Touchless Touchscreen

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Abstract- *Touch screen displays are ubiquitous worldwide. Frequent touching a touchscreen display with a pointing device such as a finger can result in the gradual de-sensitization of the touchscreen to input and can ultimately lead to failure of the touchscreen. To avoid this a simple user interface for Touchless control of electrically operated equipment is being developed. EllipticLabs innovative technology lets you control your gadgets like Computers, MP3 players or mobile phones without touching them. Unlike other systems which depend on distance to the sensor or sensor selection this system depends on hand and or finger motions, a hand wave in a certain direction, or a flick of the hand in one area, or holding the hand in one area or pointing with one finger for example. The device is based on optical pattern recognition using a solid state optical matrix sensor with a lens to detect hand motions.*

Keywords- *Touchscreen, GBUI, Touchless UI, ITEXPO , Sensors.*

I. INTRODUCTION

The touch less touch screen sounds like it would be nice and easy, however after closer examination it looks like it could be quite a workout. This unique screen is made by TouchKo, White Electronics Designs, and Group 3D. The screen resembles the Nintendo Wii without the Wii Controller. With the touchless touch screen your hand doesn't have to come in contact with the screen at all, it works by detecting your hand movements in front of it. This is a pretty unique and interesting invention, until you break out in a sweat. Now this technology doesn't compare to the hologram-like IO2 Technologies Heliodisplay M3, but that for anyone that has $18,100 laying around.You probably wont see this screen in stores any time soon. Everybody loves a touch screen and when you get a gadget with touch screen the experience is really exhilarating. When the I-phone was introduced,everyone felt the same.But gradually,the exhilaration started fading. While using the phone with the finger tip or with the stylus the screen started getting lots of finger prints and scratches. When we use a screen protector; still dirty marks over such beautiful glossy screen is a strict no-no. Same thing happens with I-pod touch. . Most of the time we have to wipe the screen to get a better unobtrusive view of the screen
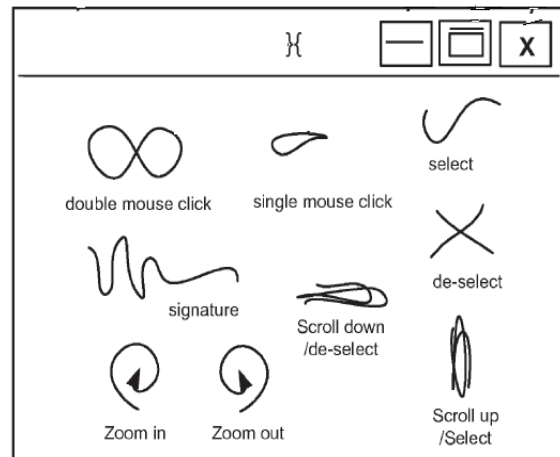
Thanks to **EllipticLabs** innovative technology that lets you control your gadgets like Computers, MP3 players or mobile phones without touching them. Simply point your finger in the air towards the device and move it accordingly to control the navigation in the device. They term this as "**Touchless human/machin**e **user interface for 3D navigation** ".

II. TOUCH SCREEN TECHNOLOGY

Touchscreen technology is the direct manipulation type gesture based technology. Direct manipulation is the ability to manipulate digital world inside a screen without the use of command-line-commands. A device which works on touchscreen technology is coined as Touchscreen. A touchscreen is an electronic visual display capable of 'detecting' and effectively 'locating' a touch over its display area. It is sensitive to the touch of a human finger, hand, pointed finger nail and passive objects like stylus. Users can simply move things on the screen, scroll them, make them bigger and many more.

