Introduction

A touch screen is a computer display screen that is sensitive to human touch, allowing a user to interact with the computer by touching pictures or words on the screen. Touch screens are used with information kiosks, computer-based training devices, and systems designed to help individuals who have difficulty manipulating a mouse or keyboard.

Touch screen technology can be used as an alternative user interface with applications that normally require a mouse, such as a Web browser. Some applications are designed specifically for touch screen technology, often having larger icons and links than the typical PC application. Monitors are available with built-in touch screen technology or individuals can purchase a touch screen kit.

A touch screen kit includes a touch screen panel, a controller, and a software driver. The touch screen panel is a clear panel attached externally to the monitor that plugs into a serial or Universal Serial Bus (USB) port or a bus card installed inside the computer. The touch screen panel registers touch events and passes these signals to the controller.

The controller then processes the signals and sends the data to the processor. The software driver translates touch events into mouse events. Drivers can be provided for both Windows and Macintosh operating systems. Internal touch screen kits are available but require professional installation because they must be installed inside the monitor.
History of Touch screen

The first "touch sensor" was developed by Dr. Sam Hurst, founder of Elographics, while he was an instructor at the University of Kentucky in 1971. This sensor was called the "Elograph", and was patented by The University of Kentucky Research Foundation. The "Elograph" was not transparent as are touchscreens, but was a significant mile-stone for touch technology.

The first true touch screen came on the scene in 1974, again developed by Dr. Hurst, of Elographics. In 1977, Elographics developed and patented five-wire resistive technology, the most popular touch screen technology in use today. On February 24, 1994, the company officially changed Its name from Elographics to Elo TouchSystems.

Definition

What are Touch Screens?

The touch screen is the most user friendly PC interface. It is an input device, a way to communicate with the PC. The user touches the screen to select options presented on the screen. Associated hardware and software are used to determine the location of the press.
Touch Screen Technology

Touch is the easiest to learn and use of any available interface. Businesses both large and small are using touch technology to create new products, reach new markets, increase productivity, and ease the flow of information.

1. Touch Sensor

A touch screen sensor 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. There are several different touch sensor technologies on the market today, each using a different method to detect touch input. The sensor generally has an electrical current or signal going through it and touching.

2. Controller

The controller is a small PC card that connects between the touch sensor and the PC. It takes information from the touch sensor and translates it into information that PC can understand. The controller is usually installed inside the monitor for integrated monitors or it is housed in a plastic case for external touch add-ons/overlays.

The controller determines what type of interface/connection you will need on the PC. Integrated touch monitors will have an extra cable connection on the back for the touch screen. Controllers are available that can connect to a Serial/COM port (PC) or to a USB port (PC or Macintosh). Specialized controllers are also available that work with DVD players and other devices.
3. Software driver

The driver is a software update for the PC system that allows the touch screen and computer to work together. It tells the computer's operating system how to interpret the touch event information that is sent from the controller. Most touch screen drivers today are a mouse-emulation type driver. This makes touching the screen the same as clicking your mouse at the same location on the screen. This allows the touch screen to work with existing software and allows new applications to be developed.

Why use Touch Screens?

Touch is the easiest to learn and use of any available interface. Businesses both large and small are using touch technology to create new products, reach new markets, increase productivity, and ease the flow of information.

Applications of Touch Screens
Common Uses for Touch

- Informational kiosks
- Trade show displays
- Museum / tourism displays
- Point-of-sale terminals
- Restaurant systems
- Employee time clocks
- Employee training systems
- Industrial process controls
- World Wide Web access kiosks
- Home automation systems
- Casino and other gaming systems
- Computer access for the physically disabled
- Railway station
- Airport
- Telephone exchange

Types of Touch Screens

There are a variety of types of touch technology available but the five major ones include analog resistive, capacitive, infrared, acoustic wave and near field imaging. Of these only one may actually be appropriate for your application.

