Claims

1. An audio processor for providing a plurality of loudspeaker signals on the basis of a plurality of input signals,

wherein the audio processor is configured to obtain an information about a position of a listener;

wherein the audio processor is configured to obtain an information about positions of a plurality of loudspeakers;

wherein the audio processor is configured to obtain an information about an orientation of the listener;

wherein the audio signal processor is configured to dynamically allocate loudspeakers for playing back objects and/or channel objects and/or adapted signals derived from the input signals, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers;

wherein the audio signal processor is configured to render the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers, in order to obtain the loudspeaker signals such that a rendered sound follows the listener when the listener moves or turns;

wherein the audio processor is configured to compute a position of objects and/or channel objects on the basis of information about the position and the orientation of the listener; and

wherein the audio processor is configured to dynamically allocate one or more loudspeakers for playing back the objects and/or channel objects, in dependence on the distances between the position of the objects and/or of the channel objects and the loudspeakers.

2. The audio processor according to claim 1,

wherein the audio processor is configured to obtain an information about an orientation of the listener;

wherein the audio signal processor is configured to dynamically allocate loudspeakers for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the information about the orientation of the listener;

wherein the audio signal processor is configured to render the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the information about the orientation of the listener, in order to obtain the loudspeaker signals such that the rendered sound follows the orientation of the listener.

3. The audio processor according to the claim 1 or 2,

wherein the audio processor is configured to obtain an information about an orientation and/or about a characteristic and/or about a specification of the loudspeakers;

wherein the audio signal processor is configured to dynamically allocate the loudspeakers for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the information about the orientation and/or about the characteristic and/or about the specification of the loudspeakers;

wherein the audio signal processor is configured to render the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the information about the orientation and/or about the characteristic and/or about the specification of the loudspeakers, in order to obtain the loudspeaker signals such that the rendered sound follows the listener and/or the orientation of the listener when the listener moves or turns.

4. The audio processor according to one of the claims 1 to 3,

wherein the audio signal processor is configured to dynamically change an allocation of loudspeakers for playing back the objects, the channel objects, or the adapted signals derived from the input signals

from a first situation in which the objects and/or the channel objects and/or the adapted signals of an input signal are allocated to a first loudspeaker setup corresponding to a channel configuration of a channel-based input signal

to a second situation in which the objects and/or the channel objects and/or the adapted signals of the input signal are allocated to a subset of the loudspeakers of the first loudspeaker setup and to at least one additional loudspeaker.

5. The audio processor according to one of the claims 1 to 4,

wherein the audio signal processor is configured to dynamically change an allocation of loudspeakers for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals

from a first situation in which the objects and/or the channel objects and/or the adapted signals of the input signal are allocated to a first loudspeaker setup corresponding to a channel configuration of a channel-based input signal with a first loudspeaker layout

to a second situation in which the objects and/or channel objects and/or the adapted signals of the input signal are allocated to a second loudspeaker setup, which corresponds to the channel configuration of a channel-based input signal, with a second loudspeaker layout.

6. The audio processor according to one of the claims 1 to 5,

wherein the audio signal processor is configured to dynamically allocate loudspeakers of a first loudspeaker setup for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals, according to a first allocation scheme, in agreement with a first loudspeaker layout, and

wherein the audio processor is configured to dynamically allocate loudspeakers of a second loudspeaker setup for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals, according to a second allocation scheme, in agreement with a second loudspeaker layout, which differs from the first loudspeaker layout.

7. The audio processor according to one of the claims 2 to 6,

wherein a loudspeaker setup corresponds to a channel configuration of the input signal, and

wherein the audio processor is configured to dynamically allocate loudspeakers of the loudspeaker setup for playing back the objects and/or the channel objects and/or the adapted signals , such that the allocation deviates from the correspondence, in response to a difference between the listener's position and/or orientation from a default listener's position and/or orientation associated with the loudspeaker setup.

