
FOCUS ON INPUT

An educational white paper by Input Technologies, LLC

THE INTERFACE BETWEEN HUMANS AND INTERACTIVE KIOSKS

BY

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Deployment:

Successful kiosk development and deployment can prosper or fail based on the interaction tools the kiosk provides to the end user.

This aspect of kiosk development is often overlooked and can result in frustration by the targeted audience. Insufficient methods of input to perform necessary tasks and the inability for a kiosk to retain the interest of the user results in low use of the machine.

A well thought out kiosk design using the appropriate input methods or combination thereof can overcome these obstacles before the kiosk owner learns the hard way.

In this section, we will explain the different input methods available, their functions and provide simple guidelines into the selection of appropriate input devices for different types of kiosk applications. Of course, not all scenarios can be covered, but consultation with not only one type of input supplier and the possible collaboration among suppliers per a specific concept can usually result in the most effective implementation available.

Types of Input:

There are three basic types of standard input for kiosks. Alphanumeric, Cursor Control and Graphical Interactivity. Each type of input has vast amounts of options, configurations and mechanical considerations to be kept in mind. The most successful integrations of input methods are usually a result of evaluating three critical points of criteria: Application, Audience and Environment. Without well thought out consideration of any ONE of these elements, the result can lead to an ineffective and non-productive kiosk design.

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Application:

What is the application of the Kiosk? Is it intended as an interactive shopping mall directory, in-store employment applications, public Internet access and email retrieval or a simple self-running product information station?

Low interactivity or highly simplified interactivity may constitute the need for only a touch screen. An example would be a Kiosk designed for a shopping mall directory. The user only needs to select from a highly defined selection of store types, then to select a store and the result is a map of where that store is. This is an ideal solution for a touch screen only implementation.

Add features to the kiosk such as panning, zooming and multiple windows and now a cursor control device is needed.

Further add an online questionnaire requiring typing that exceeds 20 characters and now a keyboard is needed.

Remove the mapping feature, and the touch screen can be eliminated.

Remove the questionnaire, and the keyboard is not needed.

This is why effective evaluation of the desired application is so important. If the kiosk lacks an appropriate device to perform a specific function, the result is an ineffective Kiosk.

Simplify, Simplify, Simplify. This does not necessarily mean simplicity from the mechanical engineering standpoint trying to make the kiosk as small as possible, thus eliminating different input devices. This does not mean a specifier trying to squeeze every last penny they can to bring the kiosk price down. It means, make the kiosk as simple as possible to use by the USER. The more appropriate tools they have for the functions which need to be performed, the more likely they will utilize the Kiosk to its highest potential.

Audience

Who is going to be using the Kiosk? A captive audience who is utilizing a kiosk to perform function within their industry, or unknown segments of users approaching a Kiosk in a highly public environment?

This is a very important factor in selecting the different models, types or layouts of input devices. One would think that the more specific an audience is, the easier it is to decide these factors. Not so in most cases. The more technologically educated your audience is, the more a Kiosk is susceptible to criticism by the user for lack of effective input.

In the case of an unknown audience, it is actually easier to select input methods. Provide the most widely, most familiar methods known.

A good example is the following. I will not mention the city name, airport, or kiosk manufacturer to protect the anonymity of the respective parties.

On a recent business trip, I had a layover in an airport that had Internet and email enabled kiosks deployed. One in fact was right in front of my gate. I observed a gentleman I estimate to be in his 20's sit down and proceed to use the device. I immediately noticed that his head was down looking at the keyboard and cursor control area about two thirds more than he was looking at the screen. He stayed at the device for about 5 minutes, and with a frustrated look, stood up and walked to a seat and started watching the Airport

TV. I immediately walked to the Kiosk to note its function and layout. It had a mechanical keyboard (with 4 keycaps missing) and touchpad finger type of cursor control device. Upon boarding the plane, the gentleman sat down in the seat across the aisle from me and I took the opportunity to ask what he thought of that kiosk. He indicated that he was initially excited to try it out, but in the whole 5 minutes he was there, he couldn't figure out how get the cursor over the appropriate button on the screen. I asked him if he had ever used a touchpad device before, and his response was "No". I asked him what he thought the rectangular pad was for next to the keyboard and his response was "Wasn't that a cover to where you used to put money in it?" In addition, my final question to him was what did he do for a living. He indicated that he was a technical support representative for the DSL service at a regional telephone company in the area.

This just goes to show that designing for the masses is critical when your audience is not known. For cursor control we call it the Centipede/Arcade theory. Want to see what controls are most widely known? Go to an arcade and play Centipede or any other game which requires moving objects on the screen.

