Swipe, pinch, zoom & tab
# All you want to know about Touchscreen Technology

Medical computers with touchscreen technology need to meet stringent medical standards. Completely sealed for easy cleaning and touchable with gloves to perform accurate touch-based inputs in patient records in medical clean rooms like operating theaters are a must. Avoiding additional physical keys on the panel, or extra devices like keyboards, mouse or touchpad is efficient as these can harbor bacteria.

A touchscreen can detect the presence and location of a touch within the display area, usually one or more fingers or a stylus. The touchscreen enables the user to interact with what is displayed without using an additional keyboard or mouse. Touchscreens are widely integrated in gaming consoles, all-in-one computers, tablets, navigation devices, smartphones, ATM devices and information kiosks. There is a variety of touch technologies that offer different methodologies of sensing the touch. All technologies are related to the X / Y coordinates of the touch sensitive area. The way how to sense the touch point is explained in the next paragraphs.

Resistive Touch

There is the Resistive Touchscreen which is pressure sensitive. The screen consists of a glass panel (or rigid plastic layer) covered with two thin transparent layers separated by an air gap. On top is a scratch-resistant layer. A voltage is applied to the touch screen and when the two sheets are pressed together the resistance changes and a controller calculates the precise location of the touch by the subsequent change in the voltage. The controller relays this information to the computer and its application. Resistive touchscreens typically have high resolution (4096 x 4096 DPI or higher) which provides accurate touch control. Because the touchscreen responds to pressure on its surface, it can be contacted by a finger, palm or any other pointing device. Advantages with regard to medical applications: no problem with gloved fingers, high resistance to liquids & contaminations. Comparison: although the least expensive, the resistive touch method blocks the light more than the other technologies due to the multiple layers and coatings.
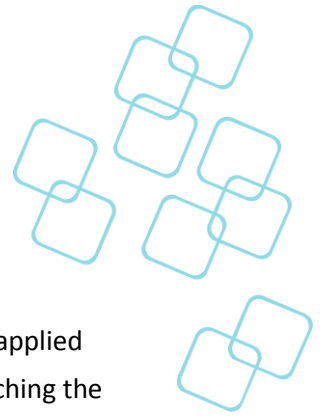
Capacitive Touch

A capacitive touchscreen uses a single metallic-coated glass panel to which a voltage is applied generating an electrostatic field. As the human body is also an electrical conductor, touching the surface of the screen results in a distortion of the screen's electrostatic field. This distortion is measured as a change in capacitance by the controller. The controller calculates the precise location of the distortion and relays this information to the computer and its application. A special stylus that absorbs electricity can be used.

Projected Capacitive Touch (PCT)

This is an enhanced version of capacitive touch where the screen is made of a grid (rows & columns) lying out on the glass sheet. Voltage is applied to this grid creating an electrostatic field. When the finger comes into contact with the screen it distorts the field at that point, measured as a change in capacitance. This change in charge can be measured extremely accurately and even a gloved finger can be sensed by PCT. The sandwiched sensor grid allows even two to ten finger touch points for pre-defined gestures like pinching, rotating and sliding. Advantages: robust, accurate, multi-touch possibilities, clear images (91% light transmission). Comparison: more expensive, sensitive to moisture or dust on screen, sensitive to high humidity.

Surface Acoustic Wave (SAW)

A continues ultrasonic acoustic wave passes over the touchscreen panel, transmitted and picked up along the x and y axis of the screen. When interrupted the 'wave' is absorbed and this is being detected and converted into a location by the controller which is then in turn interpreted by the computer as a command. No metallic layers are needed on the screen, so 100% light is being transmitted for quality image display. This makes it particularly useful for graphical display requirements.

Infrared Grid

This touchscreen uses an array of LED and photo detector pairs around the edges of the screen to detect a disruption in the pattern of LED beams. The LED beams cross each other in vertical and horizontal patterns. The screen can detect essentially any input from gloved finger to pen to stylus, ideal for outdoor situations like outdoor point of information systems. Advantage: the glass screen is durable and produces clear images. Limitations: sensitive to dirt/dust which interfere with the infrared beams.
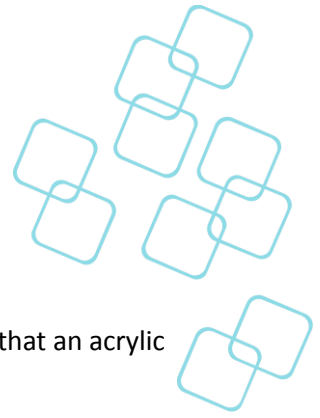
Infrared Acrylic Projection

This type of touchscreen works in a similar way as the Infrared Grid with the difference that an acrylic sheet is used for projection.

Optical Imaging (Shadow Sense)

Image sensors are placed at the edges of the screen and infrared backlights are placed in the camera's field to view the other side of the screen. A touch shows up as a shadow which is being detected by the pairs of cameras to pinpoint the exact location. Advantage: this technique scales to very large displays, transmission is above 90%. Limitation: system thickness and bezel design needs to have enough space for the camera system.

