



AUMI: Adaptive Use Musical Instrument

Turning Motion into Sound. Musical Improvisation for Every *Body*.

version 2.1.0

The Adaptive Use Musical Instruments (**AUMI**) software interface enables the user to play sounds and musical phrases through movement and gestures. This is an entry to improvisation rather than "hitting the right notes" or playing set pieces of music. Instead, the software uses music as a way for participants to express a range of affects, both by themselves and in response to, or in conversation with, others.

The original focus of the **AUMI** interface was children with profound disabilities and their teachers, therapists, caregivers, and families. In taking these participants as its starting point the project attempts to make musical improvisation and collaboration accessible to the widest possible range of individuals and communities. This approach also opens up the possibility of learning more about the relations between ability, the fullest possible range of bodies and minds, creativity and improvisation, from within a cultural context that does not always acknowledge or accept people with disabilities. The AUMI user base includes adults with and without disabilities, seniors, participants of independent living centers, artists with and without disabilities, and participants of mixed-ability, cross-generational community jam sessions, and many others.

AUMI continues to be revised and improved with feedback from anyone who uses it. We want to hear from you. Send feedback to info@aumiapp.com.

AUMI for iOS was developed for the [Deep Listening Institute](#) by [Henry Lowengard](#), and adapted from the [desktop version of AUMI](#), which is also available for download from [aumiapp.com](#)

AUMI websites:

- The Official AUMI for iOS Web site is at <http://aumiapp.com>.
- **AUMI** also has a presence on Facebook at [:https://www.facebook.com/AdaptiveUse](https://www.facebook.com/AdaptiveUse).

If you see a word with a dotted underline, it's a Glossary item. Touch it to get a quick hint about the term. Touch it again to dismiss the window.

You can get software support by emailing: info@aumiapp.com

This link points to a [PDF copy of these instructions](#). You can export them to iBooks or print them out for reference.

AUMI was developed with the support of the The Gould Family Foundation, Improvisation, Community, and Social Practice (ICASP), and International Institute for Critical Studies in Improvisation (IICS).

This is iOS AUMI version 2.1.0

Screenshots used in these instructions are taken from various models of iOS devices and may not look exactly like what is displayed on your device!

USING AUMI

SETTING UP THE AUMI PLAY SPACE

AUMI uses either the front- or back- facing camera to track motion and control which sounds are played. For this to work optimally, good lighting, a neutral background, and a steady support for the iPad, iPhone, or iPod Touch being used are needed. The more neutral the background, the better **AUMI** will be able to find intentional motion. The Apple iPad folding case is a pretty good support, but you can also use commercially available stands and mounts, and in a pinch, some big rubber bands, a chair or a pole, and some creativity will also do.

PREPARING YOUR DEVICE

AUMI runs on all iOS devices - iPhones, iPod touches, iPad, iPad minis, iPad PRO - running iOS 9.3 and above which have cameras.

You will need to confirm that you want to use the camera when a permissions dialog box appears the first time you use AUMI. For a better experience, you may want to:

- Adjust the screen brightness for the ambient lighting in the room
- Turn off gestures that relate to multitasking and the dock (iPad only). This is controlled in the Settings app, under "General", then "Multitasking & Dock", then "Allow Multiple Apps" or "Gestures". Sometimes I find it useful to switch back and forth to MIDI instruments running in the background, but usually, multi-touch gestures are used to play and control AUMI and shouldn't be misinterpreted!
- Turn off keyboard clicks. In the Settings app, look for "Sounds" then "Keyboard Clicks"
- If it's an iPhone or iPad with cell service, and you are in a performance situation, go into "Airplane mode" and it won't spend time looking for cell service or WiFi, which AUMI doesn't need.
- Some MIDI instruments may need to be started before you start AUMI if you want AUMI to play them.
- AUMI supports "Dark Mode" in iOS13 and beyond. These instructions only use light mode screenshots though.

PLAYING AUMI

You can play AUMI right away when it starts up, or by using the **Play AUMI** tab bar button to change the screen to the play screen. You will see a live video image, a circle with a red dot in the center (the Cursor), and a number of rectangles (the "sound_boxes"). The Cursor moves when AUMI detects movement in the video image. When the Cursor enters a sound box, a sound plays. You can put the Cursor anywhere on the screen with a single touch, and play AUMI with a finger just as you can with video tracking. The sound boxes can be rescaled by touching the corners of the box that encloses them with two fingers.

You can change various aspects of these interface elements with the [Looks](#) button. You can hide and show all the toolbars, and make a completely clean (and safe to touch) screen by tapping with three fingers.

If the Cursor goes to the edge of the screen for 2 seconds, it will automatically recenter itself!

CONFIGURING AUMI

To change the instrument, the number of available notes, scales, and other aspects of the audio and video of AUMI, use the [Instruments](#) button, which is on the video screen for iPads and in the tab bar on smaller devices.

USING SETUPS

AUMI has a [Setup screen](#). This is a place to identify a setup name, which could be a user's name, and other metadata useful in data in making the [reports](#) that AUMI is capable of making should you enable this feature. If you are considering the use of reports, please see [LEGAL](#). If you are not interested in those reports, you can leave the metadata information spaces blank.

The name is also used to identify saved instrument [setups](#). If you have already saved some setups, you can load one from a list with the "List Setups" button.

The Setup page in no way affects the ability to play AUMI, nor is this information sent to any server.

There are a number of adjustments that can be made to the motion tracker software that can help it work best for your device and the environment it will be working in. These adjustments are found in the [Video Camera and Tracker Settings](#)

AUMI can refine the way it turns movement into moving the Cursor. Read the [Instruments](#) section to find out more.

SOME TIPS AND HINTS

Some AUMI users are only capable of extremely limited voluntary motion. AUMI can be adjusted to accommodate their needs in a number of ways:

- You can rescale the [sound boxes](#) by "pinching" the screen. If you put a lot of [sound boxes](#) in a small space, smaller motion is more likely to initiate a sound!
- You can zoom in to get faster response. It's not really "zooming" as much as taking an excerpt of the middle of the image, but that may help AUMI find the motion it needs to play sound.
- The "Mult" slider multiplies the amount of motion that the tracking software finds, so that it can move the Cursor more with each motion. Even an eye blink or a tongue movement can control the music.
- AUMI can make the timing of its note events regular so it can play with a regular beat. See the [TIMING](#) configuration section
- You can get feedback on what AUMI's trackers are "interested" in tracking by turning on the "Show Spots" ("Show Areas") button in the [VIDEO CAMERA AND TRACKER SETTINGS](#) screen. The screen will display little labels at the positions of the tracking spots it has found. The blue spots are points that have moved enough to be considered for moving the Cursor, while the [paler ones](#) are currently being ignored until they move more later. With the Color Trackers, the selected color is shown as a paler version of itself.
- AUMI can play over other music making programs and synthesizers if they can play in the background. Improvise with AUMI over an iTunes track!
- AUMI's MIDI playing feature allows a user to play anything that understands MIDI "note on" and "note off" commands, which are not only synthesizers and samplers, but lighting consoles and other media devices. AUMI can control other MIDI instruments on a laptop connected via Wi-Fi, for instance, in Apple's Garage Band, and also other apps running on the same device. When hosted in iOS based hosts, those other apps can add effects and recording and sharing features missing from AUMI.
- The Color Tracker is very fast and precise. If you make a circle layout and use a scale of your choice, you can actually play a melody. Using the timing feature can help keep the melody regularly timed.

RECORDING VIDEO

As of iOS11 and Yosemite or later on a Mac OS system, you can record directly from an iPhone or iPad by using Quicktime. If you have another kind of computer that can record from an HDMI stream, you might be able to do it with hardware: an HDMI adapter and cable to a video recording device. Modern iPads and iPhones can transmit video and audio over WiFi to an AirPlay™ (Apple) equipped device, such as a flat screen TV or video recorder. There is also AirPlay emulating software: the device transmits lower-res video (and audio) over to a computer that can pick it up and record it, using a program called AirServer, among others. Sometimes it's a little finicky, but that's how I've made some videos of AUMI.

I'd suggest just using an external video camera to record both AUMI and the real performer using it, which gives a better idea about what is happening!

INTERFACE

This is a quick description of the toolbar and interface buttons. Click on them for more details!

MAIN TOOLBAR

	<p>Play AUMI The interactive video interface.</p>
	<p>Instruments Pick Instruments, set the volume, pick a scale and other instrument related features. On iPhones, this is in the toolbar, and on iPads, this is accessed from the side menu.</p>
	<p>MIDI Configure AUMI's MIDI playing features. On iPhones, this is in the toolbar, and on iPads, this is part of the instruments dialog box.</p>
	<p>Setup Load and Save AUMI settings like scales, instruments, video and timing, send and receive Setups to other devices, set logging metadata, enable logging to create reports, and read and export reports.</p>

AUMI PLAY PAGE TOOLBAR

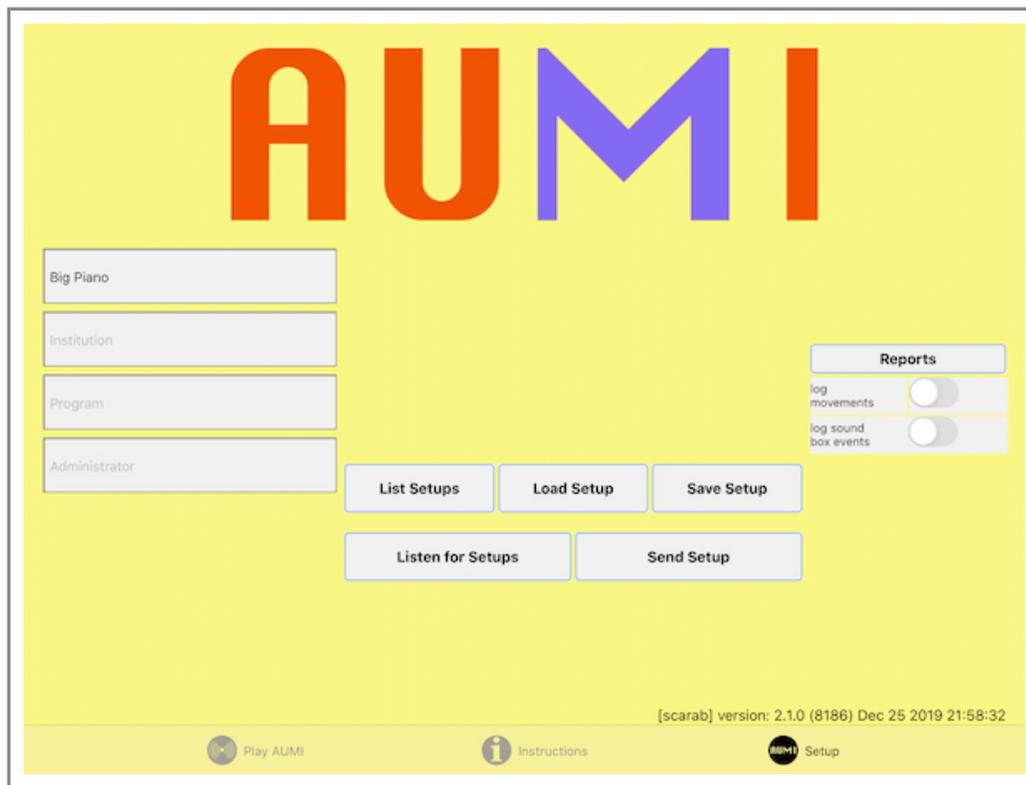
	<p>Looks Change aspects of how AUMI looks, such as colors, sound box layouts, and sizes. This is launched from the "Looks" button at the left of the main video screen.</p>
	<p>Sound Order Assign sounds to sound boxes. This is launched from the "Sound Order" button at the left of the main video screen. This button does not appear when using melodic instruments, which order sounds by using scales.</p>
	<p>Video Camera and Trackers Settings Change the size, resolution of the video cameras, choose tracker, and adjust tracking parameters.</p>
	<p>Configure Timing Change the options and speeds of AUMI's timing quantization feature. It also configures chords and arpeggios.</p>

