

A decorative graphic on the left side of the slide, consisting of white and light blue lines and circles that resemble a circuit board or a network diagram. The lines are vertical and horizontal, with some branching out, and the circles are of varying sizes, some connected to the lines and some floating nearby. The background is a gradient from orange at the top to teal at the bottom.

ARDUINO WORKSHOP

Thomas Trickel

A decorative graphic on the left side of the slide, consisting of a network of white lines and circles on a teal background, resembling a circuit board or a neural network. The lines are of varying thickness and connect to small white circles of different sizes.

ARDUINO WORKSHOP

Welcome

&

Introductions

Thomas Trickel

A decorative graphic on the left side of the slide, consisting of a network of white and light blue lines and circles, resembling a circuit board or a neural network. The lines are vertical and horizontal, with some diagonal connections, and the circles are of varying sizes, some acting as nodes or junctions.

ARDUINO WORKSHOP

What Are We Going to Do?

Thomas Trickel

ARDUINO WORKSHOP

SparkFun Inventor's Kit



More than a dozen electronic components and five Arduino-based projects to unleash your inner innovator! No soldering or previous experience required.

SparkFun Inventor's Kit
VERSION 1.1
SPARKFUN.COM/51K

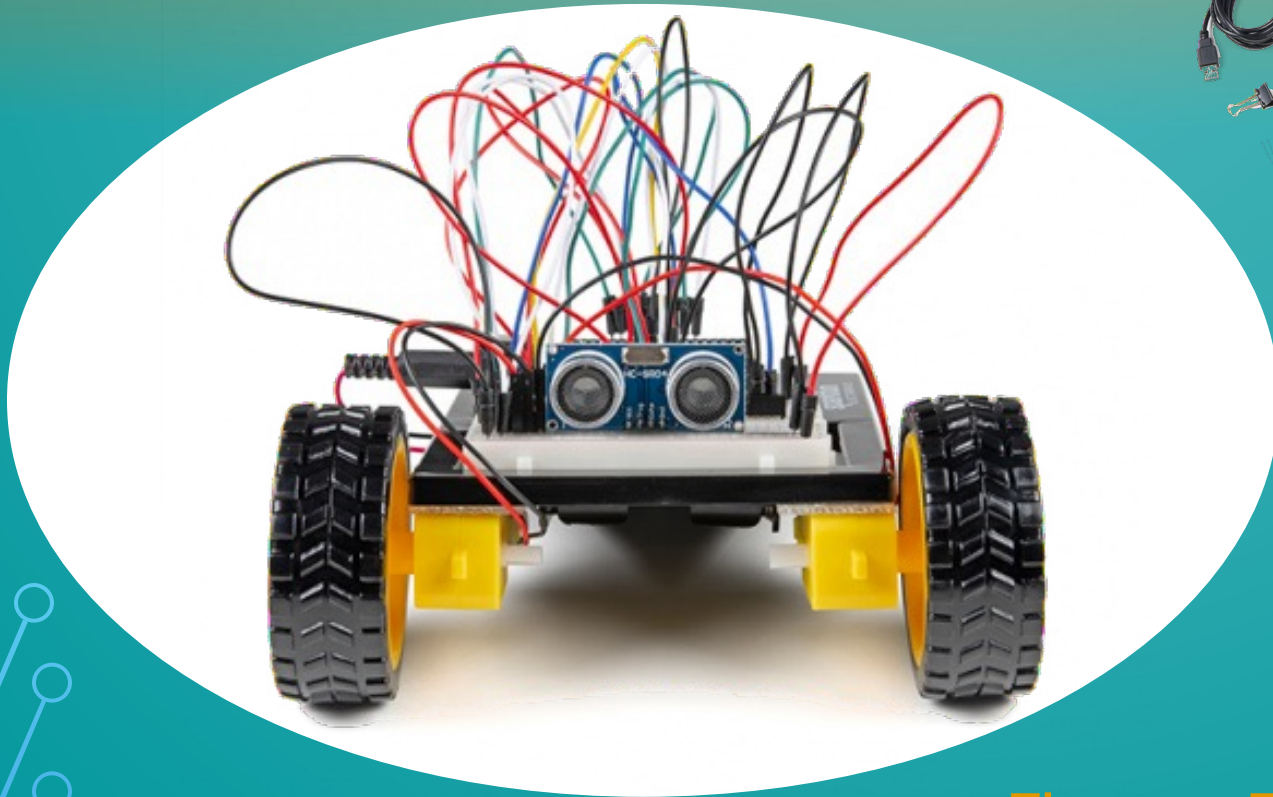
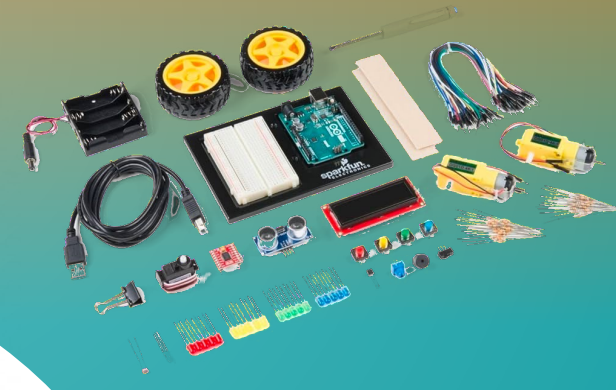
GRADES 6+ AGES 10+

sparkfun
MAKE SOMETHING

CONTAINS: SPARKFUN REDBOARD ARDUINO, BREADBOARD, LCD DISPLAY, MOTOR, AND WHEELS, MOTOR DRIVER, JUMPER WIRES, LED, DISTANCE AND TEMPERATURE SENSORS, BUTTON, SWITCHES, USB CABLE, BATTERY HOLDER AND MORE. 4 AA BATTERIES REQUIRED BUT NOT INCLUDED.

ARDUINO WORKSHOP

SparkFun Inventor's Kit

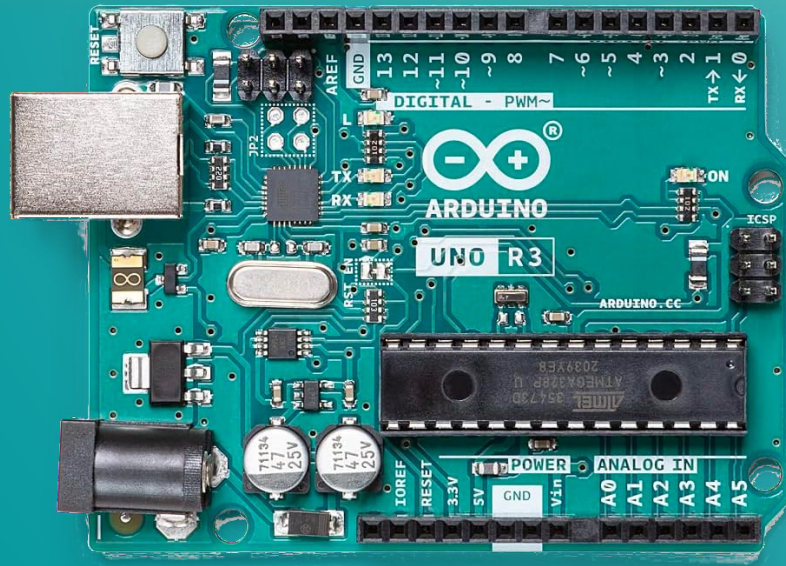


Thomas Trickel

The background features a gradient from orange at the top to teal at the bottom. White circuit-like lines with circular nodes are positioned in the corners: top-left, top-right, bottom-left, and bottom-right.

WHAT IS AN ARDUINO?

WHAT IS AN ARDUINO?



```
Blink | Arduino 1.8.5

This example code is in the public domain.

http://www.arduino.cc/en/Tutorial/Blink
*/

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

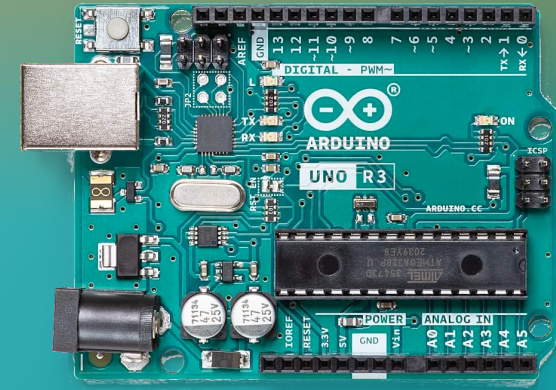
// the loop function runs over and over again forever
void loop() {$
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000); // wait for a second
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
  delay(1000); // wait for a second
}

32 Arduino/Genuino Uno on COM1
```



ARDUINO IS TWO PIECES?

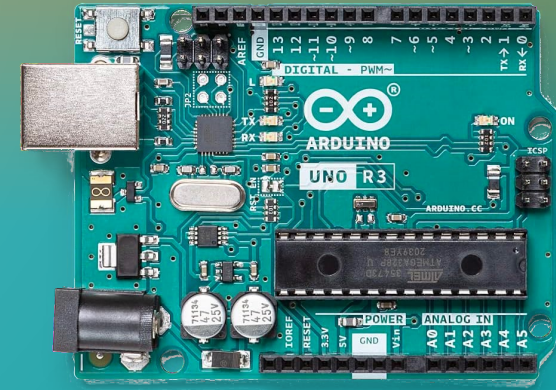
- Something you can touch and feel – the Hardware





ARDUINO IS TWO PIECES?

- Something you can touch and feel – the Hardware
- A program that allows us to
 - write programs to control the Hardware
 - copy those programs to the Hardware



```
Blink | Arduino 1.8.5
Blink $
This example code is in the public domain.
http://www.arduino.cc/en/Tutorial/Blink
*/
// the setup function runs once when you press reset or power the board
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  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
  delay(1000); // wait for a second
}
32 Arduino/Genuino Uno on COM1
```

WHAT IS AN ARDUINO?

- A simple, customizable computer
- Computers take in inputs, perform operations, and generate outputs based on how they're programmed
- Examples
 - Inputs: pressing buttons, reading a sensor, code from a programmer
 - Operations: doing math, moving and keeping track of information
 - Outputs: blinking light, sound, driving a motor

LET'S GET STARTED



LET'S GET STARTED

wait

The background features a vertical gradient from orange at the top to teal at the bottom. In the corners, there are decorative white and light blue circuit-like patterns consisting of lines and circles.

