

# [ LABVIEW APPLICATION ]

## MIDI\_JAMSESSION\*

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### Abstract

MIDI\_JamSession is a LabVIEW application VI that reads a standard MIDI file (.mid format) and renders it to audio using subVIs called "virtual musical instruments" (VMIs) that you design.

## 1 Introduction

**MIDI\_JamSession** is a LabVIEW application VI that reads a standard MIDI file (.mid format) and renders it to a audio using "instrument" subVIs of your own design. Following are the key features of **MIDI\_JamSession**:

- Reads standard MIDI files (.mid)
- Renders note events to stereo audio using user-defined subVIs called "virtual musical instruments" (VMIs) or built-in preview instruments
- Displays relevant MIDI file information to help determine how to assign instruments to MIDI channels
- Includes basic "mixing board" with controls for instrument type, mute, and stereo pan
- Creates files for rendered audio (.wav format) and note events (.csv spreadsheet format)

A MIDI file contains note and timing information (see MIDI Messages<sup>1</sup> and Standard MIDI Files<sup>2</sup> for full details). Notes are associated with **channels** (up to 16 channels possible). A single channel is almost always associated with a single instrument sound. **MIDI\_JamSession.vi** uses all of this information to repeatedly call your **virtual musical instrument (VMI)** which creates a single note (an audio fragment) according to the requested duration, frequency, and amplitude; the audio fragment is then superimposed on the output audio stream at the correct time.

The following screencast video demonstrates how to use **MIDI\_JamSession** to render MIDI files using the default preview instruments, and how to get started creating subVIs to render audio according to your own algorithms.

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<sup>1</sup>"MIDI Messages" <<http://cnx.org/content/m15049/latest/>>

<sup>2</sup>"Standard MIDI Files" <<http://cnx.org/content/m15051/latest/>>

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**Figure 1:** [video] Demonstration of the MIDI\_JamSession application

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## 2 Source Distribution

**MIDI\_JamSession.vi** is available in this .zip archive: MIDI\_JamSession\_v0.92.zip<sup>3</sup>. Right-click and choose "Save As" to download the .zip file, unpack the archive into its own folder, and double-click "MIDI\_JamSession\_runme.vi" to start the application.

## 3 Instructions

- Start "MIDI\_JamSession.vi" and choose a source MIDI file (.mid format); several MIDI files are included in the .zip distribution archive (see 'readme\_midi-files.txt' for details). Click the folder icon to the right of the text entry browse to browse for a file. Once you select a file, "MIDI\_JamSession" immediately reads the file and updates the MIDI information display panels. If you enter a filename in the "note events output file" field, a spreadsheet (in comma-separated values format) will be created that contains all of the note events extracted from the MIDI file. The columns are: channel number (1 to 16), start time (in seconds), duration (in seconds), note number (0 to 127), and velocity (0 to 127). The .csv file will be updated each time you load a new MIDI file.
- Leave all of the audio rendering controls at their default settings at first in order to use the built-in preview instruments, and to render only the first 10 percent of the song to audio. The relatively low sampling frequency and the simple algorithm for the preview instruments ensure quick rendering when you are exploring different MIDI files. Click "Render Audio" to listen to your MIDI file.
- If you have not done so already, double-click on your MIDI file to hear it played by your default media player using the built-in synthesizer on your computer's soundcard. "MIDI\_JamSession" may not work properly for some types of MIDI files, so please compare the rendered audio to your media player's rendition before you continue.
- Look at the information text panels on the lower left, especially the track listing. Each channel number (inside square brackets) is typically associated with a unique instrument, and will often be labeled as such. The text entry boxes labeled "The Band" are where you assign your "virtual musical instrument" (VMI) to render notes for a given channel. Note that Channel 10 is reserved for percussion. The preview drum instrument renders all note events on Channel 10 the same way, regardless of note number or note velocity (it sounds a bit like a snare drum).
- Experiment with the pan controls to position each instrument in the stereo sound field; click "random pan" to make a random assignment for each instrument. You can also mute selected channels in order to isolate certain instruments, or to create a solo. Click the "Lock to 1" button to cause all controls to track those of Channel 1; this is an easy way to mute or unmute all channels, for example. Adjust the two sliders on the "time range to render" control to pick the start and stop times to render. You can quickly preview sections in the middle or end of the song this way. Set the controls to 0 and 100 percent to render the entire song.
- You will eventually find it more convenient to turn off the "Listen to audio" option and enter a filename in the "audio output file (.wav)" field. Each time you click "Render Audio" the .wav file will update, and you can use your own media player to listen to the .wav file. There is presently no way to interrupt

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<sup>3</sup>[http://cnx.org/content/m15053/latest/MIDI\\_JamSession\\_v0.92.zip](http://cnx.org/content/m15053/latest/MIDI_JamSession_v0.92.zip)

the built-in audio player, and this can be a nuisance when you render long pieces. The yellow LED indicator at the upper right corner indicates when the built-in audio player is active.

- Once you are ready to create your own instrument sounds, open "vmi\_Prototype.vi" and carefully follow the instructions inside. Eventually you will create a number of different VMIs, with each having the ability to generate an audio fragment that renders a single note.
- De-select the "Preview only" button, and select the VMI you wish to use for each channel in the vertical array of folders called "The Band." Blank entries will render as silence. Remember to adjust your sampling frequency as needed, bearing in mind that CD-quality (44.1 kHz) will increase the rendering time and increase the size of the .wav file.
- Render your new audio file.
- Enjoy listening!

IMPORTANT: Once you have invested a lot of effort to adjust the front panel settings, exit the application (click "Exit" just under the "MIDI Jam Session" logo), select "Edit | Make Current Values Default," and press Ctrl+S to save "MIDI\_JamSession.vi" with your own settings.