International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

TOUCHLESS TECHNOLOGY

ATHIRA M

Department of cse, Musaliar College of Engineering and Technology, Pathanamthitta

---

Abstract - *The touch screens are to be found throughout the world. The touch screen display gives the user greater flexibility but, after a few years of touch screen display, becomes less sensitive which causes touch failure on the touch screen display. Regular touching of a touchscreen display with a pointing device such as a finger will result in a slow desensitization of the touchscreen and a failure of the touchscreen. A basic framework for Touchless monitoring of electrically operated machinery is being built to prevent this. Elliptic Laboratories created this innovative technology to monitor devices such as computers, MP3 players or mobile phones without having to touch them. Unlike other methods depend The system is predicated on optical pattern recognition that consists of a solid-state optical matrix sensor with a lens for detecting hand motions. This sensor is then connected to a digital image processor that recognizes movement of patterns that distance to the sensor or sensor range, this technique relies on the available movements of the finger, a hand wave in a certain direction, or a twitch of the hand in one area, or holding the hand in one area or pointing with a finger, for example.*

Key Words: Technologies, motions, sensor, display and pattern recognition

1. INTRODUCTION

A touchscreen is an important source of input device and output device that is normally layered on top of an information processing system's electronic visual display. By touching the screen with a special stylus and/or one or more fingers, user can give input or control of the information processing system through simple or multi touch gestures. Most touchscreen work with ordinary or specially coated gloves, while others only use a special stylus/pen. The user can use the touchscreen to reply to the display and monitor how it's display : for example ,zooming to extend the size of text. The touchscreen allows the user to interact direct with the monitor instead of using a keyboard, touchpad or any other intermediate tool. In devices like game consoles, personal computers, tablet computers, electronic voting machines, point-of-sale systems, and smartphones, touch screens are common. These also can be linked to computers or as network terminals. When designing digital devices such as personal digital assistants (PDAs) and some e-readers, they also play a prominent role. The popularity of smartphones, tablets, and many forms of information devices drives the market and acceptance for compact and usable electronics with traditional touch screens. Touchscreens are often utilized in the medical and heavy industry sectors also as in cash machine machines (ATMs) and kiosks like museum displays or room automation, where keyboard and mouse systems do not allow the user to interact with the content of the display in a suitably intuitive, fast or accurate manner. Worldwide, monitor manufacturers and chip manufacturers have recognized the movement towards embracing touchscreens as a highly desirable aspect of the interface and have begun to include touchscreens into their product's fundamental design.

2. HISTORY

In 1982, the first human-controlled multi touch contrivance was developed at the University of Toronto by Nimish Mehta. It wasn't so much a physical contact screen as it was a physical contact-tablet. The Input Research Group at the university deciphered that a frosted-glass panel with a camera behind it could detect action because it apperceived the various "ebony spots" exhibiting up on-screen. Bill Buxton has played an immensely colossal role in the development of multi touch technology. The physical contact surface was a translucent plastic filter mounted over a sheet of glass, side-lit by a fluorescent lamp. A video camera was mounted below the physical contact surface, and optically captured the shadows that appeared on the translucent filter. (A mirror in the housing was habituated to elongate the optical path). The output of the camera was digitized and alimented into a signal processor for analysis. Touch screens commenced being heavily commercialized at the commencement of the 1980s. HP (then still formally kenned as Hewlett Packard) tossed its hat in with the HP-150 in September of 1983. The computer used MSDOS and featured a 9-inch Sony CRT circumvented by infrared (IR) emitters and detectors that would sense where the utilizer's finger decreased on the screen. The system cost about $2,795, but it had been not immediately embraced because it had some usability issues. For instance, poking at the screen would successively block other IR rays that would tell the pc where the finger was pointing. This resulted in what some called "Gorilla Arm," referring to muscle fatigue that emanated from a utilizer sticking his or her hand out for so long. The first multi touch screen was developed at Bell Labs in 1984. [Bill Buxton] reports that the screen, engendered by Bob Boie, "utilized a transparent capacitive array of touch sensors overlaid on a CRT." It sanctioned the utilizer to "manipulate graphical objects with fingers with excellent replication time". The revelation availed to engender the multi touch technology used today in tablets and keenly intellective phones. In 1984, Fujitsu relinquished a physical contact pad for the Micro 16 to accommodate the intricacy of kanji characters that were stored as tiled graphics. In 1985, Sega relinquished the TerebiOekaki for the SG-1000 video game console and SC-3000home computer, additionally known as

