

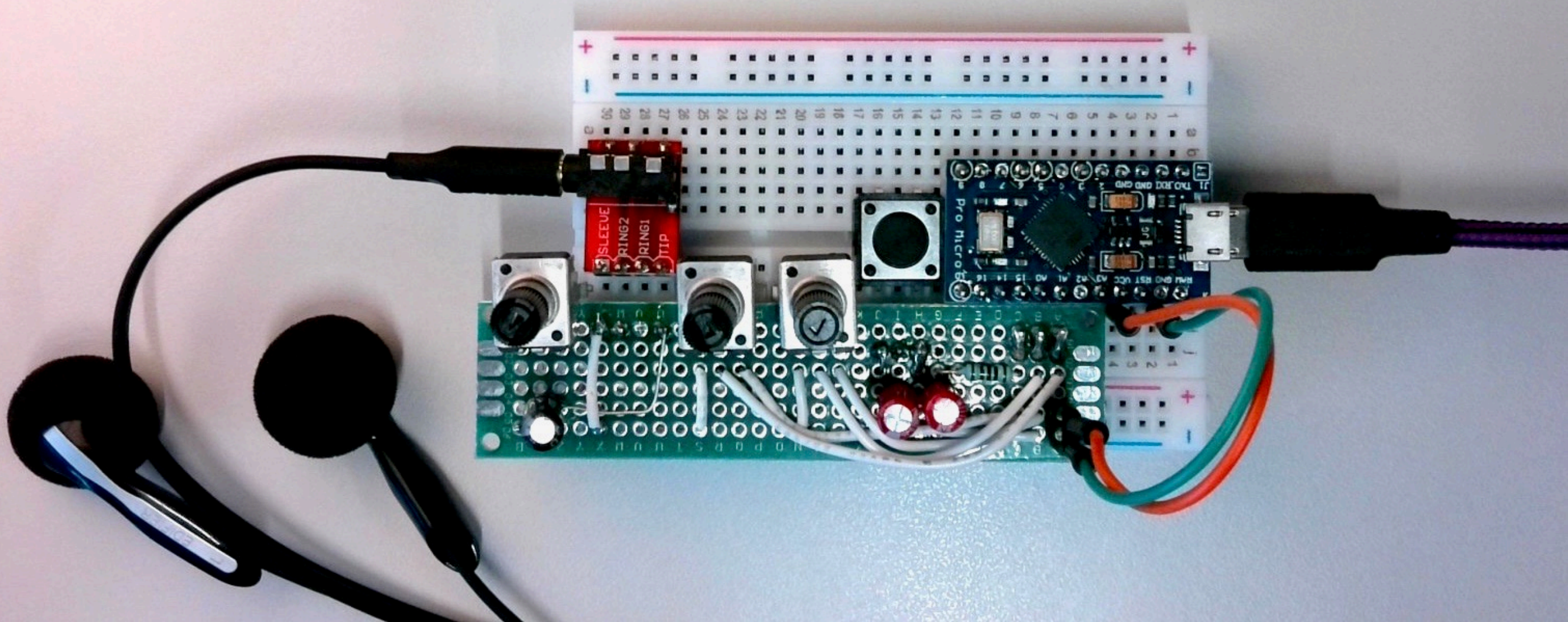
# COMPLEXITY

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*UWTMC*

*Matt Borland - 2019*





## WE'RE EXPLORING SYNTHESIZING COMPLEX SOUNDS

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*We'll use an arduino to make a digital version of a classic analog sound synthesis circuit, the Atari Punk Console.*

[https://en.wikipedia.org/wiki/Atari\\_Punk\\_Console](https://en.wikipedia.org/wiki/Atari_Punk_Console)

# DOWNLOADS

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*You need one piece of software. It's free and multi-platform!*

Download the Arduino IDE



## ARDUINO 1.8.10

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

This software can be used with any Arduino board. Refer to the [Getting Started](#) page for Installation instructions.

**Windows** Installer, for Windows XP and up  
**Windows** ZIP file for non admin install

**Windows app** Requires Win 8.1 or 10



**Mac OS X** 10.8 Mountain Lion or newer

**Linux** 32 bits

**Linux** 64 bits

**Linux** ARM 32 bits

**Linux** ARM 64 bits

[Release Notes](#)

[Source Code](#)

[Checksums \(sha512\)](#)

*Arduino IDE - a software platform used to program your microcontroller.*

<https://www.arduino.cc/en/Main/Software>



# FILES

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Workshops this term are at CML! All sessions run 3:30-5:30pm at Critical Media Lab, located in Communitech, 151 Charles St. W., Kitchener.

Sept. 18th: Deformation - MIDI Balloons: [DeformationFiles.zip](#)

Oct. 2nd: Gravity - Shruti Box: [GravityFiles.zip](#)

Oct. 23rd: Continuity - Seaboard and Bop Pad: [ContinuityFiles.zip](#)

Nov. 6th: Complexity - Modular Synthesis: [ComplexityFiles.zip](#)

Nov. 20th: Exploration - Co-play Patch Tables

Each session will start with an explanation of a musical interface and a discussion of its expressivity, followed by a hands-on build with the sensing technology being explored, then the opportunity to develop improvisational skills through jamming with other participants on the instruments you've just built. Make sure to bring your laptop to be able to program and power your instrument!

