Introduction to the Arduino

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Today we will cover:

● An Overview of Microcontrollers
● Geography of your Arduino
● What makes an Arduino an Arduino
● Basics of what the Arduino can do
● Practice using an Arduino
● Writing code for the Arduino
First ...

Drivers and IDE
What is a microcontroller?

- Miniature computer
  - Processor
  - Short term memory
  - Long term memory
- Input and Output
  - Digital
  - Analog
Microcontroller uses

- Art projects
- Robots and Automation
- Prototyping
- Human interface devices such as remote controls
- Office machines and appliances
- Car engine control systems
- Toys
- and more!
Arduino: microcontroller and more
Your Arduino

- Runs at 16 MHz
- 32 KB Flash memory
- 2 KB RAM
- 3 counters
- 14 digital I/O pins
- 6 10-bit Analog input pins
A brand new IDE

```cpp
// read the pushbutton input pin:
buttonState = digitalRead(buttonPin);

// compare the buttonState to its previous state
if (buttonState != lastButtonState) {
    // if the state has changed, increment the counter
    if (buttonState == HIGH) {
        // if the current state is HIGH then the button
        // went from off to on:
        buttonPushCounter++;
        Serial.println("on");
        Serial.print("number of button pushes: ");
        Serial.println(buttonPushCounter, DEC);
    }
    else {
        // if the current state is LOW then the button
        // went from on to off:
        Serial.println("off");
    }
}

// save the current state as the last state,
// for next time through the loop
lastButtonState = buttonState;

// turns on the LED every four button pushes by
// checking the modulo of the button push counter.
```
Talking to the Arduino

```cpp
void setup() {
    Serial.begin(9600);
}

void loop() {
    Serial.println("success!");
}
```
Digital Output
Digital Output

```cpp
void setup() {
    pinMode(3, OUTPUT);
}

void loop() {
    digitalWrite(3, HIGH);
    delay(500);
    digitalWrite(3, LOW);
    delay(500);
}
```
Digital Input
Digital Input

```cpp
void setup() {
    pinMode(3, OUTPUT);
    pinMode(2, INPUT);
}

void loop() {
    if (digitalRead(2) == HIGH) {
        digitalWrite(3, HIGH);
    } else {
        digitalWrite(3, LOW);
    }
}
```
Reading analog values with Serial

[Diagram of an analog circuit with a resistor (R1) connected between 5V and GND, and an indicator labeled Analog0]
Reading analog values with Serial

```c
void setup() {
  // no setup required for analog inputs
  // need to set up Serial
  Serial.begin(9600);
}

void loop() {
  Serial.println(analogRead(0));
  delay(30);
}
```