

DDL 124

Design with contemporary technologies

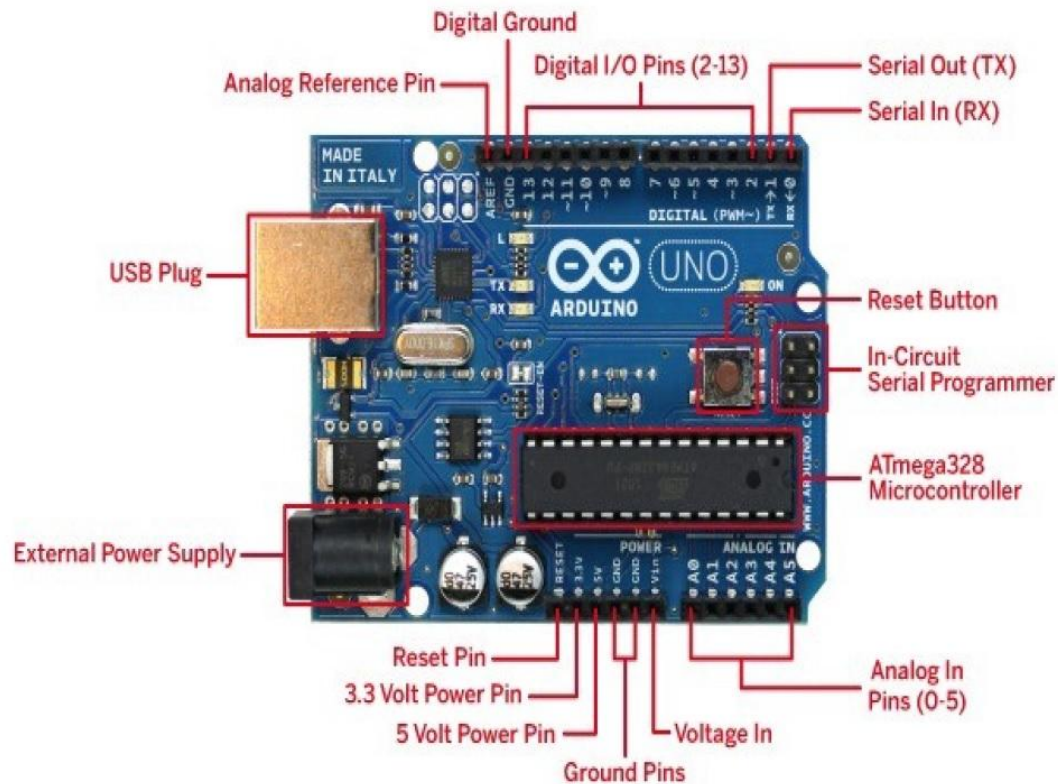
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Associate Professor,
Department of Design,
IIT Delhi



