Phil-Mont Radio Club Arduino Work Shop

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What is Arduino?

Arduino is an open-source electronics platform based on easy-to-use hardware and software.

Programmed by the computer and uploaded the to Arduino board.

Once the code is loaded onto the board can be made independent of the computer.

Basically legos for Engineers

Setup

- Install the Arduino IDE if not already done
- Connect the USB cable to Arduino
- Type in the “Hello World” Code on next slide

Hello World Code

```
void setup()
     {
          Serial.begin(9600);
          Serial.println("Hello World!");
     }
void loop()
     {
     }
```

- Save Program
- Run Program
- Tool → Serial Monitor
- What Happens?

Congratulations!!!!

You just wrote your first computer program!

Code Break Down

- The 2 most essential functions in ALL Arduino Code are:

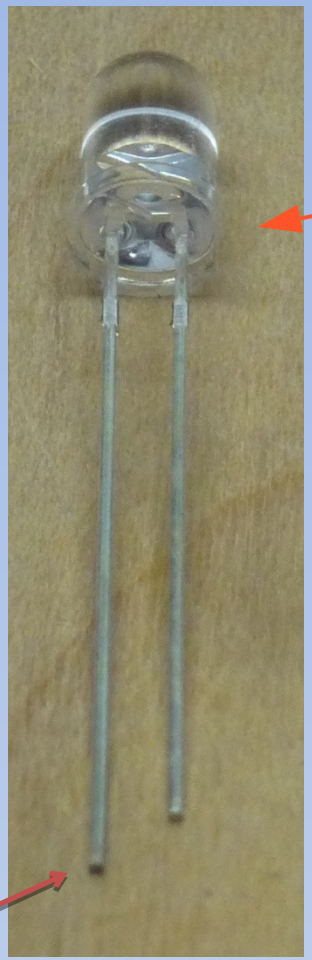
  void setup () - Run Once

  void loop() - Run in a loop forever
- Functions vs Commands
- void vs int, float, etc.
- What happens if you put the command `Serial.println("Hello world!");` in the loop() function?

Code Break Down

- Coding standards:
  - Lines of code typically end with ;
  - Code is case sensitive. (eg: `serial.begin(9600);` is not the same as `Serial.begin(9600);`)
  - Indentation is used to easily understand code and functions.
- `Serial.begin(9600)` – tells the Arduino at what baud rate to talk to the computer's COM port.

Components



Components can be polarized or non-polarized

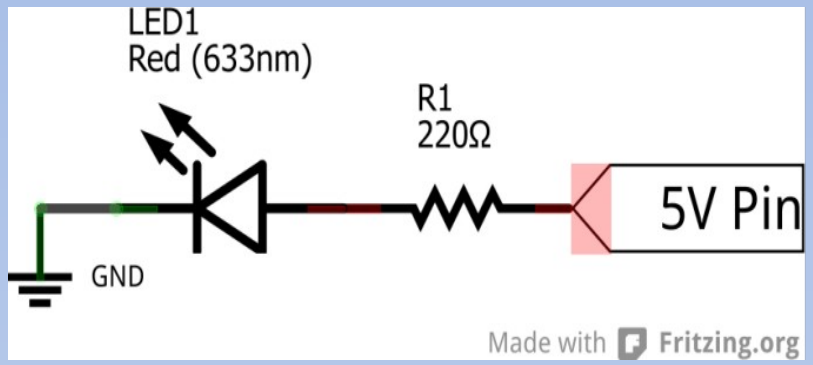
LEDs are diodes and will only let electricity flow in one direction.

