

Laboratory no. 1

Basic sound edition using Audacity software



About Audacity

Audacity is a free, easy-to-use, multi-track audio editor and recorder for Windows, Mac OS X, GNU/Linux and other operating systems. The interface is translated into many languages. You can use Audacity to:

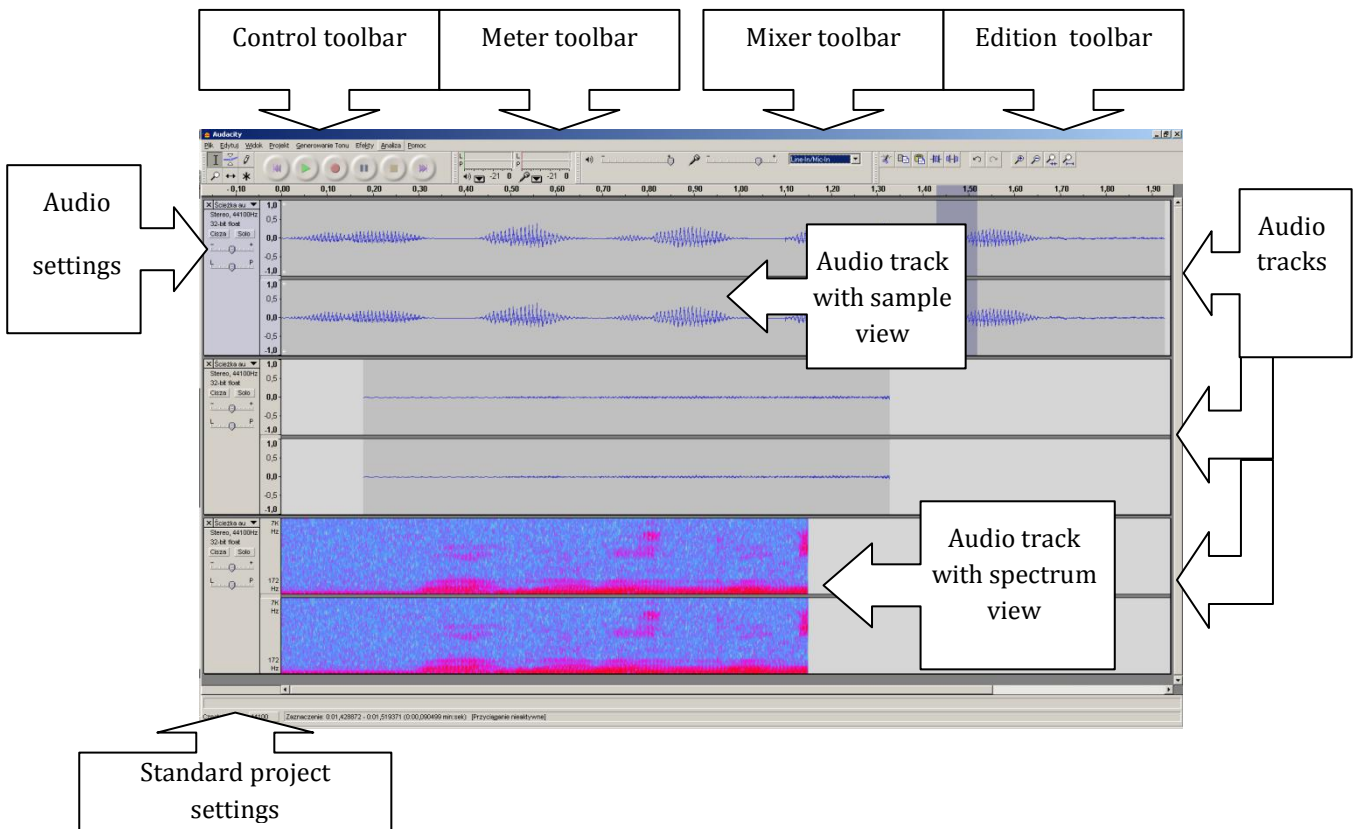
- Record live audio.
- Record computer playback on any Windows Vista or later machine.
- Convert tapes and records into digital recordings or CDs.
- Edit WAV, AIFF, FLAC, MP2, MP3 or Ogg Vorbis sound files.
- AC3, M4A/M4R (AAC), WMA and other formats supported using optional libraries.
- Cut, copy, splice or mix sounds together.
- Numerous effects including change the speed or pitch of a recording.
- And more! See the complete list of features.

About free software

Audacity is free software, developed by a group of volunteers and distributed under the GNU General Public License (GPL).

Free software is not just free of cost (like "free beer"). It is free as in freedom (like "free speech"). Free software gives you the freedom to use a program, study how it works, improve it and share it with others. For more information, visit the Free Software Foundation.







