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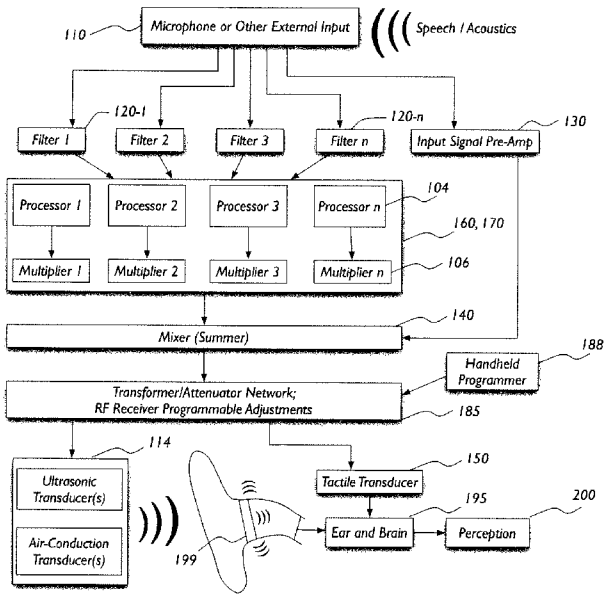
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[Continued on next page]

(54) Title: ULTRASONIC AND MULTIMODALITY ASSISTED HEARING



(57) Abstract: Speech is modulated and processed to provide a signal that is intelligible in high noise environments. Also, a device (and method of using said device) for improving the perception of acoustic signals comprising non-vocal patterns such as music is presented which utilizes high-frequency carriers in conjunction with signal modulation. Finally, a signal containing acoustic information is presented to a listener using multiple modalities including ultrasonic perception via brain demodulation, air-conduction, and tactile stimulation to provide an enhanced perception of sound.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04R 25/00 (2008.04)
USPC - 381/320
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)
IPC(8) - H04R 25/00 (2008.04)
USPC - 381/320

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 381/312,314,316,317,320; 600/25; 607/55 - search terms below
Google Scholar ? search terms below

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WEST (US Pre-Grant Publication, US Patents, EPO Abstracts, JPO Abstracts) ? passband, frequency, bandpass, filter, envelope, multiplier, modulator, mixer, summer, vibration, bond conduction, ultrasonic, high frequency, tactile, hearing aid

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 6731769 B1 (LENHARDT) 4 May 2004 (04.05.2004) figure 1 and col. 1, ln 44-62, col. 2, ln 25 to col. 4, ln 29, and col. 4, ln 61 to col. 6, ln 52.	1-4 --- 5-15
Y	US 6885752 B1 (CHABRIES et al.) 26 April 2005 (26.04.2005) col. 8, ln 5-14 and col. 21, ln 20-29.	5-15

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

* 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
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"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	Date of mailing of the international search report
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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	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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