Arduino Uncomplicated

Making things happen in the physical world with electronics

Arduino

What is it?

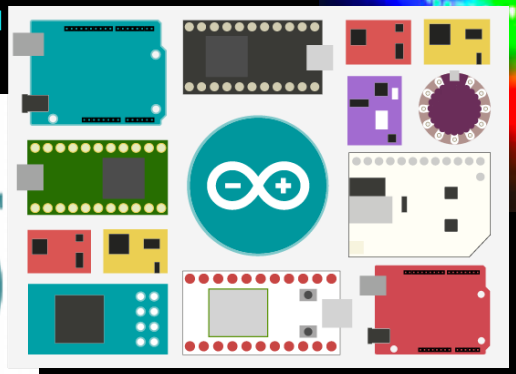
Tool for Physical Interaction

What can we do with it?

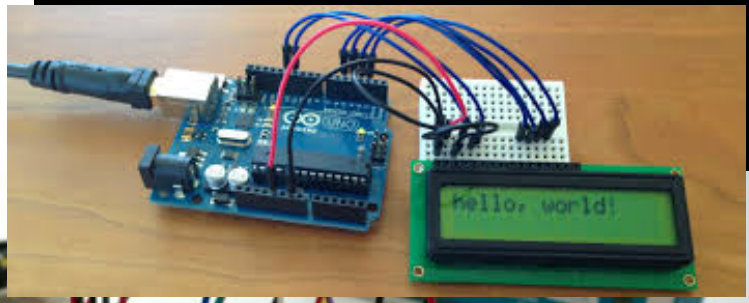
ALOT!