A FEW THINGS

A FEW THINGS

- Computers are very complex
 - Don't expect success on the first try

- Ask for help



A FEW THINGS

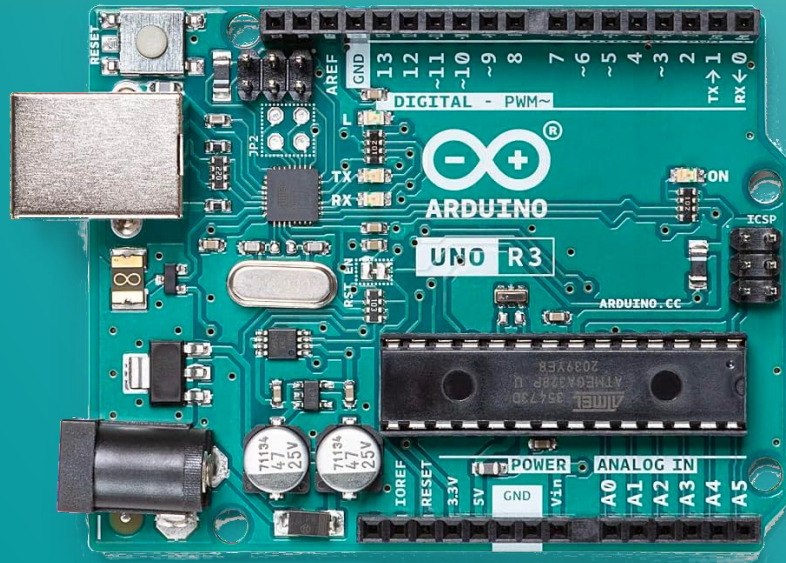
- Get programs from SparkFun Inventor's Kit Examples Folder

LET'S GET STARTED

- What do we need?



WHAT IS AN ARDUINO?



```
Blink | Arduino 1.8.5

This example code is in the public domain.

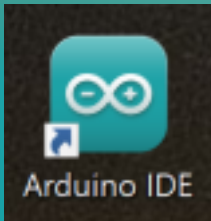
http://www.arduino.cc/en/Tutorial/Blink
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}

32 Arduino/Genuino Uno on COM1
```

ARDUINO IDE



```
sketch_mar19a | Arduino IDE 2.3.2
File Edit Sketch Tools Help
Select Board
sketch_mar19a.ino
1 void setup() {
2   // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7   // put your main code here, to run repeatedly:
8
9 }
10
Ln 1, Col 1 X No board selected
```

