



Arduino Programming

Internet of Things

Ashwini Sudarshana

Alumni Initiatives - 'Wireless-School.org'

STEP, National Institute of Technology, Karnataka, Surathkal

www.Arduino.cc boards



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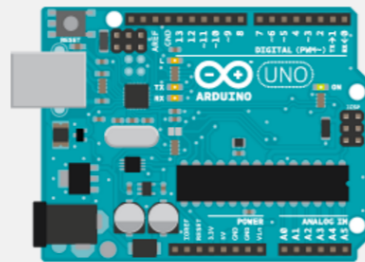
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WHAT IS ARDUINO?



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CONVERTS SOUNDS INTO
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APRIL
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Arduino's sister brand for
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Arduino boards



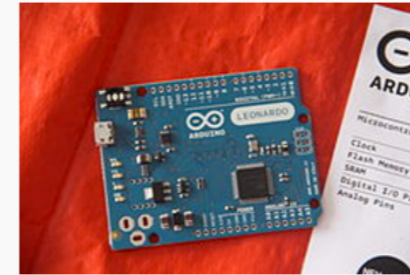
Arduino Diecimila in
Stoicheia



Arduino Duemilanove
(rev 2009b)



Arduino UNO



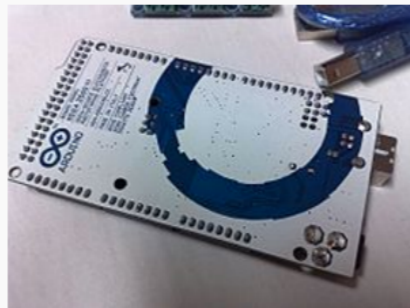
Arduino Leonardo



Arduino Mega



Arduino MEGA 2560 R3
(front side)^[a]



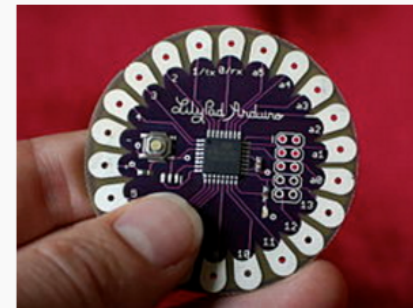
Arduino MEGA 2560 R3
(back side)^[a]



Arduino Nano

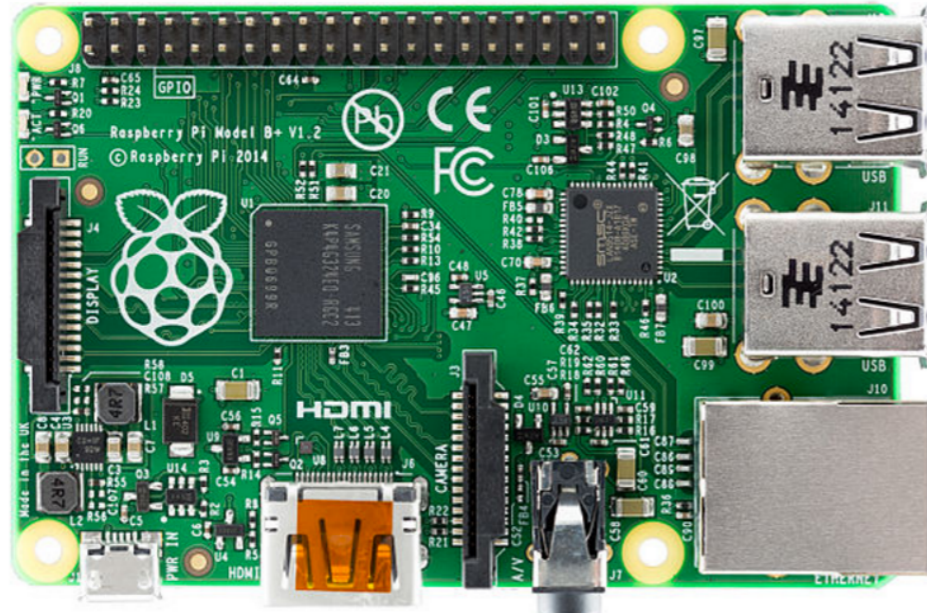


Arduino Due
(ARM Cortex-M3 core)



LilyPad Arduino (rev
2007)

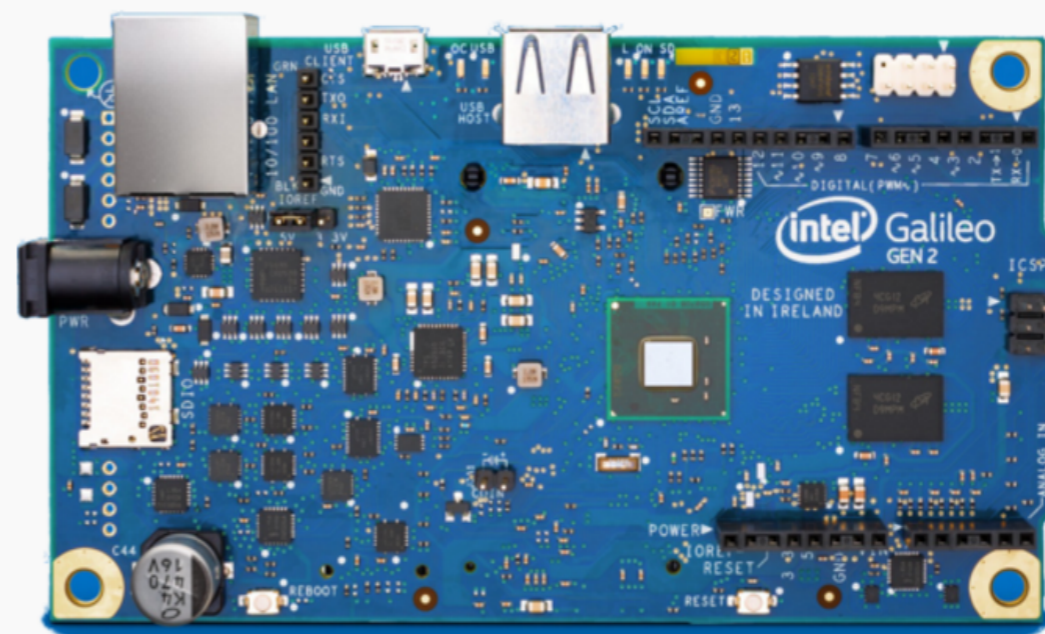
Raspberry Pi 1



Raspberry Pi 1 model B+

Release date	February 2012; 4 years ago
Introductory price	US\$25 (model A, B+ ^[1]), US\$20 (model A+), US\$35 (RPi 1 model B, RPi 2 model B), US\$30 (CM)
Operating system	Linux (e.g. Raspbian), RISC OS, FreeBSD, NetBSD, Plan 9, Inferno, AROS
CPU	700 MHz single-core ARM1176JZF-S (model A, A+, B, B+, CM) ^[2]
Memory	256 MB ^[3] (model A, A+, B rev 1) 512 MB (model B rev 2, B+, CM)
Storage	SDHC slot (model A and B), MicroSDHC slot (model A+ and B+), 4 GB eMMC IC chip (model CM)
Graphics	Broadcom VideoCore IV ^[2]
Power	1.5 W (model A), 1.0 W (model A+), 3.5 W (model B), 3.0 W (model B+) or 0.8 W (model Zero)

