Robotics with Arduino

Intro to Circuits

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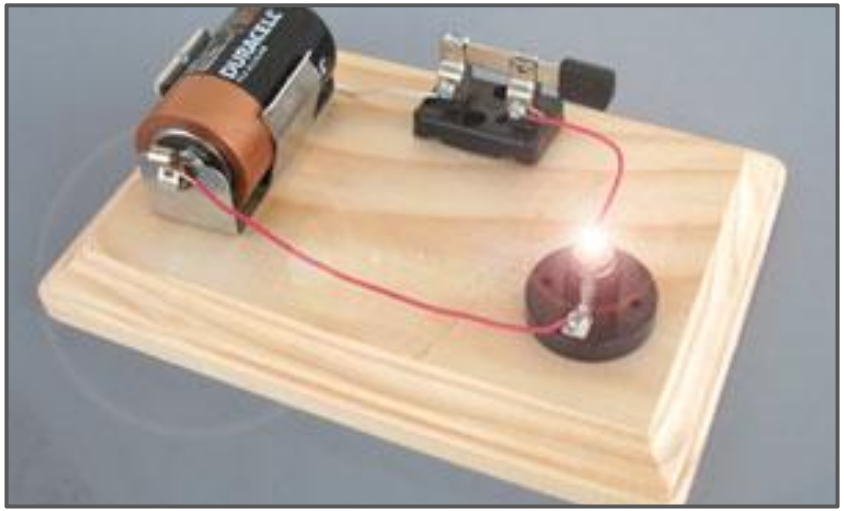
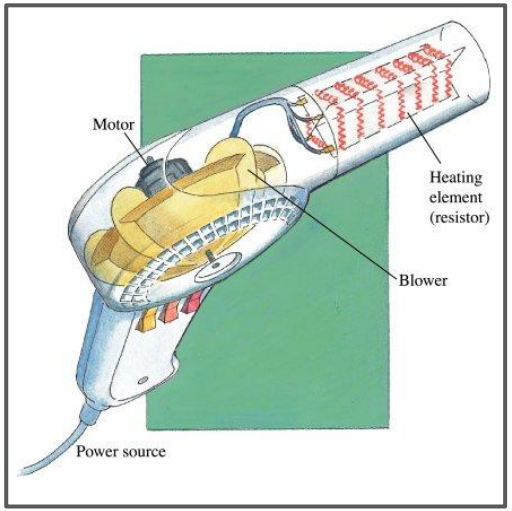
Leah Buechley

Circuits

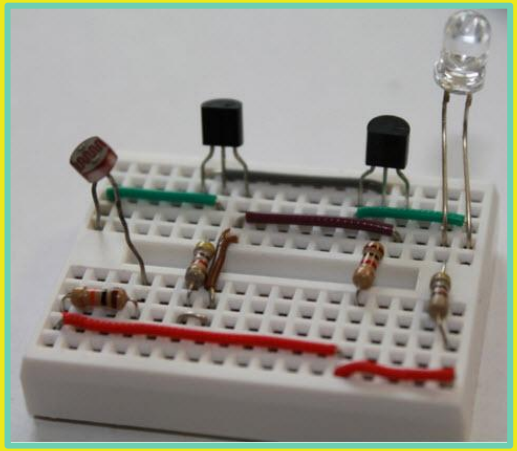
What is a Circuit?