The user interface is different on iPads and iPhones. On iPhones, the **Instruments** and **MIDI** buttons are on the **MAIN TOOLBAR**. On iPads, the **Instruments** control button is part of the **AUMI PLAY PAGE TOOLBAR**, and contains the MIDI controls as well.

AUMI works on iPhones and iPod touches, but is best on iPads, iPad Pros, and iPad Minis. Newer models will be faster!

[The official AUMI Web site at aumiapp.com is here](http://aumiapp.com), featuring more information, videos, support, news, and tips and hints.

SETUP



iPad setup screen



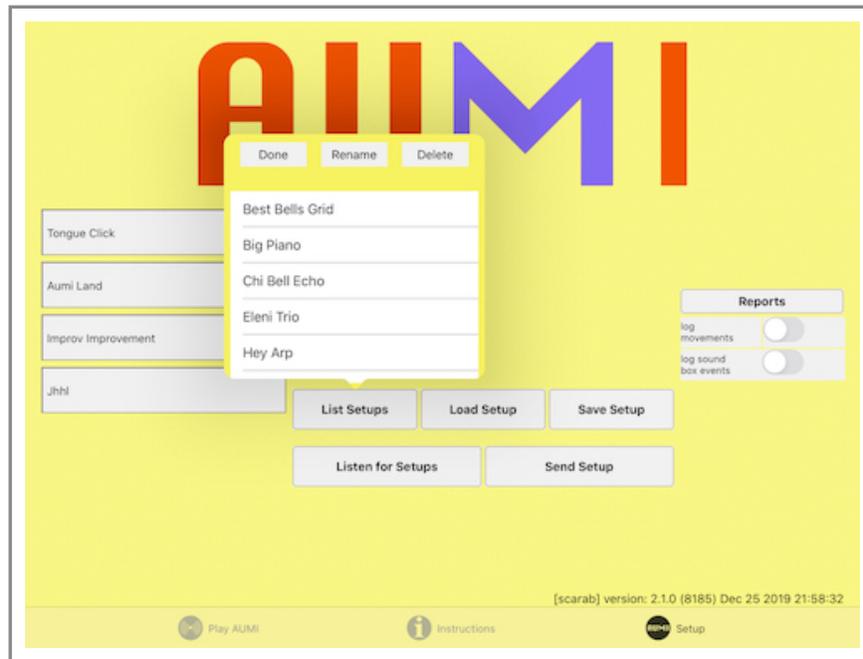
iPhone setup screen

You can load and save an instrument and other configuration data, which is called a "_Setup", with the **List Setups**, **Load Setup**, and **Save Setup** buttons. The **Save Setup** button saves the current instrument and its layout, colors, and sound order to a file named the same as the user's name, e.g. [user name].aumi.

The idea is to load a Setup appropriate for each user, so **Load Setup** looks up the Setup file using the current user name. If there is no name, it tries to load a Default Setup, which you can create by saving a Setup with no user name.

You can more easily pick the Setup out of a list using the **List Setups** button.

You can save other instrument setups for a user by adding a note to the user name, e.g. **Clara K. sitar**.



List Setups will also let you rename or delete existing setups by touching the appropriately named buttons. **Done** will dismiss this dialog. You can also find and export these setup files or import them by using the [iTunes Document interface](#) for **AUMI**. They will have the suffix ".aumi". "An ".aumi" file is an Apple plist file, which is a kind of XML file, and so is legible by humans.

The **Setup** page is also where those who are using the reports feature may set up the metadata used in recording activity during an **AUMI** session.

The [report button](#) brings up an interface for exporting the AUMI report files. These files are a comma separated value files (CSV), supported by most spreadsheet software. See the [reports](#) section for more details. See the [legal section prior to enabling the reports feature](#).

Listening and Sending

You can set up **AUMI** so that you can send a setup from the device it's running on to another **AUMI** running on a different device. This allows one device to change aspects of another device without needing to touch the screen.

This feature works even if the receiving device has a screen in [Installation Mode](#) that can't be easily unlocked.

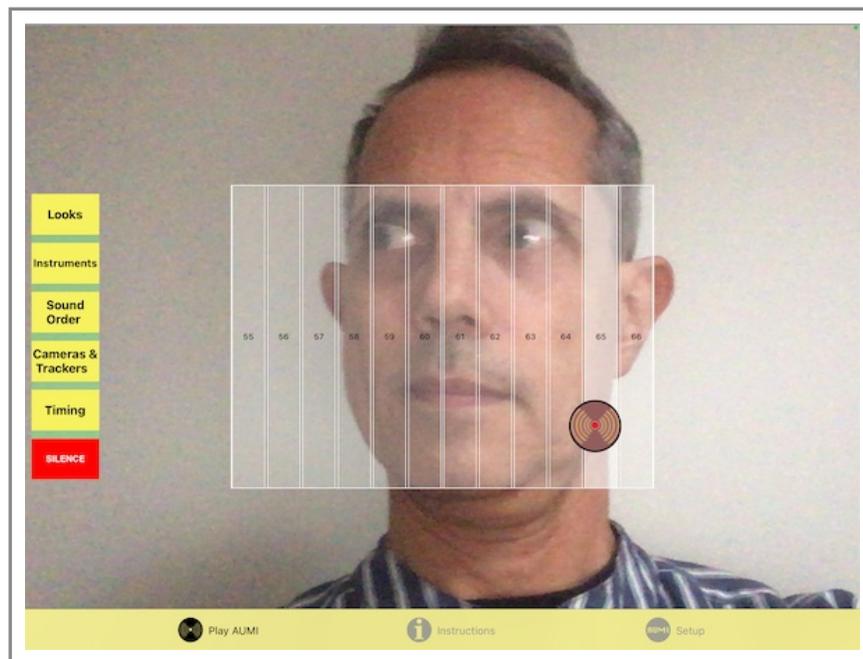
Listening and Sending is using Apple's "Multi-peer Connectivity" feature. That means all the devices involved should be on a local network, or have Bluetooth enabled, or it can also communicate peer to peer (that is, via WiFi without actually being connected to a WiFi network).

You can designate a device to listen for setups by touching the "Listen for Setups" button. You can actually do this with up to 7 devices! On another device running **AUMI**, you can then send the current setup on that device to the listening device(s) by touching "Send Setup". You'll be presented with a list of "nearby" devices that are listening as it discovers them. You can now touch the device names of the devices you wish to send the setup to. It should connect and change the setup on the listening device, and put up a notice that tells you so. If it fails for some reason, there will be another notice telling you that.

If you send a setup that has [User Sounds](#) in it, it will work if the receiving device has those sounds installed, otherwise, it will use the Piano.

Once the setup is received, it can be saved on the device that received it by tapping "Save Setup".

PLAY AUMI



This is the main interface to be used while playing **AUMI** (iPad version).

Over a live video image, **AUMI** shows a set of rectangular "sound_boxes" and a circular Cursor, which is what initiates sounds as it moves into the sound boxes.

You have the choice of either showing the live video on the screen, or replacing it with a neutral background. Some users prefer not to see themselves while playing, while others enjoy the visual feedback of watching their movements interact with the Cursor and Sound Boxes. Others go back and forth, sometimes turning off the video to reduce the distraction of trying to make a movement make a particular sound, in order to focus more on listening, or to turn the attention of a group from watching individual screens to relating to one another.

You can also set the position of the Cursor by touching the screen, and use this method exclusively for controlling AUMI

When the Cursor enters a sound box, the corresponding sound is played, and the box highlights relative to the volume of the sound that is playing.

AUMI works by detecting and tracking the movement of "interesting" parts of a video image. "Interesting" in this case usually means high contrast and angular shaped parts of the image. The motion tracker works best when there is clear lighting, and a blank background behind the user.

The relative motion of the tracking spots moves the Cursor on the screen. The Cursor has *no direct* relationship with the tracking spots. This allows any motion it detects in the image to control the Cursor, and thereby initiate the sounds.

There's a toggle button, "Show Spots," ("Show Areas" for Color Trackers) in the [VIDEO CAMERA AND TRACKER SETTINGS](#) screen, that makes the tracking spots visible when clicked. Click it again to hide the spots.

For the Face Tracker, little eye and mouth icons show the position of the eyes and mouth that it finds.

For the Color Tracker, you can see the areas that are the selected group of colors highlighted in paler versions of themselves.

There is a tracker that detects faces and put the Cursor right on the face's nose. It's not as flexible as the motion tracker, but it is pretty fast - which might make it the right tracker for your situation!

There is a tracker that detects colors and put the Cursor in the middle of where the largest block of that color is onscreen. While it's very fast, you need to select the color to track by double tapping the screen and sliding your finger around to pick up variants of that color.

The Distance Tracker is the same as the Color Tracker, except the Y axis is replaced with value derived from the area of the largest block of color. That roughly corresponds to distance, and so motion towards and away from the screen (camera) can be used!

The Touch tracker just a single touch alone to play the screen, with no video used at all. The video image is replaced with the background color.

You can change the size of the rectangle the sound boxes are laid out in by touching the screen with two fingers. The touch points move the top left and bottom right corners of the box.

