

Robotics with Arduino

Intro to Circuits

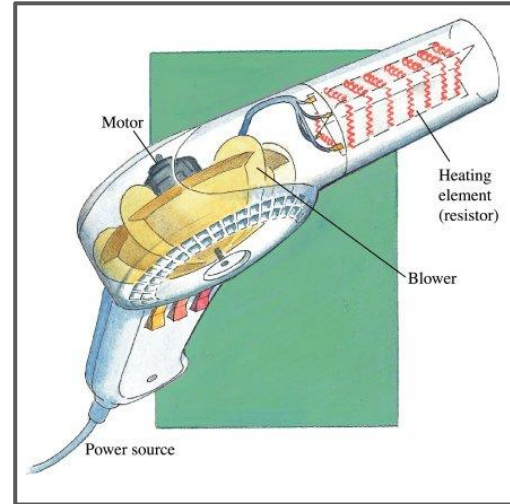
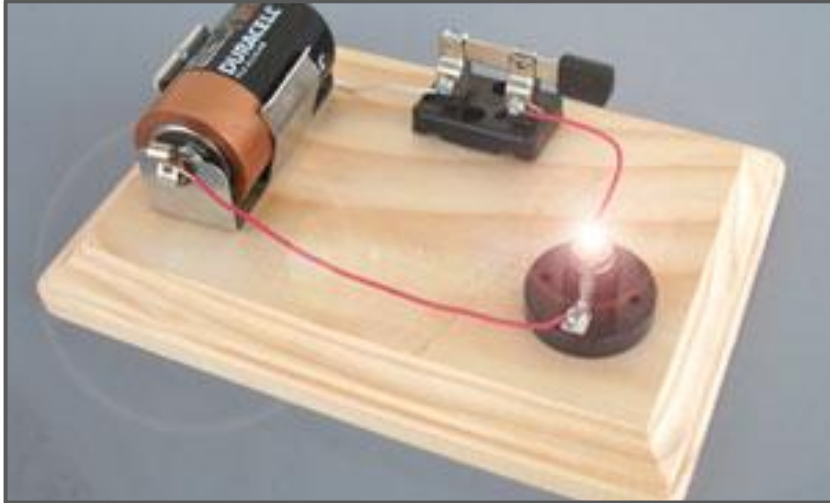
Leah Buechley



Circuits

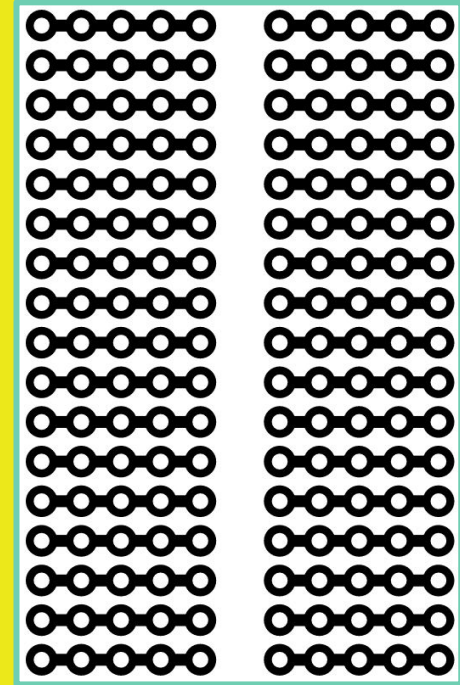
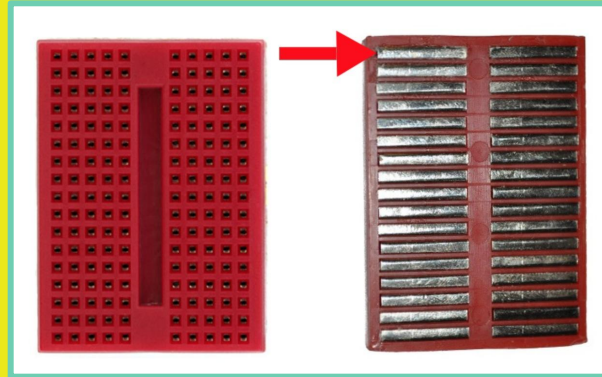
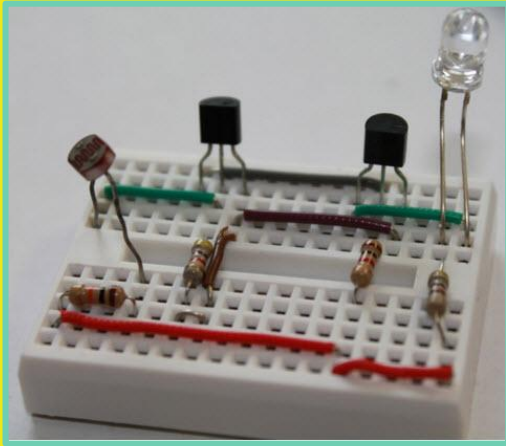


