Internet Data Streams

Lecture 2: Arduino Basics

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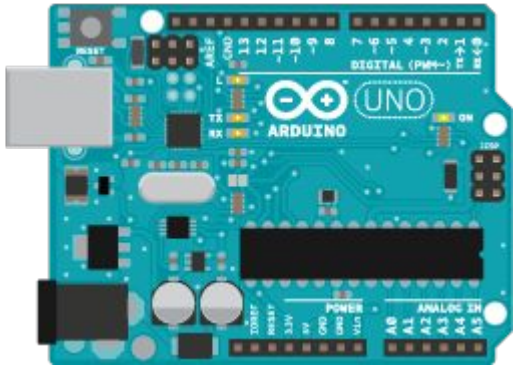
Current Generation Microcontrollers

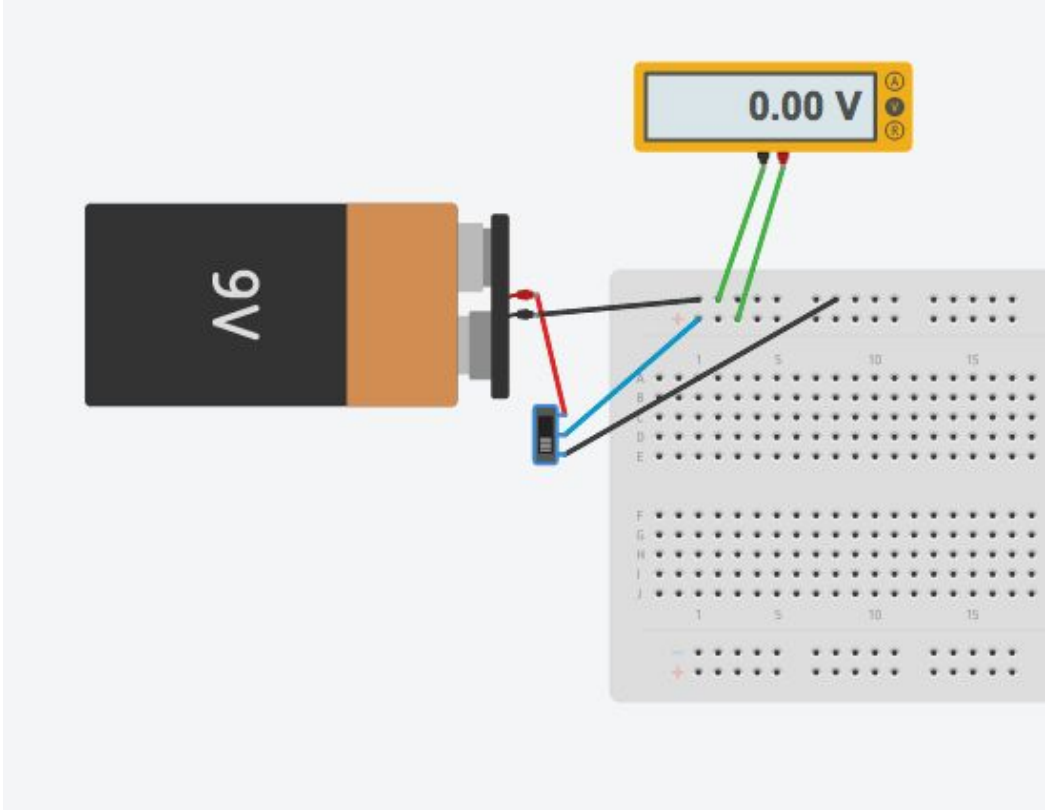
- Standardized circuits
- Easier to program
- Development kits available
- We will look at the Arduino
  - Very common for hobby use
  - Industrial versions for real world
  - http://www.arduino.cc/
  - Subject of this week's lab (on a simulator)