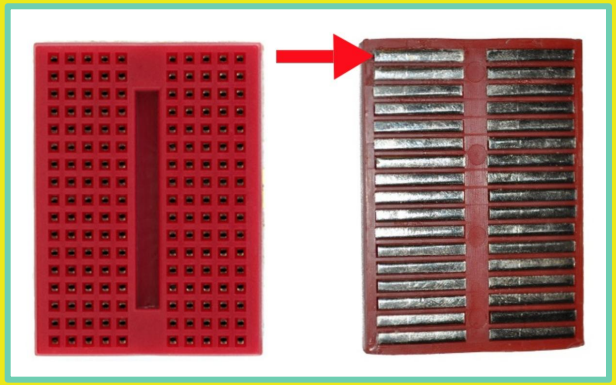


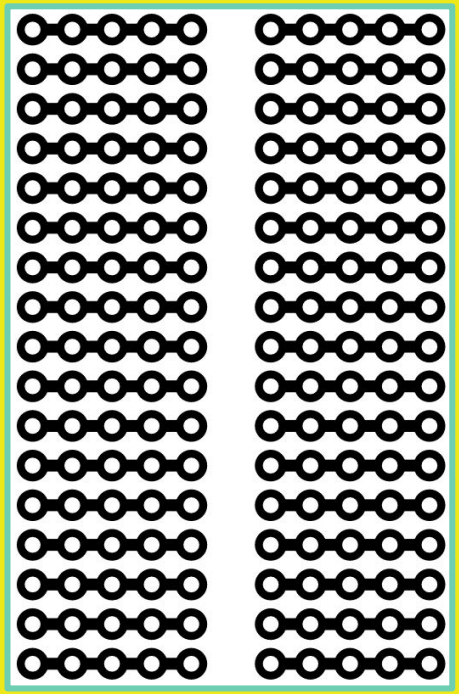


What is a Breadboard?

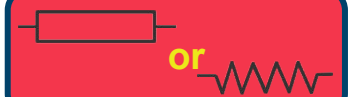
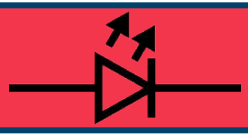
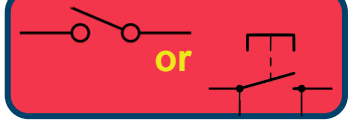
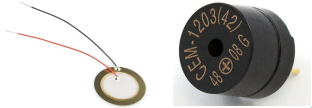
A breadboard is a tool used to prototype electronics.