What is a Circuit?



What is a Breadboard?

A breadboard is a tool used to prototype electronics.



Jump Wires



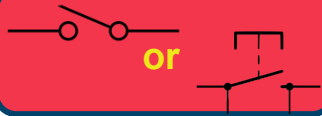
Resistors



LEDs



Button



Piezo
Element

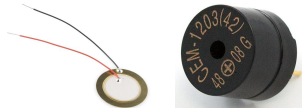


Photo
Transistor



Servo Motor

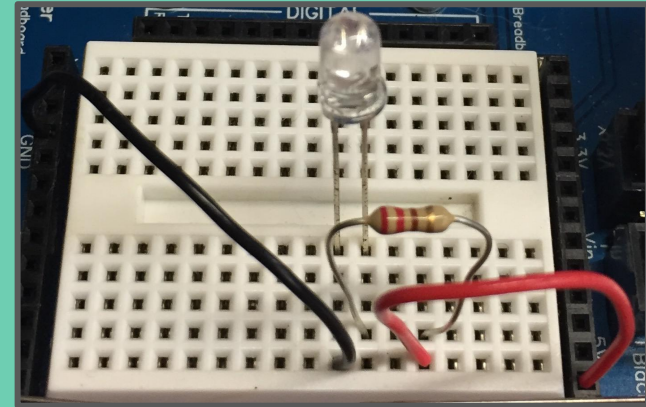
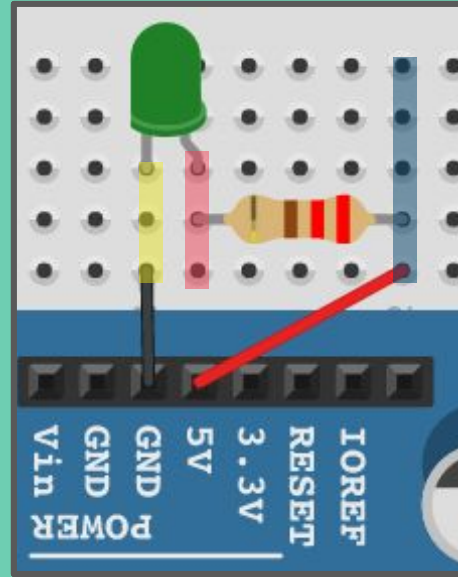
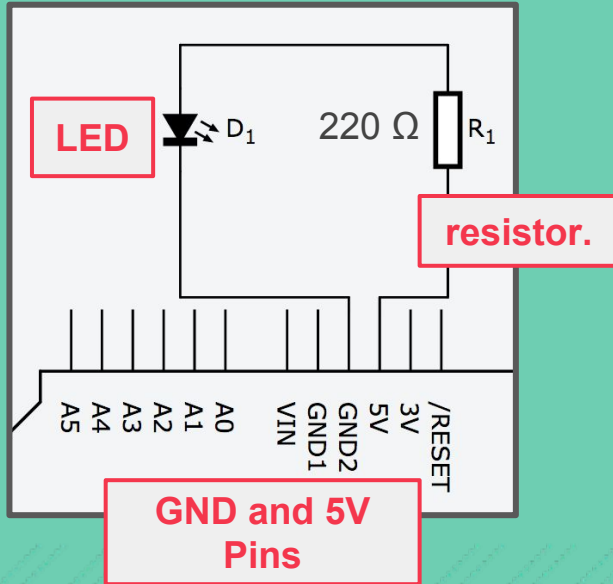


