additional layer to the system, and reduces the sensitivity and resolution of pressure inputs.

[0011] Atkins et. al. attempted a different approach in U.S. Pat. No. 5,623,280 by including a ribbed substrate, designed to maintain LC layer thickness. It may accomplish that, but the system still has the significant risk of delamination, and adds the difficulty and expense of creating and assembling a physically patterned substrate. In addition, it requires at least three substrates, limiting the versatility of the assembly and reducing the capability of future system reduction.

[0012] WO 2005/078566 describes a touch screen display assembly having a touch sensitive portion and a display portion, but does not address the inherent pressure sensitivity of existing display technologies.

[0013] There is a need for a touch sensitive display system that takes advantage of the optical advantages of a touch-screen-in-back structure, without the image quality or touch sensitivity degradation due to pressure sensitivity.

SUMMARY OF THE INVENTION

[0014] An electrically updatable device is described, wherein the device includes a touch sensor and a flexible display, wherein the display is between the touch sensor and a viewer, and wherein the display comprises a pressure-insensitive imaging layer of polymer-dispersed imaging material, wherein the thickness of the imaging layer is defined by the polymer.

ADVANTAGES

[0015] The touch sensitive device can be made at a reduced cost with improved optical properties of the display. The system can use minimal power. The system can be lightweight, portable, flexible, or a combination thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The invention as described herein can be understood with reference to the accompanying drawings as described below:

[0017] FIG. **1** is a side view of a traditional resistive touchscreen and display assembly;

[0018] FIG. **2** is a side view of a traditional resistive touchscreen and display assembly with the touchscreen actuated;

[0019] FIG. **3** is a cross-section view of a polymer-dispersed, display assembly;

[0020] FIG. **4** is a cross-section view of a polymer-dispersed, display assembly in a flexed position; FIG. **5** is a side view of a touchscreen display wherein a transparent touchscreen is positioned behind a flexible display;

[0021] FIG. **6** is a side view of a touchscreen display wherein an opaque touchscreen is positioned behind a flexible display;

[0022] FIG. **7** is a side view of a touchscreen display wherein the display is constructed as an integral part of the touchscreen assembly;

[0023] FIG. **8** is a side view of a touchscreen display wherein the display is constructed as an integral part of the touchscreen assembly, and the writing of the display and positional sensing of the touchscreen can be done simultaneously;

[0024] FIG. **9** is a side view of a modification to the system of FIG. **8** with the addition of a third display electrode;

[0025] FIG. **10** is a front view the system of FIGS. **8** or **9** with some pixels written to a different optical state;

[0026] FIG. **11** is a side view of the system of FIG. **9** with the all pixels written to the same optical state;

[0027] FIG. **12** is a front view the system of FIGS. **8**, **9**, or **11** with all pixels written to the same optical state;

[0028] FIG. **13** is a front view of a traditional spacer design;

[0029] FIG. **14** is a front view of an alternative spacer design; and

[0030] FIG. **15** is an isometric view of flexible touch-screen display assembly.

[0031] The drawings are exemplary only, and depict various embodiments of the invention. Other embodiments will be apparent to those skilled in the art upon review of the accompanying text.

DETAILED DESCRIPTION OF THE INVENTION

[0032] A touch-sensitive assembly and an electronic, rewritable display can be combined to form a touch-input device with updateable display capability. Such a device can be used in multiple applications including, but not limited to, kiosks for picture-making, airline reservations, or information; industrial controllers; data input devices such as automated teller machines, or ordering systems such as used in restaurants; notation board; informational signage; or various interactive consumer products, such as video games, toys, watches, calculators, PDAs, and electronic books.

[0033] The device can include a touch input sensor. The sensor can be a mechanical actuator, an electrical sensor, or an electromechanical device. The sensor can be a resistive touchscreen, wherein two electrodes are held apart by a gap, and positional sensing occurs when the electrodes are brought into contact. The touchscreen can be a capacitive touchscreen, wherein positional sensing occurs when a conductive material with some finite capacitance contacts a conductive layer. The touchscreen can be partially or completely flexible.

[0034] The device can include one or more sheets of display media, hereafter referred to as "media," capable of displaying an electronically updateable image. The media can have a first and second conductor. The first and second conductor can be patterned. The first conductor pattern can be defined as the "columns" of the display and the second conductor can be defined as the "rows" of the display. The rows and columns can interact to form a passive matrix, with a "pixel" being defined as each area where a row and column overlap. The media can be designed such that the electrical connections for the rows are made along one edge of the sheet, and the connections for the columns are made along a different edge. The media can be designed such that the display area defined by the rows and columns is larger in any direction than the area required for electrical interconnects.