
Can Motion Control Save Windows 8?

By John R. Malin & Sean D. Liming
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Summary

Windows 8 was a bold move by Microsoft to provide a user interface design that can support both tablet devices and PC devices to try to gain market share in the tablet market while continuing to support the richness of the PC environment. In this article we will explore the issues that have taken center stage with respect to tablet/PC duality when it comes to the new Windows Surface, touch-centric user interface and the resistance it is experiencing in the market. The recently proposed fixes for Windows 8.1 don't solve all the issues either, but we have some ideas that will help desktop users make the transition and possibly increase sales and acceptance of Windows 8. To that end, we will look at a possible alternative control methodology that is advancing rapidly, motion control, and compare its cost and performance to that of multi-touch touchscreens.

Introduction

Does one user interface metaphor actually fit all? Before we even evaluate the design of the Windows Surface user interface, we have to ask ourselves if a touch-centric user interface is the best common interface technique to use on tablets, touchscreen laptops/Ultrabooks, and desktop PC's. The Windows desktop was designed to be controlled with a high-resolution, high-precision device, the mouse, with its on-screen mouse cursor. Hand/eye coordination is something that humans do well, and the mouse is a controller that scales naturally to different screen sizes and screen resolutions.

Coming up with a replacement for the mouse is more challenging than it might seem. Early tablet designs tried incorporating a pen with a version of Windows 7, Windows for Pen Computing, some 10 years ago. Tethered pens and then non-tethered pens that could be lost, did not fare well. The pen interface did so poorly on tablets and pen-enabled laptops, it was never considered as a replacement for the mouse on desktop PCs.

Touchscreens have been used on and off since before the arrival of the first commercial version of Windows, but it wasn't until the invention of the multi-touch touchscreens that really became popular when introduced on the early iPhones, that touchscreens began to get more consideration as a serious controller. Even with the higher resolution, capacitive, multi-touch touchscreens, the finger just lacks the precision of a mouse-controlled cursor; but with the advent of gestures, like the pinch-zoom and swipes, there is a lot more control capability for the low-precision finger.

Analysis

With the Surface User Interface, Windows 8 was designed to bring touch-centric computing to tablets, laptops/Ultrabooks, and desktop PCs. If this strategy was successful, the PC sales that were being lost to non-Windows tablets could be recovered with Windows 8-based tablets. Though this is a good strategy, let's examine the challenges that needed to be overcome.

TOUCHSCREEN PHYSICAL CONTACT ISSUES

One of the biggest challenges with touchscreens is that you are physically touching the viewing screen. Who of us who washes their car windows or tries in vain to keep the baby's hands off of the TV screen does not know what a bad idea that is. Fingerprints and scratching are challenges that have been mitigated with the use of Corning's Gorilla Glass and non-smudge coatings, but there is still a thriving industry for screen cleaners and protective coatings. Now consider upgrading your desktop PCs with touchscreen monitors. The smudge issues are even more noticeable in that context.

The multi-touch touchscreens are capacitive, so they require the physical touch of the finger to alter the local capacitance of the screen every place it is touched; so try using your touchscreen with gloves on during a winter day, or try swiping on a hot, dry summer day when your hands are extremely dry. Again, some solutions have come along with gloves that have the same capacitive properties as the skin on your fingers, and conductive pens that activate the touchscreen, with all the aforementioned issues with pens and the fact that you cannot do multi-touch gestures with a pen unless you are very skilled with chopsticks.

Moving the desktop PCs into touch-centric operation with touchscreen monitors requiring physical contact with the fingers has resulted in what is being called Gorilla Arm Syndrome, no relation to the Corning glass. There are 3 big differences between using a tablet touchscreen and using a touchscreen monitor on the desktop, and those are the angle of the touchscreen, the distance the touchscreen is from the user, and the time interval for touchscreen activation. For those of you bicycle riders who have battled with tingling, aching arms, and numb hands and fingers, prepare to experience these symptoms again. These are precisely the symptoms of Gorilla Arm Syndrome caused by moving your hands from the keyboard, out to the touchscreen, and back to the keyboard repeatedly. The name clearly comes from the way your arms look when you are reaching out to touch your monitor.

PRICE AND PERFORMANCE

High resolution capacitive multi-touch touchscreens are not inexpensive. The price point on tablets is critical to compete with non-Windows devices. To keep some new convertible laptops/Ultrabooks below the thousand dollar point, examination of the hardware details will show that tradeoffs in performance were necessary to offset the increased cost of the multi-touch touchscreen. Lower performance CPUs, chipsets, and video controllers are used in the lower end of the convertible products. To get full performance hardware and a multi-touch touchscreen, the price gets pushed quickly to the two thousand dollar range, which really puts them in a different class from the non-

Windows tablets even if you factor in the addition of an accessory keyboard to the tablet.

Adding a touchscreen monitor to a desktop PC also adds a significant bump to the system price. If you compare some typical size displays for 22" – 23" displays with a resolution of 1920 x 1080, the addition of a multi-touch touchscreen can add between 47% to 76% to the cost of the display. If you go to a larger display, the cost jump for a 32" 1920 x 1080 is over 180%. This can add \$275 to over \$650 to the retail cost of a desktop PC. Then if you want to use a multi-monitor setup, you have to decide if you want to incur the added cost to support touch on all monitors.

