Sine Checker

User's guide

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Requirements

- Windows 10, 64bit

Installation

For installation, simply run "SineCheckerSetup.exe". If necessary, the installer will install Microsoft Visual C++ Redistributables automatically. At the first program start-up you will be asked for a license file. You may obtain a demo or permanent license from our homepage or by mailing us. If you don't have a license file, you may try the software for 5 minutes with random limited functionality before you must restart it.

Overview

The main feature of Sine Checker is the analysis of *.wav files for digital dropouts or similar errors. Every file that contains a single continuous sine wave (a "test tone") can be checked for errors without knowing anything about the signal source.

The intention for this tool was the hugely increasing spread of audio over IP (AoIP) solutions with their benefits and problems. Most solutions (like e.g. Dante or AES67) come with their own tools to check the healthiness of the signal transmission, but while this is a great indicator for errors, in our experience errors can occur without any hint in these monitoring tools.

So, the goal is to check a digital audio system "in situation" by feeding it a test signal which then is recorded on the other end. By analysing this recorded signal, we can determine if the system is running stable even over a longer time.
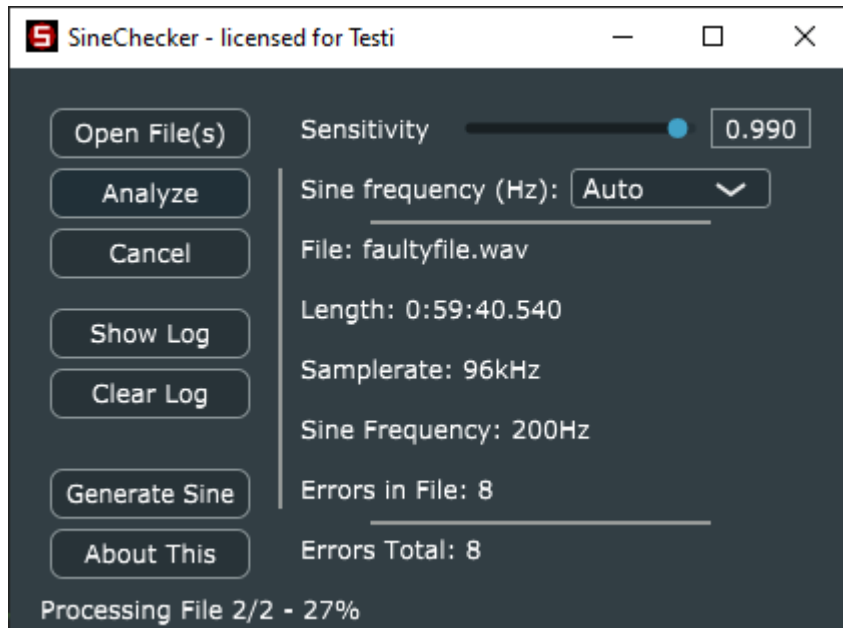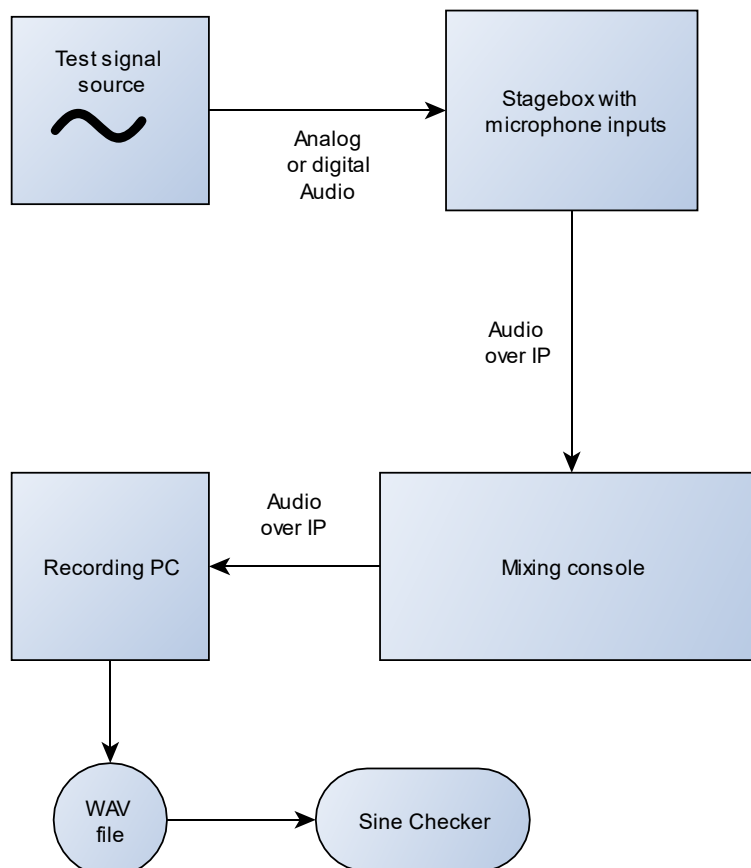
In the following, a possible workflow of checking such a system is described including the explanation of Sine Checker's controls.