Overview Basic Finger Movements (Gestures) for most touch commands
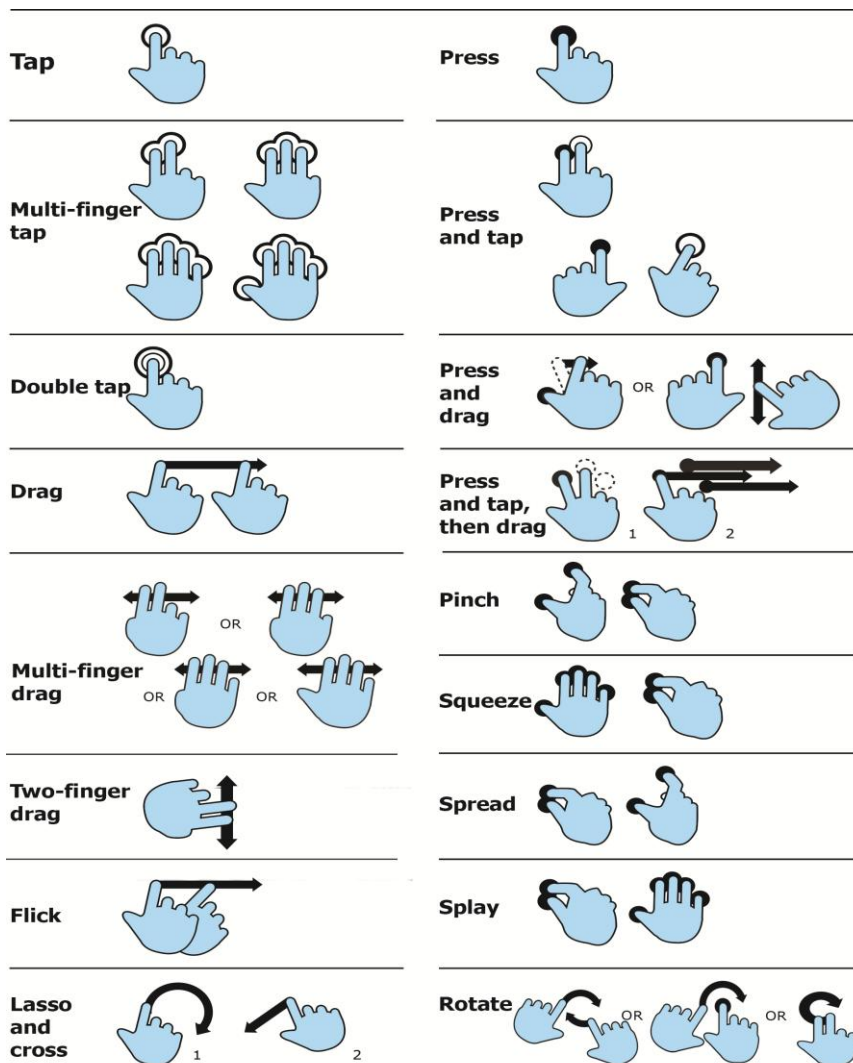
Attribution of Luke Wroblewski

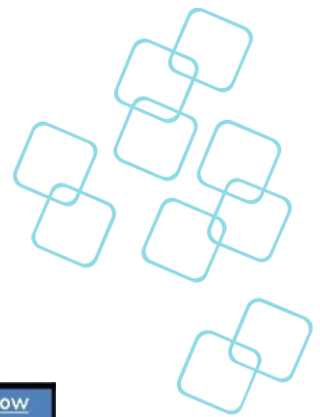Table of touch types by Advantech GPEG:

	5 Wire Analogue Resis-	E2E Resis-tive	Surface Acoustic Wave	Surface Capacitive	Project-ed Ca-pacitive	Through Glass Capaci-tive	Infrared	Shadow Sense
Appear-ance								
Typical screen sizes	5.7" to 24"	2" to 19"	10.4" to 26"	5.7" to 32"	10.4" to 32"	5" to 82"	8.4" to 82"	8" to 85"
Number of touches	Single or dual	Single or dual	Single or dual	Single	Up to 60	Single or dual	10	2 or 6
Flush smart phone look	No	Yes	No	No	Yes	Yes	No	No
Cost	Low	Low	Mid	Mid High	High	High	Low Mid	Low-Mid
Interface	MCU, USB or RS232	MCU, USB or RS232	USB or RS232	USB or RS232	USB or RS232	USB or RS232	USB or RS232	USB or RS232
Construc-tion	Film on glass or plastic	Film on glass or plastic	Standard or tem-pered glass	Chemically strength-ened glass	Glass or film on glass	Glass or film on glass	Standard or tem-pered glass	Standard or tem-pered glass
Durability	3 million touch-es	3 million touch-es	Good	Average	Good	Good	Good	Good
Surface	Soft	Soft	Hard	Hard	Hard	Hard	Hard	Hard
Max glass thickness	3-4mm	12mm	6mm	7.6mm	3-4mm	25mm	12mm	12mm
Glass trans-mitivity	Aver-age	Aver-age	Good	Good	Good	Good	Good	Good
	80%	80%	92%	90%	85%	82%	92%	92%
Input method	Any	Any	Finger only	Finger or capacitive pen only	Finger or capaci-tive pen only	Finger or capaci-tive pen only	Any	Any
Calibra-tion / line-arity drift	Aver-age	Aver-age	Average	Poor	Good	Poor	Good	Good
Operation when wet	Good	Good	Average	Poor	Poor	Poor	Average	Good
Sealability IP65	Good	Good	Average	Good	Good	Good	Good	Good
Integration	Simple	Simple	Complex	Complex	Simple	Complex	Simple	Simple

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Advantech's Medical Certified Computers used in operating rooms, intensive care units, emergency rooms, patient rooms and nurse wards (POCs) as well as bedside terminals for Patient Infotainment (HIT and PIT) are available with Resistive or Projected Capacitive Touch or SAW (POC only). The new 24 inch POC and 7 inch Medical Tablet has a multi-touch P-CAP touch screen.

Advantech GPEG offers a wide range of touchscreen LCD displays which can be configured to meet your exact requirements.

For more information call us toll free (Europe) 0800-2426-8081 or visit our websites

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