[0009] A computer system directs the projector to change the visual image in response to the interaction. In one embodiment, the camera, the first illuminator, the second illuminator, and the computer system are comprised within an enclosure, and wherein one side of the enclosure comprises the flat-panel display screen.

[0010] In one embodiment, the self-contained interactive video display system further comprises a series of mirror strips positioned at a distance from the screen to correct distortion of the camera's view. In another embodiment, the self-contained interactive video display system further comprises a Fresnel lens positioned adjacent to the screen to correct distortion of a view of the camera. In one embodiment, the self-contained interactive video display system further comprises a wavelength-based diffuser positioned adjacent to the flat-panel display screen. In one embodiment, the diffuser is substantially transparent to infrared light and substantially translucent to visible light. In another embodiment, the diffuser is a material with Rayleigh scattering. In one embodiment, the self-contained interactive video display system further comprises a diffuser having a physical texture positioned adjacent to the flat-panel display screen, wherein the diffuser is substantially translucent to light passing through the diffuser at an oblique angle and substantially transparent to light passing through the diffuser at a substantially perpendicular angle, wherein the first illuminator is placed at an oblique angle to the diffuser.

[0011] In one embodiment, the self-contained interactive video display system further comprises a scattering polarizer positioned adjacent to the flat-panel display screen and for scattering light from the first illuminator, and wherein the camera is sensitive to light of a polarization not scattered by the scattering polarizer. In one embodiment, where the flat-panel display is a liquid crystal display panel, the scattering polarizer is oriented such that light polarized in a direction for which the scattering polarizer scatters light passes through the liquid crystal display panel and light polarized in a direction for which the scattering polarizer does not scatter light is absorbed by the liquid crystal display panel. In another embodiment, the self-contained interactive video display system further comprises a linear polarizer for polarizing light received at the camera at wavelengths to which the camera is sensitive, so as to allow the camera to ignore light scattered by the scattering polarizer. In one embodiment, the self-contained interactive video display system further comprises a diffusing material that can change from substantially translucent to substantially transparent, is substantially translucent when the first illuminator is illuminating the display, and is substantially transparent when the camera is detecting objects in front of the flat-panel display screen, wherein the diffusing material is placed behind the flat-panel display screen.

[0012] In one embodiment, the self-contained interactive video display system is operable to determine information about the distance of the object from the screen. In one embodiment, the camera is a stereo camera. In another embodiment, the camera is a time-of-flight camera. In one embodiment, the time-of-flight camera is positioned such that the time-of-flight camera does not reflect back onto itself.

[0013] In one embodiment, the self-contained interactive video display system provides touchscreen functionality when the object is touching the screen. In one embodiment, the self-contained interactive video display system further comprises a transparent touchscreen adjacent the front side of the screen. In another embodiment, the self-contained interactive video display system further comprises an edge-lit transparent sheet adjacent the front side of the screen, and wherein the camera is operable to distinguish light created when the object comes in contact with the edge-lit transparent sheet.

[0014] In another embodiment, the present invention provides a method for presenting an interactive visual image using a self-contained interactive video display system. A visual image is displayed on a flat-panel display screen for presentation to a user on a front side of the flat-panel display screen. A back side of the flat-panel display screen is illuminated with visible light. An object proximate the front side of the flat-panel display screen is illuminated from a second illumination source. Interaction of the object with the visual image is detected by a device able to sense its presence through the flat-panel display screen. The visual image is changed in response to the interaction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention:

[0016] **FIG. 1** shows one physical configuration of the components of an interactive video system, in accordance with an embodiment of the present invention.

[0017] **FIG. 2** shows one arrangement of a screen where linear polarizer sheets are used to eliminate or reduce glare, in accordance with one embodiment of the present invention.

[0018] **FIG. 3** shows cross sections of several other configurations of the interactive video system, in accordance with various embodiments of the present invention.

[0019] **FIGS. 4A and 4B** are schematic diagrams respectively illustrating embodiments of an interactive video system, in accordance with embodiments of the present invention.

[0020] **FIGS. 5A and 5B** are schematic diagrams respectively illustrating embodiments of an interactive video system, in accordance with embodiments of the present invention.

[0021] **FIGS. 6A and 6B** are schematic diagrams respectively illustrating two configurations of off-axis projection, in accordance with embodiments of the present invention.

[0022] **FIGS. 7A and 7B** are schematic diagrams illustrating an interactive flat-panel display system, in accordance with one embodiment of the present invention.

[0023] **FIG. 8A** is a schematic diagram illustrating a technique for reducing image distortion using a Fresnel lens, in accordance with one embodiment of the present invention.

[0024] **FIG. 8B** is a schematic diagram illustrating a technique for reducing image distortion using a series of mirror strips, in accordance with one embodiment of the present invention.