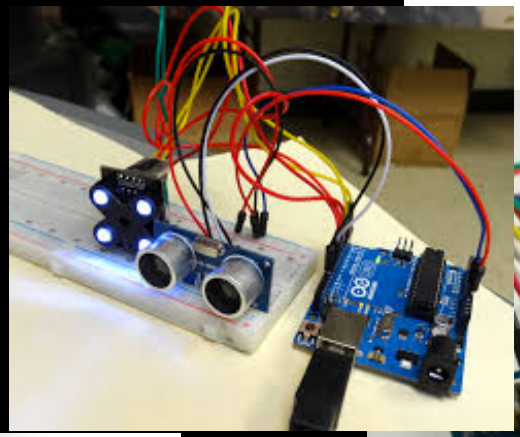
IOT

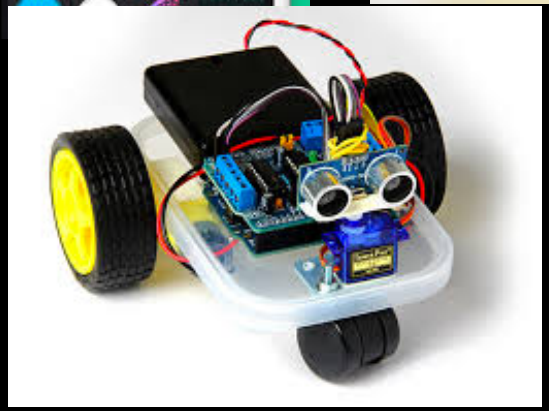
ARDUINO™

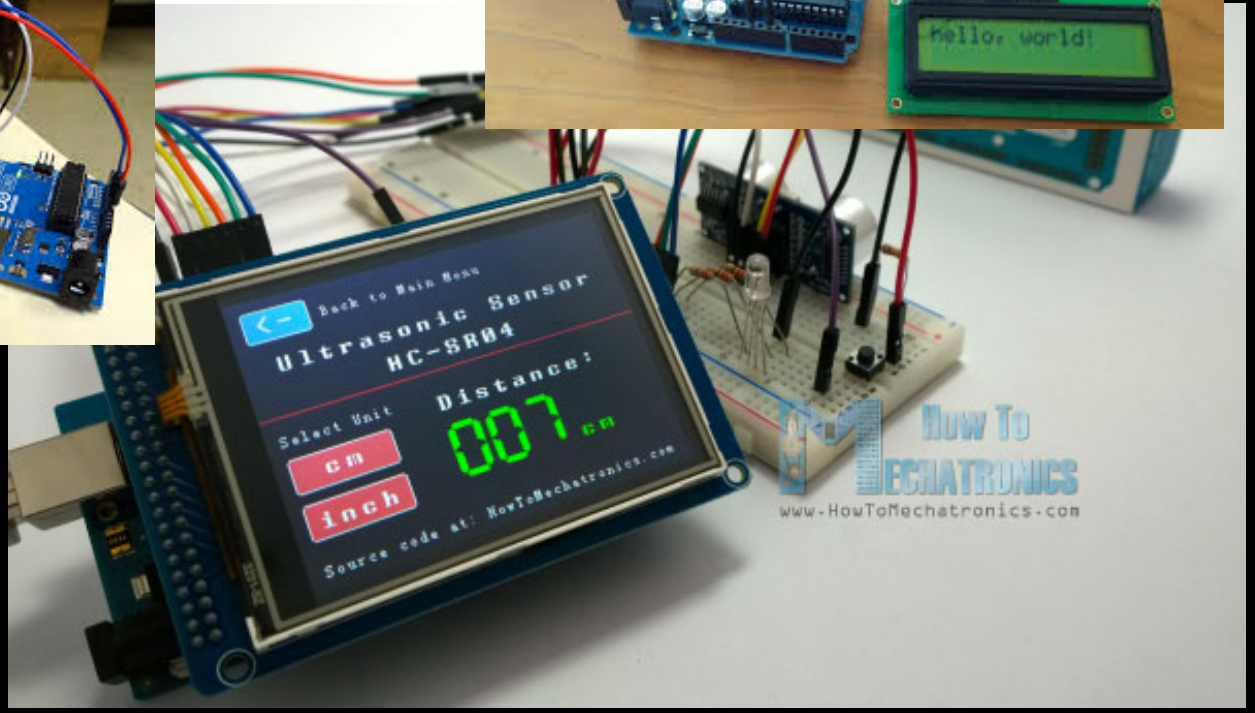


Fun









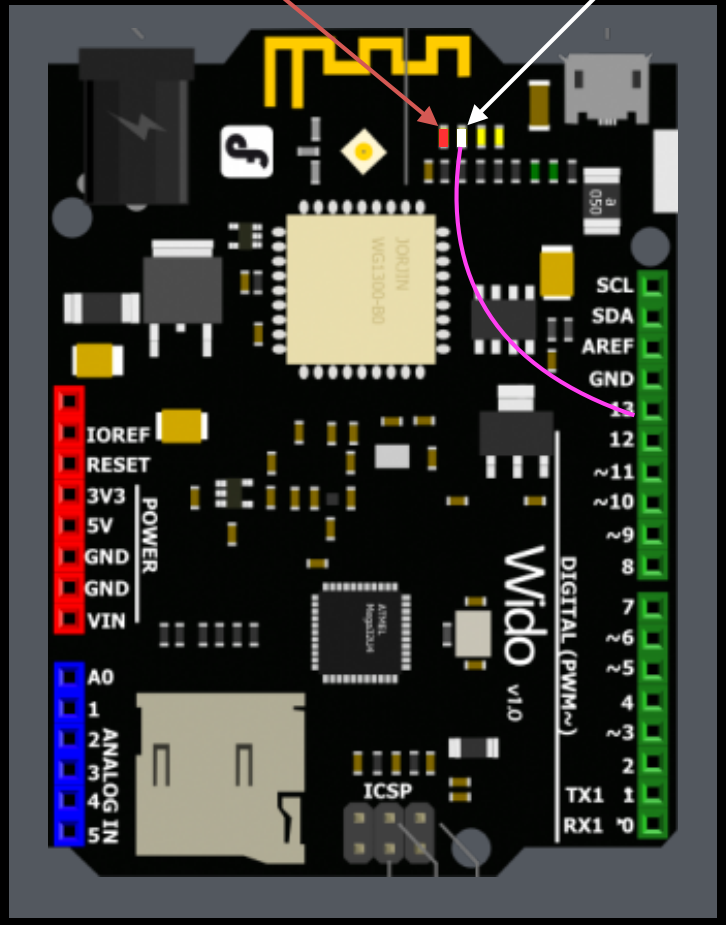
ROBOTS!

How do we do it?

Start Simple: Grow in complexity

Power On
RED

Built in
LED (13)



Power
Ground

Analog
Inputs

Digital

Inputs
and
Outputs

Let's Blink A light!

