EXHIBIT

45

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:)
)
Leroy B. KEELY, et al.) Group Art Unit: 2674
)
Serial No.: 09/815,272) Examiner: Henry Tran
)
Filed: March 23, 2001) Attorney Docket No.: 003797.00087
)
For: SIMULATING GESTURES OF A)
POINTING DEVICE USING A STYLUS)
AND PROVIDING FEEDBACK THERETO)

REQUEST FOR RECONSIDERATION

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This paper is responsive to the final Official Action dated August 8, 2003 (paper no. 9). Reconsideration and allowance of the above-identified application is requested in view of the following remarks.

INTERVIEW SUMMARY

Applicants' representative thanks the Examiner for the short telephone interview on October 29, 2003. During the telephone interview, claim 1 was briefly discussed with regard to U.S. Patent No. 5,404,458 to Zetts '458. Applicants' representative also requested a personal interview. The personal interview was later refused on a follow-up telephone call with the Examiner on November 3, 2003.

CLAIM 7

Claim 7, which depends from claim 1, is also allowable. Claim 7 further recites generating at least one event representing the primary switch of the pointing device being activated responsive to the stylus being removed from the touch-sensitive display surface before the threshold amount of time as detected in the step of detecting.

This feature may be better understood with reference to the illustrative, non-limiting embodiment shown in Figure 3 of Applicants' specification. In steps 301 and 303, a stylus is held down against the touch-sensitive display surface, and the system detects whether the stylus is removed from the surface before a timeout. This is consistent with at least a portion of claim 1. In step 304, if the stylus is removed before the timeout, then a left_mouse_button_down event is performed. This is consistent with at least a portion of claim 7.

Again, Bi '719, as conceded by the Office Action, fails to teach or suggest anything in connection with a threshold amount of time.

Zetts '458 fails to make up for the deficiencies of Bi '179, and does not generate any type of mouse event in response to the stylus being removed prior to the time delay. Instead, Zetts generates a mouse command in response to the stylus remaining motionless for the time delay. *See* Zetts '458, Figure 4, blocks 122, 124, 126, and 130. Note that in block 128 in Figure 4 of Zetts '458, a mouse command is also generated if the input stroke is not recognized as a gesture or character. However, the mouse command is still not generated responsive to the stylus being removed <u>prior to</u> the time delay. Indeed, the mouse command is either generated or not generated when the stylus is removed regardless of the time delay.

CLAIM 9

Claim 9 depends from claim 1, and is also allowable. Claim 9 further recites sixth detecting whether the stylus moves along the touch-sensitive display surface prior to the threshold amount of time having passed. At least one event is generated representing the primary switch of the pointing device being activated responsive to the stylus being moved along the touch-sensitive display surface as detected in the step of sixth detecting.

This feature may be better understood with reference to the illustrative, non-limiting embodiment shown in Figure 3 of Applicants' specification. In steps 301 and 303, a stylus is held down against the touch-sensitive display surface, and the system detects whether the stylus is removed from the surface before a timeout. This is consistent with at least a portion of claim 1. In step 302, the system detects whether the stylus moves prior to the timeout. If so, then a left_mouse_button_down event is performed in step 314. This is consistent with at least a portion of claim 9.

As conceded by the Office Action, Bi '719 fails to teach or suggest anything having to do with a threshold amount of time.

Zetts '458 fails to make up for the deficiencies of Bi '719. As previously discussed, Zetts '458 generates a mouse event only under two situations: where the stylus is held motionless for at least a time delay (see Fig. 4, blocks 122, 124, 126, and 130); or, where the stylus is lifted off and the touch input stroke is not recognized (see Fig. 4, blocks 122, 128, and 130). Neither of these situations results in an event representing the primary switch of a pointing device being generated responsive to the stylus moving prior to a threshold amount of time, as required by

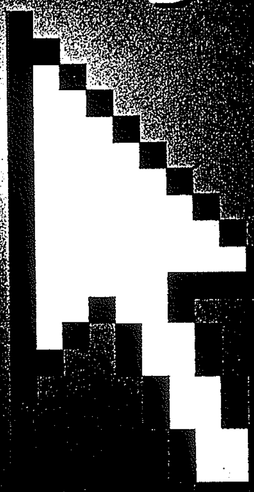
EXHIBIT 46

Microsoft

Microsoft

Computer Dictionary

Fifth Edition



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click *vb.* To press and release a mouse button once without moving the mouse. Clicking is usually performed to select or deselect an item or to activate a program or program feature. *See also* right click. *Compare* double-click, drag.

clickable maps *n. See* image map.

click rate *n. See* clickthrough rate.

clicks and mortar *n.* A business that combines an online presence with traditional "bricks and mortar" outlets.

click speed *n.* The maximum interval between the first and second time a user presses a button on a mouse or other pointing device that will still identify these actions as a double-click to the computer as opposed to two single-clicks. *See also* double-click, mouse, pointing device.

clickstream *n.* The path a user takes while browsing a Web site. Each distinct selection made on a Web page adds one click to the stream. The further down the clickstream the user goes without finding the sought item, the more likely he or she is to depart to another Web site. Analysis of usage patterns helps Web site designers create user-friendly site structures, links, and search facilities. *See also* Web site.

clickthrough *n.* The number of times that visitors to a Web site click on an advertising banner within a specified period of time. Clickthrough is one of the elements that Web site producers use to decide how much to charge advertisers. *See also* clickthrough rate.

clickthrough rate *n.* The proportion of visitors to a Web site who click on a banner advertisement there, expressed as a percentage of total visitors to the Web site. *Also called:* click rate. *See also* clickthrough.

clickwrap agreement *n.* A contract or license in software or on a Web site that sets forth conditions for use of the software or for goods and services distributed through the Web site. Users must agree to the terms in a clickwrap agreement—typically by clicking on a button that states "I Agree" or "Agree"—before they can install the software or utilize goods or services. A clickwrap agreement is an electronic version of an End-User License Agreement. *Also called:* clickwrap license. *See also* End-User License Agreement. *Compare* shrinkwrap agreement.

clickwrap license *n. See* clickwrap agreement.

client *n.* **1.** In object-oriented programming, a member of a class (group) that uses the services of another class to which it is not related. *See also* inheritance (definition 1). **2.** A process, such as a program or task, that requests a service provided by another program—for example, a word processor that calls on a sort routine built into another program. The client process uses the requested service without having to "know" any working details about the other program or the service itself. *Compare* child (definition 1), descendant (definition 2). **3.** On a local area network or the Internet, a computer that accesses shared network resources provided by another computer (called a *server*). *See also* client/server architecture, server.

