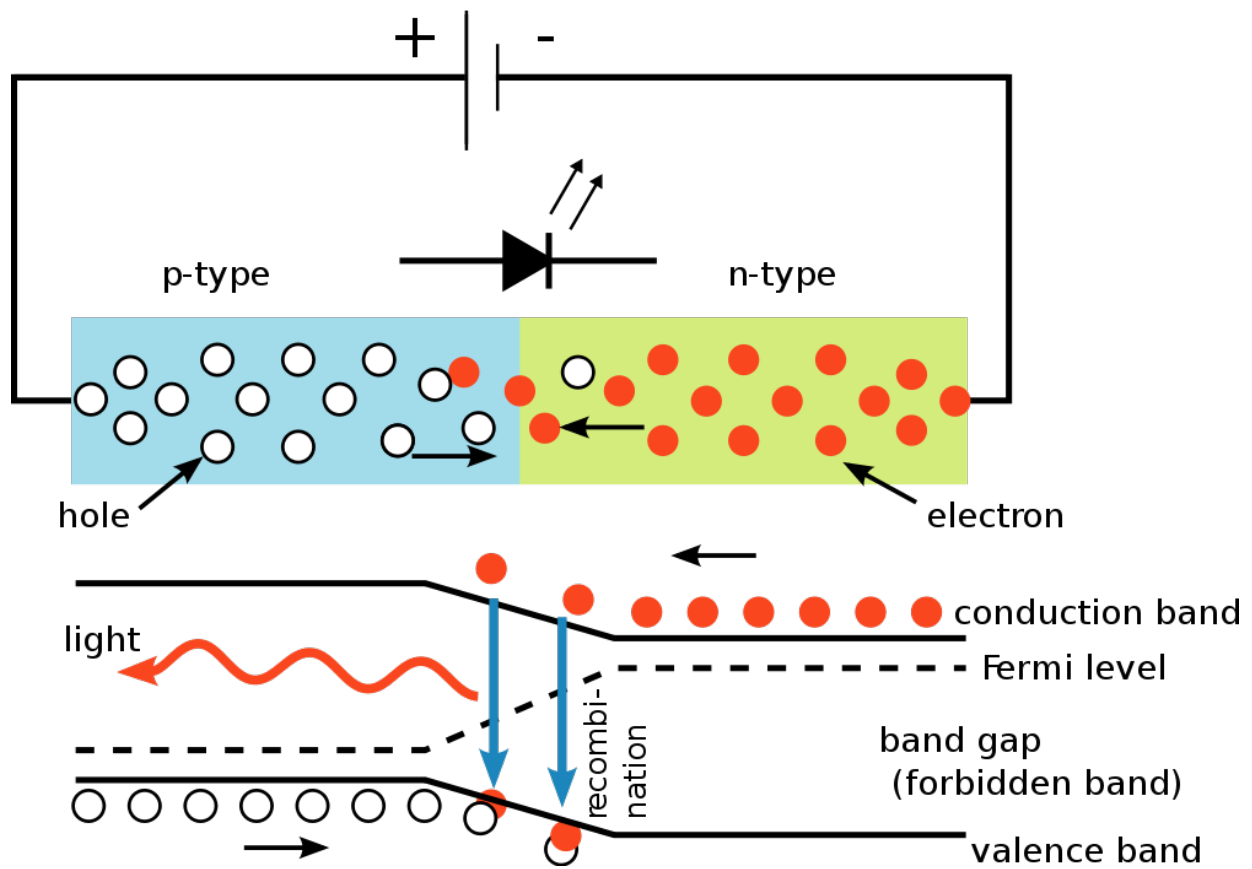
Aluminium Gallium Phosphide (AlGaP) - green