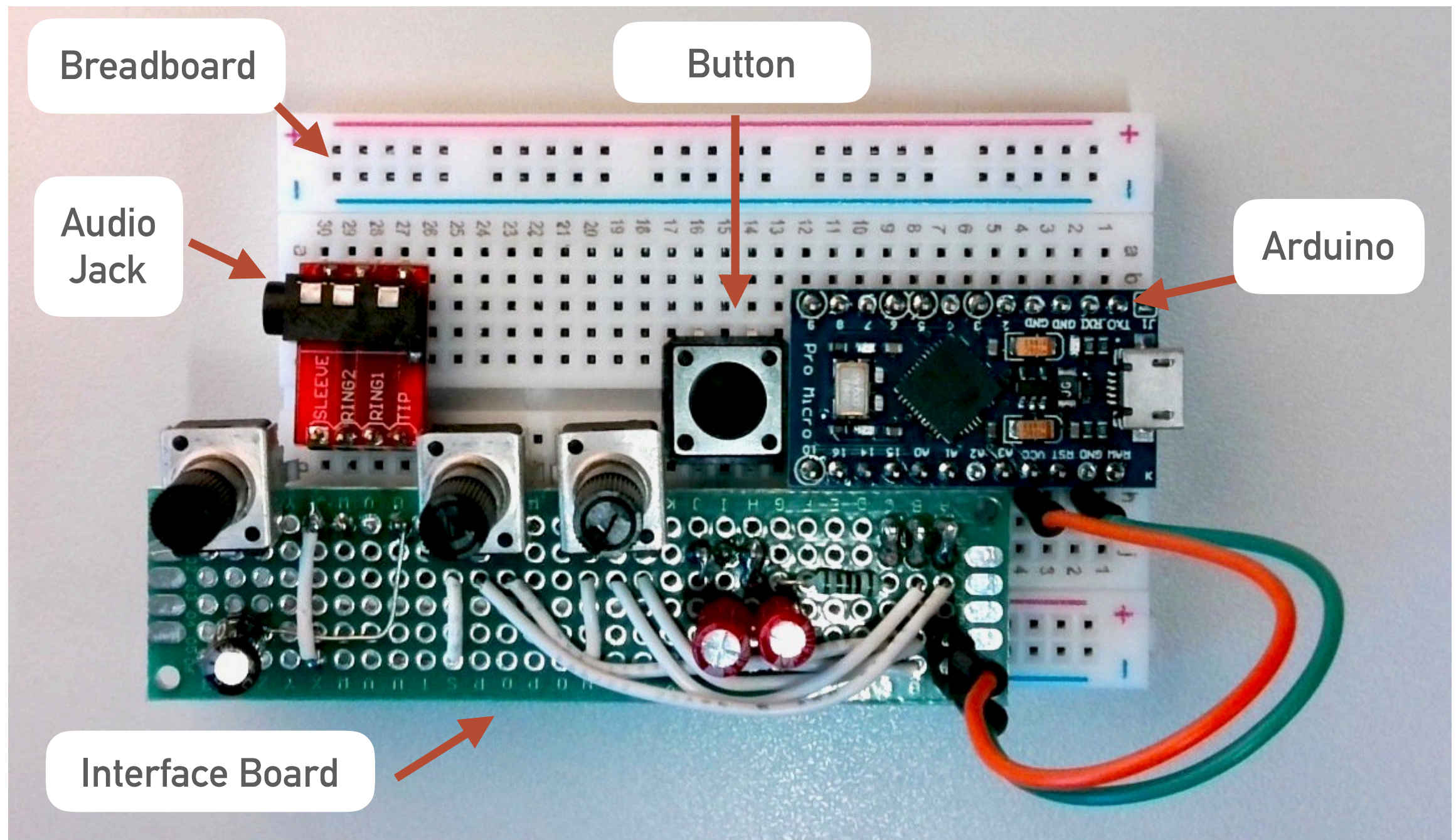


Files are available as a ZIP at <https://uwtmc.com>



# HOOKING UP YOUR SENSORS! FOLLOW MB ON THE PROJECTOR

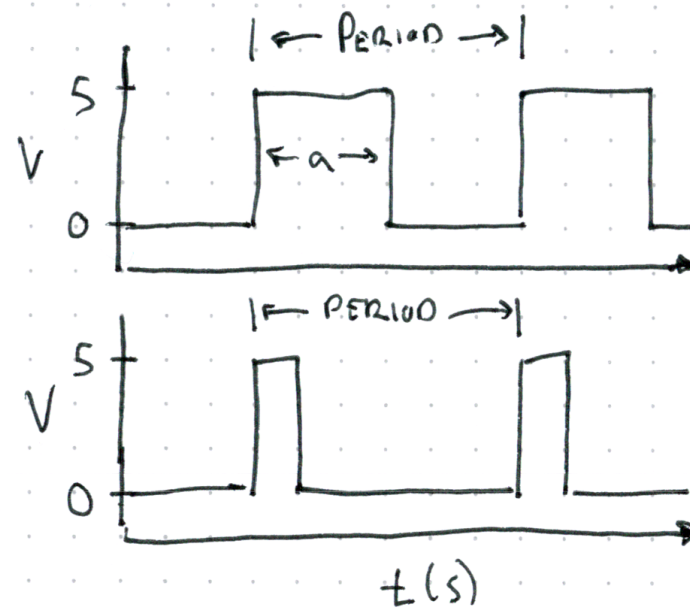
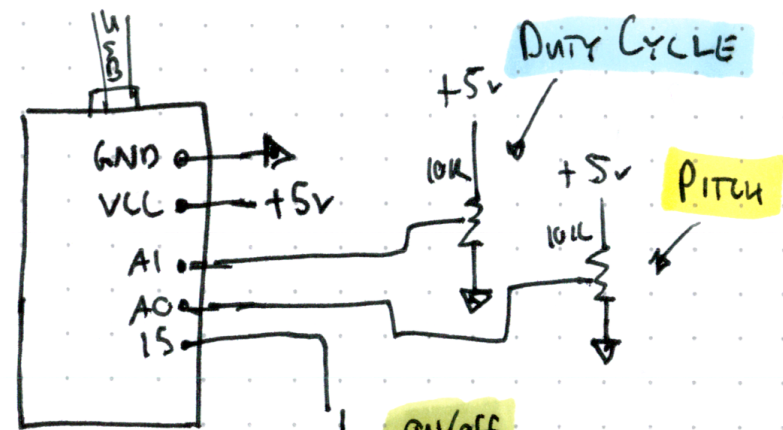
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## SIMPLE PUNK CONSOLE

# AN AROMATIC GLITCH SYNTHESIZER



T: PERO

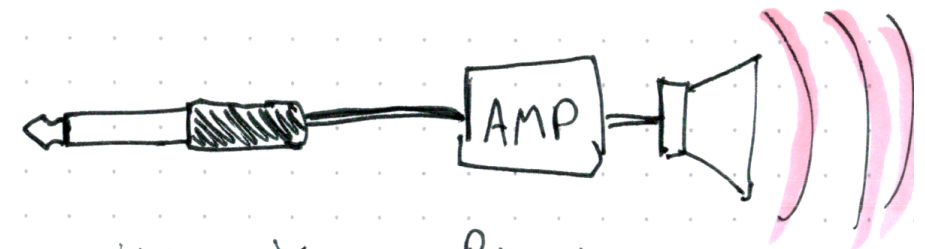
f: FREQUENCY

a: "GN" PERIOD

$$f = \frac{1}{T}$$

$$\text{Duty Cycle} = \frac{a}{T}$$

CHANGING THE  
DUTY CYCLE  
KNOB AFFECTS  
THE LENGTH  
OF THE " $\alpha$ ".



