conductor, and another substrate. This can result in a 25% loss in transparency, which can be a significant problem.

[0008] It would be desirable to have a method for making an inexpensive touchscreen display system with an integrated, continuous touch-sensor, without optical losses, costly materials, or complex handling issues.

SUMMARY OF THE INVENTION

[0009] A method of manufacturing an electrically updatable touchscreen device is described, wherein the device includes a flexible display, a first conductive layer, one or more spacer, and a second conductive layer, and wherein the method of forming the electrically updatable touchscreen device includes obtaining a flexible display, forming the first conductive layer on the flexible display, forming one or more spacer on the first conductive layer, and forming the second conductive layer over the one or more spacer.

ADVANTAGES

[0010] The touch sensitive device can be made at a reduced cost and increased robustness with improved optical properties of the display.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention as described herein can be understood with reference to the accompanying drawings as described below:

[0012] FIG. **1** is a side view of a traditional resistive touchscreen and display assembly;

[0013] FIG. **2** is a cross-section view of a flexible display laminated to a polymer-based touchscreen assembly;

[0014] FIG. **3** is a side view of a touchscreen display assembly with an integral first electrode and laminated second electrode;

[0015] FIG. **4** is a side view of a touchscreen display assembly with an integral first electrode and laminated second electrode, wherein the first electrode is shared with the display;

[0016] FIG. **5** is an isometric exploded view of the assembly from FIG. **3**;

[0017] FIG. **6** is a front view of a traditional spacer design;

[0018] FIG. **7** is a front view of an alternative spacer design; and

[0019] FIG. **8** is an isometric view of flexible touchscreen display assembly.

[0020] 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

[0021] 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, industrial controllers, data input devices, informational signage, or consumer products.

[0022] 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.

[0023] 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. Alternatively, the media can be created to form individual pixels that are driven through the use of individual transistors, to form an active matrix. The media can be designed such that the electrical connections for the rows, columns, and/or transistors are made along one or more edge of the sheet. The media can be designed such that the display area defined by the active or passive matrix is larger than in any direction than the area required for electrical interconnects. The media can be assembled with electronic drivers to form a display. The display can be constructed such that it can be rolled or folded to reduce the assembly size for transportation or storage.

[0024] The display media can contain an electrically imageable layer containing an electrically imageable material. The electrically imageable material can be light emitting or light modulating. Light emitting materials can be inorganic or organic in nature. Suitable materials can include organic light emitting diodes (OLED) or polymeric light emitting diodes (PLED). Some suitable OLEDs and PLEDs are described in the following United States patents: U.S. Pat. Nos. 5,707,745, 5,721,160, 5,757,026, 5,998,803, and 6,125,226 to Forrest et al.; U.S. Pat. Nos. 5,834,893 and 6,046,543 to Bulovic et al.; U.S. Pat. Nos. 5,861,219, 5,986,401, and 6,242,115 to Thompson et al.; U.S. Pat. Nos. 5,904,916, 6,048,573, and 6,066,357 to Tang et al., U.S. Pat. Nos. 6,013,538, 6,048,630, and 6,274,980 to Burrows et al.; and U.S. Pat. No. 6,137,223 to Hung et al. The light modulating material can be reflective or transmissive. Light modulating materials can be electrochemical materials, electrophoretic materials such as Gyricon particles (U.S. Pat. Nos. 6,147,791, 4,126,854, and 6,055,091), electrochromic materials, or liquid crystal materials. Liquid crystal materials can be twisted nematic (TN), super-twisted nematic (STN), ferroelectric, magnetic, or chiral nematic liquid crystals. Especially preferred are chiral nematic liquid crystals. The chiral nematic liquid crystals can be polymer dispersed liquid crystals (PDLC). Other suitable materials can include thermochromic materials, charged particles (WO 98/41899, WO 98/19208, WO 98/03896, and WO 98/41898), and magnetic particles. Structures having stacked imaging layers or multiple support layers can be used to provide additional advantages in some cases, such as in forming color displays.