The layout of the rectangles can also be changed, except for Loop and Relative instruments, by using the [Looks](#) screen controls. The layouts are Horizontal, Vertical, Gridded, and Circular. The Gridded and Circular layouts enable users to play notes out of their usual order.

The "Looks" screen controls can change the color, transparency, and thickness of the sound box outlines, and the color, transparency, and size of the Cursor.

On an iPad, the "Instruments" button appears on this screen, while on an iPhone, that button is on the navigation bar.

There is a big red "SILENCE" button in case you want to stop the sound that's playing and clear the queued Timing based notes. While it's held down, the trackers and sound will be disabled and even loops will stop playing. You can lock it in silence by sliding off of the button and then lifting your finger. When you let go, or tap it again if it's locked, the trackers are live again and the loops will play. While in "Silent mode", the button label will change to "RESUME"

If the instrument is a MIDI instrument, this button will change its label to "CLEAR MIDI" and will silence MIDI notes.

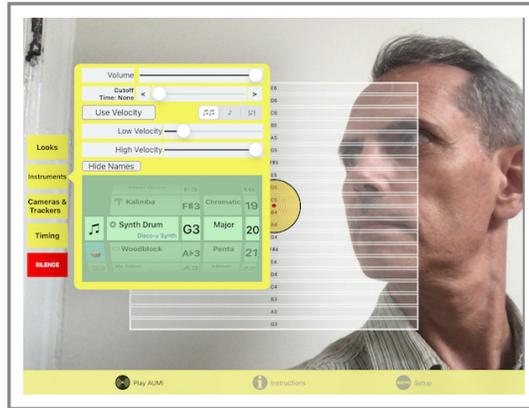
You can hide and show all the toolbars, and make a completely clean (and safe to touch) screen by tapping with three fingers.

Note: in iOS 13 and on, a three finger tap is now interpreted as a part of a cut, copy, or paste operation. To do a three finger tap that will be recognized in AUMI, you may have to put each finger down slowly (one-uh-two-uh-three-uh) for it to be detected properly.

When AUMI is used in a public installation there's a chance that you may want to lock its control interface. One way would be to put it behind glass, but if the device is exposed, it needs another method.

There is an **Installation Mode** which locks the screen from revealing the toolbars. This is enabled and disabled by touching down and holding two fingers - possibly resizing the Sound Boxes' bounding rectangle - while moving a third finger a long distance of more than 100 pixels. When enabled, it prevents a "normal" three-finger tap from revealing the controls, and also disables a four-finger tap from locking or unlocking the size of the bounding rectangle. This is designed to be a little obscure! It also locks the Sound Boxes' rectangle size, even when you go back to showing the normal interface.

INSTRUMENTS



On iPads, the Instruments screen is accessed with a button near the top of the [Play AUMI](#) screen. On iPhones and iPod Touches, it's in the toolbar at the bottom of the screen.

The Instruments screen is where you select an instrument and its properties, and set the general volume, and a few other options.

A big scrolling instrument picker is divided into five parts. Some instruments don't use all the parts, so they are blanked out.

Instruments are collections of sounds that AUMI can play in a number of ways. AUMI comes with a good variety of sounds, some conventional, some unconventional. AUMI does not currently play audio through Apple's Inter App Audio or Audio Unit interfaces, nor with Audiobus, but it can send MIDI to apps which do support these features.

Instruments are categorized into sections, each with its own background color, accessed by the scrolling control on the far left. The instruments associated with those categories are correspondingly colored.

- Melodic instruments (green): They have a range of chromatically tuned samples that can be used to play melodies. Most melodic instruments have a range from MIDI note 36(C2) to MIDI note 96 (C7).
- Sample or percussive instruments (blue): They simply play sounds that are not tuned or in any particular order. The order can be rearranged by using the [Sounds](#) button.
- Looped instruments (yellow): All the sounds play simultaneously in a continuous loop. The closer the Cursor is to a sound's sound box, the louder that sound will play. If you make the size of the Cursor bigger, it will cover more sounds and you will hear more of them simultaneously in the mix. The choices for loop sounds and the number of them on the screen can be changed by using the [Sound Order](#) screen.
- Relative instruments (light purple): These sounds are played by using the relative motion of the Cursor, instead of its absolute position. The sounds are the same as all the melodic and all the Sampled sounds, and can be selected by using the [Sound Order](#) screen. However, only four sounds can be played.
- MIDI instrument (blue): Makes no sound by itself. It sends MIDI messages to other programs or devices.

User instruments are made by importing sound files. If they follow certain naming conventions, they can be organized into individual instruments. If there are no User instruments, the background color for those options are gray.

- Melodic User instruments (green): like the built-in melodics, they can be organized into scales and tuned.
- Sampled/Percussive User instruments (blue): like the built in samples, they can be reordered in the same way.
- Looped User instruments (yellow): like the built-in loops. This uses the non-melodic sounds. You must have at least 4 sounds for looping to be enabled. There is a maximum of 16 sounds.
- Relative User Instruments (pink): like the built-in Relatives. You must have at least four sounds for this to be enabled.

other parts of this control are as follows:

- An instrument selector. Each instrument name has a small image in front of it to help identify it.

AUMI Instrument Icons

 Piano	 Percussion	 Loops
 Guitar long	 Noises	 Marsh Loops
 Guitar short	 Kitchen Percussion	 Fifth Loops
 Reedy	 Cartoon Sounds	 Tran Phu
 Tines	 String Quartet	 Pin Pia
 Bowed	 Dogs	 Synthy Loops
 Fifths	 Cats	 LP Lock Grooves
 Steel Drum	 On The Farm	 Glyptodont
 Kalimba	 Waterphone	 Troglodytes
 Synth Drum		 Widow Jane
 Woodblock		 Waterphone Loops
 Sitar		 Leaf Drums
 Orchestra Hit		
 Timpani		
 Tubular Bells		
 Glockenspiel		
 Tenor Recorder		
 Hand Pan		
 Singer Henry		
 Singer Eleni		
 Choir		

The instruments are:

- o **Melodic sounds: these can use scales in different keys.**
 - For reference: MIDI note numbers for these pitches: c2=36, c3=48, c4=60, c5=72, c6 = 84, c7 = 96
 - **Piano:** piano, C2-C7
 - **Guitar long:** synthetic strings, C2-C7
 - **Guitar short:** synthetic strings, shorter than before, C2-C7
 - **Tines:** a sampled music box, C4(60) to C7(96)
 - **Reedy:** synthetic reed instrument, C2-C7
 - **Bowed:** synthetic string instrument, C2-C7
 - **Fifths:** Looping Fifths, pulsing every second, C2-C7
 - **Steel Drum:** C2-C7
 - **Kalimba:** C4-C7
 - **Synth Drum:** C2-C7
 - **Woodblock:** C2-C7
 - **Orchestra Hit:** C4-C6
 - **Sitar:** C2-C7
 - **Timpani:** C2-C4
 - **Tubular Bells:** C2-C7
 - **Glockenspiel:** C5-C7
 - **Tenor Recorder:** C3-Ab4
 - **Hand Pan:** C3-B4, C5-C6 have harmonics (Thanks, Jesse Stewart)
 - **Singer Henry:** A2-D5

- **Singer Eleni:** D3-D6
- **Choir:** a mixed choir C3-C6
- **Non-Melodic sounds: these can be arranged in any order, but do not have scales.**
 - **Percussion:** sampled percussion sounds.
 - **Noises:** experimental rock band noises (Dr. Nerve's Nerve Events).
 - **Kitchen Percussion:** sounds of pots and pans (The Institute of Contemporary Music).
 - **Cartoon Sounds:** cartoon sound effects. (Screwy Squirrel, MGM)
 - **String Quartet:** The Soldier String Quartet and vocalist Shelley Hirsch.
 - **Dogs:** Dogs barking (<http://www.freesfx.co.uk>).
 - **Cats:** Cats meowing (from a YouTube compilation).
 - **On The Farm:** Farm animal sounds (<https://freeanimalsounds.org/farm-animals/>).
 - **Waterphone:** Waterphones from Jesse Stewart's *Xenophora: Music for Solo Waterphone*.
- **Loops: these are a circle of continuous sounds that can be mixed together.**
The closer the Cursor is to a box, the louder the loop it represents will play.
This way, slow movements can still play along with other musicians playing loops as the same rate, although some loops are more ambient and do not mesh synchronously with other loops.
There can be from 4 to 16 sound boxes to play with loops. You can adjust the number with the slider in the [Sound Order](#) screen.
 - **Loops:** An instrument where the mix of 2 second long loops is controlled by the Cursor position.
 - **Marsh Loops:** The sounds of a marsh, from Dave Soldier's *Marsh Fugue*
 - **Fifth Loops:** Looping Fifths, pulsing every second which are arranged so they harmonize
 - **Tran Phu:** Recorded in Vietnam by Kala Pierson
 - **Pin Pia:** A traditional Thai instrument recorded by Dave Soldier
 - **Synthy Loops:** A collection of 2 second electronic loops.
 - **LP Lock Grooves:** A collection of loops that will synch with vinyl lock grooves at 33 1/3 RPM. (1.8 second loops)
 - **Glyptodont:** Sounds from a recording of Skip La Plante's *Glyptodont*.
 - **Troglodytes:** Sounds from Deep Listening Band's recording *Troglodyte's Delight*.
 - **Widow Jane Mine:** Tenor Recorder played in the Widow Jane Mine.
 - **Waterphone Loops:** Waterphones from Jesse Stewart's *Xenophora: Music for Solo Waterphone*.
 - **Leaf Drums:** Drumming loops from Leaf Miller. 110 BPM..
- **Relative Motion:** All the sample playing instruments - melodic or not - can also be used in relative motion mode. Relative Motion versions of these instruments are marked with a "REL" sign at the end of their names. Relative motion uses the tracker to determine whether the motion was left, right, up or down, and plays a sound corresponding to that motion. The same [Sound Order](#) screen is used to assign sounds to the directions (in the order **Down, Right, Up, Left**). "Relatives" are limited to four sounds.
- **MIDI**
 - **MIDI:** This will send MIDI events to either a connected MIDI device (via the "Camera Connection Kit" or other MIDI interface), or to a software MIDI synth running on the same device or within the network.
[Read more in the MIDI section.](#)
- **User Instruments**
Adventurous users can add their own sound files to **AUMI** to be turned into instruments. Read the [User Sounds](#) section for details.
- The base note, if the instrument is melodic. This is like the tonic of the "key" of the selected scale. Note that many of the scales are a little more complicated than usual major, minor, and chromatic scales.
- The kind of scale to use if the instrument is melodic:
 - **Chroma:** a chromatic scale
 - **Major:** a major scale
 - **Penta:** a pentatonic scale
 - **Minor:** a minor scale
 - **Maj Triad:** a major triad I-III-V scale
 - **Min Triad:** a minor triad I-IIIb-V scale
 - **7th:** a seventh I-III-V-IIIb scale
 - **up down:** a melodic scale that goes in a pattern of up a major third, up a minor third, down a fourth, and up a minor third again.
 - **Blues:** a bluesy scale
 - **Pelog:** a beautiful scale based on Pelog Selsir, a Javanese scale.
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 - *Modes: diatonic scales that start on other notes*
 - **Ionian:** Ionian mode.
 - **Dorian:** Dorian mode.
 - **Phrygian:** Phrygian mode.
 - **Lydian:** Lydian mode.
 - **Mixolydian:** Mixolydian mode.
 - **Aeolian:** Aeolian mode.
 - **Locrian:** Locrian mode.
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 - *Fifth repeating scales: like "up down", they don't repeat by octaves but by fifths. These names are to make it easy to refer to them, and are non-standard.*
 - **Sun:** a major second, a minor third, a major second
 - **Earth:** a minor third, a major second, a major second
 - **Star:** a major third, a minor second, a major second (like Pelog)
 - **Moon:** a major third, a major second, a minor second

The assignment of sounds to sound boxes is built dynamically from the scale picked, base note (key) for that scale, and what sound samples are available for the instrument. They start on the "base note" and create the scale by adding a cycle of intervals to that base note.