Resistive Touch Screens

Analog resistive touch technology is comprised of a glass overlay that fits exactly to the shape of a flat panel display. The exterior face of the glass is coated with a conductive, transparent layer. A clear, hard coated plastic sheet is then suspended over the glass overlay.

The interior face of the plastic sheet is also coated with a conductive layer. Between the glass and the plastic sheet there are thousands of tiny separator dots about one-one
thousandth of an inch thick. When a stylus applies pressure to the surface of the display, the two layers make contact and a controller instantly calculates X and Y coordinates. This accounts for resistive overlay's very high touch recognition resolution.

An 8-wire analog resistive touch screen has held up to more than 35 million touches in laboratory environments, although most are officially rated over 1 million touches. These systems can also be sealed to prevent dust or water. Capacitive overlay systems operate by way of a conductive stylus and require the use of the human finger or stylus.

It is covered with a coat of transparent metal oxide but the coat is bonded to a single sheet of glass making it susceptible to scratches, which will jeopardize the integrity of the touch screen. A touch on the screen creates a capacitive coupling, drawing an electrical current to the touch point. However, as soon as a glove is placed over the hand, the touch
screen is rendered inoperable which eliminates it from being effective in many applications. The resistive Touch Screen is set up in the following way:

**Resistive Touch Screens**

Formed to fit the shape of a display, the glass panel has a coating of uniform resistivity. A polyester cover sheet is tightly suspended over the top of the glass, separated from it by small, transparent insulating dots. The cover sheet has a hard, durable coating on the outer side and a conductive coating on the inner side. With a light touch, the conductive coating makes electrical contact with the coating on the glass.

The controller circuit applies a voltage gradient across the resistive surface of the glass. The voltages at the point of contact are the analog representation of the position touched. The controller digitizes these voltages and transmits them to the computer for processing.
By using 4 wires, a pair of wires on each layer, both signals of X and Y are registered by the controller. When a touch occurs, the touch point introduces a pair of voltages for X and Y direction. The Analog-to-Digital Converter (ADC), which is located on the controller, is then converts these voltage positions into digital numbers.

The device driver calculates these digital numbers into display (X,Y) coordinate. Puts the mouse cursor onto the (X,Y) coordinate. Also returns the operating system with mouse left-button-down status, and left-button-up status while untouched is occurred.
<table>
<thead>
<tr>
<th>Touch Screen Technology</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Five-Wire Technology</strong></td>
<td><strong>Four-Wire Technology and Eight-Wire Technology</strong></td>
</tr>
<tr>
<td>Utilizes the bottom substrate for both X- and Y-axis measurements. The flexible coversheet acts only as a voltage-measuring probe. This means the touch screen continues working properly even with non-uniformity in the cover sheet's conductive coating. The result is an accurate, durable and reliable touch screen that offers drift-free operation.</td>
<td>Must use two layers to create X- and Y-axis measurements. For the Y-axis, the flexible top coversheet acts as a uniform voltage gradient, while the bottom substrate acts as the voltage probe. The constant flexing that occurs on the outer coversheet will change its electrical characteristics (resistance) with use, degrading the linearity and accuracy of this axis.</td>
</tr>
</tbody>
</table>

**Durability**

<table>
<thead>
<tr>
<th>Five-Wire Technology</th>
<th>Four-Wire Technology and Eight-Wire Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested to over 35 million finger touches with no performance degradation.</td>
<td>1 million-touch life max.</td>
</tr>
</tbody>
</table>

**Design Flexibility**

<table>
<thead>
<tr>
<th>Five-Wire Technology</th>
<th>Four-Wire Technology and Eight-Wire Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced design allows flat and spherical designs.</td>
<td>Not available in spherical designs.</td>
</tr>
</tbody>
</table>

**Advantages of Resistive**
Touch Screen Technology

- High Resolution and Accuracy
- Fast Response
- Pressure-activated by finger or gloved hand with a very light touch
- Durable hard-coat front surface can be non glare treated for reflection control or polished for maximum clarity
- Touch screens and controllers are safety agency-approved components, so certification of your system is easier