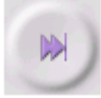
Programs like Audacity are also called open source software, because their source code is available for anyone to study or use. There are thousands of other free and open source programs, including the Firefox web browser, the LibreOffice or Apache OpenOffice suites and entire Linux-based operating systems such as Ubuntu.



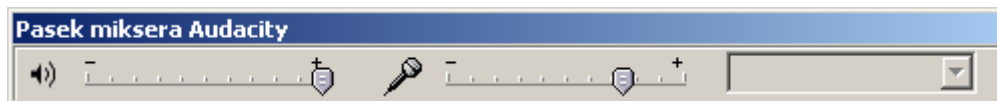
Control toolbar:



	Selection
	Envelope - allows smooth volume changes to be made over the length of a track by means of embedded volume "control points".
	Draw – enables you to manually redraw the waveform
	Zoom
	Time shift
	Multitool – combines all five tools in one. One tool is available at a time, according to the mouse position.

	Move the cursor to the beginning of the project.
	If an area of track is selected, only that selection will be played. Otherwise, playback begins wherever the editing cursor is.
	To loop-play (play the track or selection over and over until you stop), hold down SHIFT while clicking Play.
	Clicking Record always begins recording in a new track at either the current cursor position or at the beginning of the current selection.
	Temporarily pauses playing or recording without losing your place.
	Stops playing or recording immediately, and releases Pause if depressed. You must stop playback or recording before you can use the "Skip" buttons below and before you can edit any audio.
	Move the cursor to the end of the project.

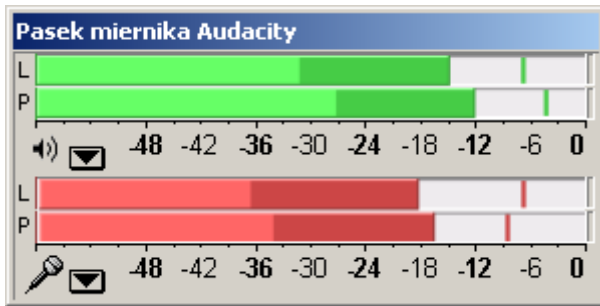
Mixer toolbar



This is the left-hand slider that lets you control the volume at which you listen to the mix of your project. This is a purely a "monitor" control. It does not affect the level of your mix and hence does not affect the level that audio is exported at. Adjusting the playback slider will not help if your mix is *clipped*. The playback slider does not affect the levels indicated by the playback meters which do reflect the level of the mix.

This right-hand slider controls the level of the currently selected "Recording Device" in Device Toolbar. Inputs can also be chosen at "Recording Device" in Devices Preferences, in the operating system mixer or in any control panel that the sound card may have. The Recording Slider should then control that input.

Meter toolbar



The green bars show the playback level, and the red bars show recording level. L is the left channel and R is the right channel.

The playback level displayed in Meter Toolbar reflects the combined amplitude of all the tracks in your project, in other words, the level of the mix as determined by the gain sliders on each track.

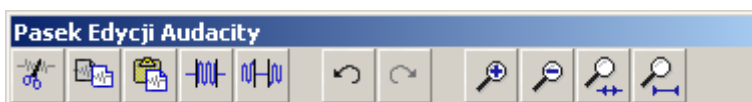
The playback volume slider on Mixer Toolbar does not affect the playback meter - the purpose of the meter is solely to indicate what the loudness of the project audio would be were you to export it as an audio file.












The right-hand edge of the lighter part of the bar shows the average level of the audio and gives a general indication of its perceived loudness.

The right-hand edge of the darker part of the bar shows the current peak level of the audio, and relates directly to the dark blue shading in the waveform.

The right edge lines indicate the highest peak level attained in the last few seconds. They disappear after playback or recording is stopped, or if you left-click on the recording meters.

Edition toolbar



	Cut (Ctrl X)
	Copy (Ctrl C)
	Past (Ctrl V)
	Delete all audia but the selection (Ctrl T)
	Silence selected audio (Ctrl L)
	Undo (Ctrl Z)
	Redo (Ctrl Y)
	Zoom in (Ctrl 1)
	Zoom out (Ctrl 2)
	Zoom selection (Ctrl E)
	Fit project (Ctrl F)

1. Create new project

Save project with the names of group member as a name (for example: NowakMalinowski.aup). Audacity software will create a new catalog automatically.

2. Project settings

Enter the Edit -> Preferences... or press Ctrl + P. Check which devices are selected as input/output. Then go to the quality settings and set standard quality - 44100Hz, 32-bit float.

