Juniper: A Functional Reactive Programming Language for the Arduino

Hands-on Sound Visualization Project
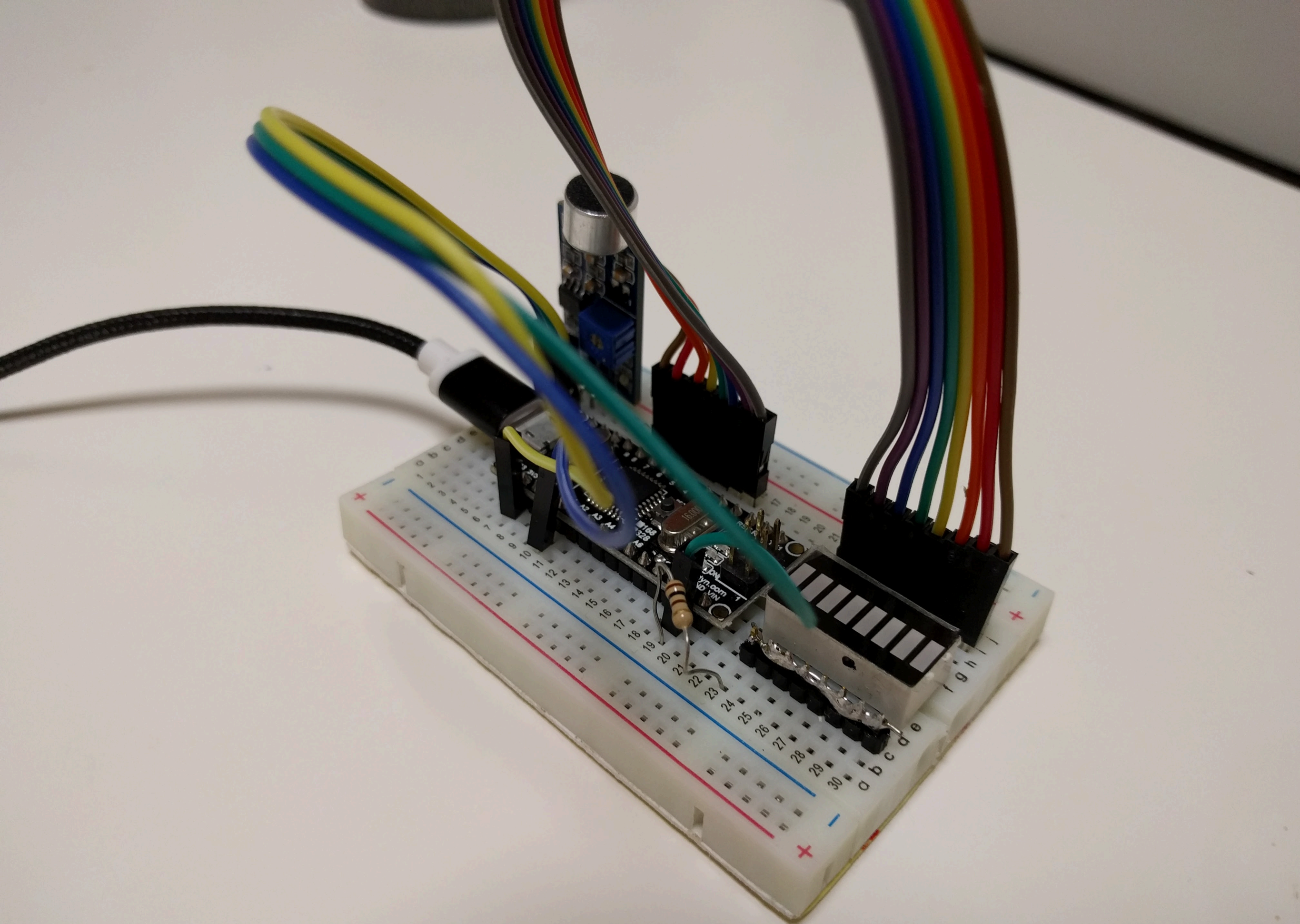## Please go to
http://www.juniper-lang.org/

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Workshop on Functional Art, Music, Modelling and Design (FARM)
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Parts List

