AudioTexture Basics

Version: 1

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Overview

AudioTexture is a plugin prototype for sound texture synthesis developed by AudioGaming. The plugin has a user interface that integrates the Audio Commons content for creative sonic/musical explorations. AudioTexture is based on *concatenative synthesis* which analyzes automatically the sound signal and decomposes it into adaptively defined units (not equal in size, so not the usual granular synthesis) for resynthesis. It is equipped with semantic descriptors for intuitive control to generate many variations from a given sound sample. This plugin let users generate sonic textures from audio recordings within a digital audio workstation (DAW) environment, such as Logic Pro X, Ableton Live, or Reaper. The type of sounds the plugin can typically be used with are non musical sounds with short-term textures (e.g., water drops, rock falls, construction work, and so on). It is however possible to use the plugin with musical sounds which can also lead to interesting textures.

Installation

If you want to install it on your own computer, you can download a free 30-day trial for Mac OS Sierra here:
http://downloads.audiogaming.net/freetrial/audiotexture_trial_v1.0.pkg
This will install an Audio Units version (.component). Please note that the plugin is in Beta version and is not available in the market yet. It is possible that you experience some bugs or crashes.

Concatenative synthesis

The principle of concatenative synthesis is to concatenate sound units in a random or controlled order. The sound units can be defined either by a fixed size (*granular synthesis*) or by more sophisticated analysis methods. The concatenation between two selected units is carried out by *crossfading*. The crossfade shall result in smooth transitions provided that the selected units have a similar timbre characteristics at the boundaries. For sound texture synthesis, the underlying events are usually evolving (energy, phase, modulation, etc.). Assuming that the events can be identified as consecutive units, this approach identifies and selects sound units which help to reconstruct sound textures that preserve the perceptual quality of the original timbre and the underlying events. Sound textures can be seen as composed of two levels of events: *micro events* (atoms) and *macro events* (segments). The assumption made here—that a segment boundary represents a new macro event—is essential to identify for good concatenation quality. The micro events are more difficult to handle for complicated long-term textures like crowd cheering/applauding.

How does it work?