First Code

- Here we are going to use the Arduino tool.
- In this class we are using version (xx.xx.xx) of the arduino Integrated Development Environment (IDE) - avail for download for free from www.arduino.cc (Download link)
- You can cheat and use
  - File-> Examples -> 01. Basics -> Blink
  - Open the example and you will see the default example
  - I have circled key values in the code on the next slide

Simple Blink Code

```
// the setup function runs once when you press reset or power the board
void setup() {
    // initialize digital pin 13 as an output.
    pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(1000);              // wait for a second
  digitalWrite(13, LOW);    // turn the LED off by making the voltage LOW
  delay(1000);              // wait for a second
}
```

Runs Once at setup

which pin is used

in milliseconds (1000ms per second)

Power On
RED

Built in
LED (13)

Not Connected

5V Reference for Analog INputs

Active LOW - RESET — pull low restarts Arduino

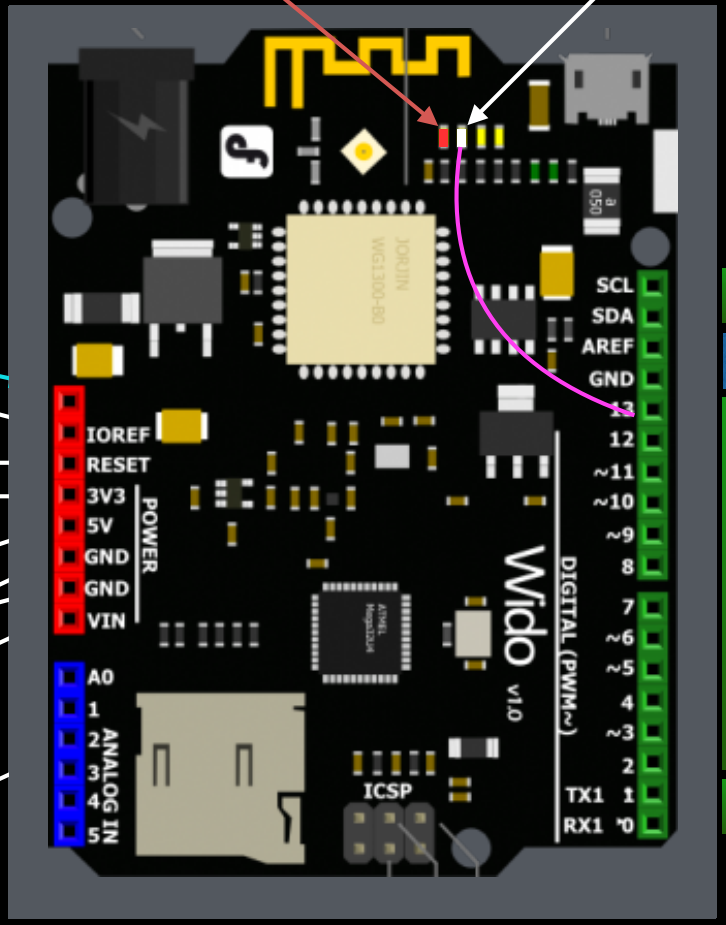
3.3V Output (low current)

5.0V Output (low current)

GND

VIN — External 5V in

Analog Inputs (0-5V)
A0, A1, A2, A3, A4, A5



SPI Serial Port

Analog Ground (Reference for A/D converter)

Generic Digital Input
~ means that pin is PWM
(Pulse Width Modulation)
Pin 13 is a TEST LED
2-12 commonly used
LOW - 0V
HIGH - 5V

Regular Serial Port

Added Stuff

- You made a light blink!
- Let's change some of the things in the file
- We are going to change the blink rate with two different methods
    - #define BLINK_PERIOD
        - This is equivalent to a global find/replace. We use this for numbers than can never change. These are called Constants or Literals. Traditionally these are denoted in code with all CAPS. Using CONSTANTS makes your code more readable and easy to edit.
    - int blink_timeout = 500;
        - This is a variable declaration. We are saying that this thing is an integer (-inf,…, -3,-2,-1,0,1,2,3,…, +inf) and we can change it during the program.
        - We will start with a very fast blink and slow it down.

CONSTANTS Blink

```
#define BLINK_PERIOD 100  //will make light blink 5 times per second

// the setup function runs once when you press reset or power the board
void setup() {
    // initialize digital pin 13 as an output.
    pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(BLINK_PERIOD); // wait for a second
  digitalWrite(13, LOW);    // turn the LED off by making the voltage LOW
  delay(BLINK_PERIOD); // wait for a second
}
```

Variable Blink

```
//#define BLINK_PERIOD 100  //will make light blink 5 times per second
int blink_rate = 1;
// the setup function runs once when you press reset or power the board
void setup() {
    // initialize digital pin 13 as an output.
    pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(blink_rate); // wait for a second
  digitalWrite(13, LOW);    // turn the LED off by making the voltage LOW
  delay(blink_rate); // wait for a second
  blink_rate = 2*blink_rate; // slows the blinking down each time
}
```