USE YOUR PUNK  
SYNTH TO MAKE SOME  
DIY NOISE!

A LOW PASS FILTER  
REMOVES THE  
NASTY HIGH  
FREQUENCIES

## LOW PASS FILTER

## VOLUME

Audio output

Matt Borland - UW TMC 2019

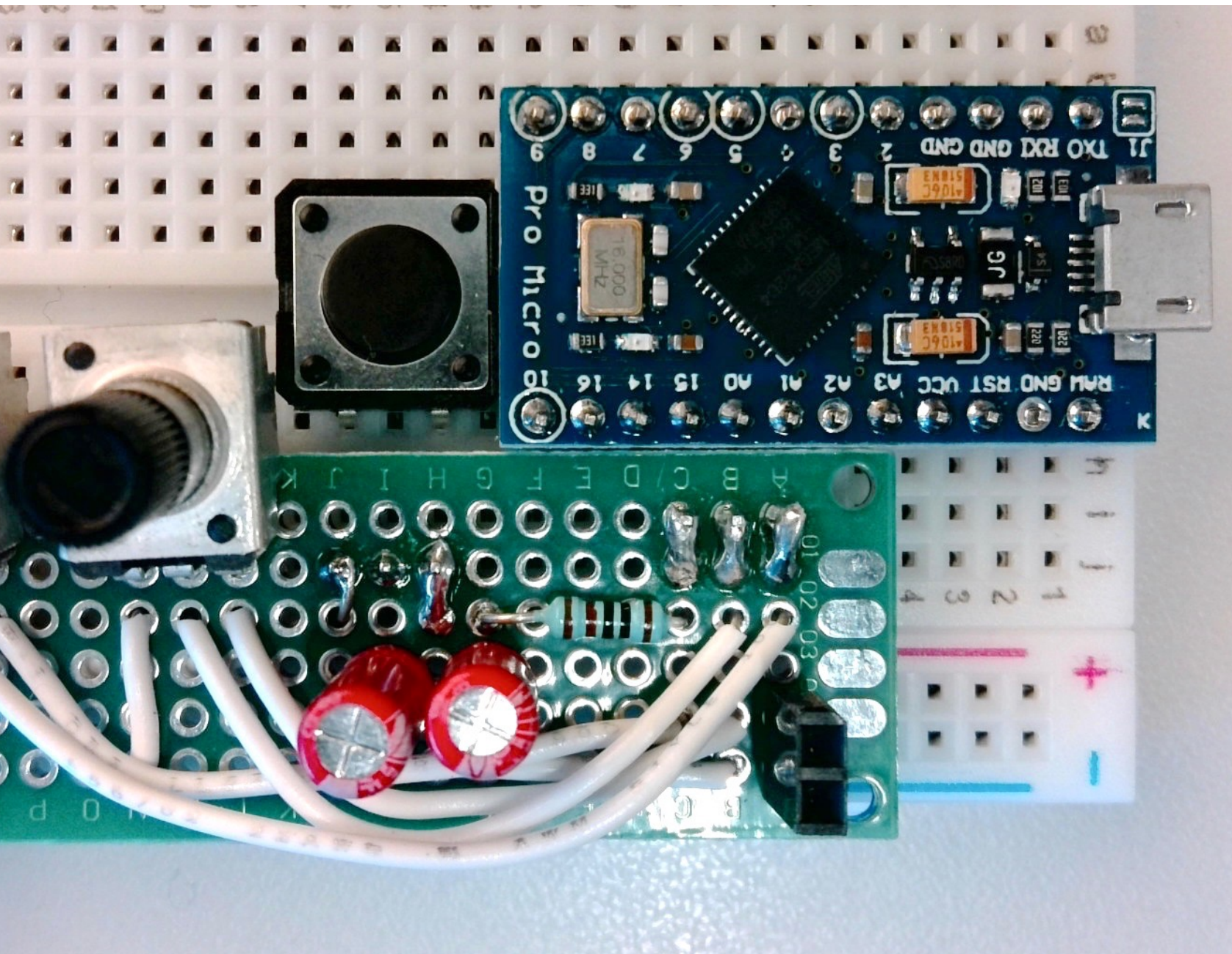
*The interface board contains this circuit.*

