



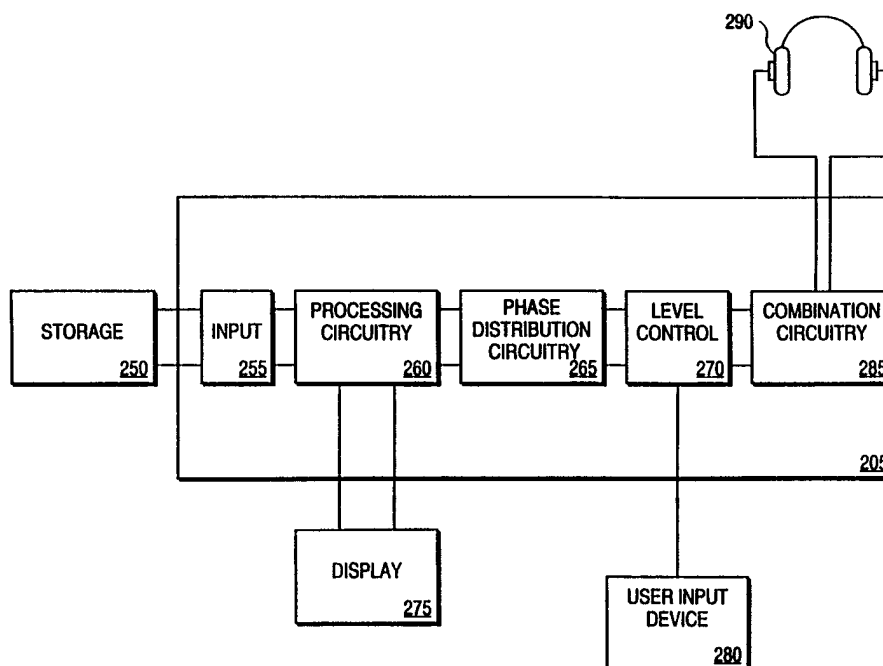
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ :	A3	(11) International Publication Number:	WO 98/33357
H04S 1/00, 5/00		(43) International Publication Date:	30 July 1998 (30.07.98)
(21) International Application Number: PCT/US98/01225 (22) International Filing Date: 22 January 1998 (22.01.98) (30) Priority Data: 08/788,739 24 January 1997 (24.01.97) US (71) Applicant: SONY PICTURES ENTERTAINMENT, INC. [US/US]; 10202 W. Washington Boulevard, Culver City, CA 90232-3195 (US). (72) Inventors: WOOD, Paul, Nigel; 1201 Moncado Drive, Glen- dale, CA 91207 (US). MERCS, Laura; 524 22nd Street, Huntingdon Beach, CA 92648 (US). EMBREE, Paul; 25 Via Lucca G303, Irvine, CA 92715 (US). (74) Agents: SOBRINO, Maria, E. et al.; Blakely, Sokoloff, Taylor & Zafman, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025-1026 (US).		(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
		(88) Date of publication of the international search report: 12 November 1998 (12.11.98)	

(54) Title: METHOD AND APPARATUS FOR ELECTRONICALLY EMBEDDING DIRECTIONAL CUES IN TWO CHANNELS OF SOUND FOR INTERACTIVE APPLICATIONS

(57) Abstract

A system for providing audible cues that enable a listener to identify locations of origins of sounds. In one embodiment, a front and rear signal are copies of an input signal. The rear signal is modified by application of a modified head related transfer function which is the difference between the front and rear head related transfer functions. Copies are then made of the front signal and the modified rear signal, one copy of each associated with a first channel and one copy of each associated with a second channel. Front/rear cues are applied by delaying one of the rear signals or inverting the phase of one of the rear signals. Volume levels are then modified according to the location of the sound source. Locations of sound sources, including sources location behind the user are therefore audibly distinguished. Thus, in an interactive environment, such modifying the volume levels.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

INTERNATIONAL SEARCH REPORT

Inter. Jnal Application No

PCT/US 98/01225

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04S1/00 H04S5/00

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 6 H04S H04R A63F

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 554 031 A (US HEALTH) 4 August 1993 see page 3, line 29 - page 4, line 28 ---	1,16,34
A	US 5 404 406 A (FUCHIGAMI NORIHIKO ET AL) 4 April 1995 see column 4, line 20 - column 6, line 7 ---	1,16,34
A	EP 0 378 386 A (NINTENDO CO LTD) 18 July 1990 see column 1, line 25 - column 6, line 52 ---	1,16,34
A	EP 0 499 729 A (QSOUND LIMITED) 26 August 1992 see column 1, line 55 - column 2, line 38 ---	1,16,34
A	US 5 521 981 A (GEHRING LOUIS S) 28 May 1996 see column 1, line 5 - column 2, line 35 ---	1,16,34
	--- -/--	

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

☒ Patent family members are listed in 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.

"&" document member of the same patent family

Date of the actual completion of the international search

15 September 1998

Date of mailing of the international search report

23/09/1998

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gastaldi, G

INTERNATIONAL SEARCH REPORT

Inter. Appl. No.

PCT/US 98/01225

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 684 751 A (MATSUSHITA ELECTRIC IND CO LTD) 29 November 1995 see column 5, line 35 - column 13, line 30 -----	1,16,34

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. Appl. Application No

PCT/US 98/01225

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0554031 A	04-08-1993	US 5173944 A	22-12-1992
US 5404406 A	04-04-1995	JP 6178397 A	24-06-1994
		JP 2755081 B	20-05-1998
		JP 6178398 A	24-06-1994
EP 0378386 A	18-07-1990	JP 2184200 A	18-07-1990
		JP 2279100 A	15-11-1990
		AT 142837 T	15-09-1996
		AU 663191 B	28-09-1995
		AU 4016393 A	26-08-1993
		AU 647378 B	24-03-1994
		AU 4776690 A	26-07-1990
		CA 2007435 A	10-07-1990
		DE 69028419 D	17-10-1996
		DE 69028419 T	30-01-1997
		ES 2090091 T	16-10-1996
		FI 900026 A	11-07-1990
		CN 1044199 A, B	25-07-1990
		CN 1080878 A	19-01-1994
		US 5095798 A	17-03-1992
		AU 5435790 A	16-11-1990
		WO 9012627 A	01-11-1990
EP 0499729 A	26-08-1992	US 5138660 A	11-08-1992
		US 5026051 A	25-06-1991
		US 5052685 A	01-10-1991
		AU 625530 B	16-07-1992
		AU 6779790 A	13-06-1991
		BG 51469 A	14-05-1993
		CA 2031665 A	08-06-1991
		DK 290190 A	08-06-1991
		FI 906028 A	08-06-1991
		GB 2238936 A, B	12-06-1991
		IE 64869 B	20-09-1995
		IL 96553 A	12-04-1994
		JP 4242684 A	31-08-1992
		KR 9600467 B	08-01-1996
		PL 165355 B	30-12-1994
		CN 1053163 A, B	17-07-1991

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/01225

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5521981 A	28-05-1996	NONE	
EP 0684751 A	29-11-1995	NONE	