If that base note is lower than the lowest note available in an instrument (like C4 for the Tines), the scale will be played in the base note's key, but only using notes within the range of the instrument.

If the scale is a "mode", and the base note you choose is lower than the first note available in that instrument, it will start the scale

on that base note in the first higher octave that is available for that instrument.

The Chord feature, found in the Timing dialog, takes advantage of the scales choices to build chords and arpeggios.

- The number of sounds to put on the screen in "sound_boxes". Loop Instruments can play from 4 to 16 sounds or the maximum number of sounds available if less than 16. You can also set the number of sounds from within the [Sound Order](#) control.

Other controls are:

- **Show/Hide Names:** This controls whether labels show up in sound boxes.
- **Volume (Vol):** The volume for playing internal instruments. If you are playing a MIDI Instrument, it will send a MIDI channel volume message.
- **Cutoff Time:** Some sounds play for a long time, and overlap each other. This can keep a user from hearing that their motion has started a new sound. By setting the cutoff time, the sound will stop playing after that time in seconds has elapsed. Cutoff time is roughly set in tenths of a second, and runs from 0.1 to 3 seconds. Setting it to 0 will let the sound play its natural length. You can set the time with the slider, and get more precise by using the "<" and ">" buttons, which change the time in 0.1 second increments.
- **Use/Ignore Velocity:** Normally, the Cursor's motion doesn't control the loudness of a sound. If this switch is set on, melodic instruments and sampled instruments will play more loudly if the Cursor moves into it faster!

There are two sliders that set the range of the velocity. The **Velocity High** ("High Vel" on iPhones) is probably more important. If you set it to a low value, it will take more velocity to make it play loudly (and it will be more sensitive!), whereas setting it higher means nearly any movement will be loud. The **Velocity Low** ("Low Vel" on iPhones) sets a level for the least velocity, so if this is higher than 0, you should always hear something, but it might be very quiet.

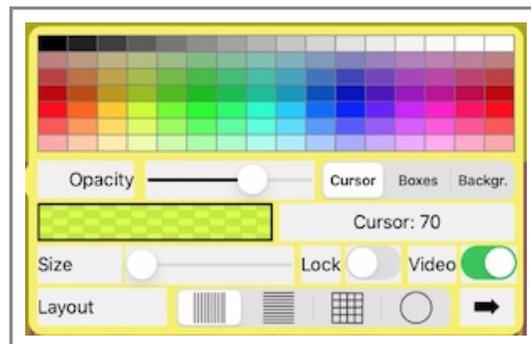
Normally, MIDI instruments will use the direction perpendicular to the layout direction the sound areas to control MIDI velocity. If the velocity switch is set on, the speed of the Cursor will be reflected in the MIDI velocity of the played notes.

The setting for "volume" is also figured into the MIDI "velocity" value

- **Polyphony** AUMI has a number of ways to control how long a sound is playing. This affects Melodic, Percussive, and to a lesser extent, MIDI instruments.
 - **(♪) Polyphonic** Normally, when any Sound Box is entered by the Cursor, its associated sound plays until it's done or until its cutoff time is reached. This can make for a lot of chaotic sound!
 - **(♪) Monophonic** When monophonic mode is on, only a single sound plays at a time. This is true even for chords and arpeggios that may have been set up with the Timing control screen. Entering a new sound box will immediately cut off the sound playing and play the new sound. In MIDI mode, staying in a Sound Box will keep the MIDI note playing until you leave the box.
 - **(♪) Monophonic Whole** This is a variant of Monophonic where the whole sample always plays (or as much as the Cutoff time allows). While the sound is playing, it's not interested in starting new sounds. This is a very specialized way of playing, designed for playing whole musical phrases, sentences, or words or phonemes, one at a time, that need to be played in their entirety. It acts like Monophonic in MIDI Mode, since there's no way to know when a MIDI note is over.

These parameters are saved in the user's [setup](#) file (see [Setups](#)).

LOOKS



The Looks screen controls lets you change the sizes, layouts, and colors of some interface elements. Pick which element you want to change from the "Cursor or Boxes" selector button.

By touching in the array of colors, you change the color of the selected element.

The box under the Opacity slider will show you the current color setting.

The "Opacity" slider lets you change the color's opacity (transparency).

For Boxes, this chooses the color that the sound box is colored. Boxes are always transparent, but you can make them more transparent with the Opacity slider.

The "Size" slider is used to change these sizes:

- For **Cursor**, you can change the size of the Cursor with the slider. It can be set from 70 to 300 pixels.

- For **Boxes**, you can change the size of the sound box borders with the slider, from 1 to 20 pixels.
- For **Background**, (Backgr) you can change the color of the background when you are not showing video.

It's quite possible to set all the colors the same for a really minimal and rather mysterious kind of screen.

The **Lock** switch locks the shape of the sound box. This disables the ability to rescale the sound box with **two-fingered touches**. This switch can also be interactively turned on and off with a **four-finger touch**, if the screen is not in [Installation Mode](#). The best way to do this is to put one finger down on the screen and use the other hand to do a three finger tap! This way, you don't accidentally resize the layout.

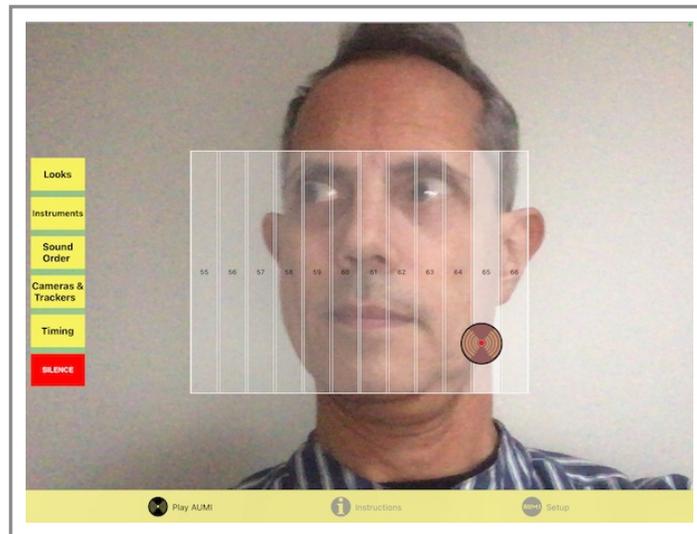
Another way to toggle the screen lock is to resize as usual with two fingers, then keep holding them down until more than 5 seconds has passed. This is also true if the screen is locked, just touching and holding for 5 seconds will unlock it.

The **Video** switch lets you choose between showing live video or just using the background color. It's the same as the switch in the [video camera and tracker configuration](#) dialog.

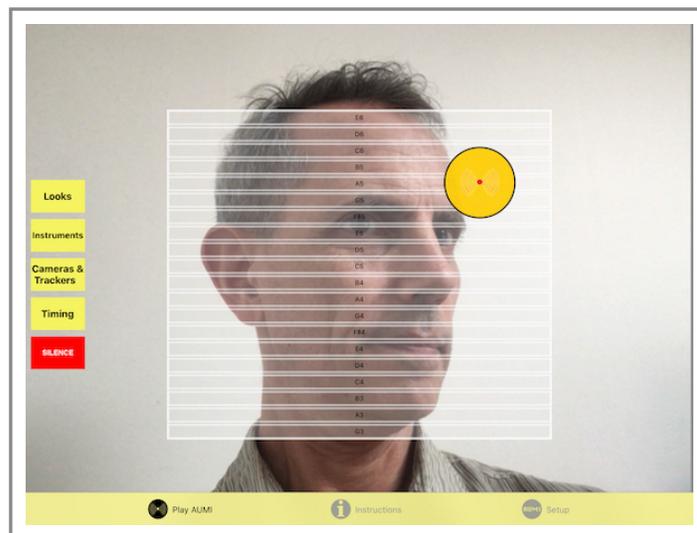
The **layout buttons** select whether the sound boxes are laid out horizontally, vertically, in a grid, or in a circle.

The **direction arrow** is used to reverse the order that the sounds are laid out in for the Horizontal, Vertical, and Circular layouts.

