AVR Moodlight (v4)

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Overview

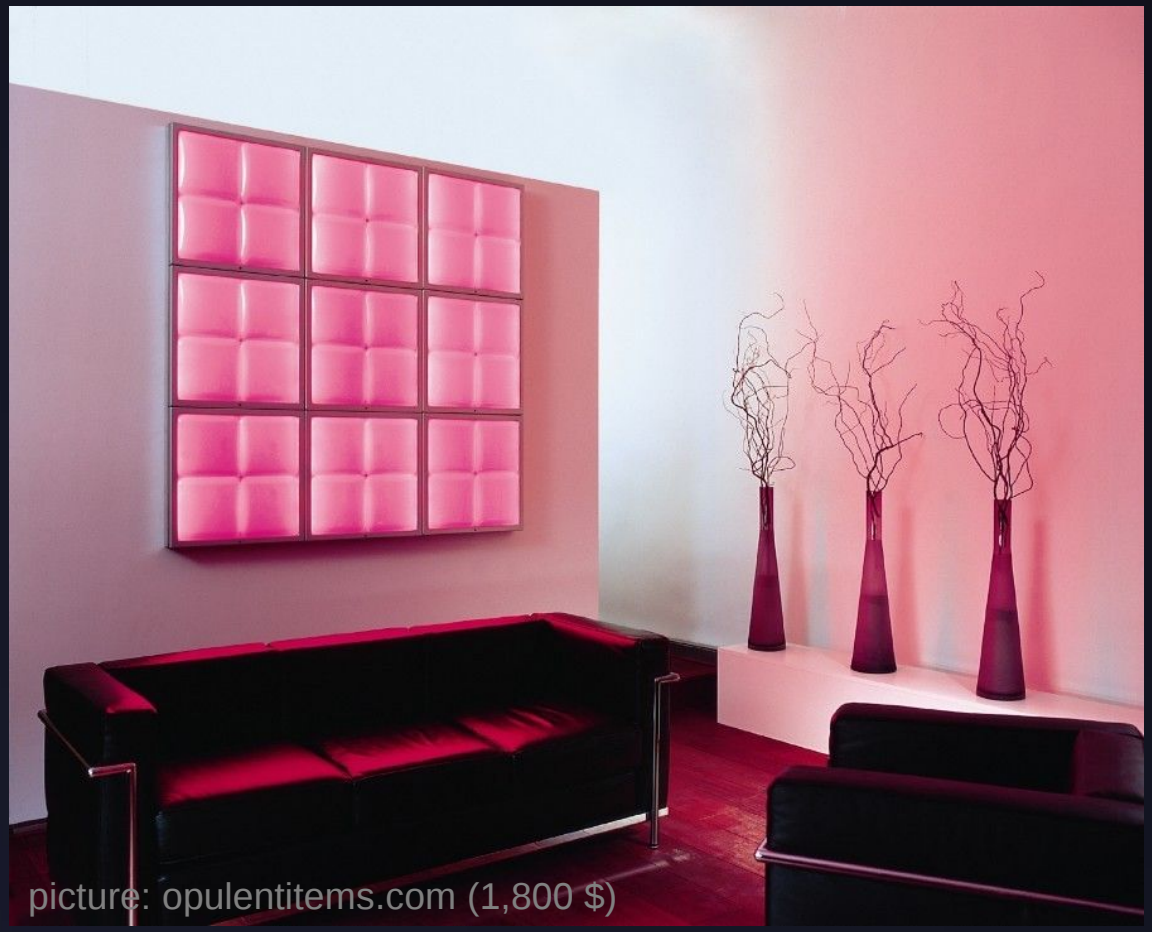
- Purpose
- Basics
  - Color mixing
  - Light emitting diodes (LEDs), dimming (PWM)
- Project
  - Design goals
  - Hardware / Software
- Demonstration
- Future

sparetime inc.