Topic 3: Fun with Open Hardware
Dated: 28th March, 2025



Microcontroller programming

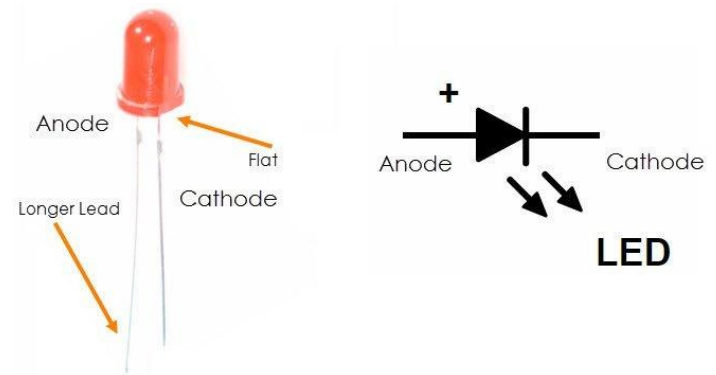
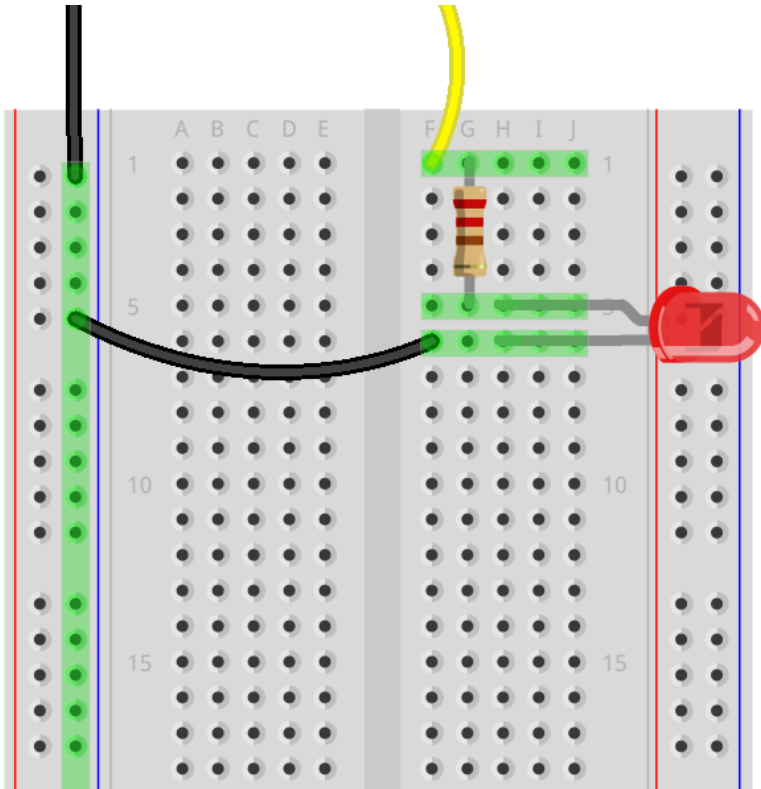


- [DIY devices](#)
- Arduino hardware
- Arduino IDE
- Arduino libraries

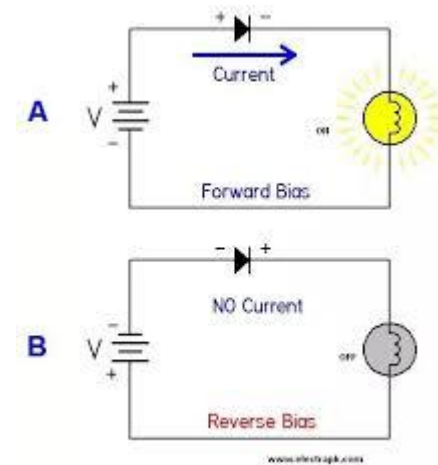
Getting started with Arduino

- Download [Arduino IDE](#)
- [Arduino kit pdf](#) for instructions
- Part 1 Preparation
- Open Arduino IDE
- Blink sketch with pin 13
- Blink sketch initialize pin 13