the Sega Graphic Panel. This consisted of a plastic pen and a clear window plastic board to track pen strokes. Also that year, Apple launched a touch screen PDA device: the Newton PDA. Although the Newton platform was launched in 1987, the Message Pad was the first to use the platform in the Apple device series. As Time points out, John Sculley, the CEO of Apple at the time, originally invented the word "PDA" (or "personal digital assistant")Like the Simon Personal Communicator from IBM, the Message Pad featured recognition software for handwriting and was operated by stylus. I Gesture Pad: Westerman and his faculty advisor, John Elias, finally formed the Finger Works company. The group started producing a line of gesture-based multi-touch products, including the Touch Stream, a gesture-based keyboard. It helped people with disabilities such as repetitive strain injuries and other medical conditions. Finger Works was finally bought by Apple in 2005 and this purchase was preceded by many attribute developments such as the multi-touch Track pad or the touch screen of the iPhone. With so many different technologies emerging over the past decades, the 2000s have been the time for real thriving touch screen technologies. As the new millennium approached, companies began pouring more money into their everyday operations by incorporating touch screen technology. The advent of the Portfolio Wall was particularly targeted by 3D animators and designers. This was a large-format touch screen intended to be a dynamic version of the boards used to monitor projects by design studios. While development began in 1999, the Portfolio Wall was unveiled at SIGGRAPH in 2001 and was developed in part through a collaborative partnership between General Motors and Alias's team. Buxton, who now serves as Microsoft Research's key research, was the project's chief scientist. Ripping people down the wall and changing the way they communicate effectively in the office and doing business, "he said back then." The gestural interface of Portfolio Wall allows users to engage directly with a digital asset. It enabled users to inspect pictures, animations, and 3D files with their fingers alone. It was also easy to scale images, create 3D models, and play back footage. Sony created a flat input air in 2002 that could simultaneously recognise multiple hand positions and touch points. It was called Smart Skin by the company. The system worked with capacitive sensing and a mesh-shaped antenna to measure the distance between the hand and the surface. The sensing components were all built into the touch surface unlike the camera-based gesture recognition device in other technologies. This also meant that in poor lighting conditions it would not malfunction. The ultimate goal of this was to convert surfaces used on a daily basis, such as the typical table or a wall, into an interactive one using a nearby PC. TJun Rekimoto noted the advantages of this technology in a white paper at the Interaction Laboratory at Sony's Computer Science Laboratories. He said technologies such as Smart Skin offer "natural support for multi-hand operations with multiple users. "Without interruption, more than two users may simultaneously touch the surface at a time. Compared to the former, the second prototype used finer mesh to map more precise finger coordinates. Overall, the technology was meant to give virtual objects a real-world feeling, essentially recreating human use with their fingers to pick up and manipulate objects. In the mainstream, multi-touch technology was struggling, appearing in specialized products but never catching a big break. One almost came in 2002, when the Hand Gear + GRT technology (the acronym "GRT" applied to the Gesture Recognition Technology of the device) was developed by Canada-based DSI Dato tech. The multipoint touchpad of the interface worked a bit like the I Gesture pad listed above, allowing users to identify different gestures and use it as an input device to monitor their computers. Hand Gear also allowed users to "pull" in real-time three-dimensional objects, further expanding the idea of freedom and efficiency in the design process. Even through Auto Desk, the company made the API accessible to developers. Sadly, as Buxton states in his multi-touch summary, before their product was released, the company ran out of money and DSI closed its doors. Two years later, Microsoft Research employee Andrew D. Wilson created a gesture-based touch screen and 3D monitor for animation. A rear projection monitor was used by the Touch Light to turn a sheet of acrylic plastic into an interactive screen. The monitor could feel more than one user's different fingers and hands and could also be used as a virtual mirror due to its 3D capabilities. The Touch Light was a cool demonstration of technology and was ultimately licensed to Eon Reality for development before the technology became too costly to be bundled into a consumer device. 2006: Multi-touch sensing by "full internal reflection frustrated". In 2006, at a TED Conference in Monterey, CA, Jeff Han gave the first public demonstration of his intuitive, interface-free touch-screen. Han moved and manipulated photos on a giant light box using his fingertips alone in his presentation. He flicked, spread and pinched images forward, all with a natural ease that was captivating. Han discovered that the "robust" multi-touch sensing was possible using "Frustrated Full Internal Reflection" (FTIR), a technique used in fingerprint imaging from the biometrics community. FTIR works through a piece of acrylic or plexil glass through shining light. The light (usually used by infrarots) bounces back and forth between the acrylic's top and bottom as it travels. The beams scatter around the edge where the finger is placed when a finger touches down on the surface, hence the term "frustrated." The images generated look like white blobs and are picked up by an infrarot camera. The machine analyzes where to mark the location of the finger and assign a coordinate. Then the algorithm will evaluate the coordinates, such as resize or rotate objects, to perform a certain operation. The Microsoft Surface was essentially a device installed in a medium-sized table in 2007, with a wide, flat display at the end. The image of the device was rear-projected from within the table onto the display board, and the machine sensed where the user approached the screen by mounting cameras inside the table looking upwards towards the user. The Surface software monitored the touch points when fingertips and hands interacted with what's on the screen and activated the right actions. Surface also acquired the ability to recognize devices via RFID later in its development cycle. Microsoft

