

Introduction to the Arduino

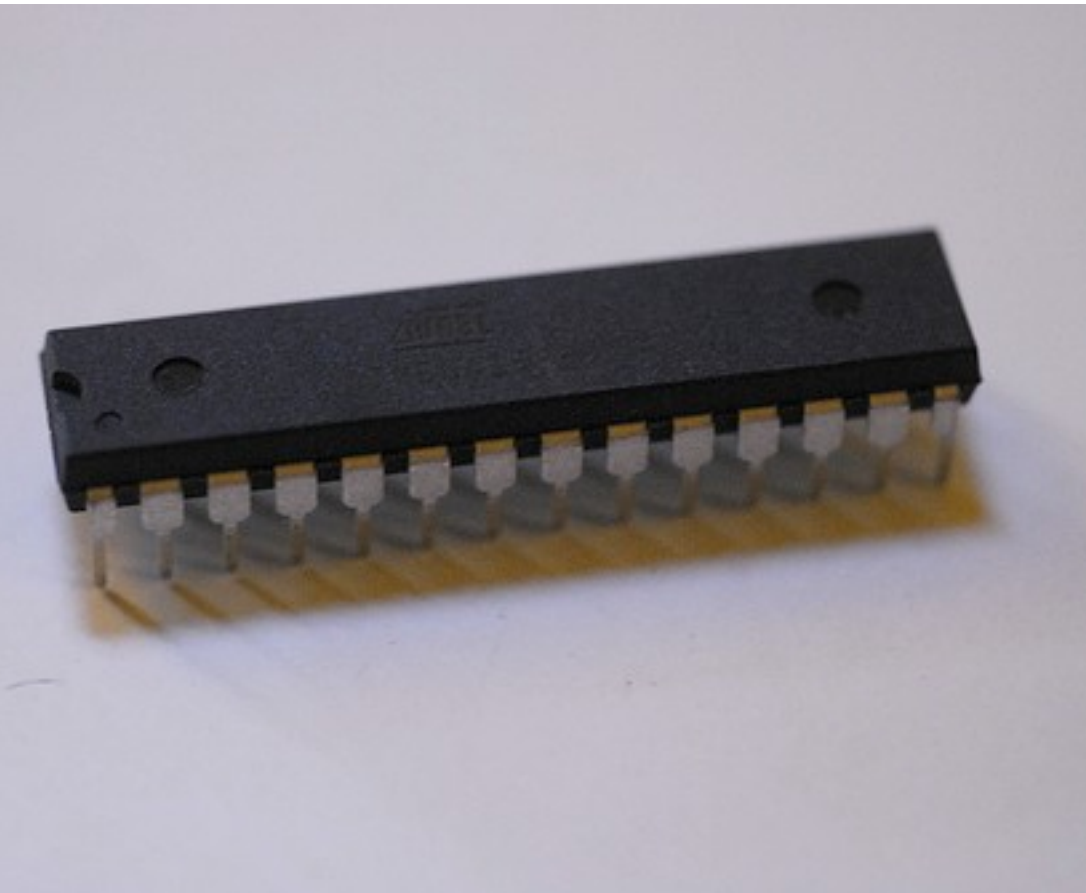


Instructor: Morgan Redfield
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Today we'll be covering:

- Microcontroller Overview
- What makes an arduino an arduino?
- What can it do?
- How do I use it?
- How do I write code for it?

What is a microcontroller?



- Miniature computer
 - CPU
 - RAM
 - FLASH
- Input and Output
 - Digital
 - Analog

Microcontroller uses

- Art projects
- Robots
- Automation
- Human interface devices
- Prototyping
- Sensing
- and more!

