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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Certificate

This is to certify that the seminar entitled, “**SEMINAR TITLE**” is a **bonified work carried out in the department of ECE by STUDENT NAME** in partial fulfillment of the award of the Bachelor of Engineering in Electronics and Communication Engineering in Visvesvaraya Technological University, Belgaum during the academic year 2010–2011. It is certified that all corrections/suggestions indicated for internal assessment have been incorporated. The seminar report has been approved as it satisfies the academic requirements.

Signature of HOD

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Name of the Student

University Seat Number

Name of the Examiners (with signature)

1. _____

2. _____

ABSTRACT

TOUCH SCREEN TECHNOLOGY

Touch Screens, are display overlays that have the ability to display and receive information on the same screen. As prices for this panels has decline steadily in the past decade, touch screen panels have become more and more commonplace. This report will include a full assessment of resistive, capacitive, pan touch capacitive touch screen, surface acoustic wave, surface capacitive, infra red, sensor in pixel, and others.

This report also will feature market analysis of touch screen technology on following applications: public information displays, customer self-service, retail and restaurant system, computer base training ,control & automation system, assistive technology.

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INTRODUCTION

A touch screen is 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 screen are used with information kiosks (an interactive computer terminal available for public use, as one with internet access or site specific information), computer based training devices, and system designed to help individuals who have difficulty in manipulating a mouse or keyboard. Touch screen technology can be used as an alternative user interface with application that normally requires a mouse, such as a web browser. Some applications are designed specifically for touch screen technology, often having larger icon and link than typical PC application. Monitors are available with built in touch screen kit.

A touch screen kit includes a touch screen panel, a controller, and a software driver. The touch screen panels are is a clear panel attached externally to the monitors that plug in to a serial or a universal serial Bus (USB) port a bus Card installed in side the computer. The touch screen panel registers touch event and passes these signal to controller. The controller then processes the signals and sends the data to the processor. The software driver translates the touch events into mouse events. Driver can be provided for both Window and Macintosh operating systems. Internal touch screen kits are available but require professional installation because the must be installed inside the monitors.

1.1 DEFINITION

A touch screen is a special type of visual display unit with a screen which is sensitive to pressure or touching. The screen can detect the position of the point of touch. The design of touch screens is best for inputting simple choices and the choices are programmable. The device is very user-friendly since it 'talks' with the user when the user is picking up choices on the screen.

Touch technology turns a CRT, flat panel display or flat surface into a dynamic data entry device that replaces both the keyboard and mouse. In addition to eliminating these separate data entry devices, touch offers an "intuitive" interface. In public kiosks, for example, users receive no more instruction than 'touch your selection.'

Specific areas of the screen are defined as "buttons" that the operator selects simply by touching them. One significant advantage to touch screen applications is that each screen can be customized to reflect only the valid options for each phase of an operation, greatly reducing the frustration of hunting for the right key or function.

Pen-based systems, such as the Palm Pilot and signature capture systems, also use touch technology but are not included in this article. The essential difference is that the pressure levels are set higher for pen-based systems than for touch.

HISTORY OF TOUCH SCREEM TECHNOLOGY

Dr. Sam Hurst, founder of Elographics, developed the first “touch screen” while he was an instructor at the university of Kentucky in 1971.

Ten stockholders founded Elographics, Inc. in March 1971, to produce Graphical data Digitizers for use in research and industrial application, with the, principal being Dr. Sam Hurst. He was on leave from the Oak Ridge National Laboratory to tech at the University of Kentucky for two years, where he was faced with a need to read a huge stack of strip chart data. It would have taken two graduate student s approximately two month to do the task. He started to thinking of a way to read the and during the process, the “Elograph” (Electronic graphics) coordinate measuring system and Elographics the company were born. The University Kentucky research foundation applied for and was granted a patent on the Elograph. The foundation granted an exclusive license to Elographics.

Why touch screen?

User interface PCs are quickly becoming the control device of choices for the plant floor, machine control and any application where the user interface is important. This change has not been without its difficulties. One challenge industrial PC manufacturers have faced is simplifying the human machine interface while maintaining accuracy of input. Industrial grade touches Screen system have quickly become the input device of choice for several reasons. Touch systems generally have no additional hardware to mount and protect, such as a mouse or keyboard. A flat panel display can also be sealed by the factory to prevent damage from dust and water. The ultra thin nature of a touch screen on a LCD saves critical space, which is a vital for most application.

Durability is tested to over 35 million finger touches with no over performance degradation. (1 million -touch life max.)

3.1 Design Flexibility: -

Advanced design allows flat and spherical design.

