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| 61/637,175 | 23 April 2012 (23.04.2012) | US |
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- (81) **Designated States** (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
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DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD,
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU,
RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
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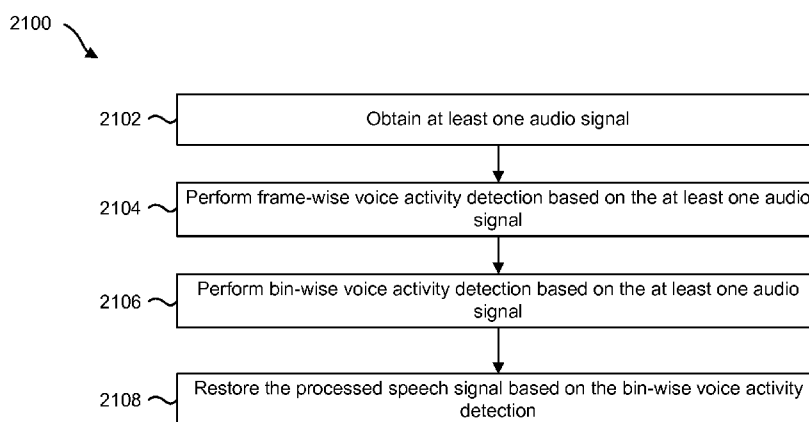


FIG. 21

(57) Abstract: A method for restoring a processed speech signal by an electronic device is described. The method includes obtaining at least one audio signal. The method also includes performing bin-wise voice activity detection based on the at least one audio signal. The method further includes restoring the processed speech signal based on the bin-wise voice activity detection.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/037109

A. CLASSIFICATION OF SUBJECT MATTER
INV. G10L21/0316 G10L21/0208
ADD.

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)
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 practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/12155 A1 (QUALCOMM INC [US]) 11 March 1999 (1999-03-11)	1-5,9, 13-17, 21, 25-29, 33, 37-41, 45,49-60
A	the whole document	8,12,20, 24,32, 36,44,48
X	----- US 2011/264447 A1 (VISSER ERIK [US] ET AL) 27 October 2011 (2011-10-27)	1-5, 13-17, 25-29, 37-41
A	In particular paragraphs 0075 to 0078, 0112, 0121, 0135, to 0136, 0148, 0153 to 0154 ----- -/-	8,12,20, 24,32, 36,44,48



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 application or patent 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

"&" document member of the same patent family

Date of the actual completion of the international search

13 February 2014

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2013/037109

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 374 265 A (MATSUSHITA ELECTRIC IND CO LTD [JP]) 9 October 2002 (2002-10-09)	1,4-7, 10,11, 13, 16-19, 22,23, 25, 28-31, 34,35, 37, 40-43, 46,47
Y	In particular pages 9 to 12, 18 to 19, 23 to 25, 51 to 53	2,3,14, 15,26, 27,38,39
A		8,12,20, 24,32, 36,44,48
X	----- US 6 658 380 B1 (LOCKWOOD PHILIP [FR] ET AL) 2 December 2003 (2003-12-02) In particular columns 4 and 6, claim 4	1,13,25, 37
Y	----- US 2006/053003 A1 (SUZUKI TETSU [JP] ET AL) 9 March 2006 (2006-03-09) In particular paragraphs 77, 78, 102, 167, 168	2,3,14, 15,26, 27,38,39
X	----- ESFANDIAR ZAVAREHEI ET AL: "Noisy Speech Enhancement Using Harmonic-Noise Model and Codebook-Based Post-Processing", IEEE TRANSACTIONS ON AUDIO, SPEECH AND LANGUAGE PROCESSING, IEEE SERVICE CENTER, NEW YORK, NY, USA, vol. 15, no. 4, 1 May 2007 (2007-05-01), pages 1194-1203, XP011177226, ISSN: 1558-7916, DOI: 10.1109/TASL.2007.894516 In particular Abstract, Section III, IV, VI, Equation 19	49-60
X	----- PLAPOUS C ET AL: "Speech Enhancement Using Harmonic Regeneration", 2005 IEEE INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH, AND SIGNAL PROCESSING - 18-23 MARCH 2005 - PHILADELPHIA, PA, USA, IEEE, PISCATAWAY, NJ, vol. 1, 18 March 2005 (2005-03-18), pages 157-160, XP010791998, DOI: 10.1109/ICASSP.2005.1415074 ISBN: 978-0-7803-8874-1 In particular Section 3.1, Equation 10 -----	49,52, 55,58

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/037109

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.:
because they relate to subject matter not required to be searched by this Authority, namely:
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 all searchable 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 report covers 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.:

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.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/ US2013/ 037109

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-48

Restoring a processed speech signal using 'bin-wise' voice activity detection

2. claims: 49-60

Refining a speech signal based on a harmonicity metric to produce a replacement signal

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2013/037109

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9912155	A1	11-03-1999	AU 4661497 A
		WO 9912155 A1	22-03-1999
			11-03-1999
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