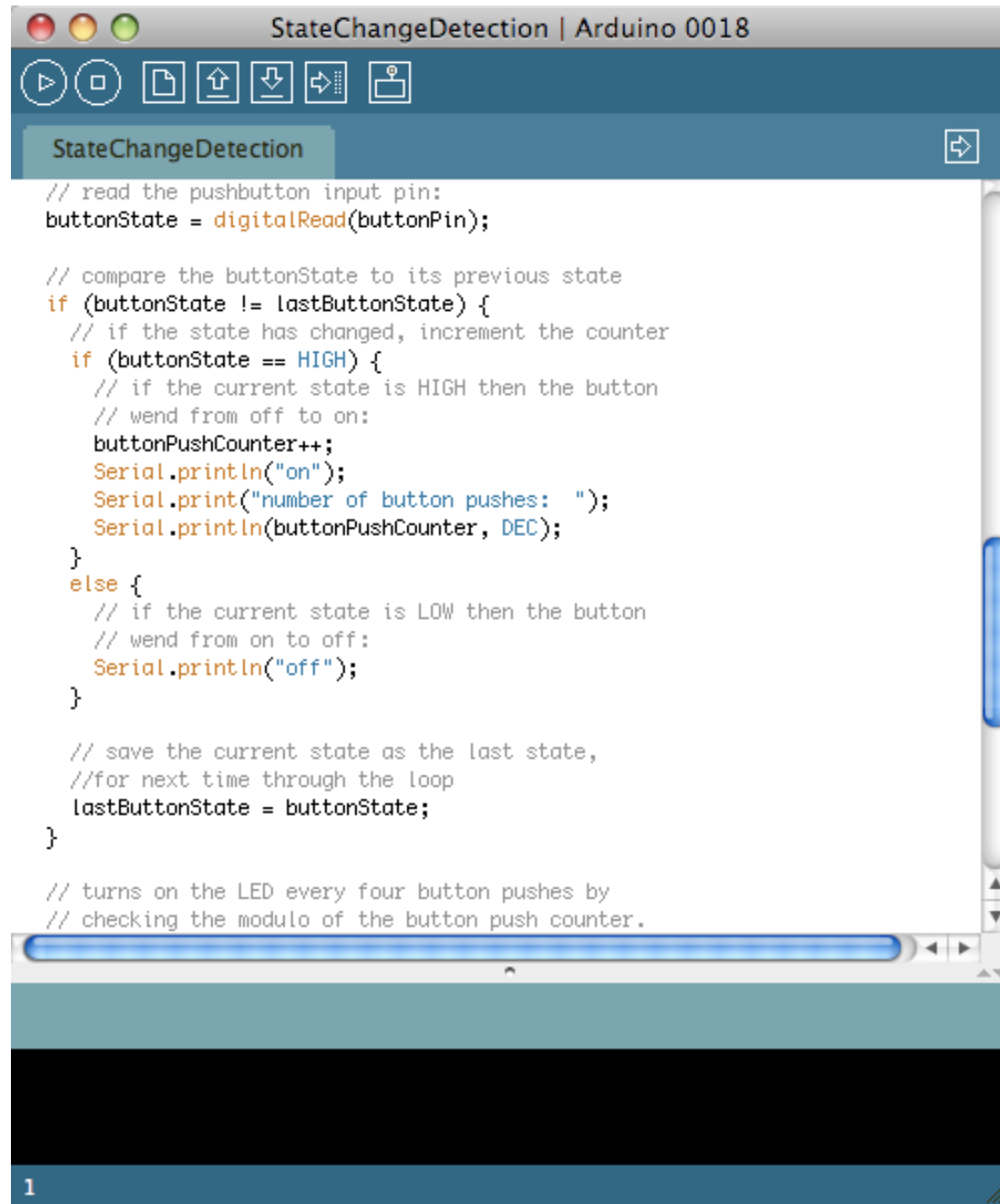
Arduino: microcontroller and more



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



```
StateChangeDetection | Arduino 0018
StateChangeDetection
// 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.
```

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Digital Output

```
int ledPin = 13;

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

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


Digital Input

```
int ledPin = 13;
int buttonPin = 12;

void setup() {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
}

void loop() {
  int turnon = digitalRead(buttonPin);
  if (turnon == HIGH) {
    digitalWrite(ledPin, HIGH);
  }
  else {
    digitalWrite(ledPin, LOW);
  }
}
```

Serial Communications

```
int ledPin = 13;
int buttonPin = 12;

void setup() {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
  Serial.begin(9600);
}

void loop() {
  int turnon = digitalRead(buttonPin);
  if (turnon == HIGH) {
    digitalWrite(ledPin, HIGH);
    Serial.println("Hello");
  }
  else {
    digitalWrite(ledPin, LOW);
  }
}
```

Reading analog values with Serial

```
int ledPin = 13;
int buttonPin = 12;
int analogPin = 0;

void setup() {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
  Serial.begin(9600);
}

void loop() {
  int turnon = digitalRead(buttonPin);
  if (turnon == HIGH) {
    digitalWrite(ledPin, HIGH);
    int analogValue = analogRead(analogPin);
    Serial.println(analogValue);
  }
  else {
    digitalWrite(ledPin, LOW);
  }
}
```