3. Import an audio file

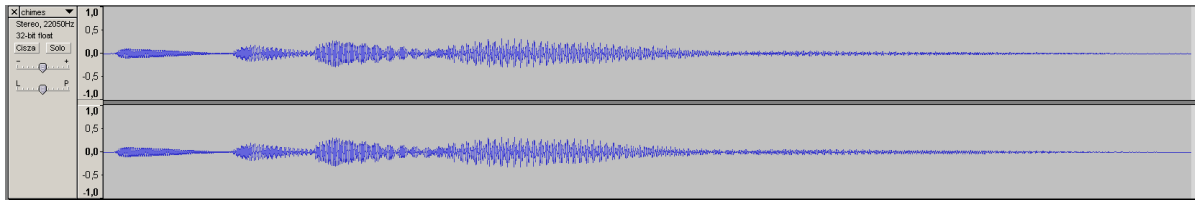
Either drag the files into the current project window, or choose File -> Import -> Audio....

Files can be opened into a new project window with File -> Open....

The main formats Audacity plays as shipped are AIFF, AU, FLAC, MP2, MP3, OGG Vorbis and WAV.

Please, import file C:\Windows\Media\chimes.wav

4. Playing

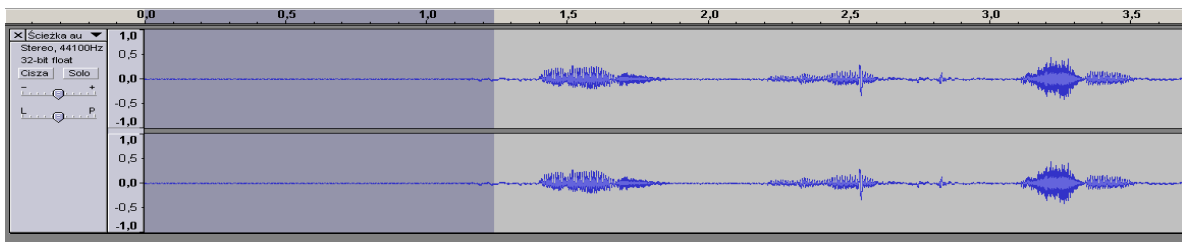


Try playing file from the beginning, then play only selected fragment, then try to play that fragment in the loop.

Check the options in the audio settings of the track. Look at the spectrum view, change the sampling frequency and try to split stereo track.

5. Recording

Check the microphone connection and whether in mixer toolbar the microphone is selected as input. Delete existing audio track from the project and record short message: "one two three". The new track should appear immediately.

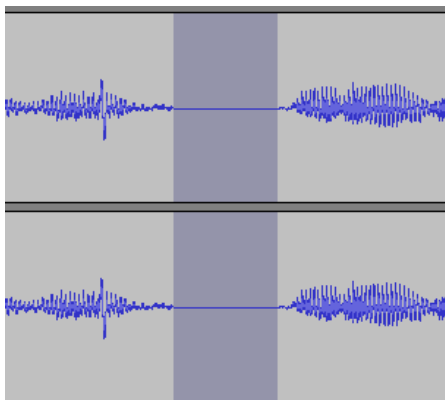


Using the selection tool, cut unnecessary fragments of silence before the message and after the message.

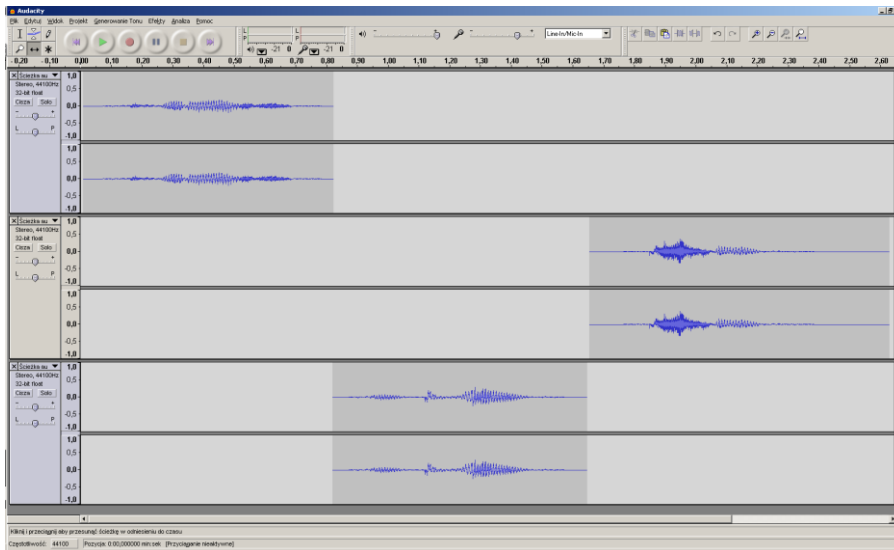
Save the project and export the audio track to the .wav file (onetwothree.wav). It will be used later.