The AudioTexture prototype is available as plugin compatible with main DAWs (Digital Audio Workstations). Once a file has been selected and is loaded, AudioTexture will display its waveform and spectrogram (see Figure 1). The "Grain Size" sets an estimate of the atom duration for this sound texture and the algorithm adapts automatically to each atom of its refined duration. The horizontal slider serves like a DJ scratch tool and provides an interactive synthesis with respect to the selected controls: Position, Energy, Noisiness, and so on.
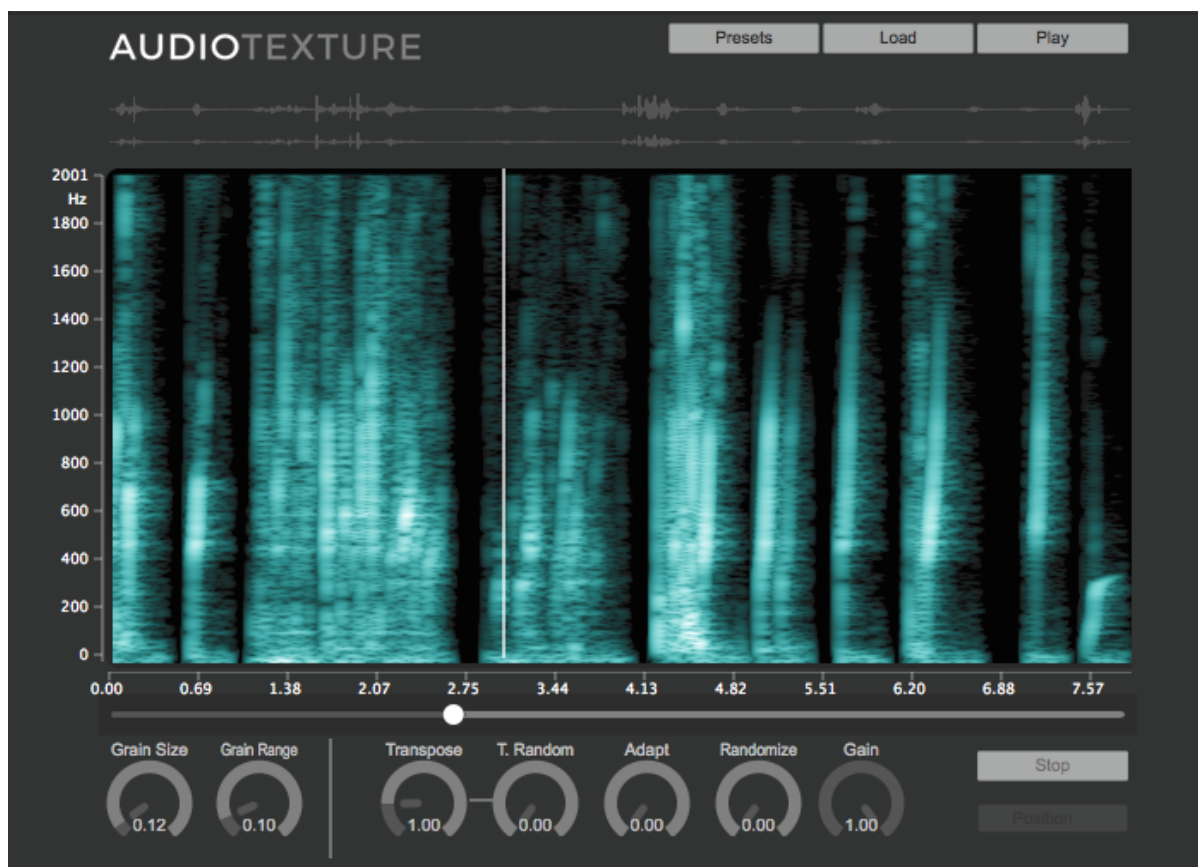
Figure 1 - AudioTexture plugin main user interface

It is possible to use the plugin with your own sounds, but also with sounds available online through the Audio Commons Ecosystem (ACE), as described in the Section "How to select sounds from ACE".

How to load the plugin in Logic Pro X

1. *File > New > Software Instrument (Instrument: audio texture) > Create* (Fig. 2).
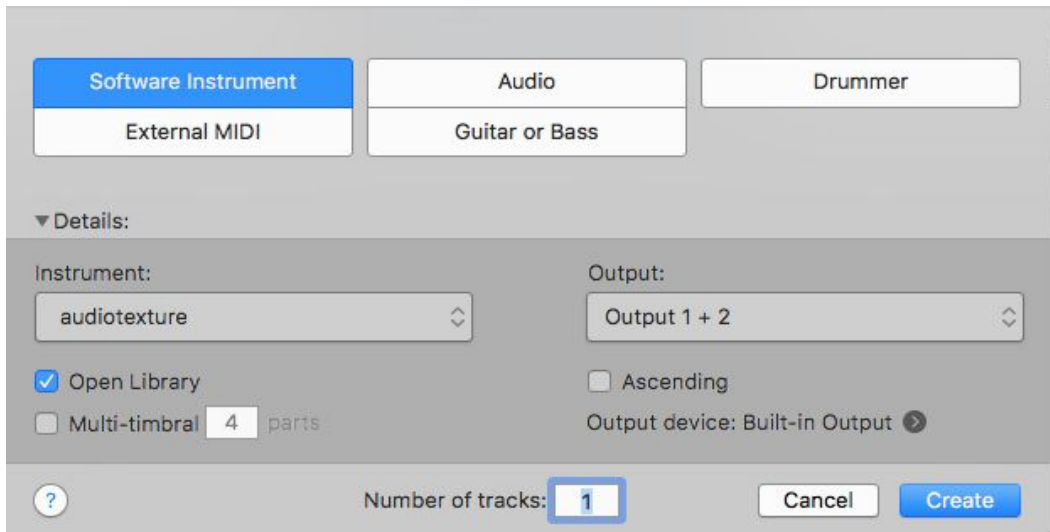
Figure 2 - Create new instrument in Logic Pro X