client error *n.* A problem reported by the Hypertext Transfer Protocol (HTTP) client module as the result of difficulty in interpreting a command or the inability to connect properly to a remote host.

client/server architecture *n.* An arrangement used on LANs (local area networks) that makes use of distributed intelligence to treat both the server and the individual workstations as intelligent, programmable devices, thus exploiting the full computing power of each. This is done by splitting the processing of an application between two distinct components: a "front-end" client and a "back-end" server. The client component is a complete, stand-alone personal computer (not a "dumb" terminal), and it offers the user its full range of power and features for running applications. The server component can be a personal computer, a minicomputer, or a mainframe that provides the traditional strengths offered by minicomputers and mainframes in a time-sharing environment: data management, information sharing between clients, and sophisticated network administration and security features. The client and server machines work together to accomplish the processing of the application being used. Not only does this increase the processing power available over older architectures but it also uses that power more efficiently. The client portion of the application is typically optimized for user interaction, whereas the server portion provides the centralized, multiuser functionality. *See also* distributed intelligence. *Compare* peer-to-peer network.

client/server network *n. See* client/server architecture.

client-side image maps *n.* An image map that performs the processing completely within the client program (i.e., Web browser) itself. Early Web implementations of image maps (circa 1993) transmitted user mouse click coordinates to the Web server for processing. Generally client-side image maps improve the speed of response to the user. *See also* image map.

EXHIBIT

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US006897853B2

(12) **United States Patent**
Keely et al.

(10) **Patent No.: US 6,897,853 B2**
(45) **Date of Patent: May 24, 2005**

(54) **HIGHLEVEL ACTIVE PEN MATRIX**

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(73) Assignee: **Microsoft Corp.**, Redmond, WA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 172 days.

(21) Appl. No.: **09/736,170**

(22) Filed: **Dec. 15, 2000**

(65) **Prior Publication Data**

US 2002/0056575 A1 May 16, 2002

Related U.S. Application Data

(60) Provisional application No. 60/247,400, filed on Nov. 10, 2000.

(51) **Int. Cl.**^{7} **G09G 5/00**

(52) **U.S. Cl.** **345/179**; 345/764; 345/769; 382/188; 382/313; 382/314

(58) **Field of Search** 345/642, 585, 345/751, 769, 863, 179; 707/102; 709/231; 382/188, 313, 314

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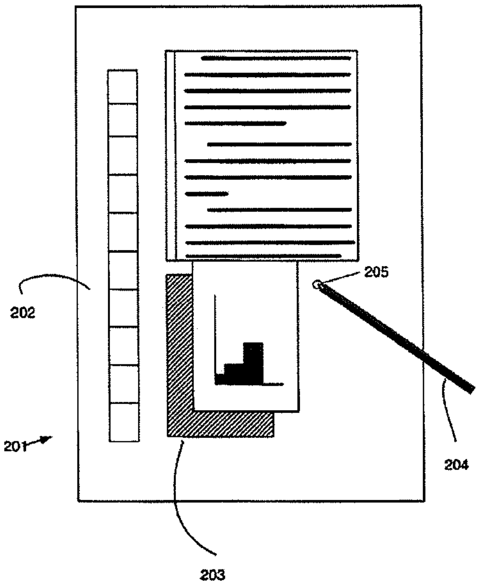
Primary Examiner—Dennis-Doon Chow
Assistant Examiner—Srilakshmi K. Kumar
(74) *Attorney, Agent, or Firm*—Banner & Witcoff, Ltd.

(57) **ABSTRACT**

The present invention relates to a system, method and medium for receiving and acting upon user input. In one embodiment, the user may only have access to a limited input device, like a stylus. Using the present invention, a user is provided with intuitive responses from the system based on inputs from the limited input device.