Touch screen are very intuitive; it is natural for people to respond to there environment by touching. Touch screen are usually manipulated with ease and require minimal instrumentation training for a user. Best of all, touch screens draw an operator “into” the application, improving accuracy attention span and speed of response. Although the touch screen system for the riggers of everyday life, for rugged environments and the best solution for your application.

The Benefits of Touch Screen

4.1 Reduce training expenses

Touch screen system are far easier to learn than traditional keyboard based. Everyday retail function like Selection tender, editing and voiding line items and capturing customer demographic information are made intuitive by virtue of the touch screen- and the right touch screen software. Many retailers, especially those in the service sector, sell items that cannot be easily bar coded. Touch system make it easy to ring up these items and ofcourse, still to allow the use of all standard bar coded technologies. Studies show reduction in training time in excess of 50% can be expected. Enhanced POS function can be added with the knowledge that employees will be able to utilize them quickly and easily.

4.2 Improve customer Service

If your customer have to wait for your employees to figure out how to use the store's system , you are going lose customer. Touch screen system eliminate this embarrassing and all too common, problem. Today's retailers need to learn as much as possible about there customers needs and buying habits. Capturing customers information is a snap with touch screen POS systems.

4.3 Reduce Transaction Times

Studies show touch screen systems process transactions up to 60% faster than traditional keyboard POS systems. One info touch' customer has clocked in with a traction rate of over 60 per Hrs. per register, over 20,000 per day-with volunteers.

4.4 Decrease Cost

In a touch screen POS system, the lay out of the color coded "keys" is stored in file on your hard drive. Change to the layout can be accomplished during the nightly poll of store data the time and expense of changing hardware key caps is eliminated.

HOW DOES A TOUCH SCREEN WORK?

A basic touch screen has three main components: a touch sensor, a controller, and a software driver. The touch screen is an input device, so it needs to be combined with a display and a PC or other device to make a complete touch input system.



Devices used in Touch Screen Technology

5.1 Touch Sensor

TOUCH SCREEN TECHNOLOGY

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 the screen causes a voltage or signal change. This voltage change is used to determine the location of the touch to the screen.

5.2 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.

5.3 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 without the need for touch screen specific programming. Some equipment such as thin client terminals, DVD players, and specialized computer systems either do not use software drivers or they have their own built-in touch screen driver.



Touch screens Add-ons and Integrated Touchscreen Monitors

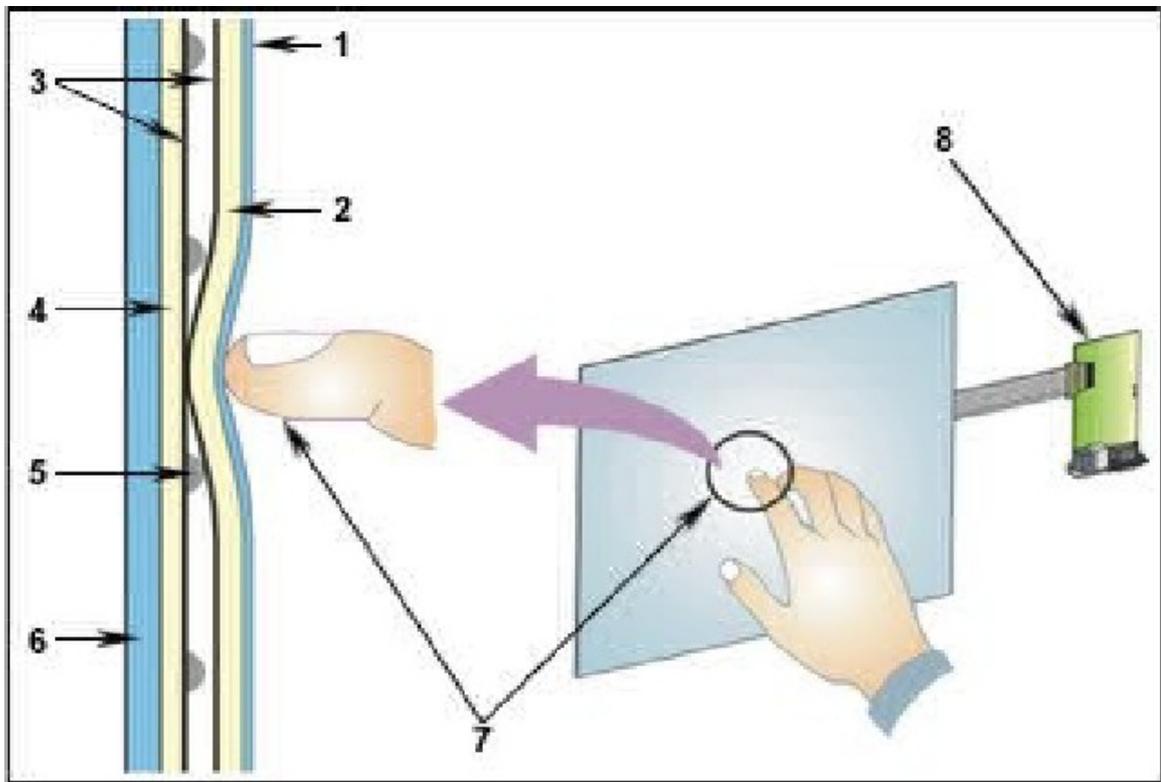
We offer two main types of touch screen products, touch screen add-ons and integrated touch screen monitor. Touch screen add-ons are touch screen panels that hang over an existing computer monitor. Integrated touch screen monitors are computer displays that have the touch screen built-in. Both product types work in the same way, basically as an input device like a mouse or track pad.

