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tain View, CA 94043 (US).
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(54) **Title:** SYSTEM AND METHOD FOR ENVELOPE-BASED ACOUSTIC ECHO CANCELLATION

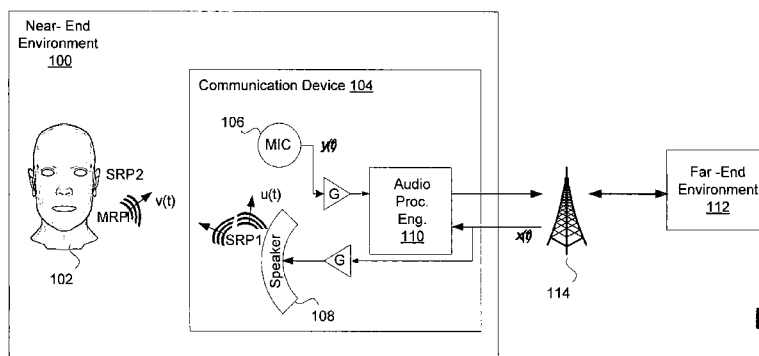


FIG. 1

(57) **Abstract:** Systems and methods for envelope-based acoustic echo cancellation in a communication device are provided. In exemplary embodiments, a primary acoustic signal is received via a microphone of the communication device, and a far-end signal is received via a receiver. Frequency analysis is performed on the primary acoustic signal and the far-end acoustic signal to obtain frequency sub-bands. An echo gain mask based on magnitude envelopes of the primary and far-end acoustic signals for each frequency sub-band is generated. A noise gain mask based on at least the primary acoustic signal for each frequency sub-band may also be generated. A combination of the echo gain mask and noise gain mask may then be applied to the primary acoustic signal to generate a masked signal. The masked signal is then output.

WO 2009/117084 A3

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<p><b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(8) - H04M 9/08 (2009.01) USPC - 379/406.14 According to International Patent Classification (IPC) or to both national classification and IPC</p>																	
<p><b>B. FIELDS SEARCHED</b></p> <p>Minimum documentation searched (classification system followed by classification symbols) USPC - 379/406.14</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched USPC - 379/406.01, 406.14 (text search)</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWest (PGPB, USPT, EPAB, JPAB); Google Scholar Search terms used: envelop, echo, cancel, mask, suppress, subband, sub-band, noise, square, root. rms. far, end, near, floor, acoustic, gain</p>																	
<p><b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b></p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 5,587,998 A (Velardo, JR. et al.) et al. 24 December 1996 (24.12.1996), col. 2, ln. 58 through col. 3, ln. 50, col. 6, ln. 8-19, col. 8, ln. 13-25</td> <td>1-23</td> </tr> <tr> <td>A</td> <td>US 5,825,320 A (Miyamori et al.) 20 October 1998 (20.10.1998), entire document</td> <td>1-23</td> </tr> <tr> <td>A</td> <td>US 2004/0057574 A1 (Faller) 25 March 2004 (25.03.2004), entire document</td> <td>1-23</td> </tr> <tr> <td>A</td> <td>US 6,999,582 B1 (Popovic et al.) 14 February 2006 (14.02.2006), entire document</td> <td>1-23</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 5,587,998 A (Velardo, JR. et al.) et al. 24 December 1996 (24.12.1996), col. 2, ln. 58 through col. 3, ln. 50, col. 6, ln. 8-19, col. 8, ln. 13-25	1-23	A	US 5,825,320 A (Miyamori et al.) 20 October 1998 (20.10.1998), entire document	1-23	A	US 2004/0057574 A1 (Faller) 25 March 2004 (25.03.2004), entire document	1-23	A	US 6,999,582 B1 (Popovic et al.) 14 February 2006 (14.02.2006), entire document	1-23
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<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"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</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			"A" document defining the general state of the art which is not considered to be of particular relevance	"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	"E" earlier application or patent but published on or after the international filing date	"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	"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)	"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	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed						
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<p>Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201</p>		<p>Authorized officer: Lee W. Young</p> <p>PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</p>															