**Disadvantages of Resistive**

- 80 % Clarity
- Resistive layers can be damaged by a sharp object

**Surface Acoustic Wave Touch Screens**

The SAW touch screen is a glass overlay with transmitting and receiving piezoelectric transducers for both the X and Y-axes. The touch screen controller sends a 5 MHz electrical signal to the transmitting transducer,

which converts the signal into surface waves. These mechanical waves are directed across the opposite side gather and direct the waves to the receiving transducer, which reconverts them into an electrical signal.
Surface Acoustic Wave Touch Screens

When the front surface of the touch screen is touched, a portion of the mechanical wave is absorbed, thus changing the received signal. The signal is then compared to a stored reference signal, the change recognized, and a coordinate calculated.

This process happens independently for both the X and Y-axes. By measuring the amount of the signal that is absorbed, a Z-axis is determined.
Acoustic wave touch screens have transducers that emit ultrasonic sound waves along two sides. Guided acoustic wave (GAW) systems function by the transmission of an acoustic wave through a glass overlay on a display surface, and surface acoustic wave systems (SAW) function by the transmission of an acoustic wave over a glass overlay on a display surface.

When an input device, such as a finger, dampens the wave, electronic sensors determine the location of the dampened area, recognizing a touch. SAW touch screen monitors have significant stylus limitations.

A stylus is the actual device, which touches the displays screen. These systems require a soft, energy absorbing pressure that would come from a finger. Although the human finger is the most popular stylus, often it is desirable to have a pen-based stylus so the display does not become dirty.
**How the Touch screen Controller Interprets Screen Measurement**

When the controller is waiting for a touch, the resistive layer of the touch screen is biased at +5V through four drivelines, and the coversheet is grounded through a high resistance. When the touch screen is not being touched, the voltage on the coversheet is zero.

The voltage level of the coversheet is continuously converted by the analog-to-digital converter (ADC) and monitored by the microprocessor on the controller. When the touch screen is touched, the microprocessor detects the rise in the coversheet voltage and begins converting the coordinates as follows:

**A** The microprocessor places the X drive voltage on the touch screen by applying +5V to pins H and X and grounding pins Y and L. An analog voltage proportional to the X (horizontal) position of the touch appears on the cover sheet at pin S of the touch screen connector. This voltage is digitized by the ADC and subjected to an averaging algorithm, then stored for transmission to the host.

**B** Next, the microprocessor places the Y drive voltage on the touch screen by applying +5V to pins H and Y and grounding pin X and L. An analog voltage proportional to the Y (vertical position of the touch) now appears on the coversheet at pin S of the touch screen connector. This signal is converted and processed as described above for the X position.
**Advantages of Surface Acoustic Wave**

- Excellent Image Clarity
- Very High Light Transmission
- Excellent Durability
- Stable "No-Drift" Operation
- High Resolution
- Finger or Gloved-Hand Operation
- Very Light Touch
- Fast Touch Response
- X-, Y-, and Z-axis Response
- Overlay That Can Be Antiglare-Treated

**Disadvantages of Surface Acoustic Wave**

- Must be touched by finger, gloved hand, or soft-tip stylus. Something hard like a pen won't work
- Not completely sealable, can be affected by large amounts of grease, water, or dirt on the touch screen
Capacitive Touch Screens

The touch pad contains a two-layer grid of electrodes that are connected to a sophisticated full-custom mixed signal integrated circuit (IC) mounted on the reverse side of the pad. The upper layer contains vertical electrode strips while the lower layer is composed of horizontal electrode strips. The IC measures "Mutual capacitance" from each of the horizontal electrodes to each of the vertical electrodes.
A human finger near the intersection of two electrodes modifies the mutual capacitance between them, since a finger has very different dielectric properties than air. Position of the finger centroid is precisely determined based on these mutual capacitance changes at various locations and can be detected before a finger actually touches the pad.

