

VISUAL INTERFACE CONTROL BASED ON VIEWING DISPLAY AREA CONFIGURATION

[0001] The present disclosure relates generally to visual display technology, and more specifically to controlling characteristics of a visual interface based on a viewable display area configuration thereof.

BACKGROUND

[0002] Portable electronic devices including cellular telephone handsets, personal digital assistants (PDAs), handheld gaming devices, and laptop computers, among other devices, have become increasingly popular, particularly in mobile societies. Consumer demand for portability however is often at odds with a competing desire for large display interfaces, since small devices severely constrain the size of the display that may be incorporated into such devices.

[0003] Others have endeavored to address competing demands for small form-factors and large display areas. For example, U.S. Pat. No. 7,095,387 entitled "Display Expansion Method and Apparatus" discloses an expandable display having multiple folding sections in a handheld computing device, wherein the display is expandable upon unfolding the multiple display sections. An alternative embodiment includes a retractable e-paper display screen that is supported by a folding panel that may be expanded. The '387 Patent also teaches reformatting displayed image based on the configuration of the display to maintain a constant display resolution regardless of the configuration of the display.

[0004] The various aspects, features and advantages of the disclosure will become more fully apparent to those having ordinary skill in the art upon careful consideration of the following Detailed Description thereof with the accompanying drawings described below. The drawings may have been simplified for clarity and are not necessarily drawn to scale.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. 1 illustrates a visual interface, or display, having a first area configuration.

[0006] FIG. 2 illustrates a display having a second area configuration.

[0007] FIG. 3 illustrates a display having a configurable viewable surface area.

[0008] FIG. 4 illustrates a sectional view of a display having a first area configuration.

[0009] FIG. 5 illustrates a sectional view of a display having a second area configuration.

[0010] FIG. 6 illustrates a sectional view of another display having a first area configuration.

[0011] FIG. 7 illustrates a sectional view of another display having a second area configuration.

[0012] FIG. 8 illustrates a visual interface.

[0013] FIG. 9 illustrates a portable electronic device including a visual interface.

DETAILED DESCRIPTION

[0014] In FIG. 1, a visual interface 100 comprises a substrate 110 having a side forming a viewable display area 102 defining a surface dimension. The substrate generally includes a plurality of addressable picture elements (pixels) 112 disposed, for example, in an array, on the side thereof forming the viewable display area. The visual interface may be implemented as a display that provides textual and graphical information. The visual interface may also be a combined

display and user input interface. The visual interface is suitable for a portable electronic device and non-portable applications.

[0015] In FIG. 1, while the illustrated visual interface includes only four pixels, the display could also comprise a relatively large number of such elements. The picture elements are addressable by a controller as discussed below. Also, while each picture element comprises at least one constituent element, individual picture elements may be aggregated to define a composite picture element. In other words, a picture element comprising a plurality of constituent picture elements. In FIG. 1, for example, three of the picture elements 112 may be aggregated to form a Red, Blue & Green (RGB) color picture element. In other embodiments, a White picture element may be added to form an RGBW picture element. Thus in FIG. 1, the three or four individual picture elements 112 may constitute a single color picture element. It is also possible for neighboring color picture elements to share individual elements. The picture elements may be discrete components disposed on the substrate or the picture elements may be an integral part of the substrates. Exemplary substrates are discussed below.

[0016] Generally, the substrate comprises a structure that is configurable between at least two different viewable display area configurations. The viewable display area is a portion of the visual interface or display visible to the user. The viewable display area also has a surface dimension that is defined generally by the pixels disposed on the substrate. In one embodiment, the surface dimension of the display is planar. In other embodiments, however, the surface dimension of the display may be curved, for example, concave or convex. According to one aspect of the disclosure, the size and/or shape of the visual interface and particularly the viewable display area thereof is configurable. In one application, first and second viewable display area configurations of the visual interface have different size viewable display areas. In another application, the first and second viewable display area configurations have different shapes with the same size area. The size and/or shape of the viewable display area may be configured by an application or by the user as discussed more fully below.

[0017] FIG. 1 illustrates the display 100 having a first size configuration having a greater area than a second size configuration of the display 200 illustrated in FIG. 2. The displays illustrated in FIGS. 1 and 2 have been re-configured in 2-dimensions, such that the display area in FIG. 1 is greater than the display area of FIG. 2. In FIGS. 1 and 2, the area of the visual interface is configured or changed by expansion and contraction of the substrate in one or more directions, as indicated by the arrows. In other embodiments, however, the substrate area may be expanded or contracted along only one direction, for example, the substrate could be extended and contracted only laterally or only vertically. Also, the configuration of the substrate may be changed without changing the size of the viewable display area. For example, the visual interface could be configured between landscape and portrait configurations, wherein both configurations have the same viewable display area.

[0018] In one embodiment, the substrate comprises an elastic component that may be expanded and contracted. In FIGS. 1 and 2, the display is reconfigured by expanding and contracting the elastic component, wherein a predominant component of the expansion and contraction of the substrate is substantially parallel to the surface dimension of the viewable display area, as indicated by the arrows. Thus in one embodiment, the substrate is stretched in a first viewable display area