17 Claims, 7 Drawing Sheets



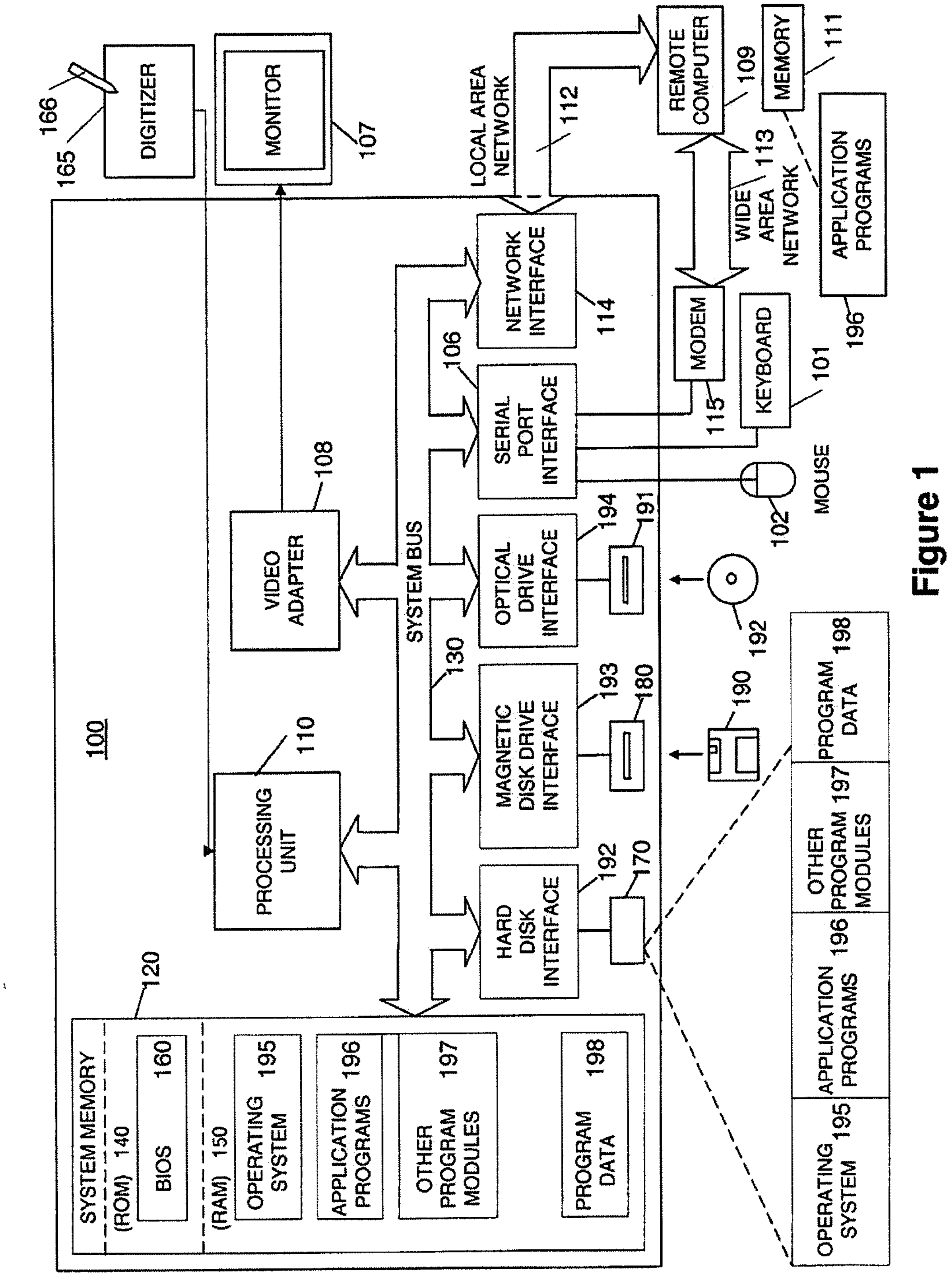

100
SYSTEM MEMORY
120
(ROM) 140
BIOS 160
(RAM) 150
OPERATING SYSTEM 195
APPLICATION PROGRAMS 196
OTHER PROGRAM MODULES 197
PROGRAM DATA 198
PROCESSING UNIT
110
VIDEO ADAPTER
108
SYSTEM BUS
130
HARD DISK INTERFACE
192
170
MAGNETIC DISK DRIVE INTERFACE
193
180
190
OPTICAL DRIVE INTERFACE
194
191
192
SERIAL PORT INTERFACE
106
NETWORK INTERFACE
114
DIGITIZER
165
166
MONITOR
107
LOCAL AREA NETWORK
112
REMOTE COMPUTER
109
MEMORY
111
WIDE AREA NETWORK
113
APPLICATION PROGRAMS
196
MODEM
115
KEYBOARD
101
MOUSE
102
OPERATING SYSTEM 195
APPLICATION PROGRAMS 196
OTHER PROGRAM MODULES 197
PROGRAM DATA 198