Components



Build This Circuit!

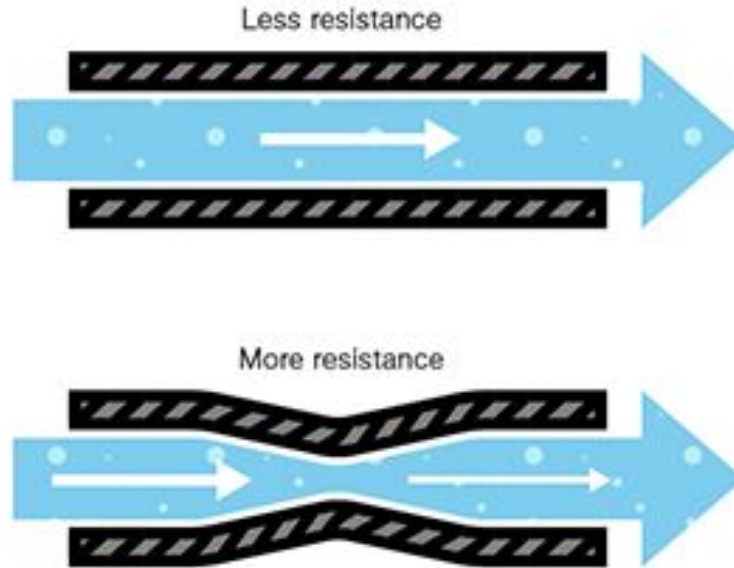
1. Identify the components
2. Plan your breadboard
3. Build and test



Why does the circuit need a resistor?

What are resistors?

The resistor slows the electricity down so the circuit doesn't catch fire.

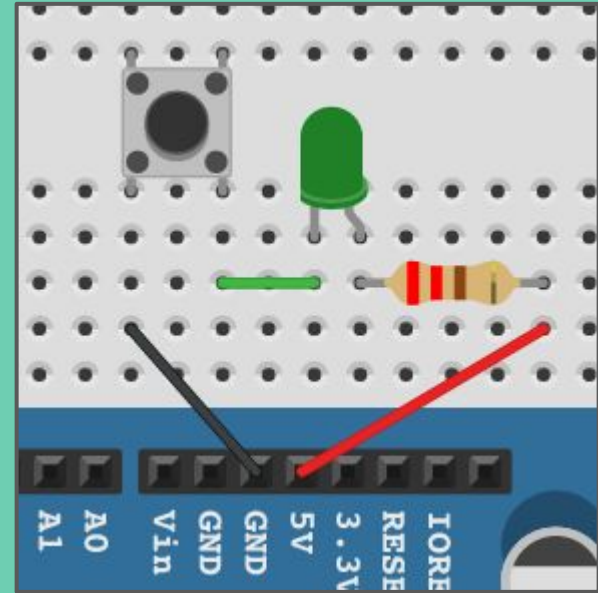
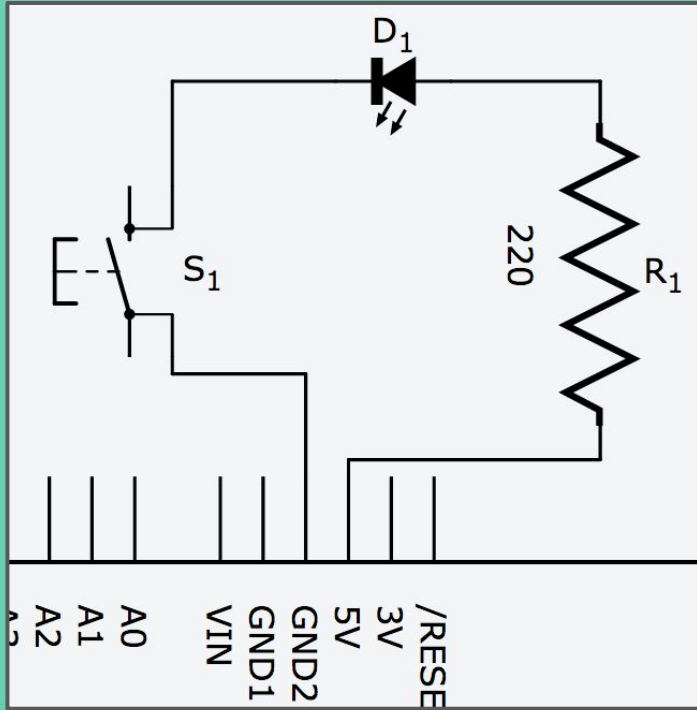


