

GESTURE RECOGNITION INTERFACE SYSTEM WITH A LIGHT-DIFFUSIVE SCREEN

TECHNICAL FIELD

[0001] The present invention relates generally to interface systems, and specifically to a gesture recognition interface system with a light-diffusive screen.

BACKGROUND

[0002] As the range of activities accomplished with a computer increases, new and innovative ways to provide an interface with a computer are often developed to complement the changes in computer functionality and packaging. For example, touch sensitive screens can allow a user to provide inputs to a computer without a mouse and/or a keyboard, such that desk area is not needed to operate the computer. Examples of touch sensitive screens include pressure sensitive membranes, beam break techniques with circumferential light sources and sensors, and acoustic ranging techniques. However, these types of computer interfaces can only provide information to the computer regarding the touch event, itself, and thus can be limited in application. In addition, such types of interfaces can be limited in the number of touch events that can be handled over a given amount of time, and can be prone to interpret unintended contacts, such as from a shirt cuff or palm, as touch events. Furthermore, touch sensitive screens can be prohibitively expensive and impractical for very large display sizes, such as those used for presentations.

SUMMARY

[0003] One embodiment of the invention includes a gesture recognition interface system. The interface system may comprise at least one light source positioned to illuminate a first side of a light-diffusive screen. The interface system may also comprise at least one camera positioned on a second side of the light-diffusive screen, the second side being opposite the first side, and configured to receive a plurality of images based on a brightness contrast difference between the light-diffusive screen and an input object. The interface system may further comprise a controller configured to determine a given input gesture based on changes in relative locations of the input object in the plurality of images. The controller may further be configured to initiate a device input associated with the given input gesture.

[0004] Another embodiment of the invention includes a method for providing device inputs. The method comprises illuminating a first side of a light-diffusive screen with at least one light source and providing simulated inputs in a foreground of a second side of the light-diffusive screen via gestures associated with an input object. The second side can be opposite the first side of the light-diffusive screen. The method also comprises generating a first plurality of images and a second plurality of images associated with the input object substantially concurrently based on a brightness contrast between the input object and the second side of the light-diffusive screen. The method also comprises determining a plurality of three-dimensional physical locations of the input object based on a relative separation of the input object in the first plurality of images relative to the second plurality of images. The method also comprises determining if changes in the plurality of three-dimensional physical locations of the input object correspond to any of a plurality of predefined

gestures. The method further comprises providing at least one device input based on a given one of the plurality of predefined gestures upon determining that the changes in the plurality of three-dimensional physical locations of the input object correspond to the given one of the plurality of predefined gestures.

[0005] Another embodiment of the invention includes a gesture recognition interface system. The system comprises means for substantially diffusing infrared (IR) illumination provided from at least one light source and means for generating a first plurality of silhouette images and a second plurality of silhouette images of the input object relative to the diffused illumination. The first and second plurality of images can form a plurality of matched pairs of silhouette images of the input object. The system also comprises means for generating two-dimensional location information associated with at least one feature of the input object for each of the first plurality of images and the second plurality of images. The system also comprises means for interpolating three-dimensional location information associated with the input object based on the two-dimensional location information associated with the at least one feature of the input object for each of the plurality of matched pairs of images of the input object. The system further comprises means for translating changes in the three-dimensional location information associated with at least one feature of the input object to a given input gesture and means for providing device inputs based on matching the given input gesture with one of a plurality of predefined gestures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 illustrates an example of a gesture recognition interface system in accordance with an aspect of the invention.

[0007] FIG. 2 illustrates another example of a gesture recognition interface system in accordance with an aspect of the invention.

[0008] FIG. 3 illustrates another example of a gesture recognition interface system in accordance with an aspect of the invention.

[0009] FIG. 4 illustrates another example of a gesture recognition interface system in accordance with an aspect of the invention.

[0010] FIG. 5 illustrates another example of a gesture recognition interface system in accordance with an aspect of the invention.

[0011] FIG. 6 illustrates an example of a method for providing inputs to a computer in accordance with an aspect of the invention.

DETAILED DESCRIPTION

[0012] The present invention relates generally to interface systems, and specifically to a gesture recognition interface system with a light-diffusive screen. A user employs an input object to provide simulated inputs to a computer or other electronic device. It is to be understood that the simulated inputs are provided by gestures using the input object. For example, the user could provide gestures that include motion and/or contact with a light-diffusive screen 20 using the input object. The input object could be, for example, the user's hand; a wand, stylus, pointing stick; or a variety of other devices with which the user can gesture. The simulated inputs could be, for example, simulated mouse inputs. At least one