Welcome

Electrical Training Week 1

RoboJackets

Competitive Robotics at Georgia Tech

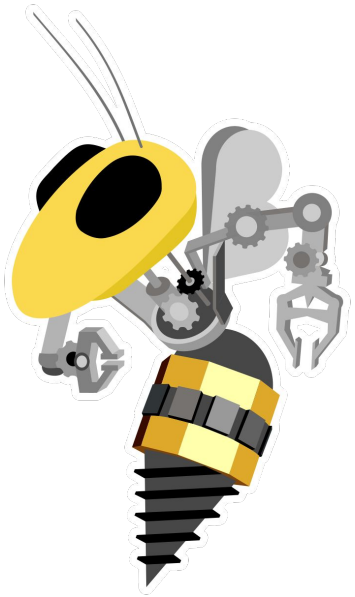
www.robojackets.org

Last Week!

- Introductions
- What is RoboJackets Electrical?
- Logistics

Agenda

- Electricity Basics
- Prototyping and Lab



Electricity Basics

Overview of Reference Guide and Applications

Ohm's Law

- $I = V/R$
  - Current (I): net flow of charged particles, Amperes(A)
  - Voltage (V): electric field potential difference, Volts(V)
  - Resistance (R): difficulty for current to pass through, Ohms(Ω)

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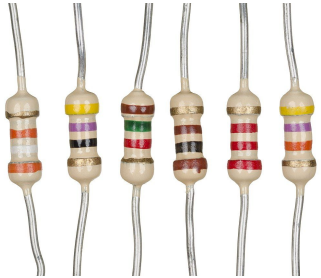
Measuring

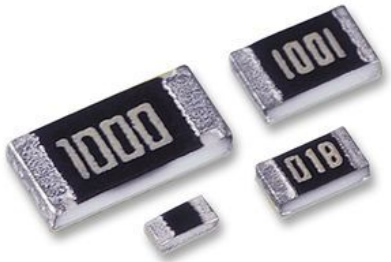
Multimeter Basics

Electrical Components

Resistors

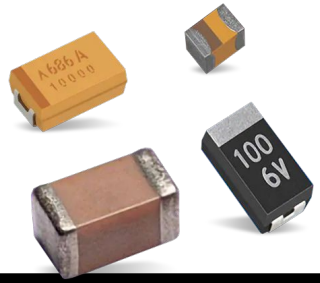
- Reduce current flow and divide voltage





Capacitors

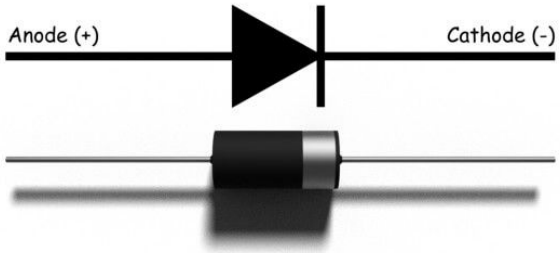
- Stores energy and smooths voltage levels



