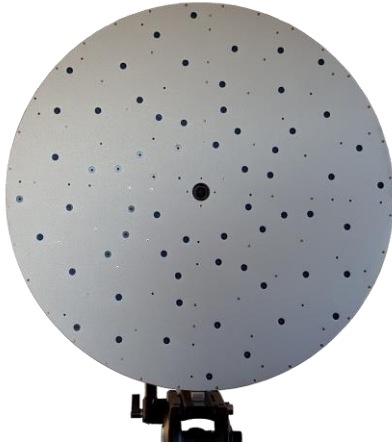




ViewNoise Acoustics Camera

ViewNoise is an acoustic camera consisting of a microphone array MA64.UB530.R6 and ViewNoise software.



Microphone Array ViewNoise MA64.UB530.R6

Parameters of the microphone array MA64.UB530.R6:

- communication interface with PC: USB 2.0 / 3.0 (Windows 7/10 64bit)
- power supply: 2.5W (self powered - USB 5V @ 500mA)
- dimensions: 520mm (diameter)
- 64 MEMS microphones (UB Spiral) with the following parameters:

Resolution: High Precision 24-bit

Sampling Frequency: 48kHz

SNR: 65 dBA

Sensitivity: -26 dB FS

Sensitivity Tolerance: ± 1 dB

Frequency Response: 50 Hz ... 20 kHz (± 3 dB)

Acoustic Overload: 117 dB SPL

- weight: 6kg (w / o tripod)
- color video camera with the following supported video formats:
(16: 9) 3840x2160 @ 30Hz; 1920x1080 @ 30Hz; 1280x720 @ 30Hz
(4: 3) 2592x1944 @ 30Hz; 2048x1536 @ 30Hz; 1600x1200 @ 30Hz; 1280x960 @ 30Hz; 1024x768 @ 30Hz; 800x600 @ 30Hz; 640x480 @ 30Hz
- data acquisition controller:
ViewNoise_K60H_C64 (integrated into the microphone array)
- included meteo sensors:
 - humidity (Rh%)
 - atmospheric pressure
 - air temperature

Software ViewNoise

ViewNoise is our data acquisition & visualization software. The ViewNoise software, the microphone array and the ViewNoise_K60H_C64 data acquisition controller have been developed as a single system. ViewNoise software automatically updates the controller firmware.

ViewNoise features

data acquisition & visualization (Realtime & Offline).

Virtually all functionalities are available both in real time and offline. In offline mode, it is possible to comment on the recording and use slow motion with a frame rate of 3000 frames per second.



Beamforming.

Displays the sound picture superimposed on the video image from the integrated camera. Dynamic range, transparency, etc. can be changed. Calculating the sound quatrains requires a huge amount of calculation, so to unload the CPU, ViewNoise can use the available GPU. ViewNoise can use CUDA on nVidia GPUs or OpenCL on nVidia / AMD / Intel GPUs. For this purpose, the GPU must have > 1TFlops (single precision) computing power (theoretical). The beamforming parameters depend on the selected size of the frame buffer and its overlap (min. 50% ... max 99.2%).

The resolution of the beamforming picture can be selected by the operator (from 80x60 ... 640x480). The more detailed beamforming picture requires much more calculations. Usually 320x240 (76800 pixels) is sufficient. During recording, it does not matter what resolution is selected. The beamforming picture is always calculated during playback according to the selected resolution, frame buffer size (freq resolution) & frame buffer overlap.



Virtual directional microphone.

Allows you to hear the sound source at the cursor position (mouse), both in real time and during recording.

NOTE:

It is advisable to use headphones for real-time listening!

 Sound Source Separation (Virtual HDR microphones). The virtual directional microphone does not always give the desired results, especially when the sound / noise sources are close and / or have a significant difference in volume. In this case, ViewNoise has Virtual HDR microphones. They are positioned by the operator at the positions of the sound / noise sources. ViewNoise separates in real time the sources on which virtual HDR microphones are available, as the sound / noise has a much better SNR than a regular directional microphone. This, of course, comes at the cost of a huge amount of calculations. The number of Virtual HDR microphones that can be analyzed in real time depends in direct proportion to the computing power of the processor used (number of cores, frequency, AVX / AVX512, ...).