Workflow

System setup

Let's have a look at the system we want to test:

With this setup we can test the complete system from the stagebox to the recording PC in the same way as it will be used in the future application.

Signal generator

The test signal source must generate a continuous sine signal. The best solution would be a dedicated device such as a "sine stick" or a PC with an audio interface, connected via an analog or digital (e.g. AES/EBU) connection. But for ease of operation, a smartphone or a sine generator in your mixing console might work as well.

If you need a source file to play back, you can generate it from Sine Checker with the "Generate Sine" button.

For the sample rate, choose the same one as in the rest of your system (e.g. mixing console).

The sine frequency should be as low as possible to find even the shortest errors, as with a lower frequency, more samples are available per period. For most applications 200Hz is a nice choice as it can comfortably be listened to if necessary and isn't affected by any lowcut filters yet. To use the automatic frequency detection of Sine Checker, use a frequency which is a multiple of 100Hz.

Choose the gain as high as possible without clipping, in completely digital systems -1dBFS should be fine!

For the test duration, the longer the better. I have tested systems that (without changes) produced the first errors after more than one hour.

The resolution is not critical, 16bit should be fine in most cases, but you can go up to 32bit per sample if necessary.

Testing process

With the sine generator running, make sure that the test signal passes your system unaltered. While linear signal processors as equalizers shouldn't affect the result much, nonlinear components like compressors must be disabled.

Make sure to record the signal without silence in the beginning or the end for best results. If this is not possible for you, consider cutting these parts afterwards.

If you are recording to a PC as in the example, you might want to "abuse" it during the recording a little to induce errors. Do graphically demanding things like moving different windows around or launch other software to bind some CPU power. If you expect changes in your audio system, try these too!

Also, you might consider to record not just one channel, but as many as you will use in your future application. Just make sure to record all channels in mono as Sine Checker does not support multichannel wave files.

Analysis

In most cases the default analysis settings in Sine Checker are sufficient. Just open the recorded files with "Open Files" and press "Analyze". Depending on the number of files and the duration, this may take a while, go and have a coffee.

With "sensitivity" you can adjust the margin of error the sine wave must be in. If you find Sine Checker report errors where there are none (for example a noisy analog signal), try decreasing this a bit. It is normal that with the sensitivity cranked to 1.0 many errors are reported, just don't do this.

The sine frequency usually is detected automatically but if you use a frequency that is not a multiple of 100Hz, you can enter it in the sine frequency field.

Results

If some errors were found during the analysis, they are reported for the current file and for all files together. By clicking "Show Log" you can view more information, including at which time the errors occurred.

```
errors.txt - Editor                                          —    □    ✕

Datei  Bearbeiten  Format  Ansicht  Hilfe

SineChecker error log started at 21 Apr 2021 18:25:35

New File: faultyfile.wav --------------------
Length: 00:59:40.540
Start of signal: 00:00:00.000
End of signal: 00:59:40.540
Samplerate: 96000
Sine freq: 200
Peak value: 0.891251
Set sensitivity: 0.990099
Allowed sample difference: 0.0117828

List of errors:
Position        Sample difference
00:00:46.509   -1.31493
00:01:00.051    1.508
00:01:25.995   -0.715529
00:01:25.998   -0.890653
00:05:21.131   -0.248244
00:08:12.972   -0.101393
00:08:12.985   -0.147596
00:17:17.887   -0.172287

Errors Total: 8
------------------------------------


New File: Sine_100Hz_441_10min.wav --------------------
Length: 00:10:00.000
Start of signal: 00:00:00.000
End of signal: 00:09:59.999
Samplerate: 44100
Sine freq: 100
Peak value: 0.5
Set sensitivity: 0.990099
Allowed sample difference: 0.00719479

List of errors:
Position        Sample difference

No Errors! :-)
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          Zeile 41, Spalte 15      100%   Windows (CRLF)    UTF-8
```

Hints

Supported WAV files

The *wav files must fulfil the following requirements:

- Contain only a single continuous sine wave of constant frequency
- Only mono signals are supported. If you select a stereo file, only the left channel is processed.
- The sampling rate must be one of: 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz
- The bit depth must be one of: 8 bit, 16 bit, 24 bit, 32 bit

Questions?

Feel free to ask! Just write a mail to info@eleton-audio.de