Figure 1

Figure 2

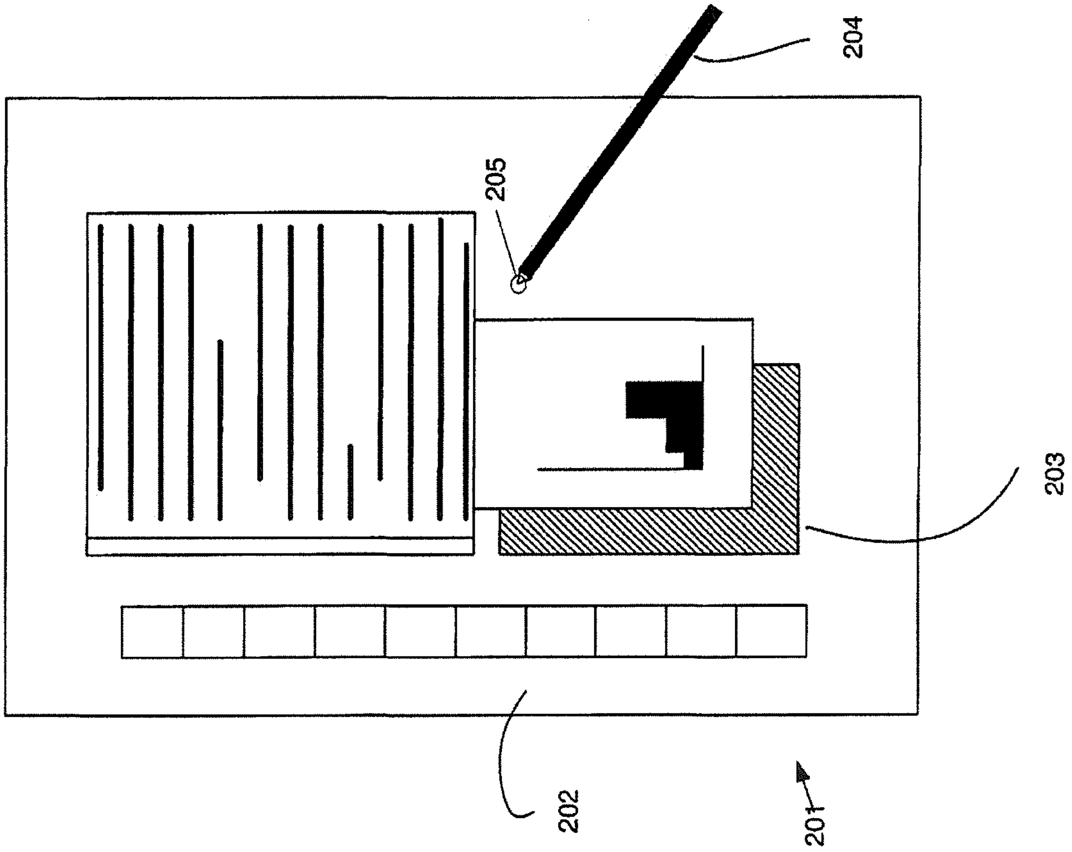


Figure 3

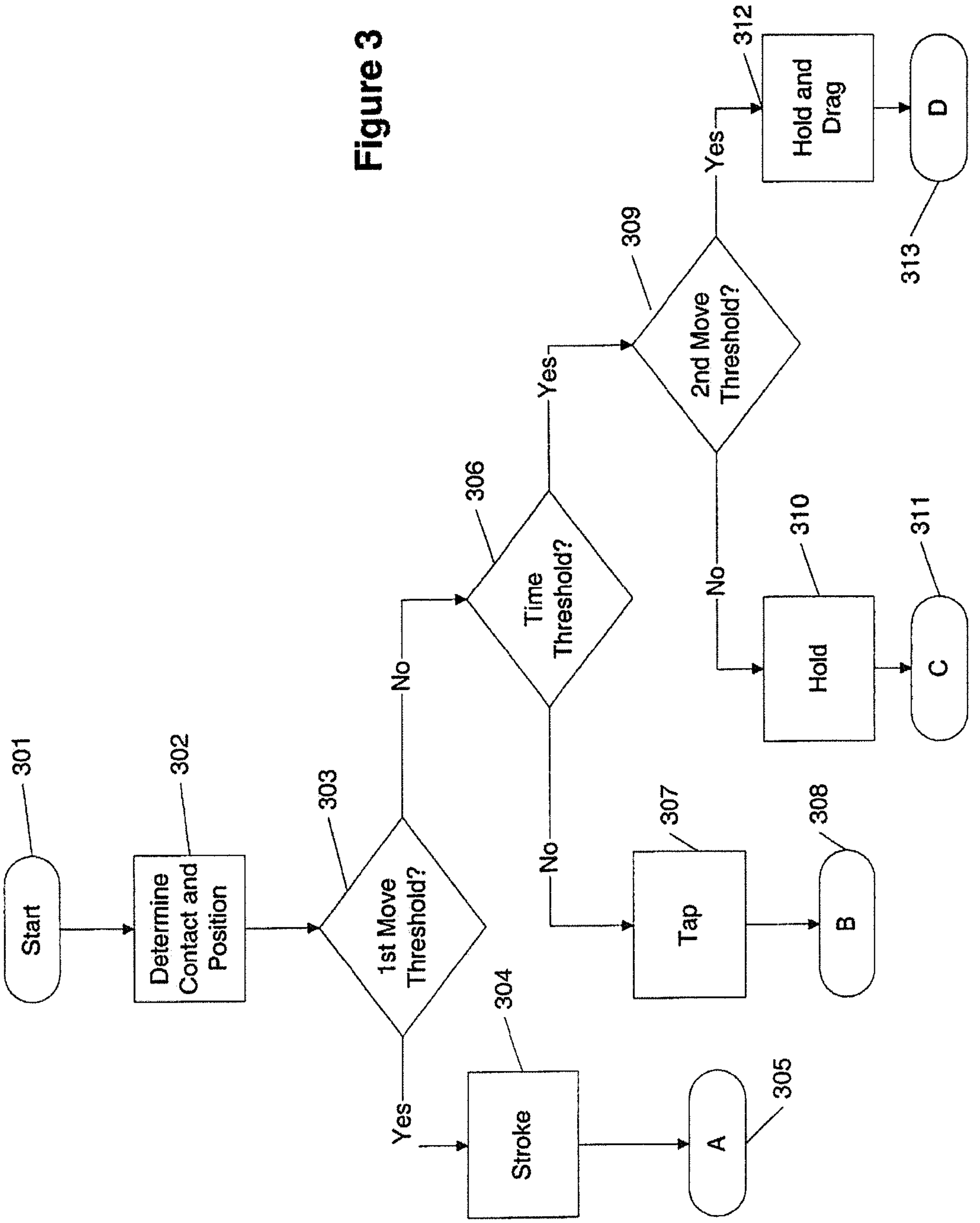

301
Start
302
Determine Contact and Position
303
1st Move Threshold?
Yes
304
Stroke
A
305
No
306
Time Threshold?
No
307
Tap
308
B
Yes
309
2nd Move Threshold?
No
310
Hold
311
C
Yes
312
Hold and Drag
D
313