Electrical Components

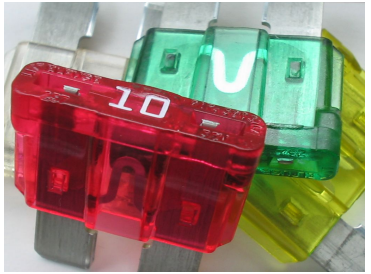
Diodes

- Conducts current primarily in one direction



Fuses

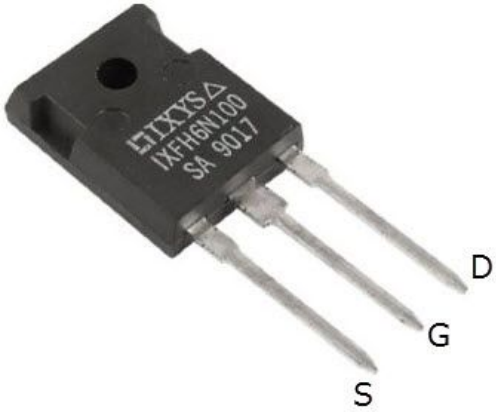
- Prevents over current

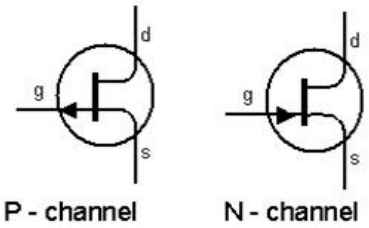


Electrical Components

Transistors

- Can act as electronic switches
- Can amplify electrical signals



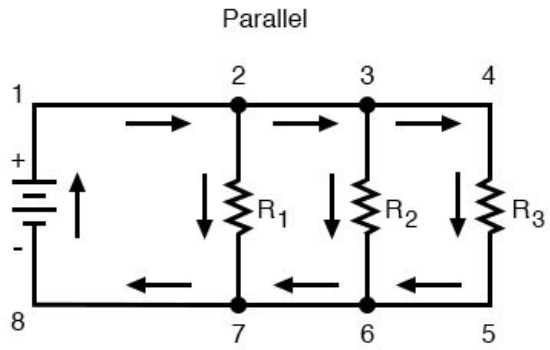


D=Drain
S=Source
G=Gate

Circuits

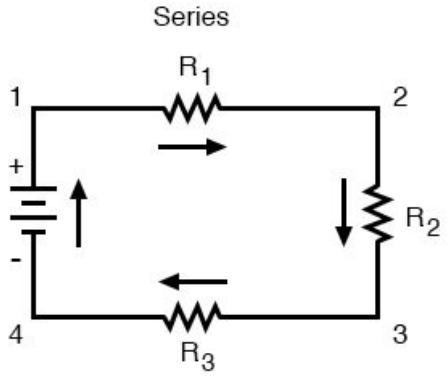
Parallel

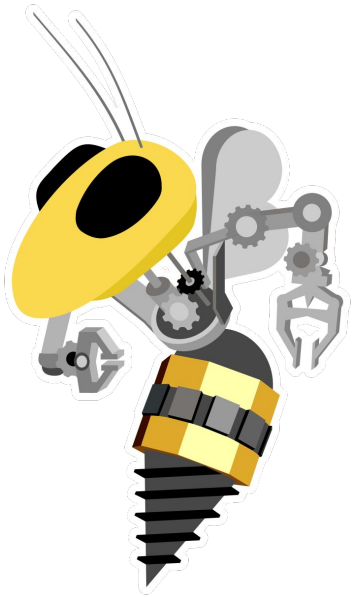
- Constant voltage



Series

- Constant current





Prototyping

Breadboard and Arduino Uno

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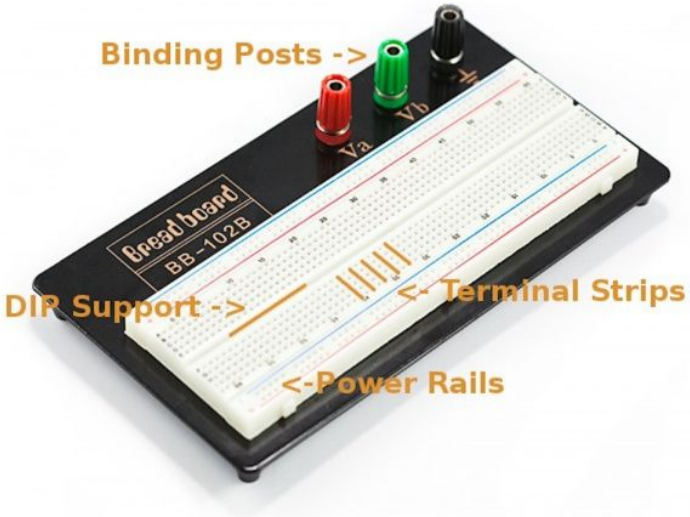
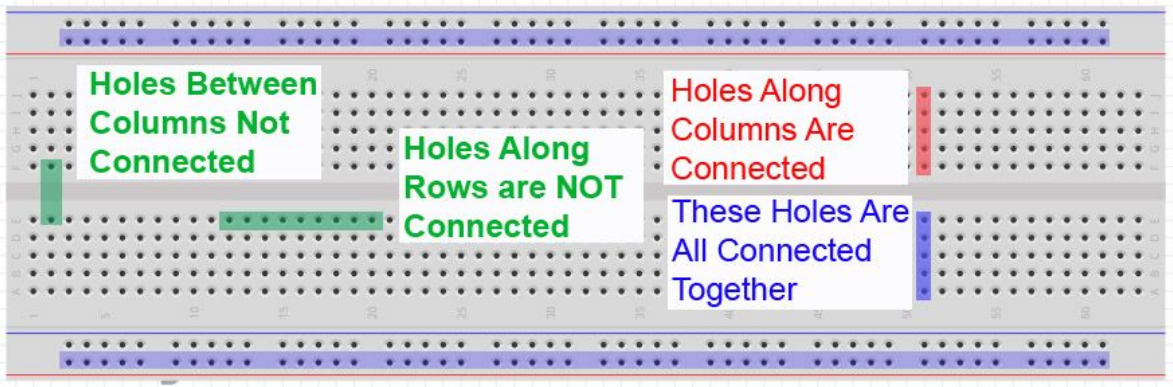
Breadboards