8. The audio processor according to one of the claims 1 to 7,

wherein a first loudspeaker setup corresponds to a channel configuration according to a first correspondence, and

wherein the audio processor is configured to dynamically allocate loudspeakers of the first loudspeaker setup for playing back the objects and/or the channel objects and/or the adapted signals, according to this first correspondence, and

wherein a second loudspeaker setup corresponds to a channel configuration according to a second correspondence, and

wherein the audio processor is configured to dynamically allocate loudspeakers of the second loudspeaker setup for playing back the objects and/or the channel objects and/or the adapted signals, such that the allocation to loudspeakers deviates from this second correspondence.

9. The audio processor according to one of the claims 1 to 8, wherein the audio processor is configured to dynamically allocate a subset of all the loudspeakers of all loudspeaker setups for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals.

10. The audio processor according to claim 9, wherein the audio processor is configured to dynamically allocate a subset of all the loudspeakers of all the loudspeaker setups for playing back the objects and/or the channel objects and/or the adapted signals derived from the input signals,

wherein the audio processor is configured to select a subset of all available loudspeakers, such that the listener is located between or amongst the selected loudspeakers, such that the subset of the loudspeakers surrounds the listener.

11. The audio processor according to one of the claims 1 to 10, wherein the audio processor is configured to render the objects and/or the channel objects and/or the adapted signals derived from the input signals with defined follow times, such that, a sound image follows the listener in a way that the rendering is adapted smoothly over time.

12. The audio processor according to one of the claims 1 to 11, wherein the audio processor is configured

to identify loudspeakers in a predetermined environment of the listener, and

to adapt a configuration of the input signals to the number of identified loudspeakers, and

to dynamically allocate the identified loudspeakers for playing back the objects and/or the channel objects and/or the adapted signals, and

to render objects and/or channel objects and/or adapted signals to loudspeaker signals of associated loudspeakers in dependence on position information of objects and/or channel objects and/or adapted signals and in dependence on a default loudspeaker position.

13. The audio processor according to one of the claims 2 to 12, wherein the audio processor is configured to compute a position of objects and/or channel objects on a basis of information about the position and/or the orientation of the listener.

14. The audio processor according to one of the claims 1 to 13, wherein the audio processor is configured to physically compensate the rendered objects and/or the channel objects and/or the adapted signals in dependence on a default loudspeaker position, on the actual loudspeaker position, and on the relationship between a sweet spot and the listener’s position.

15. The audio processor according to one of the claims 1 to 14, wherein the audio processor is configured to dynamically allocate one or more loudspeakers for playing back the

objects and/or the channel objects and/or the adapted signals, in dependence on distances between the position of the objects and/or of the channel objects and/or of the adapted signals and the loudspeakers.

16. The audio processor according to one of the claims 1 to 15, wherein the audio processor is configured to dynamically allocate one or more loudspeakers having a smallest distance or smallest distances from an absolute position of the objects and/or the channel objects and/or the adapted signals for playing back the objects and/or channel objects and/or adapted signals.

17. The audio processor according to one of the claims 1 to 16, wherein the input signal is having an ambisonics and/or Higher Order Ambisonics and/or Binaural format.

18. The audio processor according to one of the claims 1 to 17, wherein the audio processor is configured to dynamically allocate loudspeakers for playing back the objects and/or channel objects and/or adapted signals, such that a sound image of the objects and/or channel objects and/or adapted signals follow a movement of the listener.

19. The audio processor according to one of the claims 2 to 18, wherein the audio processor is configured to dynamically allocate loudspeakers for playing back the objects and/or the channel objects and/or the adapted signals, such that a sound image of the objects and/or the channel objects and/or the adapted signals follow a change of the listener's position and a change of a listener's orientation.

20. The audio processor according to one of the claims 1 to 19, wherein the audio processor is configured to dynamically allocate loudspeakers for playing back the objects and/or channel objects and/or adapted signals, such that a sound image of the objects and/or channel objects and/or adapted signals follows a change of the listener's position, but remains stable against changes of the listener's orientation.