Silicon Carbide (SiC) - blue

Aluminium Gallium Nitride (AlGaIn) – ultraviolet

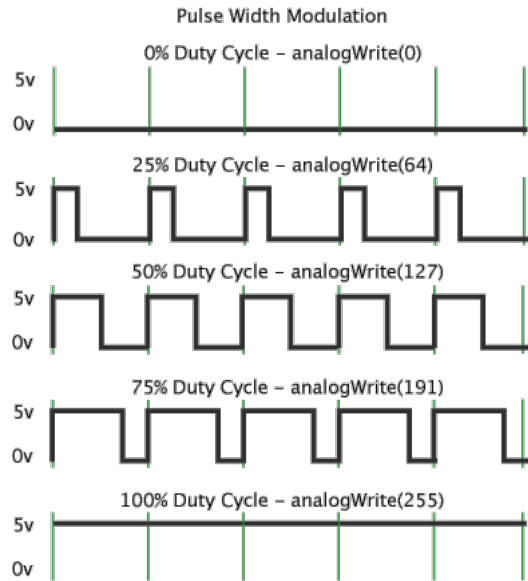
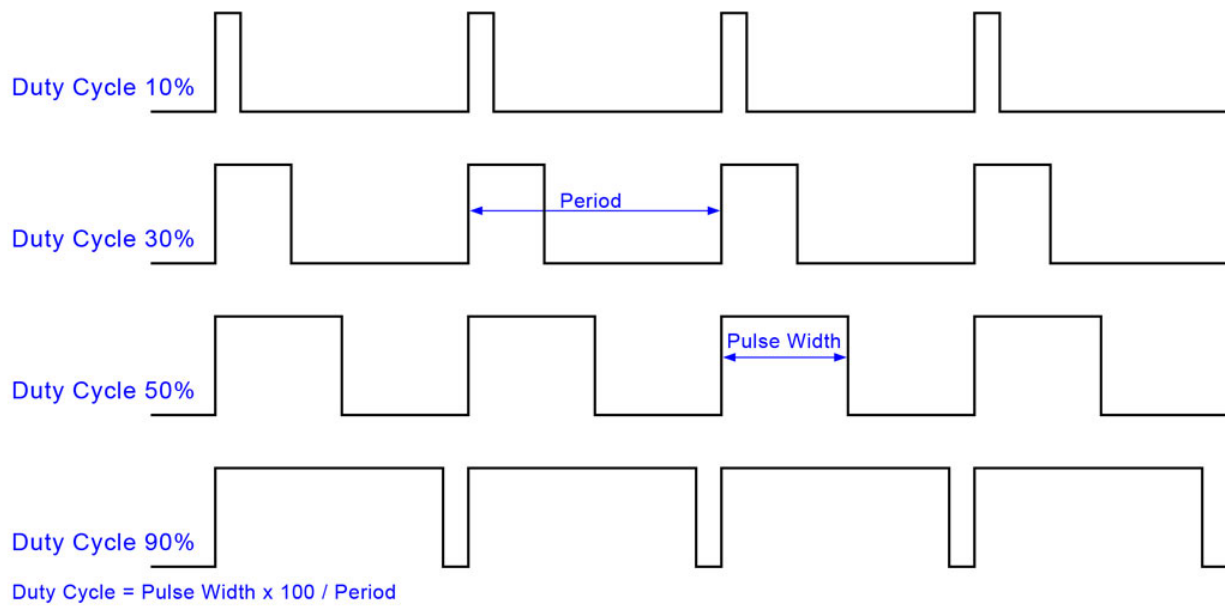
Gallium Indium Nitride (GaInN) - white