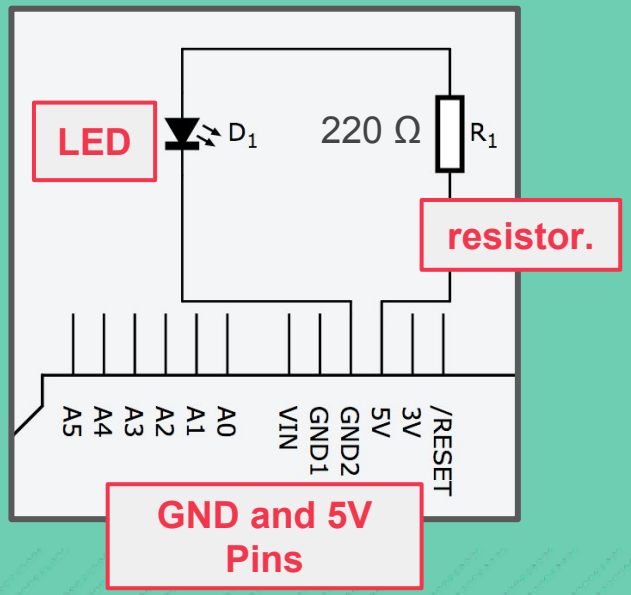


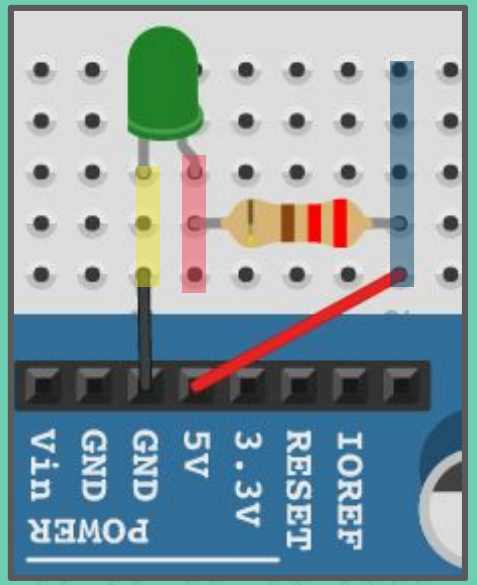
Components

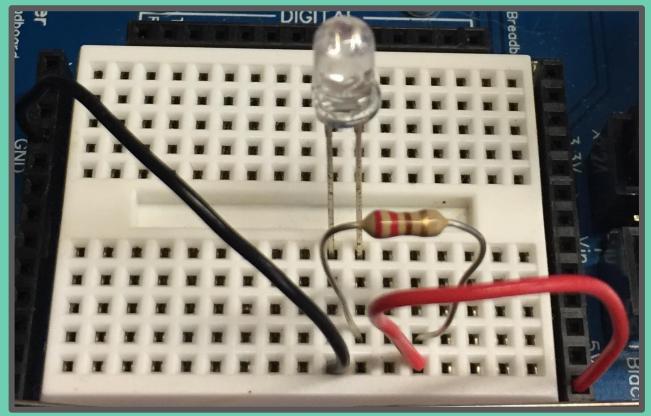
Jump Wires		
Resistors		
LEDs		
Button		
Piezo Element		
Photo Transistor		
Servo Motor		

Build This Circuit!

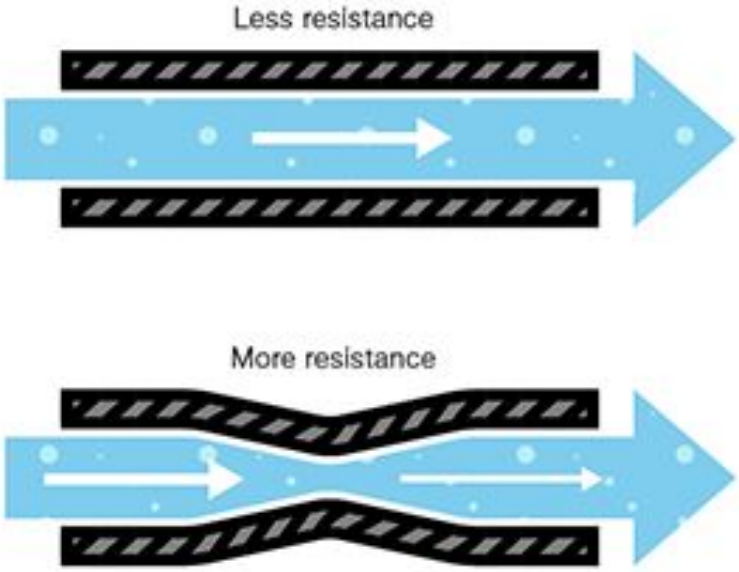
1. Identify the components
2. Plan your breadboard
3. Build and test







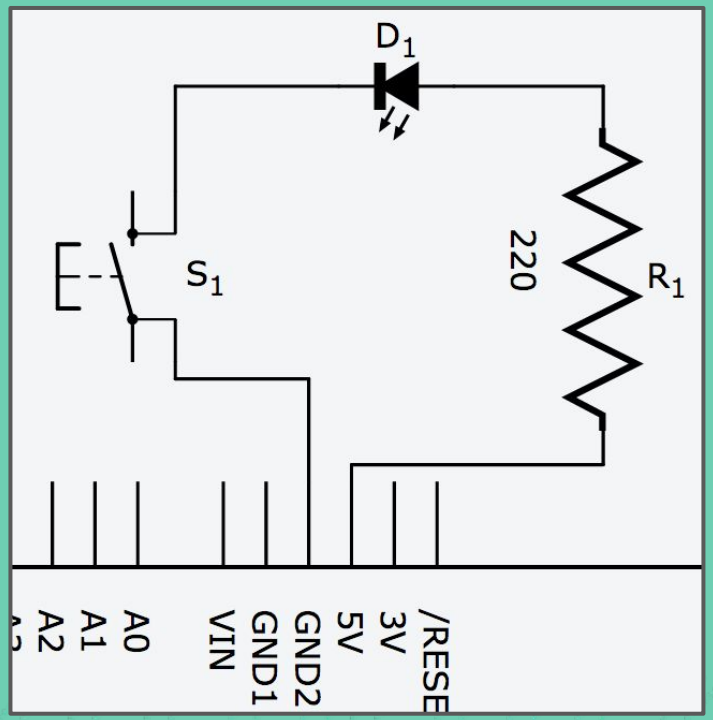
What are resistors?