Intel Galileo Gen. 2



"Intel Galileo Gen. 2"

Developer	Intel Corporation
Type	Single-board computer
Release date	Q2'14 ^[3]
Introductory price	US\$79.90 ^[4]
Operating system	Linux
CPU	Intel Quark X1000 32-bit 400 MHz
Memory	256 MB
Storage	Flash Memory 8M, EEPROM 8 kb, Micro SD card slot upto 32GB
Power	15 W
Website	www.intel.com ^[4]

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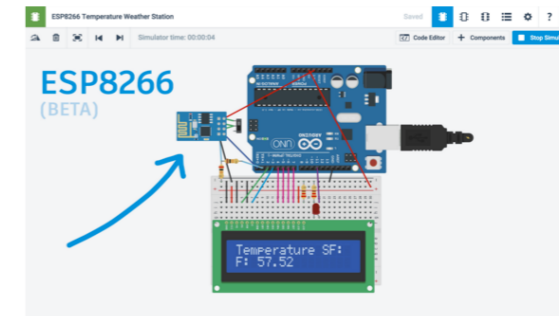
+ [User Profile]

NEW: Check out ESP8266 Wifi Chip

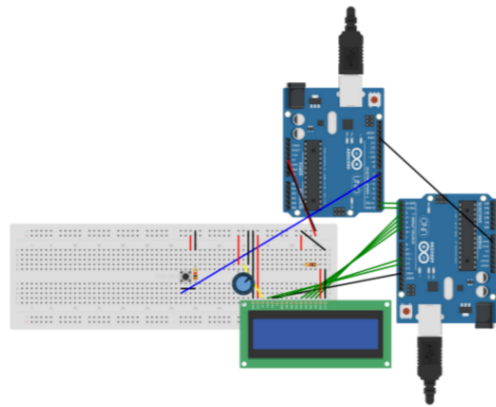
This is the beta release of the ESP8266 Wifi chip. We can't wait to see what you do with it.

Check out the example circuit here:

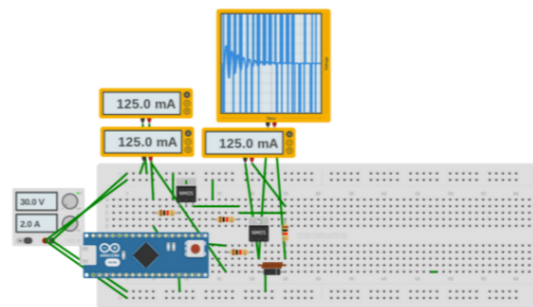
[Learn More](#)



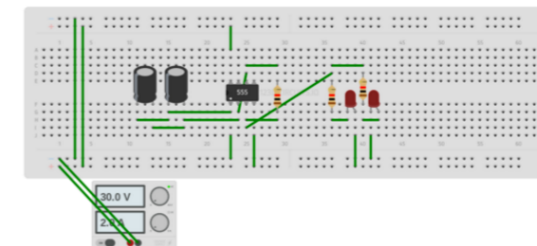
What others are doing



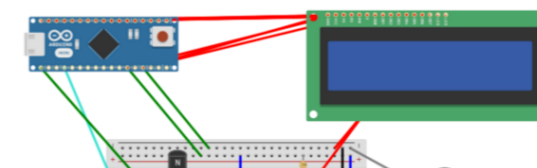
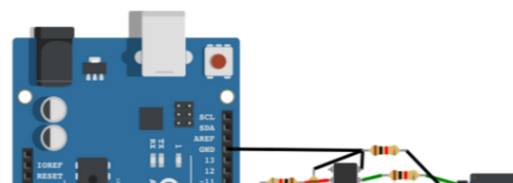
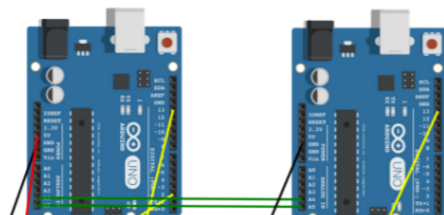
 **Serial communication between...**
Dirtuebus Dirtuebus



 **Solenoid Current Limiter**
Asad Zia



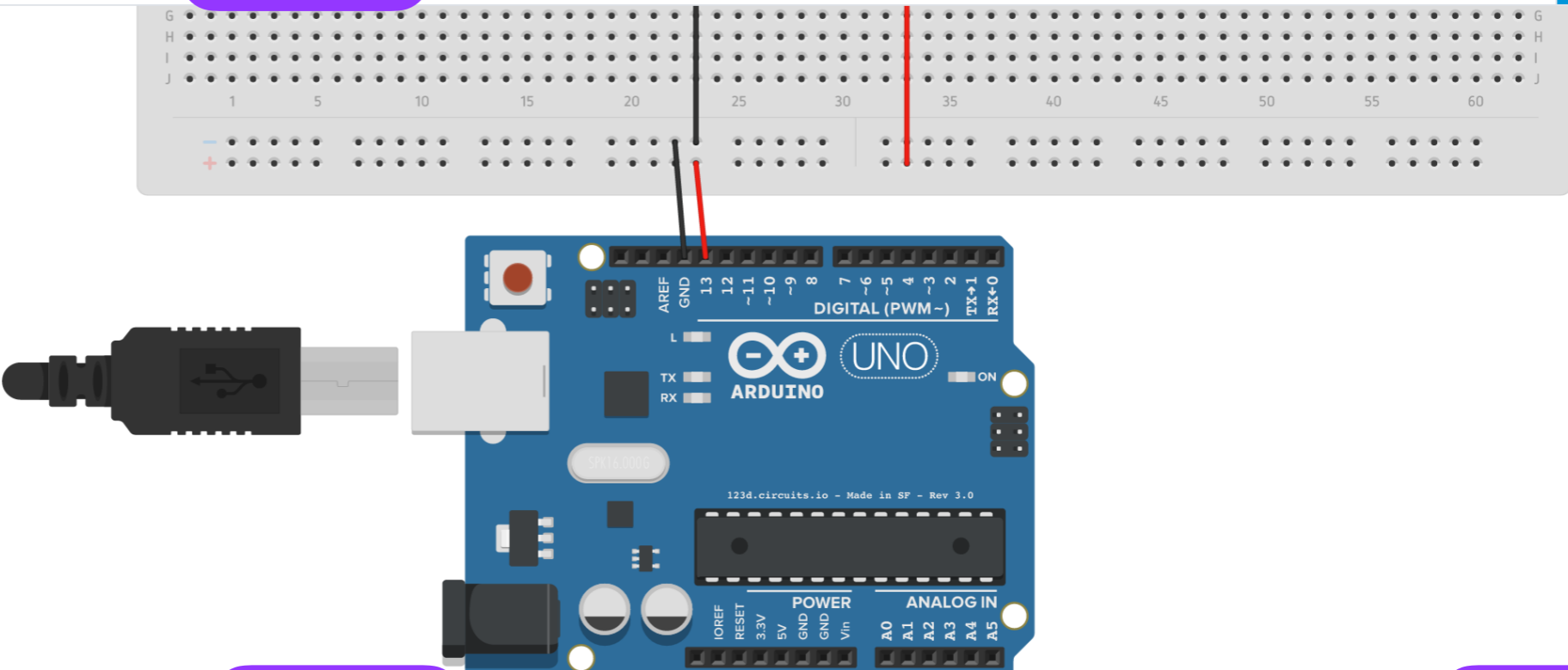
 **Train Crossing signal**
chris chris



Arduino - Serial Communication

WS2: Serial Communication | Electronics Lab

[Start Simulation](#) [Code Editor](#)



