US006075967A

United States Patent [19]

Naimark et al.

[11] **Patent Number: 6,075,967**

[45] **Date of Patent: Jun. 13, 2000**

[54] **INPUT DEVICE FOR CONTROLLING A VIDEO DISPLAY, INCORPORATING CONTENT-BASED HAPTIC FEEDBACK**

[75] Inventors: **Michael Naimark**, San Francisco; **Robert L. Adams**, Palo Alto; **Robert D. Alkire**, San Jose, all of Calif.; **Christoph Dohrmann**, Karlsruhe, Germany; **David J. Gessel**, San Francisco; **Steven E. Saunders**, Cupertino, both of Calif.

[73] Assignee: **Interval Research Corporation**, Palo Alto, Calif.

[21] Appl. No.: **09/167,172**

[22] Filed: **Oct. 6, 1998**

Related U.S. Application Data

[63] Continuation of application No. 08/728,102, Oct. 9, 1996, Pat. No. 5,816,823, which is a continuation of application No. 08/292,396, Aug. 18, 1994, abandoned.

[51] **Int. Cl.**[7] **G09B 5/00**

[52] **U.S. Cl.** ..... **434/307 R**; 434/114; 434/365

[58] **Field of Search** ..... 434/112–114, 247, 434/307 R, 11, 308, 309, 350, 365; 348/14, 121, 123, 578, 61, 722, 569; 345/7–9, 121, 156, 139, 157, 161, 163, 425, 167, 427, 435, 302, 326; 395/500.01, 500.27; 73/379.01; 340/686; 463/30, 37, 38; 703/6, 13

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,857,902	8/1989	Naimark et al. .	
5,044,956	9/1991	Behensky et al. .	
5,184,319	2/1993	Kramer .	
5,185,561	2/1993	Good et al. .	
5,189,355	2/1993	Larkins et al. .	
5,189,402	2/1993	Naimark et al. .	
5,191,320	3/1993	MacKay .	
5,229,756	7/1993	Kosugi et al. .	
5,264,933	11/1993	Rosser et al.	348/578
5,270,694	12/1993	Naimark et al. .	
5,319,387	6/1994	Yoshikawa .	
5,320,538	6/1994	Baum .	
5,389,865	2/1995	Jacobus et al. .	
5,495,576	2/1996	Ritchey	345/425
5,580,249	12/1996	Jacobsen et al.	434/11
5,590,062	12/1996	Nagamitsu et al.	395/500.27
5,709,219	1/1998	Chen et al. .	
5,734,373	3/1998	Rosenberg et al. .	

FOREIGN PATENT DOCUMENTS

0 565 143 A2 10/1993 European Pat. Off. .

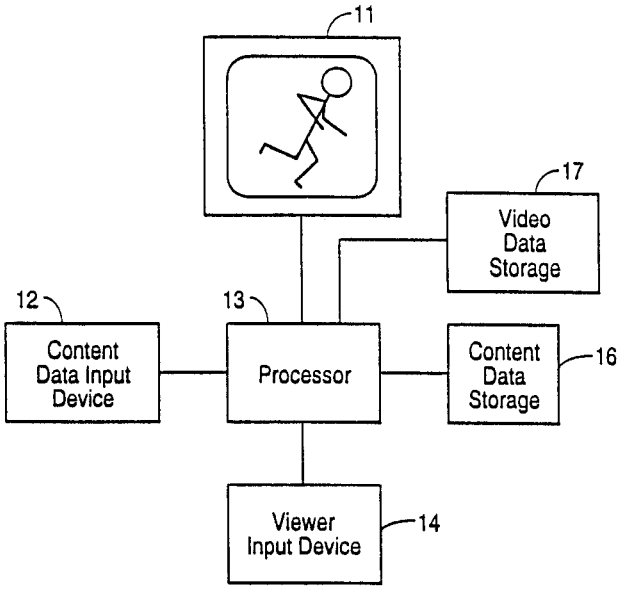
OTHER PUBLICATIONS

"Virtual Environment Display System" by Fisher et al., ACM 1986 Workshop on Interactive 3D Graphics, Oct. 23–24, 1986, pp. 1–11.

Imax Simulator Ride, Imax Ridefilm by Imax Corp. and Ridefilm Corp. (3 brochures), 1994.

Primary Examiner—Joe H. Cheng

[57] **ABSTRACT**

Disclosed is an input device and method for interacting with motion pictures incorporating content-based haptic response. Content data relating to the motion picture is stored in a content data storage device while motion picture data is stored in a prerecorded image data storage device. A viewer input device is provided so that a viewer (end-user) can advance and reverse the frames on a display screen while substantially simultaneously, the content data is accessed and braking commands are sent to the viewer input device. The result is that the viewer is provided with haptic responses to the viewer's input through the viewer input device.

17 Claims, 7 Drawing Sheets