EE/CSE 371:
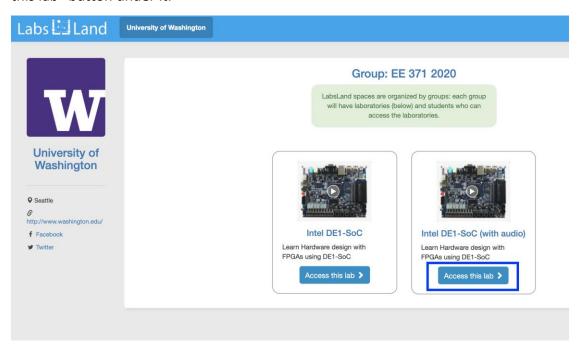**Design of Digital Circuits and Systems**
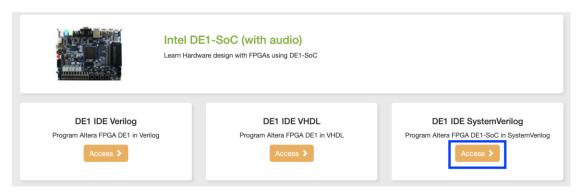
DE1 SoC & LabsLand Audio Interface Guide

Audio Interface Setup

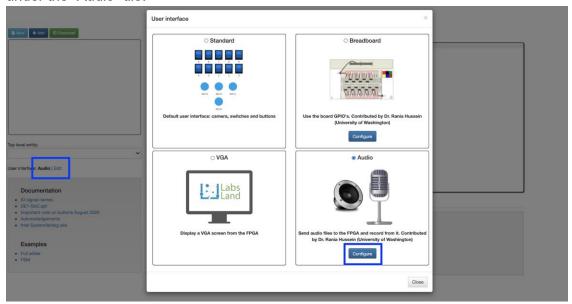To set up the audio interface for your project, please follow these steps.

1. Log into your LabsLand account.
2. Under the EE371 group, locate the "Intel DE1-SoC (with audio)" lab. Click the "Access this lab" button under it.

3. On the next page, locate the "DE1 IDE SystemVerilog" and click the corresponding "Access" button to enter the online IDE.
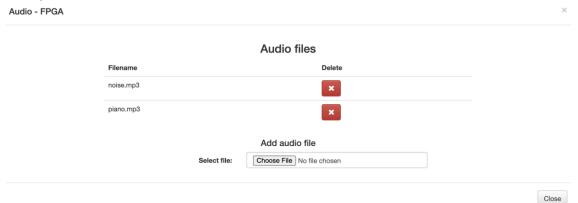
4. Upload your SystemVerilog code for the audio project to the online IDE by clicking the "Add" button on the left of the IDE.

5. Locate the "User Interface" heading above the Documentation box and click "Edit" next to it. In the pop-up window, select the "Audio" option and click the "Configure" button under the "Audio" tile.

6. In the pop-up window, click "Choose File" and select an audio file of your choice. Please note that the format of the audio file must be ".mp3" or ".ogg". The audio file must be less than 5 MB.
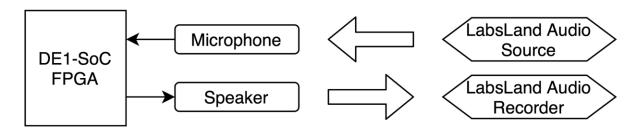

7. If needed, you can upload up to 5 audio files by clicking "Choose File" in the same pop-up window. All files uploaded will be listed in the window. Click "Close" to exit the Audio configurator and the user interface switch.
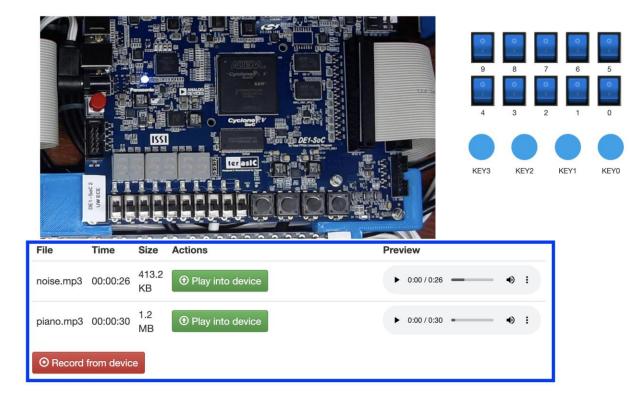
Playing and Recording

LabsLand's DE1-SoC FPGAs have been set up according to the figure below. Specifically, you can play audio into the FPGA's microphone through the LabsLand Audio Source. The LabsLand Audio Recorder can record from the FPGA's speaker and save the recorded audio into an audio file for you to download.

Please follow these steps to test your project on LabsLand.
1. Synthesize your SystemVerilog code and upload the project to FPGA.
2. A user interface similar to what is depicted in the figure below will be shown to you. Next to the FPGA's live video feed, you can still find the switches (SW) or buttons (KEY) of the board. The audio files you uploaded earlier are shown at the bottom of the page. If you want to confirm that your audio file can be played by the system, click the corresponding play button under "Preview" to hear the audio from your browser. Note that this function allows you only to preview the audio file; it will NOT play the audio into the FPGA's microphone.

3. Click "Play into device" to use the "Labsland Audio Source" to send audios into the FPGA's microphone. Then, click "Record from device" to use the "Labsland Audio Recorder" to record audios from the FPGA's speaker. Note that you won't be hearing sounds coming out from your web browser while it's recording. To listen to the recording, you will need to download it to your computer (see step 5).

File	Time	Size	Actions	Preview
noise.mp3	00:00:26	413.2 KB	⊕ Play into device	▶ 0:00 / 0:26 🔊 ⋮
piano.mp3	00:00:30	1.2 MB	⊕ Play into device	▶ 0:00 / 0:30 🔊 ⋮

⊙ Record from device

4. To finish recording, click the two "Stop" buttons shown in the figure below.

File	Time	Size	Actions	Preview
noise.mp3	00:00:26	413.2 KB	⊕ Play into device	▶ 0:00 / 0:26 🔊 ⋮
piano.mp3	00:00:30	1.2 MB	↻ Playing into device ■ Stop	▶ 0:00 / 0:30 🔊 ⋮

↻ Recording from device ■ Stop

5. The audio will then be processed and displayed at the bottom of the page. To download the recording, click the "Download file" button. Make sure to download the audio recording to your local machine before your session's time ends.

File	Time	Size	Actions	Preview
noise.mp3	00:00:26	413.2 KB	⊕ Play into device	▶ 0:00 / 0:26 🔊 ⋮
piano.mp3	00:00:30	1.2 MB	⊕ Play into device	▶ 0:00 / 0:30 🔊 ⋮

⊙ Record from device

File	Time	Size	Actions	
audio-1.mp3	00:00:19	299.6 KB	⊕ Download file	▶ 0:00 / 0:19 🔊 ⋮