1 (Arduino Uno R3) [Upload & Run](#) [Download Code](#) [Debugger](#)

```
1 // Pin 13 has an LED connected on most Arduino boards.
2 // give it a name:
3 int led = 13;
4
5 bool isLightOn = false;
6 int counter = 0;
7 String val = "";
8
9 // the setup routine runs once when you press reset:
10 void setup() {
```



```
WS1_-_Serial_Communication §
```

```
// Pin 13 has an LED connected on most Arduino boards.
```

```
int led = 13;
```

```
bool isLightOn = false;
```

```
int counter = 0;
```

```
String val = "";
```

```
// the setup routine runs once when you press reset:
```

```
void setup() {
```

```
    Serial.begin(9600); // opens serial port, sets data rate to 9600 bps
```

```
    while(!Serial)
```

```
    {
```

```
        ;
```

```
    }
```

```
    // initialize the digital pin as an output.
```

```
    pinMode(led, OUTPUT);
```

```
}
```

```
Arduino File Edit Sketch Tools Help
WS1_-_Serial_Communication | Arduino 1.6.7

WS1_-_Serial_Communication §
// the loop routine runs over and over again forever:
void loop()
{
  if (Serial.available() > 0)
  {
    Serial.println("Light ON status: ");
    Serial.print(counter);
    Serial.println("Question?");
  }

  val = Serial.readString();

  if(val.equalsIgnoreCase("OFF"))
  {
    digitalWrite(led, LOW);
  }

  if(val.equalsIgnoreCase("ON"))
  {
    digitalWrite(led, HIGH); // turn the LED on (HIGH is the voltage level)
    isLightOn = true;
  }

  if(val.equals("OFF"))
  {
    digitalWrite(led, LOW); // turn the LED off by making the voltage LOW
    isLightOn = false;
  }

  if(val.equals("BLINK"))
  {
    counter = 0;

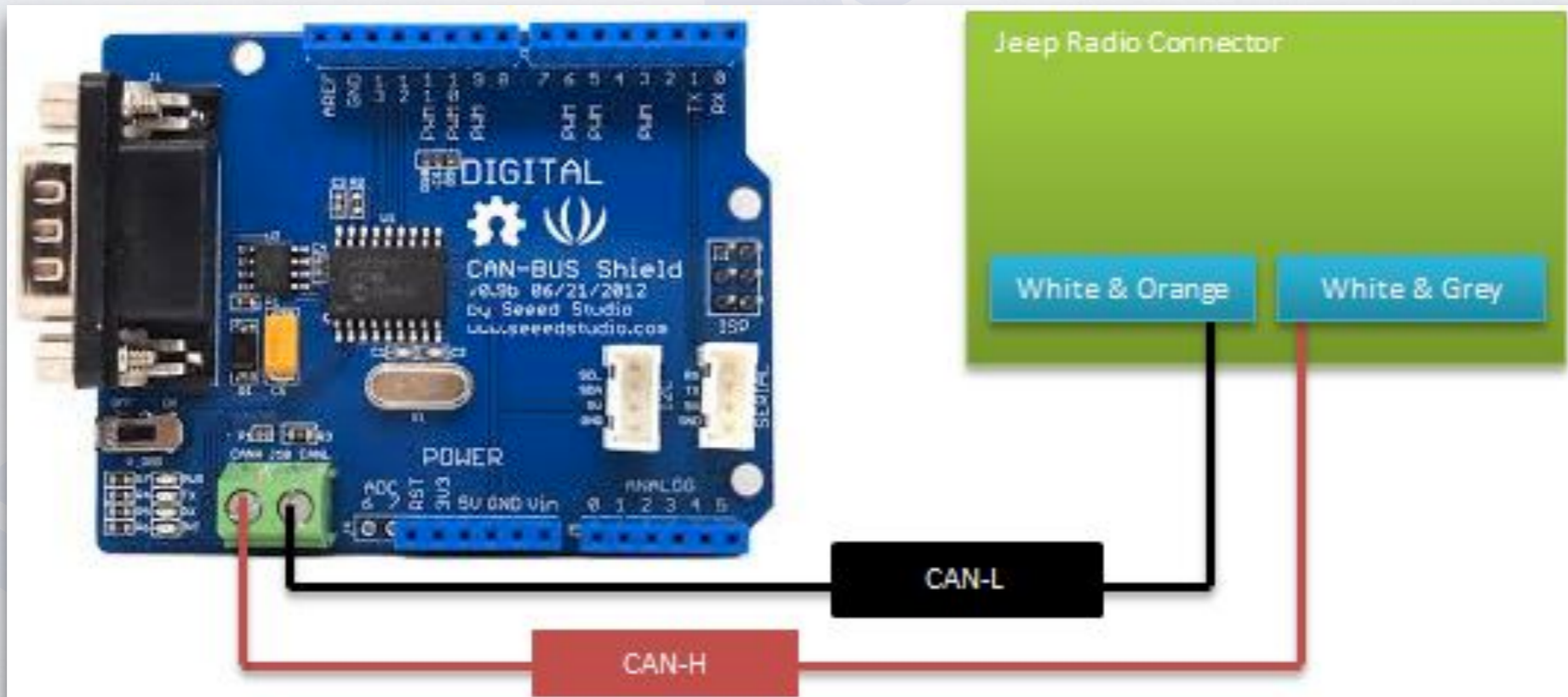
    do
```