*It allows you to adjust the duty cycle, pitch, and volume of the output sound!*

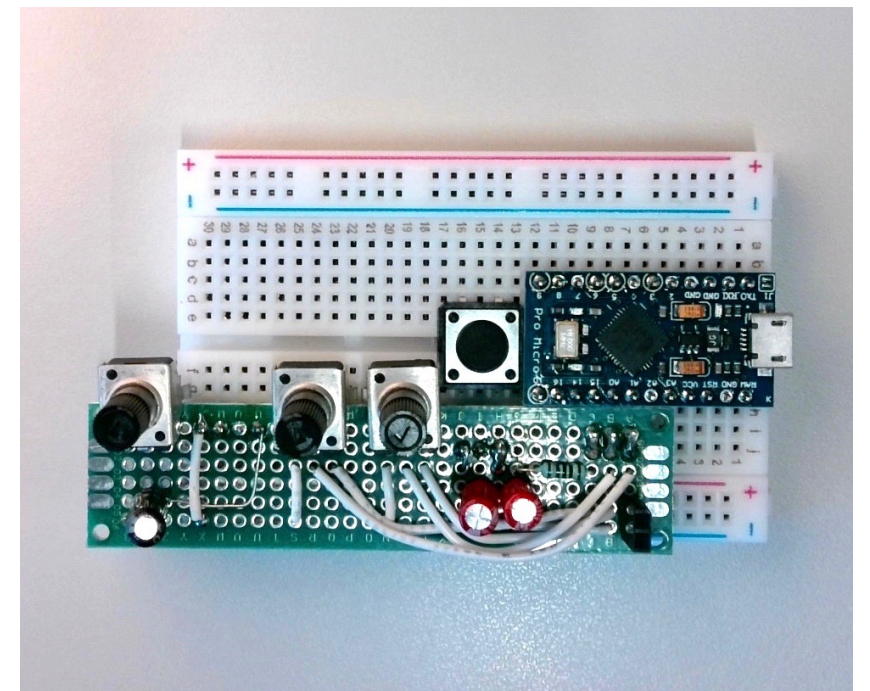


# HOOKING UP YOUR SENSORS! FOLLOW MB ON THE PROJECTOR

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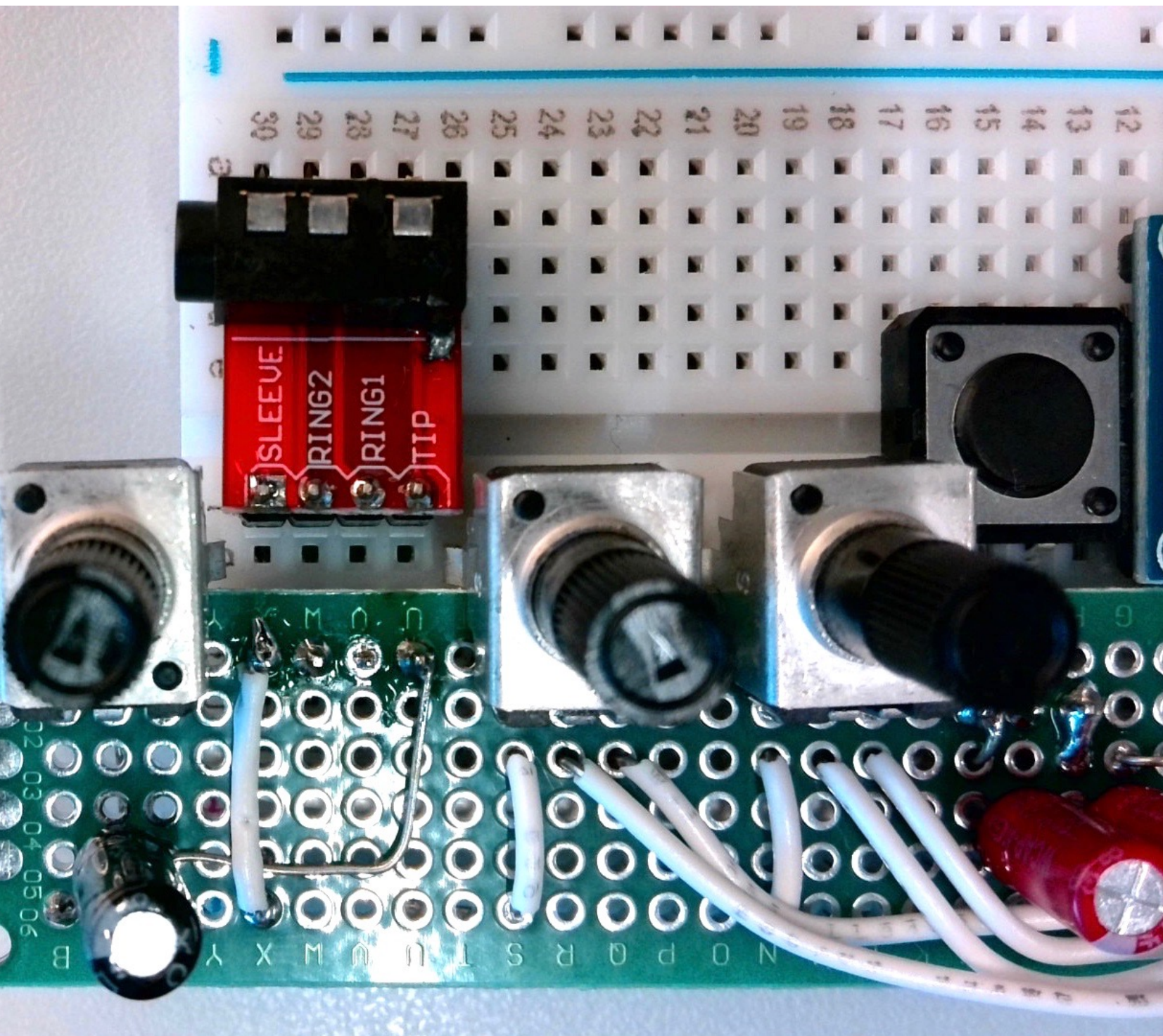
Install your interface board. The alignment is here very important, so make sure to line it up exactly as shown.





# HOOKING UP YOUR SENSORS! FOLLOW MB ON THE PROJECTOR

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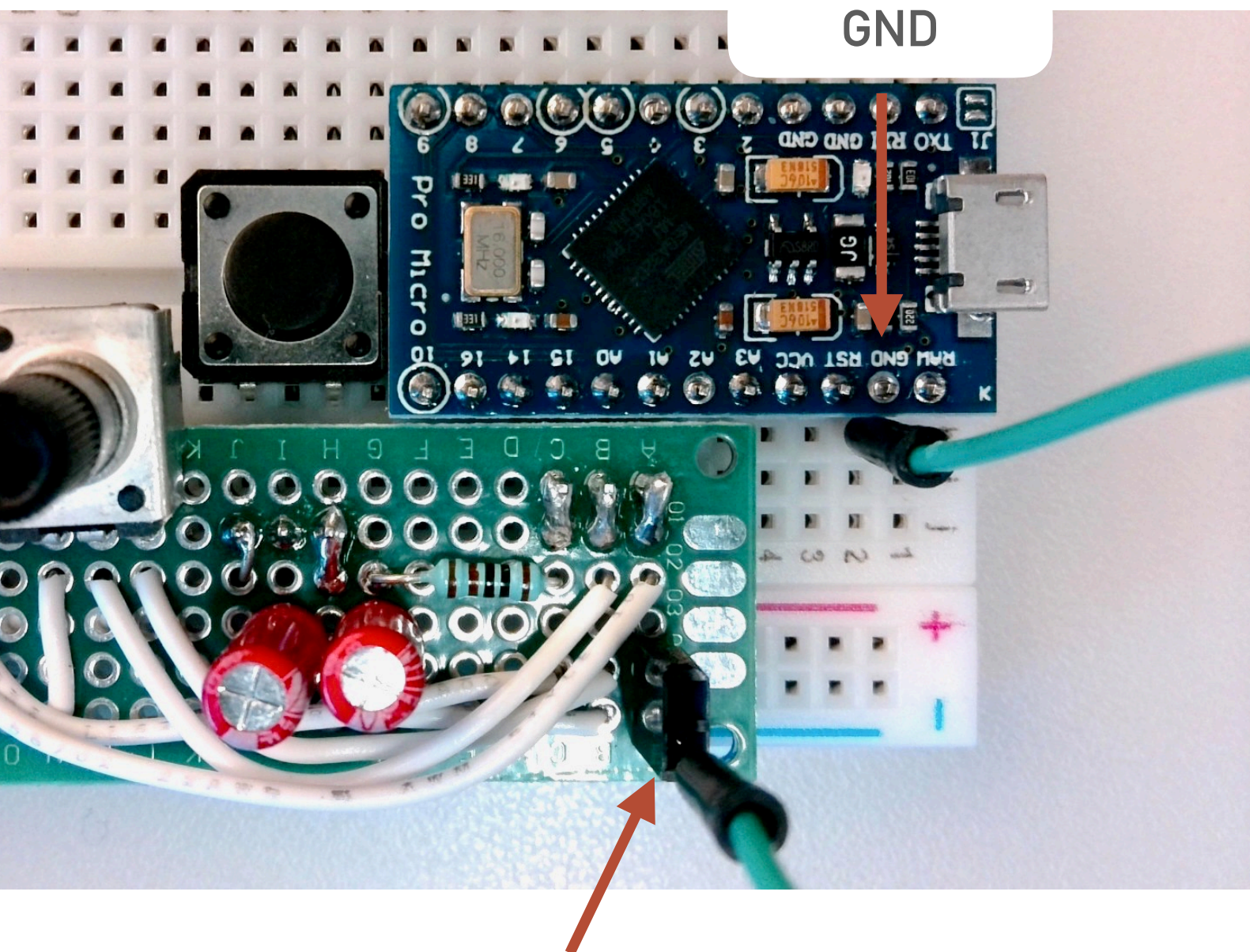