(withdrawn)

- Founded in july 1984
- Headquarters in room 67
- Flexible work time
- Meetings
- No shareholders
- Freedom of interests
- World's greatest company ... seriously

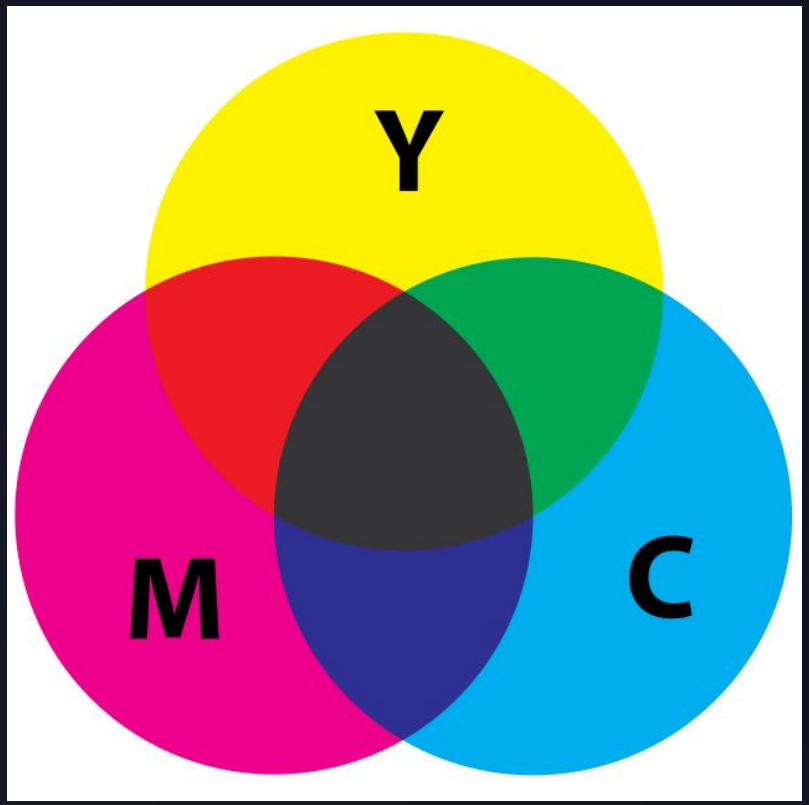
A... mood... light?


picture: opulentitems.com (1,800 $)

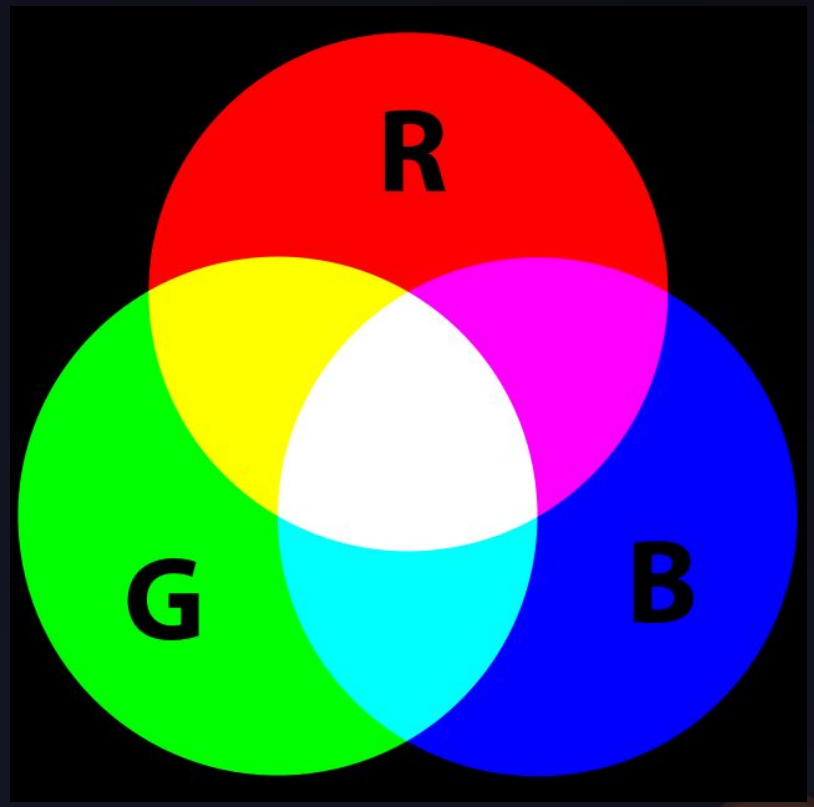
- Decorative light
  - Living room
  - Garden
  - Bars, Discos
- Expensive
- Not selfmade...