Hack your vehicle

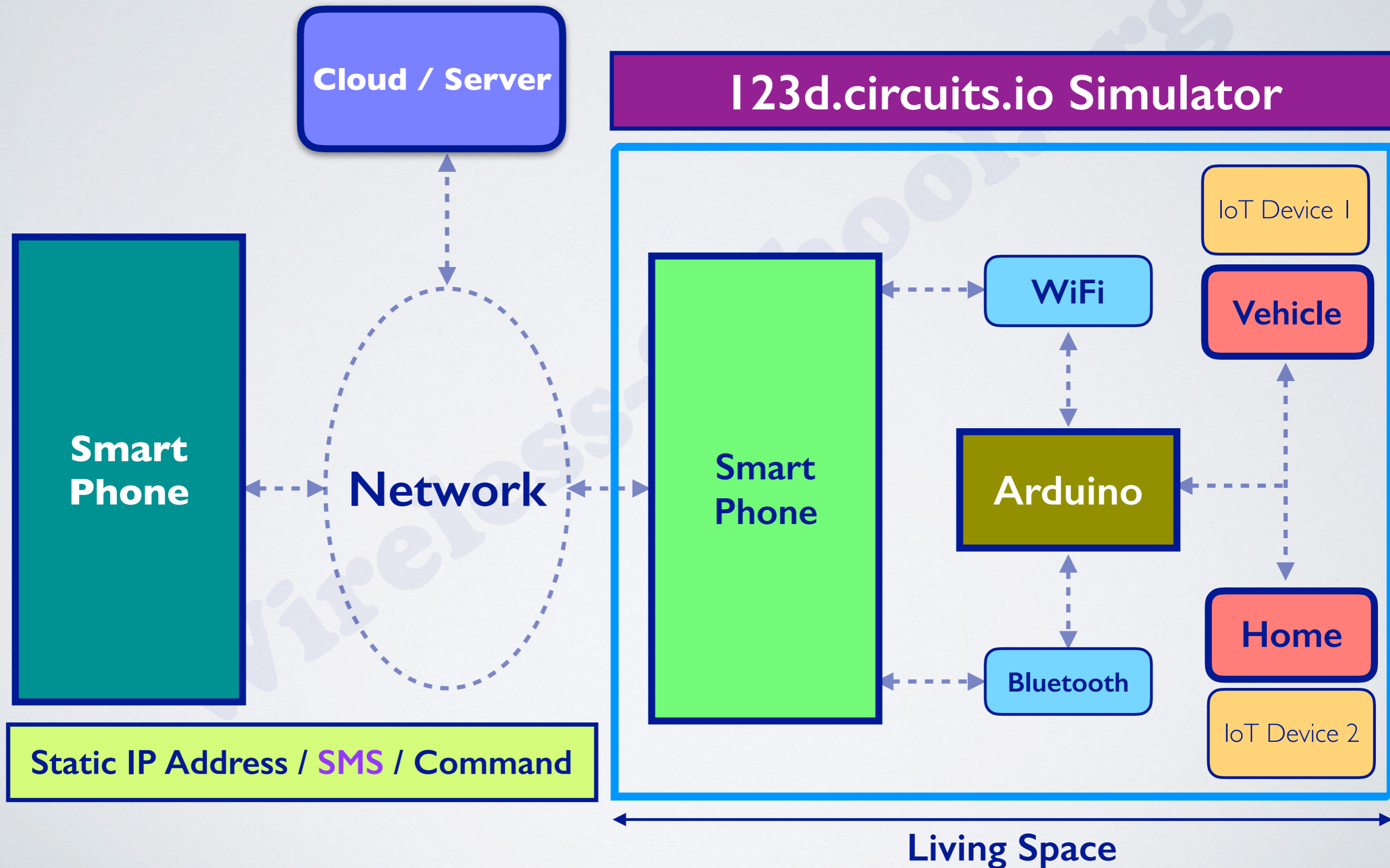
CAN Bus Shield

Arduino

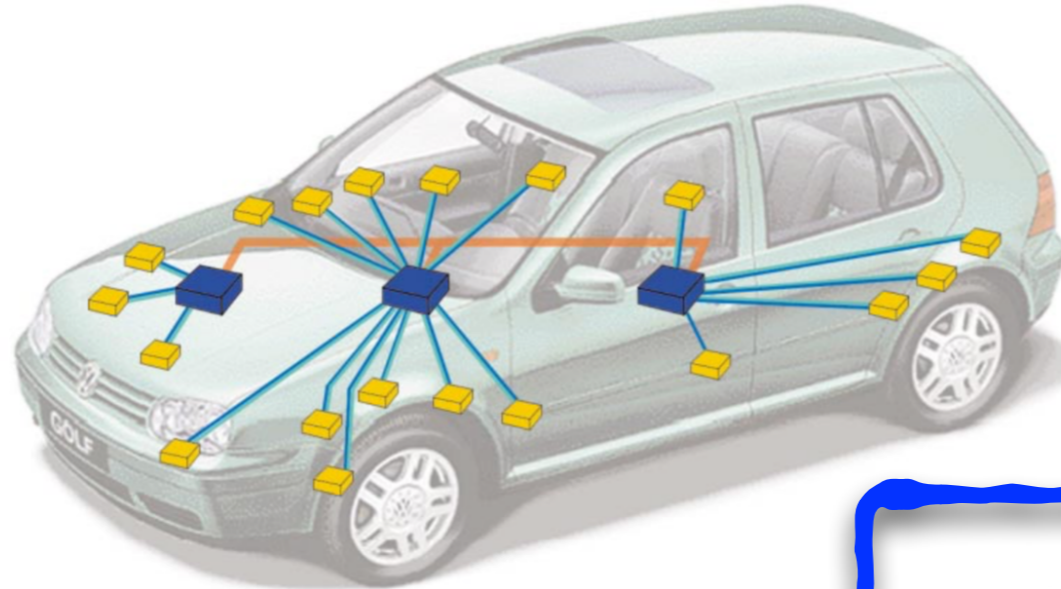
Vehicle



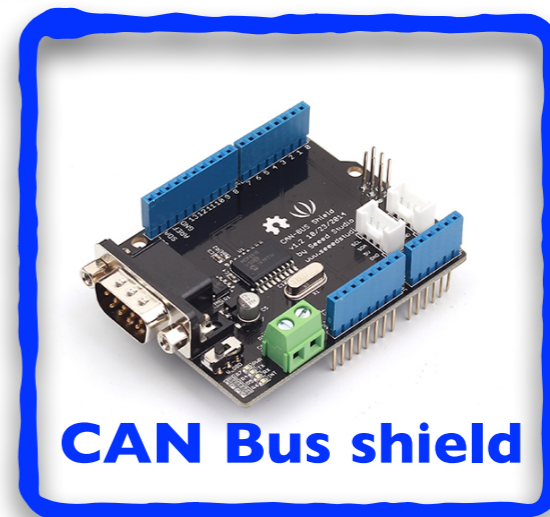
Generic IoT Communication



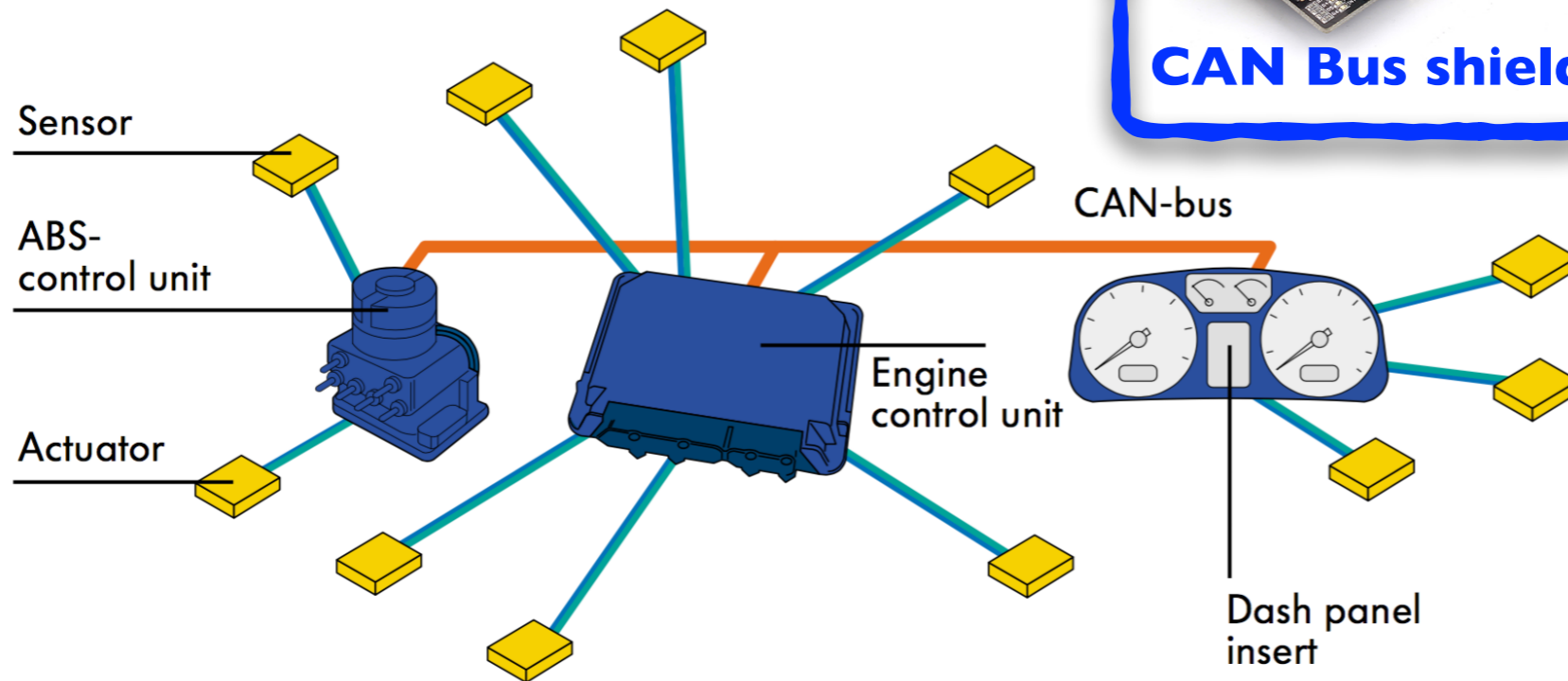
CAN Bus (Controller Area Network)