Environment

When selecting any input device, the long term durability of the Kiosk is critical. As noted in my airport experience in the previous section, the Kiosk keyboard was missing 4 keycaps. A mechanical style keyboard should have never been integrated into this device. Lack of supervision over the Kiosks located areas that generate extremely high numbers of people increases its chances for vandalism.

This is the one area where as a designer, operator or manufacturer cost needs to take a back seat. I classify environments in four categories: totally captive, semi public, totally public and outdoor. From one extreme to another, your price is going to go up in any device if you choose the proper device and implementation methods.

A *totally captive* environment would be one where the kiosk is used for a very specific purpose, in a controlled environment and where, if a person decided to vandalize part of the Kiosk, it would be very evident who that person was to the owner of the kiosk or employees in

that area. E.g. a pharmacy, optical store or the like.

A *semi-public* environment would be one where the kiosk is less supervised, yet vandalism is still not as inviting. E.g. a retail store within a shopping mall or a national chain retailer.

A *totally public* environment would be one where the kiosk is not supervised at all, there is a high amount of public movement and/or temptations of vandalism are easier to get away with. E.g. a kiosk in the open areas of a mall or in an area accessible in the late hours of the day or accessible 24 hours a day.

An *Outdoor* environment is not only, obviously outdoors, but one where different aspects of changes in temperature and moisture can occur. E.g. an ATM wall mounted outside a bank, or even in a 24 hour non-climate controlled enclosed area.

The ability for an input device to withstand the rigors of each environment, coupled with the usability of the device are important areas to keep in mind when making product selections.

Alphanumeric Input

Just as the name suggests, this is a device that allows alpha and numeric input - a Keyboard. Keyboards range in prices from \$15 to solutions that top the scales at nearly \$1000 for custom designs. They range from simple 10 key solutions, to full featured 104 key solutions and sometimes even more in certain instances. Materials are also varying among the offerings available, from traditional mechanical keys, to membrane to highly advanced Elastomer and hardened keyboard technologies.

Mechanical Key Solutions

In the context of this discussion, we are referring to products designed for public and industrial based use, not standard home or office use. Mechanical key solutions in this category typically have an MTBF (Mean Time Between Failure) ratings of 10×10^6 versus consumer grade devices that have MTBF ratings as low as 3×10^5 .

Pros: Mechanical key solutions provide probably the MOST useable and comfortable keyboarding possible. They are familiar to users as this is the same technology they are using in their offices and homes. When looking at

"industrial grade" mechanical keyboards, the primary advantage is the switch technology used vs. that of commercial grade keyboards providing a life span not even approachable by consumer grade keyboards.

Cons: Typically these solutions have keycaps which can be popped off. The plastic used can be melted with cigarette lighters and through vandalism, requiring the need to replace the whole keyboard.

Best Applications: Very captive, indoor environments where extended typing is required or in conjunction with highly expensive machinery where overall reliability is of the utmost importance.

Typical Price: \$150.00 to \$250.00 depending on configuration and quantity.

Membrane technologies

Sometimes referred to as "flat panel" keyboards, membrane keyboards are constructed with rigid circuit boards and extremely low profile "dome" switches. This allows the keyboard to be covered by the manufacturers by only a very thin layer of various materials such as vinyl or Lexan®.

Pros: Very sealed surface, impervious to most grease, oil and dirt in the area without affecting the operation of the keyboard.

Cons: One of the least useable technologies for applications which require extended typing and data input. Susceptible to vandalism with sharp objects.

Best Applications: Totally captive and semi public environments. Automotive test equipment, shop floor controls and industrial machinery.

Typical Price: \$150.00 to \$500.00 depending on configuration and quantity.

Elastomer based Keyboards

Elastomer based keyboards combine the touch-typing usability of a mechanical keyboard along with the sealed advantages of membrane technologies. By utilizing molded elastomer

covers over a PCB with various types of switch technology the result is a mid-travel keyboard that provides the tactile feedback that is so important during typing operations.

Pros: Highly sealed surface, easily compliant to NEMA4x and NEMA12 specifications. Backlighting is common in Micro-Elastomer solutions. Easily refurbished at the factory when vandalized eliminating the need to purchase a complete replacement. Economical cost solution.

Cons: Susceptible to vandalism with sharp objects.

Best Applications: All environments. Interactive Kiosks, test equipment, medical equipment.

Typical Pricing: \$100.00 to \$500.00 depending on configuration and quantity.