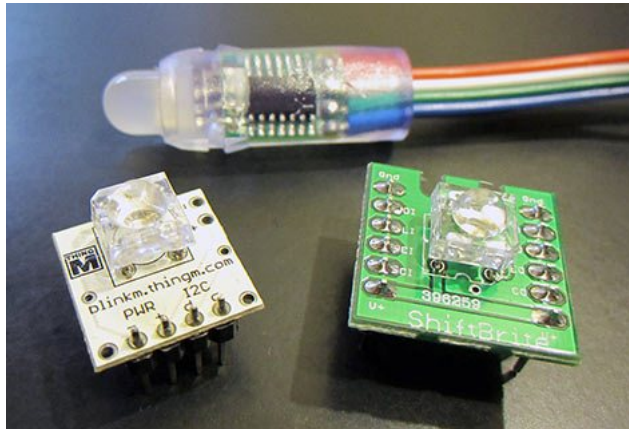
## BINARY



MIXING, DIMMING and PWM







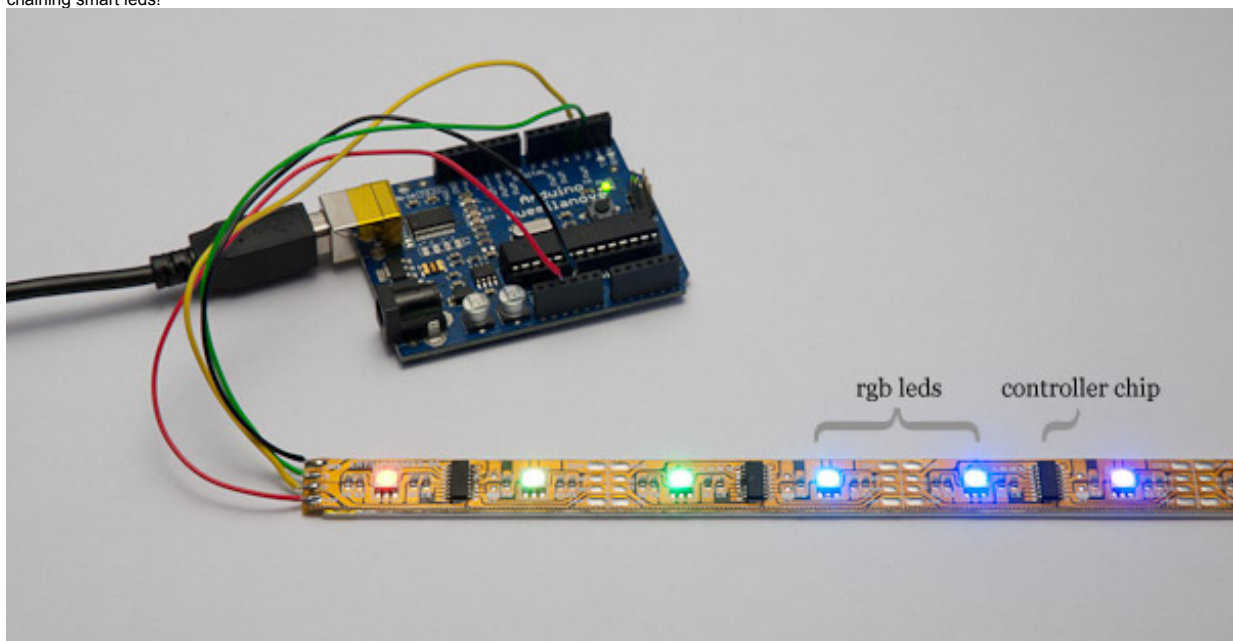
# MIXING and DIMMING