Car with 3 control units and bus system

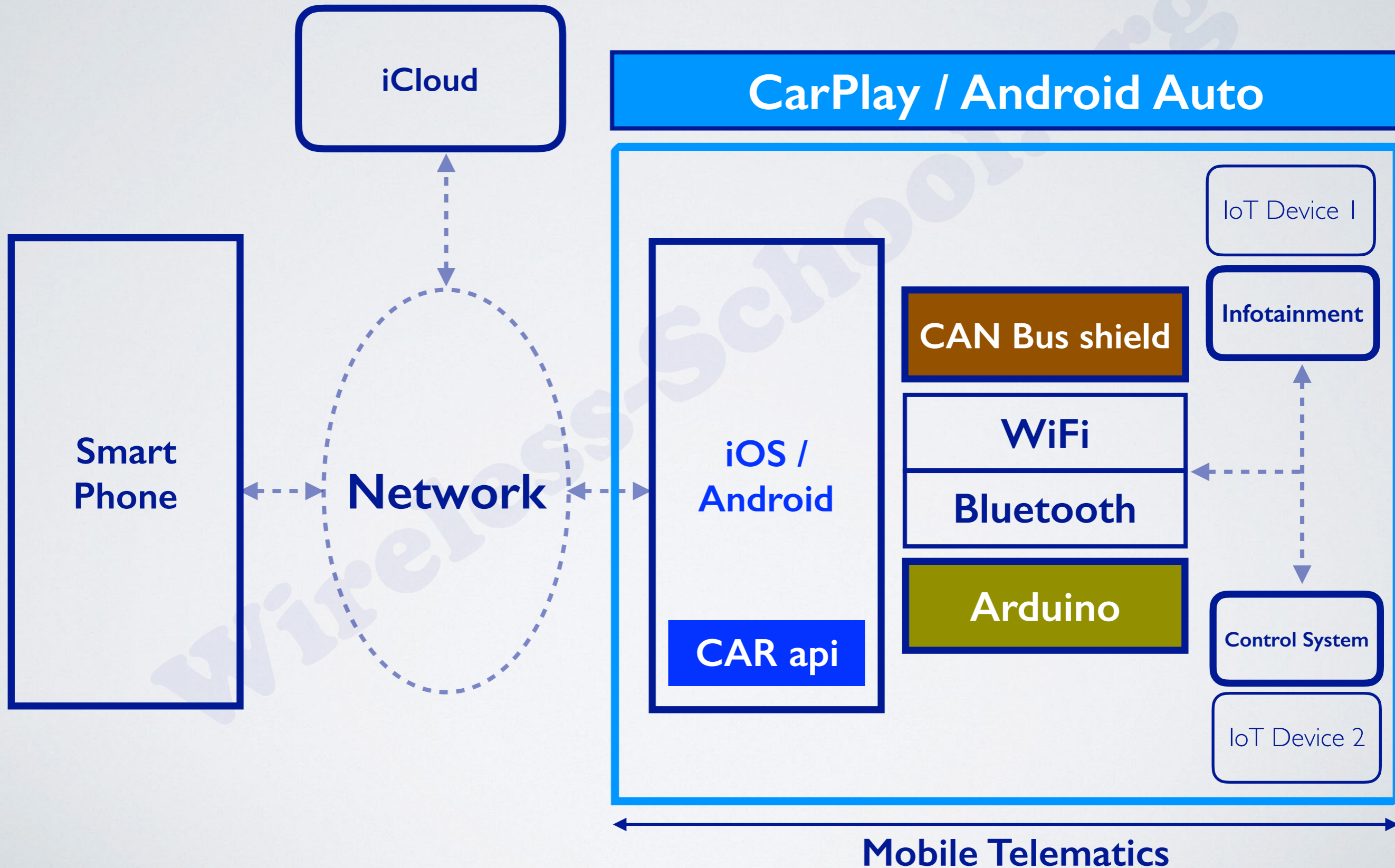


CAN Bus shield



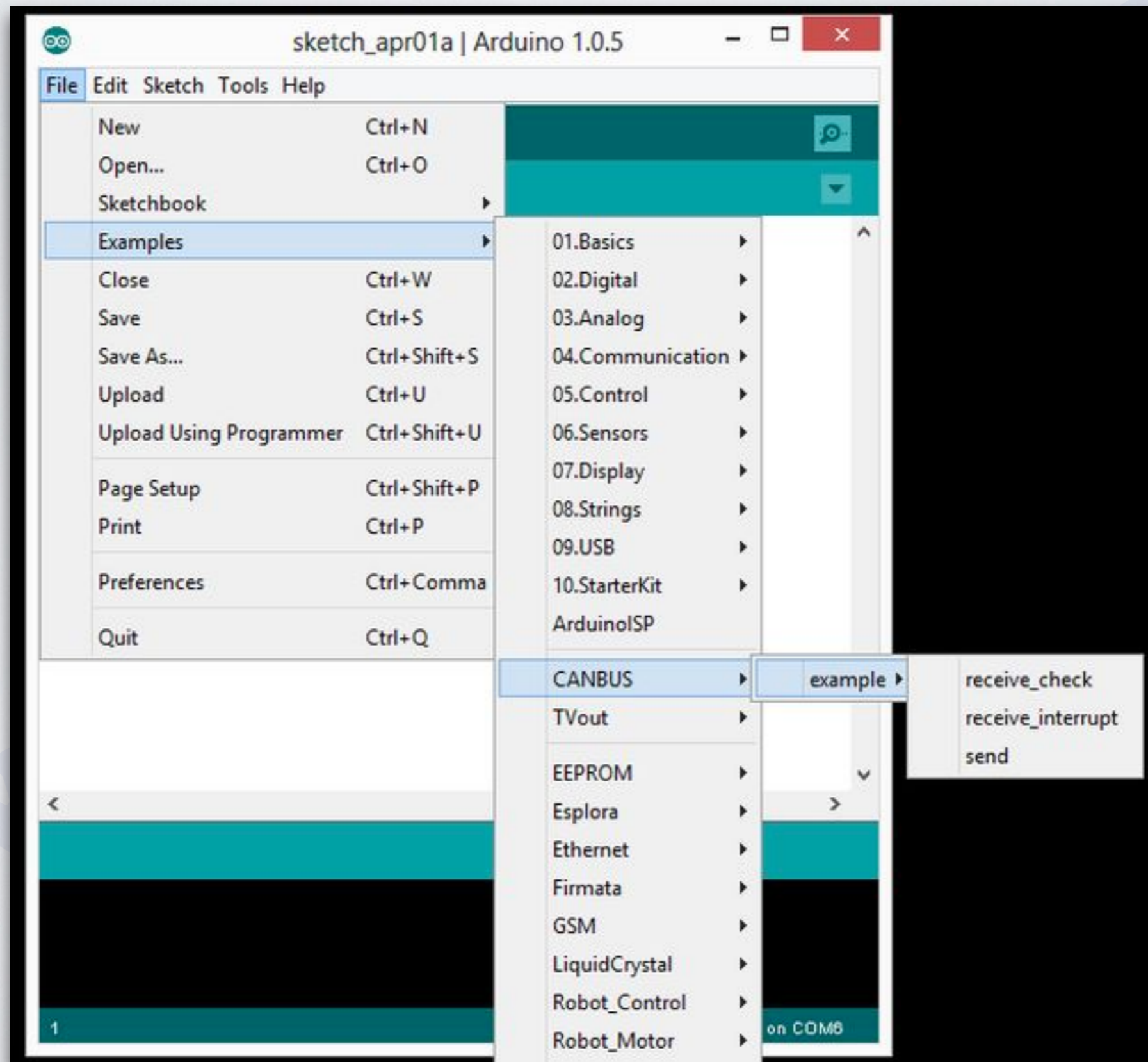
Drive train CAN network with 3 control units

Connect & Control CAR



CAN Bus - Arduino example