Figure 4

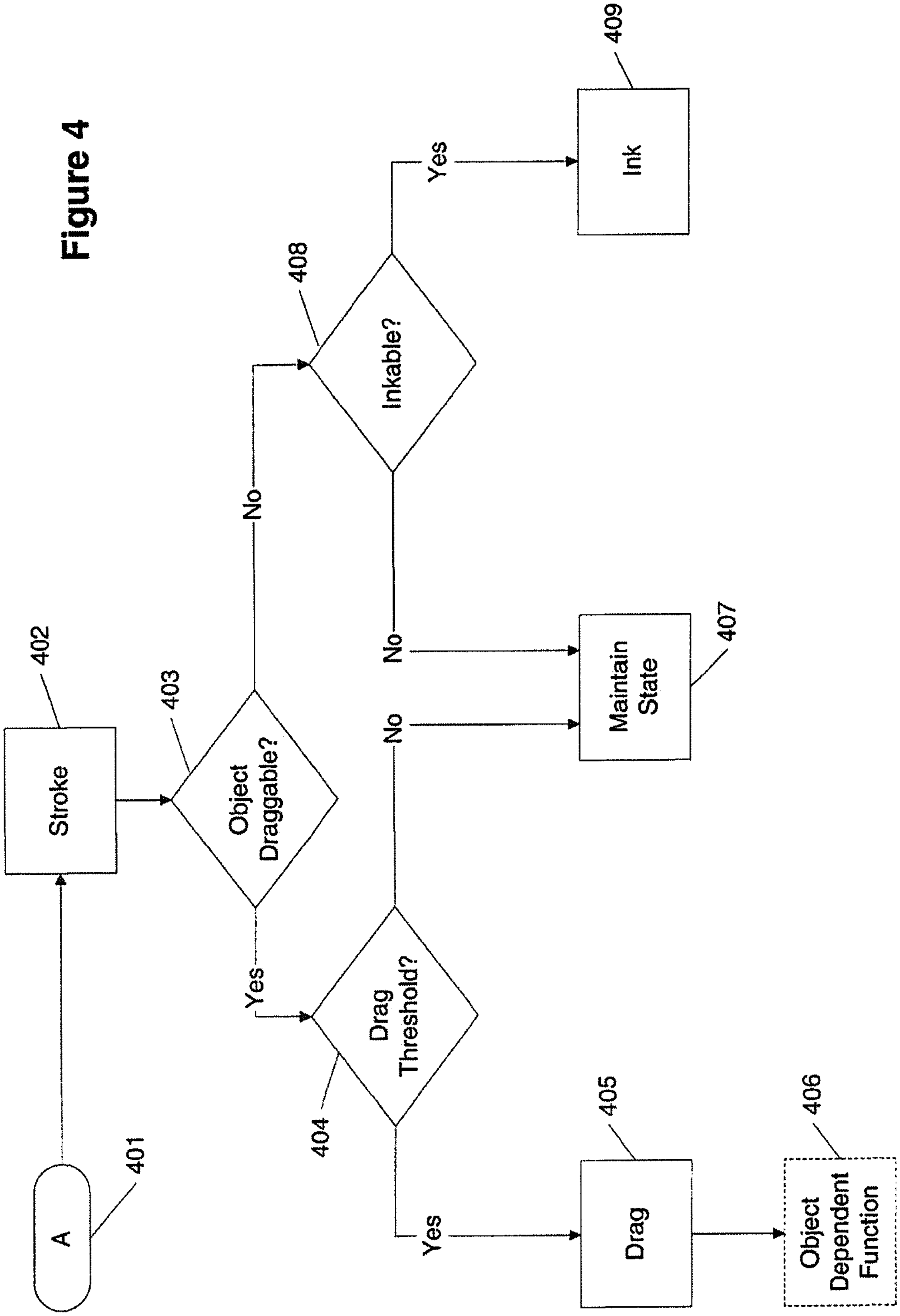
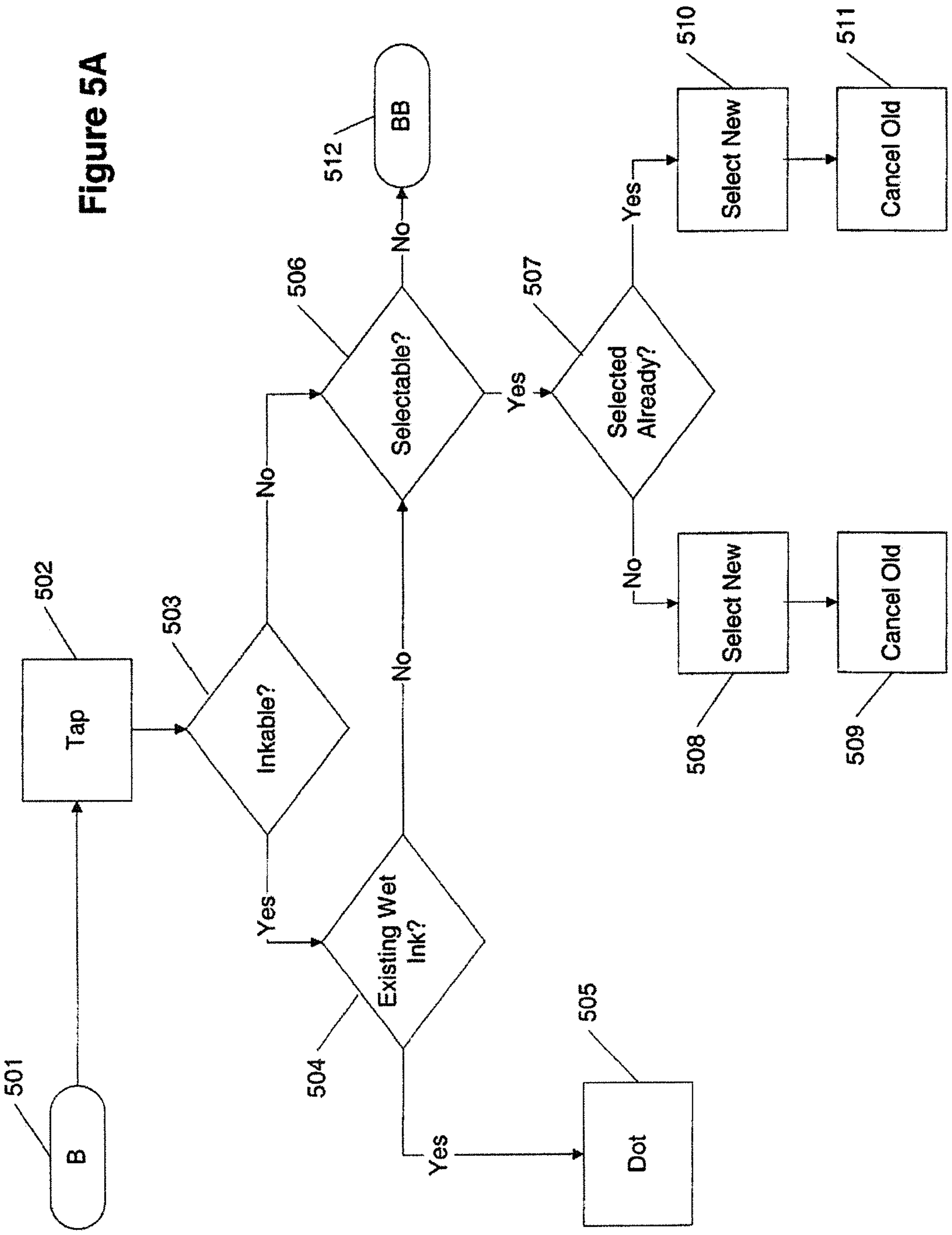

A
401
Stroke
402
Object Draggable?
403
Yes
No
Drag Threshold?
404
Yes
No
Drag
405
Object Dependent Function
406
Inkable?
408
Yes
No
Ink
409
Maintain State
407

Figure 5A


B
501
Tap
502
Inkable?
503
Yes
No
Existing Wet Ink?
504
Yes
No
Dot
505
Selectable?
506
No
BB
512
Yes
Selected Already?
507
Yes
No
Select New
510
Cancel Old
511
Select New
508
Cancel Old
509