III. HISTORY OF TOUCH SCREEN

In 1971, the first "Touch Sensor" was developed by Doctor Sam Hurst (founder of Elographics) while he was an instructor at the University of Kentucky. This sensor, called the "Elograph," was patented by The University of Kentucky Research Foundation. The "Elograph" was not transparent like modern touch screens; however, it was a significant milestone in touch screen technology. In 1974, the first true touch screen

incorporating a transparent surface was developed by Sam Hurst and Elographics. In 1977, Elographics developed and patented five-wire resistive technology, the most popular touch screen technology in use today. Touchscreens first gained some visibility with the invention of the computer-assisted learning terminal, which came out in 1975 as part of the PLATO project. Touchscreens have subsequently become familiar in everyday life. Companies use touch screens for kiosk systems in retail and tourist settings, point of sale systems, ATMs, and PDAs, where a stylus is sometimes used to manipulate the GUI and to enter data. The popularity of smart phones, PDAs, portable game consoles and many types of information appliances is driving the demand for, and acceptance of, touchscreens. From 1979–1985, the Fairlight CMI (and Fairlight CMI IIx) was a high-end musical sampling and re-synthesis workstation that utilized light pen technology, with which the user could allocate and manipulate sample and synthesis data, as well as access different menus within its OS by touching the screen with the light pen. The later Fairlight series III models used a graphics tablet in place of the light pen. The HP-150 from 1983 was one of the world's earliest commercial touchscreen computer. It did not have a touchscreen in the strict sense; instead, it had a 9" Sony Cathode Ray Tube (CRT) surrounded by infrared transmitters and receivers, which detected the position of any nontransparent object on the screen. Until recently, most consumer touchscreens could only sense one point of contact at a time, and few have had the capability to sense how hard one is touching. This is starting to change with the commercialization of multi-touch technology. Touchscreens are popular in hospitality, and in heavy industry, as well as kiosks such as museum displays or room automation, where keyboard and mouse systems do not allow a suitably intuitive, rapid, or accurate interaction by the user with the display's contentHistorically, the touchscreen sensor and its accompanying controller-based firmware have been made available by a wide array of after-market system integrators, and not by display, chip, or motherboard manufacturers. Display manufacturers and chip manufacturers worldwide have acknowledged the trend toward acceptance of touchscreens as a highly desirable user interface component and have begun to integrate touchscreen functionality into the fundamental design of their products.

IV. DEVELOPMENT

Virtually all of the significant touchscreen technology patents were filed during the 1970s and 1980s and have expired. Touchscreen component manufacturing and product design are no longer encumbered by royalties or legalities with regard to patents and the manufacturing of touchscreen-enabled displays on all kinds of devices is widespread. The development of multipoint touchscreens facilitated the tracking of more than one finger on the screen, thus operations that require more than one finger are possible. These devices also allow multiple users to interact with the touchscreen simultaneously. With the growing acceptance of many kinds of products with an integral touchscreen interface, the marginal cost of touchscreen technology is routinely absorbed into the products that incorporate it and is effectively eliminated. As typically occurs with any technology, touchscreen hardware and software has sufficiently matured and been perfected over more than three decades to the point where its reliability is proven. As such, touchscreen displays are found today in airplanes, automobiles, gaming consoles, machine control systems, appliances, and handheld display devices of every kind. With the influence of the multi-touch enabled iPhone, the touchscreen market for mobile devices is projected to produce US$5 billion in 2009. The ability to accurately point on the screen itself is also advancing with the emerging graphics tablet/screen hybrids.

ADVANTAGES OF TOUCH SCREEN:

1) Switch and buttons are not physically required. Device makers can make and modify various input interfaces creatively by software.

2) With multi-touch function, various operations/inputs (eg: zoom-in/zoom-out, rotation) are possible. ☐ Because a user operates an electronic device by directly touching the images on the display he is seeing, the operation will be intuitive, thus anyone can operate it from first use.

3) The whole unit is space-saving because display and input space are integrated. There is a lot of flexibility in design. ☐ Unlike keyboard or physical switch, there will be no dirt, dust, and moisture getting into the spaces between buttons. Thus, it is easy for maintenance.

