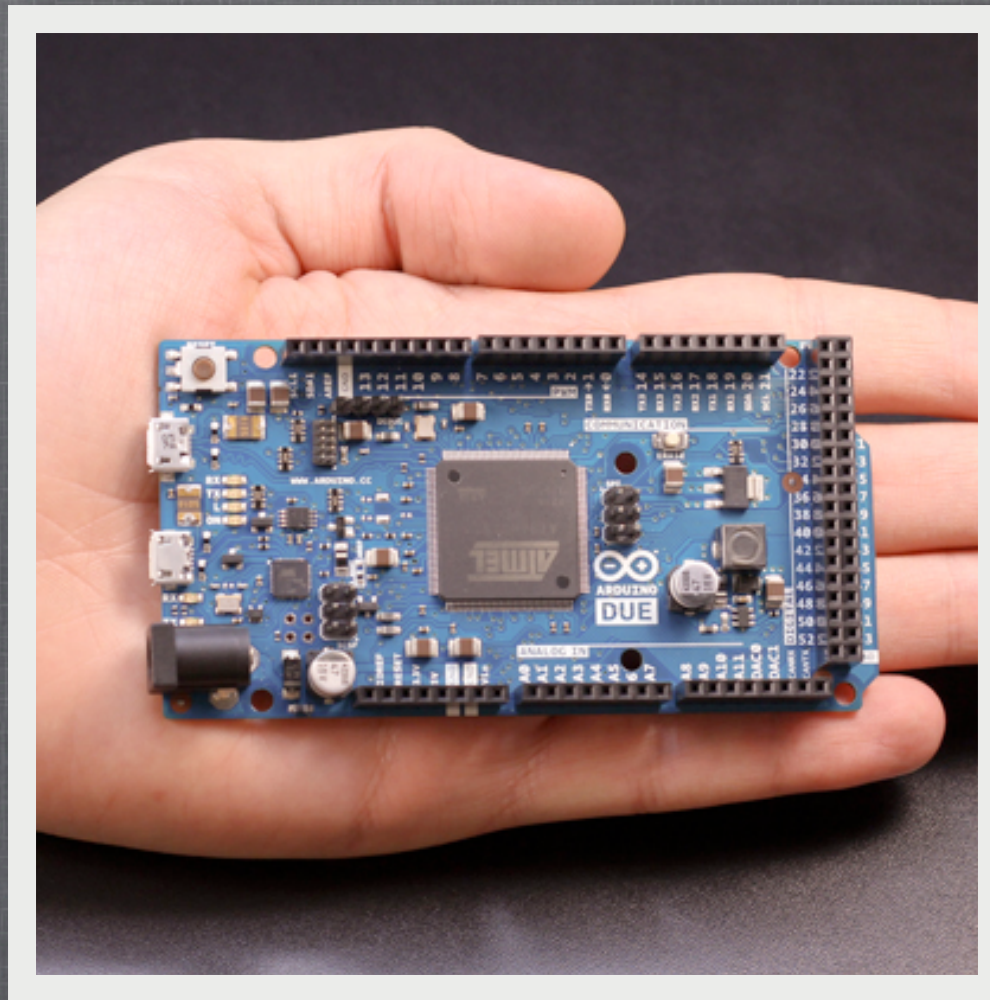# ARDUINO

The Basics...

WHAT IS AN ARDUINO???

- Microcontroller standard, based on AVR (usually)

- Takes a lot of the complications away - custom bootloader, IDE, language (based on C/C++)

- Lots of different models

- Open standard - anyone can make a clone, just can't call it "Arduino" (but can call it an Arduino clone)

- Easy to expand many models with "shields" to add capabilities

MODELS

- Several generations

- Several form factors for each generation

- Plus a couple oddballs...

MODERN BOARDS

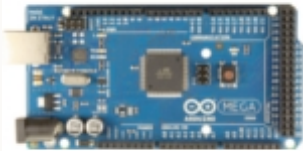Uno (R3)   Fio (3.3V)   Ethernet   13 Digital IO
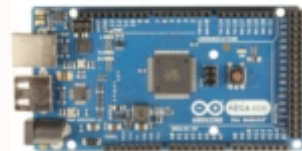6 Analog

Mega 2560   Due (3.3V)   Mega ADK   54 Digital IO
16 Analog

Nano   Fio (3.3V)   Micro   Mini

MODERN BOARDS

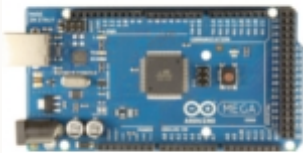Uno (R3)   Fio (3.3V)   Ethernet

13 Digital IO
6 Analog

New - Can act as HID!!!

Mega 2560   Due (3.3V)   Mega ADK

54 Digital IO
16 Analog

Nano   Fio (3.3V)   Micro   Mini

OTHER COMPATIBLES...