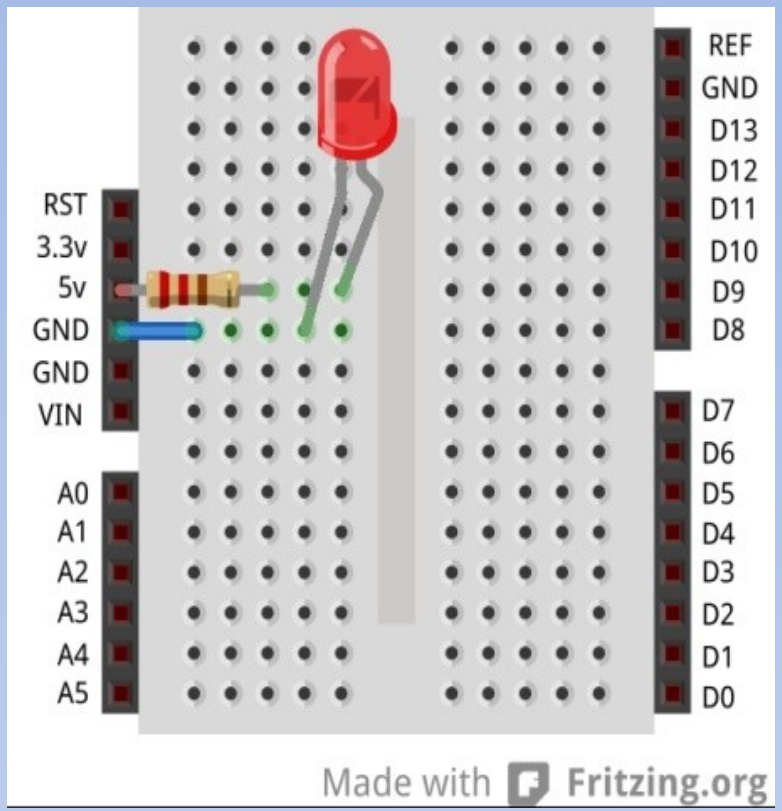
Inserted backwards the LED will not light.

Components

- **Resistor**: is a passive two-terminal electrical component that implements electrical resistance as a circuit element. Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits.
- Are not polarized
- Can be read through the color code