http://www.libelium.com/downloads/documentation/canbus_communication_guide.pdf



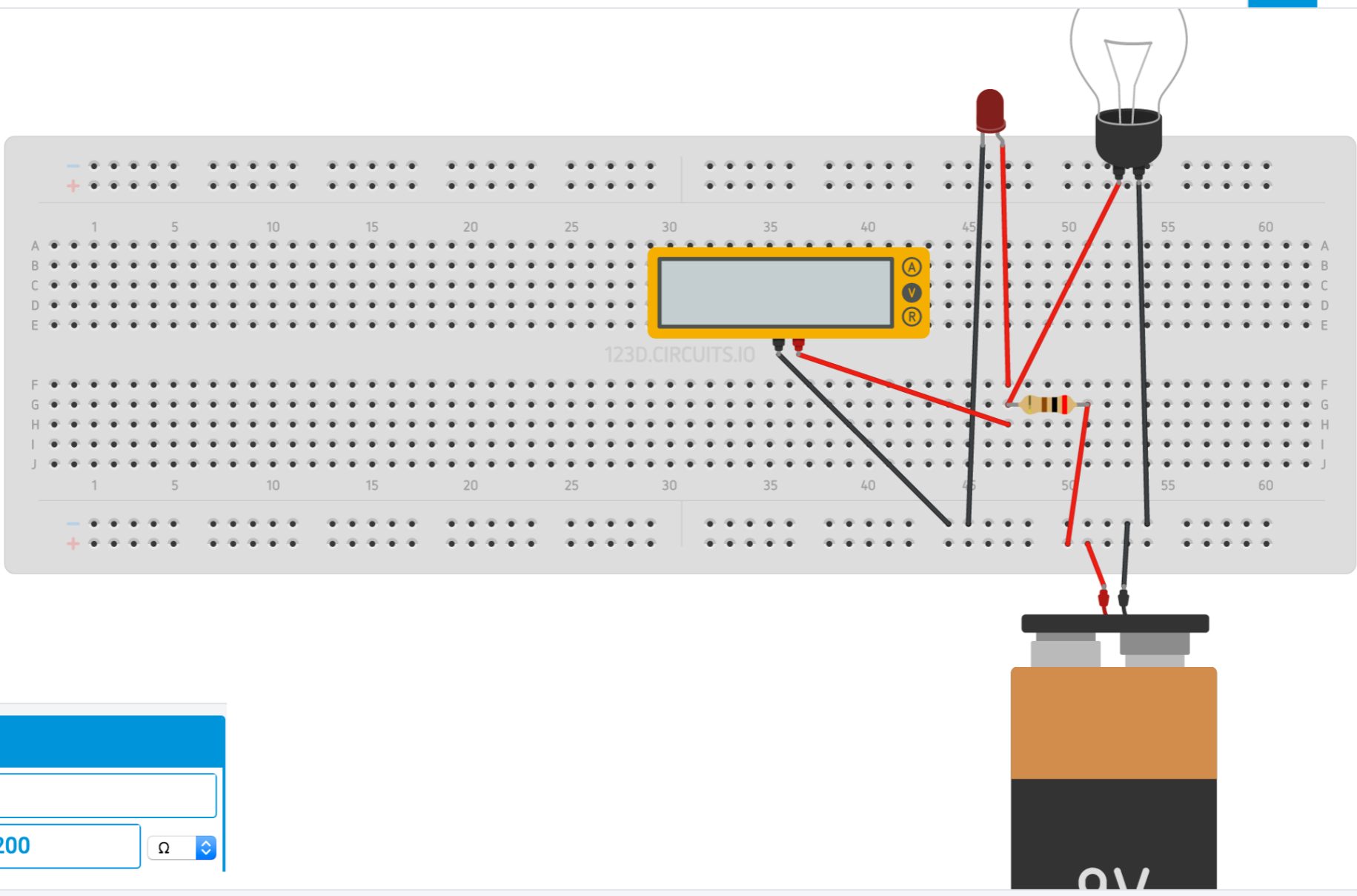
Workshop - 123d.circuits.io

- 1. Simple LED demo**
- 2. Serial Communication**
- 3. RGB Color with Serial Communication**
- 4. Push Button**