Chapter 6

Types of touch Screen

Resistive this technology uses two layers of conductive material to create an X/Y grid (vertical lines on one surface, horizontal). When pressure is applied to the flexible top layer, the grid surfaces come in contact and allow current to flow. The presence of current in a vertical and horizontal line gives the X/Y coordinate of the touch. Because the screen itself supplies all current, workers with heavy gloves can work this type of screen.

The draw back to resistive screen is that they are subject to scratches, burns and others type of damage to protect against damage, companies such as DynaPro apply an additional Mylar over laminate, which can be replaced if damaged.



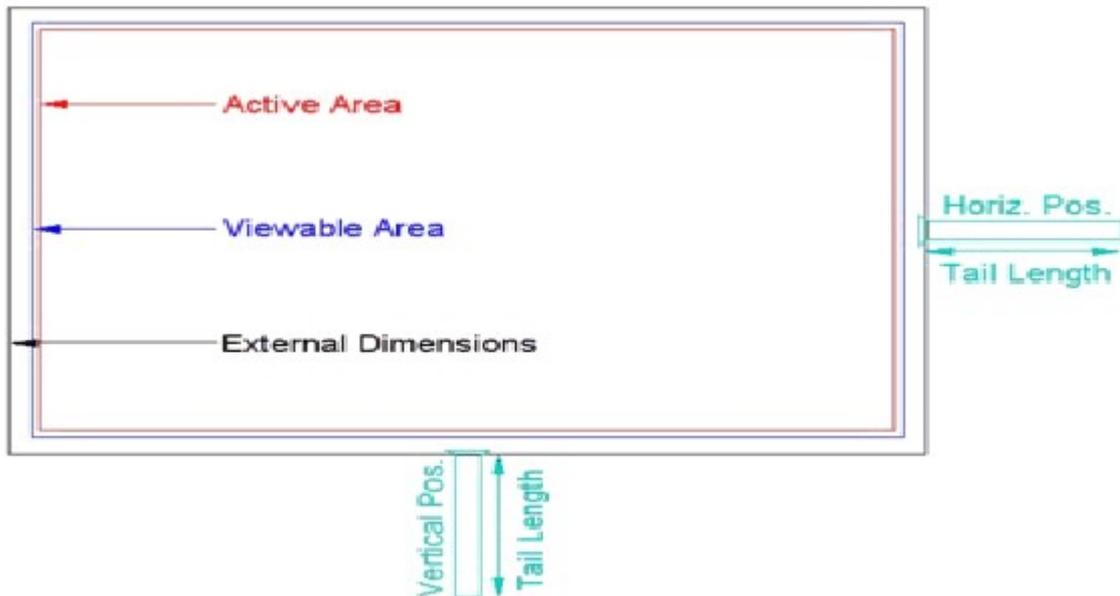
1. Scratch resistant coating.
2. Conductive layer
3. Separators