Capacitive overlay systems operate by way of a conductive stylus and require the use of the human finger or stylus. It is covered with a coat of transparent metal oxide but the coat is bonded to a single sheet of glass making it susceptible to scratches, which will jeopardize the integrity of the touch screen. A touch on the screen creates a capacitive coupling, drawing an electrical current to the touch point. However, as soon as a glove is placed over the hand, the touch screen is rendered inoperable which eliminates it from being effective in many applications.

**Advantages of Capacitive**
- High Touch Resolution
- High Clarity
- Completely Seal able

**Disadvantages of Capacitive**
- Must be touched by finger- will not work with any non-conductive input
- Can be affected by electricity
- May need re-calibration often

**Comparison of the Different Types**

**Advantages of Resistive**
- High Resolution and Accuracy
- Fast Response
- Pressure-activated by finger or gloved hand with a very light touch
Touch Screen Technology

- Durable hard-coat front surface can be no glare treated for reflection control or polished for maximum clarity
- Touch screens and controllers are safety agency-approved components, so certification of your system is easier

Disadvantages of Resistive

- 80% Clarity
- Resistive layers can be damaged by a sharp object

Advantages of Surface Acoustic Wave

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- Very High Light Transmission
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- Stable "No-Drift" Operation
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- Very Light Touch
- Fast Touch Response
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- Must be touched by finger, gloved hand, or soft-tip stylus. Something hard like a pen won't work
- Not completely seal able, can be affected by large amounts of grease, water, or dirt on the touch screen
Comparison Between the Different Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Resistive*: Activation</th>
<th>Acoustic Wave: Activation</th>
<th>Capacitive**: Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pressure sensitive</td>
<td>Wave aborption</td>
<td>Human body electricity</td>
</tr>
<tr>
<td>Antiglare protection:</td>
<td>Minimal</td>
<td>Medium</td>
<td>Clear, Light-Etch, Etched</td>
</tr>
<tr>
<td>Clarity:</td>
<td>Medium</td>
<td>Best</td>
<td>Minimal, Medium, Best</td>
</tr>
<tr>
<td>Damaged by:</td>
<td>Very sharp objects</td>
<td>Glass - breakable</td>
<td>Glass coating wears out</td>
</tr>
<tr>
<td>Can handle dirt:</td>
<td>Good</td>
<td>Poor</td>
<td>Best</td>
</tr>
<tr>
<td>Made with:</td>
<td>Hardened acrylic plastic</td>
<td>Glass with coatings</td>
<td>Glass with coatings</td>
</tr>
<tr>
<td>Durability (MTBF):</td>
<td>15 million touches</td>
<td>30 million touches</td>
<td>60 million touches</td>
</tr>
<tr>
<td>Resolution:</td>
<td>1 million touch points</td>
<td>1 million touch points</td>
<td>1 million touch points</td>
</tr>
<tr>
<td>Warranty:</td>
<td>1 Year</td>
<td>3 Years</td>
<td>5 Years</td>
</tr>
<tr>
<td>SUMMARY:</td>
<td>Best Price</td>
<td>Best Clarity</td>
<td>Most Durable</td>
</tr>
</tbody>
</table>

Construction of touch screen

Capacitive
The touch pad contains a two-layer of electrodes that are connected to a sophisticated integrated circuit (IC) mounted on the reverse side of the pad. The upper layer contains vertical electrode strips while the lower layer is composed of horizontal electrode strips.
Manufacturing Process

The resistive material for a resistive touch screen is usually made of a thin-film, Nickel-Phosphorous (NiP) alloy. In the manufacturing process, about 0.1 to 0.4 microns of the alloy is electro-deposited onto the rough, or tooth side, of a standard electrodeposited copper foil.

Resistor Conductor Sheet Material

Typical sizes available in the market are 25 ohm per square and 100 ohm per square sheet resistivities at + or - 5% tolerance. Ohms per square is a dimensionless square area of resistive material.