2. Click on the Instrument slot to launch the plugin interface in the left inspector channel strip of the instrument track (Fig. 3).
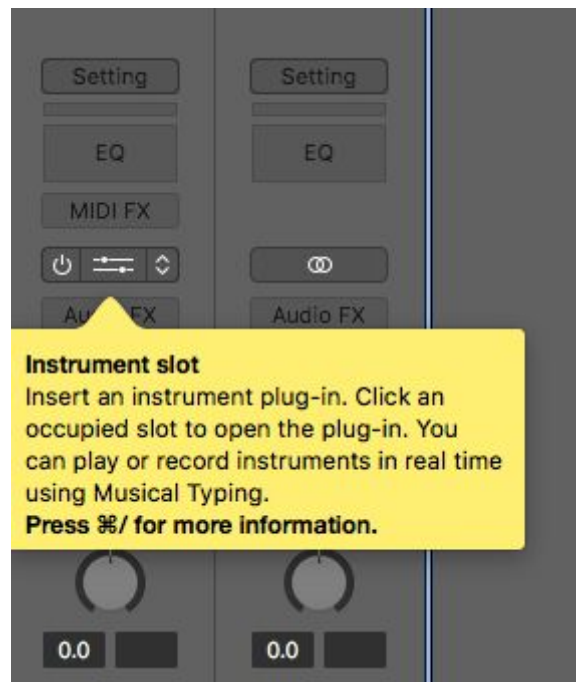

Figure 3 - Left inspector channel strip in Logic Pro X

3. Close the option *"Your trial license expires in…".* You should see a clean empty window with top and bottom controls (Fig. 4).
4. Load a sound (see section "How to select sounds from ACE").

Figure 4 - AudioTexture plugin with top and bottom controls.

How to load the plugin in Ableton Live 9

1. In the sidebar browser, double click the "audiotexture" plugin from the "Plug-ins>Audio Units" or "Plug-ins>VST" folders.
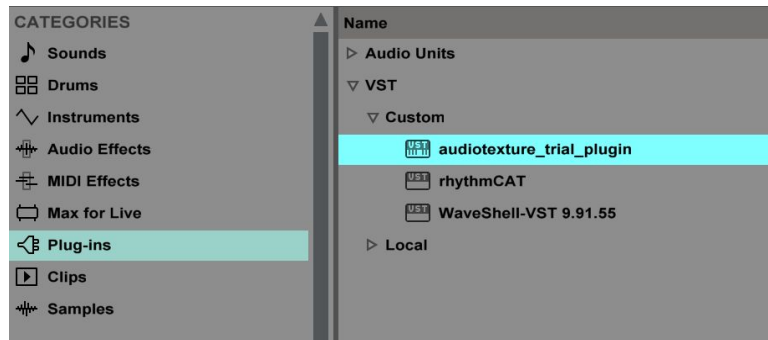

Figure 5 - Loading AudioTexture plugin in Ableton Live.

2. Load a sound (see section "How to select sounds from ACE").
3. To keep accessing the plugin, you can click on the "Tool" icon of the audiotexture module at the audio effects section located at the bottom bar.

Figure 6 - AudioTexture plugin in Ableton Live's Audio Effects section.

How to select sounds from Audio Commons (Internet required)

AudioTexture can work with audio content from the Audio Commons Ecosystem (ACE). ACE audio content is typically user-generated and available under Creative Commons licenses. AudioTexture Version 1 only works with audio content from Freesound (see Freesound supporting material); in the future, other content providers will be added. AudioTexture Version 1 lets you access, audition, download and process Freesound audio content directly from the DAW. Use the following instructions to browse and download ACE content in AudioTexture:

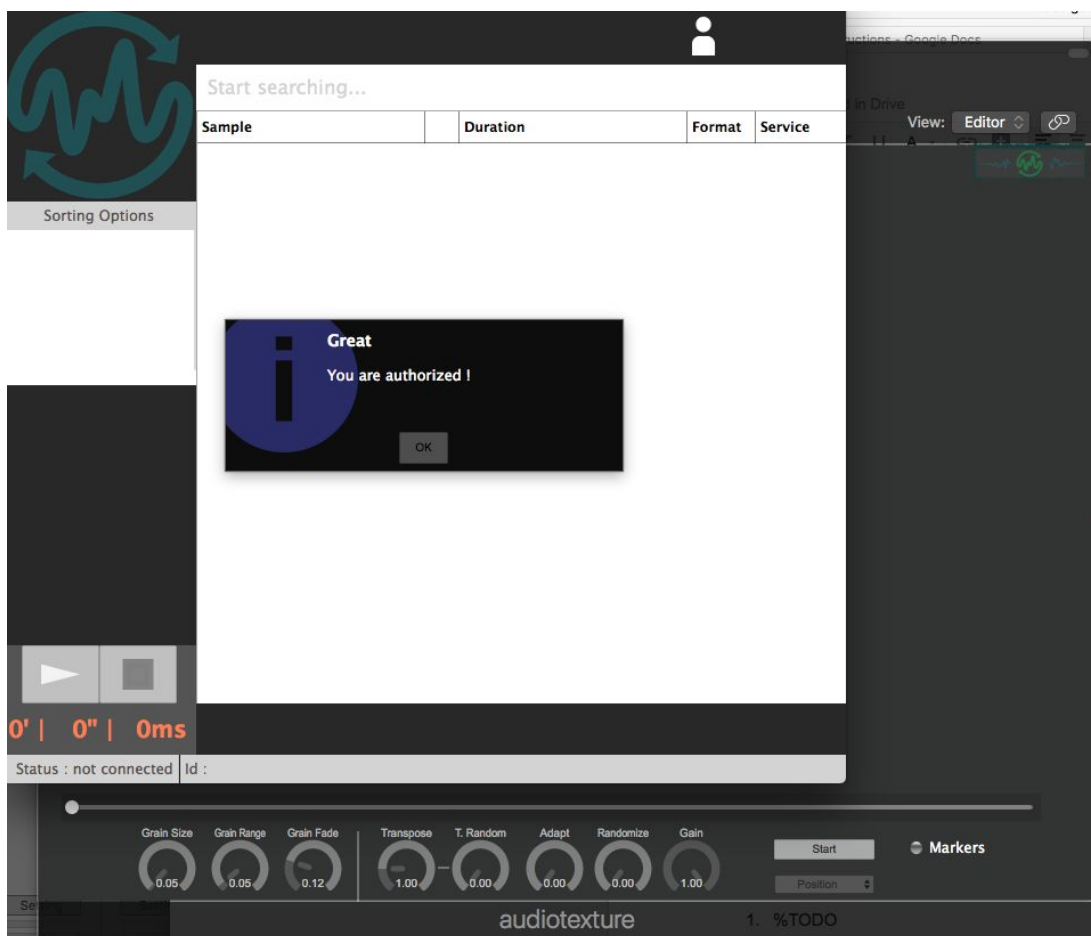1. Click on the top-right ACE icon of the plugin window to open the ACE window.

Figure 7 - ACE window of the AudioTexture plugin.

