Connecting Arduino & Phones with Bluetooth & Cordova

Philly ETE - April 23, 2014

Presented by **Don Coleman** / **@doncoleman**

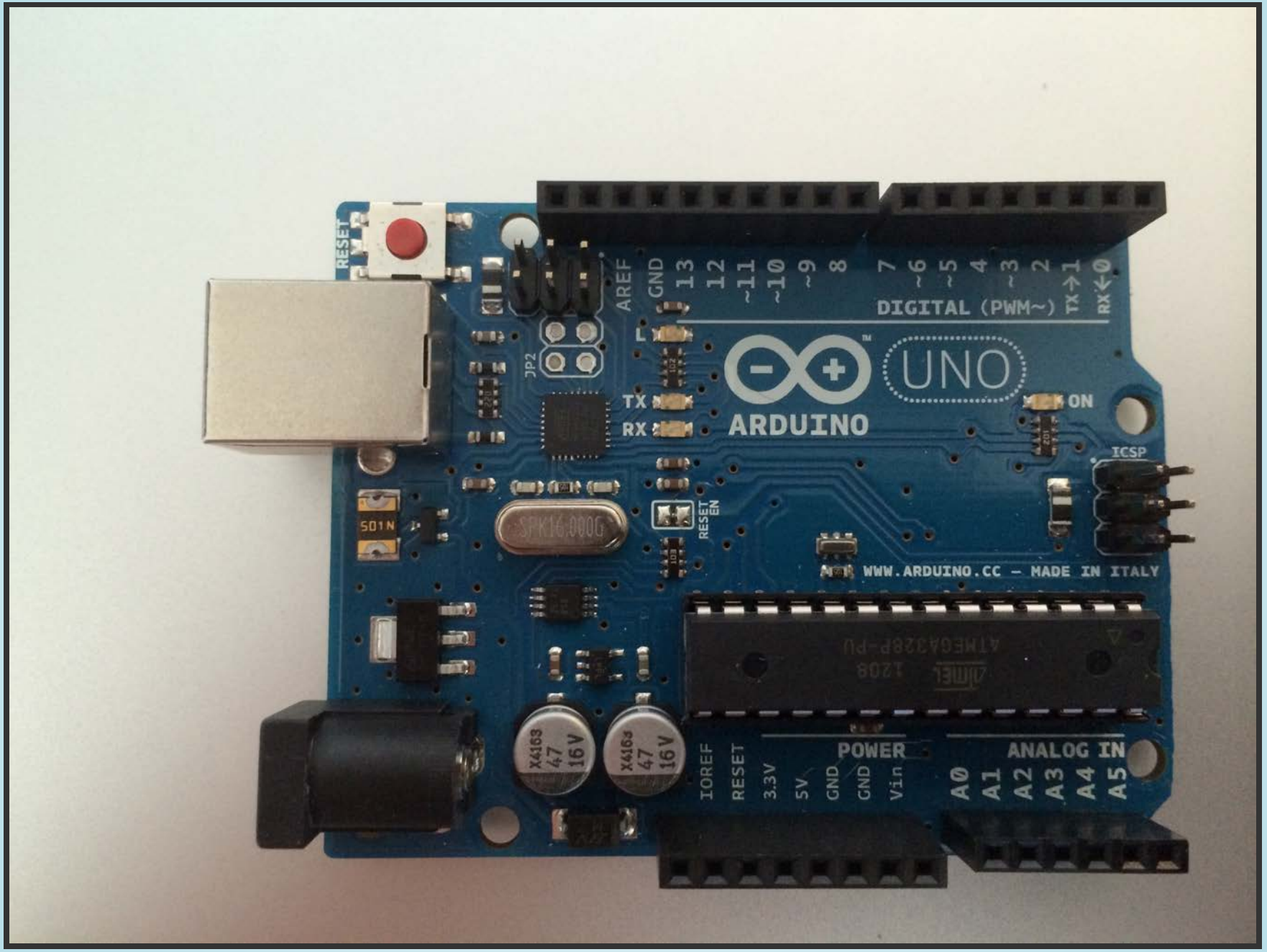
Apache Cordova

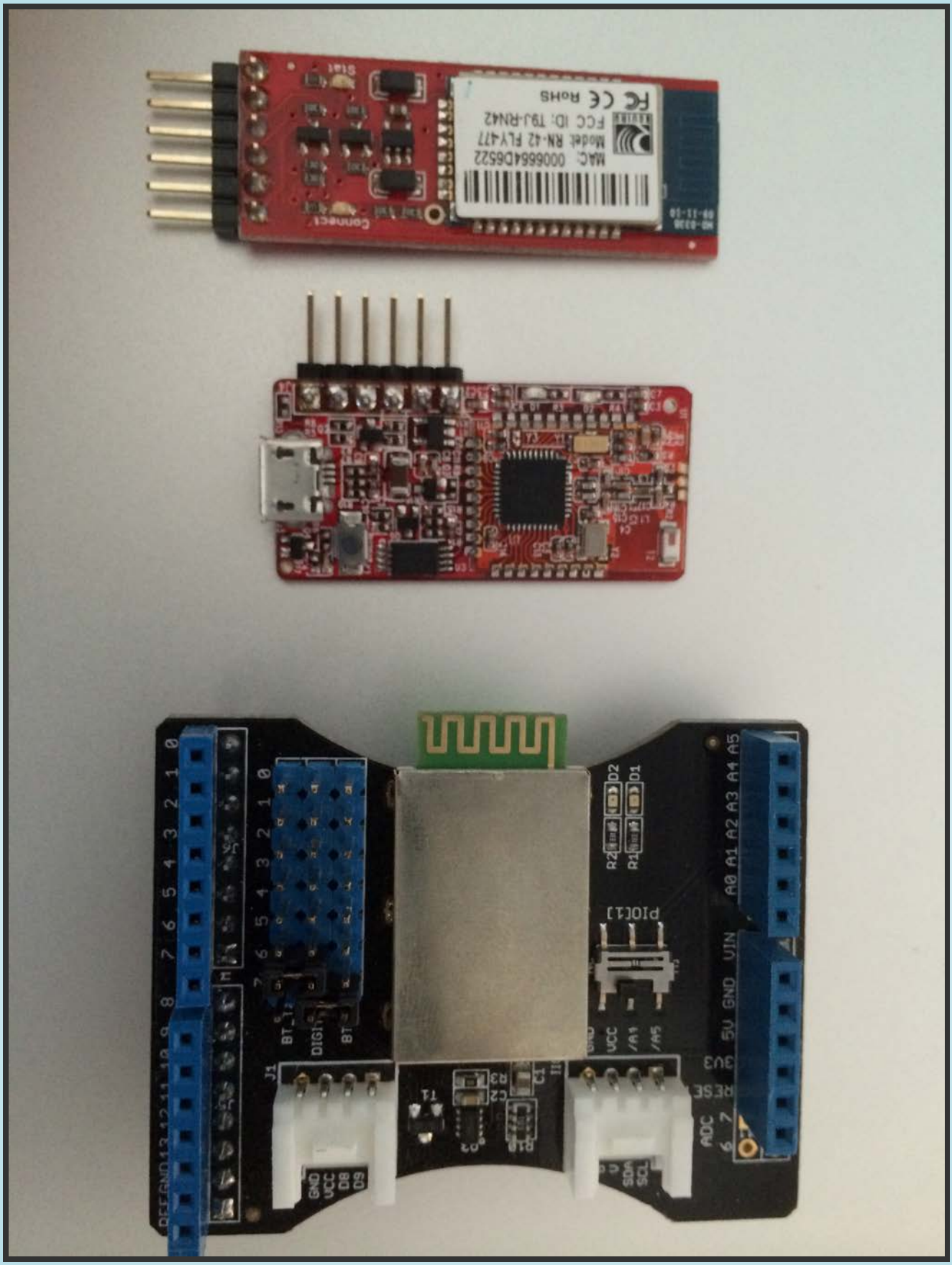
PhoneGap

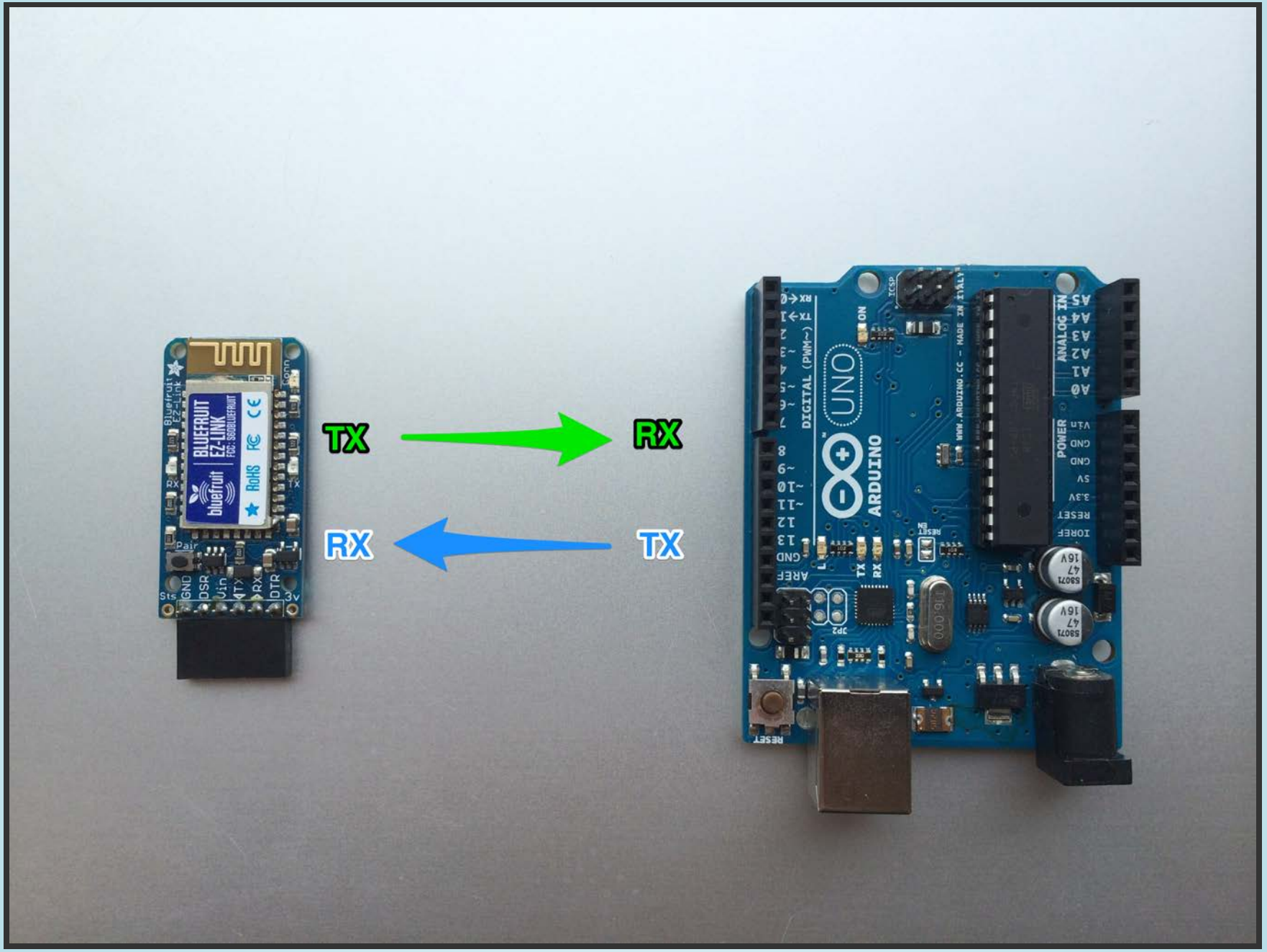
```
npm install -g cordova
```

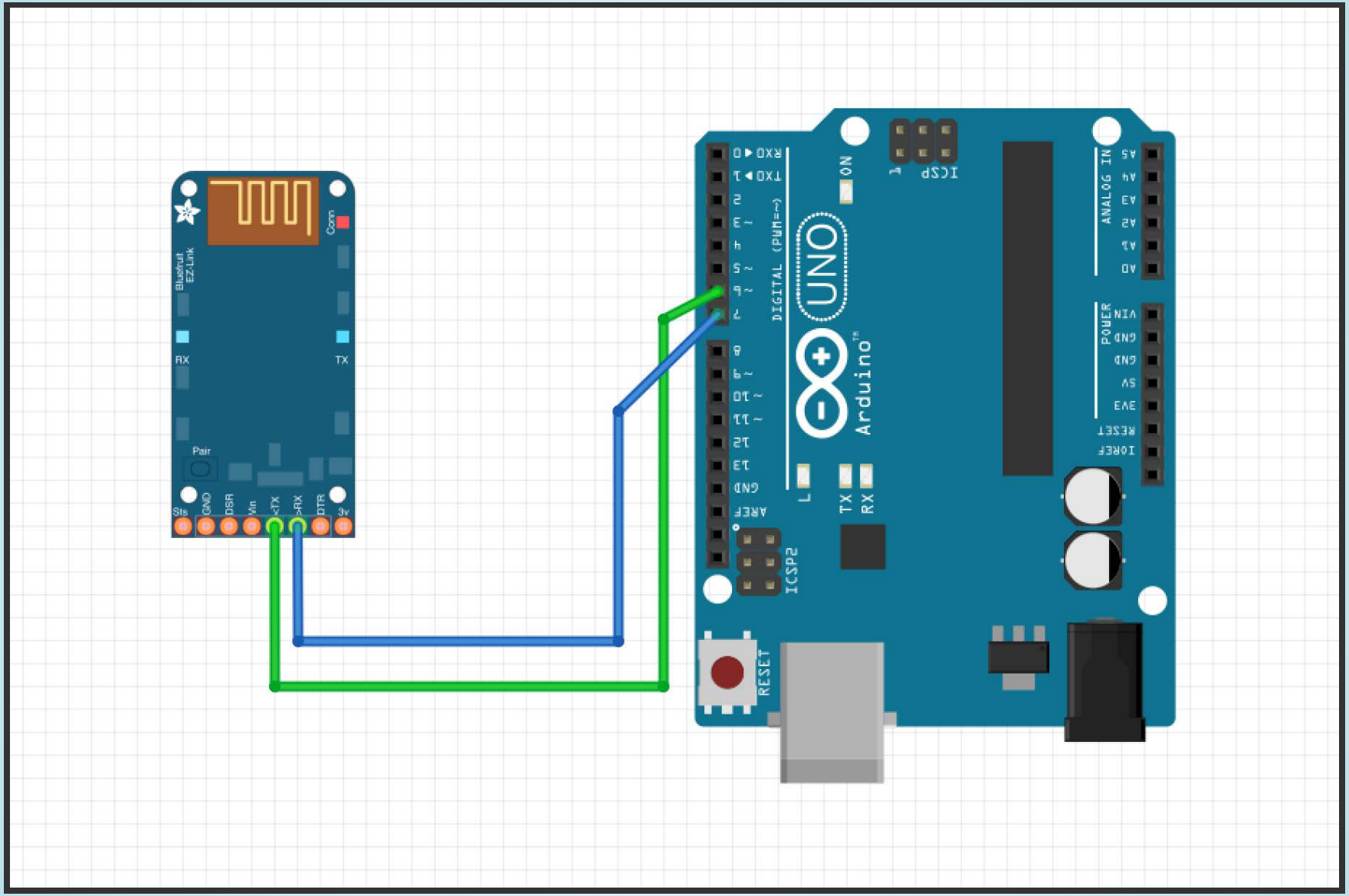
http://docs.cordova.io

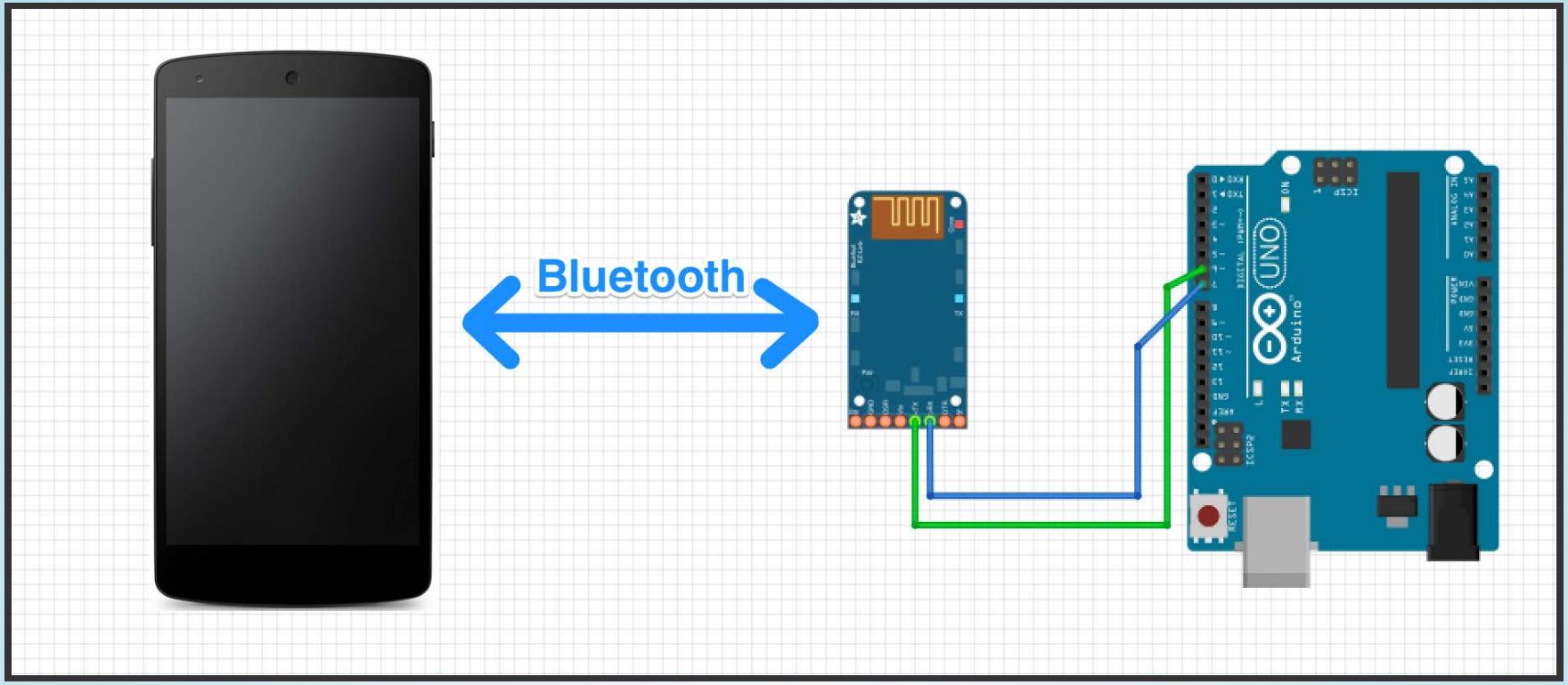
Arduino


RESET