WS1: Simple Demo | Electronics Lab

Edit Show more

Start Simulation Code Editor



Resistor

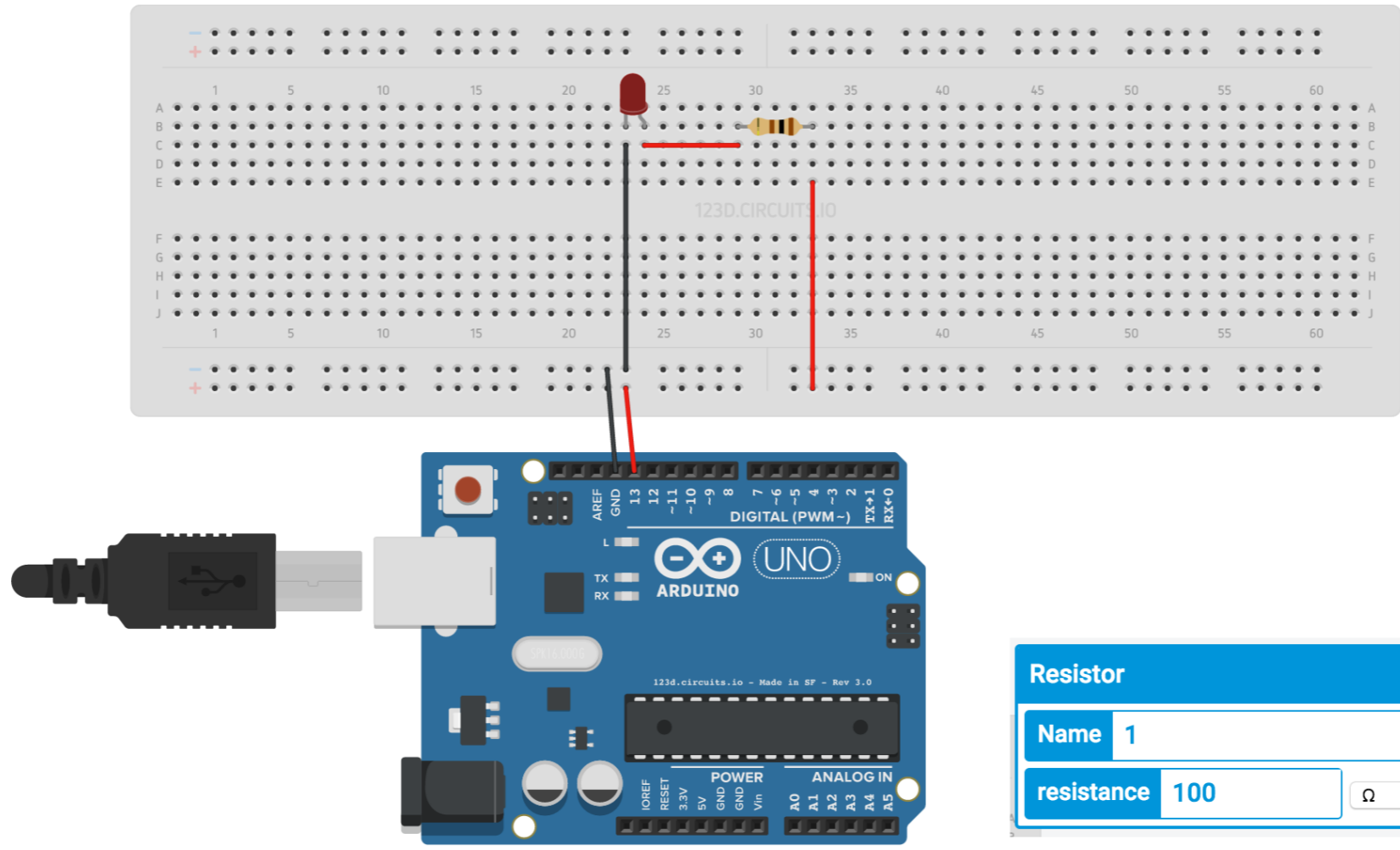
Name

resistance Ω

WS2: Serial Communication | Electronics Lab

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Resistor

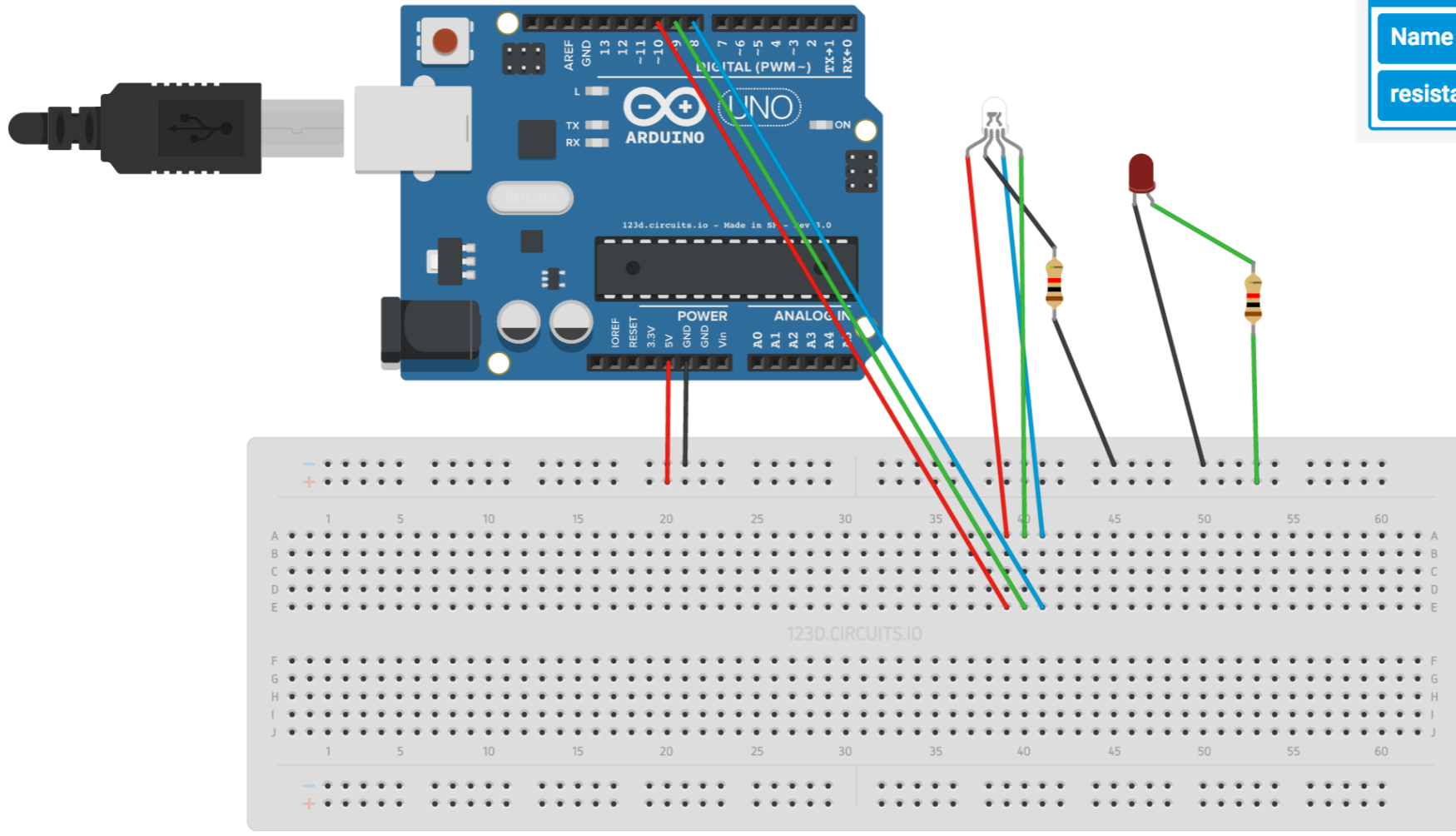
Name 1

resistance 100 Ω

WS2: RGB Color | Electronics Lab

Edit Show more

Start Simulation Code Editor



Resistor

Name

resistance kΩ

```
WS3-RGBColor §  
// -----  
// / | \ ) / \ / | \ | \ V | | | | | | \ |  
// | / | \ | | | | | | | | | | | | | | | | |  
// | / | \ | / \ | | | | | | | | | | | | | |  
//  
// WS3: RGB Color  
//  
// Made by Sudarshana Karkala  
// License: CC-BY-SA 3.0  
// Downloaded from: https://123d.circuits.io/circuits/1663254-ws2-rgb-color  
  
// Output  
int redPin = 10; // Red LED, connected to digital pin 10  
int grnPin = 9; // Green LED, connected to digital pin 9  
int bluPin = 8; // Blue LED, connected to digital pin 8  
  
String val = "GRAY";  
  
// Set up the LED outputs  
void setup()  
{  
  Serial.begin(9600); // opens serial port, sets data rate to 9600 bps  
  
  while(!Serial)  
  {  
    ;  
  }  
  
  pinMode(redPin, OUTPUT); // sets the pins as output  
  pinMode(grnPin, OUTPUT);  
  pinMode(bluPin, OUTPUT);  
}
```