2. Click "OK" to the popup window "Great You are authorized!".
3. Type a term in the "Start searching…" text field. For example: "rain".
4. Click ENTER to return results from the online database FreeSound.org. Sounds can be sorted by *creation date*, *downloads*, *duration*, and *popularity*.
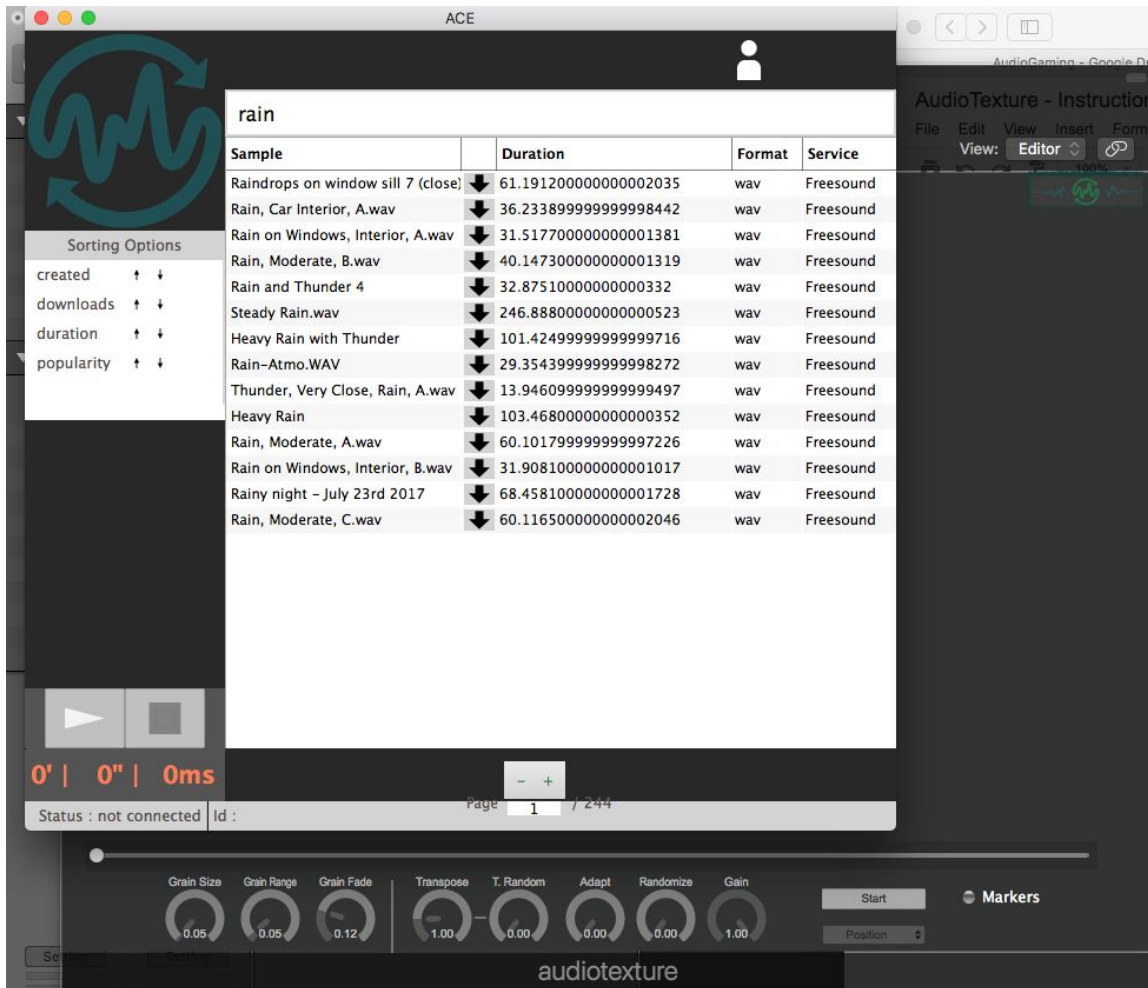
Figure 8 - Results from query "rain" in the ACE window.

5. Download an audio sample by clicking on the "download" arrow. Downloading a sound can take time depending on the file duration and size. There is a visualization loading bar that shows the process of loading a sound. Once downloaded, the waveform and spectrogram will appear in the window of the AudioTexture plugin.
6. Once the audio sample has been loaded, close the ACE window. The sounds are downloaded on the Desktop, in case you wish to load them locally later on.
7. Press the bottom button "Start/Stop" to trigger/stop the generation of a sound texture, and explore the different control parameters (see section "What each control parameter is for?").

