CLAIMS

What is claimed is:

1. A method for processing audio between multiple audio spaces of a user using ~~with~~ an audio system~~,~~ where audio is transmitted from an external audio space of the user to an internal space of the user, the method comprising:

receiving at least one microphone signal that captures an external sound from ~~an~~the external audio space with at least one microphone corresponding to at least one external position in the external audio space; and

generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound from a position of the at least one microphone corresponding to the at least one external position in the external audio space to at least one driver corresponding to at least one internal position in ~~an~~ the internal audio space,

wherein the virtualized capture of the external sound is perceivable by ~~a~~ the user from the position of the at least one driver corresponding to the at least one internal position in the internal audio space relative to the external sound's corresponding position in the external audio space; and

wherein the internal and external audio spaces are separated from each other ~~by an audio space boundary~~.

2. The method as recited in claim 1, wherein the at least one microphone does not match the at least one driver in quantity.

3. The method as recited in claim 1, wherein the at least one microphone signal captures external sound from the external audio space in real time.

4. The method as recited in claim 1, wherein the audio system is either: (1) associated with an automobile where the internal audio space is inside of an automobile cabin and the external audio space is outside of the automobile cabin; or (2) associated with a headphone

where the internal audio space is inside of a headphone ear cup and the external audio space is outside of the headphone ear cup; or (3) associated with a helmet where the internal audio space is inside of a helmet shell and the external audio space is outside of the helmet shell.

5. The method as recited in claim 1, wherein the microphone transform function implements a convolution involving the at least one microphone signal corresponding to the at least one external position and at least one impulse response signal corresponding to the at least one external position and the at least one internal position.

6. A method as recited in claim 1, further comprising:~~for processing audio between multiple audio spaces with an audio system comprising~~:

~~receiving at least one microphone signal that captures external sound from an external audio space with at least one microphone corresponding to at least one external position;~~

~~generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound from the at least one microphone corresponding to the at least one external position to at least one internal position corresponding to at least one driver in an internal audio space, the internal and external audio spaces being separated from each other by an audio space boundary; and~~

~~generating at least one conditioned microphone signal by~~ applying at least one audio conditioning technique to the at least one processed microphone signal to generate at least one conditioned microphone signal,

wherein the audio system is either: (1) associated with loudspeakers where the at least one audio conditioning technique is selected from the group consisting of Transaural Acoustic Crosstalk Cancellation, Beam Forming, Virtualization, Interaural Time Difference (ITD), Interaural Intensity Difference (IID), and Interaural Level Difference (ILD); or (2) associated with headphones where the at least one audio conditioning technique is selected from the group consisting of Interaural Time Difference (ITD), Interaural Intensity Difference (IID), Interaural Level Difference (ILD), and HRIR/HRTF/BRIR/BRTF personalization.

7. The method as recited in claim 6, further comprising:

generating at least one combined output signal by adding the at least one conditioned microphone signal with at least one conditioned audio content signal, the at least one conditioned audio content signal being generated by applying the at least one audio conditioning technique to an audio content signal.

8. The method as recited in claim 1, wherein generating at least one processed microphone signal comprises enhancing certain sounds of the captured external sound ~~that humans are unable to hear~~.

9. The method as recited in claim 1, wherein the at least one microphone signal is preconditioned by applying audio preconditioning techniques to the at least one microphone signal, the audio preconditioning techniques being selected from the group consisting of noise canceling, noise reduction, and microphone transforms for changing signal domains.

10. The method as recited in claim 1, wherein the at least one microphone signal captures external sound from the external audio space in a recording.

11. The method as recited in claim 1, wherein generating at least one processed microphone signal comprises saving the at least one processed microphone signal for later playback.

12. The method as recited in claim 1, wherein the audio space boundary attenuates open air transmission of the external sound from the external audio space to the internal audio space such that less than 6 dB of external sound is measurable in the internal audio space.

13. The method as recited in claim 1, further comprising:

rendering the at least one processed microphone signal via the at least one driver for playback in the internal audio space, whereby the playback includes the external sound virtually captured by the at least one microphone at the at least one internal position.

14. The method as recited in claim 7, further comprising:

rendering the at least one combined output signal via the at least one driver for playback in the internal audio space, whereby the playback includes the external sound virtually captured by the at least one microphone at the at least one internal position and audio content captured on the audio content signal.