Nano microcontroller
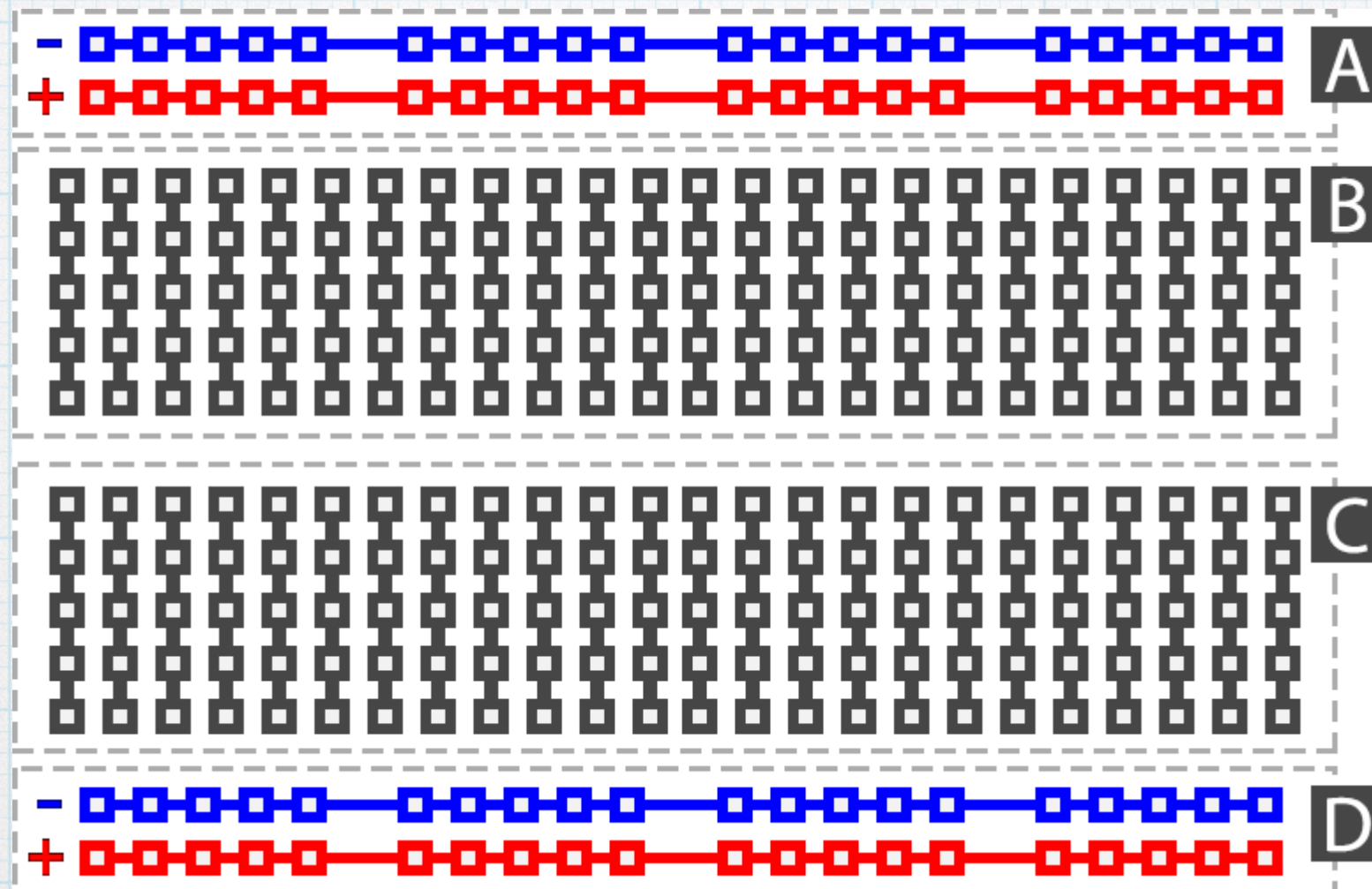Sound sensor
100 ohm resistor