Diode is like a one-way valve of electronics

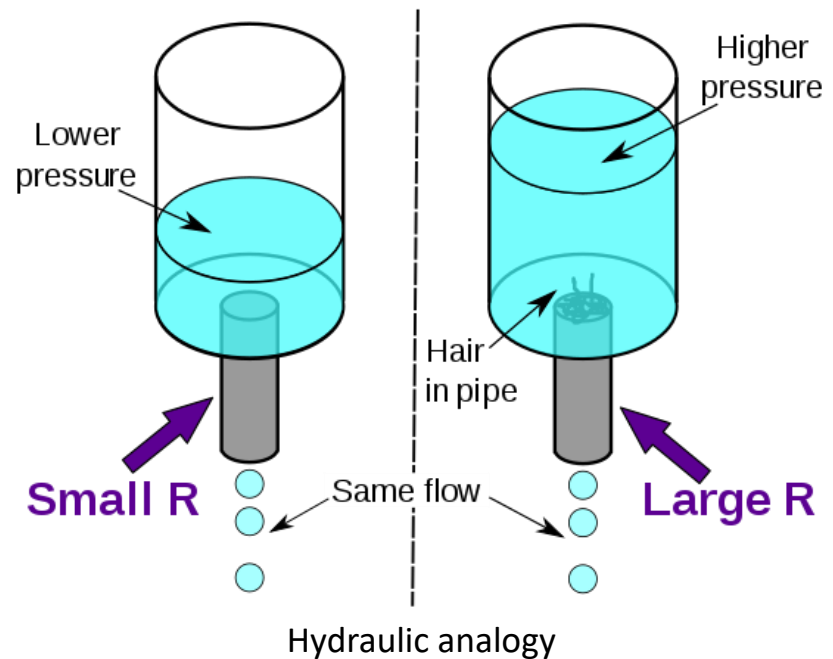


LED is a diode

- LED is a diode which makes the current flow only in one direction

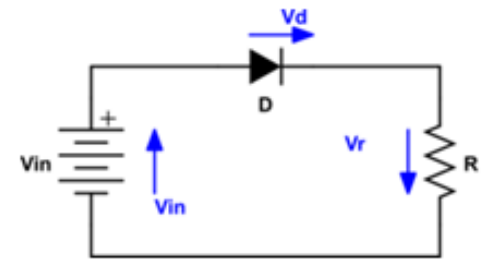
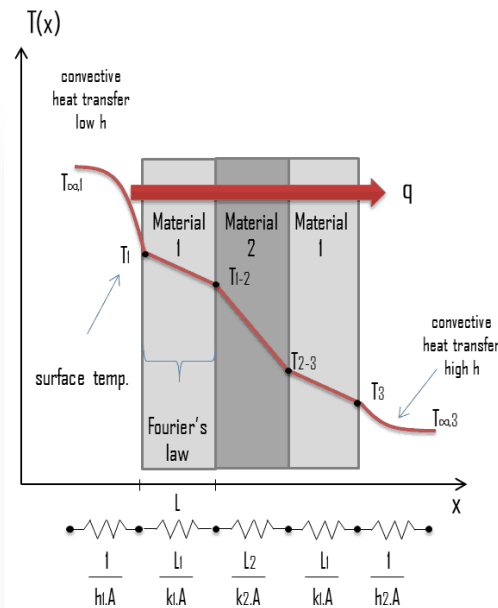
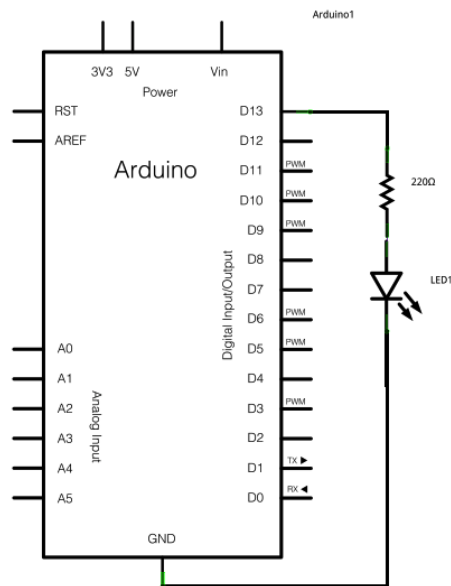
Blinking LEDs

- Part 2 Module Learning
- 2.1 LED
- Blink sketch (pin 12) with own LEDs and [resistors](#)



