COMPARATIVE STUDY OF VARIOUS TOUCH SCREEN TECHNOLOGIES: A REVIEW

Kshitish S Jha[1], Koushik Saha[2], Palak Choudhary[3], Indrani Naskar[4], Monalisa Ghosh[5], Sumanta Chattterjee[6]

[1]Student, [2]Student, [3]Student, [4]Student, [5]Student [6]Assistant Professor
Department of Computer Science and Engineering,
JIS College of Engineering (An Autonomous Institution), Kalyani, India

Abstract: In this paper, the approach would be to understand the significance of different touch screens, their applications and a comparative study among various types of touch screen technologies. Different touch screen technologies are compared in various fields. The touch screen is an assistive technology. The interface can be beneficial to those that have difficulty in using other input devices such as a mouse or keyboard. The basic idea behind this comparative study is to understand different types of touch screen technologies. Various observations are made during this study and its found that different touch screen technology have different workforce in their fields.

Index Terms **– Touch Screen Technologies**

I. INTRODUCTION

A touch screen is a display device that allows the user to interact with an electronic device. The term generally refers to touching the display of the device with a finger or hand. Touch screens can also sense other passive objects, such as a stylus. A touch screen is any monitor, based either on LCD (Liquid Crystal Display) or CRT (Cathode Ray Tube) technology that accepts direct onscreen input. The touchscreen has two main attributes. First, it enables one to interact directly with what is displayed, rather than indirectly with a cursor controlled by a mouse or touchpad. Secondly, it lets one do so without requiring any intermediate device that would need to be held in the hand.

II. TYPES OF TOUCHSCREEN TECHNOLOGY:

The touch panels themselves are based around four basic screen technologies:

1. Resistive
2. Capacitive
3. Surface Acoustical Wave (SAW)
4. Infrared (IR)

[A]Resistive: Resistive touch screen is a touch-sensitive computer display composed of two flexible sheets coated with a resistive material and separated by an air gap or microdots. The inside surface of each of the two layers is coated with a transparent metal oxide coating of Indium Tin Oxide (ITO). Resistive touch screen panels are generally more affordable but offer only 75% clarity and the layer can be damaged by sharp objects. These are dust and water resistant.

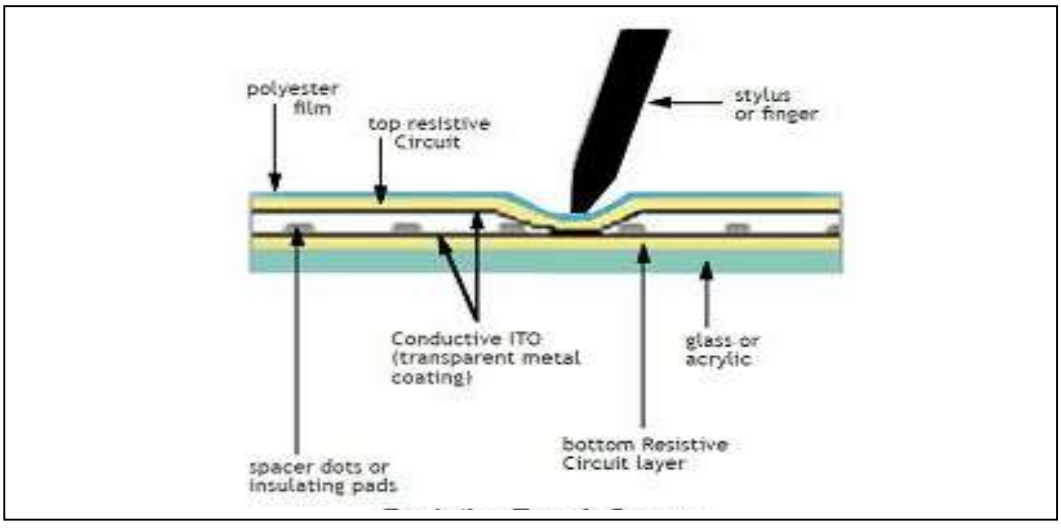

Fig 1: Resistive Touch Screen

[B]Capacitive: A capacitive touch screen is a control display that uses the conductive touch of a human finger or a specialized device for input. When the panel is touched, a small amount of charge is drawn to the point of contact. Liquids, dirt, grease, or other contaminants do not affect them. Capacitive touch screens have excellent clarity, and there are no moving parts to wear out.