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
L
TX
RX
ARDUINO
UNO
ON
ICSP
JP2
RESET
EN
WWW.ARDUINO.CC – MADE IN ITALY
POWER
ANALOG IN
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5


MAC: 000666 4D652 2
Model: RN-42 FLY477
FCC ID: T9J-RN42
RoHS
Connect
D2
D1
R2
R1
PIOC[1]
A0 A1 A2 A3 A4 A5
VIN
GND
5V
3V3
RESET
ADC
J1
GND
VCC
D8
D9
SDA
SCL


TX
RX
RX
TX
BLUEFRUIT
EZ-LINK
UNO
ARDUINO


Bluefruit EZ-Link
Conn
RX
TX
Pair
Sts
GND
DSR
Vin
<TX
>RX
DTR
3v
UNO
Arduino
DIGITAL (PWM=~)
ANALOG IN
POWER
ICSP
ICSP2
RESET
ON
L
TX
RX


Bluetooth
UNO
Arduino

```
#include <SoftwareSerial.h>

#define RxD 6
#define TxD 7

SoftwareSerial bluetooth(RxD,TxD);
int counter = 0;
```

```
void setup() {
  Serial.begin(9600);
  bluetooth.begin(9600);
  Serial.println("Bluetooth Counter\n");
}
```

```
void loop() {
  Serial.println(counter);
  bluetooth.println(counter);
  counter++;
  delay(1000);
}
```

Bluetooth Serial

Cordova Plugin

https://github.com/don/BluetoothSerial

Installing

```
$ cordova plugin install \
      com.megster.cordova.bluetoothserial
```

Connecting

```
var macAddress = "00:00:AA:BB:CC:DD";

bluetoothSerial.connect(
      macAddress,
      connected,
      disconnected);
```

Sending Data

```
bluetoothSerial.write("Hello Arduino");
```

Receiving Data

```
var onMessage = function(data) {
    console.log(data);
};

bluetoothSerial.subscribe("\n",
            onMessage,
            onFailure);
```

Demo

Phone receives data from Arduino

Listing Devices

```
bluetoothSerial.list(success, failure);
```

List shows paired devices


```
[{
    "class": 276,
    "id": "10:BF:48:CB:00:00",
    "address": "10:BF:48:CB:00:00",
    "name": "Nexus 7"
}, {
    "class": 7936,
    "id": "00:06:66:4D:00:00",
    "address": "00:06:66:4D:00:00",
```

What about iOS?