Touch Screen Configurations

Touch Controls, Inc. offers the widest range of rugged zed touch screen and highly adaptable operator interface touch technology available anywhere. For example, your application may require:

- a daily high pressure caustic wash-down (NEMA 4X/IP 66);
• protection against abrasive dust;
• the use of harsh chemicals or organic solvents;
• outdoor installation with environmental extremes;
• withstanding abuse by the general public or vandalism;
• special cursor manipulation; or
• ability to locate and trigger very small targets.

**Latest development**

**Introducing a New Touch Screen System**

Touch screens are widely used in numerous industries and applications that require exacting combinations of accuracy, touch sensitivity, and durability. Each touch screen application has its own unique challenges, and traditionally, customers chose the touch screen technology with the fewest disadvantages and technical limitations for their specific application.

Enter Dynapro’s Near Field Imaging (NFI) Touch Screen System. Patented by Dynapro in 1997, it is uncompromising in both performance and toughness, making it the perfect choice when high clarity and durability are at issue.

**What is NFI?**

Simply put, it’s a touch screen where the screen itself is the sensor. NFI uses a sophisticated sensing circuit that can detect a conductive object - a finger or conductive stylus - through a layer of glass, as well as through gloves or other potential barriers (moisture, gels, paints, etc.). This is achieved with a high degree of accuracy using data acquisition and image processing techniques that generate a precise profile of the touch.
The NFI touch screen sensor uses a transparent conductive film patterned with a proprietary topology applied to the base layer of glass. The front layer of glass is bonded over the base layer with an optical adhesive. An excitation waveform is supplied to the conductive layer by the controller to generate a low strength electrostatic field in the front layer of glass. The near field is modulated by finger contact with the front layer of glass, and a resultant differential signal is created, making it possible to accurately resolve the electrostatic loading on the face of the screen.

Dynapro’s data acquisition expertise was instrumental in designing the method by which the system firmware recognizes and decodes the location of the touch. The controller scans continuously until it receives signs of an impending touch. At this point it shifts into a different mode and subtracts the baseline associated with the conditions immediately preceding the touch.

This way, static and noise do not affect the image of the touch. The profile of the touch is constructed from a dynamic array of data points, and resolved to an actual touch point through continuous re-imaging of the electrostatic field. Touch coordinates are fed back to the operating system as fully compliant Microsoft mouse coordinates.

Once a touch is registered, its effect is zeroed out, so a subsequent touch in another location can be detected. The system resolves and reports concurrent touches without averaging, allowing for advanced touch input capabilities.

Any long-term changes in the electrostatic image are compensated for, allowing the system to ignore unwanted objects directly on the screen such as water droplets, insects, conductive dirt, or other adhering contamination. Imaging also enables the touch screen to ignore unwanted loading effects from large or distant objects such as hands or arms, and to reject false touches.

Sophisticated data acquisition and image processing ensure NFI is accurate enough to control equipment consistently and precisely, yet sensitive enough to detect finger touches through gloves, and work through moisture and other contaminants. The sensor’s glass construction provides superior optical performance, and will continue to operate despite scratching, pitting, and other surface damage from abrasives, chemicals or vandals.
Touch Screen Technology

NFI touch screens can be reliably sealed for applications that require high pressure washdown or protection from contaminant-filled environments.

**NFI Addresses Needs**

NFI offers significant advantages in performance and durability without compromises, and it's the only touch screen technology that overcomes the technical limitations found in other touch screen technologies, by addressing three main factors:

- **Accuracy** - the ability to control equipment consistently and precisely despite extreme environmental conditions
- **Touch Sensitivity** - the ability to operate the touch screen with gloves through moisture, dirt, and other surface contaminants
- **Durability** - the ability to withstand scratches and other surface damage caused by abrasives, chemicals, or vandalism

![Diagram of touch screen technology](image)

**The Benefits of NFI**
Touch Screen Technology

NFI technology offers protection against scratches, scrapes, gouges, and severe abrasion. The sensor layer of the screen is well protected beneath the glass surface, so performance remains unaffected even if the front glass layer is damaged.