DISADVANTAGES OF TOUCH SCREEN:

1) Screen has to be really big not to miss things when pressing them with your finger: I only like HTC Touch HD, screen size wise, and big screen means increased size of the device ☐ Big screen leads to low battery life

2) Touchscreen means screen can't be read too well in direct sunlight as it applies an additional not 100% transparent ☐ Touchscreen devices usually has no additional keys (see the iPhone) and this means when an app crashes, without crashing the OS, you can't get to the main menu as the whole screen becomes unresponsive

3) Touchscreens usually have low precision, virtual QWERTY keyboards being one of the most annoying things ☐ Most user interfaces are not optimized for thumb

operation, so a stylus in necessary, and this means using two hands □ Screens get very dirty
4) These devices require massive computing power which leads to slow devices and low battery life

V. APPLICATION OF TOUCH SCREEN:

1. Informational kiosks
2. Trade show displays
3. Museum / tourism displays
4. Point-of-sale terminals
5. Restaurant systems
6. Employee time clocks
7. Industrial process controls
8. World Wide Web access kiosks
9. Home automation systems
10. Casino and other gaming systems

TOUCH LESS TECHNOLOGIES:

Sure, everybody is doing touchscreen interfaces these days, but this is the first time I've seen a monitor that can respond to gestures without actually having to touch the screen.

The monitor, based on technology from **TouchKo** was recently demonstrated by **White Electronic Designs**and **Tactyl Services** at the **CeBIT** show. Designed for applications where touch may be difficult, such as for doctors who might be wearing surgical gloves, the display features capacitive sensors that can read movements from up to 15cm away from the screen. Software can then translate gestures into screen commands.Touchscreen interfaces are great, but all that touching, like foreplay, can be a little bit of a drag. Enter the wonder kids from Elliptic Labs, who are hard at work on implementing a touchless interface. The input method is, well, in thin air. The technology detects motion in 3D and requires no special worn-sensors for operation. By simply pointing at the screen,users can manipulate the object being displayed in 3D. Details are light on how this actually functions, but what we do know is this:

TECHNOLOGY BEHIND :

It obviously requires a sensor but the sensor is neither hand mounted nor present on the screen. The sensor can be placed either onthe table or near the screen. And the hardware setup is so compact that it can be fitted into a tiny device like a MP3 player or a mobile phone. It recognizes the position of an object from as 5 feet.

WORKING:

The system is capable of detecting movements in 3-dimensions without ever having to put your fingers on the screen. Their patented touchless interface doesn't require that you wear any special sensors on your hand either. You just point at the screen (from as far as 5 feet away), and you can manipulate objects in 3D.

Sensors are mounted around the screen that is being used, by interacting in the line-of-sight of these sensors the motion is detected and interpreted into on-screen movements. What is tostop unintentional gestures being used as input is not entirely clear, but it looks promising nonetheless. The best part? Elliptic Labs says their technology will be easily small enough to be implemented into cell phones and the like. IPod touchless.

TOUCHLESS GIVES GILMPSE OF GBUI:

We have seen the futuristic user interfaces of movies like **Minority Report** and the **Matrix Revolutions** where people wave their hands in 3 dimensions and the computer understands what the user wants and shifts and sorts data with precision. Microsoft's XD Huang demonstrated how his company sees the future of the GUI at **ITEXPO**this past September in fact. But at the show, the example was in 2 dimensions, not

The GBUI as seen in Minority ReportMicrosoft's vision on the UI in their Redmond headquarters and it involves lots of gestures which allow you to take applications and forward them on to others with simple hand movements. The demos included the concept of software understanding business processes and helping you work. So after reading a document - you could just push it off the side of your screen and the system would know to post it on an intranet and also send a link to a specific group of people.