Ohm's Law, $V=IR$

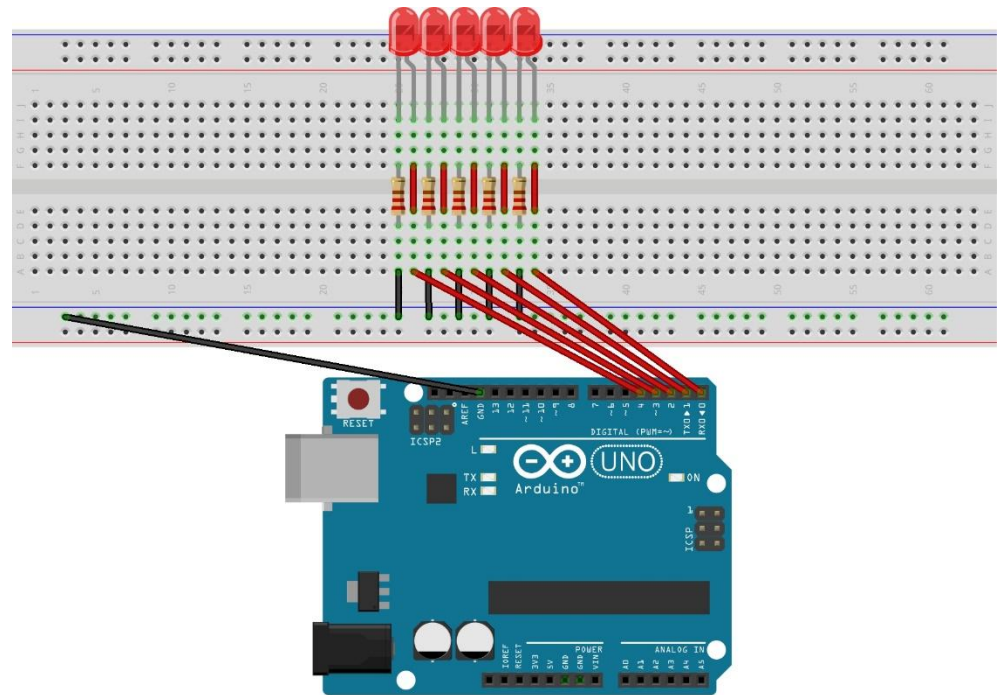
Thermal analogy, $Q = dT/R$, $I = V/R$



Kirchoff's Voltage Law

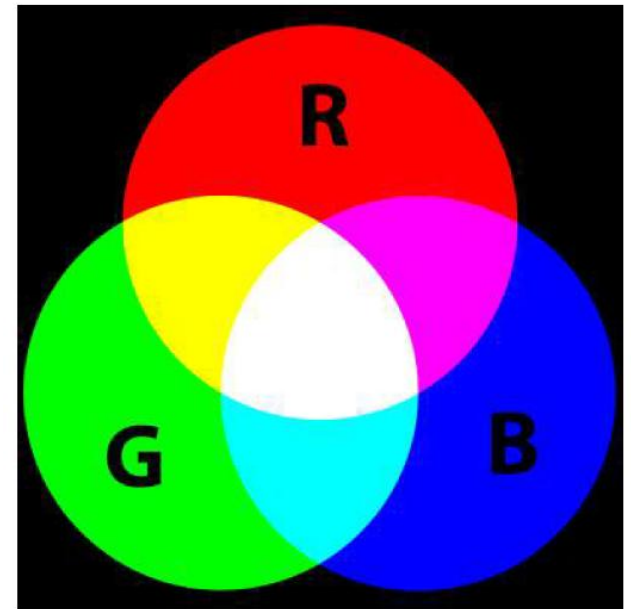
Blinking LEDs

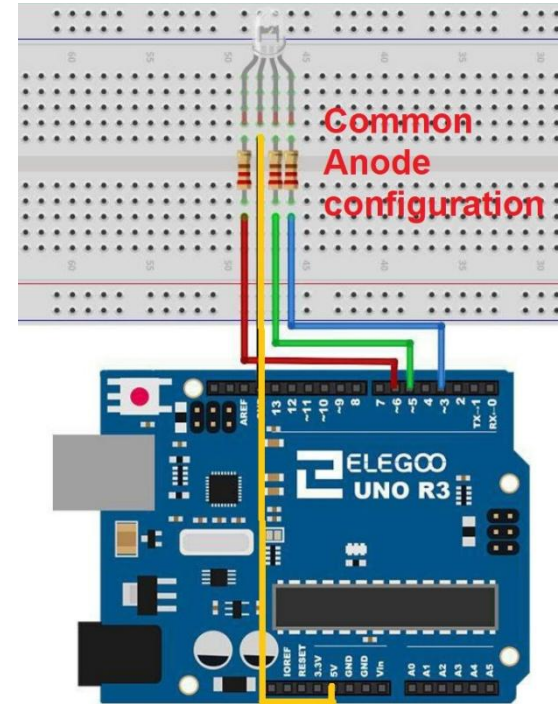
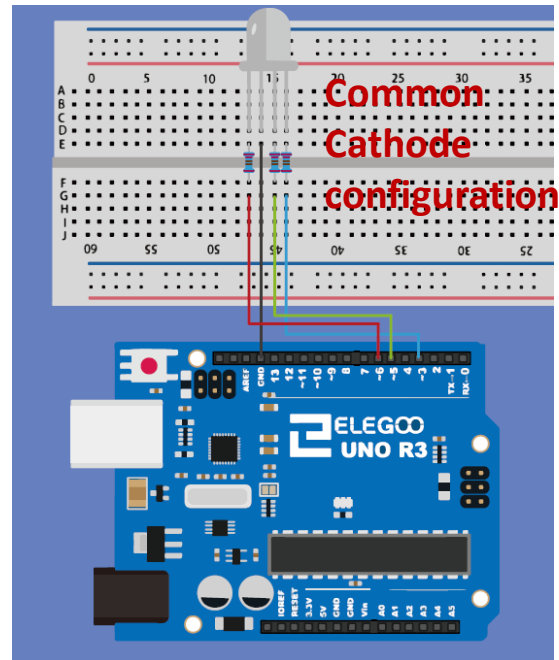
