

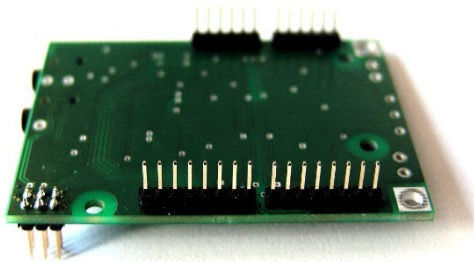
## Open.Theremin.UNO Kit

Congratulations, this is your Open.Theremin.UNO. Happy to have you in the community of people exploring the amazing instrument initially conceived by Leon Theremin. This is a digital theremin shield for the Arduino UNO based on the original principle of heterodyne oscillators.

Some instruction on how to get the best out of that little circuit:

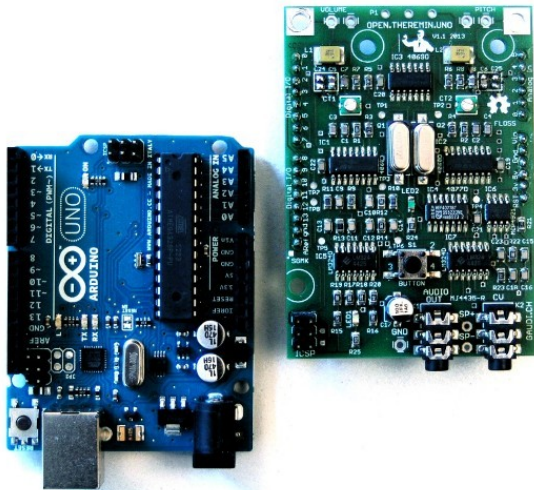
### 1. Complete the shield

First solder the pins that connect the shield to the arduino as shown in the picture below.



### 2. Connect the shield to the arduino

Next connect the shield on top of an Arduino UNO carefully without bending the pins. Arduino UNO is an open source electronic development platform that you can get from many sources on the Internet.



### 3. Programming the arduino

Connect the Arduino UNO to the computer using a standard USB cable. Download the latest Arduino IDE Software and the Open.Theremin.UNO code form the links below and upload it to the board.

Instruction on how to install the Arduino programming tool and how to use it can be found here:

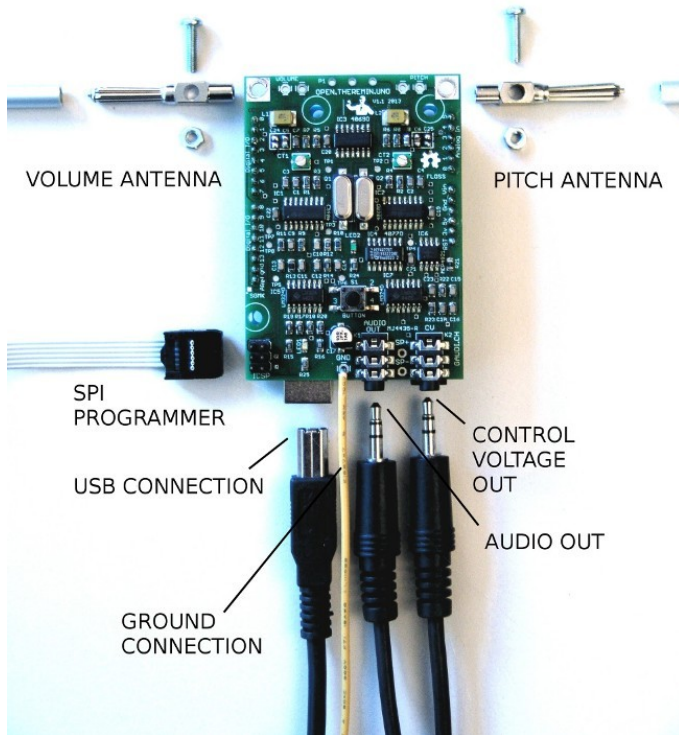
<http://arduino.cc/en/Guide/HomePage>

Get the Open Theremin Code from the Git-Hub Repository by clicking the “Download ZIP” Button on this site:

<https://github.com/GaudiLabs/OpenThereminUNO>

#### 4. Connect Antennas to the Open.Theremin

You can use any electrically conductive material as antennas. The picture shows how to connect two aluminum rods with an inner diameter of 4 mm using simple banana plugs. Just stiff wire works well to. The total length per antenna should be around 40 to 50 cm. Bend the antennas in the shape you want them. Even the aluminum tube can be bent by hand easily. To use much longer antennas you would have to adjust the tank capacity to compensate (see extra instruction).