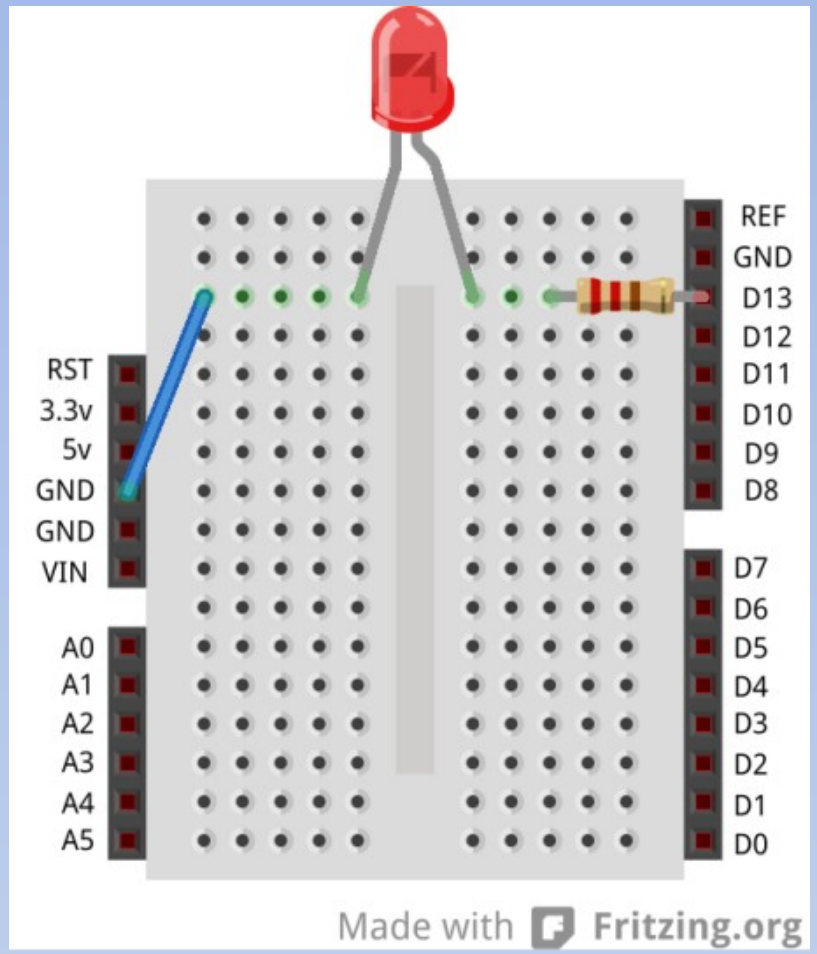
LED Test

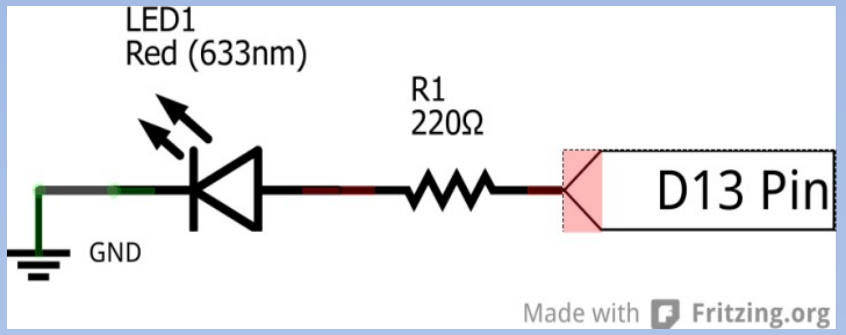