collaborated with manufacturers such as Samsung in 2011 to develop sleeker, modern Surface hardware tabletop. For example, the Samsung SUR40 has a 40-inch 1080p LED, significantly reducing the amount of internal space required for the mechanisms of touch sensing. It was smaller than its predecessors at a thickness of 22 inches, and the reduction in size allowed the monitor to be placed on a wall rather than a table to house the camera and sensors.

3.WORKING OF TOUCHSCREEN

There are several layers in a resistive touchscreen display, the most important of which are two small, transparent layers separated by a thin gap. There's a small distance between these layers. The top panel (the touching screen) has a coating on the screen's underside. Just below, on top of its base, there is a thin resistive layer. There are conductive connections on one layer along its sides, the other on top and bottom. In one side, a voltage is applied and felt by the other. When an object, like a fingertip or stylus tip, presses down onto the outer surface, the two layers touch to connect at that point: the panel then acts as a pair of dividers of voltage, one axis at a time. The location of a pressure on the screen can be read by moving rapidly between each sheet. Since the human body is also an electrical conductor, contacting the screen surface results in distortion of the electrostatic field of the screen, which can be interpreted as a capacitance shift. To determine the location of the object, different technologies can be used. The location will then be sent for processing to the controller. Unlike a resistive touchscreen, most types of electrically insulating clothing, such as gloves, can't use a capacitive touchscreen. In particular, this limitation affects usability in consumer electronics, such as touch tablet PCs and cold weather capacitive smartphones. It can be resolved with a special capacitive stylus, or with a special application glove with a conductive thread patch that passes through it and touches the user's fingertip.

3.1 Touch Sensor

A touch screen sensor is a transparent panel of glass with a sensitive contact surface. Generally speaking, the sensor has an electrical current or signal passing through it and contacting the device triggers a change in voltage or signal.

3.2 Controller

The controller is a small PC card connecting the touch sensor to the PC. The controller specifies the type of interface/connection that you need on your PC.

3.3 Driver

The driver is a program that enables communication between the touch screen and the computer. Most of today's touch screen drivers are drivers of the form of mouse emulation.

3.4 Advantage

1. To point directly to the objects.
2. Quick
3. You can use your finger or pen (any cable required).
5. No need for a mouse.
6. Suitable for: novices, call for retrieval of information etc.

3.5 Disadvantage

1. Using hand, low precision.
2. User must sit closer to the screen or stand near.
3. By using hand, the screen can be more secured.
5. Any activation of the selected role directly

4. INTRODUCTION TO TOUCHLESS TOUCHSCREEN

Elliptic Labs is developing less control of the electrically operated equipment. This system depends on movements of the hand or finger, a movement of the hand in some direction. The sensor can either be placed on the screen or close to the screen. The touchscreen allows the user to interact directly with what is displayed, rather than using a mouse, touchpad, or any other intermediary device (other than a stylus, which is optional for most modern touchscreens).Touchscreens are popular in devices such as game consoles, personal computers, tablet computers, electronic voting machines, point of sale systems, and smartphones. These can also be linked to computers or networks, as terminals. In the design of digital devices such as personal digital assistants (PDAs) and some e-readers, these also play a prominent role. The popularity of smartphones, tablets and lots of sorts of information devices drives the demand and acceptance for portable and functional electronics of touch screens. Touchscreens are often utilized in the medical and heavy industry sectors also as in cash machine machines (ATMs) and kiosks like museum displays or room automation, where keyboard and mouse systems don't allow the user to interact with the content of the display in a suitably intuitive, fast or accurate manner. Historically, a wide range of after-market system integrators and not display, chip, or motherboard manufacturers have made the touchscreen sensor and its accompanying controller-based firmware available. Worldwide, monitor manufacturers and chip manufacturers have recognized the movement towards embracing touchscreens as a highly desirable aspect of the user interface and have begun to incorporate touchscreens into their product's fundamental design. Contact less screen technology, without touching a screen, uses finger movements. It just uses a hand wave in some direction, or a hand flick in one place. If the glass is broken, we can not control the computer by simply touching a button in the touch screen panel. The goal of this less technology touch is to make life easier and more relaxed. This system requires a sensor, but on the computer the sensor is neither installed by hand nor present. The sensor can either be placed on the table or near to the screen. The hardware setup is so