Contaminant Proof
Surface contaminants such as moisture, dirt, grease, and chemicals do not affect the performance of the touch screen and can easily be cleaned. The touch screen stands up to virtually all chemicals and continues to function accurately through any substance.

Touch Sensitivity
You can activate NFI with a touch of a finger - gloved or ungloved - or other conductive stylus.

Stability
Variations in temperature, humidity, and altitude do not affect NFI. The touch screen remains drift-free and does not require field calibration to maintain accuracy. NFI is also immune to electro-static discharge and electromagnetic interference.

Sealing Capability
NFI touch screens can be reliably sealed for applications that require high pressure washdown or for protection from contaminant-filled environments. Systems incorporating NFI touch screens can readily achieve a NEMA 4X rating.

Performance
NFI requires very light contact and responds instantly to an operator’s touch. With NFI’s linearity and resolution, you can effectively perform drag and drop operations. And the NFI touch screen also resolves and reports concurrent touches without averaging.

Shock and Vibration
Touch Screen Technology

NFI touch screens can withstand significant vibration and shock without jeopardizing safety or performance. With chemically strengthened glass and no mechanically sensitive components, NFI performs reliably when used in a high vibration environment.

Optical Clarity

NFI’s solid glass layer provides excellent image clarity. With extremely high transmissivity, and unobtrusive glare and reflection protection,

How is Touch Technology different from other devices?

- No special commands to learn.

- The user doesn't need to look away from the screen to a keyboard and back again.

- Entering wrong information is impossible, only valid options are offered on the screen.

- There are no loose pieces of hardware to be damaged or lost
Completely Integrated Freestanding Internet Touch Screen Kiosk System

Vandal Resistant Reliable Modular Durable Economical Easy To Maintain

Features
- Metal or injection Molded Plastic Computer Enclosure
- No Exposed Cables, Wires or Ports
- Small Footprint
- 15" Active Matrix Ultra Bright TFT LCD
- Intel PII or Celeron Processor
- ELO Touch Screen
- Internet Ready
- Patented ServiceConnect™ Wiring System

Applications
- Retail Sales
- Customer Services
- Protected Public Internet Access
- Visitor Information
- Ticketing Systems
- Trade Shows
- Human Resource Programs
- Custom Turnkey Solutions

Options
- Bar Code Readers
- Printers
- Magnetic Card Readers
- Stereo Speakers
- Telephones
- Tamper Proof & Moisture Resistant Keyboards
- Cameras
- Integrated Wireless Connectivity
- Various Signage Opportunities

25
UltimaTouch

A high-performance touch screen POS platform with three different systems keyed to your needs. All provide a superior foundation for a comprehensive retail POS workstation. Each features an integrated, single-board computer, active matrix LCD with 5-wire resistive touch screen, and magnetic stripe reader to support many retail applications. Highly configurable with multiple mounting options and large selection of interface ports, including USB for connectivity to printers, cash drawers, scanners, keyboards and more. Models are differentiated by processor speed.

- Attractive, compact ergonomic design
- Multiple mounting options ideal for any environment
- Rugged, tamper-resistant enclosure for high-use retail interaction
- Easy installation, maintenance, and access to peripheral connections
Ultrx Systems

The ultimate prescription to eliminate the paperwork Pharmacy Technology - A Way Ahead

Whether you like it or not - change is on your doorstep! The rate of change in technology occurring at present means pharmacists can either get on the wagon, or be left behind in the dust wondering just where everyone else has gone. This article will give you an idea of some of the technology is presently available to retail and hospital pharmacists to make your life easier, and save you time (a most valuable resource that pharmacists have little of!).

There are a range of technology options available to todays' pharmacist, and you don't have to have a computer science degree to be able to use them. Most systems come with excellent back up, so even if you do test the "fool-proof" system to the max., there will be someone to haul you out.

Technology can be divided broadly into three sections:

- Hardware
- Software
- Web-based/Internet/Intranet

Web addresses are listed where available for further information.