For example: the 4th core Intel i7 or AMD Ryzen CPU @ 3.6GHz can handle up to 12 virtual microphones in real time. Respectively 8 core CPUs up to 24 virtual HDR microphones ...

The maximum number of virtual HDR microphones is 63 (with a 64 microphone array).

Note: ViewNoise makes the most of the multithread capabilities of the CPU & GPU.



Acoustic eraser.

Allows you to suppress the sound source in a certain direction in real time. Up to 64 sources can be suppressed (operated by the operator)

SPL (dBA).

ViewNoise allows you to measure sound pressure level (SPL) from a specific direction (similar to a directional microphone).

Record.

Along with the acoustic picture (64 24-bit audio channels at 48kHz), video is also recorded. ViewNoise supports the following video recording codecs:

x264 HW hardware encoder for Intel / AMD / nVidia GPU

x265 HW hardware encoder for Intel / AMD / nVidia GPU

x264 SW software encoder (uses CPU - not recommended for CPUs less than 6 cores)

x265 SW software encoder (uses CPU - not recommended for CPUs less than 8 cores)

Video Export

ViewNoise allows you to export the acoustic picture to a AVI video file that can be played by almost any player (depending on the encoder selected). Supported video formats are:

x264 HW hardware encoder for Intel / AMD / nVidia GPU

x265 HW hardware encoder for Intel / AMD / nVidia GPU

x264 SW software encoder (uses CPU - not recommended for CPUs less than 6 cores)

x265 SW software encoder (uses CPU - not recommended for CPUs less than 8 cores)

Note:

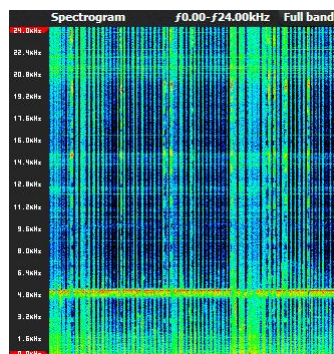
The x265 format has better compression (smaller video file size at the same or better quality), but not every player / computer supports it. For example, the built-in Win10 player requires the x265 codec to be installed additionally (for free) ...

Therefore, the recommended video format is x264.

Text subtitles (at a specific position and at a specific time) or audio comments (via a microphone) can be added to the exported video file.

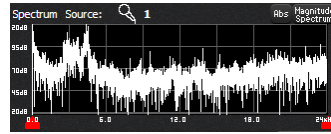
Spectrogram:

ViewNoise displays a spectrogram of the sound picture in real time. The parameters of the spectrogram depend on the selected size of the frame buffer and its overlap (min. 50%).



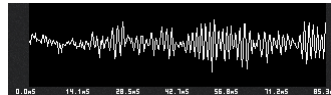
Spectrum:

ViewNoise displays in real time the spectrum (frequency domain) for the input signal (one of all 64 microphones) and the spectrum of the currently playing source (if any): direction microphone or virtual HDR microphone. The spectrum can be linear, logarithmic, absolute or relative



Audio signal:

ViewNoise displays in real time the signal (time domain) from the currently selected microphone (1 ... 64 or all).



Video playback (Off line)

ViewNoise plays the recorded audio & video data in sync. The played Video image can be color, BW or contour (switched with one button). Playback can also be hardware accelerated by the available GPU, which unloads the CPU for other tasks. If the selected recording format is x265 (HEVC), it is desirable to use the GPU for decoding.

Sound reproduction.

ViewNoise can play audio from the following sources:

- one of the real microphones
- virtual directional microphone
- virtual HDR microphone

The sound is played on the selected sound card, with the ability to adjust the volume both locally and globally (including mute). When playback is delayed / accelerated, the playback frequency changes accordingly. During delayed playback, it is possible to observe the sound in slow motion. For video recording, the time resolution is 1 frame (33ms at 30Hz), while the sound picture can achieve much better resolution (for example 0.33ms at 3000 audio fps)

Minimum computer/laptop requirements

- Windows 10 64bit
- CPU with 4+ cores (i7 or Ryzen 4xxx)
- GPU supporting CUDA (nVidia) or OpenCL (nVidia / AMD / Intel) with theoretical performance 1.0 + TFLOPS (eg GTX850M, GTX1050, GTX1650, GTX2060, GTX3060)
- 16GB RAM
- SSD (60 sec recording can take up 1GB of disk space)