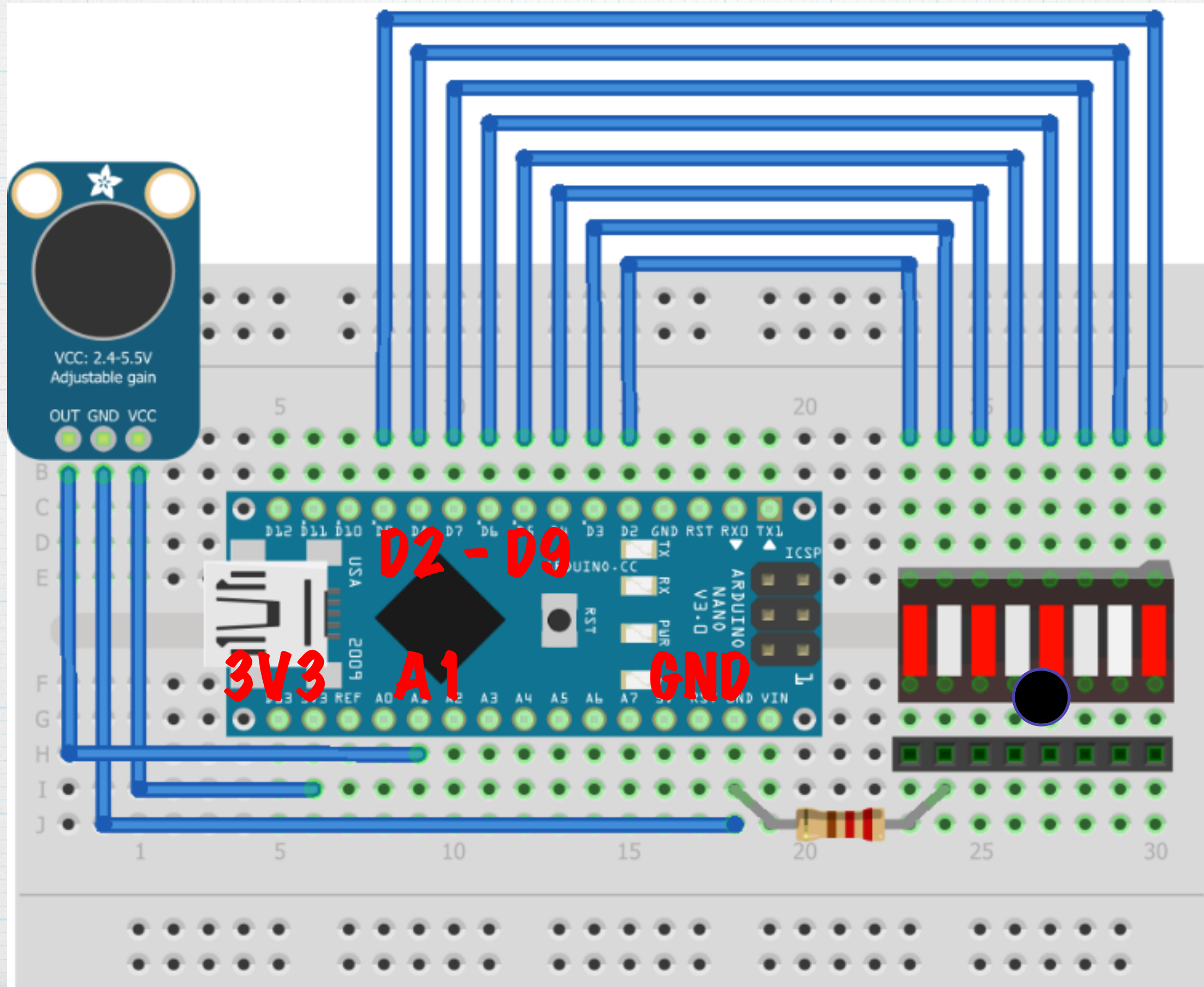8 LED Bargraph
Bridged 8 pin header
8 pin jumper wire