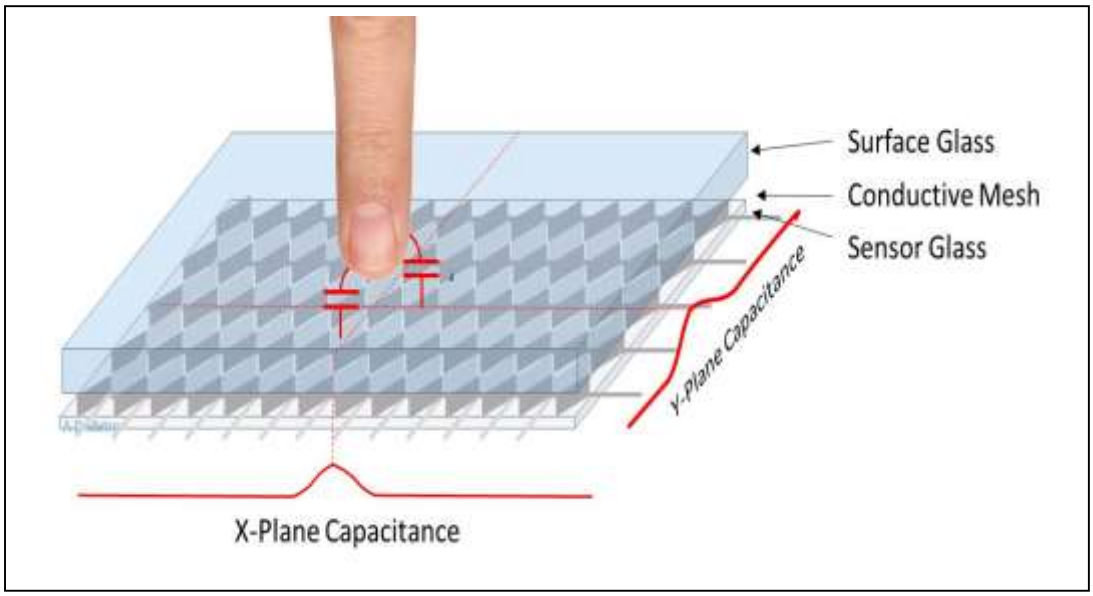

Fig 2: Capacitive Touch Screen

[C] Surface Acoustic Wave: SAW resistive touch screen technology uses ultrasonic waves that pass over the surface of the touch screen panel. Surface Acoustic Wave (SAW) technology is one of the most advanced types of touch screen solutions available in the touch screen a market. Compared to Resistive and Capacitive technologies, SAW technology provides superior image clarity, resolution, and higher light transmission. Because the panel is all glass, there are no layers that can be worn, giving this technology the highest durability factor and also the highest clarity.

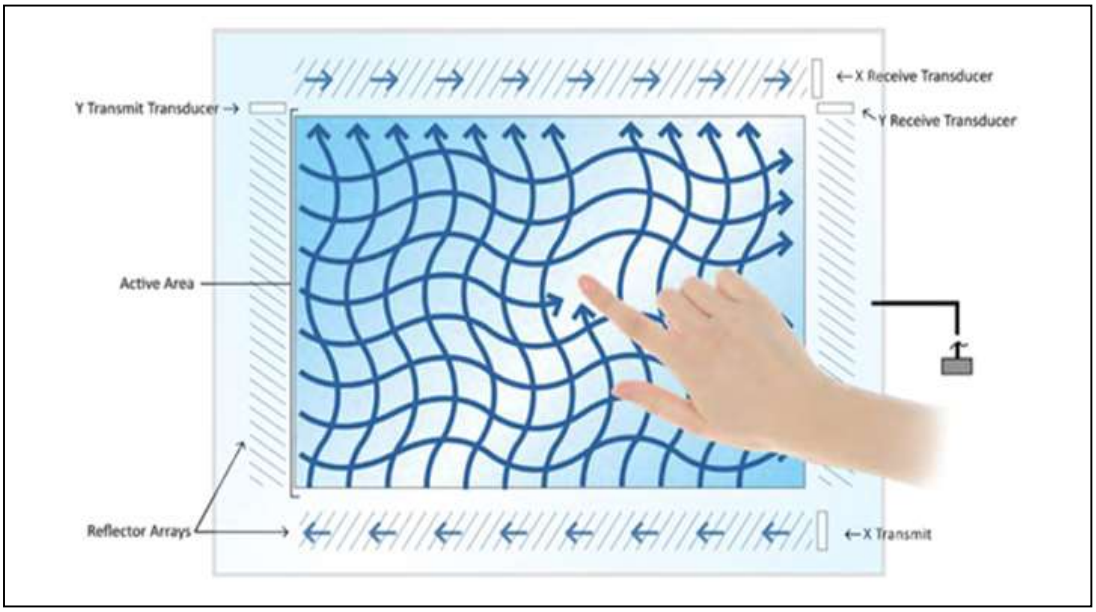

Fig 3: Surface Acoustic Wave Touch Screen

[D] Infrared: Infrared touch uses light emitting diodes and sensors that are embedded in a bezel around the display and emit and detect rows and columns of infrared light across the face of the display. A major benefit of such a system is that it can detect essentially any input including a finger, gloved finger,

