

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year)	13.05.2014
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Applicant's or agent's file reference 0184SP352998	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/JP2014/060460	International filing date (day/month/year) 11.04.2014	Priority date (day/month/year) 26.04.2013
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International Patent Classification (IPC) or both national classification and IPC
H04S5/02 (2006.01) i, H04R3/00 (2006.01) i

Applicant
SONY CORPORATION

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed
 - a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - on paper
 - in electronic form
 - b. (time)
 - in the international application as filed
 - together with the international application in electronic form
 - subsequently to this Authority for the purposes of search
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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1. Statement			
Novelty (N)	Claims	1-8	YES
	Claims	_____	NO
Inventive step (IS)	Claims	1-8	YES
	Claims	_____	NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims	_____	NO

2. Citations and explanations:	
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Document 1: JP 2013-510481 A (FRAUNHOFER-GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG e.V.) 21 March 2013, entire text, all drawings & US 2012/0237062 A1 & WO 2011/054876 A1

Document 2: JP 2008-17117 A (NIPPON HOSO KYOKAI) 24 January 2008, entire text, all drawings

Document 3: WO 2011/117399 A1 (THOMSON LICENSING) 29 September 2011, entire text, all drawings & JP 2013-524564 A & US 2013/0010971 A1 & EP 2553947 A & AU 2011231565 A & CN 102823277 A & KR 10-2013-0031823 A

The invention in claims 1-8 is not disclosed in any of the documents cited in the ISR, and would not be obvious to a person skilled in the art.

Document 1 discloses, in a device that supplies a speaker drive signal of speaker equipment on the basis of an audio signal pertaining to a virtual audio source, being "provided with a speaker determiner (810) connected to a multi-channel renderer (820). The speaker

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determiner (810) determines a group of related speakers (812) of speaker equipment positioned within a variable angle range centered on the position (802) of a virtual audio source. The variable angle range is on the basis of the distance between the virtual audio source position (802) and a predetermined listener position (804). The multi-channel renderer (820) calculates the drive factor for the determined group of related speakers (812). Furthermore, the multi-channel renderer (820) supplies a drive signal (822) to the group of related speakers (812) on the basis of an audio signal (806) of the virtual audio source and the calculated drive factor, but does not supply a drive signal (822) pertaining to the virtual audio source to the speakers other than the speakers of the group of related speakers (812). As a result, position information (802) (for example, coordinates) for example of the virtual audio source and position information (804) of a predetermined listener position are supplied, and an audio signal (806) of the virtual audio source is supplied to the multi-channel renderer (820)" (see paragraph [0108], fig. 8).

Document 2 discloses that a sound image formation device that can improve sound image localization in the depth direction "includes an acoustic signal output means (11) that includes at least two speaker layers (111, 112) configured from at least three speakers disposed along a spherical surface having a radius (r_i) centered on a listening position (G)..., a localization position designation means (12) that designates the localization position (S) of an acoustic signal, a speaker disposition information storage means (13) that stores speaker disposition information that is disposition information

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for the speakers included in the acoustic signal output means (11), and a sound-image-forming acoustic signal generation means (14) that generates a sound-image-forming acoustic signal that forms a sound image at the localization position (S) on the basis of the localization position (S) and the speaker disposition information, and outputs the result to the acoustic signal output means (11). The sound-image-forming acoustic signal generation means (14) includes: a speaker selection means (141) that selects a speaker to emit the sound-image-forming acoustic signal for each speaker layer; an output level determination means (142) that determines the output level of the sound-image-forming acoustic signal output by the speaker selected by the speaker selection means (141); a lag time determination means (143) that determines the lag time of the sound-image-forming acoustic signal output by the speaker selected by the speaker selection means (141); and a sound-image-forming acoustic signal output means (144) that outputs to the acoustic signal output means (11) the sound-image-forming acoustic signal having an output level subjected to lag time lagging to the speaker selected by the speaker selection means (141)" (see paragraphs [0025] and [0026] and fig. 1).

Document 3 discloses that a device and method for decoding an audio acoustic field expression include "a step (110) for calculating a pan function using a geometric method on the basis of a plurality of source directions (103) (where S is the number of source direction) and speaker positions (102) (where L is the number of speakers) for each of a plurality of speakers, a step (120) for calculating a mode matrix (E) from the

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imparted degree (N) of the acoustic field expression and the source directions, a step (130) for calculating a pseudo-inverse mode matrix (E^+) of the mode matrix (E), and a step (130, 140) for obtaining sound data (AU_{dec}) resulting from decoding the audio acoustic field expression (SF_c). The decoding is on the basis of a decoding matrix (D) obtained (135) at least from said pseudo-inverse mode matrix (E^+) and the pan function (W). In an embodiment, the pseudo-inverse mode matrix is obtained in accordance with $E^+ = E^H[EE^H]^{-1}$. The degree (N) of the acoustic field expression may be defined ahead of time, or may be extracted (105) from the input signal (SF_c)" (see page 6, lines 8-20; fig. 1).

However, none of documents 1-3 disclose the feature as in the invention in claims 1-8 that "with regards to at least four audio output units and combinations of two or three of the audio output units among the at least four audio output units positioned in the vicinity of a target sound image localization position, by calculating, for each of the plurality combinations that are different from each other, the gain of the audio output from the audio output units on the basis of the position relationship of the audio output units, the output gain of the audio output from the at least four audio output units is determined for localizing the sound image at the sound image localization position", and the invention in claims 1-9 thereby exerts the advantageous effect that "the audio from four speakers positioned at the periphery of the target sound image position is output, and it becomes possible to further stabilize the sound image localization. As a result, it is possible to further expand the range of a sweet spot".

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