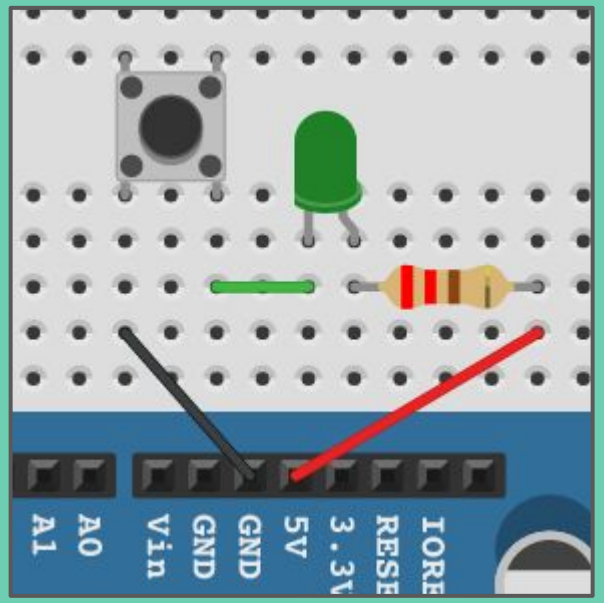


Try It On Your Own!

Let's try another!

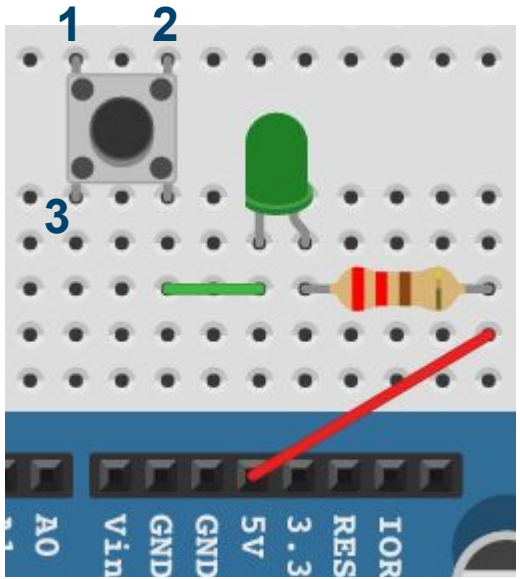
1. Identify the components
2. Plan your breadboard
3. Build and test





Buttons

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



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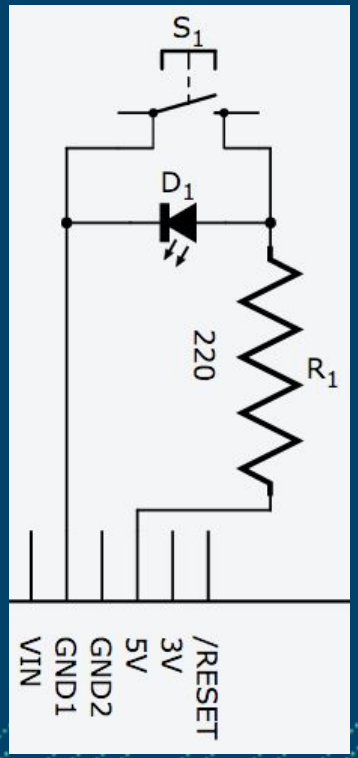
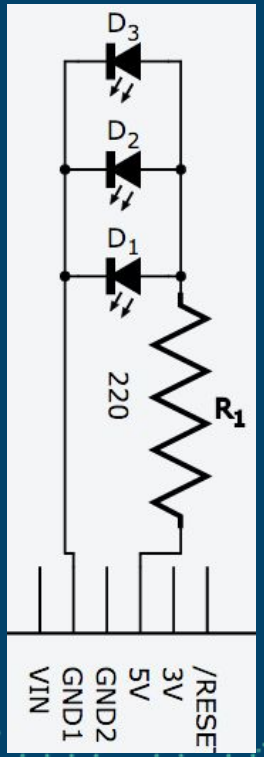
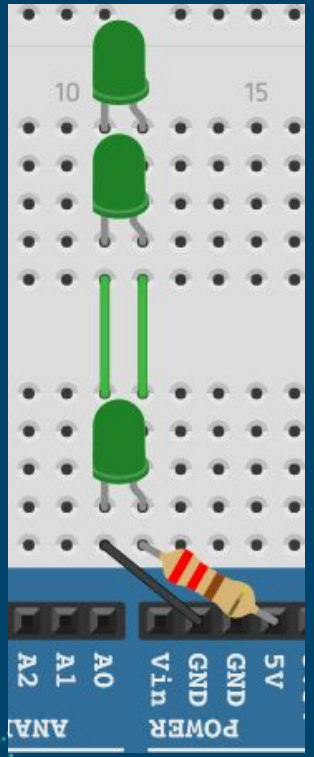
In Series Vs. In Parallel