6. Basic edition

By selecting and using Ctrl+L shortcut, silence unwanted noised fragments between the words.



Select the word "three" and from edition menu choose the split tool. The new audio track should appear. Do the same with the word "two". Final result should look like this:

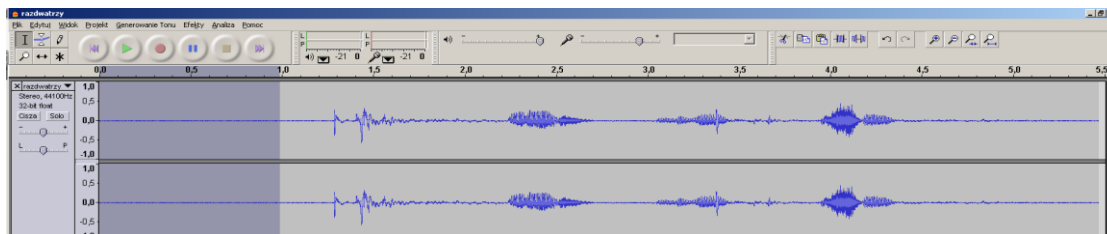


By using time shift tool, shift the words, so the audio track should sound: "three two one". By holding SHIFT and clicking on audio track toolbars select all three tracks. From menu Project select Fast Mix. Tracks should be connected again in one audio track.

Export this track as threetwoone.wav

7. Denoising

Close all opened tracks and import file onetwothree.wav




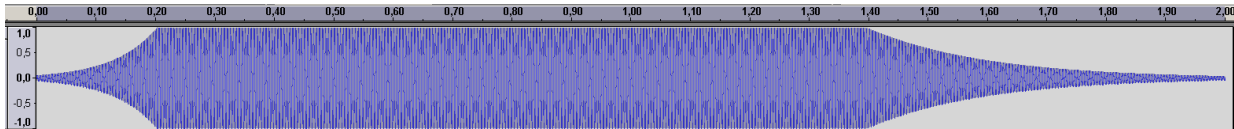
Select fragment of the audio track, where no voice is recorded.

In menu effects choose the option of denoising and collect the noise sample. Now select the whole track (Ctrl+A). Again go to the denoising options and click preview. If the preview track sounds unnatural, decrease the strength of the effect. After that, just click Remove Noise. Export denoised audio track to the file onetwothree-denoised.wav.

8. Tone generator + envelope tool

Generate the 2s sinusoidal tone with 200Hz frequency. Select from menu Generate -> Tone.

Use the envelope tool  to make the smooth beginning and ending of the tone.



Export this track as 200Hz.wav and 200Hz.mp3 (look at next point).

9. Saving as MP3

Audacity does not have built-in MP3 encoder. To save files as MP3, software will ask You about path to the LAME encoder. Please, download the file lame_enc.dll (for example from the site: <http://lame1.buanzo.com.ar/>).

During the save Audacity will ask You about ID3 tag (name, artist, album etc.)

10. Practical tasks

- Generate two alternating tones 1 s with 100Hz frequency with two different amplitudes (1,0 and 0,5). Use the envelope tool to smooth the passage between tones. Sound should last about 6s. Save the result as task1.wav
- Generate two alternating tones 1s with 100Hz and 1000Hz with amplitude 1,0. Use the envelope tool to smooth the passage between tones. Sound should last about 6s. Save the result as task2.wav
- Generate four 1s noise pulses with exponentially decreasing amplitudes (1,0 ; 0,5 ; 0,25; 0,125). Use the envelope tool. Save the file as task3.wav
- Generate four 1s noise pulses with lineary decreasing amplitudes (1,0 ; 0,7 ; 0,4 ; 0,1). Save the result as task4.wav
- Generate sequence of 2s sinusoidal tones with frequencies: 200 and 8000Hz (file: task5a.wav); 1000Hz and 1200Hz (file: task5b.wav)
- Generate 2s mix of sinusoidal tones with frequency of 200Hz and 1000Hz. Save the result as task6.wav.
- Try to record the typical musical scale "do re mi fa sol la si do". Use the spectrum analysis tool and the effect "Change tone" to adjust your voice pitch to match the frequencies in the table:

solmization	note	f[Hz]
do	C(4)	261,63
re	D	293,66
mi	E	329,63
fa	F	349,23
sol	G	392,00
la	A	440,00
si	H	493,88
do	C(5)	523,25

Contest task (best group awarded bonus points):

- Record a music jingle/joke for radio "Żak". The jingle must contain the exact words: "Studenckie Radio Żak Politechniki Łódzkiej" and be between 20 and 60 seconds long.

Mix your recorded voice (or synthesized speech from an online source, such as ivona) with some background music and/or sound effects in Audacity. Try to use Audacity tools to make the jingle sound clear and uniformly loud.