Color mixing

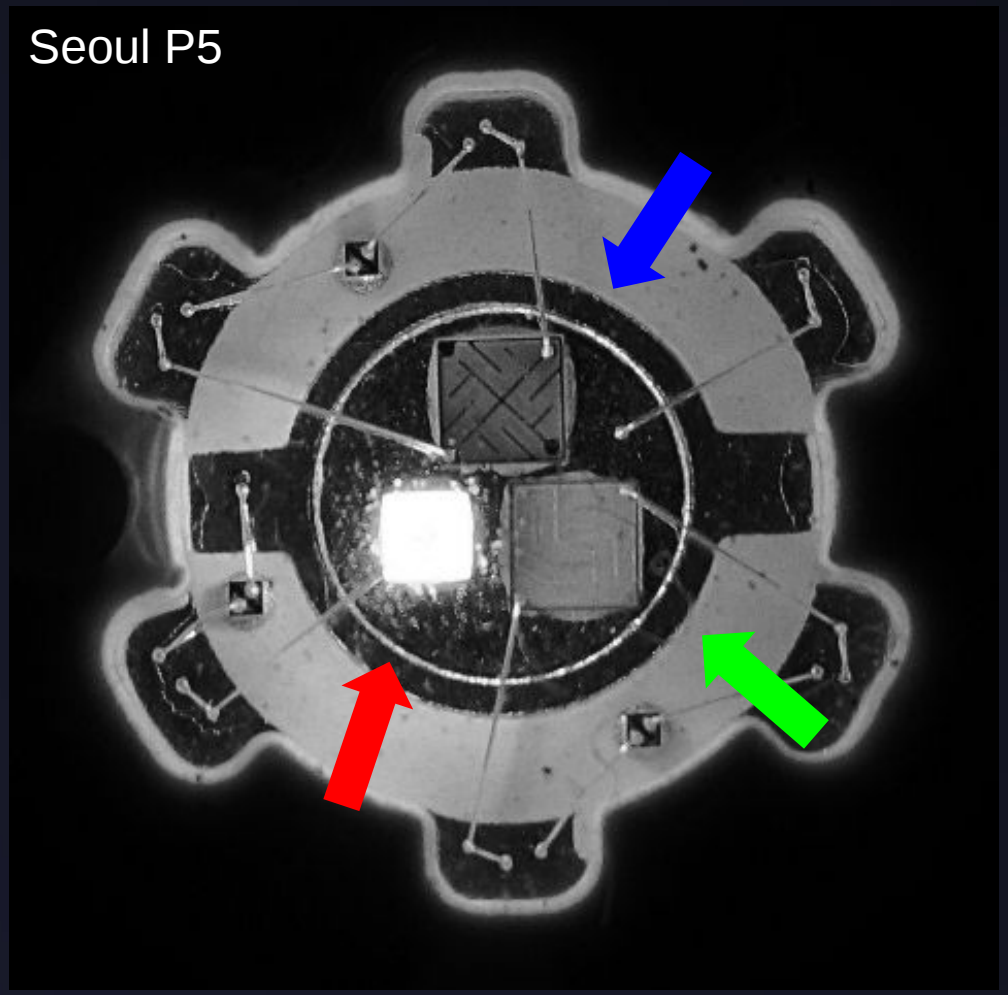
Subtractive



Additive



Light emitting diode



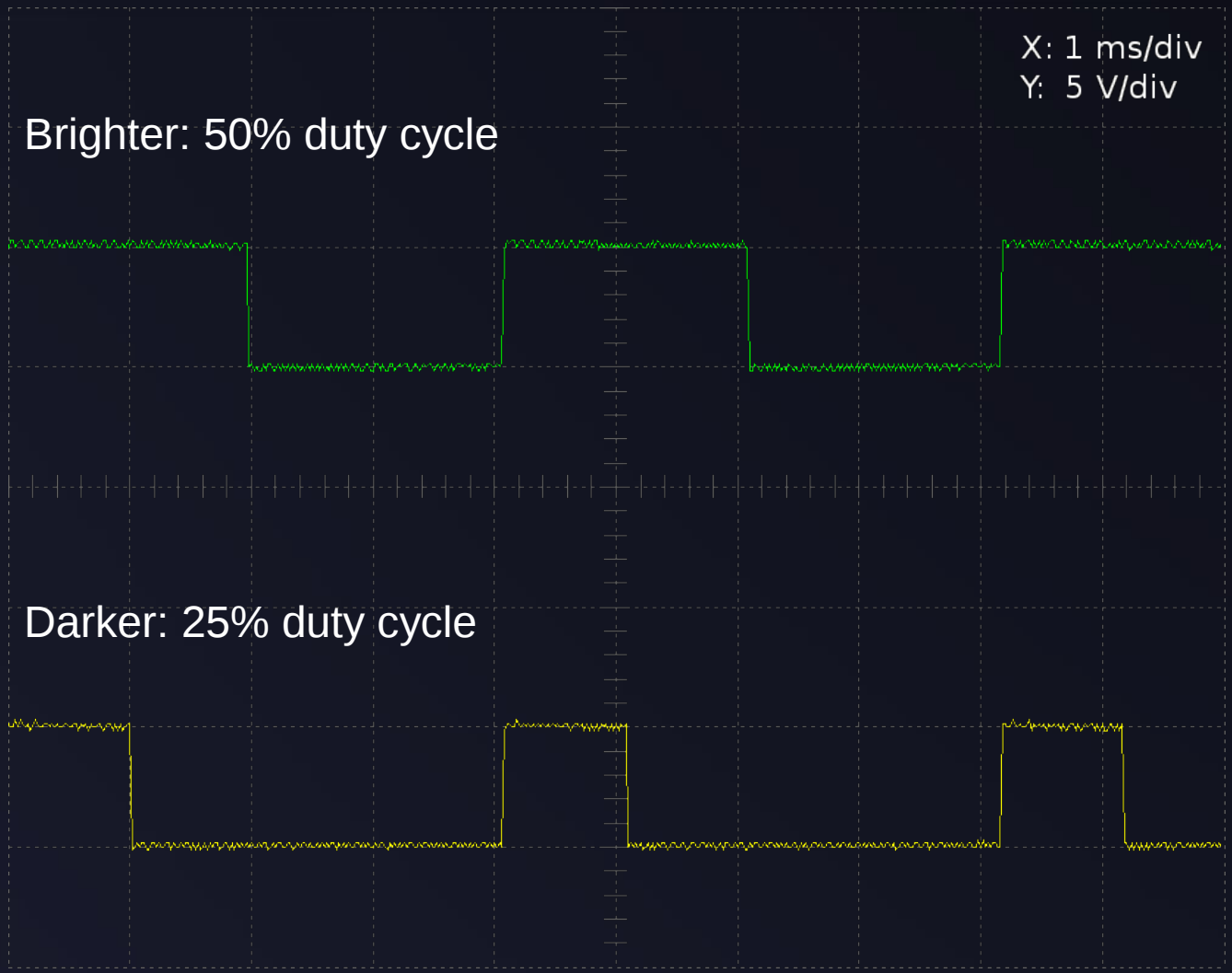
- Semiconductor
- „Clean“ color
- High effiency
- Various sizes & packages
- Still expensive
- Cooling needed