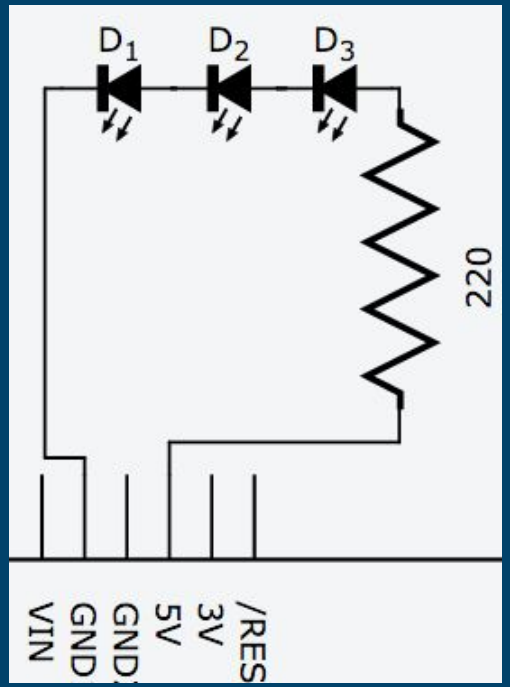


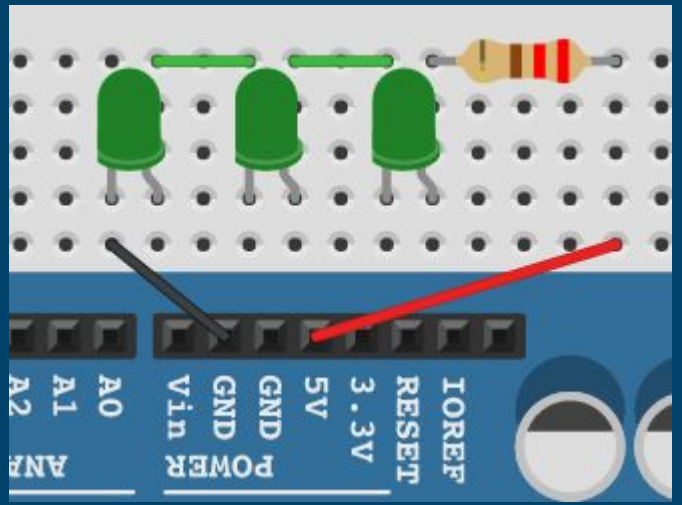
In Series Vs. In Parallel





In Series Vs. In Parallel





Programming with Arduino

Get your LEDs under Control!

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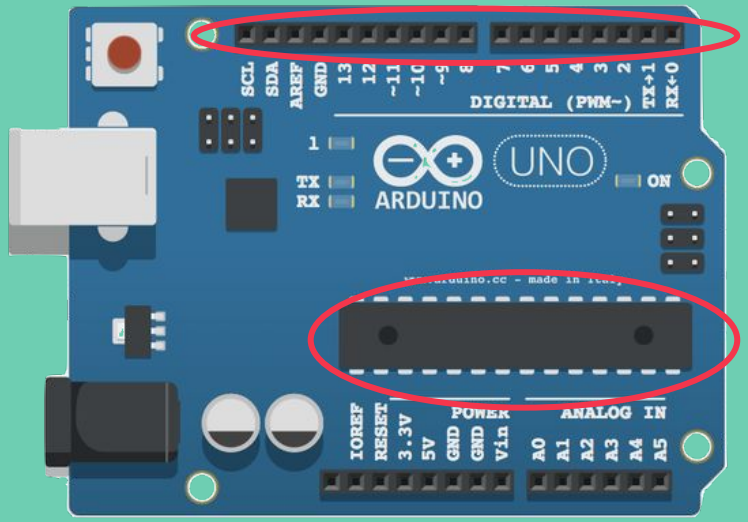
Arduino Programming: C++