Bluetooth Low Energy

aka Bluetooth Smart

BLE doesn't have SPP

but available hardware has "serial like" services

UART Service

- RX - write without response
- TX - read, notify

Discovering devices

```
bluetoothSerial.list(success, failure);
```

No pairing, finds devices

List discovered devices


```
[{
  "id": "CC410A23-2865-F03E-FC6A-4C17E858E11E"
  "uuid": "CC410A23-2865-F03E-FC6A-4C17E858E11
  "name": "Biscuit",
  "rssi": -68
},{
  "id": "ED7127D4-593B-490E-9DA7-959FE78EC603"
  "uuid": "ED7127D4-593B-490E-9DA7-959FE78EC60
  "name": "UART",
```

Once you're connected there's no difference

(except BLE only handles small chunks of data)

BLE hardware

- **RedBearLab BLEmini**
- **RedBearLab BLE Shield**
- **Adafruit Bluefruit LE**

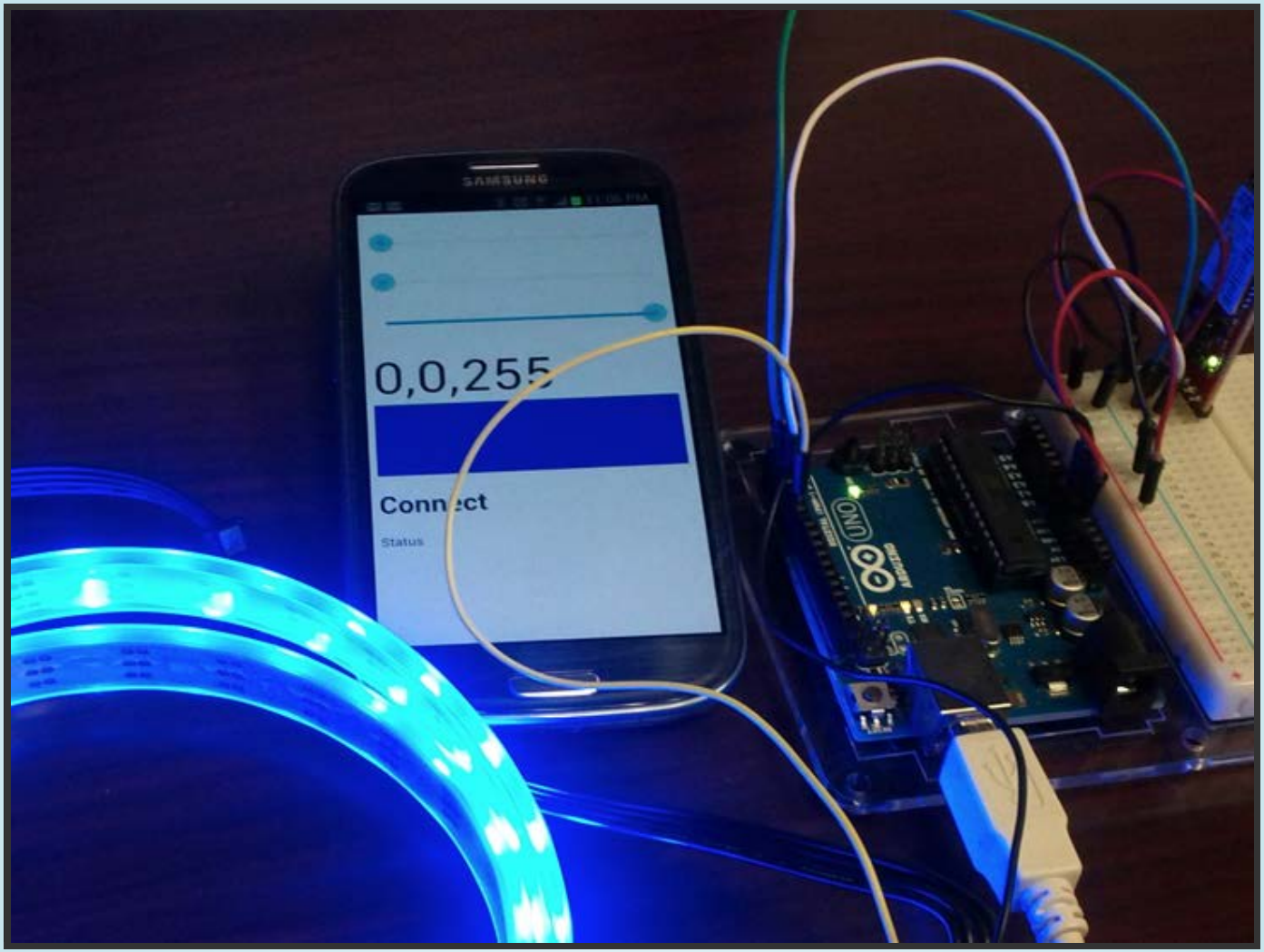
c red, green, blue

c0,0,255\n

Demo

Phone controls LED strip on Arduino

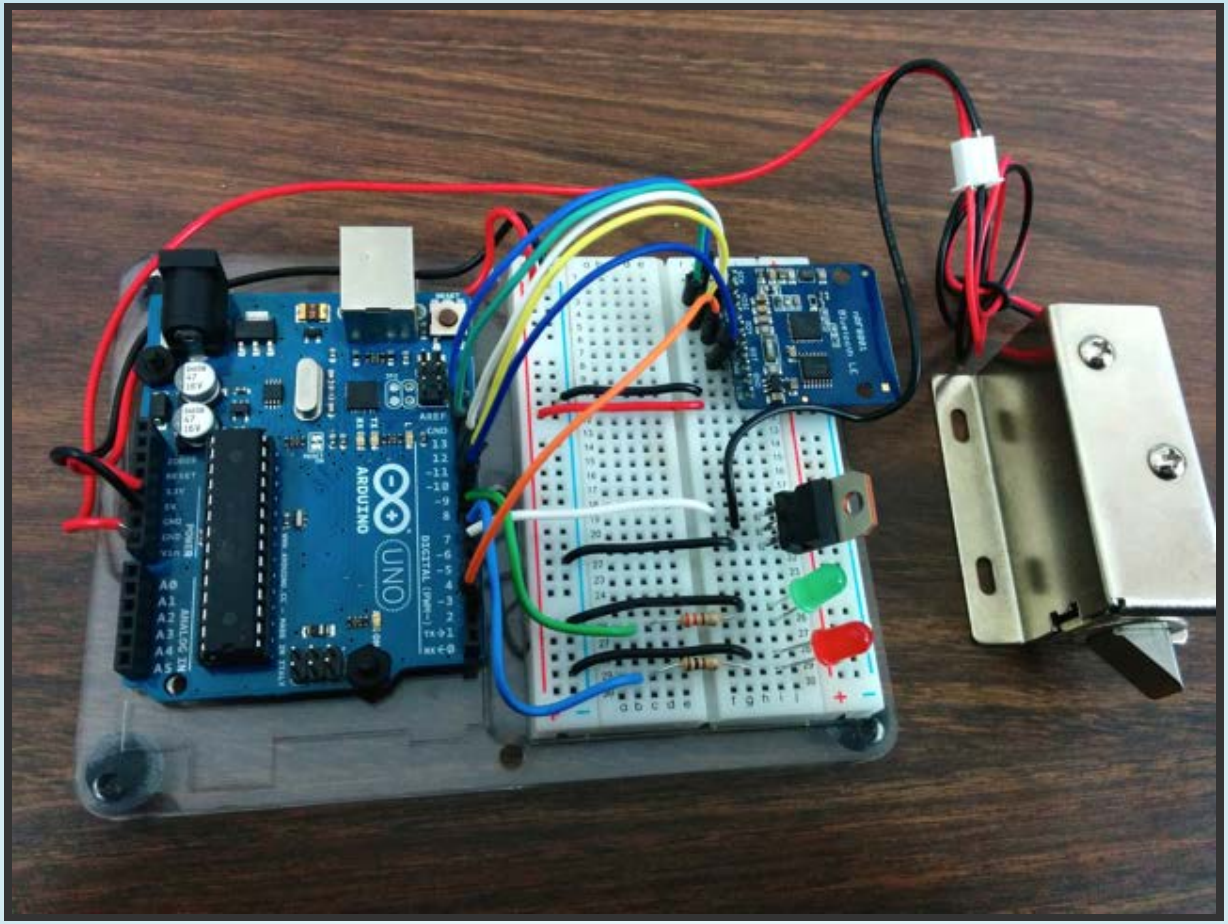
Control NeoPixel LED on Arduino from Android



```
onColorChange: function (evt) {
  var c = app.getColor();
  rgbText.innerText = c; // 0,0,255
  previewColor.style.backgroundColor =
      "rgb(" + c + ")";
  app.sendToArduino(c);
},
```

```
sendToArduino: function(c) {
  bluetoothSerial.write("c" + c + "\n");
},
```