LED in action



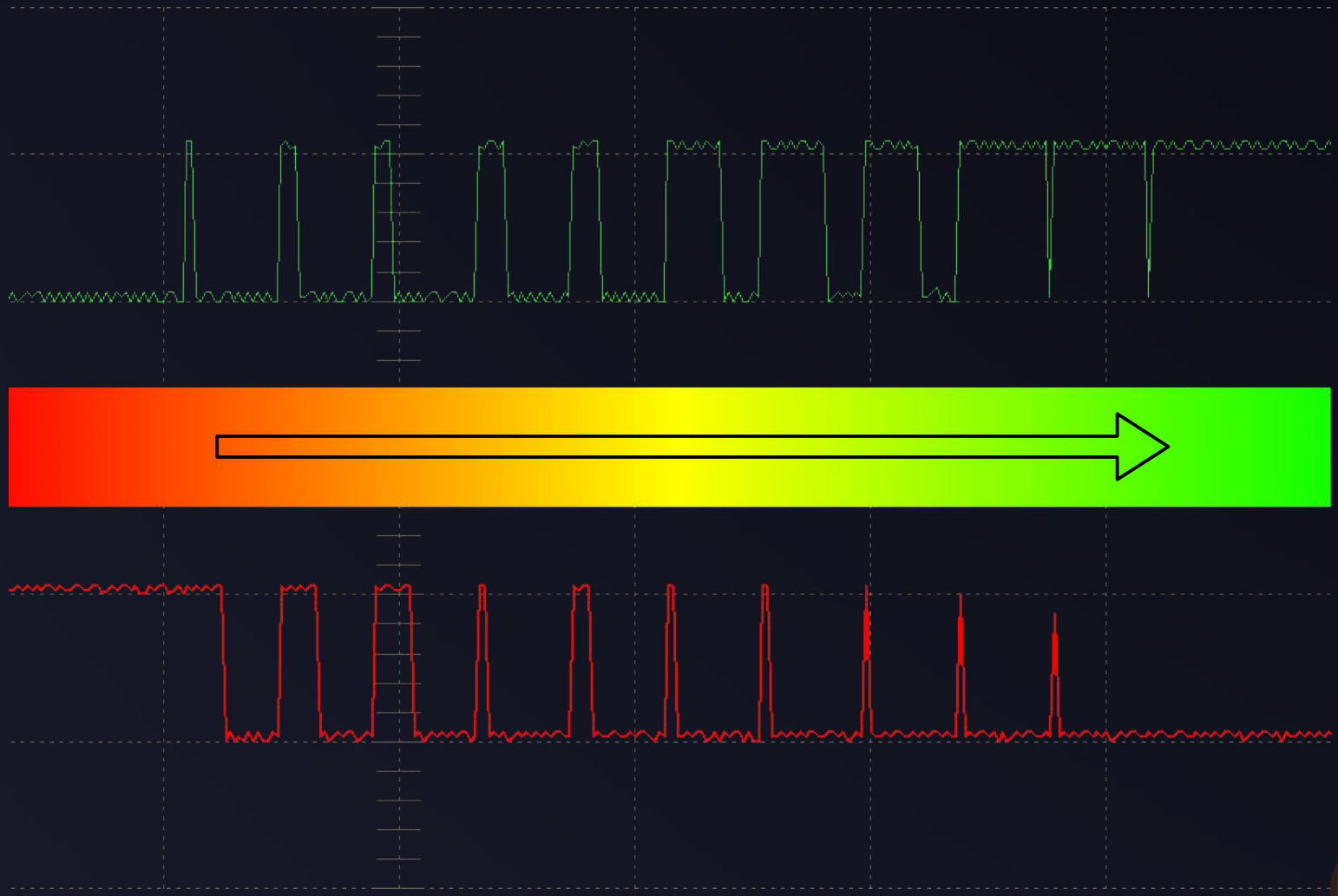
Imagine moving pictures here...

Dimming: PWM



- Duty cycle determines brightness
- 244 Hertz flickering is invisible

Realizing gradients



AVR Moodlight

- Design goals
  - Learn about AVR microcontrollers
  - Standalone device
  - As cheap and simple as possible
  - Extendable (with electronic skills)
- History
  - v1: 2x16 characters LCD, 1 output, ATmega88
  - v2: 4x20 LCD, crossover network, ATmega168
  - v3: temperature sensor, EEPROM, 4 outputs, ATmega128