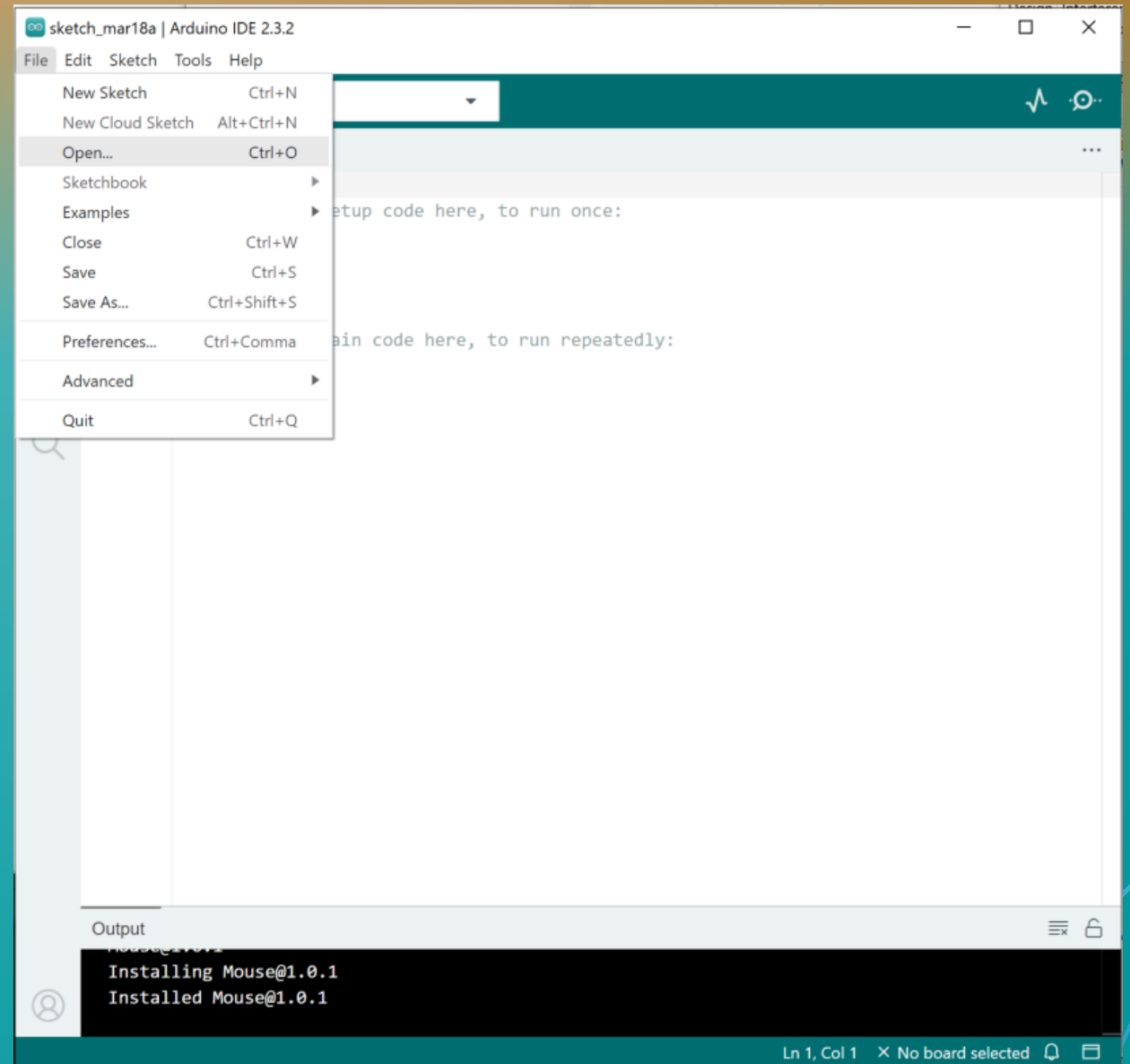
ARDUINO IDE

- File -> Open

SIK-Guide-Code-V40

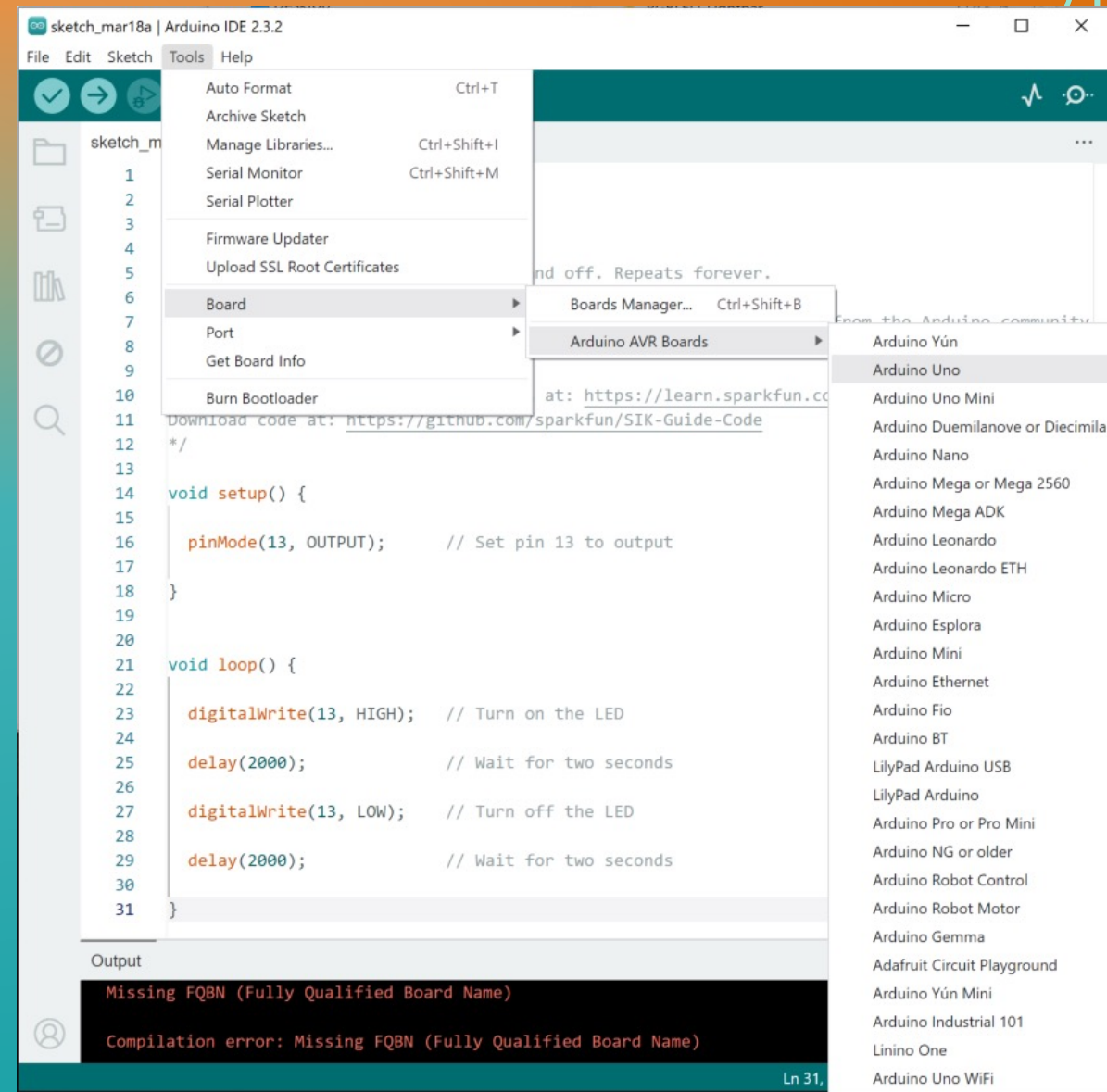
SIK_Circuit_1 A-Blink

SIK_Circuit_1 A-Blink.ino



ARDUINO IDE

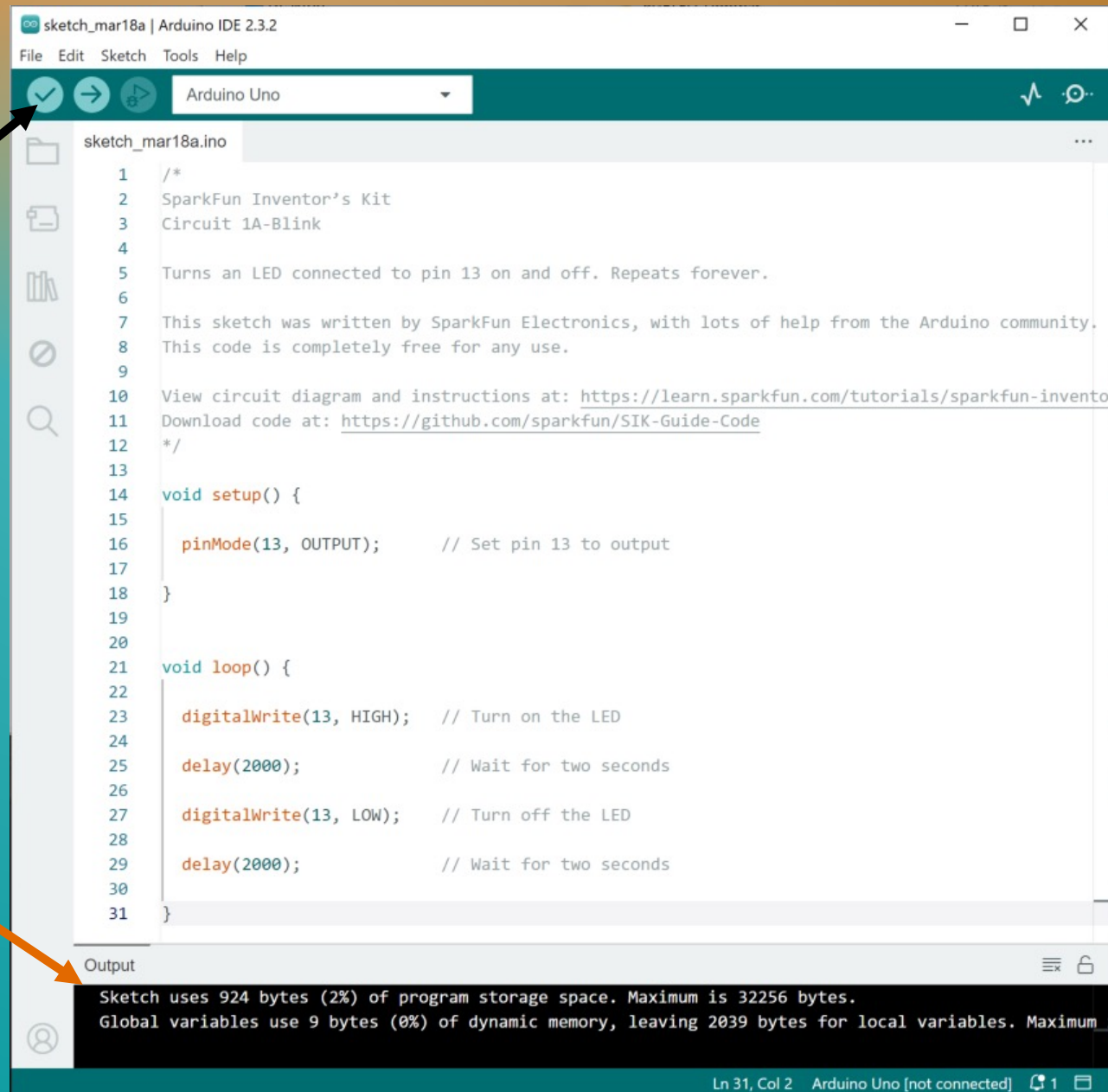
- Tools -> Board -> Arduino AVR Boards
Arduino Uno



ARDUINO IDE

- Verify Program

- Output should have no errors

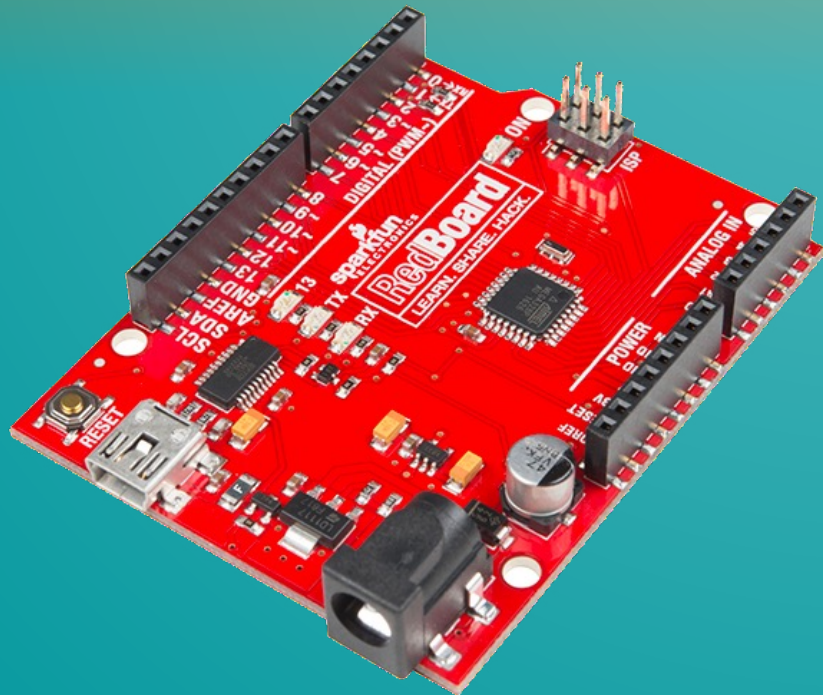


```
sketch_mar18a | Arduino IDE 2.3.2
File Edit Sketch Tools Help
Arduino Uno
sketch_mar18a.ino
1  /*
2  SparkFun Inventor's Kit
3  Circuit 1A-Blink
4
5  Turns an LED connected to pin 13 on and off. Repeats forever.
6
7  This sketch was written by SparkFun Electronics, with lots of help from the Arduino community.
8  This code is completely free for any use.
9
10 View circuit diagram and instructions at: https://learn.sparkfun.com/tutorials/sparkfun-inventor
11 Download code at: https://github.com/sparkfun/SIK-Guide-Code
12  */
13
14 void setup() {
15
16     pinMode(13, OUTPUT);    // Set pin 13 to output
17
18 }
19
20
21 void loop() {
22
23     digitalWrite(13, HIGH); // Turn on the LED
24
25     delay(2000);           // Wait for two seconds
26
27     digitalWrite(13, LOW); // Turn off the LED
28
29     delay(2000);           // Wait for two seconds
30
31 }
Output
Sketch uses 924 bytes (2%) of program storage space. Maximum is 32256 bytes.
Global variables use 9 bytes (0%) of dynamic memory, leaving 2039 bytes for local variables. Maximum
```

EXCELLENT!