A black and white photograph of two young women sitting at a desk, looking at a laptop. The woman on the left is smiling and looking down at the screen. The woman on the right is looking at the screen with a focused expression. A large yellow banner is overlaid on the bottom half of the image.

Try It On Your Own!

Let's try another!

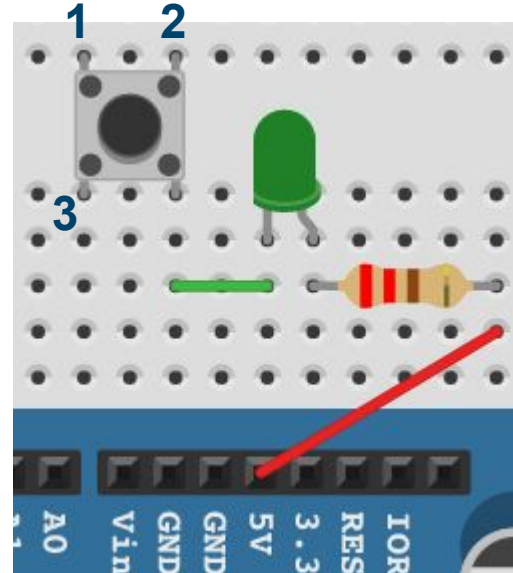
1. Identify the components
2. Plan your breadboard
3. Build and test