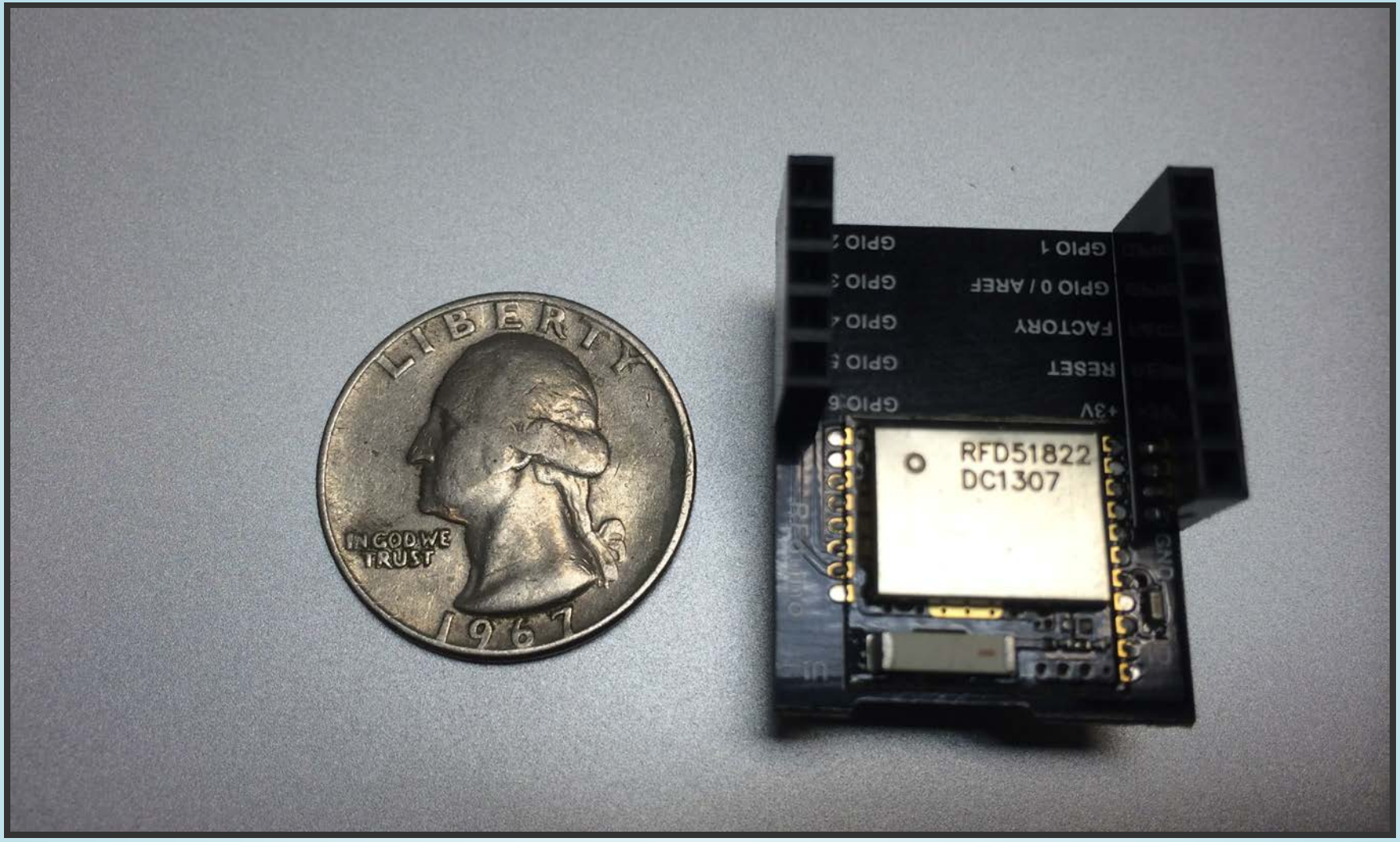
```
void loop() {

  if (bluetooth.find("c")) {
    red = bluetooth.parseInt();
    green = bluetooth.parseInt();
    blue = bluetooth.parseInt();
    showColor(red, green, blue);
  }
}
```



Bluetooth Low Energy Lock

BluetoothSerial Plugin

- Bluetooth Classic for Android
- Bluetooth LE for iOS
- List or discover devices
- Connect to a peripheral
- Write to send data
- Subscribe to read data



http://rfduino.com

RFduino Cordova Plugin

https://github.com/don/corodva-plugin-rfduino

```
rfduino.discover(seconds, success, failure);
```

```
{
  "name": "RFduino",
  "uuid": "BD922605-1B07-4D55-8D09-B66653E51BF
  "advertising": "echo",
  "rssi": -79
}
```

```
rfduino.connect(uuid, success, failure);
```

```
rfduino.write("hello", success, failure);
```

```
rfduino.onData(success, failure);
```

```
var onData = function(arrayBuffer) {
  var a = new Float32Array(arrayBuffer);
  celsius = a[0];
  fahrenheit = celsius * 1.8 + 32;
}
```

RFduino Plugin

- Bluetooth LE for iOS and Android
- Discover devices
- Connect to a peripheral
- Write to send data
- Subscribe to read data

Future