Best Practices for Recording with the em32 Eigenmike® Array

There are essentially two ways to record the 32 microphone signals of the em32 Eigenmike® microphone array:

     1) Using mh acoustics' EigenStudio® application, or

     2) Using third-party audio recording software (e.g. Cockos Reaper)

Both approaches will yield the same result **IF** the user follows a few guidelines:

1. To ensure the best performance when processing the recorded microphone signals (i.e. for beamforming, Ambisonics encoding/decoding, etc), it is important that the microphone signals are calibrated. Therefore, **make sure to always record calibrated microphone signals.** This practice ensures there is no confusion about whether a raw microphone recording contains calibrated or uncalibrated signals.

2. When using mh acoustics' **EigenStudio** application, the microphone signal calibration is transparent to the user. The EigenStudio application will always record calibrated microphone signals and provides user confirmation feedback by displaying "*calibrated*" in the GUI window title bar.

3. When using **third-party applications**, users have two options for microphone signal calibration:

    I.   If the application can host 32-channel Apple Audio Units, it is recommended to use mh acoustics' **EigenUnit-EM32Control** AU. This AU will take care of the calibration and provide volume control via the em32's programmable gain amplifiers (PGAs). The 32 output signals of the EigenUnit-EM32Control AU are the calibrated microphone signals. Therefore, the output signals of the EigenUnit-EM32Control AU are the signals to be

recorded (**NOT** the signals directly provided to the OS by the audio driver from the Eigenmike).

II. If the user does not want to add an AU to the signal flow or the recording application is not capable of hosting a 32-channel AU, the user can use mh acoustics' standalone application **em32setGain**. This application performs the appropriate calibration and provides volume control via the em32's internal microphone programmable gain amplifiers (PGAs). After starting and using the standalone em32setGain application, the microphone signals provided to the OS by the audio driver are calibrated and can be recorded directly.

4. **Always make sure to use only one of the above tools and NEVER use them in combination!** Using more than one tool at a time could cause the calibration weights to be applied twice, resulting in an incorrect calibration of the microphone signals.

5. Recording 32 audio channels at 48kHz sample rate generates a lot of data. Traditional audio file formats have a 4GB limit which equates to about 15 minutes of Eigenmike array recording (depending on the word size). Make sure your recording application uses a file format that can handle the expected recording length. (EigenStudio uses the RF64 format. This is an extension to the traditional RIFF format and is capable of recording the raw em32 microphone signals for hours.)

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