4. Resistive layers
5. Glass Panel
6. CRT

6.1 Capacitive –

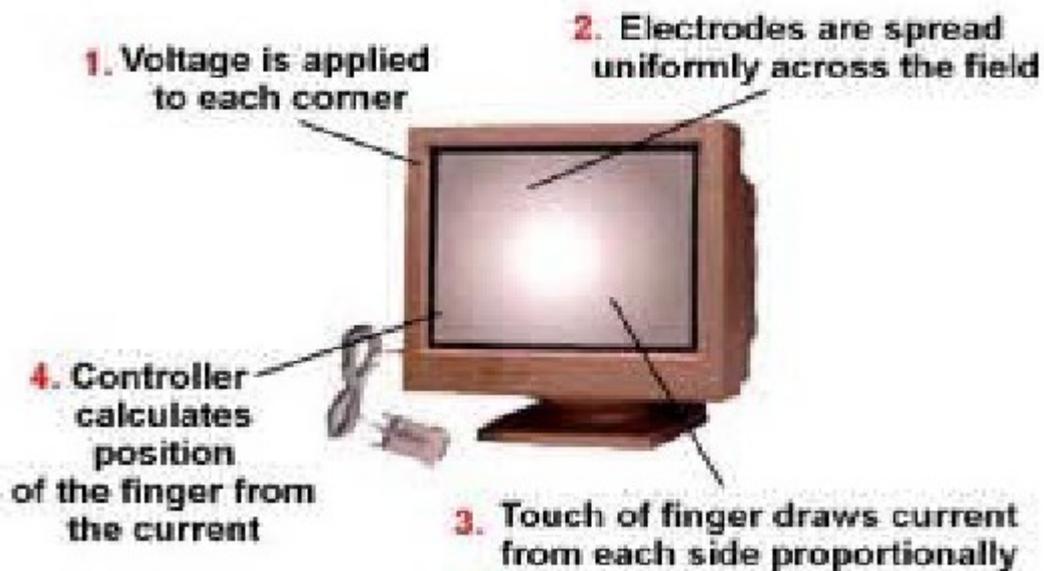
A conductive laminate is applied to a glass screen. Current is applied to all four corners of the screen when a conductive surface (such as a finger or special stylus) is applied to the surface, the current flows through the conductive surface (the electrical current is so low that a user doesn't feel it) by calculating the relative draw from all corners the controller can determine the location of touch. Because capacitive screens are glass, they are resistant to abuse and damage. These screens are used in gaming applications where burning cigarettes are often left on the screen.

The disadvantage is that workers wearing thick gloves don't register on these screens (although thin surgical gloves do register). Grounded styluses can be used in applications where gloves would interfere with operation.



Capacitive Technology

- How it Works



[CAPACITIVE TOUCH SCREEN MONITOR]

What Are Touch Screen Used For ?

The touch screen is one of the easiest PC interfaces to use, making it the interface of choice for a wide variety of applications. Here are a few examples of how touch input systems are being used today:

7.1 Public Information Displays



Information kiosks, tourism displays, trade show displays, and other electronic displays are used by many people that have little or no computing experience. The user-friendly touch screen interface can be less intimidating and easier to use than other input devices, especially for novice users. A touch screen can help make your information more easily accessible by allowing users to navigate your presentation by simply touching the display screen.

7.2 Retail and Restaurant Systems



Time is money, especially in a fast paced retail or restaurant environment. Touch screen systems are easy to use so employees can get work done faster, and training time can be reduced for new employees. And because input is done right on the screen, valuable counter space can be saved. Touch screens can be used in cash registers, order entry stations, seating and reservation systems, and more.

7.3 Customer self-services



In today's fast pace world, waiting in line is one of the things that has yet to speed up. Self-service touch screen terminals can be used to improve customer service at busy stores, fast service restaurants, transportation hubs, and more. Customers can quickly place their own orders or check themselves in or out, saving them time, and decreasing wait times for other customers. Automated bank teller (ATM) and airline e-ticket terminals are examples of self-service stations that can benefit from touch screen input.

7.4 Control and Automation Systems

The touch screen interface is useful in systems ranging from industrial process control to home automation. By integrating the input device with the display, Valuable workspace can be saved. And with a graphical interface, operators can monitor and control complex operations in real-time by simply touching the screen.



Control and Automation systems

7.5 Computer Based Training

Because the touch screen interface is user-friendlier than other input devices, overall training time for computer novices, and therefore training expense, can be reduced. It can also help to make learning more fun and interactive, which can lead to a more beneficial training experience for both students and educators.

7.6 Assistive Technology

The touch screen interface can be beneficial to those that have difficulty using other input devices such as a mouse or keyboards. When used in conjunction with software such as on-screen, Key-boards, or other assistive technology, they can help make computing resources more available to people that have difficulty using computers.

7.7 And many more uses...

The touch screen interface is being used in a wide variety of applications to improve human-computer interaction. Other applications include digital jukeboxes, computerized gaming, Student registration systems, multimedia software, financial and scientific applications, and more.

Comparing Touch Technologies

We offer touch screen products with several of the most widely used touch screen technologies. Each type of screen has unique characteristics that can make it a better choice for certain applications. Follow the links below for information on the different touch technologies that we offer and recommend. Please contact us if you have any questions or would like assistance selecting a touch technology for your application.