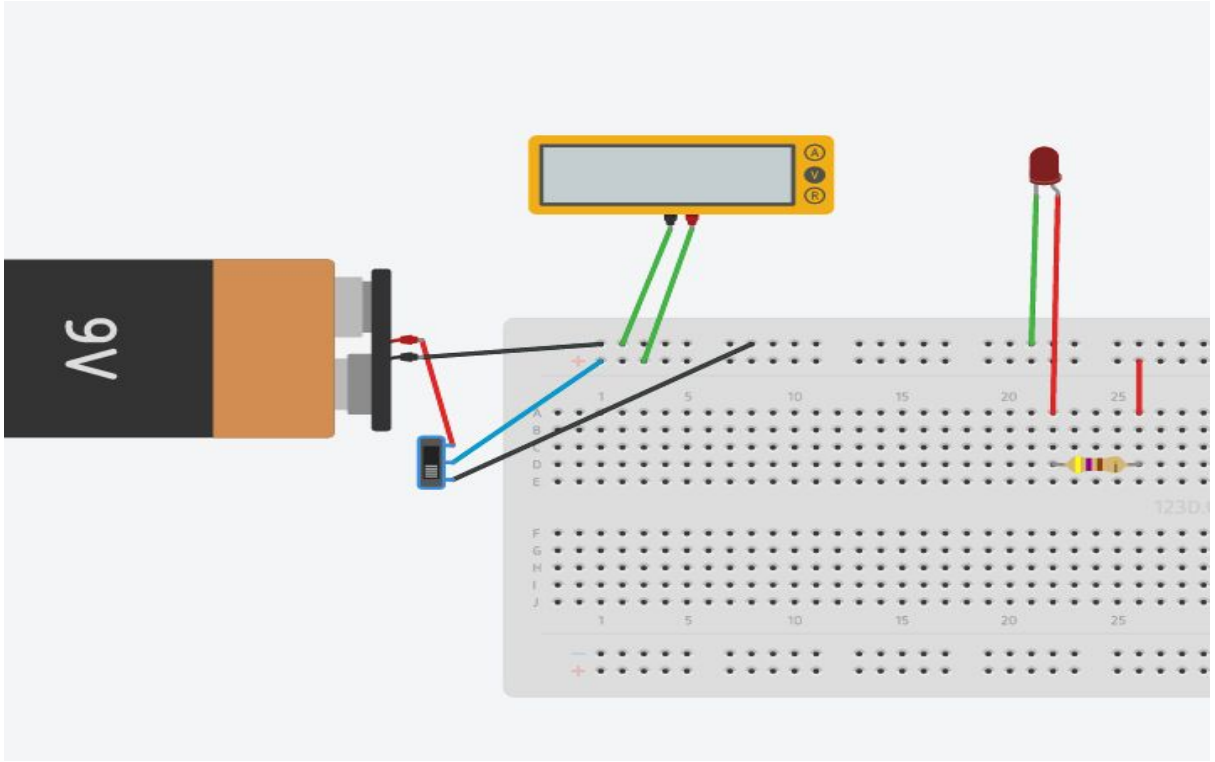
Lab Preparation

- Bring your laptop running Chrome
  - Make sure WiFi works for you
- Read a little about the Arduino
  - http://www.arduino.cc/
  - http://en.wikipedia.org/wiki/Arduino
- We will be programming a simulated Arduino