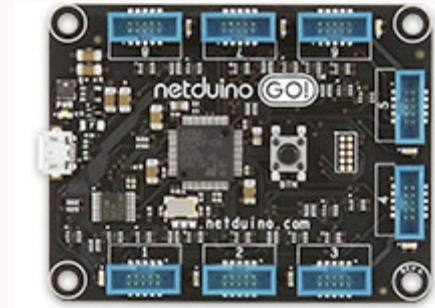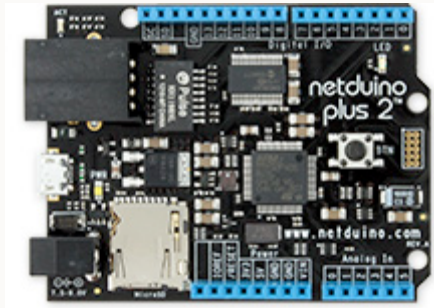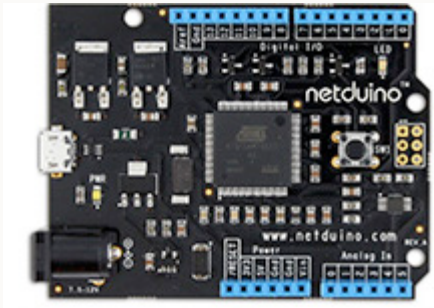- Pololu's "Orangutan" series - these often include other things like LCD displays, motor controllers, etc. But not shield compatible

- Netduino (+ V2) - different processor but 95% pin / shield compatible, program in .Net languages + dev environment

- Boarduino - Breadboard compatible Arduino clone. Small size. Not shield compatible, but can be used on a breadboard. 2 versions - USB power, DC power.

	Arduino Uno	Baby Orangutan B-328	Orangutan SV-328	Orangutan SVP-1284
Supply voltage	7 – 12 V	5 – 13.5 V	6 – 13.5 V	6 – 13.5 V
5V regulator	0.25 – 0.8 A (dep. on VIN)	0.1 A	3 A	3 A
Secondary regulator	50 mA @ 3.3 V			3 A, adjustable (2.5 V – 85% VIN)
Size	2.95 × 2.10 in	1.20 × 0.70 in	2.15 × 1.90 in	3.70 × 2.20 in
Processor	ATmega328P	ATmega328P	ATmega328P	ATmega1284P
Program memory	31.5 KB	32 KB	32 KB	128 KB
RAM	2 KB	2 KB	2 KB	16 KB
Clock	16 MHz resonator	20 MHz resonator	20 MHz resonator	20 MHz resonator
Digital I/O	20	16	8	17
Analog inputs	6	8	8	12
User UARTs	0	1	1	2
User LEDs	1	1	2	2
User pushbuttons	0	0	3	3
User trimpot		✓	✓	✓
Built-in programmer	✓			✓
USB	✓			✓
Reset button	✓		✓	✓
Power button			✓	✓
Self-shutdown capability			✓	✓
Motor drivers		2 × 1A (continuous)	2 × 1A (continuous)	2 × 2A (continuous)
Motor current sensing				✓
LCD			8×2 character	16×2, backlit
Buzzer			On PWM output	On PWM output, MOSFET-amplified
Dedicated servo hardware				8 channels

NETDUINOS...

- As said, program in .Net languages

- Hardware is beefier, but needs to be to run the .Net runtime and compiled code, so take specs with grain of salt

- Prices Comparably to Arduinos and Orangutans

- Can use many (but not all) Arduino shields, so better than Orangutan in that regard

BOARDUINO + MINTDUINO
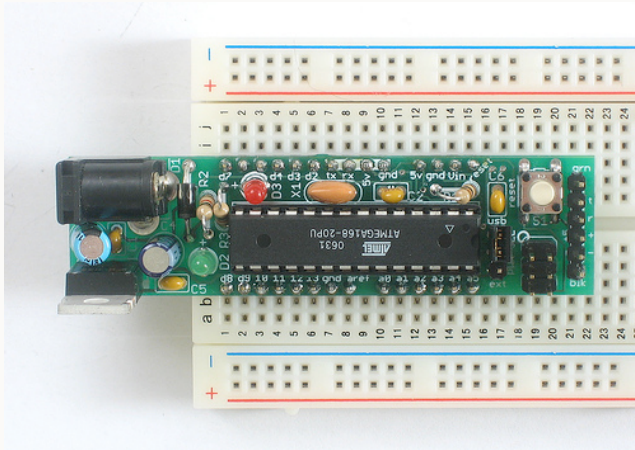
- Produced/sold by Adafruit.com

- Broadboard-compatible pin arrangement

- Let's you build your own!

- Can see just how simple Arduino is...

SHIELDS...

- Stackable

- Each shield adds a capability, but uses various pins (which might limit ability to use 2 shields together if they both need the same pins.)

- Makes it easy to add functionality with minimal effort. Easy starting point for newbies and the electronics challenged...

- BUT - Limits design flexibility (form factor) and usually only for the Uno/Leo - style units (limited ones for Mega style)

- Typicals include - Xbee/Bluetooth/Wifi, SD memory storage, Motor controllers, GPS, Display, etc.

LANGUAGE...

- As stated, based on C/C++ (links against AVRLibC), but don't have to get down into the ugly stuff if you don't want to for most projects

- Custom commands to:

  - Read/write pins, play sound, time, deal with interrupts, serial connections, KB+mouse

  - LOTS of libraries as well to do more!

- Command reference at: http://arduino.cc/en/Reference/HomePage