CLAIMS

~~*What is claimed is:*~~

1. A method of enhancing an audio signal comprising:
receiving an input signal at a microphone array having a plurality of transducers;
generating from the microphone array a plurality of audio signals;
processing the plurality of audio signals to form a reference signal;
processing the plurality of audio signals to form multiple steered beams; and
~~applying~~performing spatial analysis ~~to~~on the multiple steered beams to characterize ~~the~~an audio scene.

2. The method as recited in claim 1 wherein the spatial analysis comprises assigning a spatial direction vector to each of the multiple steered beams and associating the vector with the generated beam signals from the multi-beamformer.

3. The method as recited in claim 1 or 2, further comprising using the characterization to construct an enhancement operation comprising deriving a time-frequency mask and applying it to the reference signal so as to improve ~~that, when applied to the reference signal, improves~~ the spatial selectivity and reduces unwanted noise in the reference signal.

~~4. The method as recited in claim 1 wherein the spatial analysis comprises estimating a dominant direction for each time and frequency and using that estimate in determining the extent to which the reference signal component at that time and frequency is included in the output signal.~~

~~5. The method as recited in claim 1 wherein the multiple steered beams are generated by combining the input microphone signals with at least one of progressive delays and elemental filters applied to the transducers in the array.~~

~~6. The method as recited in claim 3 wherein the enhancement operation comprises deriving a time-frequency mask and applying it to a reference signal.~~

~~7~~4. The method as recited in claim ~~6~~3, wherein the reference signal is a summation of the plurality of ~~beam~~audio signals.

~~8~~5. The method as recited in claim ~~6~~3, wherein the reference signal is a single ~~microphone~~audio signal.

~~9~~6. The method as recited in claim ~~6~~3, wherein the reference signal corresponds to a beam steered in a predetermined look direction.

~~10~~7. The method as recited in claim ~~6~~3, wherein the reference signal is a tracking beam tracking a selected talker.

~~11~~8. The method as recited in any of claim 3 to 7,~~claim 6~~ wherein the time-frequency mask is derived using (r,θ) spatial information , where r is a parameter measuring the extent that a received signal originates form multiple directions and θ is the angle of a direction vector corresponding to the dominant sound direction.

~~12. A method of enhancing an audio signal comprising:~~
~~forming multiple steered beams; and~~
~~performing a spatial analysis of the audio scene based on the multiple steered beam; and~~
~~using the results of the spatial analysis to derive a time-frequency mask that is applied to a reference signal to enhance target sources.~~

~~13~~9. The method of any of claims 3 to 8, ~~as recited in claim 12~~ wherein the application of the time-frequency mask to the reference signal enhances target sources. ~~reference signal is a look-direction beam.~~

~~14~~10. The method ~~as recited in claim 12~~of claim 9, wherein the time-frequency mask is further adapted to reject interference signals arriving from outside a predefined target region.

~~15. A method of enhancing the spatial selectivity of an array configured for receiving a signal from an environment, the method comprising:~~
~~receiving a signal at a plurality of elements;~~
~~generating a plurality of steered beams for sampling the acoustic environment;~~
~~identifying a reference signal; and~~
~~estimating for each time and frequency a direction of arrival; and using the estimates as a basis for accepting, attenuating, or rejecting components of the reference signal to create an output signal.~~

11. The method of any preceding claim, wherein the spatial analysis comprises estimating a dominant direction for each time and frequency and using that estimate in determining the extent to which the reference signal component at that time and frequency is included in the output signal.

12. The method of any preceding claim, wherein the multiple steered beams are generated by combining the input microphone signals with at least one of progressive delays and elemental filters applied to the transducers in the array.

13. The method of any preceding claim, further comprising:
estimating for each time and frequency a direction of arrival; and
using the estimates as a basis for accepting, attenuating, or rejecting components of the reference signal to create an output signal.