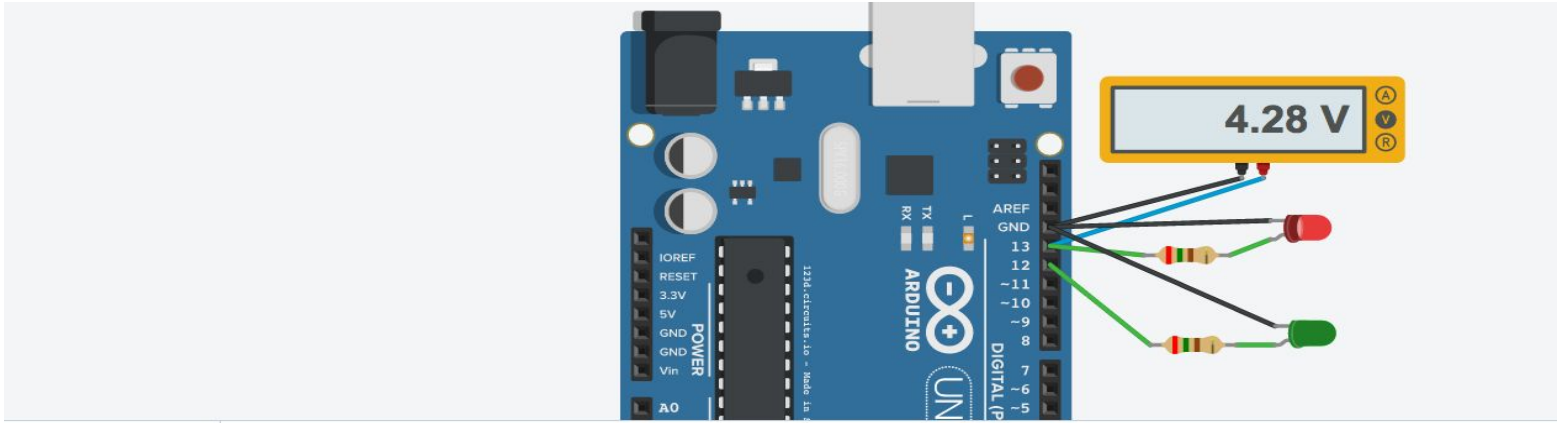
Exercise 1



Exercise 2



Exercise 3

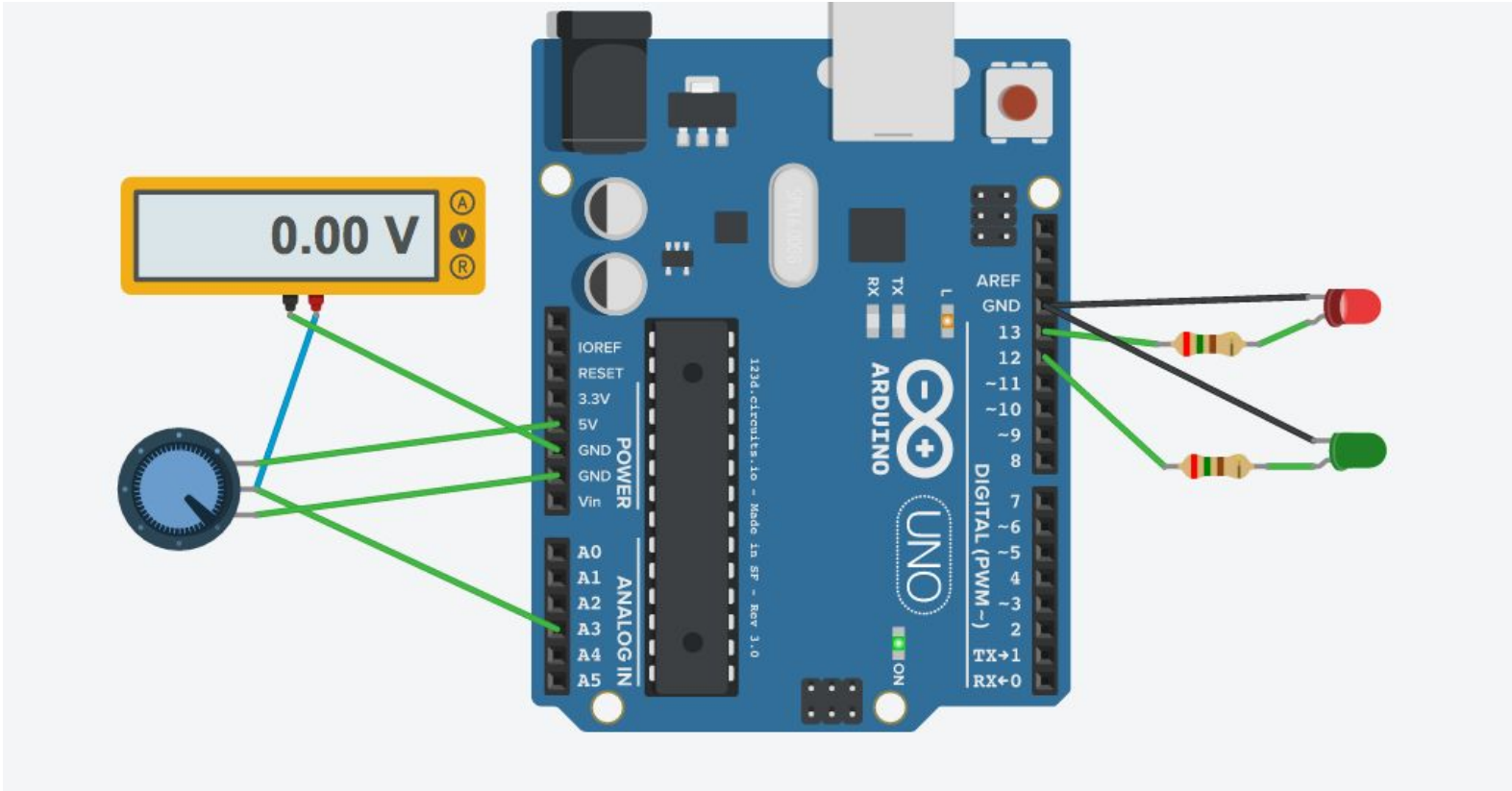



```
// Pin 13 has an LED connected on most Arduino boards.
// give it a name:
int led1 = 13;
int led2 = 12;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(led1, HIGH);   // turn the LED on (HIGH is the voltage level)
  digitalWrite(led2, LOW);
  delay(5000);                // wait for a second
  digitalWrite(led1, LOW);    // turn the LED off by making the voltage LOW
  digitalWrite(led2, HIGH);
  delay(500);                 // wait for a second
}
```

