SELF-CONTAINED INTERACTIVE VIDEO DISPLAY SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a Continuation-in-Part patent application claiming priority from co-pending U.S. patent application Ser. No. 10/160,217, filed on May 28, 2002, entitled "INTERACTIVE VIDEO DISPLAY SYSTEM," by Bell, and assigned to the assignee of the present application, which is herein incorporated by reference. This application also claims priority from co-pending U.S. Provisional Patent Application No. 60/504,375, filed on Sep. 18, 2003, entitled "SELF-CONTAINED INTERACTIVE VIDEO DISPLAY SYSTEM," by Bell, and assigned to the assignee of the present application, from co-pending U.S. Provisional Patent Application No. 60/514,024, filed on Oct. 24, 2003, entitled "METHOD AND SYSTEM FOR PROCESSING CAPTURED IMAGE INFORMATION IN AN INTERACTIVE VIDEO SYSTEM," by Bell, and assigned to the assignee of the present application, from co-pending U.S. Provisional Patent Application No. 60/528,439, filed on Dec. 9, 2003, entitled "SELF-CONTAINED INTERACTIVE VIDEO DISPLAY SYSTEM AND FEATURES RELATING THERETO," by Bell, and assigned to the assignee of the present application, and from co-pending U.S. Provisional Patent Application No. 60/554,520, filed on Mar. 18, 2004, entitled "METHOD AND SYSTEM FOR ALLOWING A CAMERA TO VIEW AN AREA IN FRONT OF A DISPLAY BY IMAGING IT THROUGH THE DISPLAY," by Bell et al., and assigned to the assignee of the present application, all of which are herein incorporated by reference.

FIELD OF INVENTION

[0002] The present invention relates to the field of visual electronic displays. Specifically, embodiments of the present invention relate to a self-contained interactive video display system.

BACKGROUND OF THE INVENTION

[0003] For many years, information was typically conveyed to an audience by use of static displays. For example, product advertisements were presented using print ads and posters. With the advent of television and movies, information could be presented using a dynamic display (e.g., commercials). While more engaging than static displays, dynamic displays do not typically provide interactivity between a user and the display.

[0004] More recently, interactive touchscreens have been used for presenting information on flat surfaces. For example, an image may be displayed on a touchscreen, and a user may interact with the image by touching the touchscreen, causing the image to change. However, in order to interact with the image displayed on the touchscreen, the user must actually come in contact with the touchscreen. Moreover, typically touchscreens can only receive one input at any time, and are not able to discern the shape of the input. Essentially, current touchscreens are only able to receive the input of one finger contact.

[0005] In some applications, such as point-of-sale, retail advertising, promotions, arcade entertainment sites, etc., it is desirable to provide an interactive interface for displaying information to a user. This interactivity provides an even more engaging interface for presenting information (e.g., media, advertisements, etc.). By catching the attention of a person, for even a few moments, the person may be more likely to absorb the information presented in the interactive display than in previous displays.

[0006] As described above, current interactive displays typically require a user to physically contact a touchscreen surface. By requiring contact with a touchscreen to provide interactivity, a large number of potential users are not interested in or intimidated by current interactive displays. Moreover, since only one user may interact with a touchscreen at a time, more users are excluded. Furthermore, because current touchscreens cannot discern the shape of input, they are limited in the type of information that can be presented in response to interaction.

SUMMARY OF THE INVENTION

[0007] Various embodiments of the present invention, a self-contained interactive video display system, are described herein. A flat-panel display screen displays a visual image for presentation to a user on a front side of the flat-panel display screen. In one embodiment, the flat-panel display screen is a liquid crystal display (LCD) panel. A first illuminator illuminates the flat-panel display screen with visible light. In one embodiment, the self-contained interactive video display system further comprises a diffusing screen for reducing glare of the first illuminator and illuminate the flat-panel display screen more evenly. A second illuminator illuminates an object. In one embodiment, the object is a body part of a human user. In one embodiment, the second illuminator projects illumination through the flat-panel display screen onto the object. In one embodiment, the second illuminator is positioned so as to reduce potential for glare effects on the camera. In one embodiment, the second illuminator is located next to the flat-panel display screen such that the second illuminator does not project illumination through the flat-panel display screen. In one embodiment, the self-contained interactive video display system comprises a plurality of the second illuminators, wherein the second illuminators are located next to the flat-panel display screen as well as behind the screen. In one embodiment, the second illuminator is strobed in time with exposures of the camera.

[0008] A camera detects interaction of an illuminated object with the visual image, wherein the camera is operable to view the object through the flat-panel display screen. In one embodiment, the second illuminator is an infrared illuminator for illuminating the object with infrared illumination, and wherein the camera is an infrared camera for detecting infrared illumination. In one embodiment, the camera is located behind the flat-panel display screen and pointed toward the screen, allowing the camera to view the area on and in front of the screen. In one embodiment, the camera's image is calibrated to the visual image such that the interaction caused by the object is matched to a physical position of the object proximate to the screen. In one embodiment, the camera and the second illuminator comprise a time-of-flight camera. In one embodiment, a plurality of time-of-flight cameras are placed in a manner so as to provide complete coverage of the area in front of the display and angled so as to prevent specular reflection into the time-of-flight cameras due to the screen.