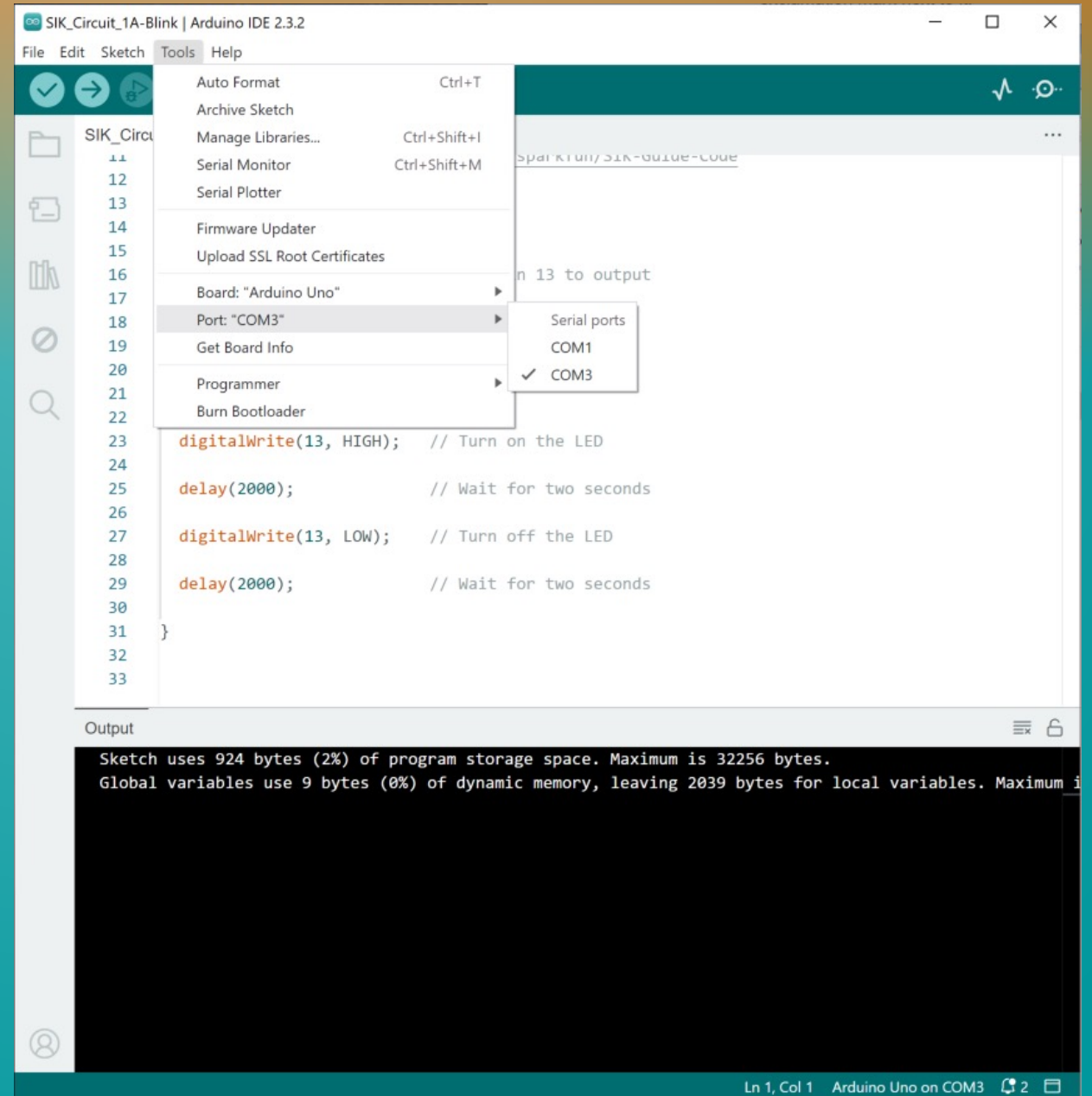
RUN IT ON THE HARDWARE



ARDUINO IDE

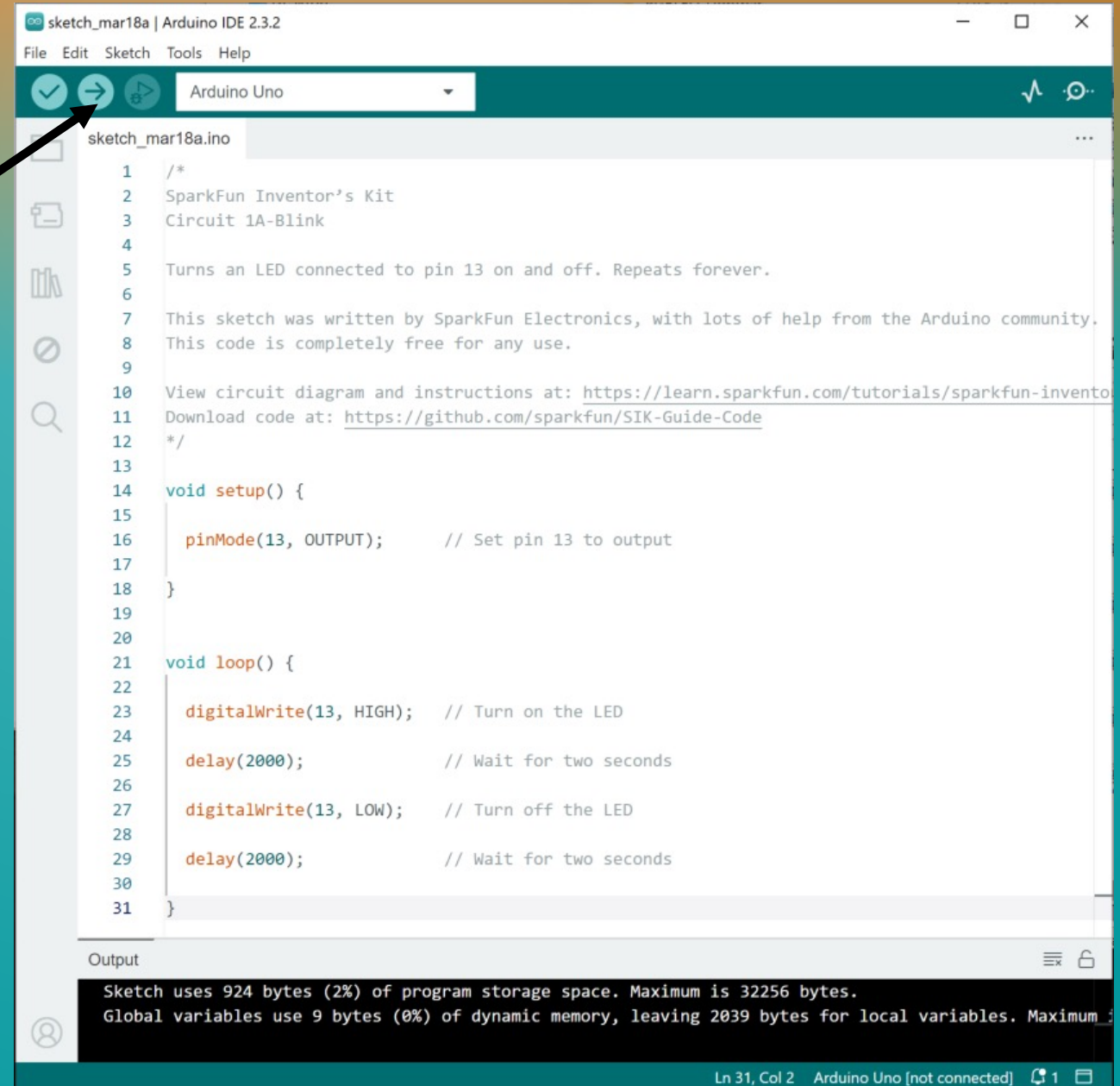
- Tools -> Board -> Port
COM3

(your port may differ)