How to record the audio output from the plugin

How to record the audio output in Logic Pro X

1. Route the audio of the track to an auxiliary track using a bus (e.g. "Bus 3" as in Figure 9). Increase the level of the audio sent to the bus by adjusting the tiny knob icon located on the right of the bus' send (on the right of Bus 3 in Figure 9).

Figure 9 - Routing audio output to an auxiliar bus in Logic Pro X.

2. Create a new audio track (*Track>New Audio Track*). Add an Insert to the track and select the bus that you created (e.g. Bus 3), which provides the audio from the AudioTexture plugin (see Figure 10).

Figure 10 - Inserting auxiliary track via a bus to an audio track in Logic Pro X.

3. Click on the "R" button next to the title of the audio track to enable recording, and on the "I" button to enable input monitoring (to check the levels). As a rule of thumb, keep the maximum level at around -6dB (assuming you are recording at 24 bits).
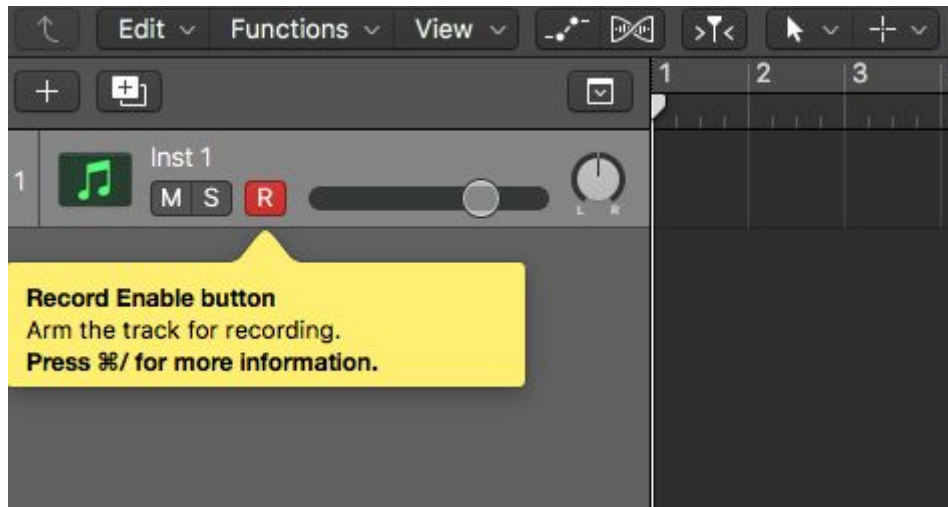
Figure 11 - Record enable button in Logic Pro X. Note that this figure displays a Software instrument track as example but the recording should be done using an Audio track as in Figure 12.

4. Open the AudioTexture plugin. Start the sound processing and once you obtain a texture you are happy to record, press the "Record" button in the top control bar of Logic Pro X's main window (see Figure 12), or press keyboard letter "r". Once you have recorded enough of the texture, stop the recording by clicking on the "Stop" button in top control bar, or press on the keyboard spacebar. You can then use Fade Ins/Out on the audio region you recorded to smoothen the transitions at the start and end of the recorded texture.
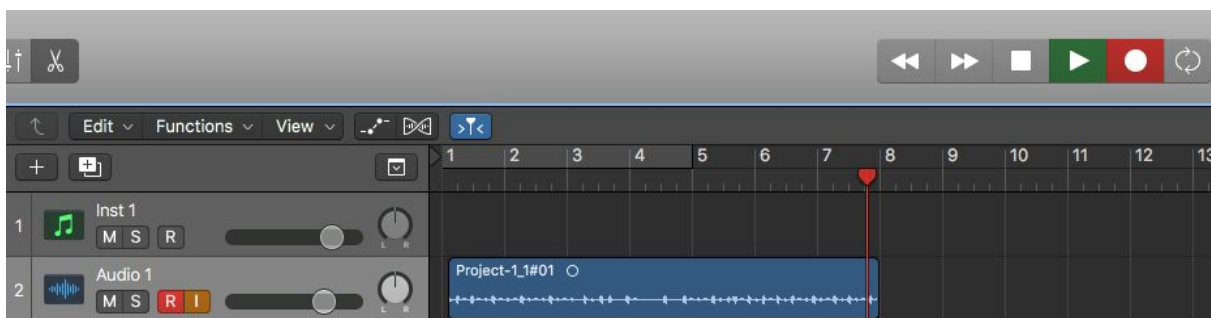

Figure 12 - Recording an audio track in Logic Pro X.