8.1 4-Wire Resistive Touchscreens:

4-Wire Resistive touchscreen technology is used in the touch add-ons that we offer for PC monitors and notebooks. It is a reliable and affordable technology that is widely used by individuals and in less demanding workplace applications. It is pressure sensitive so it responds to any input device, including finger, gloved hand, or pen stylus.

8.2 5-Wire Resistive Touchscreens

We offer 5-Wire Resistive touchscreen technology with the CRT and LCD touch monitors that we offer. It is a durable and accurate technology that is widely used in demanding workplace applications such as point-of-sale systems, industrial controls, and medical systems. It is pressure sensitive so it responds to any input device, including finger, gloved hand, or pen stylus.

8.3 Capacitive Touchscreens

We offer Capacitive touchscreen technology with the CRT and LCD touch monitors that we offer. 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.

8.4 Pen Touch Capacitive Touchscreens

We offer Pen Touch Capacitive touchscreen technology with the CRT and LCD touch monitors that we offer. This screen combines durable Capacitive technology with a tethered pen stylus. The screen can be set to respond to finger input only, pen input only, or both. The pen stylus is a good choice for signature capture, on-screen annotations, or for applications requiring precise input.

8.5 Surface Acoustic Wave Touchscreens

We offer Surface Acoustic Wave touchscreen technology with the CRT and LCD touch monitors that we offer. It is a very durable screen that is widely used in applications such as computer based training and information kiosk displays. The SAW screen is a good choice for applications where image clarity is important, but it may not perform well in extremely dirty or dusty environments. Responds to finger or soft rubber tipped stylus.

8.6 Infrared Touchscreens

We offer Infrared touchscreen technology with the Plasma display solutions that we offer. This is the only type of touch technology that we have available for large displays such as 42-inch Plasma screens. It is a durable technology that offers high image clarity. Responds to any input device or stylus.

8.7 Strain Gauge

In a strain gauge configuration, also called force panel technology, the screen is spring-mounted on the four corners and strain gauges are used to determine deflection when the screen is touched. This technology has been around since the 1960s but new advances by Vissumo and F-Origin have made the solution commercially viable. It can also measure the Z-axis and the force of a person's touch. Such screens are typically used in exposed public systems such as ticket machines due to their resistance to vandalism.

8.8 Optical Imaging

A relatively-modern development in touchscreen technology, two or more image sensors are placed around the edges (mostly the corners) of the screen. Infrared backlights are placed in the camera's field of view on the other sides of the screen. A touch shows up as a shadow and each pair of cameras can then be triangulated to locate the touch or even measure the size of the touching object (see visual hull). This technology is growing in popularity, due to its scalability, versatility, and affordability, especially for larger units.

8.9 Acoustic pulse recognition

This system, introduced by Tyco International's Elo division in 2006, uses more than two piezoelectric transducers located at some positions of the screen to turn the mechanical energy of a touch (vibration) into an electronic signal.[11] The screen hardware then uses an algorithm to determine the location of the touch based on the transducer signals. This process is similar to triangulation used in GPS. The touchscreen itself is made of ordinary glass, giving it good durability and optical clarity. It is usually able to function with scratches and dust on the screen with good accuracy. The technology is also well suited to displays that are physically larger. As with the Dispersive Signal

Technology system, after the initial touch, a motionless finger cannot be detected. However, for the same reason, the touch recognition is not disrupted by any resting objects.

8.10 Coded LCD: Bidirectional Screen

A new system that turns LCD displays into giant cameras that provide gestural control of objects on-screen [12] was introduced by MIT Media Lab in December, 2009. Instead of an LCD, an array of pinholes is placed in front of sensors. Light passing through each pinhole strikes a small block of sensors producing a low-resolution image. Since each pinhole image is taken from a slightly different position, all combined images provide a good depth information about the sensed image.

Pinholes are problematic because they allow very little light to reach the sensors, requiring impractically long exposure times. Instead of pinholes, an array of liquid crystals could work similarly but more effectively: The LCD's panel is composed of patterns of 19-by-19 blocks, each divided into a regular pattern of differently sized black-and-white rectangles. Each white area of the bi-colored pixels allows light to pass through. Background software uses 4D light fields to calculate depth map, changes the scene, and collects gesture information. The LCD alternates between mask pattern display and a normal scene display at a very high frequency/rate.

CONCLUSION

Though the touch screen technology contains some limitations it's very user friendly, fast, accurate, easy for the novices & fun to operate. It has been widely accepted. And now by just modifying a little it can replace the mouse and key board completely in near future.

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