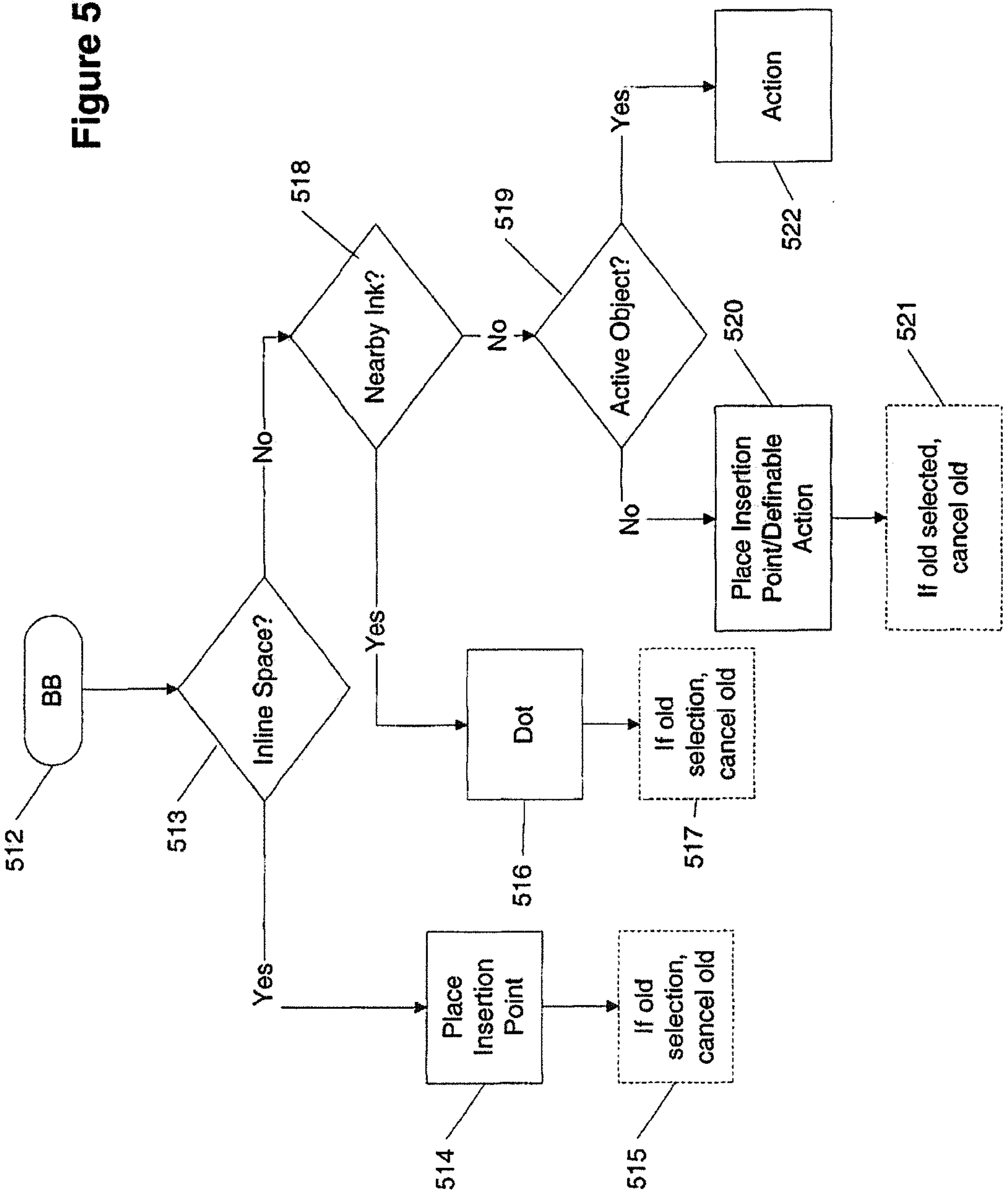

BB
512
Inline Space?
513
Yes
No
Place Insertion Point
514
If old selection, cancel old
515
Nearby Ink?
518
Yes
No
Dot
516
If old selection, cancel old
517
Active Object?
519
Yes
No
Action
522
Place Insertion Point/Definable Action
520
If old selected, cancel old
521

Figure 5B

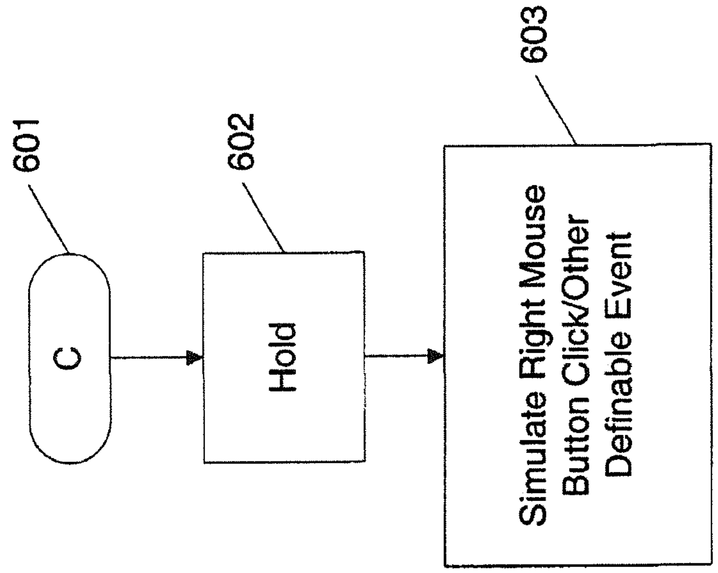


Figure 6

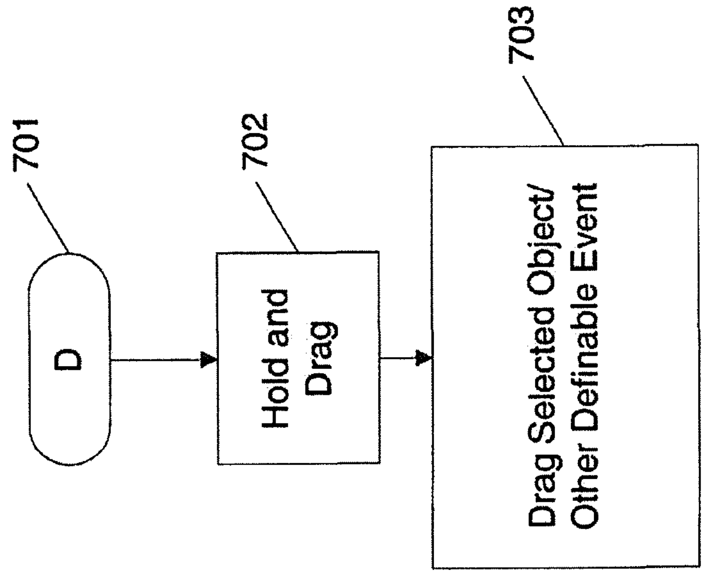


Figure 7

HIGHLEVEL ACTIVE PEN MATRIX

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is based on U.S. provisional patent application No. 60/247,400, filed Nov. 10, 2000, entitled "Highlevel Active Pen Matrix".

The present application is also related to application Ser. No. (Atty docket 3797.00066), entitled "Method and Apparatus For Improving the Appearance of Digitally Represented Handwriting", filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00069), entitled "Selection Handles in Editing Electronic Documents", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00070), entitled "Insertion Point Bungee Space Tool", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00072), entitled "Simulating Gestures of a Mouse Using a Stylus and Providing Feedback Thereto", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00074), entitled "System and Method For Accepting Disparate Types Of User Input", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00075), entitled "In Air Gestures", and filed concurrently with the present application; to application Ser. No. (Atty docket 3797.00076), entitled "Mouse Input Panel Windows Class List", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00077), entitled "Mouse Input Panel and User Interface", and filed Nov. 10, 2000; and to application Ser. No. (Atty docket 3797.00079), entitled "System and Method For Inserting Implicit Page Breaks", and filed Nov. 10, 2000; each of which is incorporated by reference herein.

FIELD OF THE INVENTION

Aspects of the present invention are directed generally to apparatus and methods for controlling a graphical user interface (GUI). More particularly, the present invention relates to receiving user input, determining based on the user input what the user wants to do, and performing a function related to the desired input.