Exercise 4


0.00 V
A
V
R
IOREF
RESET
3.3V
5V
GND
GND
Vin
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
TX
RX
L
ON
ARDUINO
UNO
123d.circuits.io - Made in SF - Rev 3.0

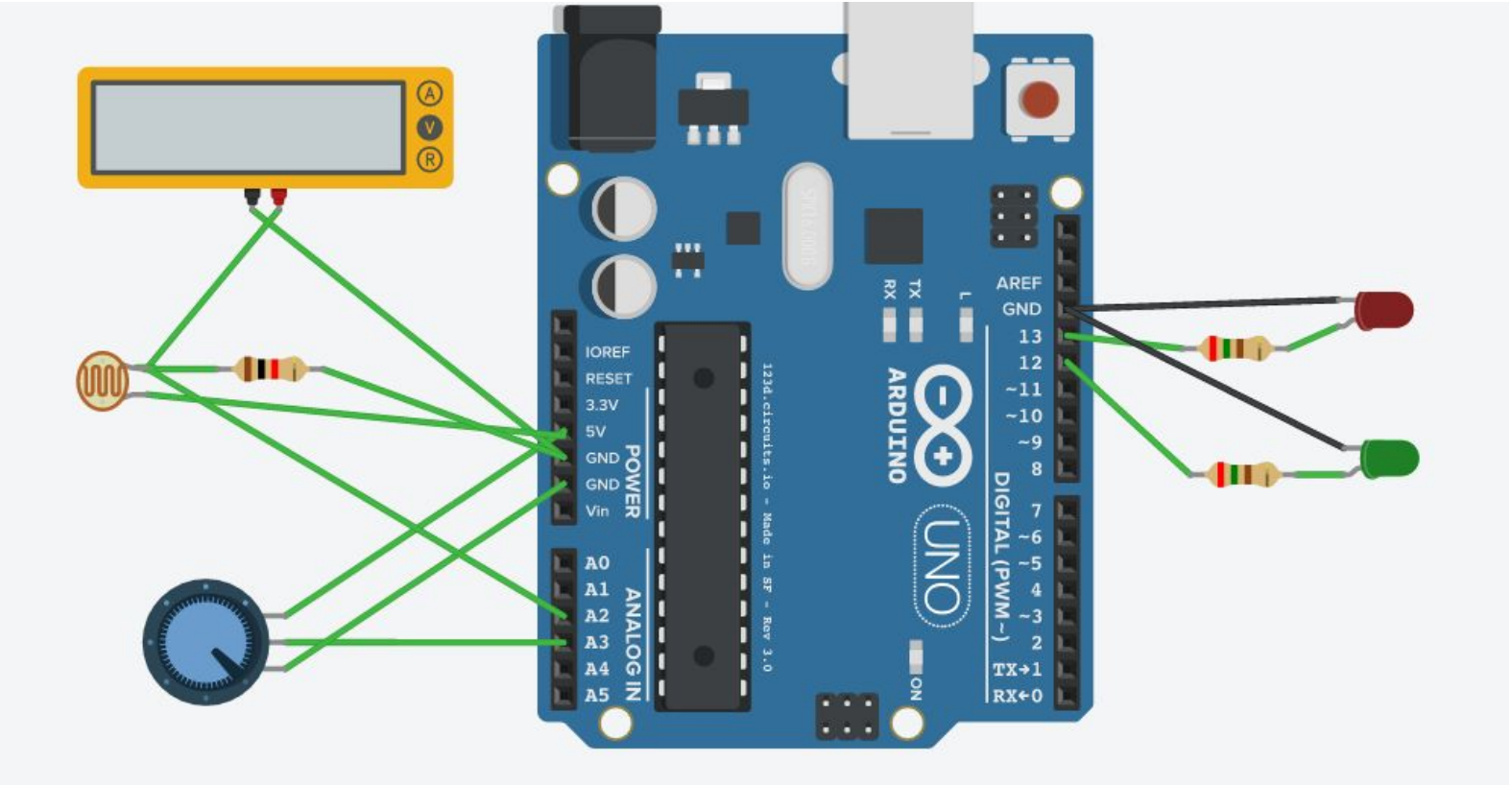
Exercise 4 (code)

```
// Pin 13 has an LED connected on most Arduino boards.
// give it a name:
int led1 = 13;
int led2 = 12;
int i = 0;
int analogPin = 3;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
  Serial.begin(9600);
}

// the loop routine runs over and over again forever:
void loop() {
  i = i + 1;
  Serial.print("The value of A3 is ");
  Serial.print(analogRead(analogPin) * 5.0 / 1024.0);
  Serial.print("\n");
  digitalWrite(led1, HIGH);   // turn the LED on (HIGH is the voltage level)
  digitalWrite(led2, LOW);
  delay(500);                 // wait for a second
  digitalWrite(led1, LOW);    // turn the LED off by making the voltage LOW
  digitalWrite(led2, HIGH);
  delay(500);                 // wait for a second
}
```

Exercise 5


A
V
R
IOREF
RESET
3.3V
5V
GND
GND
Vin
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
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RX
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ARDUINO
UNO
ON
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13
12
~11
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~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
123d.circuits.io - Made in SF - Rev 3.0

Exercise 5 (code)

```
// Pin 13 has an LED connected on most Arduino boards.
// give it a name:
int led1 = 13;
int led2 = 12;
int i = 0;
int analogPin = 3;
int lightSensor = 2;
float lightValue = 0;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
  Serial.begin(9600);
}

// the loop routine runs over and over again forever:
void loop() {
  lightValue = analogRead(lightSensor) * 5.0 / 1024.0 / 3.5;
  Serial.print("The light value is ");
  Serial.print(lightValue);
  Serial.print("\n");
  if (lightValue > 0.5) {
      digitalWrite(led1, HIGH);    // turn the LED off by making the voltage LOW
      digitalWrite(led2, LOW);
  }
  else {
      digitalWrite(led1, LOW);    // turn the LED off by making the voltage LOW
      digitalWrite(led2, HIGH);
  }
  delay(500);               // wait for a second
}
```