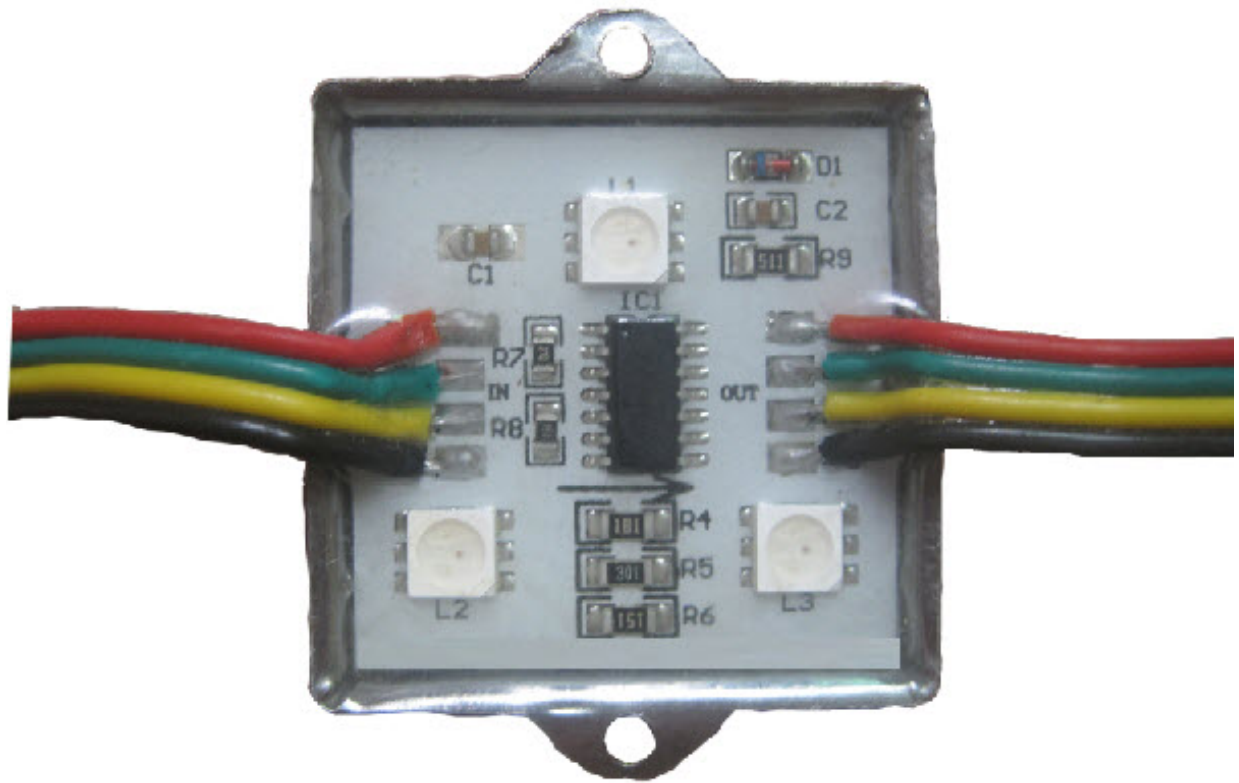
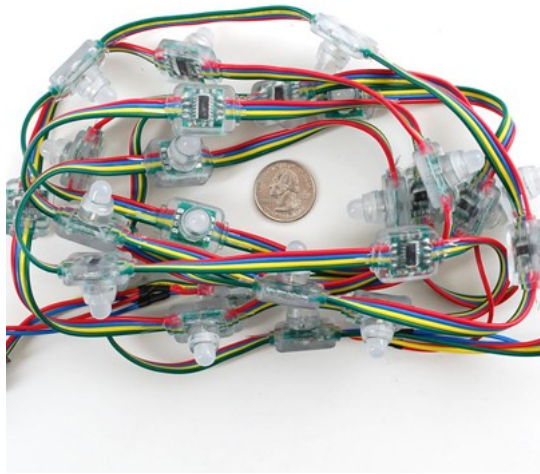
- color theory
- pulsing... wow crazy timing

microcontrollers for the win!