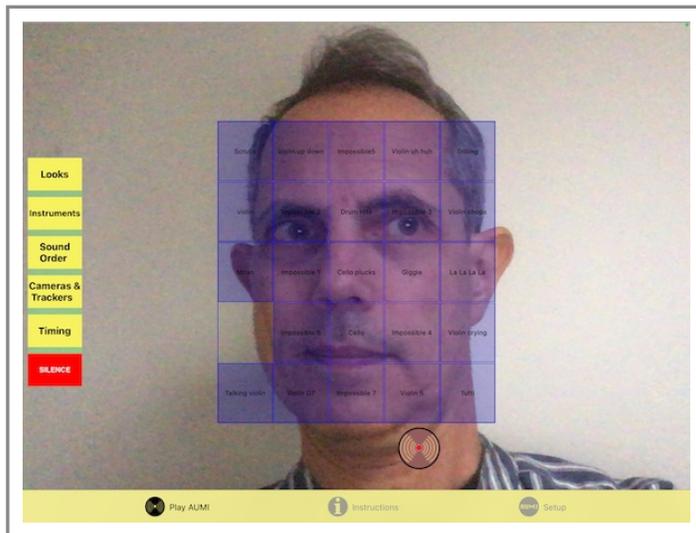
Vertical



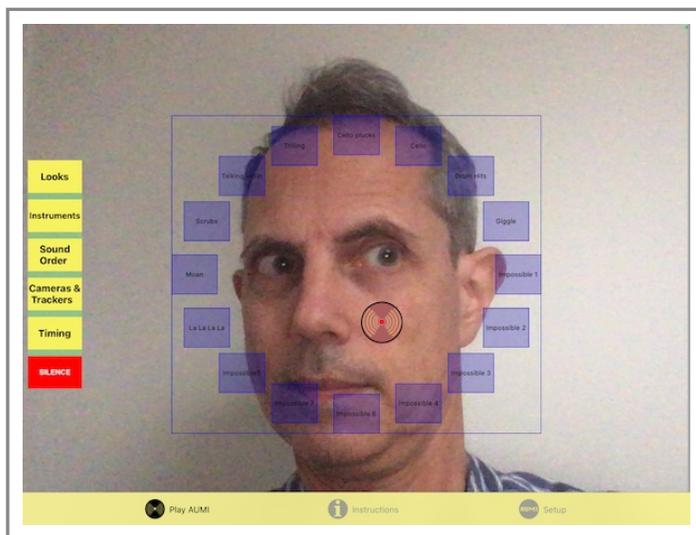
Horizontal



Grid

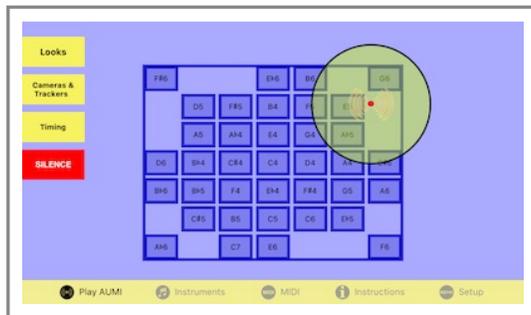


Circle



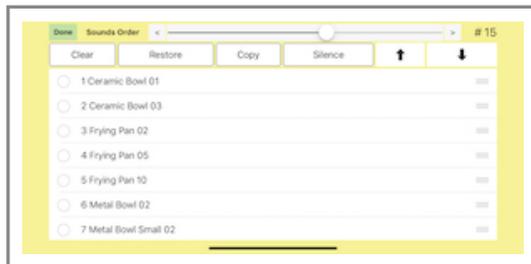
When you are using the MIDI instrument, and you are not using the Cursor's velocity, and if your layout is vertical, the position between top and bottom of the row of sound boxes is used as the note's "velocity," so that near the bottom of the grid is "low velocity" and near the top of the row is "high velocity". For a horizontal layout, left is "low velocity" and right is "high velocity".

To dismiss this control on an iPad, tap anywhere outside the popup. To dismiss this control on an iPhone, tap "Done".



This gridded layout assigns notes in a special order that tries to associate nearby pitches with nearby Sound Boxes. There can be up to 64 sounds available!

SOUND ORDER



This screen is accessed by touching the "Sound Order" button on the "Play AUMI" screen. The Sound Order dialog allows assign specific sounds to Sound Boxes. It's only enabled for Percussion, Noises, Loops, and Relative Motion instruments, because the sounds of these instruments do not have to be in a particular order

Pressing the Sound Order button shows you an interactive list of all the sounds available for that instrument. The ones currently playing are in black, and the ones that are currently not playing are shown grayed out.

To quickly remove a number of sounds from active use, select their names and touch the "Down Arrow". Similarly, if you want to use instruments from the middle of the list, select them and touch the "Up Arrow". Now you can easily re-order them!

- The slider at the top sets the number of sounds that this instrument will use, which will be from 1 to 64. On the iPad, you can see the layout of the sound boxes change as you move it.
- The Reset button restores the order of the sounds to what it was when the control was first displayed.
- You can change the order of the sounds by dragging the sound using the 'dragging' button on the right of each line.
- You can select any number of sound names and send them either to the top of the list or the end of the list using the appropriate buttons. This makes it easier to move sounds you want to hear into place.
- You can add silence to this list by touching the "Silence" button.
- You can duplicate a sound (and later move it) by touching the "Copy" button.

The **Loop** instrument, for example, can play from 4 to 16 sounds, but more sounds are to be found in the list which can be moved into place so that they can be heard.

Similarly, if you set up a **Percussion** or **Noises** instrument with just two sounds to play, you can choose those sounds by moving them into place using the sounds screen.

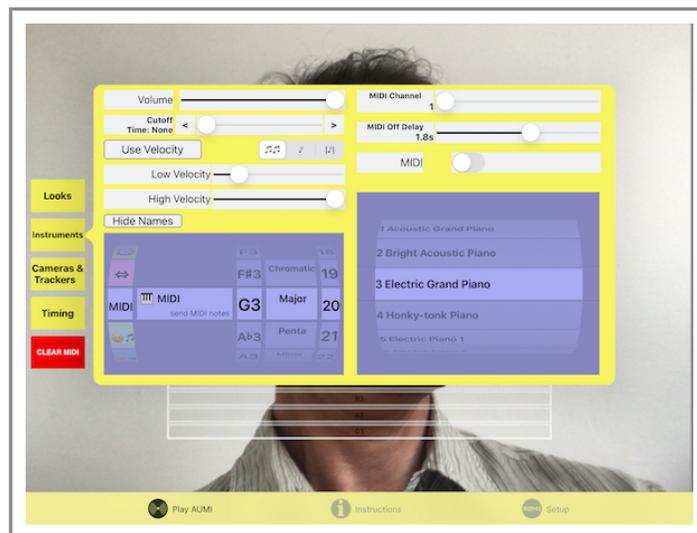
This alternative order of sounds is saved with the instrument if you use the "Save Setup" button on the [Setup](#) screen.

MIDI controls are a separate screen on iPhones:

MIDI



The MIDI screen is included as part of the Instruments screen on iPads.



If the current instrument is a MIDI instrument, you can use these controls to select a MIDI channel and MIDI program settings.

Because most MIDI instruments are not percussive, and need to be told to stop playing a note, there's a slider to set the delay time until a "note off" event is emitted. But if AUMI is set to be in monophonic mode, MIDI notes will stay on until the Cursor is in a new Sound Box. When a MIDI instrument is selected, the "SILENCE" button turns into a **CLEAR MIDI** button, in case there are stuck notes.

You can also enable and disable MIDI transmissions with a switch.

You can select a program with the picker on the right. **The names of the programs are the standard General MIDI names, and may not correspond to sounds that are actually played by the MIDI synthesizer you are connecting to.**

Different synths try to discover MIDI sources in different ways, and sometimes, it's trickier than it looks. AUMI will try to connect to every MIDI receiver that it sees, even if they are added while AUMI is running. Apple's "Camera Connection Kit", when connected to a hardware USB-to-MIDI adapter, will let you attach AUMI to an external hardware MIDI synthesizer. There are other MIDI interfaces available as well.

To have AUMI play another synthesizer or synthesizers on the same device:

1. Start **AUMI**.
2. In Instruments, choose a MIDI instrument. Pick a scale and note range too, if you like.
3. Make sure the MIDI switch is turned on.
4. Click the home button (on devices that have them) or swipe on the Home indicator (those without a Home button) to put **AUMI** in the background (it's still running)
5. Start an iOS MIDI synthesizer like **Garage Band**, **Bismark BS-16i**, **KQ Dixie**, **Animoog**, **Thumbjam**, or another MIDI compatible iOS app.
6. Make sure the synthesizer can play using background audio. This is usually a switch in the MIDI section of the app's settings and information section
7. Click the home button (on devices that have them) or swipe on the Home indicator (those without a Home button) to put the synth in the background, and click on **AUMI's** icon again.
8. It should be able to play the MIDI synth now.

You can also use a local network to play instruments on a nearby laptop or desktop. That's a little more involved; I'd suggest you look at tutorials about the Apple Audio MIDI Setup utility, like [this one](#) by Joe Stallings.

REPORTS

AUMI is capable of generating two kinds of reports if this feature is enabled. If you are considering the use of the reports feature, please see [LEGAL](#). These reports are in the form of CSV files. .



There are two kinds of events that AUMI optionally logs: **Movements** and **Sound Box Events**. These are enabled by switches on the Setup screen.

When you enable logging, you'll see a privacy notice in a red box appear with the text:

AUMI collects usage data when this switch is turned on.
By turning this on, you agree to let AUMI collect and retain this data.
You can switch off this option at any time.
You can also either export or remove the data which has been collected.

You can dismiss this notice by tapping the "DONE" button.

Saved Setups does not save the state of these switches. This is to make sure these switches are always set manually. This is true for remotely sent and initially loaded setups as well.

Movement event logging

When **movement logging** is enabled with the optional switch "Log Movements", every 15 seconds, a record is cut with some information that may be used to make reports in an external spreadsheet program like Numbers or Excel. This information may be useful for tracking the progress of individual **AUMI** users in different programs at various institutions.

The movement file is created with a name in the format **AUMI-YYMMDD-HHMMSS.csv**, so that the date and time are part of the file name, e.g.: **AUMI--121206-092201.csv**

Also, when the program transitions from foreground to background, it will also log this event. In this record, the timestamp and identifying information are retained, and the position related fields will be blank, but the Scale field will say **FOREGROUND** or **BACKGROUND**.

When logging is turned on, a tiny logging notice appears in the upper left corner of the screen to remind you that it's logging.



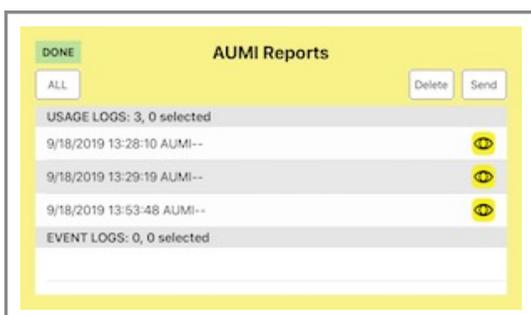
Sound Box event logging

There's a second kind of report that is enabled with the optional switch "Log Sound Box Events".

It tracks the entry and exit from Sound Boxes, and records the time spent in each one, and its file has a slightly different name from the movement report file:

AUMI-EL-[institution]-[program]-[date and time].csv

Reviewing, deleting, and exporting logs



The **Reports** button will present you with a list of all the report files AUMI has made. They are ordered by date, and the two types of files are in different sections of the list.