TOUCHLESS UI:

The basic idea described in the patent is that there would be **sensors arrayed around the perimeter of the device** capable of sensing finger movements in 3-D space. The user could use her fingers similarly to a touch phone, but actually **without having to touch the screen**.That's cool, isn't it? I think the idea is not only great, because user input will not be limited to 2-D anymore, but that I can use my thick, dirty, bandaged, etc. fingers as well (as opposed to "plain" touch UI). I'm a bit skeptic, though, how accurate it can be, whether the software will have AI or the user will have to learn how to move her fingers. We'll see hopefully very soon!.Finally, there is one more thing to mention, it's the **built-in accelerometer.**

TOUCHLESS SDK:

The Touchless SDK is an open source SDK for .NET applications. It enables developers to create multi-touch based applications using a webcam for input. Color based markers defined by the user are tracked and their information is published through events to clients of the SDK. In a nutshell, the Touchless SDK enables touch without touching. Well, Microsoft Office Labs has just released "Touchless," a webcam-driven multi-touch interface SDK that enables "touch without touching."

Using the SDK lets developers offer users "a new and cheap way of experiencing multi-touch capabilities, without the need of expensive hardware or software. All the user needs is a camera," to track the multi-colored objects as defined by the developer. Just about any webcam will work

TOUCHLESS DEMO:

The Touch less Demo is an open source application that anyone with a webcam can use to experience multi-touch, no geekiness required. The demo was created using the Touch less SDK and Windows Forms with C#. There are 4 fun demos: Snake - where you control a snake with a marker, Defender - up to4 player version of a pong-like game, Map - where you can rotate, zoom, and move a map using 2 markers, and Draw the marker is used to guess what…. draw!
Mike demonstrated Touch less at a recent Office Labs' Productivity Science Fair where it was voted by attendees as "most interesting project." If you wind up using the SDK, one would love to hear what use you make of it!

WINDOW SHOP PIC:

In addition, it is worth pointing out that you may need a few cameras in stereo to maximize accuracy and you could theoretically use your hands as a mouse - meaning you can likely take advantage of all the functions of the GBUI while resting your hand on the desk in front of you for most of the day. At some point we will see this stuff hit the OS and when that happens, the consumer can decide if the mouse and keyboard will rule the future or the GBUI will be the killer tech of the next decade.

TOUCH WALL:

Touch Wall refers to the touch screen hardware setup itself; the corresponding software to run Touch Wall, which is built on a standard version of Vista, is called Plex. Touch Wall and Plex are superficially similar to **Microsoft Surface**, a multi-touch table computer that was introduced in 2007 and

which recently became commercially available in select **AT&T** stores. It is a fundamentally simpler mechanical system, and is also significantly cheaper to produce. While Surface retails at around $10,000, the hardware to "turn almost anything into a multi-touch interface" for Touch Wall is just "hundreds of dollars".

Touch Wall consists of three infrared lasers that scan a surface. A camera notes when something breaks through the laser line and feeds that information back to the Plex software. Early prototypes, say Pratley and Sands, were made, simply, on a cardboard screen. A projector was used to show the Plex interface on the cardboard, and a the system worked fine. Touch Wall certainly isn't the first multi-touch product we've seen (see iPhone). In addition to Surface, of course, there are a number of early prototypes emerging in this space. But what Microsoft has done with a few hundred dollars worth of readily available hardware is stunning. It's also clear that the only real limit on the screen size is the projector, meaning that entire walls can easily be turned into a multi touch user interface. Scrap those white boards in the office, and make every flat surface into a touch display instead. You might even save some money.

VI. CONCLUSION

Touch systems represent a rapidly growing subset of the display market. The majority of touch systems include touch sensors relying on vacuum-deposited coatings, so touch coatings present opportunity for suppliers of vacuum coatings and coating equipments. Touch sensor manufactures currently require thin films in the areas of transparent conductors, optical interference coating and mechanical protective coatings. Touch sensors technical requirements dovetail well with those of the flat panel and display filter markets. The reality should provide value added opportunities to operations participating in these areas

Today's thoughts are again around user interface. Efforts are being put to better the technology day-in and day-out. The Touchless touch screen user interface can be used effectively in computers, cell phones, webcams and laptops. May be few years down the line, our body can be transformed into a virtual mouse, virtual keyboard and what not??, Our body may be turned in to an input device!

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