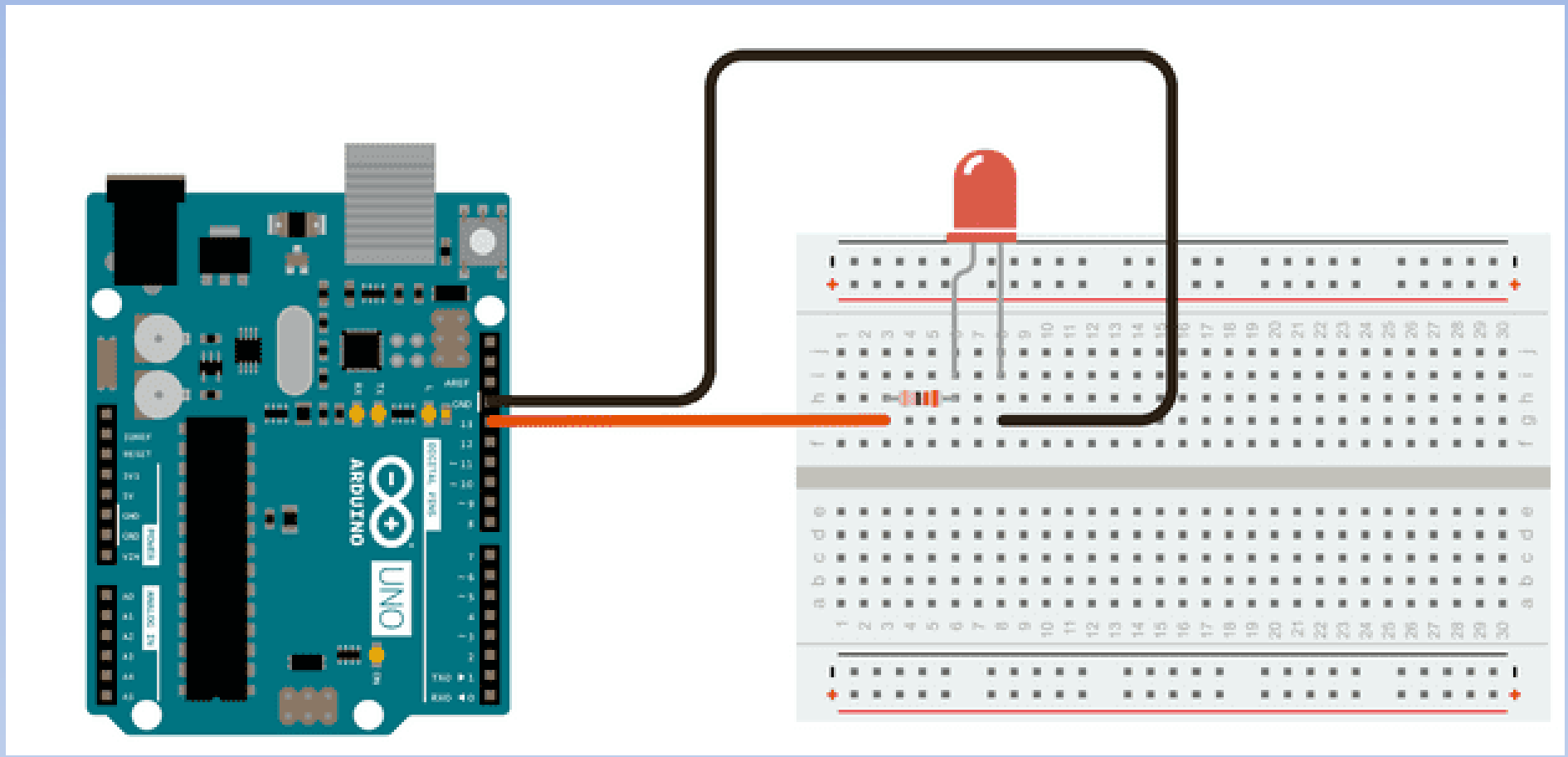
- LED should light up when powered by Arduino