TOUCH-CENTRIC APPLICATION DESIGN

Along with Window 8's touch-centric user interface is a new breed of Windows 8 Modern apps that are designed to be more touch friendly. The geometric design and layout of the graphic user interface for Windows 8 apps is designed to make maximum use of the full touch screen and all of the swipe zones. This forced the application to take a step backward in Windows GUI evolution restricting the Modern app to running full-screen, only. The Windows 8.1 update due out at the end of the year is supposed to improve that by letting up to 4 Modern apps share the screen at a time. It is not clear how gestures and the focus for the active app will be resolved, though.

Windows 8 apps require the use of the charm bar and have touch zones that are large enough to be easily activated by finger taps. Simple applications are easy to adapt to this design, but the more complicated the Windows Desktop application is, the more difficult it is to come up with a Window 8 Modern app adaptation that still provides access to all important features. All too often the Windows 8 Modern app version turns out to be a dumbed down version of the Desktop application often forcing the user to return to the non-touch friendly Windows Desktop to make full use of the full application. This is providing a lot of resistance to both application developers adapting Windows Desktop applications to Windows 8 Modern apps and users moving over to Windows 8 Modern apps from the Desktop.

Solution

Motion controllers like the Kinect, eyeCharm, Leap Motion Controller and others may be the solution.

MOTION CONTROL EVOLUTION

Motion controllers have evolved considerably from the days of switching a light bulb on when someone walks by. The [Kinect controller](#) showed sophisticated control capability with body, arm, leg, and head position tracking for an affordable price, \$250. This has led to the development of smaller, cheaper sensors, like the [Leap Motion Controller](#) that can track hand and finger positions and motion for under \$100. There are even controllers that track eye movement, like the [NUIA eyeCharm](#) adapter for the Kinect. This latest generation of motion controllers promises to make interfacing with a device much simpler, because they do not require physical contact and are starting to provide

the same kind of high resolution control that we have grown accustomed to with the mouse.

INTUITIVE GESTURES

The gestures that have been evolving on the multi-touch touchscreens can be challenging to learn and to execute. For a multi-touch touchscreen to get Windows 8 certification, it has to have at least 5-point touch capability; but many of the latest displays have 10-point touch capability, that is, the touchscreen can resolve the individual fingertip touches of all ten fingers (8 fingers and 2 thumbs) simultaneously. Because the touchscreen is overlaid on the display, there are complications for distinguishing gestures, taps, pinches, swipes, etc. from location control, select, move, position cursor, etc. To help with this, some areas of the touch screen are reserved for gesture recognition, like the edges of the screen. These screen edge detection regions are only 6 pixels in some cases, making them difficult to accurately touch with a fingertip.

The [gestures](#) that are evolving for motion controllers [are not constrained to the geometric area of the display screen](#); and because of the nature of the tracking of the human body, they tend to be less restrictive and more intuitive in nature. HP and ASUS are taking the lead in [bundling Leap Motion controllers](#) as part of their upcoming PC offerings and will be building them right into future PCs.

One of the first, obvious advantages of motion controllers is that they eliminate Gorilla Arm Syndrome. You don't have to reach out and touch the display screen every time you need to interface with the device. Finger gestures can be recognized without even lifting your hands from a keyboard. Motion control gestures tend to employ the same hand/eye coordination that works so well with the mouse. Motion control gestures also work well with any size of display screen. The display screen does not impose geometric restrictions on the gestures, thus moving from one size of device to another size of device is smoother and less restrictive.

Conclusion

With the small size, low cost, and intuitive gesture recognition provided with current state-of-the-art motion sensors, these might be just the kinds of controllers that Windows 8 is looking for to operate seamlessly and intuitively on tablets, laptops, Ultrabooks, and desktop PCs. Many of the physical drawbacks of touchscreens are overcome with motion controllers, and with the current cost and size of these controllers being more competitive than high resolution, multi-touch touchscreens, these controllers can be built into systems or easily added as simply as one adds a mouse, without having a major impact on the retail price of the system.

We will be watching the evolution of motion controllers and their use with Windows 8 and keep you informed of major developments. Perhaps motion controllers are just the thing needed to save Windows 8.

Additional Resources

For more information consider the following references:

"Windows 8.1: Microsoft doubles down on new touch interface"

<http://www.nbcnews.com/technology/windows-8-1-microsoft-doubles-down-new-touch-interface-6C10126434>

"'Gorilla Arm' Will Keep Touch Screens From Taking Over"

<http://hardware.slashdot.org/story/13/01/06/0249225/gorilla-arm-will-keep-touch-screens-from-taking-over>

Microsoft Kinect for Windows

<http://www.microsoft.com/en-us/kinectforwindows/>

Next generation Kinect, Kinect for Xbox One:

http://www.youtube.com/watch?v=j7GBUeHv_Ts

NUIA eyeCharm for Kinect

<http://www.4tiitoo.com/>

Leap Motion Controller

<https://www.leapmotion.com/product>

MYO armband

<https://getmyo.com/>