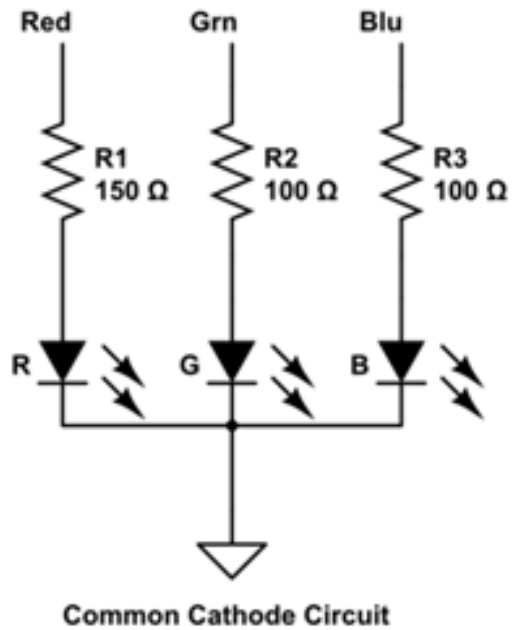
- Blink sketch (pin 12) with own LEDs and resistors
- Blink sketch (pin 12) with own LEDs and resistors and pin 13. (Sequentially on and off vs. Both on and Both off.) [Arduino code](#)