15. An audio system for processing audio between multiple audio spaces, where audio is transmitted from an external audio space of the user to an internal space of the user, the system comprising:

at least one microphone transform function module configured for receiving at least one microphone signal that captures an external sound from ~~an~~ the external audio space with at least one microphone corresponding to at least one external position in the external audio space, and for generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound from a position of the at least one microphone corresponding to the at least one external position in the external audio space to at least one driver corresponding to at least one internal position in ~~an~~ the internal audio space, wherein the virtualized capture of the external sound is perceivable by ~~a~~ the user from the position of the at least one driver corresponding to the at least one internal position in the internal audio space relative to the external sound's corresponding position in the external audio space, and wherein the internal and external audio spaces are separated from each other ~~by an audio space boundary~~.

16. An audio system ~~for processing audio between multiple audio spaces~~as recited in claim 15, further comprising:

~~at least one microphone transform function module configured for receiving at least one microphone signal that captures external sound from an external audio space with at least one microphone corresponding to at least one external position, and for generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound from the at least one microphone corresponding to the at least one external position to at least one~~

~~internal position corresponding to at least one driver in an internal audio space, the internal and external audio spaces being separated from each other by an audio space boundary; and~~

at least one audio conditioning module configured for generating at least one conditioned microphone signal by applying at least one audio conditioning technique to the at least one processed microphone signal,

wherein the audio system is either: (1) associated with loudspeakers where the at least one audio conditioning technique is selected from the group consisting of Transaural Acoustic Crosstalk Cancellation, Beam Forming, Virtualization, Interaural Time Difference (ITD), Interaural Intensity Difference (IID), and Interaural Level Difference (ILD); or (2) associated with headphones where the at least one audio conditioning technique is selected from the group consisting of Interaural Time Difference (ITD), Interaural Intensity Difference (IID), Interaural Level Difference (ILD), and HRIR/HRTF/BRIR/BRTF personalization.

17. The audio system as recited in claim 16, further comprising:

at least one combining module configured for generating at least one combined output signal by adding the at least one conditioned microphone signal with at least one conditioned audio content signal, the at least one conditioned audio content signal being generated by applying the at least one audio conditioning technique to an audio content signal.

18. The audio system as recited in claim 16, further comprising:

at least one playback module configured for rendering the at least one conditioned microphone signal via the at least one driver for playback in the internal audio space, whereby the playback includes the external sound virtually captured by the at least one microphone at the at least one internal position.

19. The audio system as recited in claim 17, further comprising:

at least one playback module configured for rendering the at least one combined output signal via the at least one driver for playback in the internal audio space, whereby the playback includes the external sound virtually captured by the at least one microphone at the at least one internal position and audio content captured on the audio content signal.

20. A computer program product for processing audio between multiple audio spaces with an audio system, where audio is transmitted from an external audio space of the user to an internal space of the user, the computer program product being embodied in a non-transitory computer readable medium and comprising computer executable instructions for:

receiving at least one microphone signal that captures an external sound from ~~an~~ the external audio space with at least one microphone corresponding to at least one external position in the external audio space; and

generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound from a position of the at least one microphone corresponding to the at least one external position in the external audio space to at least one driver corresponding to at least one internal position in ~~an~~ the internal audio space, wherein the virtualized capture of the external sound is perceivable by ~~a~~ the user from the position of the at least one driver corresponding to the at least one internal position in the internal audio space relative to the external sound's corresponding position in the external audio space, and wherein the internal and external audio spaces are separated from each other ~~by an audio space boundary~~.

21. A method for processing audio between multiple audio spaces with an audio system~~,~~ where audio is transmitted from an external audio space of the user to an internal space of the user, the method comprising:

receiving at least one microphone signal that captures an external sound from ~~an~~ the external audio space with at least one microphone corresponding to at least one external position in the external audio space; and

generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound wherein the virtualized capture of the external sound is perceivable by a user from a first perspective of at least one driver corresponding to at least one internal position in an internal audio space instead of from a second perspective of the at least one microphone corresponding to the at least one external position in the external audio space; and

wherein the internal and external audio spaces are being separated from each other ~~by an audio space boundary~~.

22. A method for processing audio between multiple audio spaces with an audio system~~,~~ where audio is transmitted from an external audio space of the user to an internal space of the user, the method comprising:

receiving at least one microphone signal that captures an external sound from ~~an~~ the external audio space with at least one microphone corresponding to at least one external position in the external audio space; and

generating at least one processed microphone signal by processing the at least one microphone signal with at least one microphone transform function in order for virtualizing the capture of the external sound wherein the virtualized capture of the external sound is perceivable by ~~a~~ the user from a first perspective of at least one internal position in an internal audio space that corresponds to at least one driver instead of from a second perspective of the at least one external position in the external audio space that corresponds to the at least one microphone; and

wherein the internal and external audio spaces are separated from each ~~other by an audio space boundary~~.