compact that it can be installed as a mobile phone or laptop screen into a device. It recognizes a 5-feet object's location. Touch less screen technology ensures we can quickly access the machine without using a finger or touching a computer. It's also called technology "Don't touch me". Simply draw a pattern in this technology to pick a tool or to remove a tool. This pattern should be stored in the database, and if pattern fits then the system works correctly, the pattern currently displayed is compared with the already stored images. No special sensors need to be worn on our finger or on our hand to touch less show. The user is just looking at the device (up to 5 feet away) and can conveniently use the machine Microsoft Company has rebranded the platform as Pixel Sense launched the unrelated Surface tablet to consumers. The term "Pixel Sense" refers to how the technology actually works: it puts a touch-sensitive protective glass on top of an infrarot backlight. The light is reflected back to integrated sensors as it enters the window, which transforms the light into an electrical signal. The signal is called a "value," and those values create an image of what is on display.

4.1 Working Of Touchless Touchscreen

The machine can sense 3-dimensional gestures without ever touching your fingers on the screen. Sensors are placed around the screen being used, the motion is sensed and interpreted in on-screen gestures by engaging in the line-of-sight of these sensors.Using a solid state optical matrix sensor with a lens to detect hand movements, the device is based on optical pattern recognition. The sensor is then connected to a digital image processor that interprets motion patterns and outputs the results as signals for controlling fixtures, machines, equipment, or any system that can be operated by electrical signals. One can point to the screen (up to 5 feet away) and manipulate objects in 3D. Sensors are placed around the screen being used, and the motion is sensed and translated into on-screen gestures by communicating with the line-of-sight of these sensors. There is a stop unintended movements being used as feedback which are not entirely clear, but nevertheless it looks promising. The machine can track 3-dimensional gestures without ever having to put your fingertips on the screen. Touchless interface does not allow one for navigation control to wear any special sensors on one side. The machine can track 3-dimensional gestures without ever having to put your fingertips on the screen. Touchless interface does not allow one for navigation control to wear any special sensors on one side. Sensors are placed around the screen being used, the motion is sensed and interpreted on the motion of the device by engaging in the line-of-sight of these sensors. Using a solid state optical matrix sensor, the tool is based on optical pattern recognition to detect hand movements with the aid of lens. This sensor is then connected to a digital image processor that interprets movement patterns and outputs the results as signals for controlling machines, equipment, machinery, or any other devices that can be operated by electrical signals. Just point the finger at the screen (up to 5 feet away), and you can manipulate objects in 3D.

4.2 Gesture Based Graphical User Interface (Gbui)

Leap motion controller is used to turn hand movements into computer commands. Initial research was conducted to determine how the controller worked and to understand basic interaction. The controller is used for evaluating sign language comprehension. The finger spelling alphabet was chosen for the relative simplicity of individual signs and the alphabet's diverse range of movements. These experiments concentrate on assessing the controller's capabilities and ability to identify hand movements. Various movements or actions have a particular meaning.

4.3 APPLICATIONS

The applications of Touchless Screen Technology are :

- Touchless Monitor
- Touch Wall
- Touchless UI
- Touchless SDK

5. MINORITY REPORT INSPIRED TOUCHLESS

Touching less gesture-based technology rather than clicking and typing may have been an aspect of a Sci-fi film in 2002 but it is no longer science fiction today. There are eight forms of Minority Report Inspired Touchless Technology. The following are:-

5.1 Tobii Rex

Tobii Rex is a tool that monitors your eyes. A Tobii eye tracker is a peripheral device along with software to use it with the computer, and the user will be able to control the machine with his or her eyes just by placing this with the phone. For zoom in and out, it can be used as the user looks exactly where to zoom in. It can be used for selecting, the eye works essentially as a pointing device and can be used to select applications. It can also be used when reading texts to scroll automatically. The device has built in a pair of infrared sensors to monitor the eyes of the user.