RUN IT ON THE HARDWARE

- Upload & Run Program



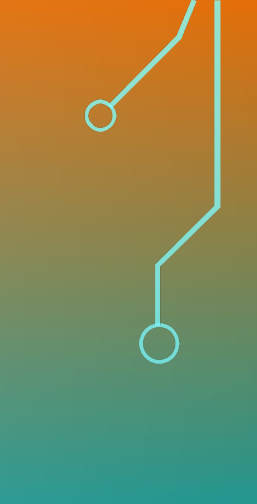
```
sketch_mar18a | Arduino IDE 2.3.2
File Edit Sketch Tools Help
Arduino Uno
sketch_mar18a.ino
1  /*
2  SparkFun Inventor's Kit
3  Circuit 1A-Blink
4
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8  This code is completely free for any use.
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10 View circuit diagram and instructions at: https://learn.sparkfun.com/tutorials/sparkfun-inventor
11 Download code at: https://github.com/sparkfun/SIK-Guide-Code
12  */
13
14 void setup() {
15
16   pinMode(13, OUTPUT);    // Set pin 13 to output
17
18 }
19
20
21 void loop() {
22
23   digitalWrite(13, HIGH); // Turn on the LED
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31 }
Output
Sketch uses 924 bytes (2%) of program storage space. Maximum is 32256 bytes.
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EXCELLENT!





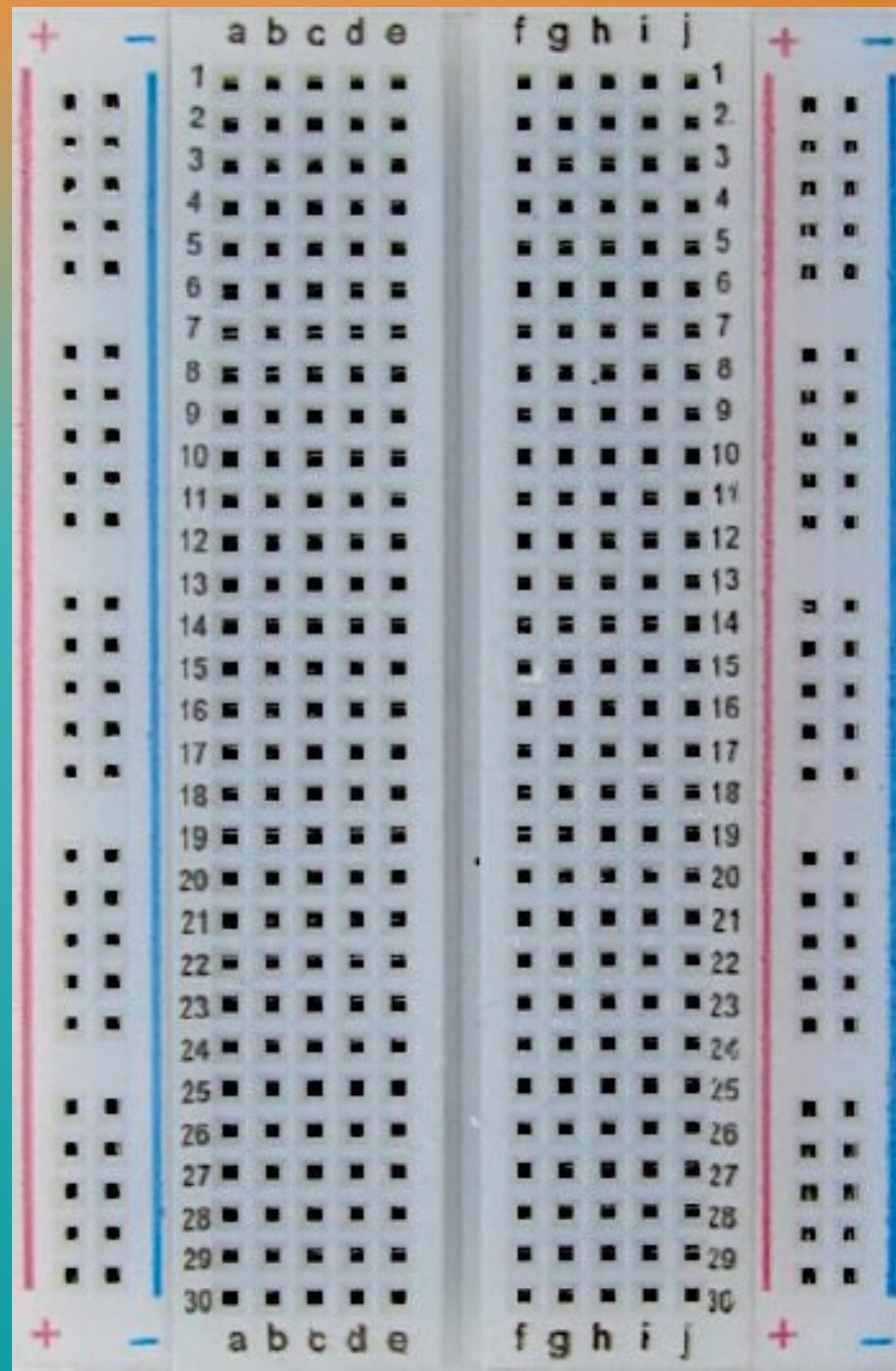
FIRST CIRCUIT

- Circuits are a continuous loop
- 



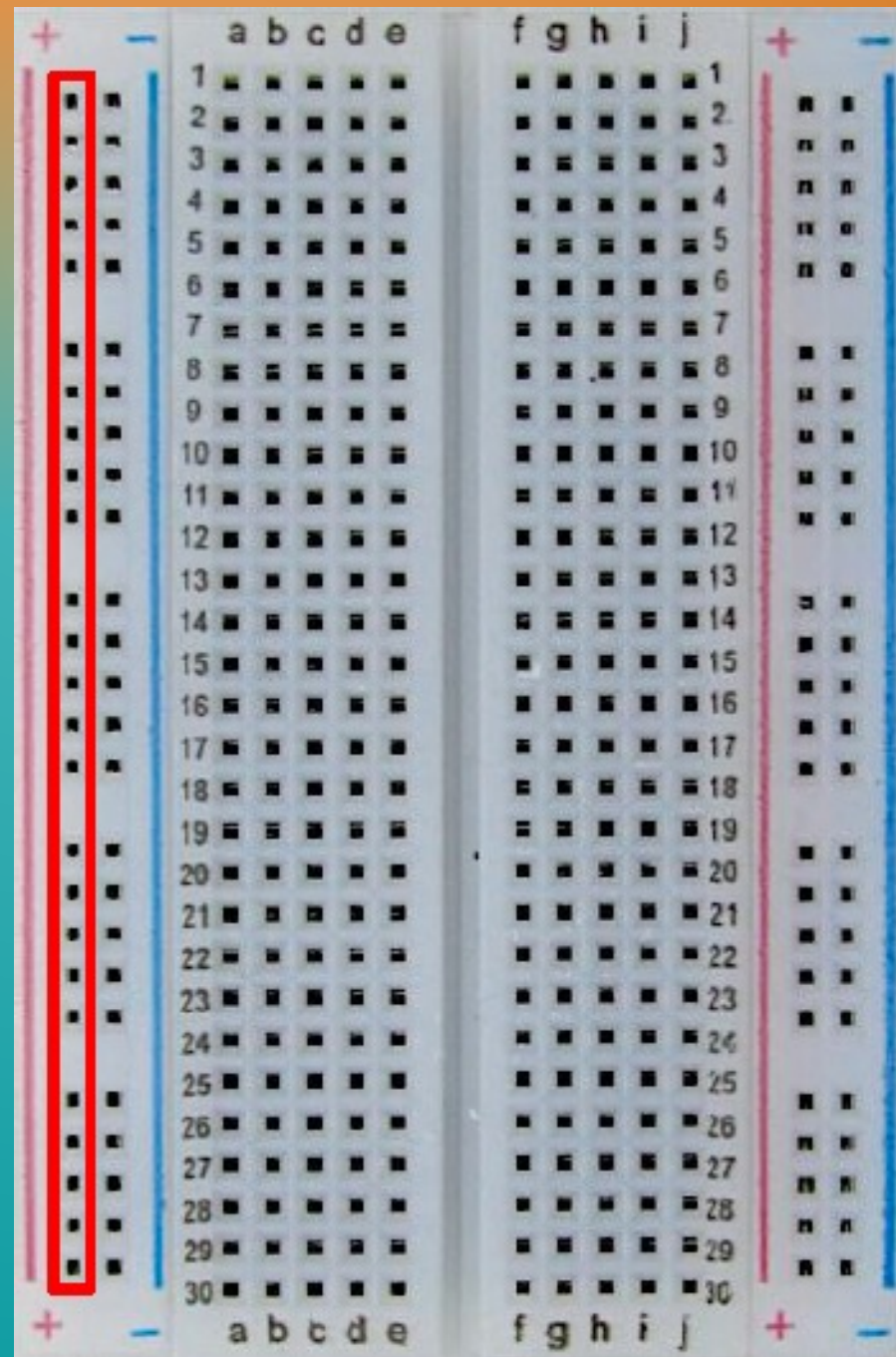
FIRST CIRCUIT

- Breadboard



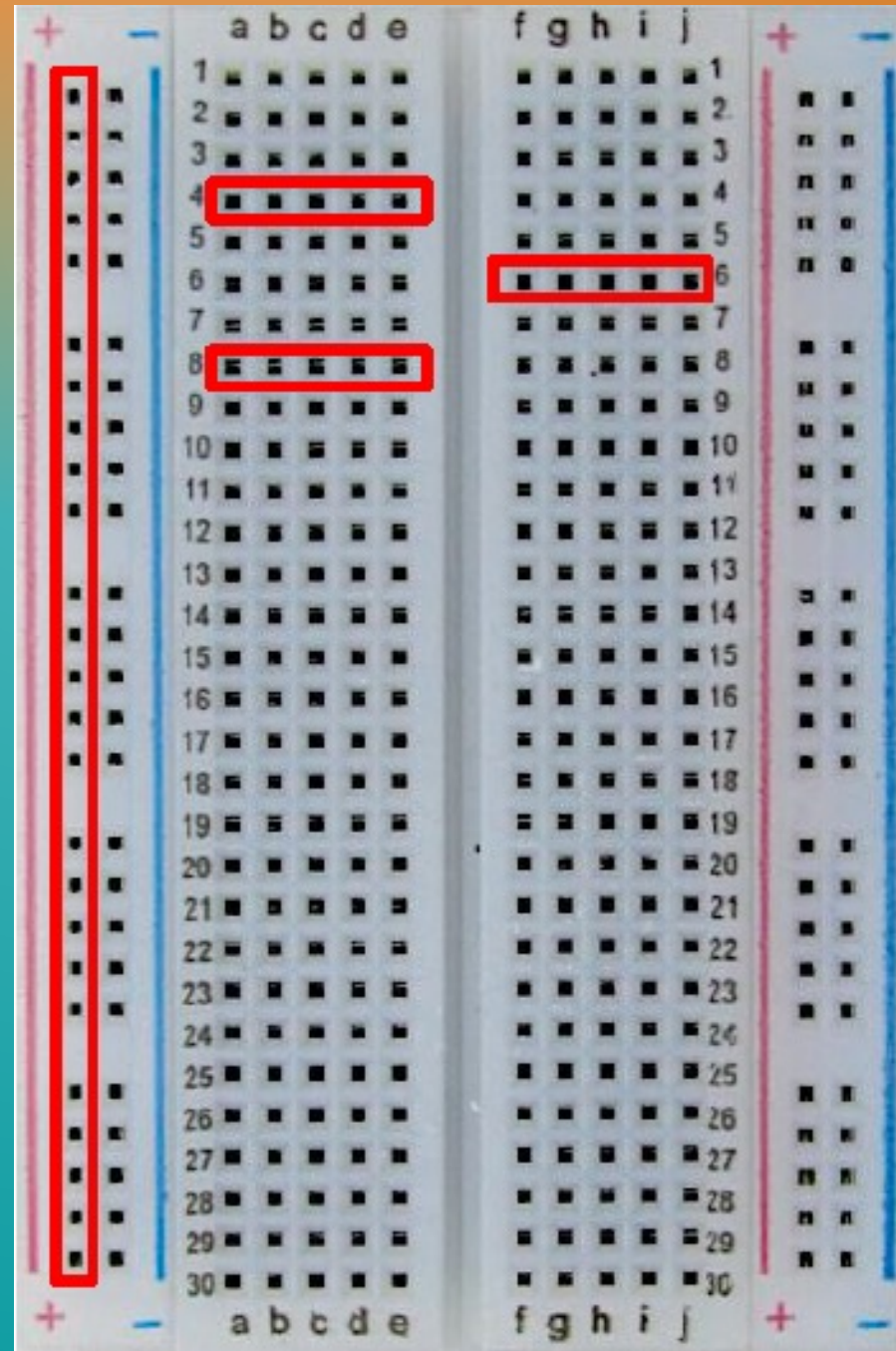
FIRST CIRCUIT

- Breadboard



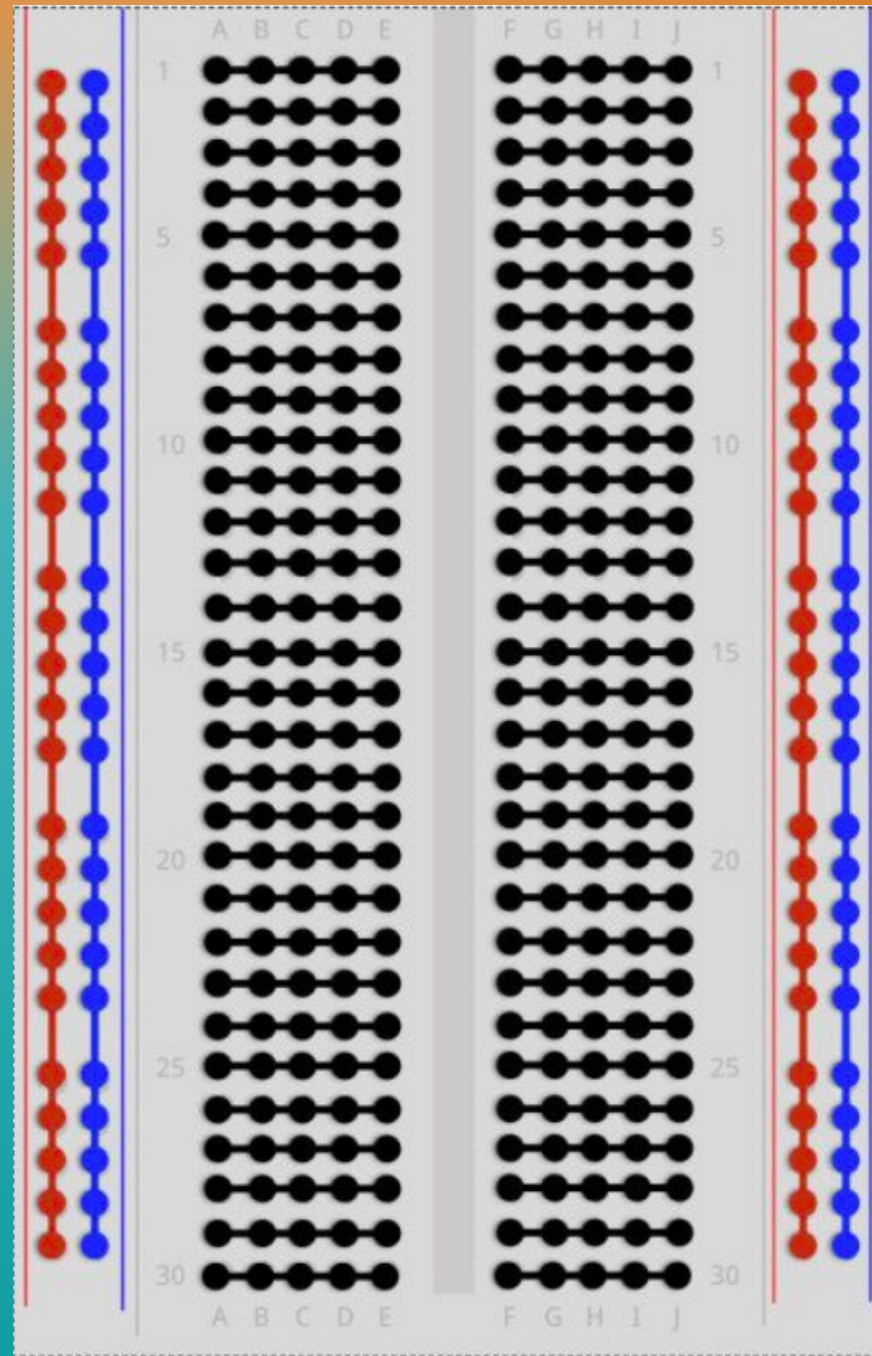