Install your audio jack.  
make sure to get it to  
line up with the pins on  
the interface board, as  
shown.



# HOOKING UP YOUR SENSORS! FOLLOW MB ON THE PROJECTOR

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Connect the GND pin on the arduino to the interface board female headers using a jumper cable.

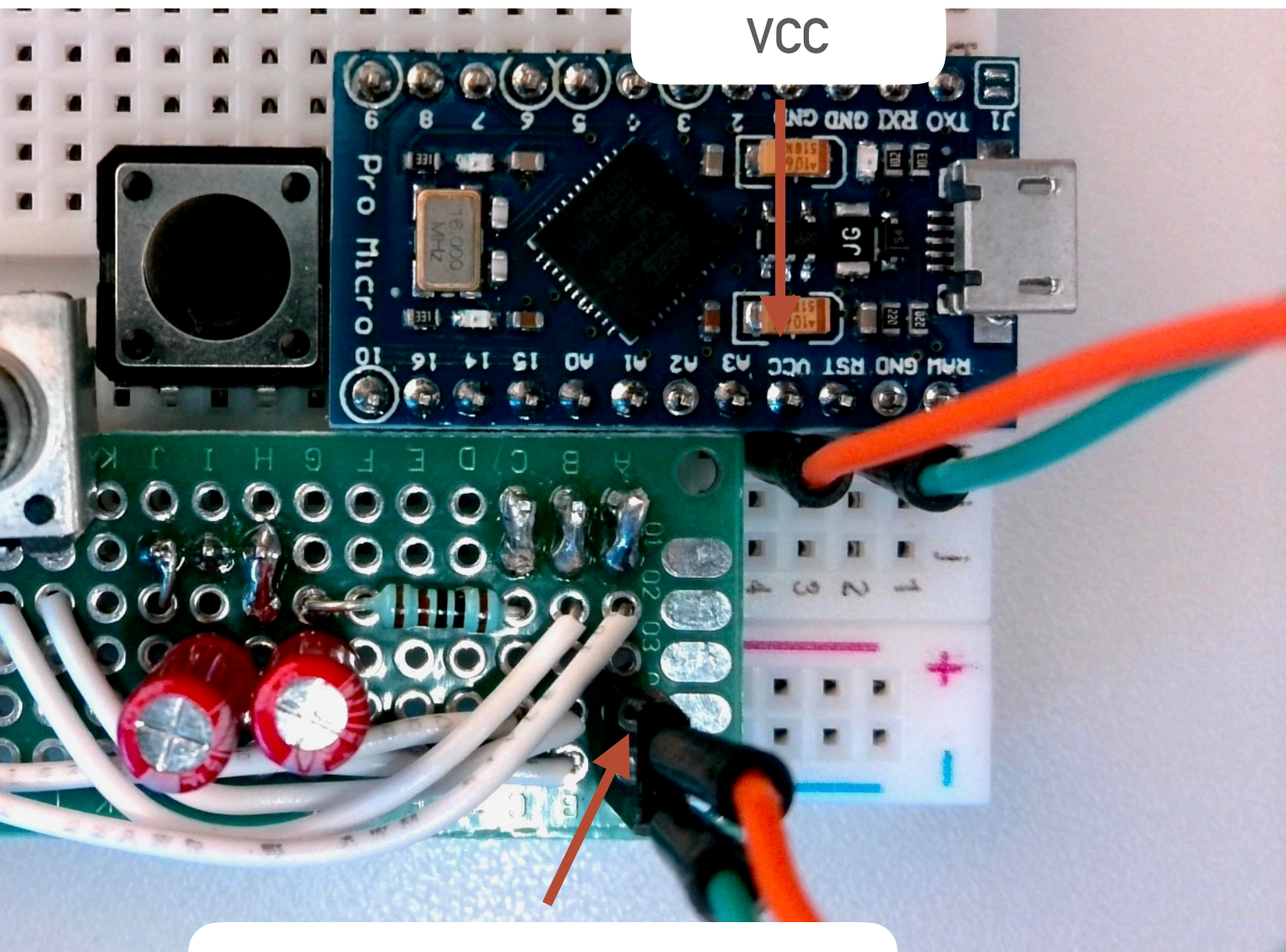
**NOTE:** All pin references are to the labels directly on the components, not the breadboard.

Connect to the lower header.



# HOOKING UP YOUR SENSORS! FOLLOW MB ON THE PROJECTOR

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VCC

Connect the VCC pin on the arduino to the interface board female headers using a jumper cable.