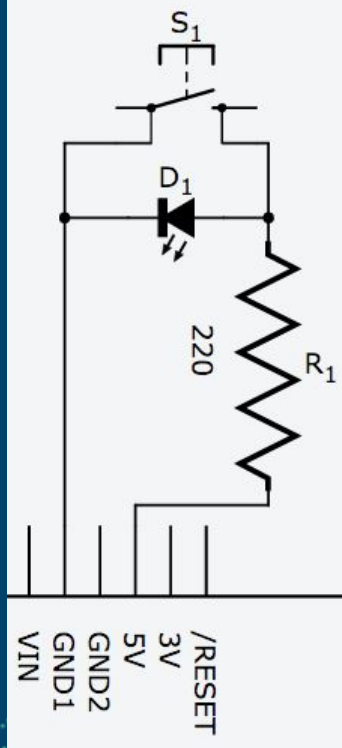
Buttons



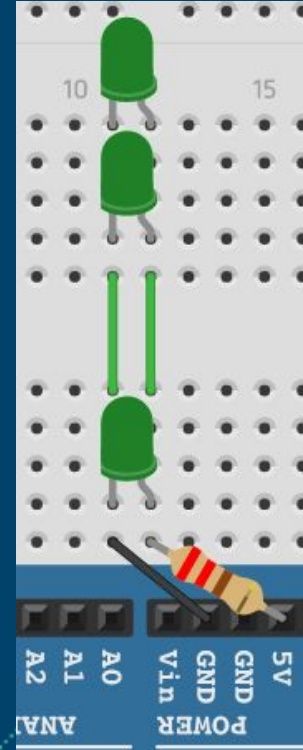
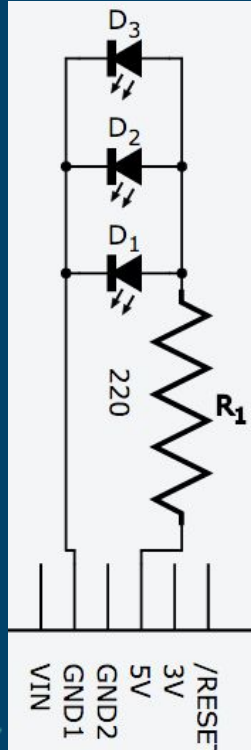
Grounded Pin	Button Pressed	LED on?
1	Pressed	
	Not Pressed	
2	Pressed	
	Not Pressed	
3	Pressed	
	Not Pressed	



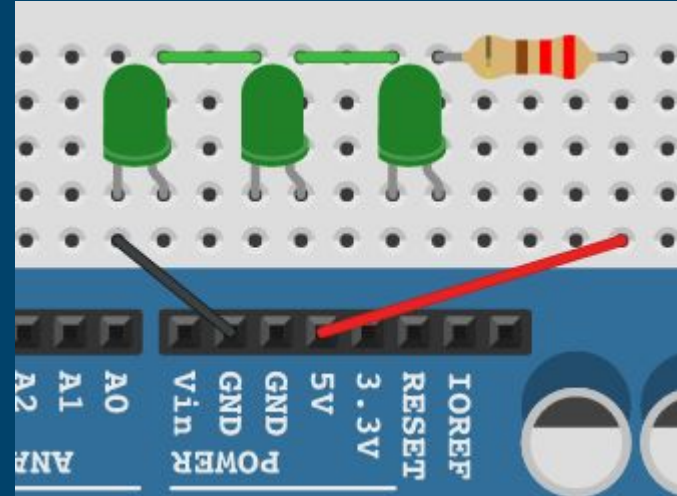
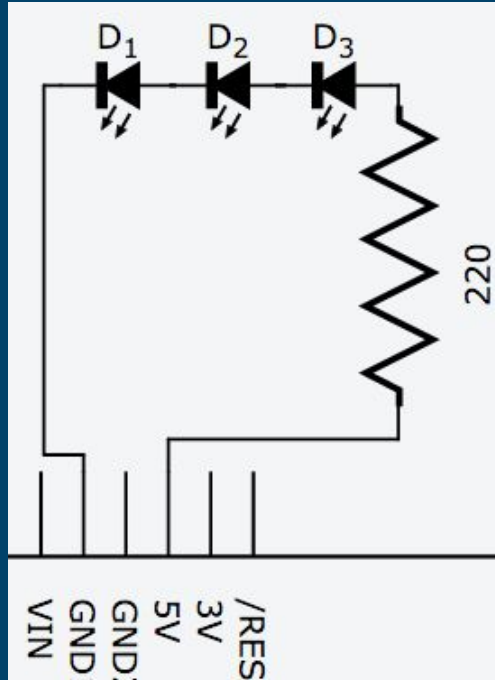
In Series Vs. In Parallel



