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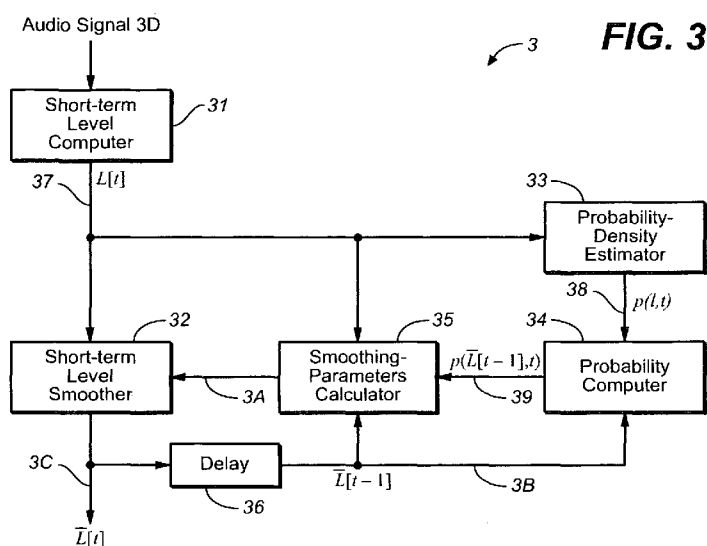
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Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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30 April 2009

(54) Title: TIME-VARYING AUDIO-SIGNAL LEVEL USING A TIME-VARYING ESTIMATED PROBABILITY DENSITY OF THE LEVEL



(57) Abstract: Methods, media and apparatus for smoothing a time-varying level of a signal. A method includes estimating a time-varying probability density of a short-term level of the signal and smoothing a level of the signal by using the probability density. The signal may be an audio signal. The short-term level and the smoothed level may be time series, each having current and previous time indices. Here, before the smoothing, computing a probability of the smoothed level at the previous time index may occur. Before the smoothing, calculating smoothing parameters using the probability density may occur. Calculating the smoothing parameters may include calculating the smoothing parameters using the smoothed level at the previous time index, the short-term level at the current time index and the probability of the smoothed level at the previous time index. Calculating the smoothing parameters may include calculating the smoothing parameters using breadth of the estimated probability density.

WO 2009/011826 A3

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2008/008591

A. CLASSIFICATION OF SUBJECT MATTER
INV. H03G3/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H03G H04H H04N G10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/274620 A1 (HADDAD BASSEL [US]) 7 December 2006 (2006-12-07) paragraphs [0003]; [0022] - [0025], [0032], [0043] - [0046], [0052] - [0055], [0060]; claim 21; figures 2-5 -----	1,2,5,7, 12,15,16
X	US 5 101 416 A (FENTON PATRICK [CA] ET AL) 31 March 1992 (1992-03-31) column 6, line 52 - column 7, line 50; figure 3 -----	1,5,12, 15,16
X	US 6 768 979 B1 (MENENDEZ-PIDAL XAVIER [US] ET AL) 27 July 2004 (2004-07-27) column 2, lines 4-29 column 3, lines 49-61 column 7, line 25 - column 10, line 67; claims 4,18; figures 1,8-10 ----- -/--	1,2,5,7, 12,16

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Z document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/196510 A1 (HIETALA VINCENT MARK [US] ET AL) 26 December 2002 (2002-12-26) figures 2,4-20 -----	1,5,7, 12,15,16
A	WO 92/15150 A (DSP CONSULTANTS LTD [GB]) 3 September 1992 (1992-09-03) figures 1-4 -----	1,2,5,7, 12,15,16

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 3

The features of claim 3 present a result caused by the input signals. In this general formulation no technical method step can be seen. Consequently, claim 3 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined. The claim attempts to define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem, without providing the technical features necessary for achieving this result.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/008591

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: ³
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search reportcovers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

see annex

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1,2,4-12,15-26

method for smoothing with a probability density and
computing the probability of the smoothed level at the
previous time index

2. claims: 13,14

method for smoothing with a probability density and
estimating the probability density by fitting a parametric
representation to past values of the short term level

3. claim: 27

method for smoothing, the smoothing comprises using slow
time constants where the difference between the smoothed
short-term level at the previous time index and the
short-term level at the current time index exceeds a
threshold directing the use of fast time constants

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/008591

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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