FIRST CIRCUIT

- Breadboard



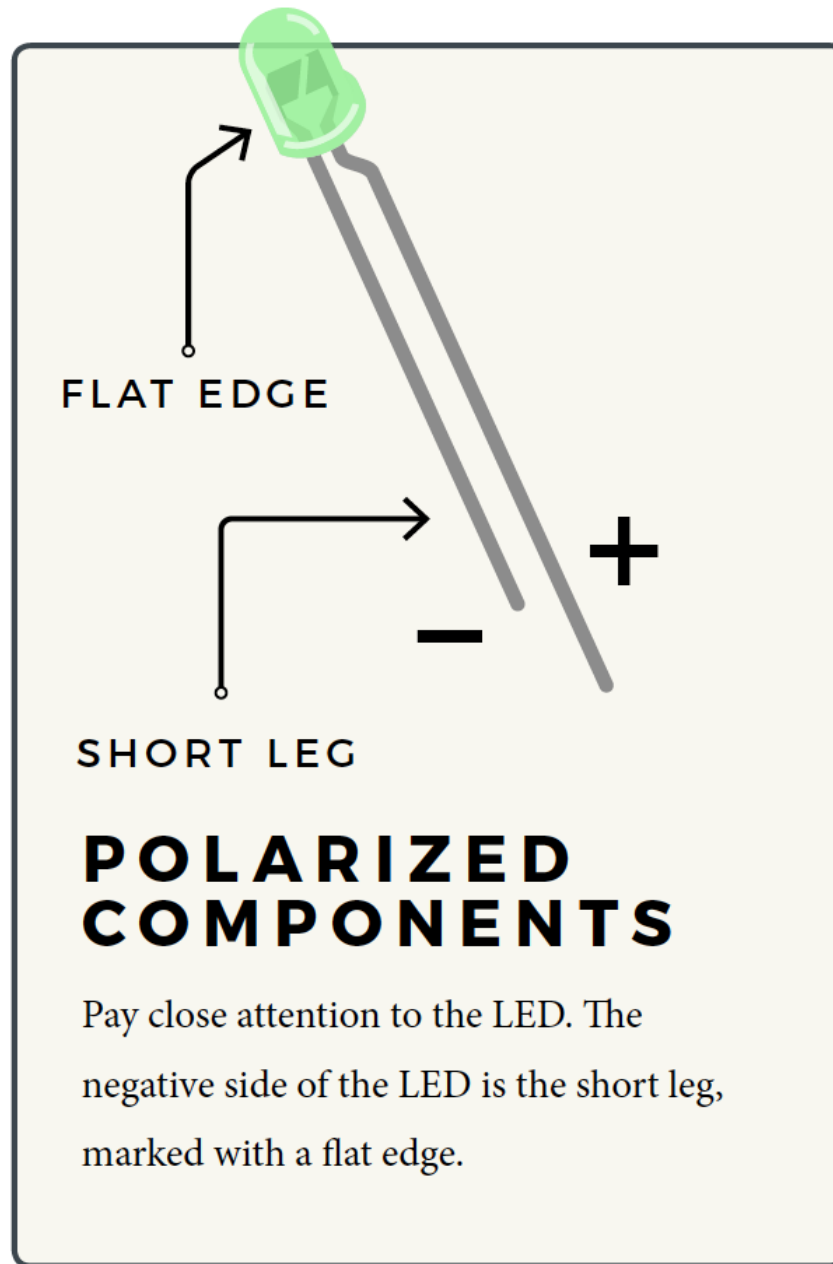
FIRST CIRCUIT

- Breadboard



FIRST CIRCUIT

- LED
 - Polarized

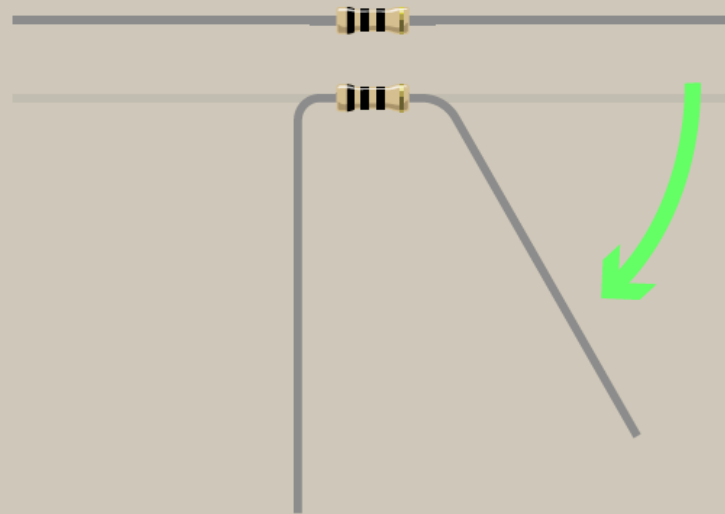


FIRST CIRCUIT

- Resistor
 - not polarized

RESISTOR LEADS

Components like resistors need to have their legs bent into 90° angles in order to correctly fit in the breadboard sockets.



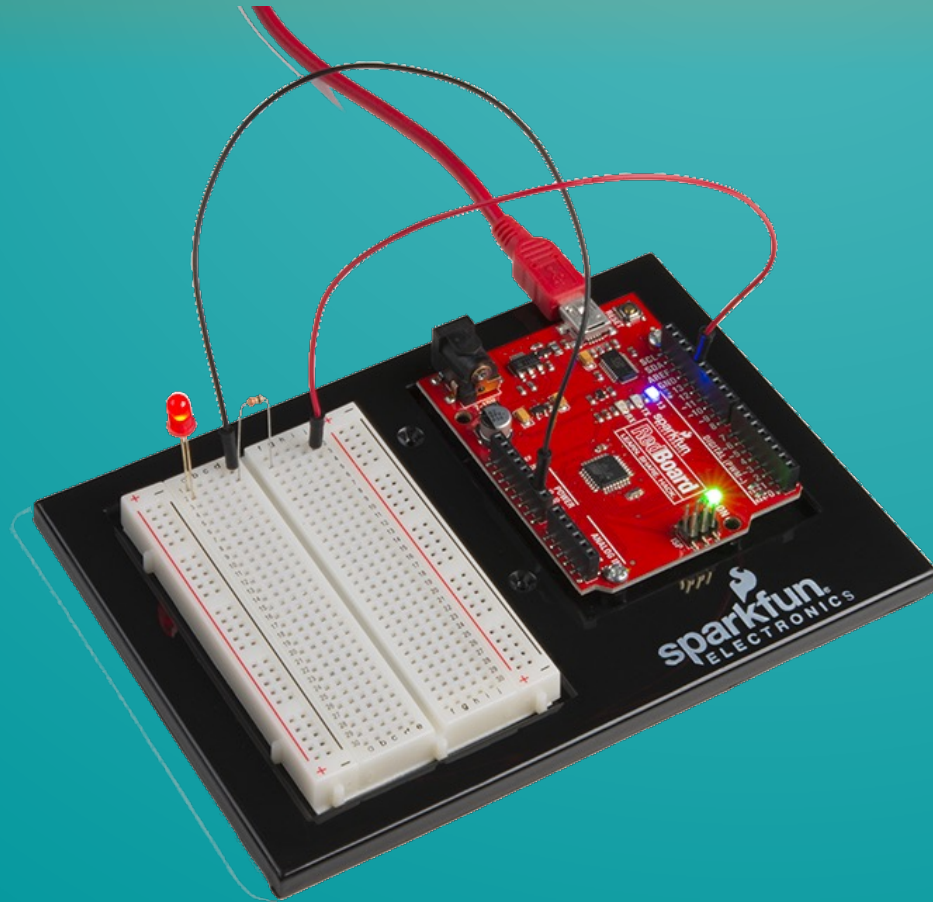
The slide features a teal-to-orange gradient background. In the corners, there are decorative white and light blue circuit board traces and nodes. The top-left and top-right corners have white traces, while the bottom-left and bottom-right corners have light blue traces.

FIRST CIRCUIT

- DISCONNECT USB Cable before wiring circuits
- Circuits should always be modified with power off

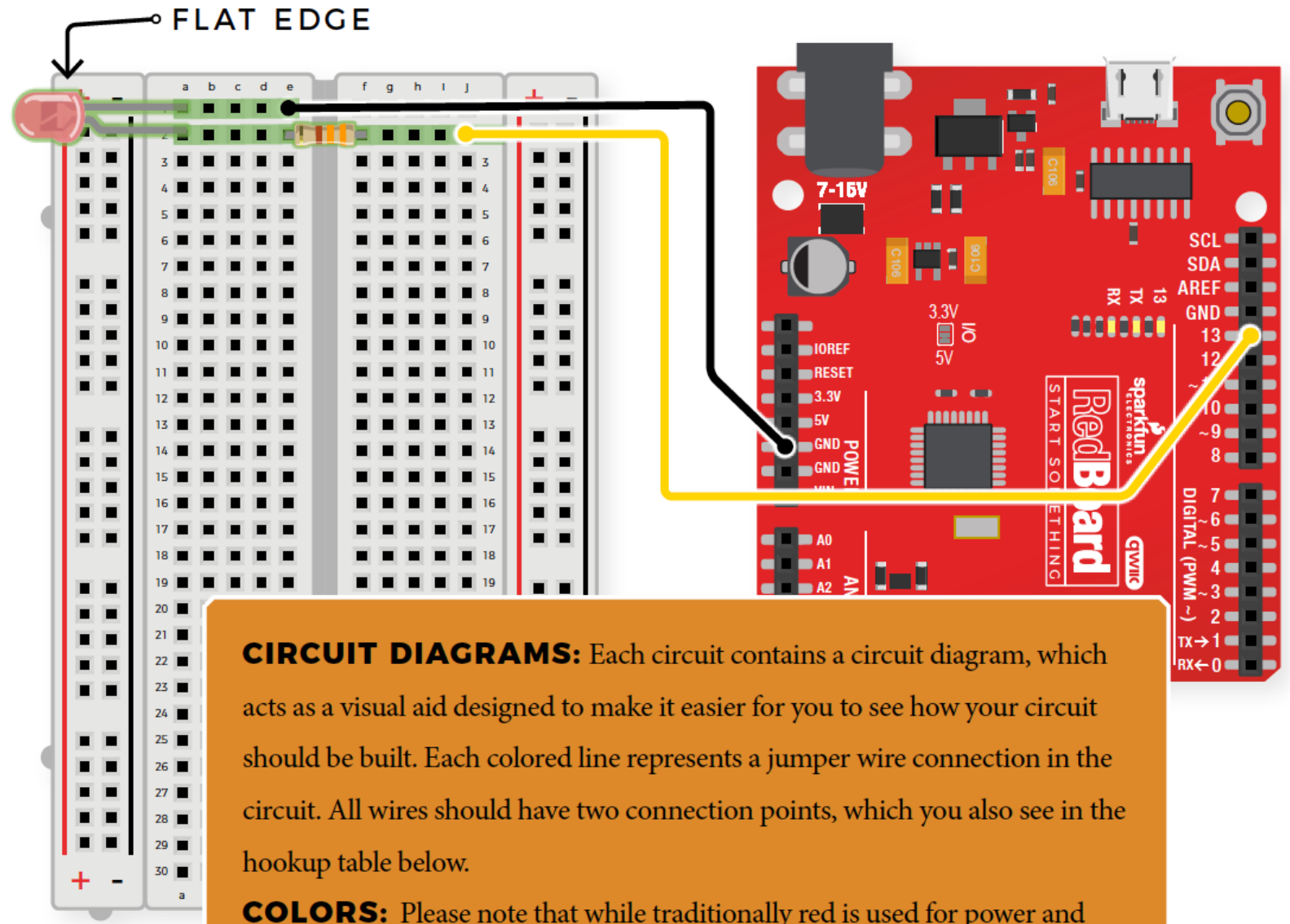
FIRST CIRCUIT

- Circuit 1A: Blinking an LED -pg 12



FIRST CIRCUIT

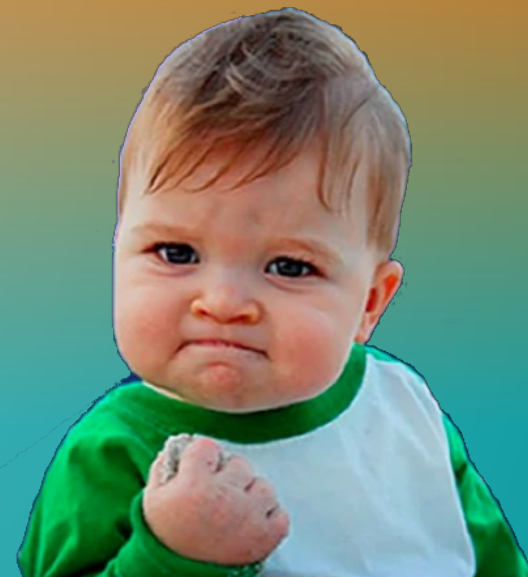
- Circuit 1A:
Blinking an LED
-pg 13



CIRCUIT DIAGRAMS: Each circuit contains a circuit diagram, which acts as a visual aid designed to make it easier for you to see how your circuit should be built. Each colored line represents a jumper wire connection in the circuit. All wires should have two connection points, which you also see in the hookup table below.