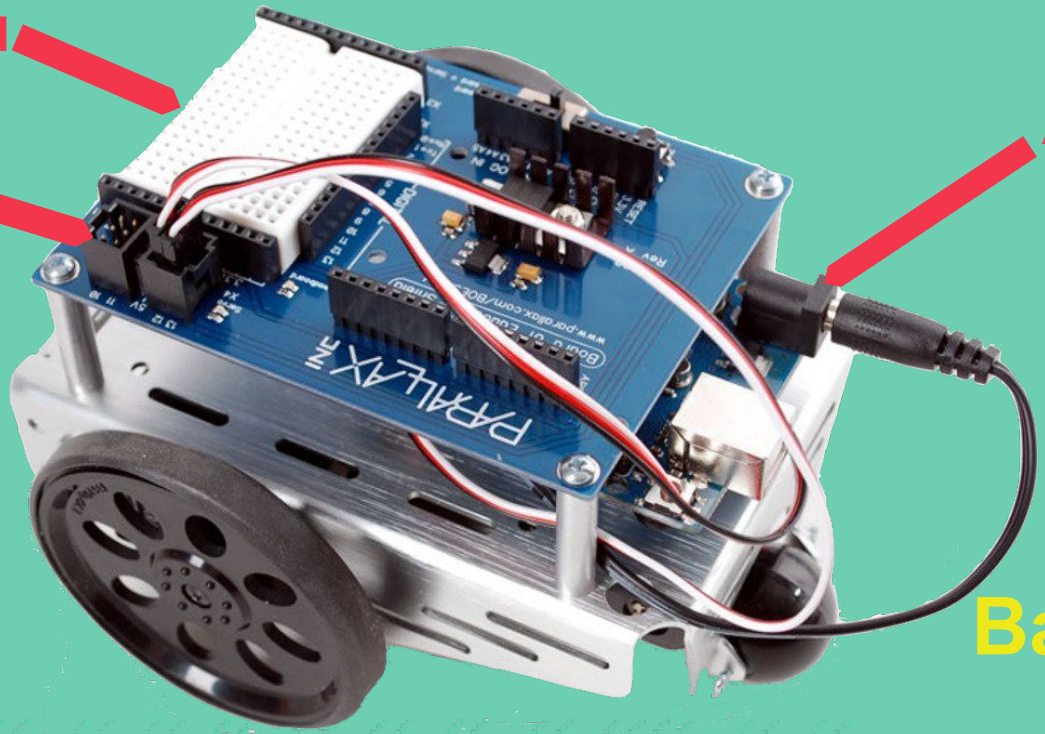
What is an Arduino?



Digital Input/Output (or I/O) pins

Microcontroller “Brain”

What is the Parallax BoE Bot?