A way to prototype basic circuit designs





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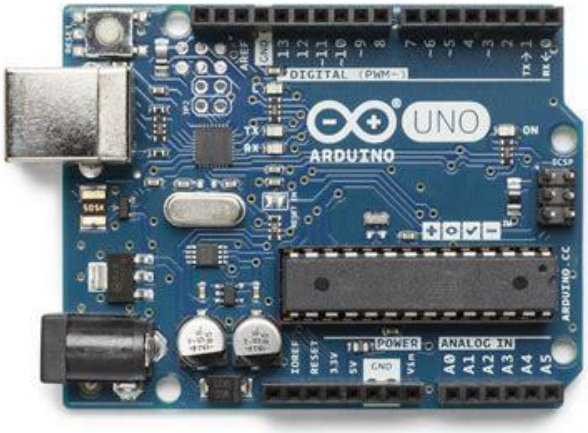
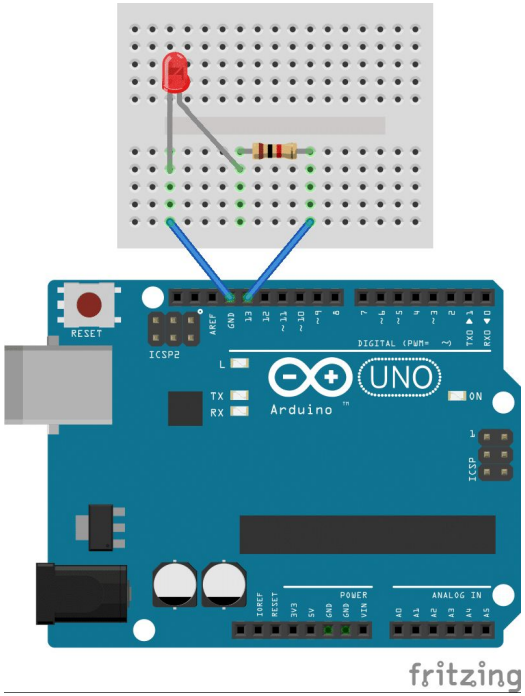
Arduino Uno