RGB LED

- PWM with RGB LED with common cathode (Lesson 2.2). NOTE: Longest leg of RGB LED goes to ground pin.
- RGB code [RGB basic](#)
[RGB favorite color](#)

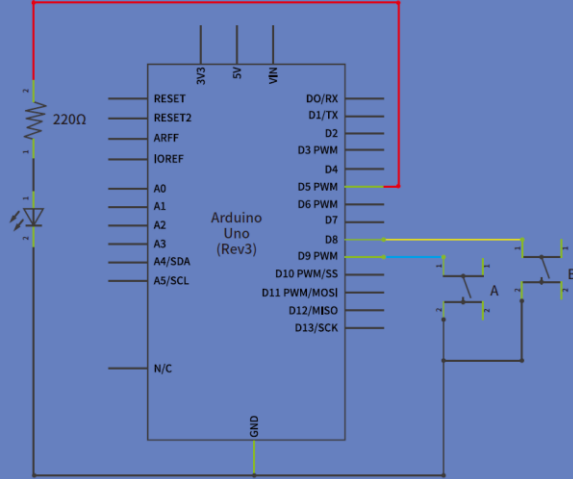




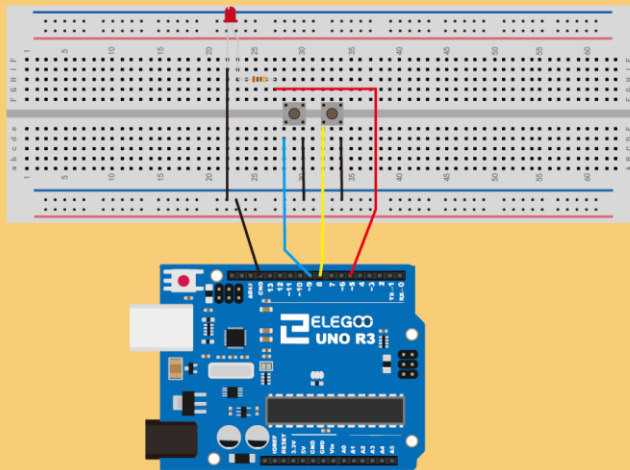
RGB LED circuit

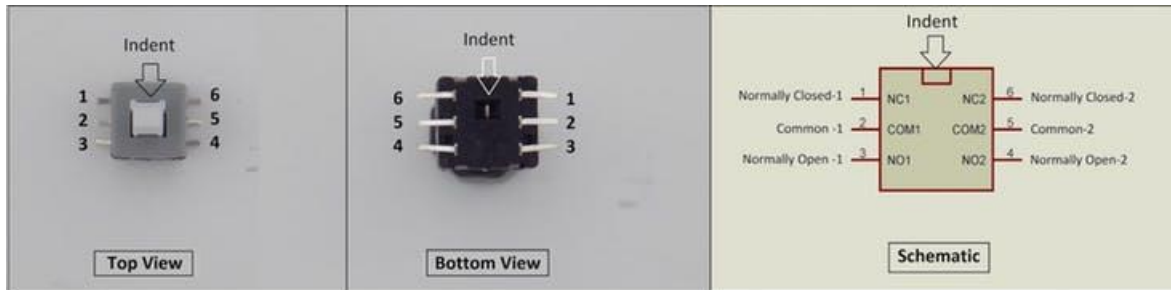
Push buttons (Input Pullup) – Lesson 2.3

Connection Schematic:

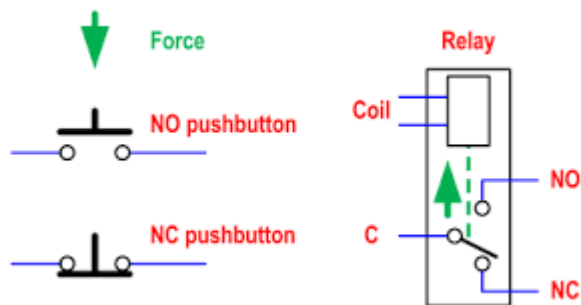
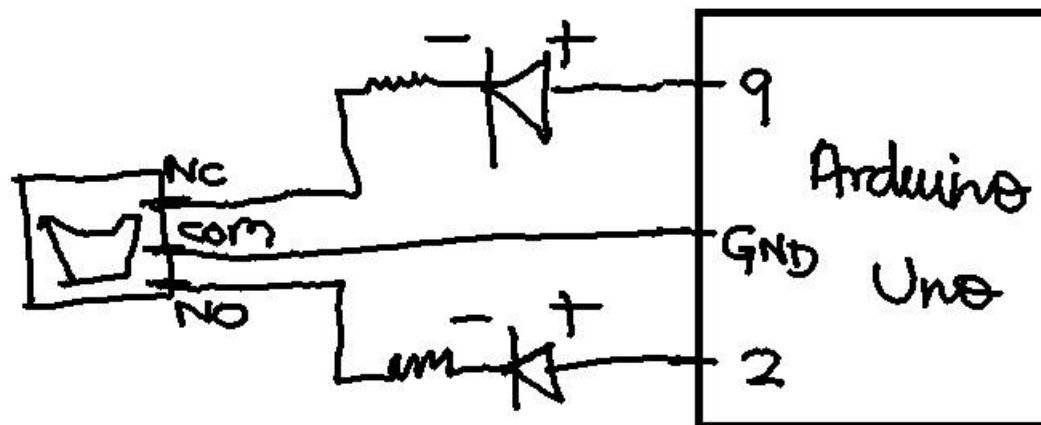


- By default, input pullup pin is High, when push button pressed, it gets to Low. [Video](#)





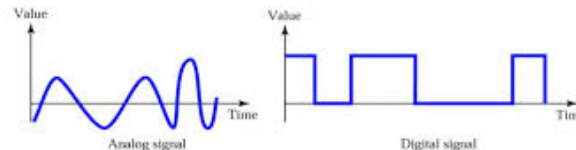
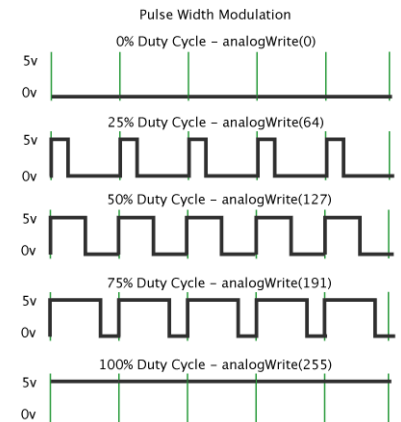
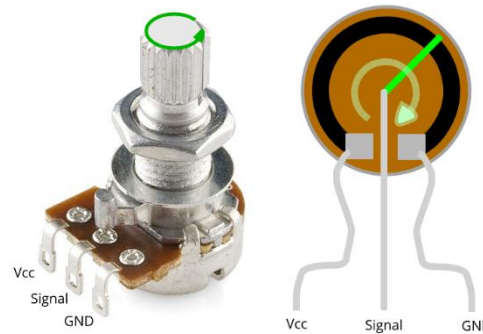
6 Pin Push Switch (Mini DPDT Push Switch) Pinout