Blinky

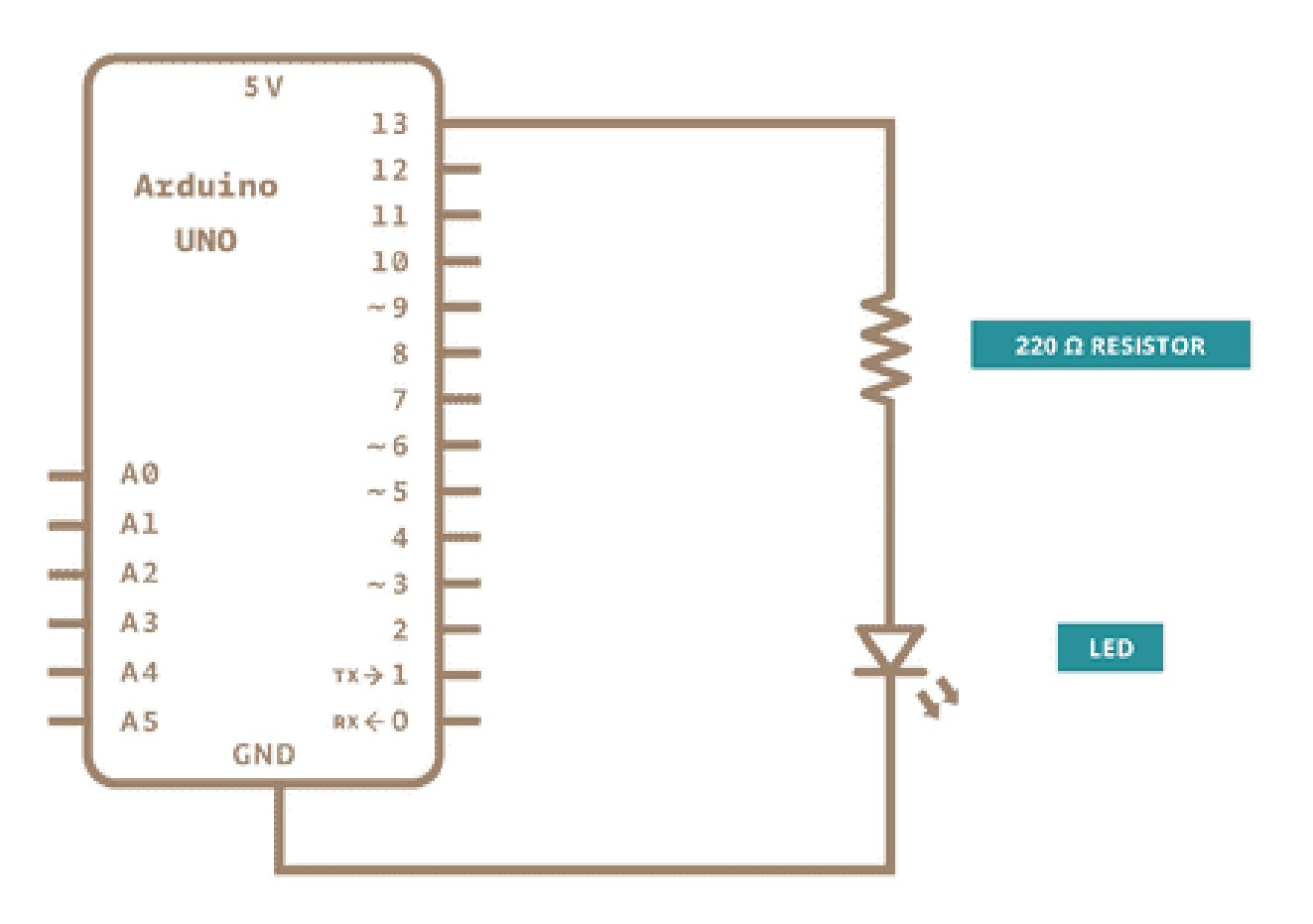

REF
GND
D13
D12
D11
D10
D9
D8
RST
3.3v
5v
GND
GND
VIN
D7
D6
D5
D4
D3
D2
D1
D0
A0
A1
A2
A3
A4
A5
Made with Fritzing.org


LED1
Red (633nm)
R1
220Ω
D13 Pin
GND
Made with Fritzing.org

Alternate Wiring Diagram



Schematic


5V
Arduino
UNO
13
12
11
10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
A0
A1
A2
A3
A4
A5
GND
220 Ω RESISTOR
LED

Blinky Code

```
int led = 13;

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


void loop() {
  digitalWrite(led, HIGH);
  delay(1000);
  digitalWrite(led, LOW);
  delay(1000);
}
```

Code Break Down

- `int led = 13;`
  - Variable assignment – assigning pin 13.
  - int is short for integer
- `pinMode(led, OUTPUT);`
  - Tells the Arduino pin 13 will be output or input.
  - Since led = 13, we are setting pin 13 to output, to send a signal to the LED.

Code Break Down

- `digitalWrite(led, HIGH);`
  - digitalWrite(*pin,* ***HIGH or LOW***);
  - Sends voltage to pin number 13
- `digitalWrite(led, LOW);`
  - Stops voltage to led pin 13.
- `delay(1000);`
  - delay(*milliseconds*);
  - Holds the Arduino code from moving on for a set period of time.

What would happen if?

- Placed all of the code found in the loop() function into the setup() function?
- Replaced delay(1000); with delay(500); or with delay(1); etc
- Used a larger resistor resistance?

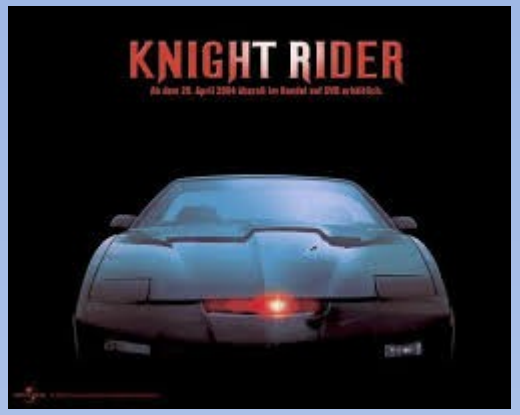
Congratulations!!!!

You built your first Arduino project!!!

Homework

- Add up to 5 additional LEDs using only the 220 Ohm resistors
- Blink in different patterns
- One pattern is a ***Larson Scanner*** where the LEDs light up forward and then backwards

The Glenn A. Larson Scanner is from Popular TV Shows



For Further Reading