ok.. smart LEDs are even better

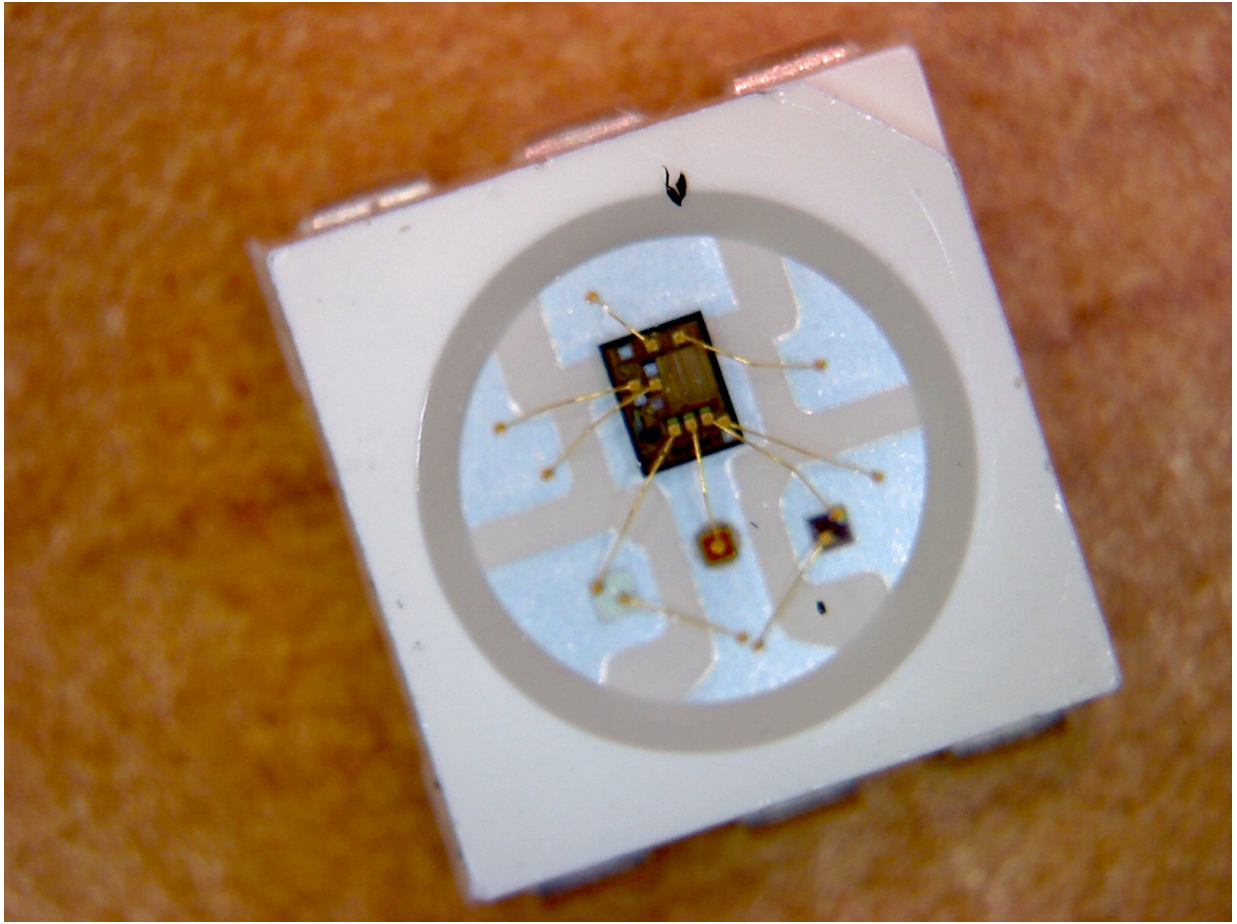
chaining smart leds!

