Projected-capacitive touch panels: Coming to a hospital near you

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From automated patient check-in systems to diagnostic equipment in operating theaters, touch interfaces are becoming pervasive in the healthcare industry and have the potential to radically improve efficiency and reduce cost. Projected capacitive touch panels, the dominant touch technology today thanks to the popularity of smartphones and tablets, have many advantages that make them ideally suited for medical applications. Some of the benefits of projected capacitive (PCAP) technology over previous touch technologies, such as resistive, include increased optical clarity, additional durability, resistance to chemicals and fluids, and glass construction for flush-mounting the touch interface into a device. Additionally, PCAP technology enables better implementation of human factors in medical device design with true multi-touch user interfaces that work with multiple layers of latex or nitrile gloves and have the low-power capability to work with portable medical devices.

The optical clarity of projected capacitive touch panels made with all-glass construction makes them ideal for incorporating touch interactivity into demanding medical applications that require high-end LCDs with superior contrast, resolution, luminance and sharpness. Touch panels made from PET film instead of glass typically have lower transmissivity, greater haze and often exhibit interference patterns, or Newton’s rings, all of which make them less suitable for medical devices. Projected capacitive touch panels with all-glass construction overcome issues that would be present with PET-based PCAP panels. (Figure 1)

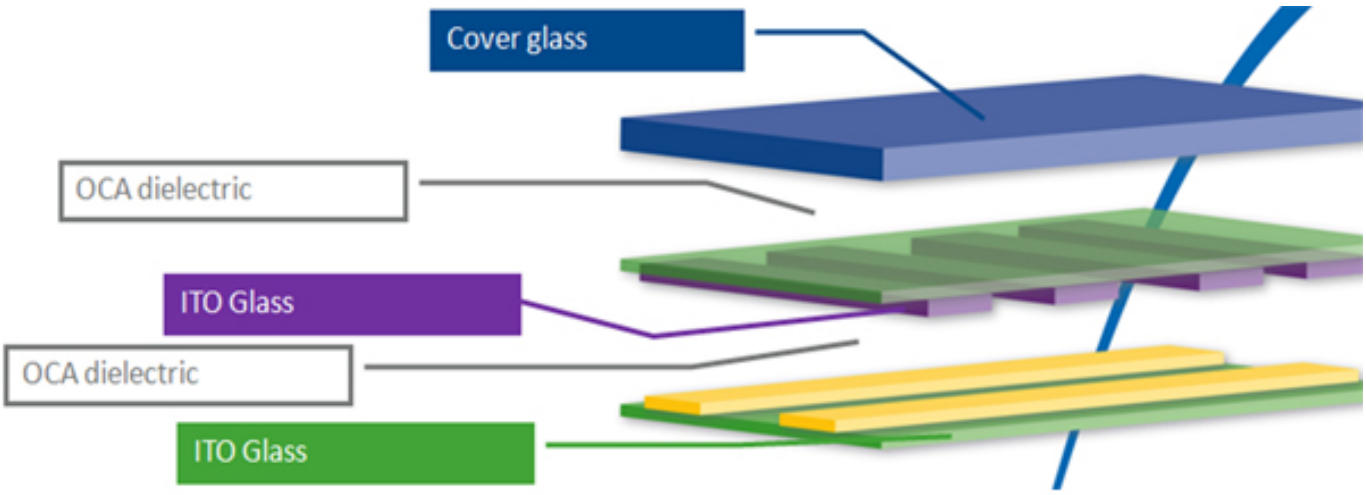

Figure 1. All-glass projected capacitive touch panel construction

All-glass PCAP touch panels can be incorporated into a completely sealed design which prevents the intrusion of fluids and contaminants. PCAP panels can be laminated with protective cover glass using index-matched optical adhesives that reduce reflections and maintain the crystal clear optical characteristics of the panel. By flush-mounting the cover glass, a bezel-less and completely flat surface can be created on the device. This is extremely important and one of the major benefits of migrating to a touch interface in medical applications. Traditional buttons, switches, keyboards, mice and bezels are difficult to design without grooves, corners, crevices and other features that are difficult to clean and can harbor bacteria. (Figure 2) A flat, glass surface that is resistant to harsh cleaners and fluids is much easier to clean and maintain. For increased ruggedness where impact resistance is required, the cover glass material can be chemically strengthened soda-lime or alkali-aluminosilicate glass.