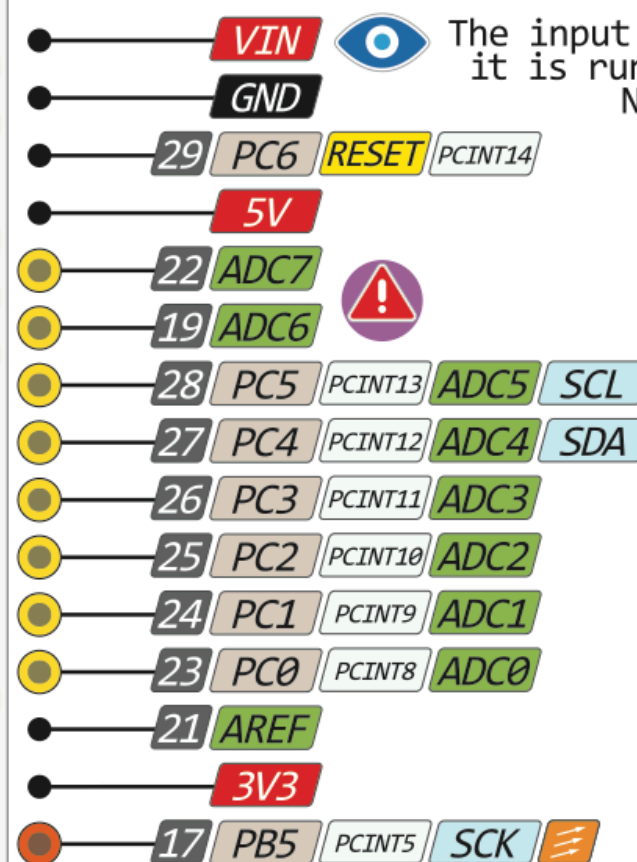3 pin jumper wire
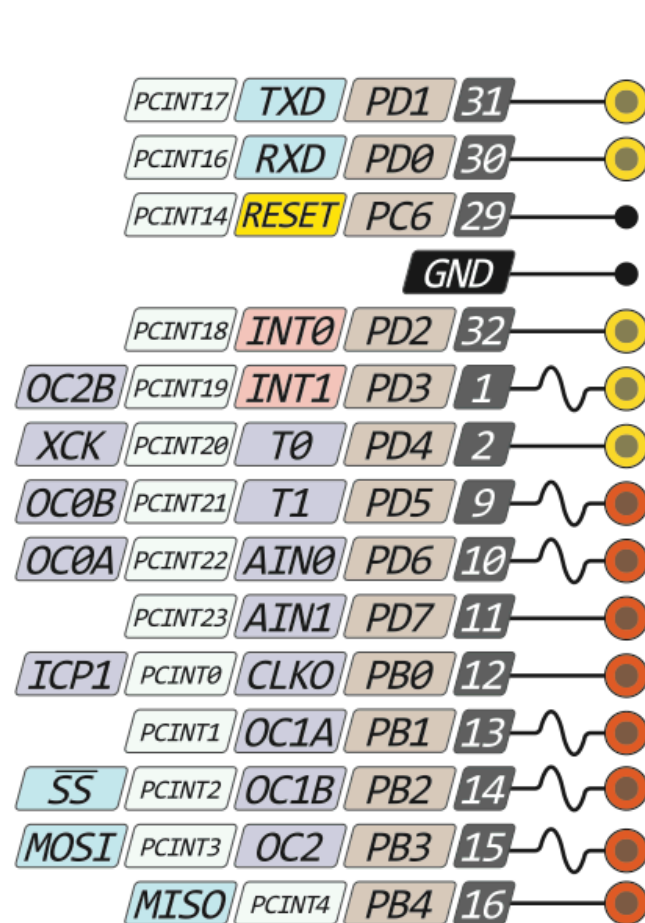Micro-usb cable