Arduino Program Layout

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);
}
```

Coding with Arduino

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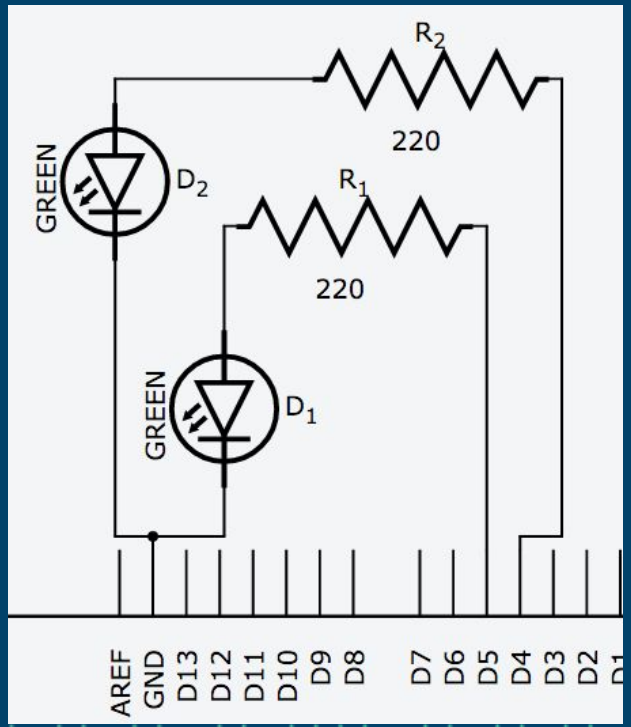
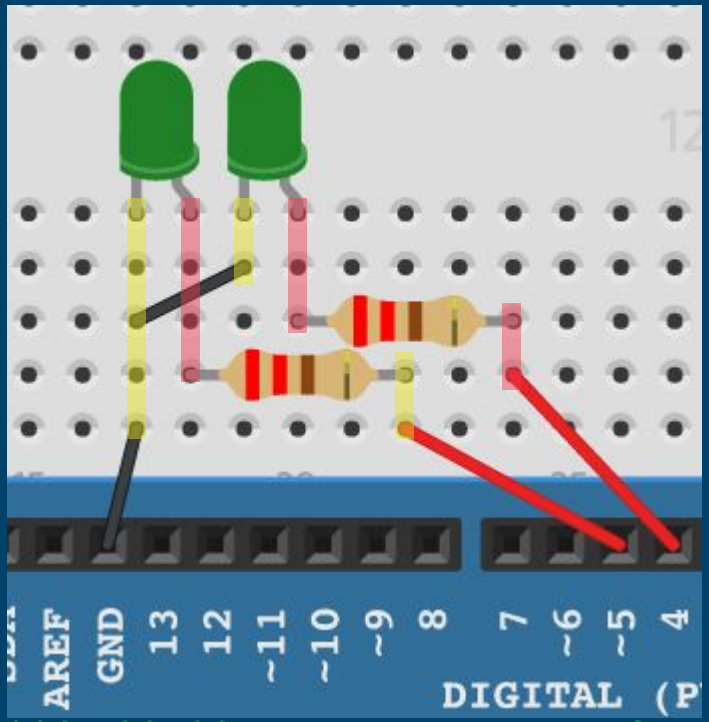
Your Turn!

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

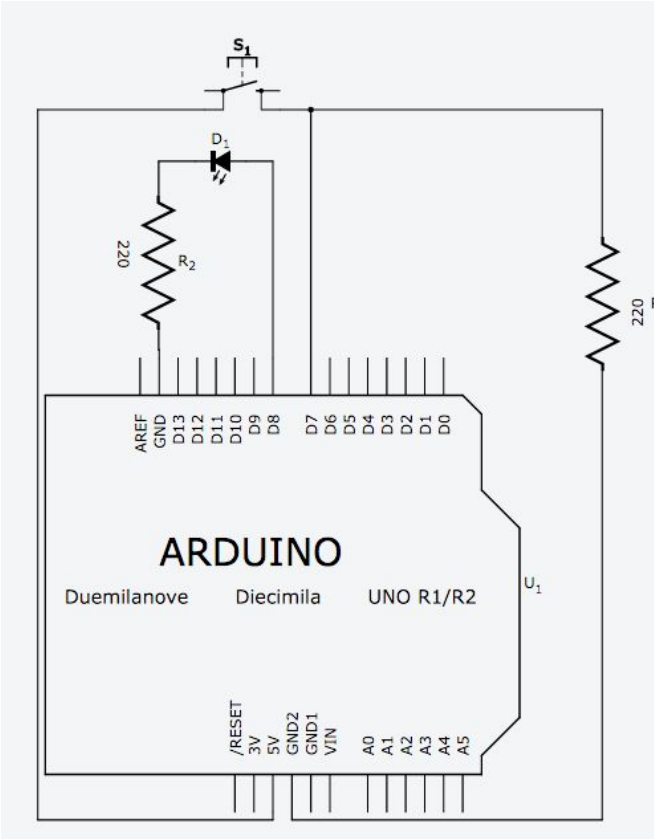

R2
220
GREEN
D2
R1
220
GREEN
D1
AREF
GND
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2


AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
DIGITAL

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: ||

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