Software

- The very most work: ~1000 hours/18 months
- Written in pure C

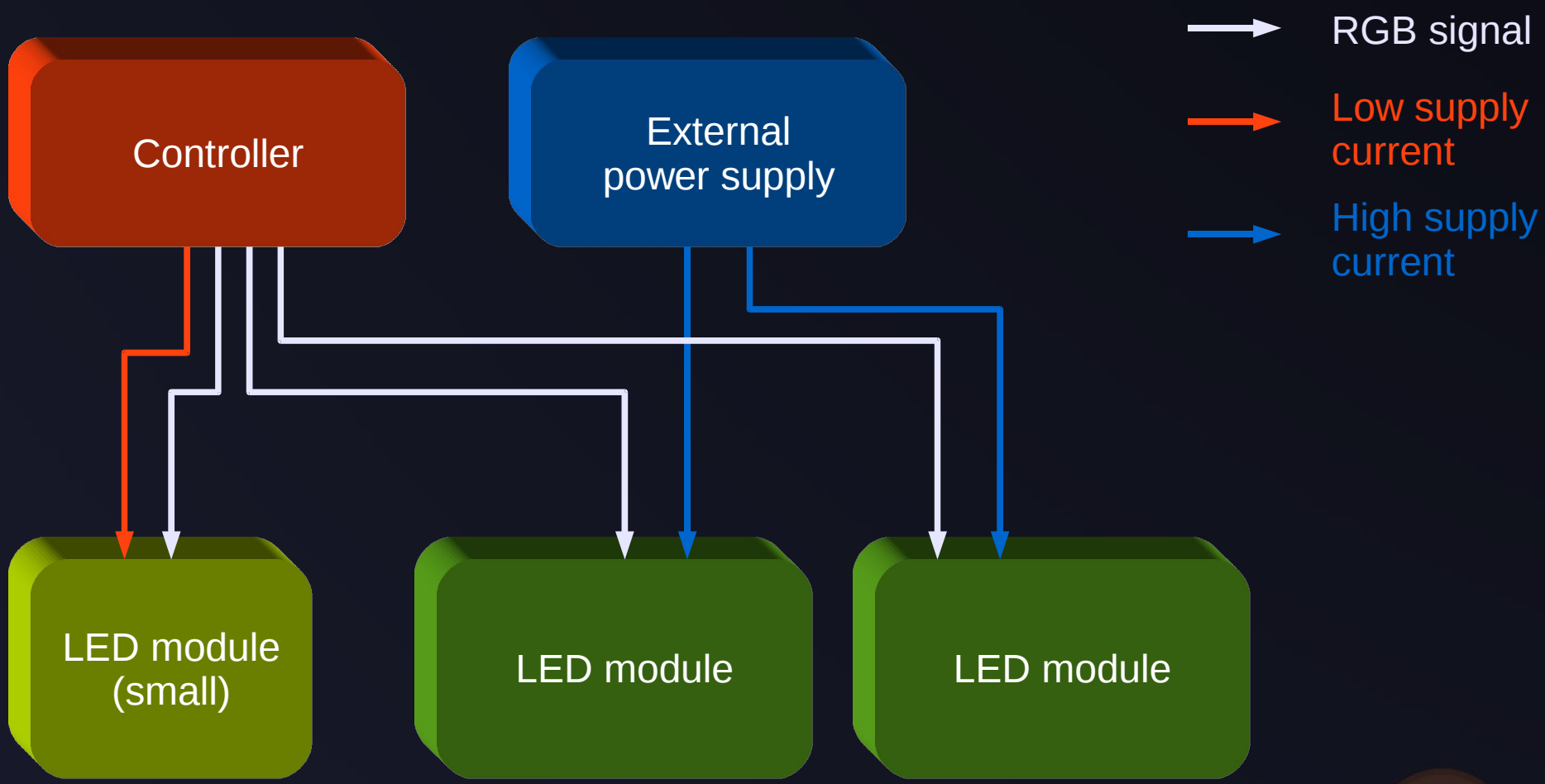
- Realtime operating system: FreeRTOS
  - Independend tasks and inter-task-communication

- 6 Modes
  - Fixed color; preset fades; random fades
  - Temperature; Time of day; Analog Input (4 channel)

Display

Menu, system information, mode & color, time...

Hardware


Controller
External
power supply
RGB signal
Low supply
current
High supply
current
LED module
(small)
LED module
LED module

Short demonstration

If there is time left...

Future

- Use extension connector
  - Buzzer (alarm clock)
  - Clap switch (on, off, next color...)
  - IR remote
- Use analog input
  - Re-attach crossover network
  - Measure houseplants humidity?

- Add bigger/smaller LED modules

Thank you!

Source code, schematics, PCB:

http://www.mikrocontroller.net/topic/123253

v3 (by-nc-sa)