#### 5. Set up and Grounding

The theremin measures smallest variations of capacities (less than 1 pico Farad). The capacity between the antenna and your hand is measured and translated into the pitch (or the volume) of the sound. The electric loop with the instrument is closed from your hand through your body, through your shoes through the floor into the ground and from ground back into the instrument. This is why proper grounding of the instrument is important. And not only your body is interfering with instrument, also a table or an object close to the theremin will add to the capacity sensed by the instrument. So best is to put up the theremin on a stand in the open space.

Use any of the following methods to ground your theremin.

- a. Use a grounded audio cable. If you connect your theremin to a mixer or amplifier that is grounded, the theremin is grounded through the audio cable.
- b. Use a grounded power supply. You can power your theremin through the USB plug (by a device like a computer or a power adapter with USB connector) or by a separate power adapter. If the power supply is grounded the theremin is grounded as well. Notice that many USB power adapter and power supplies are not grounded.
- c. Use a separate grounding wire. There are soldering pads on the open.theremin.Uno board where you can

connect a extra grounding wire. Attach this wire to a grounded metallic object in your room (like a lamp or a water tube)

#### 6. Connect the Audio Out

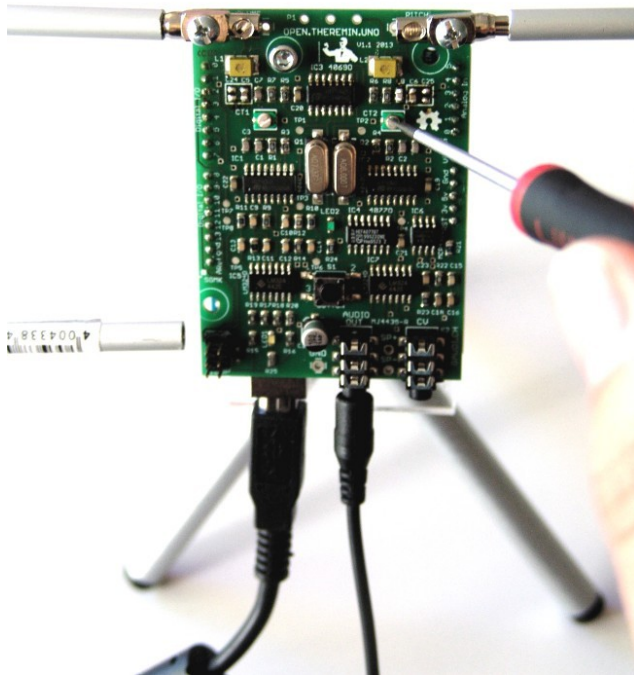
There are two mini jack connectors on the open.theremin.uno shield. Use the left one (indicated with AUDIO OUT) to connect an amplifier or an active speaker. Between the two jacks you find two soldering pads where you can directly connect a little speaker if you wish.

#### 7. Turn on the theremin

Now when everything is ready power up your theremin by plugging it in thorough the USB connector. To power the theremin you can also use the external power connector of the arduino and connect a power supply or even a battery. (Be sure to have your theremin grounded in this case). Once plugged in you should see the green LED-light near the USB plug turn on and hear the welcome sound (three tones) through the speaker.

#### 8. Calibrating the theremin

Theremins are very sensitive devices. This is why most of them need calibration and adjustment before playing. The open.theremin.UNO has an electronic auto calibration built in. However you need to do manual calibration first to adjust the theremin to your antennas and setup. To do so follow these steps:



a. Power the theremin and let it warm up for about 10 minutes.

b. Press the little button on the theremin shield for about 1 second until you hear one “beep”. Now you are in the “pitch antenna calibration mode”. You calibrate the pitch antenna by listening to the audio signal. There is a little knob near each antenna (see picture). Turn this knob using a small screwdriver or simply your finger nail until you hear a sound. Adjust until the sound is at about 600 Hz with your hand removed from the antenna. Yes, this

is the tricky part, you want to adjust and then remove your hand, listen and eventually adjust again. Theremins are usually played so that the sound gets higher when you approach the antenna with your hand. So try to set the calibration that way.

c. Press the little button again for about 1 second until you hear a “double beep”. Now you are in the “volume antenna calibration mode”. Do the same procedure as in b. to calibrate the volume antenna.

d. Now the manual calibration is done. Hit the small button shortly to soft calibrate the theremin. You will hear a sequence of “beep” while the theremin is calibrating. Set your pitch and volume hand to the distance where you want the neutral position (or so called “zero beat”) to be.

Now you are ready to play. Enjoy.

For more information, documentation and source code of the open design go to:

[www.gaudi.ch/OpenTheremin](http://www.gaudi.ch/OpenTheremin)