**NOTE:** All pin references are to the labels directly on the components, not the breadboard.

Connect to the upper header.



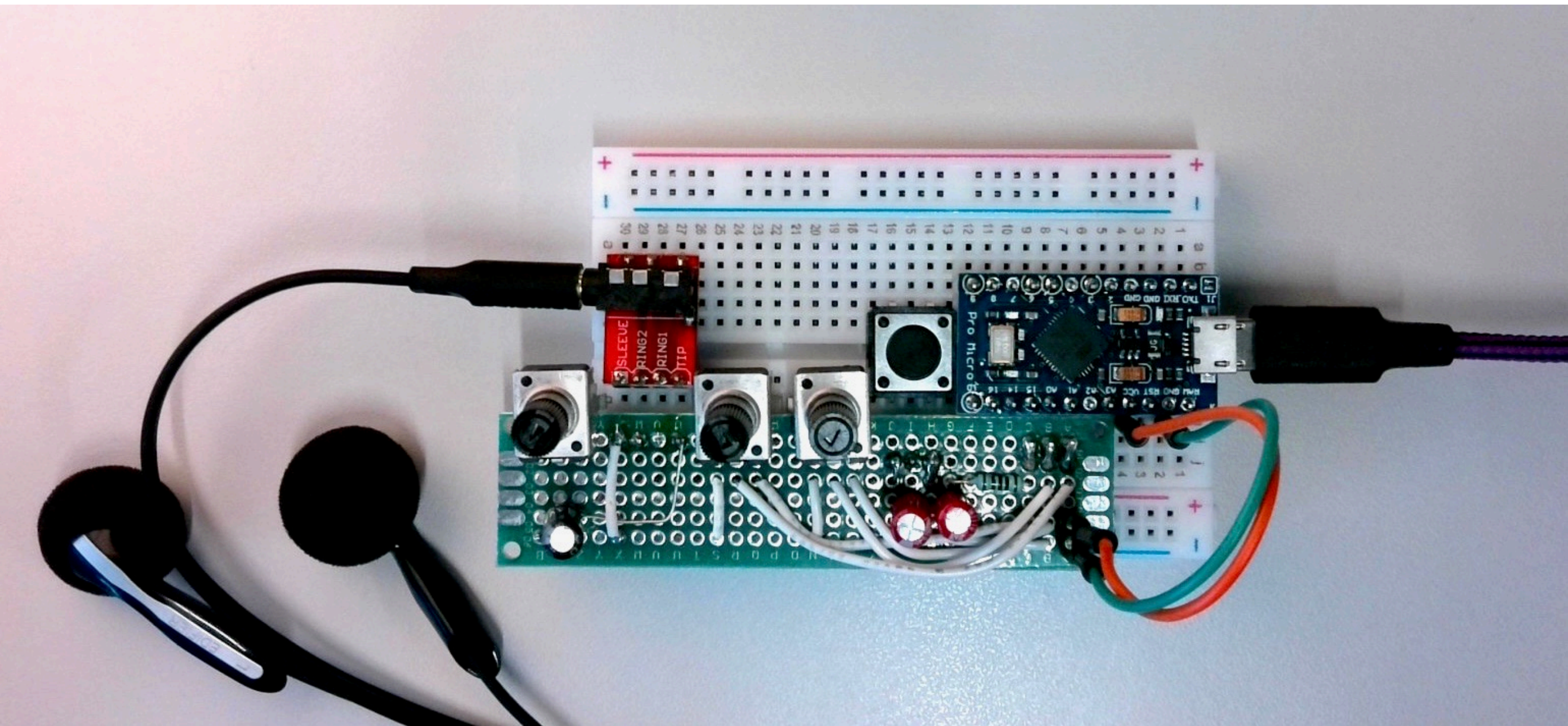
**SAFETY CHECK!**

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***BEFORE PLUGGING THE  
USB CABLE INTO YOUR  
COMPUTER GET MATT TO  
CHECK YOUR BOARD SO  
YOU KNOW IT'S SAFE AND  
NOTHING WILL BREAK!***

# HOOKING UP YOUR HEADPHONES! PLUG IN USB!

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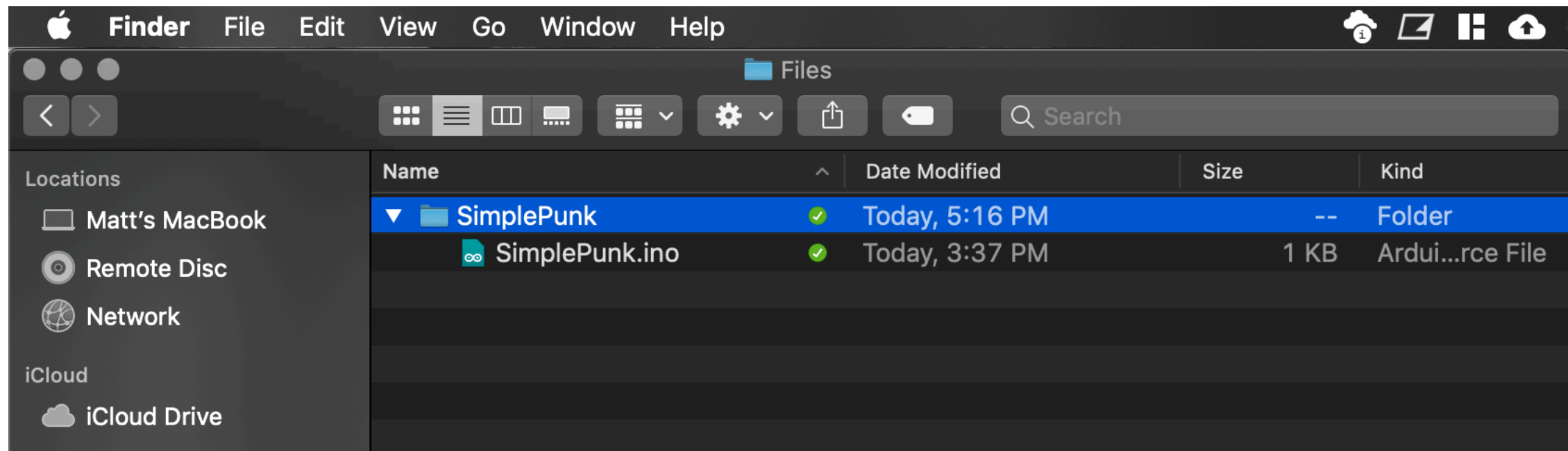
*You will only hear audio out the left headphone, there is no audio on the right.*