Cursor Control Devices

An effective cursor control device is paramount in a kiosk design. Even if the most effective keyboarding solution is NOT selected, users still understand the keyboard, its function and how to use it. Cursor control devices are another matter. If a user cannot effectively understand what the pointing device is, how to use it, or the inability to use the device in a effortless manner, their experience at the Kiosk will usually be unfavorable. Cursor control devices range from \$8.00 to \$200.00 depending on what style and configuration is required.

Trackballs

Widely used in the arcade gaming industry, these devices are probably the most user friendly/familiar method for cursor control in the kiosk industry.

Pros: Probably the most user-friendly solution for Kiosks. Easy to ingrate, very durable.

Cons: Could have possible mounting difficulties in extremely thin designs that have less than 1.5" depth for mounting.

Best Applications: Public environments. Ideal for Kiosk cursor control. Automotive test equipment, audio visual controls, shop floor controls and industrial machinery.

Typical Price: \$65.00 to \$150.00 depending on configuration and quantity.

Pointing Sticks/Pads

Pointing Sticks/Pads are typically either small eraser type sticks or small pads that physically rotate under your finger providing cursor movement.

Pros: Extremely small and portable devices. Typically sealed.

Cons: Not very familiar to the general public.

Best Applications: Remote control devices.

Typical Price: \$15.00 to \$40.00 depending on configuration and quantity.

Touchpads

Touchpads have been featured as the standard cursor control device in most notebook computers since the mid 1990's. The user simply places their finger on the flat surface and moves their finger in the desired direction.

Pros: Extremely small and portable devices. Very low price.

Cons: Not very familiar to the general public. Depending on integration method or model, can experience problems from moisture or electromagnetic interference or cold environments. Cannot be used with gloves on or with a stylus.

Best Applications: Notebook Computers.

Typical Price: \$10.00 to \$40.00 depending on configuration and quantity.

Graphical Input

Graphical input is primarily the interaction of the kiosk screen with the user via virtual controls in which the user can select by simply touching the screen. Touch screens are most widely available in three different types of technology. Surface Acoustic Wave (SAW) sensing, capacitive sensing and Resistive sensing.

SAW sensing

Surface-wave sensing functions by launching an acoustic wave on the glass surface, which is disturbed by the users finger when touched.

Pros: Very high resolution up to 4095 x 4095 resulting in high accuracy. Scratch resistant and graffiti can be removed with solvents and razor blades. Inherently stable, this technology has zero-drift operation. Can be used with visual cursor turned off. Can be activated with or without gloves on.

Cons: Seal ability. Droplets of water will activate the touch screen.

Best Applications: Interactive Kiosks, gaming devices, retail devices.

Typical Price: \$550.00 to \$1700.00 depending on configuration and quantity. (based on technology integrated with a CRT)

Capacitive Sensing

Capacitive touch screens operate by CRT having metallic conductive coatings on the surface which create an electrical connection to the user.

Pros: Very fast and sensitive, resistant to most chemicals, low power.

Cons: Reduces light output of the CRT \approx 15%, different models for operation with gloves or without gloves, static discharge can be conveyed to the user in dry environments and may require periodic recalibration due to drift.

Best Applications: Interactive Kiosks, gaming devices, retail devices.

Typical Price: \$500.00 to \$1700.00 depending on configuration and quantity. (based on technology integrated with a CRT)

Resistive Sensing

Resistive CRT's have 2 conductive coatings applied over the surface of the CRT separated by air, then covered with a polyester sheet. When a finger is applied to the surface, the conductive layers make contact providing a signal indicating where the finger is located on the screen.

Pros: Can be used with bare fingers or gloves, tough scratch resistant hard coat on surface.

Cons: Reduces light output of the CRT \approx 20% - 25%, pressure based technology that possibly can be physically distorted over long periods of time and heavy use.

Best Applications: Interactive Kiosks, gaming devices, retail devices.

Typical Price: \$450.00 to \$1600.00 depending on configuration and quantity. (based on technology integrated with a CRT)

Close considerations of all the elements in this section will undoubtedly lead to a more user-friendly solution. Design and integrate products with the user in mind.

During the design process, utilize the experience of the component suppliers. Most component suppliers are working with dozens upon dozens of kiosk manufacturers. This provides a great amount of information gathered as to the environment, application and past acceptance of models in the field. Most component suppliers are more than happy not only to consult with the specifier, but with the other component suppliers as well to determine compatibility and how well the devices will appear aesthetically.

And in closing, remember that the more successful any kiosk is, which can be directly attributed to its controls, simply makes the kiosk industry stronger and more successful as a whole.

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