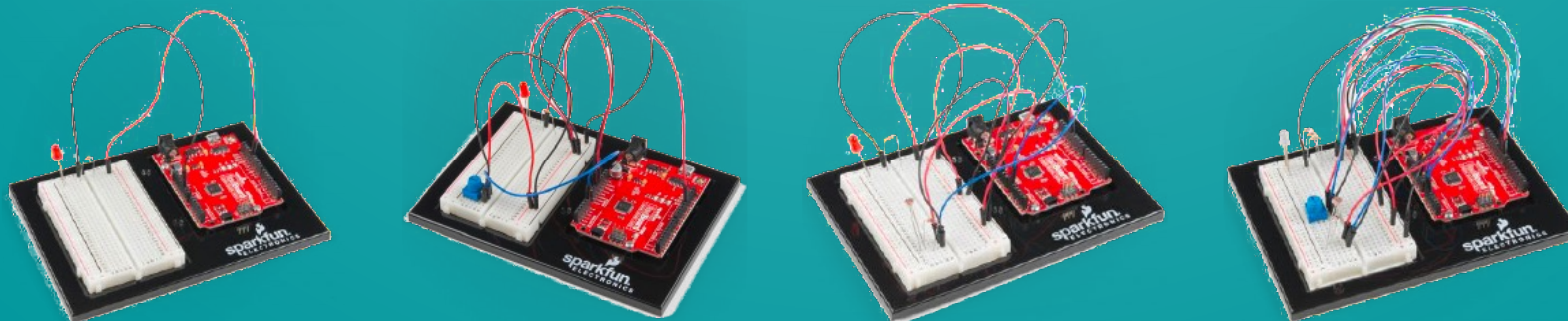
COLORS: Please note that while traditionally red is used for power and black is used for ground, all wires, no matter their color, function the same.

EXCELLENT!



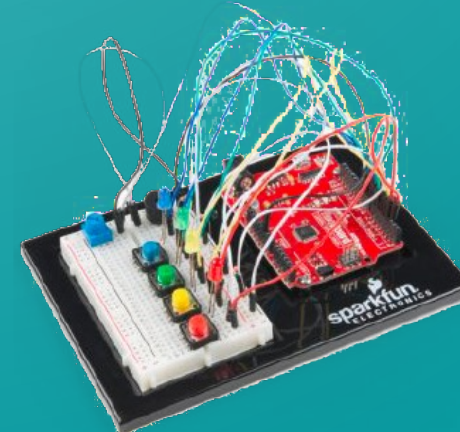
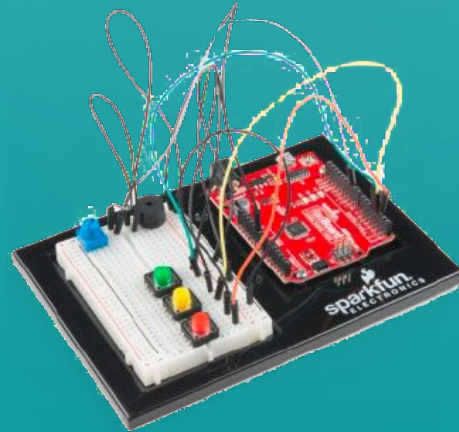
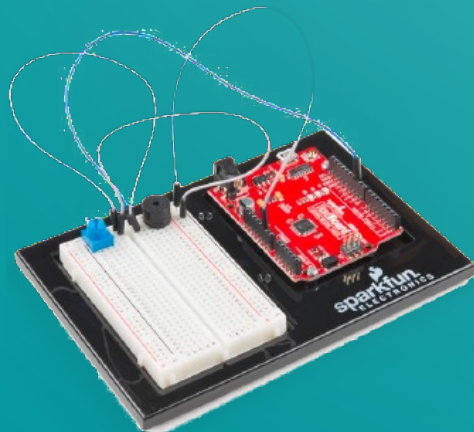
PROJECT 1: LIGHT

- Circuit 1A: Blinking an LED -pg 13
- Circuit 1B: Potentiometer -pg 20
- Circuit 1C: Photoresistor -pg 26
- Circuit 1D: RGB Night-Light -pg 31



PROJECT 2: SOUND

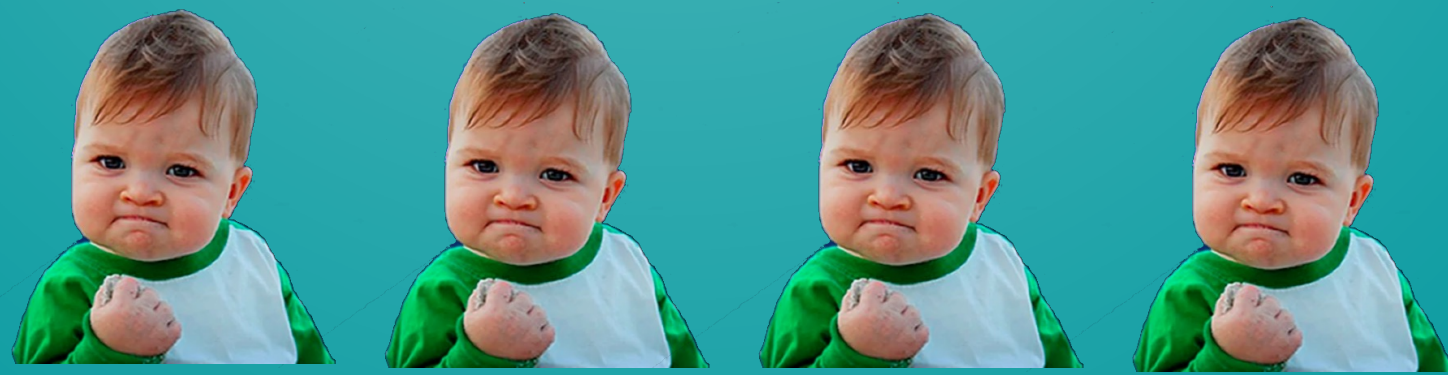
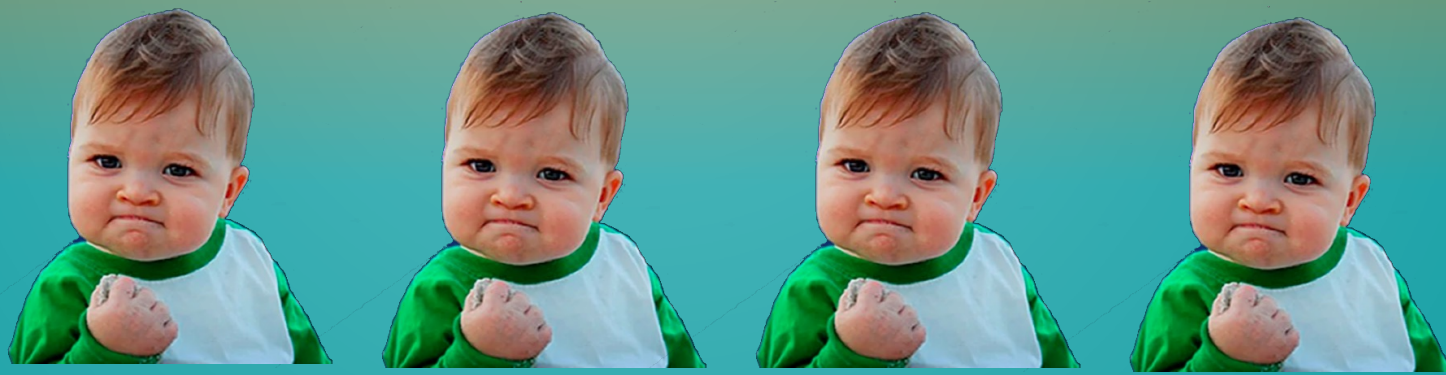
- Circuit 2A: Buzzer -pg 37
- Circuit 2B: Digital Trumpet -pg 42
- Circuit 2C: “Simon Says” Game -pg 47



The background features a vertical gradient from orange at the top to teal at the bottom. In each of the four corners, there are white, stylized circuit board traces that branch out and terminate in small circles, resembling nodes or components on a PCB.

WHAT DID WE LEARN?

EXCELLENT!

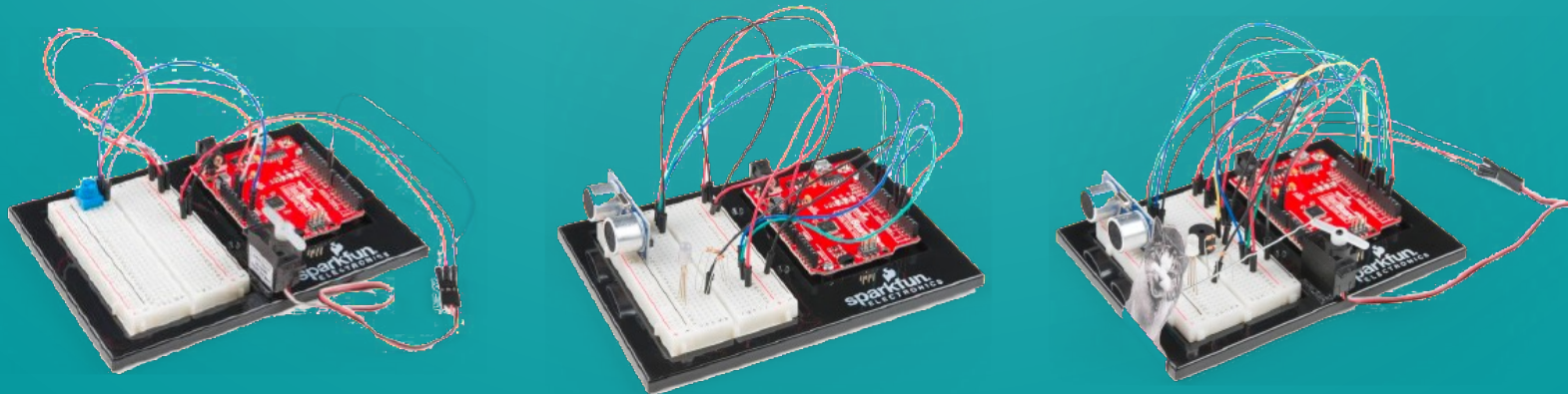