5.2 Elliptic Labs

With the Windows 8 Gesture Pack, Elliptic Labs allows the user to control his or her computer without touching it, a hand wave in certain directions. It uses ultrasound so that it operates with your audio devices, not with cameras. Ideally you need 6 speakers and 8 microphones, but it could also work with the dedicated speakers on laptops and a standard microphone. The speaker will emit ultrasound that will bounce to microphones to track hand movements of a user that the Elliptic Labs software will interpret. Designed to work on the Windows 8 platform, this technology is

expected to work on tablets, smartphones and even cars. Elliptic Labs is not available for consumers to buy as the company focuses on marketing it to manufacturers of original equipment (OEM).

5.3 Airwriting

Airwriting is a technology that enables you to write text messages or write emails in the air. Sensors attached to glove monitor hand movements, a computer system captures and converts specific signals into texts that can then produce emails and text messages or any other form.

5.4 Eyesight

Eyesight is a gesture system that monitors the gestures of ones fingers and helps them to navigate through the device by pointing at them. EyeSight's basic requirement to work is to have a standard 2D webcam (even the built-in ones work) and the app, screen doesn't even need to be one with touch technology. To navigate, just move a finger to move the cursor, push the finger to press (like pushing a button). EyeSight not only deals with computers and laptops, it also works with many other apps, such as smartphones, TVs and much more.

5.5 Mauz

Mauz is a third-party app that transforms the iPhone into a trackpad or mouse. Install the driver on the machine and then attach the device to the iPhone through the port of an adapter. Mauz connects via Wi-Fi to the device. Continue controlling the machine like a normal mouse: left-click, right-click, and scroll as usual.

5.6 Point Grab

Point Grab hand gesture control software that uses the typical 2D camera installed in the device, the advanced hand shape and movement algorithms are used to assess where the hand is and perform an entire set of actions that allows the user to monitor the applications and version of the windows aids. This is close to the Eye Sight that can be worked simply by pointing to the eye.

5.7 Leap Motion

Leap Motion is a motion sensor system that, with its infrared LEDs and cameras, recognizes the user's fingers. Since it works by knowing just the fingertips, nothing registers when fingers move over it to type on the keyboard. But one can manipulate the screen like a smartphone or tablet when one hover their fingers above it: flick to search pages or pinch to zoom.

5.8 Microsoft Kinect

Kinect is different. There are no gadgets to hold, swing, push or pull. The User is the controller. Kinect lets you interact with games and entertainments in the most natural way possible, using body and voice. Kinect is revolutionary when it comes to games, a whole world of entertainment is at user's command.

5.9 Advantage

- The device would last for a long time.
- Since the screen is touchless, a transparent image will always be clear.
- Because commands are accepted using sensors such as verbal or hand gestures, the GUI requires lies space. The touch area is therefore minimized, thus the text quality of the screen is increased.
- It doesn't need a driver.
- No screen desensitization.
- Simple and easy to use.
- Good for people with physical disabilities

5.10 Disadvantage

- A good environment is required.
- The contact of the public must be monitored.
- There is a very high initial cost.
- Used in a sophisticated environment

6. CONCLUSION

Today's thoughts are again around the user interface. Day-in and day-out efforts are being made to improve the technology. Touchless screen technology can be used effectively in computers, cell phones, webcams, laptops and any other electronic devices. The body may be transformed into a virtual mouse, virtual keyboard or converted into an input device after the few years. Currently the controller can be used for the identification of simple signs with significant work, but it is not suitable for complex signs, particularly those requiring direct face or body contact. Because of the severe rotation and line-of-sight distortion of digits during conversational signs is unreliable and indistinguishable, rendering the controller (currently) unusable for conversational purposes. Nevertheless, when presenting signs as single entities, they may be educated in Artificial Neural Networks.

REFERENCES

[1] Mr.Manoranjan Kumar1, Surendran.j.k2,2018, "Touchless Touchscreen Technology" journal of International Research Journal of Engineering and Technology(IRJET), Volume: 05 Issue: 04-Apr-2018.M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

[2] Aditidhol, Suman,Goudar, Sukita, Shettigar, ShubhumAnand "Touchless Touch Screen User Interface"" International Journal of Technical Research and Applications e-ISSN: 2320-8163 www.ijtra.com Special, Issue 43 (March 2017), PP. 59-63.K. Elissa, "Title of paper if known," unpublished.