- You can select a file for export by tapping on it. You can unselect it by tapping it again. You can select all the files by tapping all. Whenever all the files are selected, the "All" button turns into a "None" button, so all the selections can be cleared. The header for each section keeps track of the number of items and how many are selected.
- Each line has an "eye" icon on it. By tapping that, a kind of précis of the data shows up on a new screen, which you can examine to make sure it's the one you want. Tap the title bar on this screen to dismiss it and return to the list.
- You can delete the all the selected files by touching the delete button. There will be a confirmation dialog just in case you hit it accidentally!
- By dragging the name of a file to the left, a **delete** button will show up. You can tap this to delete a file individually.

When you are ready to send out the reports, tap **SEND**. Any program, like Apple's **Numbers**, that can read a text file will be listed in the dialog that pops up. You can also use Air Drop to send the files directly to any other Apple device that supports Air Drop, for instance, a desktop machine. You can also mail or post the files to various services, and you can also cancel the dialog.

All these files, are also available in the [iTunes Document interface](#) for **AUMI**. The main log file is also written whenever you leave the program.

Each record has the following information:

- "Version",
- "Date Time Stamp",
- "Name",
- "Instrument",
- "Scale",
- "Notes",
- "Notes Played",
- "min X",
- "max X",
- "min Y",
- "max Y",
- "avg Vel X",
- "avg Vel Y",
- "Institution",
- "Program",
- "Administrator"

and the event report fields are these:

- "Version",
- "Date Time Stamp",
- "Name",
- "Instrument",
- "Note",
- "TimeInBox"
- "Name"

The "Version" is currently "Iv_1.0", and the version also records the device type and AUMI's release number. This way, you can tell users and instruments apart, and send files to different institutions.

For example:

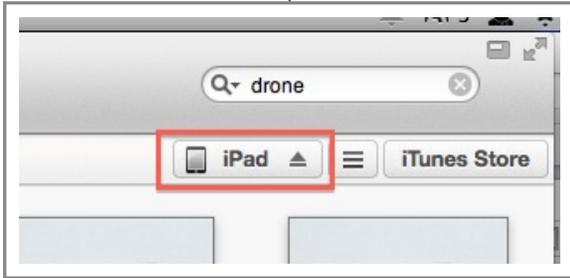
Version	Date Time Stamp	User	Instrument	Scale	Notes	Notes Played	min X	max X	min Y	max Y	avg Vel X	avg Vel Y	Institution	Program	Administrator
Iv_1.0 iPad	160718-012303		Piano	Chroma	5	0	0	0	0	0	0	0	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012304	Example		FOREGROUND	0	1	0.5	0.5	0.5	0.5	0.5	0.5	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012318	Example	Piano	Major	8	0	0.5	0.5	0.5	0.5	0	0	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012333	Example	Piano	Major	8	2	0.5	0.53	0.5	0.5	0.31	7.46	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012348	Example	Piano	Major	8	21	0.59	1.08	0.5	0.5	2.39	36.41	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012403	Example	Glockenspiel	up down	8	31	-0.31	1.03	0.5	0.5	4.21	59.46	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012418	Example	Waterphone	up down	8	2	0.16	0.28	0.5	0.5	0.31	15.01	Test Inst	AUMI Class	Lowengard
Iv_1.0 iPad	160718-012421	Example		BACKGROUND	0	0	0	0	0	0	0	0	Test Inst	AUMI Class	Lowengard

USING THE ITUNES DOCUMENT BROWSER

If for some reason you don't want to Send or Mail the reports externally, you can find them in the Files app, in "On My iPad"'s AUMI folder. But if you are running on an older operating system, you can get your reports by:

1. plugging in the device into a computer that knows about it. Usually, that's the one that was used to set it up or back it up.

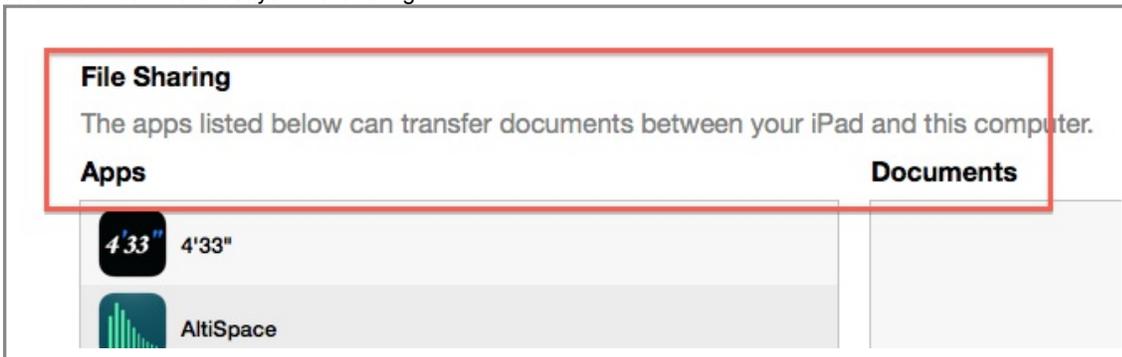
- open iTunes
- find the device in iTunes's top bar:



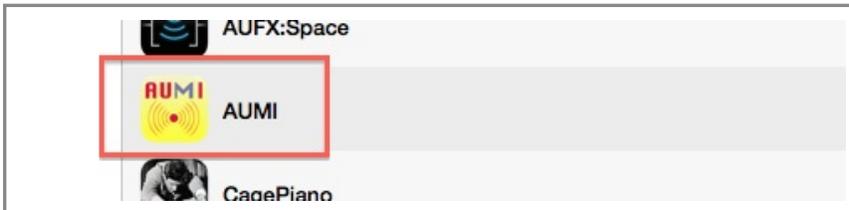
- click on that and click on 'Apps' in this list of buttons:



- scroll down to where it says "File Sharing"



- scroll down that list and click on AUMI:



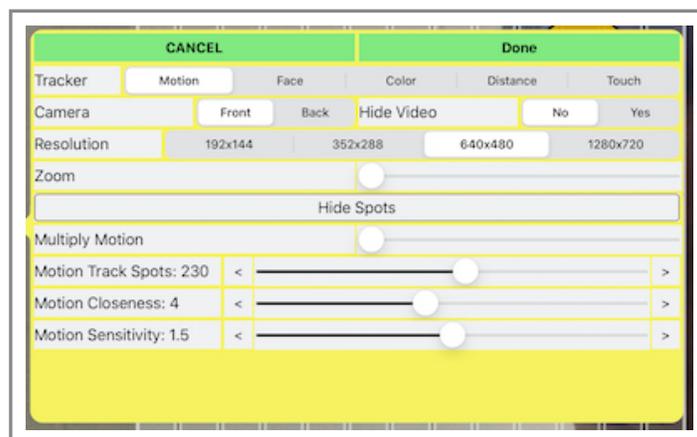
- The box on the side marked "Documents" will show all the sessions it has recorded:

AUMI Documents			
	AUMI-Deep Listening--140621-152619.csv	6/21/14, 3:26 PM	8 KB
	AUMI-Deep Listening-AUMI-140621-153246.csv	6/21/14, 3:32 PM	12 KB
	AUMI-Deep Listening-AUMI-140626-124609.csv	6/26/14, 12:46 PM	4 KB
	AUMI-Deep Listening-AUMI-140629-085235.csv	6/29/14, 8:52 AM	4 KB
	AUMI-Deep Listening-AUMI-140629-094948.csv	6/29/14, 9:49 AM	12 KB
	AUMI-Deep Listening-AUMI-140705-122343.csv	7/5/14, 12:23 PM	4 KB
	AUMI-Deep Listening-AUMI-140705-122756.csv	7/5/14, 12:27 PM	8 KB
	AUMI-Deep Listening-AUMI-140705-123900.csv	7/5/14, 12:39 PM	12 KB
	AUMI-Deep Listening-AUMI-140713-074235.csv	7/13/14, 7:42 AM	4 KB
	AUMI-Deep Listening-AUMI-140713-133609.csv	7/13/14, 1:36 PM	4 KB
	AUMI-Deep Listening-AUMI-140713-140432.csv	7/13/14, 2:04 PM	4 KB
	AUMI-Deep Listening-AUMI-140713-140559.csv	7/13/14, 2:05 PM	4 KB
	AUMI-Deep Listening-AUMI-140713-140628.csv	7/13/14, 2:06 PM	4 KB
	AUMI-Deep Listening-AUMI-140713-140756.csv	7/13/14, 2:07 PM	4 KB
	AUMI-Deep Listening-AUMI-140713-140946.csv	7/13/14, 2:09 PM	4 KB
	AUMI-Deep Listening-AUMI-140713-141028.csv	7/13/14, 2:10 PM	4 KB

All the personal set-ups are also in the Documents Directory.

You can select them all and click "Save to..." to save them in a directory that you can remember. They don't take up a lot of space, and you can also just delete them after you've saved them.

VIDEO CAMERA AND TRACKER SETTINGS



Video Camera Settings There are many options to customize the video camera here:

Front or Back Camera: AUMI can use the front camera or the back camera. The video image of the front camera is flipped like a mirror, but the rear camera remains the same.

Hide Video: This switch lets you control whether you see the live video on the screen or not. Some players may not want to look at themselves while playing, or you may just prefer a solid color instead of video for some performances. When **Hide Video** is off, the screen will show what the camera sees and display the live video image behind the Sound Boxes, controls, and Cursor. When **Hide Video** is on, the screen will show a solid colored background instead. This background color can be set using the [Set Looks](#) screen controls. The Cursor, sound boxes, and tracking spots are unaffected by this switch. Select the segment "No" or "Yes". There is an identical switch in the [Set Looks](#) screen control dialog.

AUMI's camera resolution is initially set low to accommodate slower devices, but on newer, faster devices, you can use a higher resolution if you like. The "Zoom" feature will let you zoom in to the center of the image, and reduce the resolution, thereby significantly lowering the latency of the tracker. In fact, if you set the camera to a high resolution setting, and zoom way in, you can more easily track the motion of eye blinks and tongues.

Resolutions:

- Lowest resolution (192x144)
- 352x288
- 640x480
- 1280x720

Zoom: If the camera is too far from the user, Zoom can help make limited motion more effective. It also speeds up the interactivity a lot, because there is a smaller image to track!

Trackers

AUMI uses software called a "tracker" to analyze the video images in order to know how to move the Cursor. These tracker settings may help you optimize AUMI when you have a faster iOS device, or want to experiment with the responsiveness of AUMI.