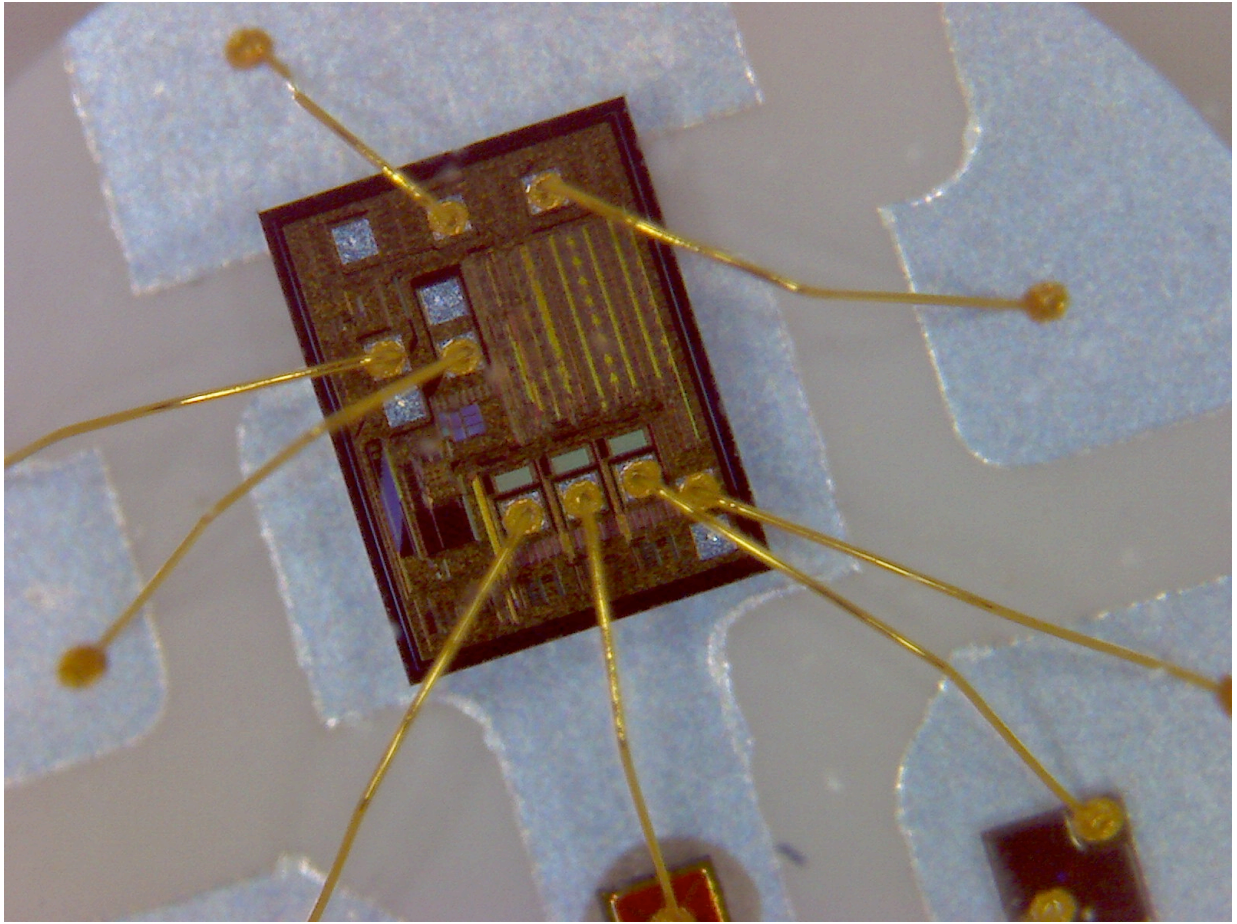




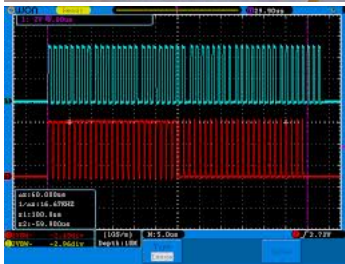
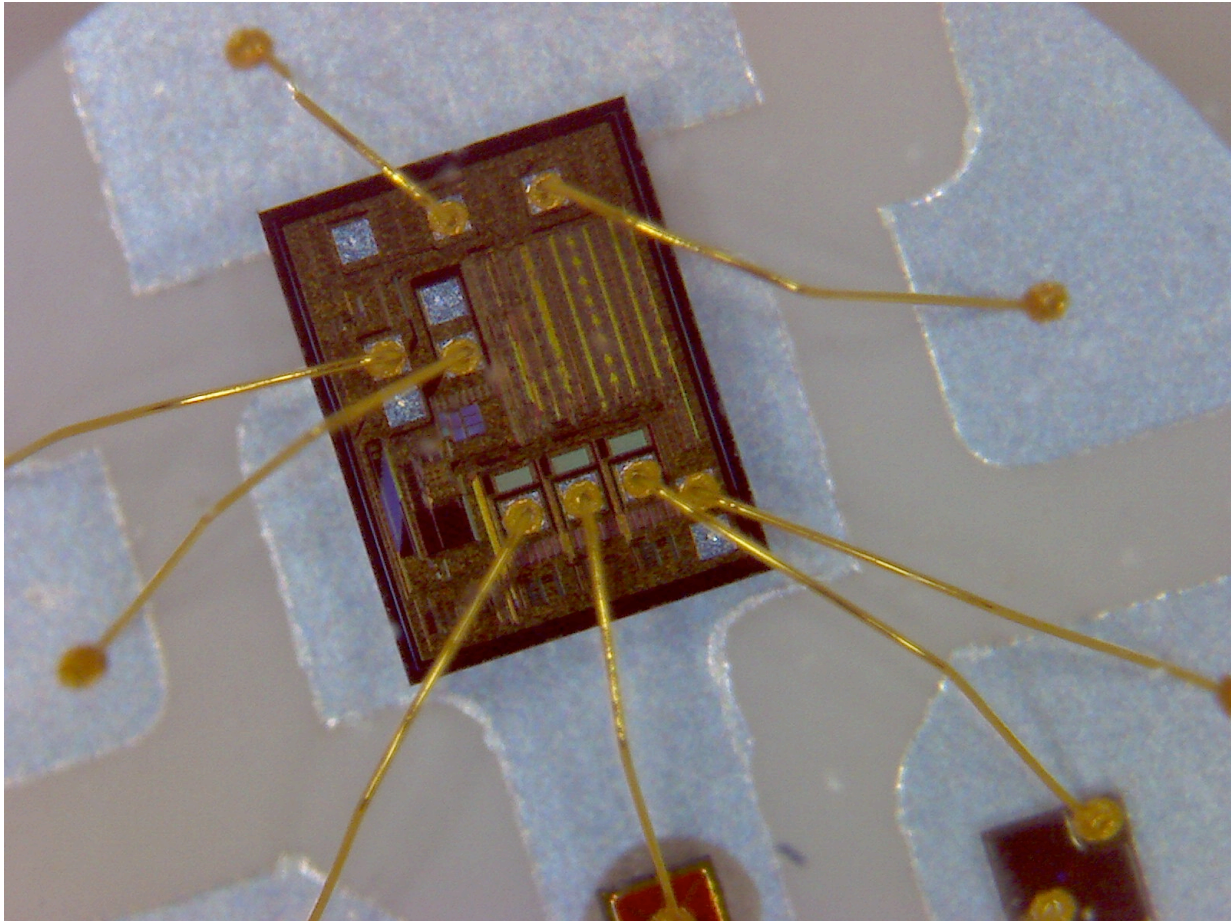












## LEDS

cons:

- very few colors -> MIXING
- binary -> PWM
- complex -> SMART LEDS
- ugly -> CUSTOMIZATION!!

Arduino : an intro

a community :

- LOTS of help,
- tutorials, examples, projects,
- forums, libraries, kits

microcontroller :

- a very small (micro) computer
- i/o, ram, storage, bias, network!

- you can add your own peripherals

open standard :

- anyone can improve it
- it works with everything
- this makes it cheap

development environment :

- your software interface
- add, compile, run, and debug code
- built for students to be easy

programming language :

- java/c... sorta
- the syntax and semantics are pretty useful
- (show blink)

bootloader :

- an OS
- that loads code
- it is The Magic

learn electronics:

- circuits are easy
- create circuits with no soldering
- reusable parts make for free play

input / output:

- many pins for input and output
- capable of analog and digital
- serial communication

programs are simple:

- variables
- setup and loop
- libraries