21. The audio processor according to one of the claims 1 to 20, wherein the audio processor is configured to dynamically allocate loudspeakers for playing back the objects and/or channel objects and/or adapted signals in dependence on information about positions of two or more listeners, such that a sound image of the objects and/or channel objects and/or adapted signals is adapted depending on a movement or turn of two or more listeners.

22. The audio processor according to claim 21, wherein the audio processor is configured to track the position of the one or more listeners in real-time.

23. The audio processor according to one of the claims 1 to 22, wherein the audio processor is configured to fade a sound image between two or more loudspeaker setups in dependence on the positional coordinates of the listener, such that an actual fading ratio is dependent on the actual position of the listener or on an actual movement of the listener.

24. The audio processor according to one of the claims 1 to 23, wherein the audio processor is configured to fade the sound image from a first loudspeaker setup to a second loudspeaker setup, wherein a number of loudspeakers of the second loudspeaker setup is different from number of loudspeakers of the first loudspeaker setup.

25. The audio processor according to one of the claims 1 to 24, wherein the audio processor is configured to adaptively upmix or downmix the objects and/or channel objects, in dependence on the number of the objects and/or channel object in the input signal and in dependence on the number of dynamically allocated loudspeakers, in order to obtain adapted signals.

26. The audio processor according to one of the claims 1 to 25, wherein the audio processor is configured to transition

    from a first state, in which an audio content is rendered to a first loudspeaker setup,

    to a second state in which an ambient sound of the audio content are rendered to the first loudspeaker setup, or to one or more loudspeakers of the first loudspeaker setup, while directional components of the audio content are rendered to the second loudspeaker setup.

27. The audio processor according to one of the claims 1 to 26, wherein the audio processor is configured to transition

    from a first state, in which an audio content is rendered to a first loudspeaker setup,

to a second state in which an ambient sound of the audio content and directional components of the audio content are rendered to different loudspeakers in the second loudspeaker setup.

28. The audio processor according to one of the claims 1 to 27, wherein the audio processor is configured to associate a position information to an audio channel of a channel-based audio content, in order to obtain a channel object, wherein the position information represents a position of a loudspeaker associated with the audio channel.

29. The audio processor according to one of the claims 1 to 28, wherein the audio processor is configured to dynamically allocate a given single loudspeaker for playing back the objects and/or channel objects and/or adapted signals , which is positioned closest to the listener, as long as a listener is within a predetermined distance range from the given single loudspeaker.

30. The audio processor according to claim 29, wherein the audio processor is configured to fade out a signal of the given single loudspeaker, in response to a detection that the listener leaves the predetermined range.

31. The audio processor according to one of the claims 1 to 30, wherein the audio processor is configured to decide, to which loudspeaker signals the objects and/or channel objects and/or adapted signals are rendered in dependence on a distance of two loudspeakers and/or in dependence on an angle between the two loudspeakers from a listener’s position.

32. A method for providing a plurality of loudspeaker signals on the basis of a plurality of input signals,

wherein the method comprises obtaining an information about a position of a listener;

wherein the method comprises obtaining an information about positions of a plurality of loudspeakers;

wherein the method comprises obtaining an information about an orientation of the listener;

wherein a dynamic allocation of loudspeakers for playing back the objects and/or channel objects and/or adapted signals is adapted, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers;

wherein the objects and/or the channel objects and/or the adapted signals derived from the input signals are rendered, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers, in order to obtain the loudspeaker signals such that the rendered sound follows a listener, when the listener moves or turns;

wherein a position of objects and/or channel objects is computed on the basis of information about the position and the orientation of the listener; and

wherein one or more loudspeakers are dynamically allocated for playing back the objects and/or channel objects, in dependence on the distances between the position of the objects and/or of the channel objects and the loudspeakers.

33. Computer program with a program code for performing the method according to claim 32, when the computer program runs on a computer.