The image features a background with a vertical gradient from orange at the top to teal at the bottom. In the four corners, there are decorative white line-art patterns resembling circuit traces or fiber optic paths, with small circles at the end of the lines. The text "SEE YOU TOMORROW!" is centered in the upper half of the image.

SEE YOU TOMORROW!

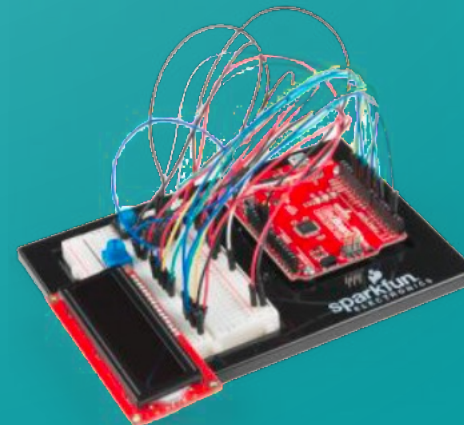
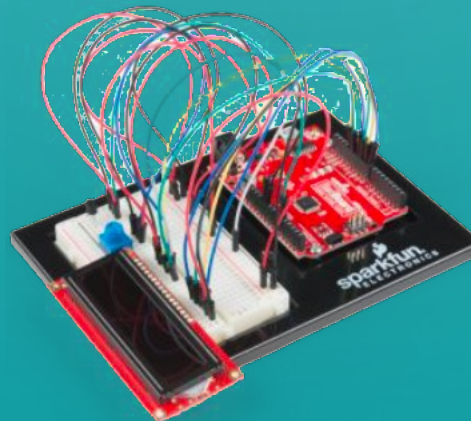
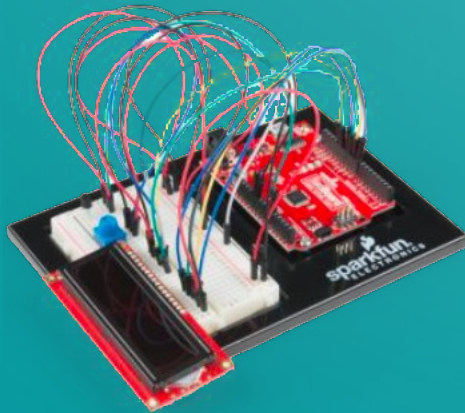
PROJECT 3: MOTION

- Circuit 3A: Servo Motors -pg 54
- Circuit 3B: Distance Sensor -pg 60
- Circuit 3C: Motion Alarm -pg 65



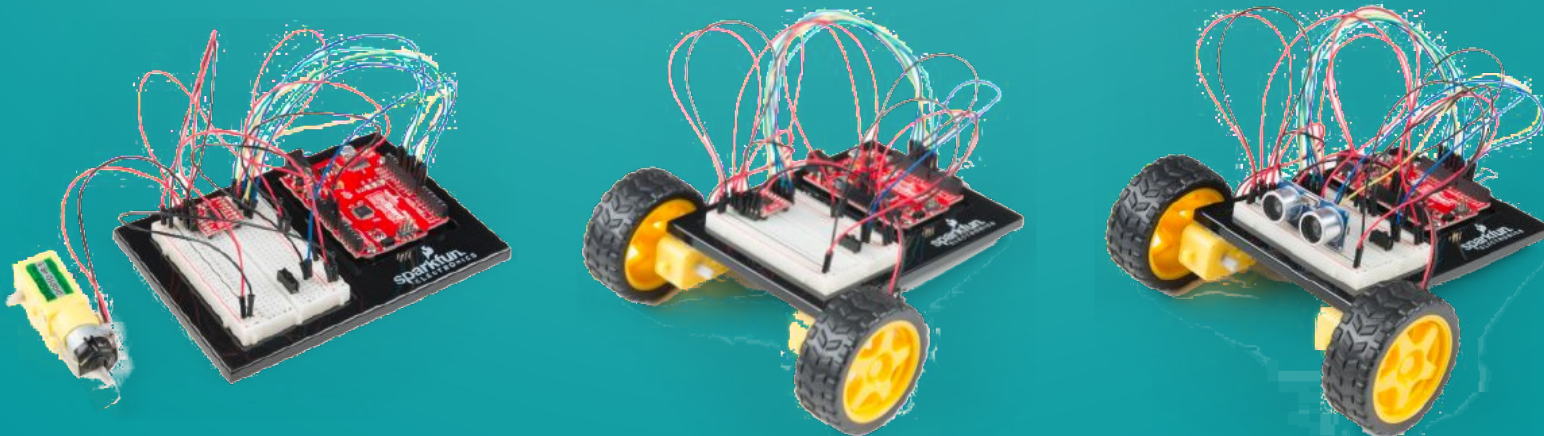
PROJECT 4: DISPLAY

- Circuit 4A: LCD “Hello World!” -pg 72
- Circuit 4B: Temperature Sensor -pg 77
- Circuit 4C: DIY “Who Am I?” Game -pg 82



PROJECT 5: ROBOT

- Circuit 5A: Motor Basics -pg 89
- Circuit 5B: Remote-Controlled Robot -pg 96
- Circuit 5C: Autonomous Robot -pg 102



The image features a background with a vertical gradient from orange at the top to teal at the bottom. In the corners, there are decorative white and light blue circuit-like patterns consisting of lines and circles. The text is centered in the upper half of the image.

HOPE YOU HAD FUN!
&
LEARNED SOMETHING

EXCELLENT!