In Series Vs. In Parallel



In Series Vs. In Parallel



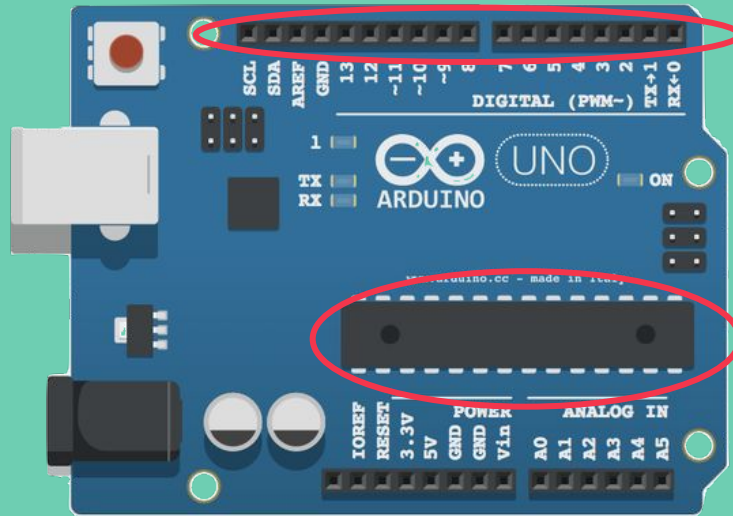
Programming with Arduino

Get your LEDs under Control!

Arduino Programming: C++



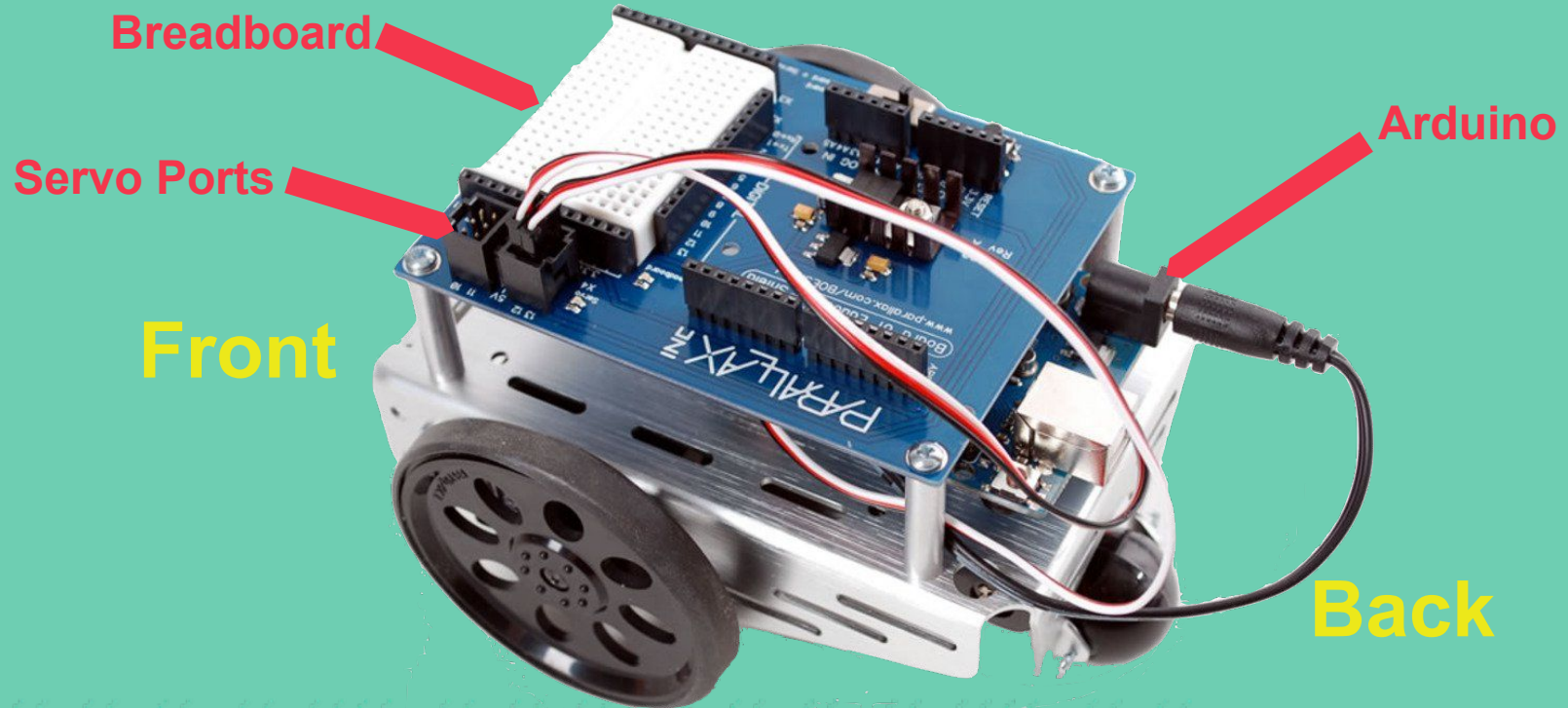
What is an Arduino?