34. An audio processor for providing a plurality of loudspeaker signals on the basis of a plurality of input signals,

wherein the audio processor is configured to obtain an information about a position of a listener;

wherein the audio processor is configured to obtain an information about positions of a plurality of loudspeakers;

wherein the audio signal processor is configured to dynamically allocate loudspeakers for playing back objects and/or channel objects and/or adapted signals derived from the input signals, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers;

wherein the audio signal processor is configured to render the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the

information about the position of the listener and in dependence on the information about positions of the loudspeakers, in order to obtain the loudspeaker signals such that a rendered sound follows the listener when the listener moves or turns;

wherein the audio processor is configured to render the objects and/or channel objects and/or adapted signals derived from the input signals with defined follow times, such that, the sound image follows the listener in a way that the rendering is adapted smoothly over time; and

wherein changes do not happen immediately, but the translational or rotational changes, or a combination of both, adapt within adjustable time constants to the new listener position.

35. An audio processor for providing a plurality of loudspeaker signals on the basis of a plurality of input signals,

wherein the audio processor is configured to obtain an information about a position of a listener;

wherein the audio processor is configured to obtain an information about positions of a plurality of loudspeakers;

wherein the audio signal processor is configured to dynamically allocate loudspeakers for playing back objects and/or channel objects and/or adapted signals derived from the input signals, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers;

wherein the audio signal processor is configured to render the objects and/or the channel objects and/or the adapted signals derived from the input signals, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers, in order to obtain the loudspeaker signals such that a rendered sound follows the listener when the listener moves or turns;

wherein the audio processor is configured

to identify loudspeakers dynamically in a predetermined environment of the listener, based on a distance between the listener and the loudspeaker, and

to dynamically allocate the identified loudspeakers for playing back the objects and/or channel objects and/or adapted signals, and

to render objects and/or channel objects and/or adapted signals to loudspeaker signals of associated loudspeakers in dependence on position information of objects and/or channel objects and/or adapted signals and in dependence on the default loudspeaker position.

36. A method for providing a plurality of loudspeaker signals on the basis of a plurality of input signals,

wherein the method comprises obtaining an information about a position of a listener;

wherein the method comprises obtaining an information about positions of a plurality of loudspeakers;

wherein a dynamic allocation of loudspeakers for playing back the objects and/or channel objects and/or adapted signals is adapted, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers;

wherein the objects and/or the channel objects and/or the adapted signals derived from the input signals are rendered, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers, in order to obtain the loudspeaker signals such that the rendered sound follows a listener when the listener moves or turns;

wherein the objects and/or channel objects and/or adapted signals derived from the input signals are rendered with defined follow times, such that, the sound image follows the listener in a way that the rendering is adapted smoothly over time; and

wherein changes do not happen immediately, but the translational or rotational changes, or a combination of both, are adapted within adjustable time constants to the new listener position.

37. A method for providing a plurality of loudspeaker signals on the basis of a plurality of input signals,

wherein the method comprises obtaining an information about a position of a listener;

wherein the method comprises obtaining an information about positions of a plurality of loudspeakers;

wherein a dynamic allocation of loudspeakers for playing back the objects and/or channel objects and/or adapted signals is adapted, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers;

wherein the objects and/or the channel objects and/or the adapted signals derived from the input signals are rendered, in dependence on the information about the position of the listener and in dependence on the information about positions of the loudspeakers, in order to obtain the loudspeaker signals such that the rendered sound follows a listener when the listener moves or turns;

wherein loudspeakers are identified dynamically in a predetermined environment of the listener, based on a distance between the listener and the loudspeaker, and

wherein the identified loudspeakers are dynamically allocated for playing back the objects and/or channel objects and/or adapted signals, and

wherein objects and/or channel objects and/or adapted signals are rendered to loudspeaker signals of associated loudspeakers in dependence on position information of objects and/or channel objects and/or adapted signals and in dependence on the default loudspeaker position.

38. A Computer program with a program code for performing the method according to claim 36 or 37, when the computer program runs on a computer.