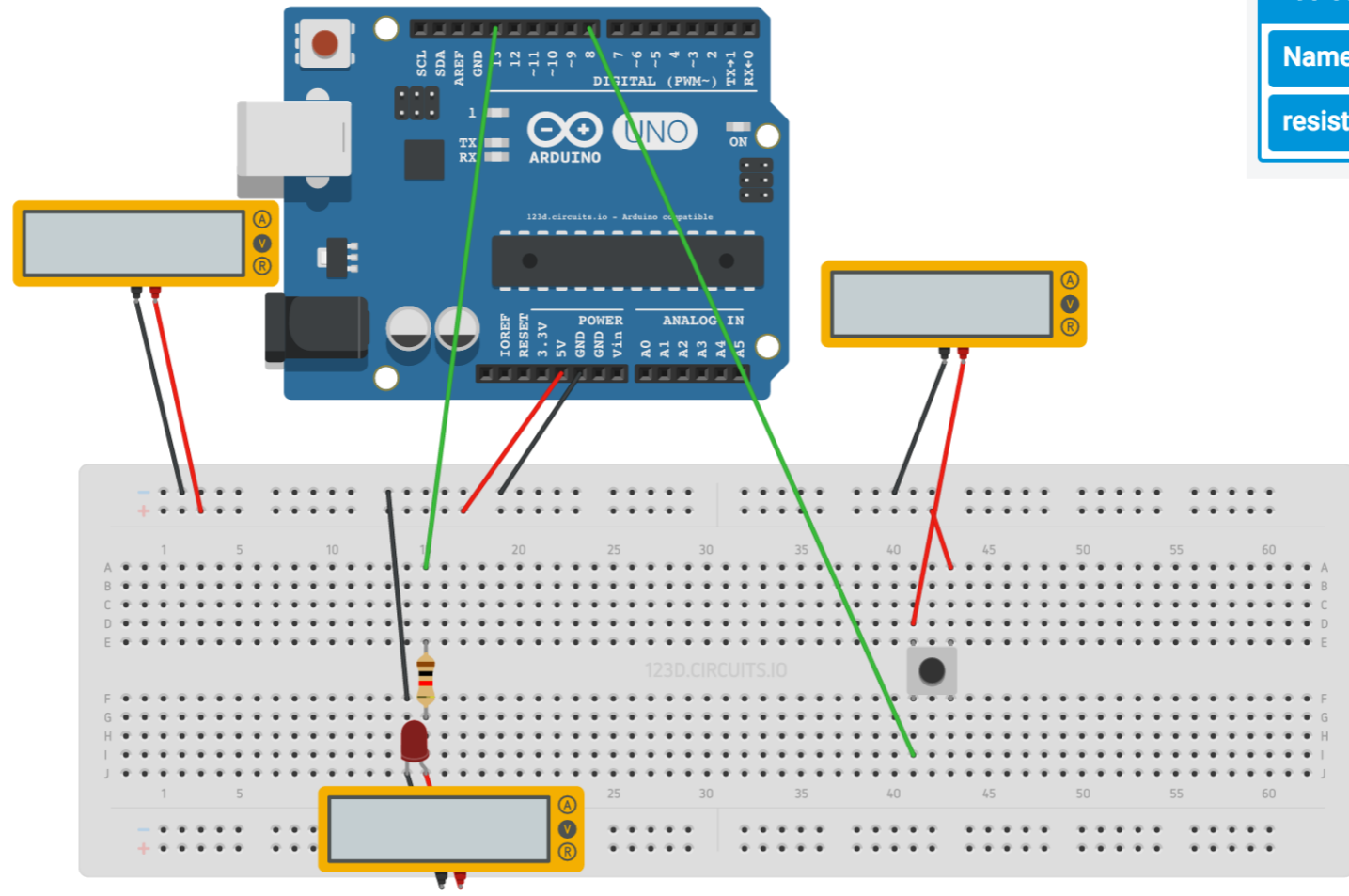
```
void setRGBColor(int red, int green, int blue)  
{  
  analogWrite(redPin, red);  
  analogWrite(grnPin, green);  
  analogWrite(bluPin, blue);  
}
```

```
WS3-RGBColor §  
  
// Main program: list the order of crossfades  
void loop()  
{  
  if (Serial.available() > 0) {  
    Serial.println("Light ON status: ");  
  }  
  val = Serial.readString();  
  
  if(val.equalsIgnoreCase("RED")) {  
    setRGBColor(255, 0, 0);  
  }  
  else if(val.equalsIgnoreCase("GREEN")) {  
    setRGBColor(0, 255, 0);  
  }  
  else if(val.equalsIgnoreCase("BLUE")) {  
    setRGBColor(0, 0, 255);  
  }  
  else if(val.equalsIgnoreCase("BLINK")) {  
    int i = 0;  
    while (i<10) {  
      setRGBColor(255, 0, 0);  
      delay(1000);  
      setRGBColor(0, 255, 0);  
      delay(1000);  
      setRGBColor(0, 0, 255);  
      delay(1000);  
      i++;  
    }  
  }  
  delay(1000);  
}
```

WS3: Push Button | Electronics Lab

Edit Show more

Start Simulation Code Editor



Resistor

Name 1

resistance 1 kΩ

```

WS4-PushButton S
// -----
// / | ) / \ / | | | \ | | | | | | | | | | |
// | / | | | | | | | | | | | | | | | | | | | |
// | \ | | | | | | | | | | | | | | | | | | | |
//
// WS4:   Push Button
//
// Made by Sudarshana Karkala
// License: CC-BY-SA 3.0
// Downloaded from: https://123d.circuits.io/circuits/1638899-ws3-push-button

// Pin 13 has an LED connected on most Arduino boards.

int readAt = 8;
int writeAt = 13;

int val = LOW;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(writeAt, OUTPUT);
  pinMode(readAt, INPUT);
  digitalWrite(writeAt, val);
}

// the loop routine runs over and over again forever:
void loop() {
  val = digitalRead(readAt);
  digitalWrite(writeAt, val);  // turn the LED on (HIGH is the voltage level)
}

|

```

Contact us

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coming soon

“Thank You”

**“Education is the most powerful weapon
which you can use to change the world.”**

-Nelson Mandela