1. HARDWARE

The decision to upgrade your computer is usually made based on the software you choose to purchase for your shop/dispensary system. The term "hardware" covers wide range of
products such as Automated drug dispensing systems, information kiosks, EFTPOS terminals and scanners.

**a) Automated Drug Dispensing Systems :**

**a) Healthpoint Kiosks:**

Healthpoint kiosks are user-friendly, comprehensive tools for up to date health information. With touch screen technology and a wide range of information available such as adult ailments, specialty diets, post-operative care, first aid, mental health, vitamin and amino acid information, pregnancy, child care and more, customers and staff find the kiosks easy to use. Information is presented using print media, and also video and graphic presentations.

Pharmacies who already have the kiosks installed find they are popular with all age groups, and lead to an increase in foot traffic, as well as improved communication between pharmacist and patient.

**b) EFTPOS terminals:**

EFTPOS New Zealand Limited have recently launched an innovative new product, PC EFTPOS Lite. PC EFTPOS Lite enables any pharmacy to integrate their PC-Windows based point-of-sale system with their EFTPOS terminal. This provides retailers with the ability to keep an electronic journal eliminating the need for receipt copies, and process transactions cheaper, as EFTPOS receipt and sales receipts are printed by one printer. PC EFTPOS Lite has the ability to run multiple EFTPOS lanes from a single telephone line, as well as increasing counter space due to a compact pinpad unit and no need for a separate printer.

**c) Bar Code Scanners** - The main types of scanners used in the retail environment are Laser Scanners and CCD scanners. Both types scan automatically and can be initiated by either a trigger switch, or automatically using flash mode.

Main differences are:

- Laser scanners read bar codes over short to medium distances (most types up to 1 metre), and are in the upper price range.
• CCD scanners can read barcodes only over small distances - usually not more than 25mm. They are less expensive and more robust than the laser scanners.

New technology which should be available to the pharmacy market in the near future is wireless scanners which will have uses for stocktaking, and potentially as a useful tool in dispensing and checking prescriptions.

2. SOFTWARE

There are two main pharmacy software programmes:

(i) LOTS (Harvey Lockie):
LOTS is designed to be 100% Windows compliant. You can have multiple windows open, for example, while dispensing also have open orders, and Point of Sale (PoS) for instant access. If you have both dispensing and OTC modules, the two systems are integrated to combine ordering and interactions (ie between OTC purchases and prescription medicines), and also customer accounts.
LOTS uses sales forecasting and stock management formulae which have been shown to allow some 15% more turnover for the same stock compared to common computer systems, with about 50% less out-of-stocks and dead stock. LOTS has as a feature the "Compliance chart" that presents the whole of the last 12 months history of a patient in visual form on screen. It is a very popular features, and most pharmacists say that it is allows a major advance in their professional services.

(ii) TONIQ:
TONIQ is a Windows-based program, with both dispensing and retail modules available. TONIQ has electronic communications used as frontline support, which means any time you have a software problem, TONIQ aim to resolve it for you while you are on the phone, using modems and the pcAnywhere program to control your computer from their office in Christchurch and work on the problem for you. Help is available anytime you need it.
Touch Screen Technology

Toniq has a comprehensive database of medicines, including a large range of Hospital only medicines. The medicine file update is available for download to registered users from their website.

This year Toniq is introducing a number of new features—Web based education and online forums, modules for assisting patient compliance. The program prepares a patient guide, which assist the patient to understand dose times, the medication and expected pick up dates for repeats. Data sharing tools are also being introduced, to allow transfer of retail information within a group.

Other software available to assist in areas of pharmacy practice includes—

a) pc Anywhere:

Pharmacies can use a program such as pcAnywhere to allow staff to work off-site, accessing the pharmacy computer via a modem connection. pcAnywhere is password protected, so staff can only access areas that they are assigned to. Stobo's pharmacy in Oamaru employ a staff member who works from home to process inwards goods. This streamlines the processing of orders, and frees up shop staff to be available to customers. Their Dispensary Manager also accesses the MAQS program from home to review documents using pcAnywhere, without the interruptions of a normal busy day.