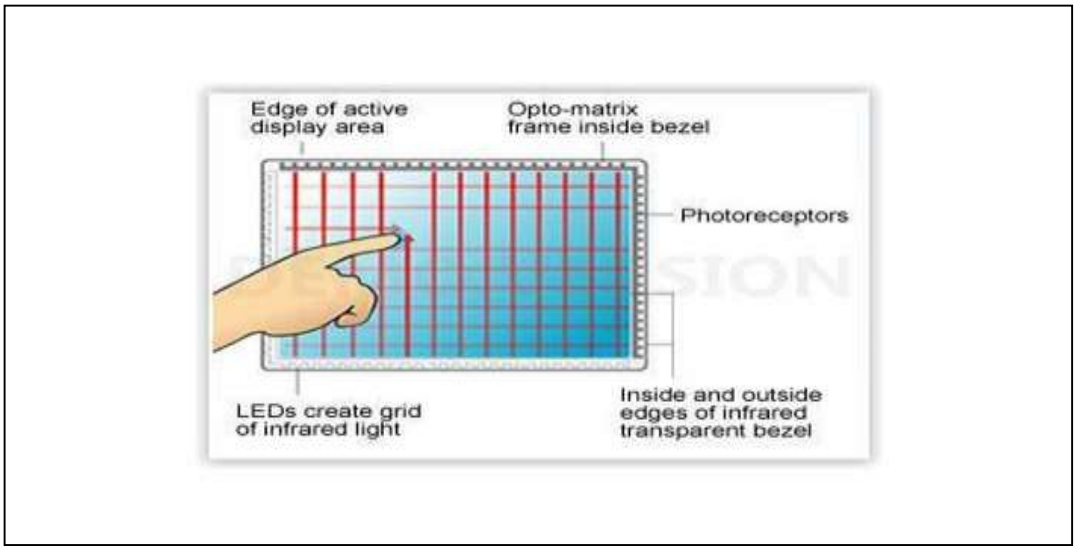

Fig 4: Infrared Touch Screen

III. COMPARISON TABLE OF VARIOUS TOUCH SCREEN TECHNOLOGIES:

PROPERTIES	RESISTIVE	CAPACITIVE	SAW	INFRARED
Transmissivity/Clarity	Good 75-85%	Very Good 90-98%	Very Good 90-98%	Best 95-100%
Sensor Substrate	Glass substrate w/ ITO coating	Glass w/ ITO coating	Glass w/ ITO coating	Any Substrate
Activate With Any Object	Best Any object	Poor Finger or capacitive stylus	Good Finger, gloved hand, soft/ pliable stylus	Very Good Most objects
High Sensitivity (Light Touch)	Good	Very Good	Very Good	Best
Type	Surface Technique(Electrical)	Surface Technique(Electrical)	Surface Technique(Acoustic)	Edge Technique(Optical)
Durability	5 Years	2 Years	5 Years	5 Years
Stability	High	Normal	Highest	High
Response time	<15ms	<15ms	10ms	<20ms
Waterproof	Good	Good	Normal	Normal
Monitor option	CRT or LCD	CRT or LCD or LED	CRT or LCD	CRT or LCD
Cost	Low cost	Moderate	High	High
Disadvantages	High costs for large areas, very sensitive to scratch, low fidelity and reduces the visibility of the screen.	Finger activation only, reduces illumination, finger must stay in position for detection so no movement.	Delicate, expensive and sensitive to scratch.	Expensive, detection placed above screen and sensitive to ambient light.
Multiple Support Events	Yes	No	No	No

Table 1

IV. CONCLUSION:

As discussed in the above observation table, different touch screen technologies have different uses and efficiency in their respective fields. The touch screen interface is easier to use than other input devices. It is useful to make information more easily accessible by allowing user to navigate by simply touching the display screen. Touchscreens can suffer from the problem of fingerprints on the display. This can be mitigated by the use of materials with optical coatings designed to reduce the visible effects of fingerprint oils, such as the oleo phobic coating used in the iPhones, or by reducing skin contact by using a fingernail or stylus. Among all these touch screen technologies, Infrared is the most secured one. It works on the principle of dot projector authentication.

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