How to record the audio output in Ableton Live 9

1. Change to the "Arrangement view". We need to tell each track what are the input and output audio signals. In the "audiotexture" track, we do not need any input sources nor input channels. In the upper input chooser, select "No Input" as an input source. In the lower input chooser, select "Sends only" as input sources.

2. In an additional audio track, select "audiotexture" as an input source. In the lower input chooser, select "Post Mixer" as input sources.

Figure 13 - Routing output and input signals in Ableton Live 9.

3. Choose "Auto" to monitor the input signal through Live.

Figure 14 - Routing output and input signals in Ableton Live 9.

4. Before the recording can start, we should arm the audio track by clicking on its Arm button. Once the track is armed, its level meter should show the signal level of the track's input.
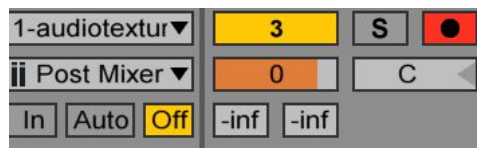

Figure 15 - Arming the audio track in Ableton Live 9.

5. Press the Control Bar's Stop button twice to reset the Arrangement to the beginning.
6. Press the adjacent "Arrangement Record" button. As recording progresses, you will see a new audio clip being created in the track. Press the stop button to stop the recording.
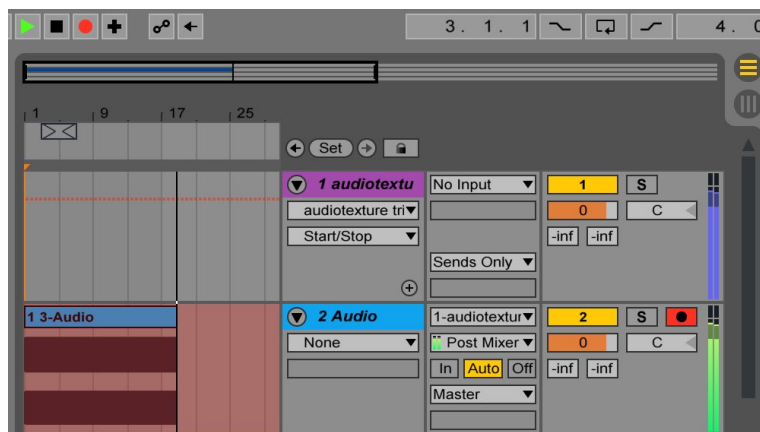

Figure 16 - Recording an audio clip in an audio track in Ableton Live 9.

What each control parameter is for?

You will find below a brief description of the various control parameters that let you generate unique textures from a single sound. Experiment with these control parameters to understand their perceptual effects and obtain relevant sounds for your soundscapes.

- **Grain Size**: average duration of sound texture atoms (macro event units). The smaller the value, the shorter the duration of the event unit.
- **Grain Range**: select grains around current control values.
- **Grain Fade**: crossfade based on waveform similarity between the event units.
- **Transpose/T. random**: simple pitch shifting based on resampling.
- **Adapt**: adapt for unit crossfade.
- **Randomize**: randomize control values.

Other controls:

- **Horizontal Slider**: The horizontal slider serves like a DJ scratch tool which allows interactive synthesis with respective to the selected controls: Position, Energy, Noisiness, etc.

References

If you use this work, please cite the following reference.

Anna Xambó, Frederic Font, György Fazekas, Mathieu Barthet (2018). Leveraging Online Audio Commons Content For Media Production. In M. Filimowicz, editor, Foundations in Sound Design for Linear Media: an interdisciplinary approach, Routledge