3. INTERNET/INTRANET

With the many applications available through the Internet, it is rapidly becoming an essential business tool. Security becomes an issue with internet access, and must always be kept in mind.

Many pharmacies are now advancing in e-commerce, and launching on-line stores. Pharmacy groups, such as Amcal and Unichem, recognise IT as important directions for growth, and have dedicated IT departments.

Amcal:
The Amcal website has a number of features which give pharmacies in this group a presence on the Internet.

Each Amcal pharmacy has its own on-line store, an e-zine ( an e-zine is an internet newsletter, if you're not familiar with the term ) which is generated centrally, but personalised when sent to the customer, a section where customers can enter their repeat prescription details and a fax is sent to their pharmacy ( which customers select from a drop-down list), with all the details, including delivery or collection time . This means Amcal pharmacists can have the prescriptions ready for the patients before they come in. Amcal also utilises Intranet technology ( which means all members are linked via an independent line ) to run a point of sale system called AdvanceRetail, which centralizes product maintenance & sales information, and is used create a national sales picture of what is happening in each pharmacy. This allows measure of how successful a particular promotion has been, and other important feedback.

**Unichem**

Unichem launched their IT department 6 months ago, focussing on setting up an Intranet system which was launched in Nov 2000, the first in a number of technology projects the Board are committed to. It caters to the three franchises, Unichem, Unichem Life, and Dispensary First, with each franchise only accessing information relevant to them. The Intranet is named "Splash " and allows Unichem members to "dive" into four different sections of information technology - News, Knowledge, Discussion and Trade. The News area has general news pertaining to pharmacy, such as industry news - both local and international, suppliers' news, conference and marketing information. The Knowledge area contains logos and templates for advertising, training information, marketing promotions, and reference articles. This frees up the Head Office staff from repetitive tasks to allow them to concentrate on other issues, as well as allowing pharmacies to access information in their own time, as often as they like. This flexibility, as well as ease of content editing is essential for the success of Splash.
The discussion area is proving popular for discussion on issues such as Society and new Government initiatives, as is the Trade area, giving pharmacists the opportunity to exchange dead stock.

Primenet:
Primenet is a secure on-line information network and communications package. With 50% ownership by the Pharmacy Guild and the remaining 50% owned by pharmacists, Primenet will bring pharmacy to the fore in the ownership of medicine data collection and feedback, putting a stake in the ground for pharmacy to be the correlators of patient care.

Primenet offers a complete communication package, allowing savings to be made on existing telecommunication and operating costs. Savings will also be made through access to medical reference material, reducing the necessity for purchasing these items. Finding and retrieving information will be quick and easy with high speed, secure Internet access.

Of particular importance to pharmacy are the security protocols that have been built into Primenet, to ensure an exceptionally high level of security. Being a secure intranet for the medical community, usage is restricted to registered health professionals with authorised access. While the protection of data is provided through a layer of encryption processes and network firewalls.

Probably the most exciting benefit that Primenet offers is the glimpse of future directions and uses the Primenet system will offer. Data collection and exchange - not only prescription details, but also clinical information such as test results will give pharmacists meaningful data to assist in patient care, and the tracking of any alterations in therapy made through PRS.

IPA budget spending can already be tracked for individual IPA groups and categorised into 144 Therapeutic groups. Meaningful data is collected, with not only funded medicines being analysed,
Conclusion:

Touch Screen is widely used and emerging technology that is sensitive to human touch, allowing a user to interact with the computer by touching pictures or words on the screen. It provides a very good user interface with applications that normally require a mouse.

It is very useful in various fields like Museum / tourism displays, railway station, casino and other gaming systems, Airport, telephone exchange etc.

It has good future in many new technologies like in cell phones, palmtops, laptops etc.
References:

- http://www.touchscreen_encyclopedia.com
- http://www.elotouchsystem.com