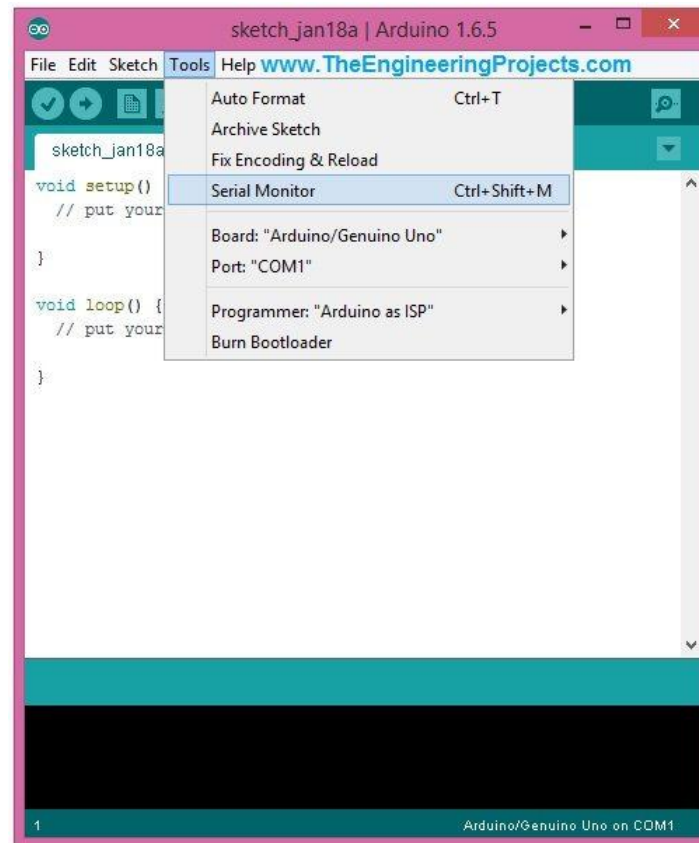
- [DPDT switch video](#)