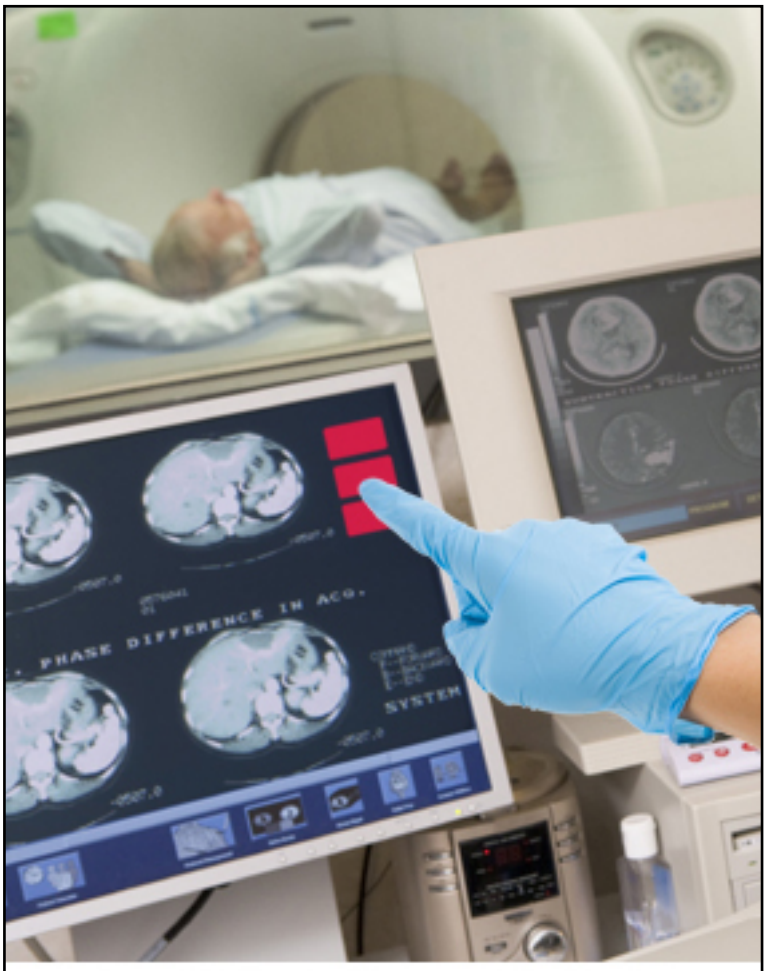

Figure 2. Touch-driven medical device

All-glass PCAP panels are also the most durable and reliable of projected capacitive technologies. With no moving parts, an abrasion-resistant surface and a common coefficient of thermal expansion among electrode layers, all-glass PCAP panels can survive years of heavy use over varying temperatures with no reduction of optical or touch performance.

The ability to interact directly with a display using touch technology is creating a new paradigm in the development of human-machine interfaces. When designing user interfaces for medical devices, touch interactivity provides great flexibility for incorporating enhanced human factors into the operation of the device. Human factors are especially important in medical devices because simple and intuitive interfaces reduce the likelihood of potential life-threatening mistakes, improve overall patient care and can reduce the time and costs associated with training healthcare workers. Eliminating traditional buttons and knobs allows designers to increase the size of a display while maintaining the overall size of a particular piece of equipment. Larger displays can exhibit more information and are easier to read, this is important for healthcare workers because they often operate under conditions of extreme fatigue and stress. Whereas buttons and keypads can be used to enter or adjust parameters without looking at a display, distracted or fatigued healthcare professionals are more likely to make input errors. By incorporating input features directly on the display, there is less likelihood that an operator will fail to notice the information being entered. Furthermore, touch-based interfaces do not require all controls to be present at the same time. Advanced gestures can be used to switch between menus and panels and only those controls relevant to the information being displayed need be present. This is where true multi-touch and projected capacitive technology are most beneficial. With the ability to independently track 10 or more touches, PCAP panels can require advanced multi-finger or even multi-hand gestures and operations to switch between menus and deactivate alarms, thereby reducing the chance of accidental or un-authorized inputs.

PCAP touch panels are an ideal interface for portable medical devices, including patient-worn diagnostic equipment. Small devices have limited space to display useful information and provide an efficient human-machine-interface. Traditional button-driven menus quickly become cumbersome and complicated when trying to design multiple diagnostic functions into a small device. Projected capacitive touch panels circumvent this issue through the efficiency of direct-touch and gesture interfaces, while also allowing for larger display sizes without increasing the size of the device. Also, the sophisticated configurability of presently available high-end PCAP touch panel controllers gives designers precise control over electrode scan rates and sense intervals, enabling low power and battery operated product designs.

Projected capacitive touch panels are the clear choice for adding touch interactivity to medical devices. They are highly transparent, durable, easy to clean and maintain, work with surgical gloves and allow for advanced user interfaces. Purely graphical panel-based controls, instead of mechanical inputs, make designing, testing and modifying user interfaces simpler and more effective than ever before.

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