Internal Breadboard Layout
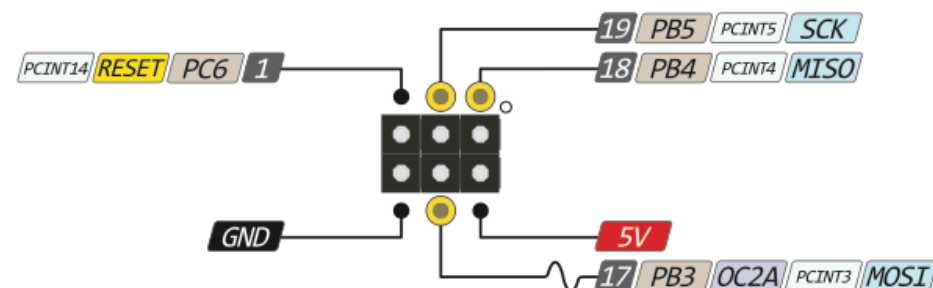
Putting the "work" back in workshop

NANO PINOUT

PCINT14 | RESET | PC6 | 1

19 | PB5 | PCINT5 | SCK
18 | PB4 | PCINT4 | MISO

GND
5V
17 | PB3 | OC2A | PCINT3 | MOSI

ICSP | 1

1			
0			

PCINT17 | TXD | PD1 | 31
PCINT16 | RXD | PD0 | 30
PCINT14 | RESET | PC6 | 29
GND

VIN
GND
29 | PC6 | RESET | PCINT14
5V

The input voltage to the board when it is running from external power. Not USB bus power.

2	PCINT18	INT0	PD2	32
3	OC2B	PCINT19	INT1	PD3	1
4	XCK	PCINT20	T0	PD4	2
5	OC0B	PCINT21	T1	PD5	9
6	OC0A	PCINT22	AIN0	PD6	10
7	PCINT23	AIN1	PD7	11
8	ICP1	PCINT0	CLKO	PB0	12
9	PCINT1	OC1A	PB1	13
10	SS	PCINT2	OC1B	PB2	14
11	MOSI	PCINT3	OC2	PB3	15
12	MISO	PCINT4	PB4	16

22 | ADC7
19 | ADC6
28 | PC5 | PCINT13 | ADC5 | SCL
27 | PC4 | PCINT12 | ADC4 | SDA
26 | PC3 | PCINT11 | ADC3
25 | PC2 | PCINT10 | ADC2
24 | PC1 | PCINT9 | ADC1
23 | PC0 | PCINT8 | ADC0
21 | AREF
3V3
17 | PB5 | PCINT5 | SCK

A7
A6
19 A5
18 A4
17 A3
16 A2
15 A1
14 A0

13

TX RX PWR L
D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V GND RST
GND RST RX0 TX1

RST
RESET BUTTON

ATMEGA328P-AU 1022

USB JACK
Mini Type B

Legend

Power
GND
Serial Pin
Analog Pin
Control
INT
Physical Pin
Port Pin
Pin function
Interrupt Pin
PWM Pin
Port Power

The power sum for each pin's group should not exceed 100mA

Absolute MAX per pin 40mA recommended 20mA

Absolute MAX 200mA for entire package
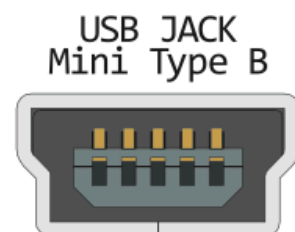
Analog exclusively Pins

```
module SoundBar
open(Prelude)

let microphonePin = 15
let barPins = [9, 8, 7, 6, 5, 4, 3, 2]
let numBarPins = 8

fun setup() = (
    Io:setPinMode(microphonePin, Io:input());
    for i in 0 to numBarPins - 1 do
        Io:setPinMode(barPins[i], Io:output())
    end
)

...
```

```
...

fun drawBar(level : uint16) = (
    for i in 0 to level do
        Io:digWrite(barPins[i], Io:high())
    end;
    for i in level + 1 to numBarPins - 1 do
        Io:digWrite(barPins[i], Io:low())
    end
)

...
```

```
...
let state = ref List:replicate<uint16; 5>(0, 0)
fun main() = (
    setup();
    while true do (
        let micSig = Io:digIn(microphonePin);
        let barSig = Signal:map(
            fn (digVal) ->
                case digVal of
                | Io:low() => 7u16
                | Io:high() => 0u16
                end
            end,
            micSig);
        let pastBarSig = Signal:record(barSig, state);
        let meanBarSig = Signal:map(List:average, pastBarSig);
        Signal:sink(drawBar, meanBarSig)
    ) end
)
```

Thank you!

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