Digital vs. Analog signal

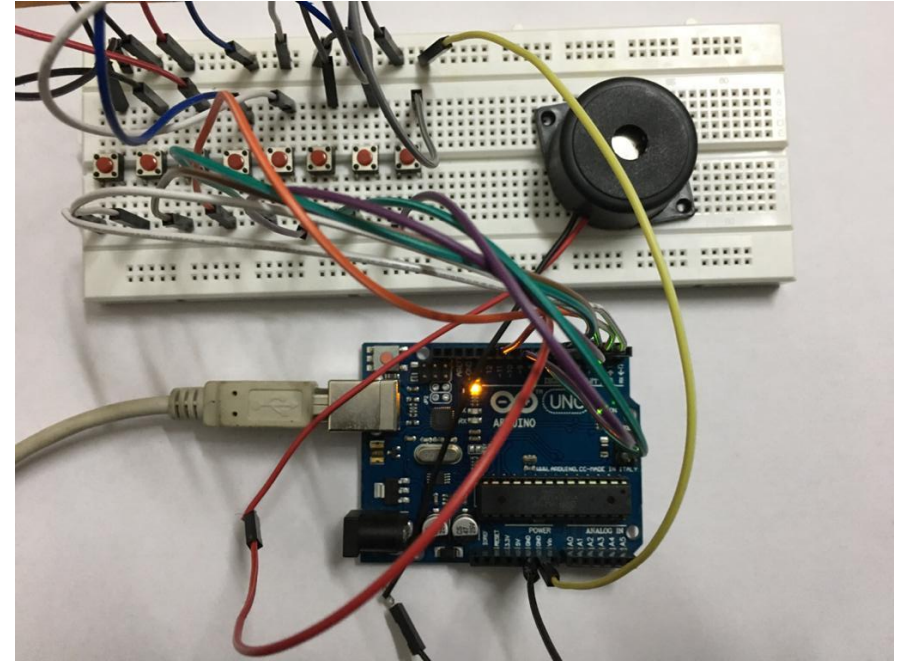
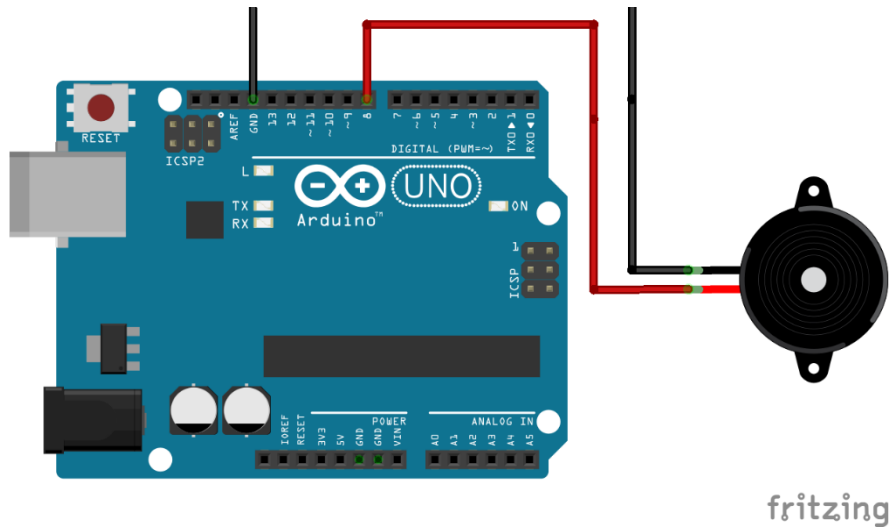
- digital output = Blink sketch
- digital input_pullup = push button example, Lesson 2.3
- analog output = Fade example, PWM pins (~)
- Analog input = AnalogInOutSerial (potentiometer)
- Multimeter = voltages, resistors, continuity.



Arduino features



- If then else
- [function, for loop, serial communication, serial monitor](#)
- Arduino examples: [Arduino codes](#)



[Basic musical instrument](#)

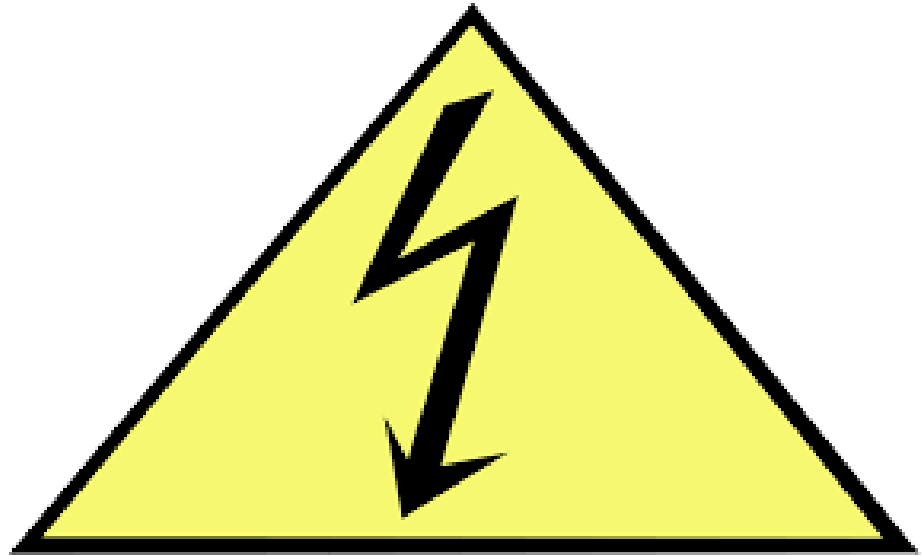
Piezo buzzer (Lesson 2.6)



Summary

- Arduino based programming
- LEDs, buttons, buzzer
- Analog and Digital signals (read and write)
- Serial communication

Electrical Safety and handling



- [Video](#) (1:30 - 4:00 minutes)
- Take utmost care of the electronics. Shouldn't be exposed to water. Keep in Ziploc bags. Delicate stuff.

Announcements



- Assignments are skills learnt in the class
- We would give you a chance to resubmit your assignment for re-evaluation once after we evaluate your assignment.