BACKGROUND OF THE INVENTION

Typical computer systems, especially computer systems using graphical user interface (GUI) systems such as Microsoft WINDOWS, are optimized for accepting user input from one or more discrete input devices such as a keyboard and for entering text, and a pointing device such as a mouse with one or more buttons for driving the user interface. Virtually all software applications designed to run on Microsoft WINDOWS are optimized to accept user input in the same manner. For instance, many applications make extensive use of the right mouse button (a "right click") to display context-sensitive command menus. The user may generate other gestures using the mouse such as by clicking the left button of the mouse (a "left click"), or by clicking the left or right button of the mouse and moving the mouse while the button is depressed (either a "left click drag" or a "right click drag").

In some environments, a mouse is not usable or desirable. For example, in a digitizer tablet environment, the primary input device may be a stylus. While a stylus attempts to provide pad and paper-like feel to a computing environment, current systems are limited. For example, the use of a stylus in a graphical user interface is limited to tapping on various items for selection. See, for example, the Palm-series of products using the Palm OS 3.0 operating system. Further, in stylus-based input environments, a user is continually forced to select tools or operations from a remote tool bar, generally on a top or bottom of a screen. While a user can type in letters or have the digitizer recognize handwriting, these operations require selecting a keyboard input mode and writing in a predefined portion of the digitizer, respectively. In short, requiring a user to tell the computer, for every new input, what a user wants to do makes stylus-based computing difficult for the average user. Accordingly, stylus based inputs have been relegated to personal data assistants (PDAs) where significant user input is not possible. Mainstream computing still requires the use of at least a keyboard and mouse (or mouse-based input device, for example, trackballs, touch-pads, and other mouse substitutes).

Accordingly, a need exists for permitting a user to perform all operations of a mouse-type device using a stylus.

SUMMARY OF THE INVENTION

As discussed in the various copending patent applications incorporated herein by reference, aspects of the present invention are directed to a tablet-like computer that allows users to directly write on a display surface using a stylus. The display surface may physically, optically, and or electro magnetically detect the stylus. The computer may allow the user to write and to edit, manipulate, and create objects through the use of the stylus. Many of the features discussed in these copending applications are more easily performed by use of the various aspects of the present invention discussed herein.

An aspect of the present invention is directed to methods and apparatus for simulating gestures of a mouse by use of a stylus on a display surface. The present invention determines the operation a user wants to perform based on the user's input. This determination may include reference to other information including the location of the user's input on a digitizer (e.g., location on a screen) and the status of other objects or elements as displayed. By using this information, the system determines what the user wants to do and implements the action.

A number of inputs with a stylus are possible. For example, a user may Lap a stylus, stroke the stylus, hold the stylus at a given point, or hold then drag the stylus. Other inputs and combinations are possible as noted by the above-identified applications, which are expressly incorporated herein by reference.

In response to a stroke operation, the system may drag an object, may maintain a current state or operation, or perform inking. Inking may include writing, drawing, or adding annotations as described in greater detail in U.S. Ser. No. 60/212,825, filed Jun. 21, 2000, entitled "Methods for Classifying, Anchoring, and Transforming Ink Annotations" and incorporated by reference.

As to a tap operation, the system may add to existing writing, may select a new object, insert a cursor or insertion point, or may perform an action on a selected object.

As to a hold operation, the system may simulate a right mouse button click or other definable event.

As to a hold and drag operation, the system may drag a selected object or perform other functions.

These and other features of the invention will be apparent upon consideration of the following detailed description of preferred embodiments. Although the invention has been defined using the appended claims, these claims are exemplary in that the invention is intended to include the elements and steps described herein in any combination or subcombination. Accordingly, there are any number of alternative combinations for defining the invention, which incorporate one or more elements from the specification, including the description, claims, and drawings, in various combinations or subcombinations. It will be apparent to those skilled in the relevant technology, in light of the present specification, that alternate combinations of aspects of the invention, either alone or in combination with one or more elements or steps defined herein, may be utilized as modifications or alterations of the invention or as part of the invention. It is intended that the written description of the invention contained herein covers all such modifications and alterations.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary of the invention, as well as the following detailed description of preferred embodiments, is better understood when read in conjunction with the accompanying drawings, which are included by way of example, and not by way of limitation with regard to the claimed invention. In the accompanying drawings, elements are labeled with three-digit reference numbers, wherein the first digit of a reference number indicates the drawing number in which the element is first illustrated. The same reference number in different drawings refers to the same element.

FIG. 1 is a schematic diagram of a general-purpose digital computing environment that can be used to implement various aspects of the invention.

FIG. 2 is a plan view of a tablet computer and stylus that can be used in accordance with various aspects of the present invention.

FIGS. 3–7 are flowcharts showing a variety of steps for interpreting a user's input in accordance with embodiments of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention may be more readily described with reference to FIGS. 1–7. FIG. 1 illustrates a schematic diagram of a conventional general-purpose digital computing environment that can be used to implement various aspects of the present invention. In FIG. 1, a computer **100** includes a processing unit **110**, a system memory **120**, and a system bus **130** that couples various system components including the system memory to the processing unit **110**. The system bus **130** may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. The system memory **120** includes read only memory (ROM) **140** and random access memory (RAM) **150**.

A basic input/output system **160** (BIOS), containing the basic routines that help to transfer information between elements within the computer **100**, such as during start-up, is stored in the ROM **140**. The computer **100** also includes a hard disk drive **170** for reading from and writing to a hard disk (not shown), a magnetic disk drive **180** for reading from or writing to a removable magnetic disk **190**, and an optical disk drive **191** for reading from or writing to a removable optical disk **192** such as a CD ROM or other optical media. The hard disk drive **170**, magnetic disk drive **180**, and optical disk drive **191** are connected to the system bus **130** by a hard disk drive interface **192**, a magnetic disk drive interface **193**, and an optical disk drive interface **194**, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer readable instructions, data structures, program modules and other data for the personal computer **100**. It will be appreciated by those skilled in the art that other types of computer readable media that can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, random access memories (RAMs), read only memories (ROMs), and the like, may also be used in the example operating environment.