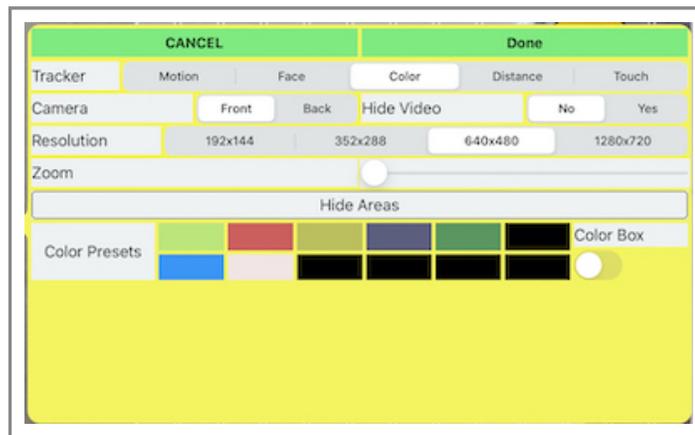
- The **Motion Tracker** looks for high contrast parts of the image (**features** or **tracking spots**) and tries to correlate their movement from frame to frame. The average direction of this movement is used to move the Cursor. Some settings related to the Motion Tracker are detailed below.
- The **Face Tracker** looks for a face in the image and puts the Cursor right on the nose. When it cannot find a face, it leaves the Cursor where it is.



- The **Color Tracker** looks for a specific color (really, a set of colors) in the video image and tracks the center of the largest contiguous area of those colors that it finds.
 - To select the colors that are tracked, double tap the screen on a color that you want to set, which puts AUMI in "color setting mode". While AUMI is in the color setting mode, the cursor will change to a multicolored ring. While your finger is still down, the colors touched are added to the list of tracked colors, and you can "collect them" by moving the colored object onscreen or your finger. The color of the cursor is set to one of these colors as a reminder.
 - You can reset the color of the cursor using the [Looks](#) screen.
 - There are 12 buttons that you can use to save these tracking color sets. Tap on a black button to save the current color set there. Tapping on a colored button will change to that color set. Long pressing on a color set button will clear it back to black. These color sets are only saved on the device being used.
 - The current color set is saved with the Environment for this Setup, and can be transmitted to other devices using the [Listen and Send](#) interface.

There's a debugging switch, "Color Box", that draws a bounding box around the largest contiguous area that matches the color set. It also changes the video's colors to show the limited color set that it uses for tracking instead of the vastly larger number of colors normally seen. This can help you pick out colors sets.

The Color Tracker is very fast and can be used with high resolution video! A good tip is to put a brightly colored sticker or button on a stick, a hat or a glove, and set it to track that color!



- The **Distance Tracker** is a variant of the Color Tracker that uses the area of the largest contiguous color to control the Y-axis placement of the cursor. Since that area can be correlated with the distance from the camera, it's a good way to track objects that are approaching and receding. The X axis is unaffected. With carefully thought out layouts, this can be a very effective way to play AUMI.
- The **Touch Tracker** is an official way to play the screen with just a touch. No video is processed at all. As a side effect, the recentering of the cursor feature is turned off, and you can tap on a sound box repeatedly to play it.

Next to the tracker selector is a toggling button **SHOW SPOTS / HIDE SPOTS (SHOW AREAS/ HIDE AREAS** for Color Trackers) that shows or hides the Tracker's tracking spots for debugging purposes.

For the Motion Tracker, each little numbered square on the screen is one of the tracker's tracking spots. The dark blue ones are spots that have moved enough to contribute to the motion of the Cursor, the paler ones are being ignored until they move more. It's useful to find out what it is looking for, based on the tracker settings.

The Face Tracker also shows icons for the eyes and mouth with little eye and mouth icons. This gives feedback on whether the Face Tracker has detected a face or not.

The Color and Distance Trackers will not "show spots" (there are none), but will color the areas that match the tracked color a lighter shade of whatever color it is.

The Touch Tracker shows no spots - it's not tracking any video!

Each kind of device and working environment has its own best parameters for working with this kind of tracker.

The Motion Tracker has these configuration options:

- **Multiply Motion:** When the Multiplier is at its lowest setting, all "meaningful" motion is directly added to the Cursor's position. "Multiply Motion" takes that motion offset and multiplies it up to 4 times. This increases the range of motion, so that a very slight motion can have a bigger effect at moving the Cursor. Multiply has no effect on the Face, Color, or Touch Trackers, which directly set the cursor.
- **Motion Track Spots** controls the number of tracking spots (features) that **AUMI** uses to detect motion. The more there are, the better the chance that the motion will be accurate. However, lower powered devices may need to keep this number low. The range is from 32-400 spots. The default is 50, to accommodate slow devices.
- **Motion Track Closeness:** This controls how close together the tracking spots will be located in pixels. It's good to keep them apart so that general motion can be detected. If there are parts of the image with a lot of high contrast points close together, the tracker will find that a little too interesting and ignore other parts of the image which you may want to track. Increasing the number of spots will mean it has more chance to find the motion it needs! The range is from 0 to 8 pixels.
- **Motion Sensitivity:** This number sets a limit on how much motion a tracking spot must have for it to be considered "meaningful motion". A setting of 0.5 is good, but in visually noisier environments, a higher setting may be needed. For more sensitivity, make it low, like .1 or even 0.0. The range is 0.0 to 4.0, in increments of 0.1 in average pixels.

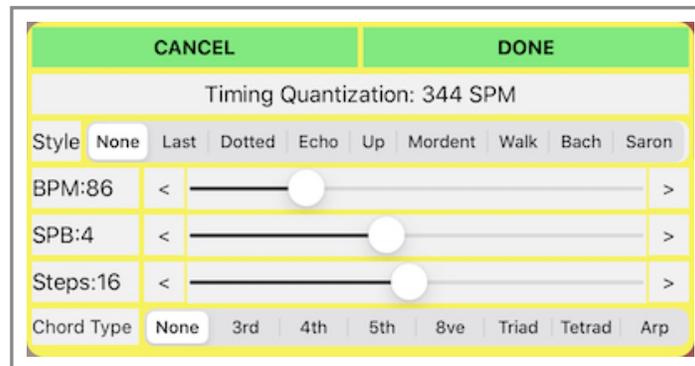
The Face Tracker has no configuration options.

The Color Tracker has one configuration option:

- **Color Range:** This tells the color tracker how close a color needs to be in order to qualify a color that matches the selected color. The lower the number, the closer the match. Usually 4 is good, but uneven lighting could be compensated for with a higher setting.

The Touch Tracker has no configuration options.

CONFIGURE TIMING



"Timing Quantization" is the process of playing sounds on even beats. Normally, when a Cursor touches a Sound Box, it immediately produces a sound. Sometimes, you can have more control if playing the sound related to that contact is delayed until it appears on a specific beat. AUMI decides what to do with the events that come in and schedules the playing of sounds to occur only on the beat. Different styles of quantization let you change the timing of the beats and schedule more than one note to play from a single entry into a Sound Box. You can choose from these by choosing a "Timing Style". If the sounds are spread out in time and a new sound box is touched, usually this will restart the sequence of sounds.

Here are the Timing Styles:

- **None:** No Timing Quantization is used. All sounds play immediately.
- **Last:** If several Sound Boxes are passed through, only the last box before the beat comes by is chosen. This way a user can have more time to choose the right sound correctly.
- **Dotted:** This behaves like "Last", except instead of an even distribution of beats, it puts them in a "dotted" rhythm: a long beat followed by a short beat (or a short followed by a long, depending on how you hear it!)
- **Echo:** Like "Last", except every time a Sound Box plays, it plays the same note again the specified number of times, each time a little quieter. New events override these "Echos". This has the effect of giving you a lot of sound even if there isn't a lot of motion.
- **Up:** Like "Echo", except each play will queue up the next Sound Box's note in the Sound Boxes on screen. If the scale is a chord, this means it will arpeggiate the chords upward! If the layout is reversed, this will instead go "down".
- **Mordent:** Like "Echo", except each step will queue up the next box's note in the boxes on screen, back to the original note, the box before the note, and the note again, and it will repeat this the more echos you provide for. Set "Echos" to 5 to hear "original, up, original, down, original".
- **Walk:** A random walk - it either repeats, goes one step below (if it can) or one step above (if it can), for "Echos" steps.
- **Bach:** The first 8 notes of Bach's Prelude 1, BWV 846. This sounds recognizable no matter what the scale!
- **Saron:** Plays a traditional Indonesian gamelan saron pattern. This sounds good with Diatonic, Pelog, Madenda, and the fifth-based scales. The whole pattern is 16 steps long, so set echo to 16 if you want to hear the whole pattern.

Characteristics of these "Beats" can be configured with the sliders, and small changes can be set accurately by using the "<" and ">" buttons next to each slider.

The sliders control the following things:

- **BPM** "Beats Per Minute" , which can be used to set up the general pace of quantization. AUMI doesn't know about other programs' rhythms, but if it's set to the same BPM, it will at least be roughly in phase with them. (20 to 300)
- **SPB** "Sounds Per Beat" divides the beat equally and plays this many sounds per beat. It's an easy way to increase the closeness of sounds and still be "in time" with other programs. (1 to 8). Turning this up also lets the arpeggiation and chord timing features be used in a way that is nearly operating in real time. BPM and SPB multiply to show the "Sounds Per Minute" (SPM) in the titlebar.
- **Echos** AUMI's Timing Quantization can also act like a mini-arpeggiator, echo, or assign new note sequences with each touch of a Sound Box. This is the number of scheduled sounds (usually echos) in that mini-sequence (1 to 32).
- **Chord Type** AUMI can also play several notes simultaneously - or nearly so - by choosing sounds from the layout to make a chord. For example, with Chord Type set to "triad", playing a C in a C major scale will result in "C E G", which is a C major triad, playing an "A" will result in "A C E", an A minor triad, and so forth. The choices of chord type are made based off of the original note picked (the "root")
 - **None** Only the root is played
 - **3rd** The root and the third sounds are played.
 - **4th** The root and the fourth sounds are played.
 - **5th** The root and the fifth sounds are played.
 - **8ve** The root and the octave(8th) sounds are played.
 - **Triad** The root, third and fifth sounds are played.
 - **Tetrad** The root, third, fifth and seventh sounds are played.
 - **Arp** The root, third, and fifth are played in an arpeggio.

Using Timing Styles with Chord Types will let a chord play in a Timing Styled pattern. It can play a series of triads, say, ascending the scale.

Using these chord types with more interesting scales, you'll get more interesting chords!

A chord will only play if it can play all the notes in the chord, so it will stop at the "top" of the scale.

It may help to shorten the instrument's cutoff time (or MIDI off delay time) so you don't have a massive number of notes playing at once.

This will also work on non-melodic sounds, adding to the cacophony, depending on the instrument!

The Chord Types don't work in monophonic mode, instead only playing the last note scheduled.