# ON YOUR COMPUTER

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*Launch Arduino by opening “SimplePunk.ino”*

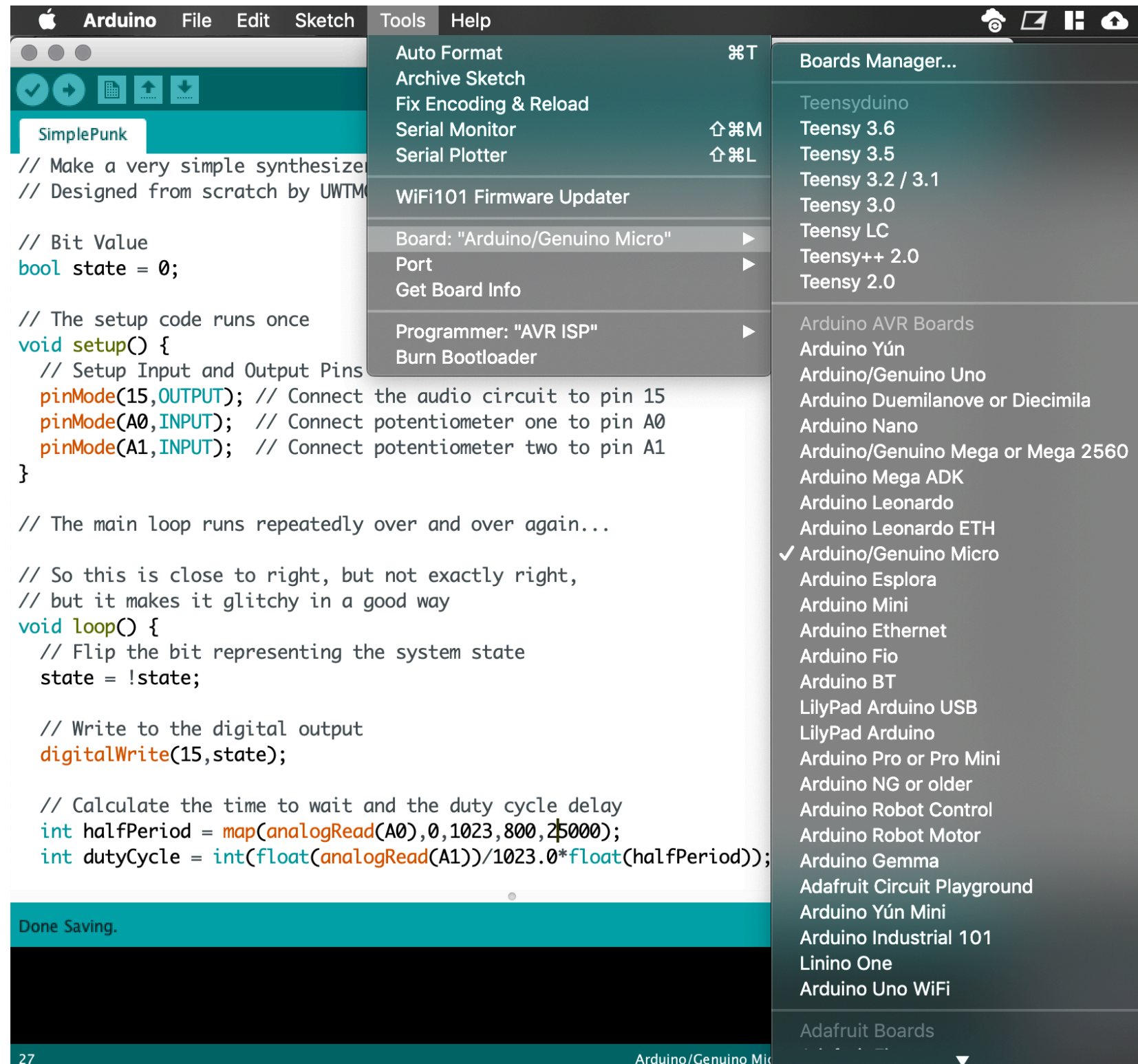


*Arduino IDE - a software platform used to program your microcontroller.*

<https://www.arduino.cc/en/Main/Software>



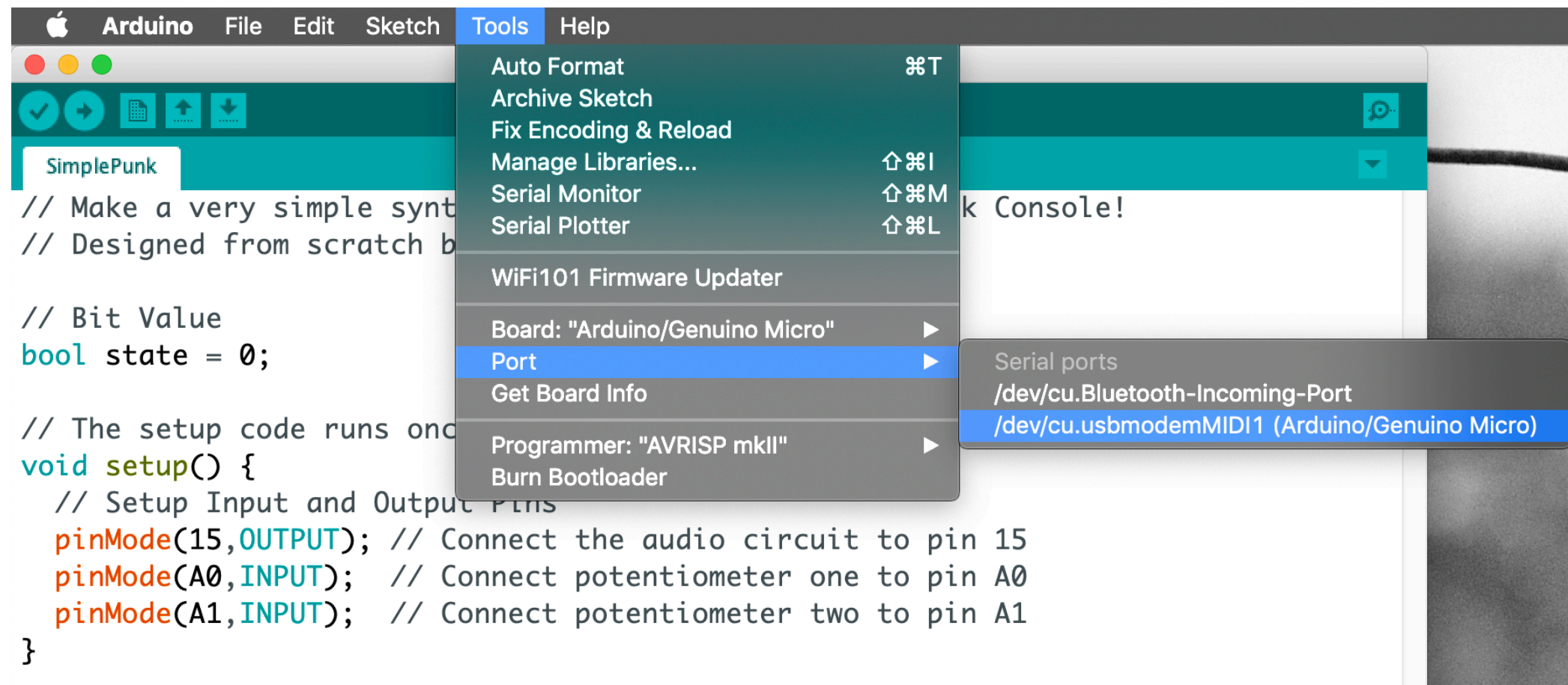
# PROGRAM YOUR DEVICE – BOARD TYPE



*Set your board type.  
We want “Arduino/  
Genuino Micro”.*



# PROGRAM YOUR DEVICE – PORT



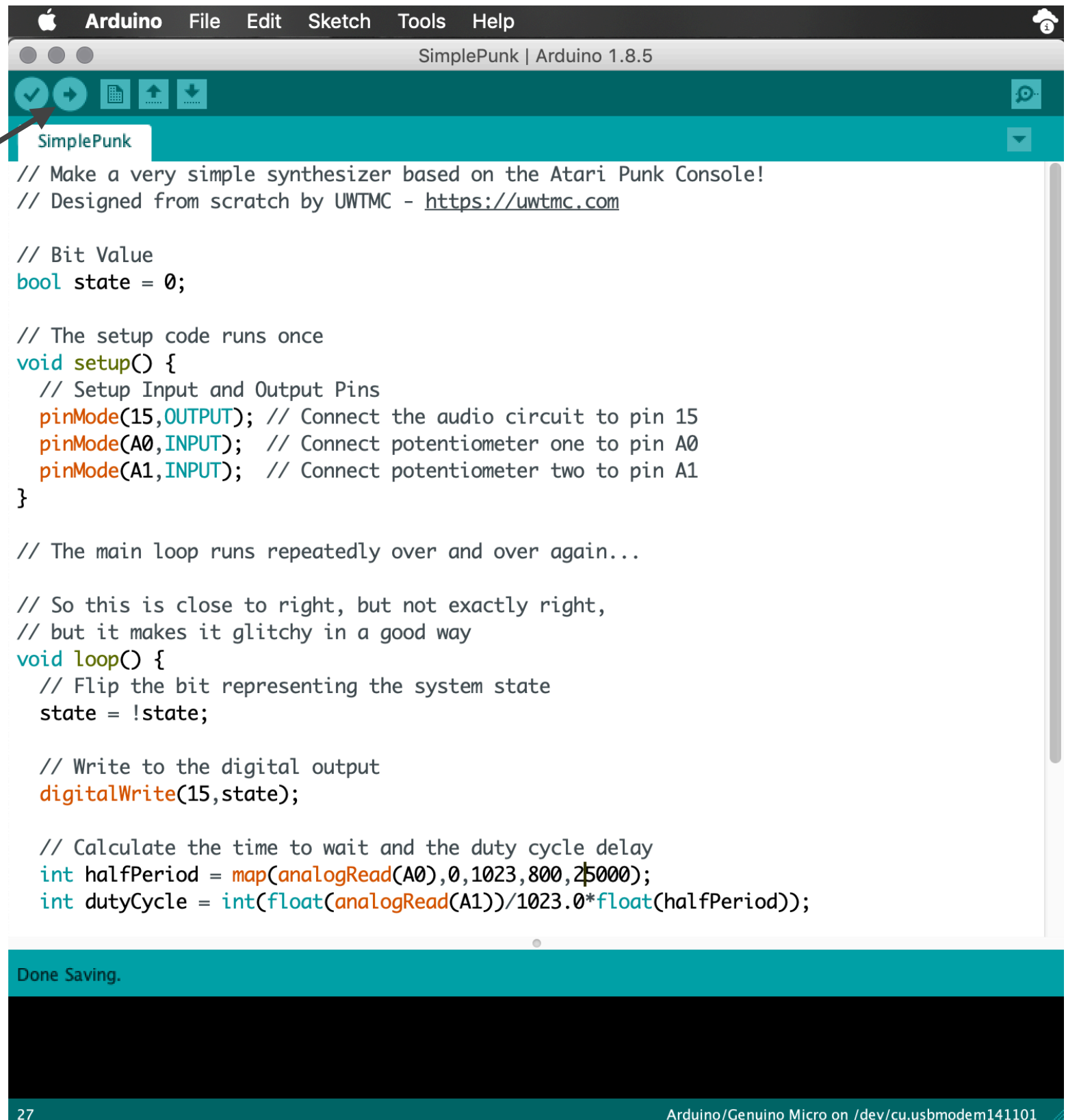
*Sometime this name changes after programming, so you may need to reselect this from time to time.*

*If you get an error that says “board not found” you should check it’s plugged in and that your port is selected correctly.*



# PROGRAM YOUR DEVICE – SIMPLEPUNK.INO

*With your arduino plugged in, press the ARROW button to compile the code and send it to the arduino.*





# HOOKING UP YOUR HEADPHONES! PLUG IN USB!

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This knob controls volume. Turn it down (CCW) before you put your headphones in, then turn it up to a comfortable volume.

This knob controls duty cycle, which will affect the timbre of the sound.

Press this button to hear sound. If you don't press it, you won't hear anything.

This knob controls the pitch of the sound you are hearing.

*You will only hear audio out the left headphone, there is no audio on the right.*