Microcontroller with I/O ports to control electronics





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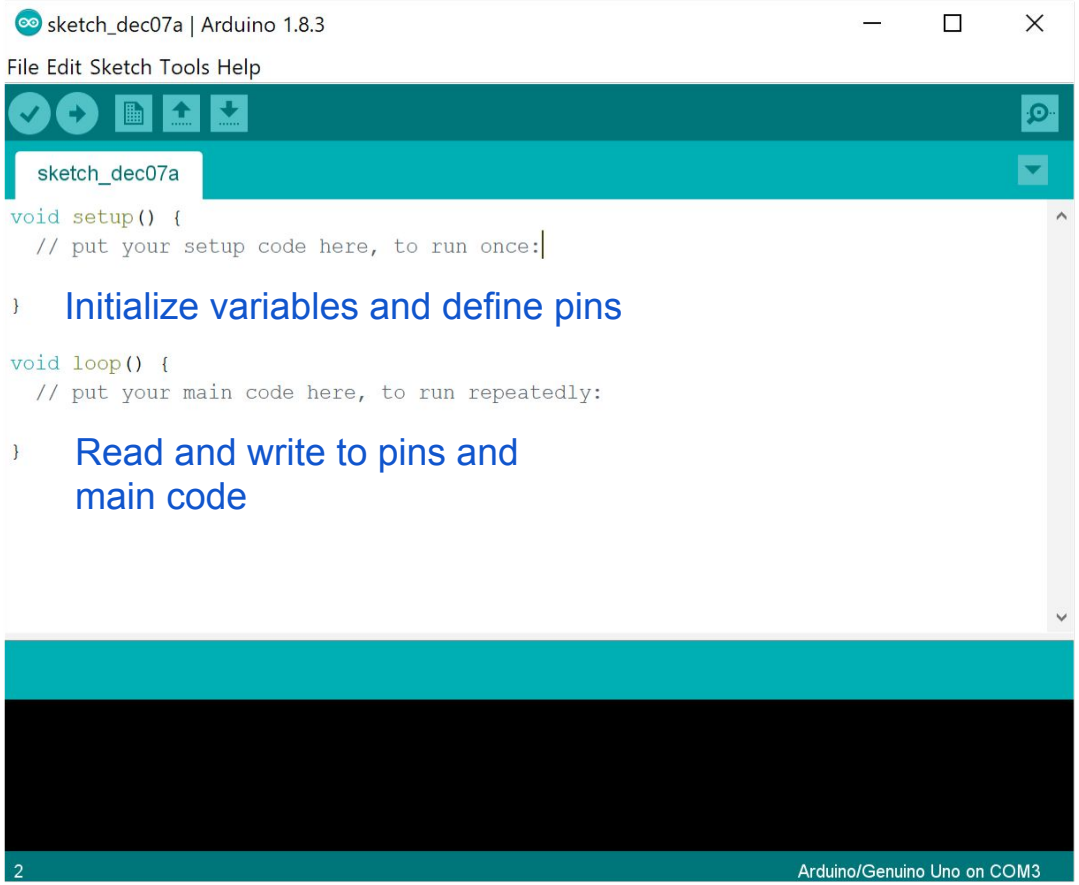
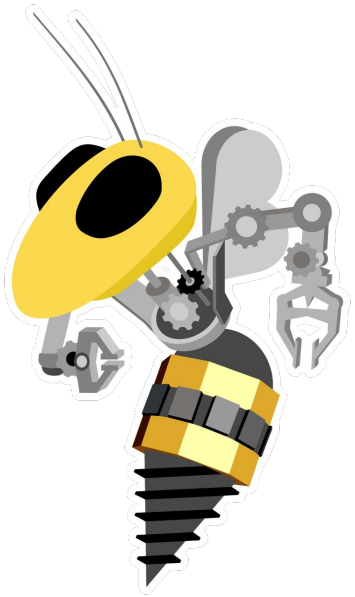
Arduino IDE

Tool to program Arduinos



Common Arduino Functions

- pinMode(pin, mode)
  - Configures the specified pin to act as an input or output
- digitalWrite(pin, value)
  - Write a high (5V) or low (0V) value to a specified pin
- digitalRead(pin)
  - Read a high or low value from a specified pin
  - Returns true if voltage is 5V, or false if it is 0V.



Lab

Blinking LEDs and fun

Lab Setup

- Install Arduino IDE
- Configure: Tools -> Board -> Arduino/Genuino Uno
- Plug in Arduino
- Choose Port: Tools -> Port
- Follow the Lab 1 Guide