Digital Input/Output (or I/O) pins

Microcontroller “Brain”

What is the Parallax BoE Bot?



Arduino Program Layout

A screenshot of the Arduino IDE interface. At the top, there is a toolbar with five icons: a checkmark, a right arrow, a document with a plus sign, an up arrow, and a down arrow. Below the toolbar is a tab labeled 'sketch_mar23a'. The main text area contains the following code:

```
void setup() {  
  // put your setup code here, to run once:  
}  
  
void loop() {  
  // put your main code here, to run repeatedly:  
}
```

Functions

`pinMode(pin , INPUT/OUTPUT)`

`digitalWrite(pin, HIGH/LOW)`

`delay(time)`

What does this program do?

```
int LEDPIN = 4;

void setup(){
    pinMode(LEDPIN, OUTPUT);
}

void loop(){
    digitalWrite(LEDPIN, HIGH);
    delay(500);
    digitalWrite(LEDPIN, LOW);
    delay(1500);
}
```

A black and white photograph of two young women sitting at a desk, looking at a laptop. The woman on the left is smiling and looking down at the screen. The woman on the right is looking at the screen with a focused expression. A bright yellow banner covers the bottom half of the image, containing the text 'Coding with Arduino'. In the bottom right corner, there is a logo for 'girls who code' in a stylized font.

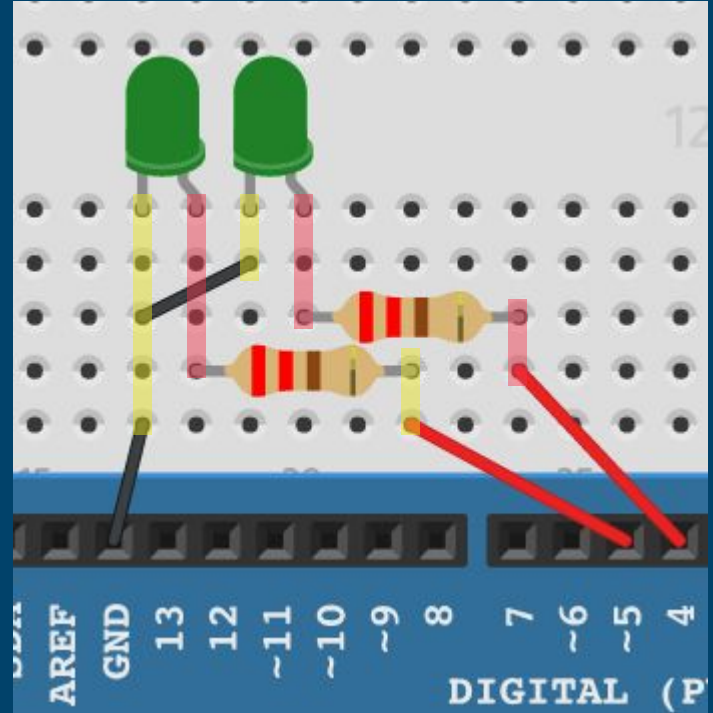
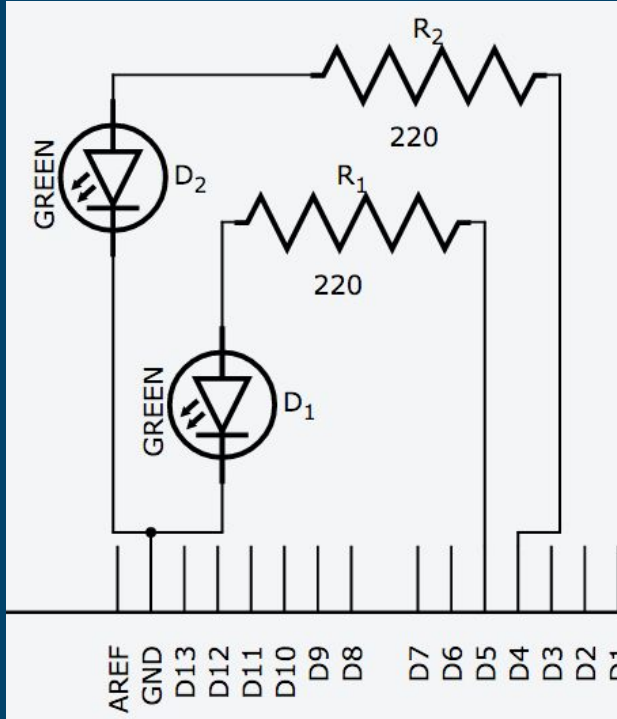
Coding with Arduino

