Haldia Institute of Technology

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A Seminar Report on
“Touch Screen Monitors”

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Introduction:

A touchscreen is a display which can detect the presence and location of a touch within the display area. The term generally refers to touch or contact to the display of the device by a finger or hand. Touchscreens can also sense other passive objects, such as a stylus. The ability to interact directly with a display typically indicates the presence of a touchscreen. Touchscreens emerged from academic and corporate research labs in the second half of the 1960s. One of the first places where they gained some visibility was in the terminal of a computer-assisted learning terminal that came out in 1972 as part of the PLATO project. They have subsequently become familiar in kiosk systems, such as in retail and tourist settings, on point of sale systems, on ATMs and on PDAs (Personal Digital Assistance) where a stylus is sometimes used to manipulate and enter data. Touchscreens are popular in heavy industry and in other situations, such as museum displays or room automation, where keyboard and mouse systems do not allow a satisfactory, intuitive, rapid, or accurate interaction by the user with the display's content.

The touchscreen has two main attributes. First, it enables one to interact with what is displayed directly on the screen, where it is displayed, rather than indirectly with a mouse or touchpad. Secondly, it lets one do so without requiring any intermediate device, again, such as a stylus that needs to be held in the hand. Such displays can be attached to computers or, as terminals, to networks. They also play a
prominent role in the design of digital appliances such as the personal digital assistant (PDA), satellite navigation devices, mobile phones, and video games.

How Touch Screen Works?

**Touch Screen Sensor:** It is a clear glass panel with a touch responsive surface. The touch sensor/panel is placed over a display screen so that the responsive area of the panel covers the viewable area of the video screen.

**Controller:** It is a small PC card that takes information from the touch sensor and translates it into information that PC can understand.

**Software Driver:** It tells the computer's operating system how to interpret the touch event information that is sent from the controller.

Types of Touch Screen Technologies
1. Resistive Touch Screen
2. Capacitive Touch Screen
3. Surface Acoustic Wave Touch Screen
4. Infrared Touch Screen

**Resistive**

A resistive touchscreen panel is composed of several layers, the most important of which are two thin, metallic, electrically conductive layers separated by a narrow gap. When an object, such as a finger, presses down on a point on the panel's outer surface the two metallic layers become connected at that point: the panel then behaves as a pair of voltage dividers with connected outputs. This causes a change in the electrical current which is registered as a touch event and sent to the controller for processing.

Two types of Resistive Touch Screens are available:
4-Wire type Touch Screen & 5-Wire type Touch Screen.
Capacitive

A capacitive touch-screen panel is a sensor typically made of glass coated with a material such as indium tin oxide (ITO). The sensor therefore exhibits a precisely controlled field of stored electrons in both the horizontal and vertical axes - it achieves capacitance. The human body is also an electrical device which has stored electrons and therefore also exhibits capacitance. Capacitive sensors work based on proximity, and do not have to be directly touched to be triggered. It is a durable technology that is used in a wide range of applications including point-of-sale systems, industrial controls, and public information kiosks. It has a higher clarity than Resistive technology, but it only responds to finger contact and will not work with a gloved hand or pen stylus. Capacitive touch screens can also support Multitouch. Examples include Apple Inc.’s iPhone and iPod touch, and HTC’s G1 & HTC Magic.

Two types are available: Capacitive technology & Pentouch
Capacitive
Surface Acoustic Wave

**Surface acoustic wave (SAW)** technology uses ultrasonic waves that pass over the touch-screen panel. When the panel is touched, a portion of the wave is absorbed. This change in the ultrasonic waves registers the position of the touch event and sends this information to the controller for processing the location. Surface wave touchscreen panels can be damaged by outside elements. Contaminants on the surface can also interfere with the functionality of the touchscreen.
Infrared

Conventional optical-touch systems use an array of infrared (IR) light-emitting diodes (LEDs) on two adjacent bezel edges of a display, with photo sensors placed on the two opposite bezel edges to analyze the system and determine a touch event. The LED and photo sensor pairs create a grid of light beams across the display. An object (such as a finger or pen) that touches the screen interrupts the light beams, causing a measured decrease in light at the corresponding photo sensors. The measured photo sensor outputs can be used to locate a touch-point coordinate. Widespread adoption of infrared touch screens has been hampered by two factors: the relatively high cost of the technology compared to competing touch technologies and the issue of performance in bright ambient light. Another feature of infrared touch which has been long desired is the digital nature of the sensor output when compared to many other touch systems that rely on analog-
signal processing to determine a touch position. Infrared touch is capable of implementing multi-touch, something most other touch technologies cannot easily achieve.

Applications:

Public Information Displays, Tourism displays, trade show displays, and other electronic displays.

Customer self-service: Customers can quickly place their own orders or check themselves in or out, saving them time. Example: ATM

Computer Based Training: Since the touch screen interface is more user-friendly than other input devices, overall training time and training expense can be reduced. Also make learning more interactive and fun.

Other applications include computerized gaming, student registration systems, financial and scientific applications.
Benefits & Drawbacks:

✔ Fast, faster, fastest
✔ Touch makes everyone an expert
✔ Reduced cost
✔ Compact & handy
✔ Durable and easy to clean
✔ Good Resolution

✗ Must be touched by finger or stylus, will not work with any non conductive input.
✗ Resistive layer can be damaged by sharp object.
✗ Can be affected by large amount of dirt, dust & moisture of environment.
**Conclusion**

A touch screen is the simplest, most direct way for a person to interact with a computer. The basic way users interact with a touch screen is age-old. We point to what we want. It's intuitive for virtually every child and adult in the world today. With the influence of the multi touch-enabled iPhone and the Nintendo DS, the touch screen market for mobile devices is projected to produce US$5 billion in 2009. The ability to accurately point on the screen itself is taking yet another step with the emerging graphics tablet/screen hybrids. Touchscreen displays are found today in airplanes, automobiles, gaming consoles, machine control systems, appliances and handheld display devices of every kind.

**Bibliography**

- Wikipedia - The Free Encyclopedia
- Google Search Engine.