

[0029] FIGS. 6 to 8 illustrate examples of apparatuses which can benefit of a display arrangement according to any of the embodiments demonstrated above, and examples of use.

[0030] FIG. 6 illustrates an example apparatus 600, here a telephone, where upon need to dial a telephone number, an image of a keypad 602 is displayed on the screen 604 and the user can dial the telephone number by tapping the displayed keys 606 and the display arrangement 608, which is of the type elucidated above, will be able to detect the tapped positions with accuracy enough to enable the dialing. The apparatus can also have other input means, e.g. a navigation input means 610. This is an example of an application where demand on resolution of the detected position is moderate, and for which this is an efficient solution. In the illustration, it can be seen that a part of the display is used for the input, and another part is used for presenting the dialed digits.

[0031] FIG. 7 illustrates an example apparatus 700, here a digital camera, where upon wish to input meta data, such as text, to a captured picture, an image of a keypad 702 is displayed on the screen 704 and the user can input the text by tapping the displayed keys 706 and the display arrangement 708, which is of the type elucidated above, will be able to detect the tapped positions with accuracy enough to enable the input.

[0032] FIG. 8 illustrates an example apparatus 800, here a media player, where upon browsing among stored media content, an image of items 802 associated with available content, optionally scrollable by tapping or sliding scrollbar 803 as illustrated, is displayed on the screen 804 and the user can select content to be rendered by tapping a displayed item 806 associated with the media content. The display arrangement 808, which is of the type elucidated above, will be able to detect the tapped positions with accuracy enough to enable the selection.

[0033] FIGS. 9a and 9b illustrate a part of a display arrangement 900 comprising a display element 902 according to any of the embodiments of display elements described above, comprising a rigid protective layer 903 and one or more display layers 904 and a force sensitive layer 906 arranged alongside the display element 902.

[0034] In FIG. 9a, the display arrangement 900 is not yet touched or tapped by a user 910. In FIG. 9b, the user 910 applies a force on the rigid protective layer 903 by touching or tapping it, e.g. by a finger. The rigid protective layer 903, as well as the display layers 904, will upon application of the force allow small local deformation without breaking.

[0035] In FIG. 9b, the illustration of the deformation is for providing understanding of the principle and may be exaggerated for illustrative purposes. This small local deformation will, by deformation  $\Delta$  of the force sensitive layer 906 which stretches at a position corresponding to the position where the user 910 touches or taps the display element 902, enable

detection of the applied force and the position, which detection can be provided as an electrical signal to be decoded by a processing means. The force sensitive layer 906 can comprise pads of polyvinylidene fluoride film, or other force sensitive elements. These can be arranged at spots to be defined positions to be detected.

[0036] According to an embodiment, the touch sensitive layer only cover the part of the display that need to be used for input. This can save costs and/or space.

[0037] The above given examples can of course be combined in a multitude of ways, e.g. text input in a media player for searching for a content, item selection in a telephone or camera for enabling a menu system, input to a game console for controlling the game, input and menu selection in a personal digital assistant, etc.

1. A display arrangement for portable electronic devices, comprising

a display element comprising one or more layers arranged to provide electro-optical modulation of light or provision of patterned light for providing graphical content to a viewer, and a rigid protective layer; and

a force sensitive layer arranged on, from a viewer, a distal side of the display element.

2. The display arrangement according to claim 1, wherein the rigid protective layer is a glass layer, or a layer of transparent and rigid polymer, preferably polycarbonate or polymethyl methacrylate.

3. The display arrangement according to claim 1, wherein the force sensitive layer is arranged only over a part of an area of the distal side of the display element.

4. The display arrangement according to claim 1, wherein the force sensitive layer comprises at least one polyvinylidene fluoride film.

5. A portable electronic device comprising

a display element comprising one or more layers arranged to provide electro-optical modulation of light or provision of patterned light for providing graphical content to a viewer, and a rigid protective layer; and a force sensitive layer arranged on, from a viewer, a distal side of the display element.

6. The portable electronic device according to claim 5, wherein the rigid protective layer is a glass layer.

7. The portable electronic device according to claim 5, wherein the force sensitive layer is arranged only over a part of an area of the side of the display element.

8. The portable electronic device according to claim 5, wherein the force sensitive layer comprises at least one polyvinylidene fluoride film.

9. The portable electronic device according to claim 5, being any of a mobile phone, a personal digital assistant, a digital camera, or a gaming console.

\* \* \* \* \*