Your Turn!

1. Make circuits for two LEDs to be controlled INDEPENDENTLY from pins 4 and 5.
2. Write a program that makes the two LEDs blink in the following way:
 - a. The LED connected to pin 4 is on when the pin 5 LED is off and they blink on for one second, off for one second.*

When you complete this, create your own pattern with the LEDs!

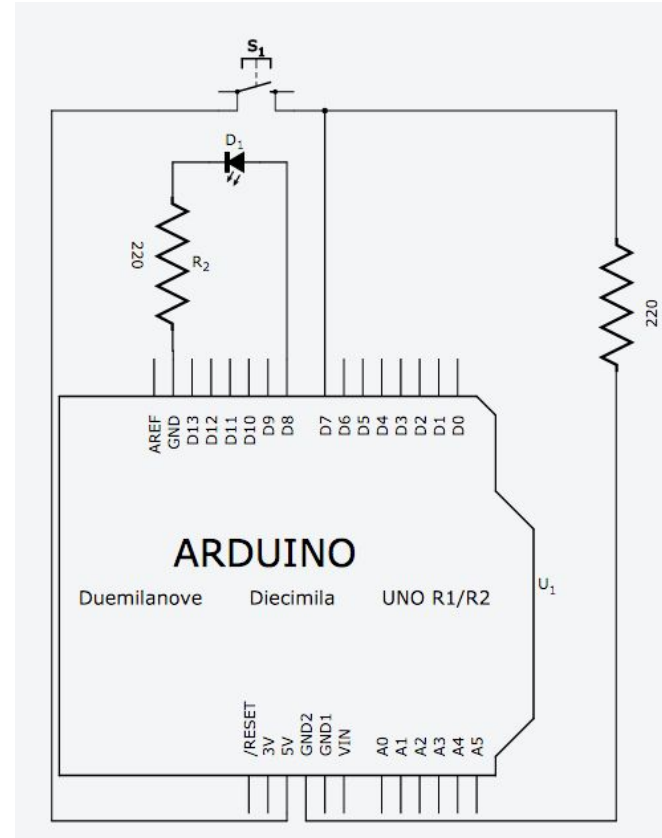
Two LEDs



Buttons!

```
pinMode(4, INPUT);
```

digitalRead(4)



Conditionals and Boolean Operators in C++

```
if (condition) {  
  
}  
else if (condition) {  
  
}  
else {  
  
}
```

- Is equal to: ==
- Is greater than: >
- Is greater than or equal to: >=
- Is less than: <
- Is less than or equal to: <=
- Is not equal to: !=
- And: &&
- Or: ||