USER SOUNDS AND AUMI INSTRUMENTS

AUMI makes it easy to add pre-packaged sets of sounds as optional instruments. This way, custom sounds for a particular user or group can be easily installed on a number of devices. Since they are optionally loaded, they don't enlarge the original AUMI download or clutter up the lives of people who might not be interested in them.

A collection of pre-made AUMI instruments is available on [aumiapp.com's AUMI Instrument page](http://aumiapp.com/aumiinst.php) (<http://aumiapp.com/aumiinst.php>). Just tap on one and it will ask to launch AUMI, and install it right away and let you play it. This page is constantly growing with a collection of unusual instruments and sound sets.

There are two ways to delete a User Instrument: One is to use the "Delete Instrument" button in the instruments controls, or you can delete individual sounds in the Sounds Control. If you choose to delete all the sounds, the option to delete the whole instrument will present itself.

An AUMI Instrument can be prepared by the AUMI staff out of your sound files and put in this list for the whole AUMI community, just contact info@aumiapp.com! Or you can make one yourself:

- Using the MacOs Finder, you can make a directory of sound files that follow the naming conventions, and compress it from the Finder.
- Rename the file's suffix from zip to aumiinst.

or, if you are not on a Mac,

- Put the sound files into a folder. Make sure they are named correctly if you want them to be "melodic", and that they are edited and equalized and normalized to your taste. tar/zip the files. I use this UNIX command in a shell script:


```
/usr/bin/tar --exclude ".DS_Store" -vczf "$1.aumiinst" "$1"
```
- note that the tar/zip file should have the suffix ".aumiinst"

These files can be loaded into AUMI from a web page by using the HTTP scheme "aumiinst:", for instance,

[Whatever](#)

You can also text or email an aumiinst file as an attachment, click on it on a device, and it should launch AUMI and load it up in the same way.

Somewhat adventurous **AUMI** users or administrators can add their own sounds into **AUMI** in a limited fashion.

- You can "share" sound files from other applications that can record or create audio files and they can be made available inside **AUMI**, like Voice Memos or Garage Band and many more! This will work if the sharing dialog says "Copy into AUMI". It will not work if it says "Open In AUMI".
- You can use the "Files" app to move sounds in and out of AUMI and rename them. If you "Share" from another app into AUMI's folder in "Files", it will show up!
- You can also use the iTunes Document interface for **AUMI**, you can drop in MP3 and other sound files and have them automatically turn into instruments from another computer running iTunes (or, from the Finder, in MacOS Catalina and later).

By using some naming conventions, you can organize the files into separate melodic and percussive Instruments. If the instrument you created has more than 4 sounds, it can also be used as a Looping instrument or Relative instrument.

Here's how to add sound files from a desktop Mac using the Finder (after MacOs 13/Catalina):

- Plug in your device and open the Finder.
- When the device becomes available, it will appear as a device in the "Locations" list, like other disk drives. Click on the button named for your device.
- Look for the menu item "Files". Inside of Files should be the "AUMI" folder, which is in fact where you can put files that AUMI can use. You can treat this folder like any other folder and copy sounds into it, or rename, or delete them, and otherwise organize them. Logs, .aumi setup files are also available in there.
- Back in the device, your sounds should be available in AUMI when you launch it again.

Here's how to add sound files from iTunes File Sharing interface (before MacOs 13/Catalina):

- Plug in your device and open iTunes.
- When the device becomes available in iTunes, it will appear as an icon next to the drop down menu in the toolbar on the left. Click on this button.
- Pick "File Sharing" in the button menu. (Called "Apps" before iOS11)
- Scroll down below the listing of Apps to the "File Sharing" section
- Find **AUMI** in that section and click on it. It should look like the image shown below.



- You can now drag files in (or out) from this window. Or you can use the "Add ..." button.
- Drag in any sound files you want to use. They must have a suffix of ".mp3", ".aif", ".aiff", ".m4a", or ".wav" (lower case).

You can also share sounds in an iCloud Drive folder so they are available for several devices.

Naming Conventions

The sounds can be turned into different kinds of Instruments if they follow this naming convention:

- Files which you want to be interpreted together as a *melodic instrument* - that is, able to use scales and keys like Piano - should be named as the corresponding MIDI note numbers, and have a contiguous range of chromatic notes. The name should start with 36 (which is C2) and not go higher than 96 (C7). You can provide a smaller range of sounds within those limits, say, starting at 60 (Middle C). It's important that they be contiguously numbered - otherwise they won't be recognized as melodic! For example, 36.mp3, 37.mp3, 38.mp3, etc. These files are turned into a "melodic instrument" named "**My Melodic**". They are also put in as a percussive instrument, and you can reorder the sounds!
- If you don't want your sounds to be considered melodic, but you still would like to number them, try starting the numbers from 100 rather than 0 or 1! You can also mix the two kinds of instruments. A percussive instrument can reveal non-melodic, but related sounds as part of the instrument as well. These special sounds simply must not end in a number from 36 to 96.
- Any sound file is also put in the list for simple sampled instruments (**My Instrument**), loops (**My Loops**) and a relative instrument (**My Instrument REL**). You have to have at least 4 of these sounds to make a "**My Loops**" instrument or a "**My Instrument REL**".

There's no reason to constrain yourself to sounds with pitches corresponding to the MIDI note number that it is named for, or melodic sounds at all! You should have a file for each MIDI note in the range of notes you want to support.

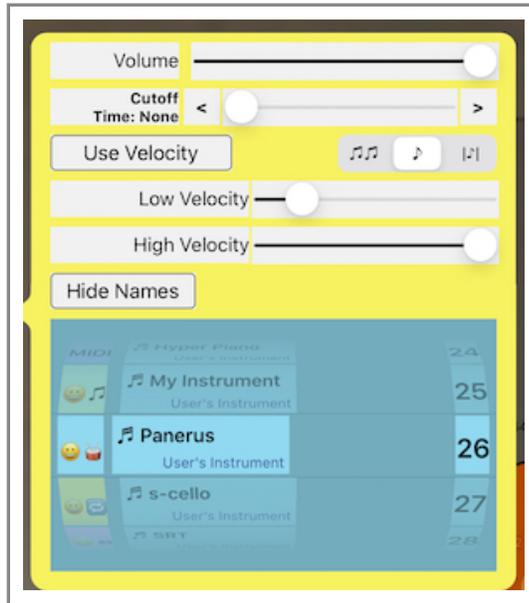
If you want to organize your sound files into separate instruments, you can follow this naming convention of having them all start the same way, but with an underscore separating the name from the "MIDI note number" or other distinguishing string. For instance:

- (Melodic audio files) Marimba_60.mp3, Marimba_61.mp3, Marimba_62.mp3,...
- (Percussive audio files) Peter_hi.mp3, Peter_there.mp3, Peter_AUMI.mp3, Peter_players.mp3

You can also put them in a directory with an instrument name. This is what actually happens with "AUMI Instrument" files.

- You can remove sound files from a User instrument by going to the sounds menu while a user instrument is selected. A "delete" button shows up in the interface. Select the files you want to delete, and tap the delete button. It will ask to confirm the deletions. If you are deleting all of the sound files, it will ask to confirm that you want to remove the instrument as well. If the current instrument is deleted, AUMI will use the "Piano" instrument when done.
- You can remove files from **AUMI** using the desktop File Sharing interface. The .csv AUMI logging files will be visible there and are also able to be transferred for reporting purposes or removed.
- Once the files have been transferred, you can close iTunes.
- When you now restart **AUMI**, you can see the new instruments appear at the bottom of the list named **My Melodic**, **My Instrument**, **My Loops**, and **My Instrument REL** or classified with the names given with the naming convention mentioned above.

If there are no samples in that particular category, the instrument won't be created.



The "User Sounds" Instruments can be saved in a Setup (using "Save Setup"), but because of the possibility of sound files being added or removed if it is loaded on a device that does not have one of these files, it will put a tilde (~) in front of the name and play Silence instead if it can't find sound files when it is loaded. The same goes for sharing sounds to other devices via the [Listen and Send](#) interface.

Many apps like "Audio Share" or other editing, recording, and synthesis programs, have a sharing button that can send a sound file to other programs. AUMI is now a destination for this kind of sharing. The supported sound formats are :mp3, aif, aiff, wav, and m4a. I'd suggest you keep the sounds under 30 seconds long.

REGISTER

You can register for news about **AUMI** by [clicking on this MailChimp link](#) or visiting the AUMI website's "Get Involved" page at <http://aumiapp.com/participate.php>.

LEGAL

AUMI for iOS collects data about how the app is used. To learn more about what kind of information is being stored, see [Reports](#). This information is stored only on the device AUMI is running on. It is not shared or uploaded to any service. Using AUMI's reporting interface, these usage records can be reviewed and exported for further reporting needs, such as research on the progress of a group of AUMI users. The export can be done in a number of ways to any apps which accept text files. These records can have metadata included in them that can identify the user, program, administrator, and institution if the person filling out that metadata wishes. Each file can also be deleted from within the app.

It is the responsibility of the person transferring the data to ensure that the privacy of the AUMI Users is in accordance with the laws in their jurisdiction, and the wishes and consent of the people whose actions are recorded in the data which is being collected and retrieved.

A privacy policy document is currently under review. Contact us at info@aumiapp.com if you have any questions. A preliminary version is visible at: <http://aumiapp.com/policy>.

CREDITS

AUMI for iOS was developed by [Henry Lowengard](#) for the Deep Listening Institute, now called "The Center for Deep Listening at Rensselaer" and headquartered in the Center for Cognition, Communication, and Culture. **AUMI for iOS** adapted from the desktop version of **AUMI**, also available from aumiapp.com. Thanks to Pauline Oliveros, Leaf Miller, Jaclyn Heyen, Emily Halstein, Lisa Barnard Kelley, and Al Margolis of DLI, and the AUMI desktop developers:

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- [The Institute of Contemporary Music](#) for Kitchen Percussion. (via ccMixer.com)
- [Free SFX](#) for the Dogs
- [Funny Cats and Kittens Meowing Compilation 2013 \[HD\]\(You Tube\)](#) for the Cats
- [Farm animal sounds \(https://freeanimalsounds.org/farm-animals/\)](https://freeanimalsounds.org/farm-animals/)
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Many more "AUMI Instruments" can be found online [aumiapp.com's AUMI Instrument page](http://aumiapp.com/aumiinst.php) (<http://aumiapp.com/aumiinst.php>) .
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AUMI websites:

- The Official AUMI for iOS Web site is at <http://aumiapp.com>.
- **AUMI** also has a presence on Facebook at [:https://www.facebook.com/AdaptiveUse](https://www.facebook.com/AdaptiveUse).

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