A number of program modules can be stored on the hard disk drive **170**, magnetic disk **190**, optical disk **192**, ROM **140** or RAM **150**, including an operating system **195**, one or more application programs **196**, other program modules **197**, and program data **198**. A user can enter commands and information into the computer **100** through input devices such as a keyboard **101** and pointing device **102**. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner or the like. These and other input devices are often connected to the processing unit **110** through a serial port interface **106** that is coupled to the system bus, but may be connected by other interfaces, such as a parallel port, game port or a universal serial bus (USB). Further still, these devices may be coupled directly to the system bus **130** via an appropriate interface (not shown). A monitor **107** or other type of display device is also connected to the system bus **130** via an interface, such as a video adapter **108**. In addition to the monitor, personal computers typically include other peripheral output devices (not shown)., such as speakers and printers. In a preferred embodiment, a pen digitizer **165** and accompanying pen or stylus **166** are provided in order to digitally capture freehand input. Although a direct connection between the pen digitizer **165** and the processing unit **110** is shown, in practice, the pen digitizer **165** may be coupled to the processing unit **110** via a serial port, parallel port or other interface and the system bus **130** as known in the art. Furthermore, although the digitizer **165** is shown apart from the monitor **107**, it is preferred that the usable input area of the digitizer **165** be co-extensive with the display area of the monitor **107**. Further still, the digitizer **165** may be integrated in the monitor **107**, or may exist as a separate device overlaying or otherwise appended to the monitor **107**.

The computer **100** can operate in a networked environment using logical connections to one or more remote computers, such as a remote computer **109**. The remote computer **109** can be a server, a router, a network PC, a peer device or other common network node, and typically includes many or all of the elements described above relative to the computer **100**, although only a memory storage device **111** has been illustrated in FIG. 1. The logical connections depicted in FIG. 1 include a local area network (LAN) **112** and a wide area network (WAN) **113**. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets and the Internet.

When used in a LAN networking environment, the computer **100** is connected to the local network **112** through a network interface or adapter **114**. When used in a WAN networking environment, the personal computer **100** typically includes a modem **115** or other means for establishing a communications over the wide area network **113**, such as the Internet. The modem **115**, which may be internal or external, is connected to the system bus **130** via the serial port interface **106**. In a networked environment, program modules depicted relative to the personal computer **100**, or portions thereof, may be stored in the remote memory storage device.

It will be appreciated that the network connections shown are exemplary and other techniques for establishing a communications link between the computers can be used. The existence of any of various well-known protocols such as TCP/IP, Ethernet, FTP, HTTP and the like is presumed, and the system can be operated in a client-server configuration to permit a user to retrieve web pages from a web-based server. Any of various conventional web browsers can be used to display and manipulate data on web pages.

FIG. 2 illustrates a tablet PC **201** that can be used in accordance with various aspects of the present invention. Any or all of the features, subsystems, and functions in the system of FIG. 1 can be included in the computer of FIG. 2. Tablet PC **201** includes a large display surface **202**, e.g., a digitizing flat panel display, preferably, a liquid crystal display (LCD) screen, on which a plurality of windows **203** is displayed. Using stylus **204**, a user can select, highlight, and write on the digitizing display area. Examples of suitable digitizing display panels include electromagnetic pen digitizers, such as the Mutoh or Wacom pen digitizers. Other types of pen digitizers, e.g., optical digitizers, may also be used. Tablet PC **201** interprets marks made using stylus **204** in order to manipulate data, enter text, and execute conventional computer application tasks such as spreadsheets, word processing programs, and the like.

A stylus could be equipped with buttons or other features to augment its selection capabilities. In one embodiment, a stylus could be implemented as a "pencil" or "pen", in which one end constitutes a writing portion and the other end constitutes an "eraser" end, and which, when moved across the display, indicates portions of the display are to be erased. Other types of input devices, such as a mouse, trackball, or the like could be used. Additionally, a user's own finger could be used for selecting or indicating portions of the displayed image on a touch-sensitive or proximity-sensitive display. Consequently, the term "user input device", as used herein, is intended to have a broad definition and encompasses many variations on well-known input devices.

Region **205** shows a feed back region or contact region permitting the user to determine where the stylus as contacted the digitizer. In another embodiment, the region **205** provides visual feedback when the hold status of the present invention has been reached.

FIGS. **3–7** show various flowcharts for determining what a user wants to do based on a user's interaction with the digitizer. As will be discussed below, the user contacts the digitizer where the user wants to begin writing, tapping, annotating, dragging, etc. In the case where the digitizer is superimposed over a display, the user's contact with the digitizer is directed at operating at (or near) the contact point between the user's stylus and the currently displayed information at or near the contact point.

In step **301**, the system senses a contact or other indication of an action. In one embodiment the contact may be the stylus contacting the surface of the digitizer. In another embodiment, the action may be bringing the tip of the stylus near the digitizer's surface. Further, if the stylus includes another signaling method (for example, a radio transmitter transmitting a signal to the digitizer signaling a user's input), the digitizer (or related input mechanism or mechanisms) interpret the received signal as a user's input. Other methods of starting an operation or writing or contact with a digitizer are known in the art. For purposes of illustration and description, the system and method reference physical contact with the digitizer. All other ways of providing signals to a processor are considered within the scope of the invention and are not mentioned here for simplicity.

In step **302**, the system determines the contact position and what lies beneath the contact position (for example, an object, a drawing, blank space, ink, and the like). In step **303**, the system determines if the stylus has moved beyond a first threshold (time, distance, rate, or acceleration, and the like). In one embodiment, the threshold is set to the minimum resolvable movement. In another embodiment, the threshold is set higher to account for shaky hands, vibrations of the digitizer or tablet pc (for example, if trying to use the system while driving in a car over a bumpy road). It is noted that objects may have all the same threshold. Alternatively, objects may have different thresholds. This may be dependent on the object, the size of the object, the state of the system, the state of the object, and the like.

If the first threshold has been exceeded, then the system proceeds to step **304** where the user's input is classified as a stroke and the system steps to point A **305**. If the first threshold has not been exceeded, the system determines if the stylus was still in contact with the digitizer when a time threshold had expired in step **306**. If no (meaning that the stylus was not still in contact with the digitizer surface), the system classifies the input as a tap in step **307** and proceeds to point B **308**.

If the stylus was still in contact with the surface after the time threshold in step **306**, the system determines if a second move threshold was exceeded in step **309**. The first and second move thresholds may be identical or different. For example, both may be 0.25 mm. Or, the first may be 0.5 mm or one mm and the second be 0.3 mm. Further, the first may be 1.2 mm or more and the second may be 0.5 mm or more. In short, any values may be used as long as they are not obtrusive to the user. The second threshold may be determined only after the time threshold of step **306** has expired. In this example, the second threshold may be higher than the first threshold (or it may be the same or smaller).

If the second move threshold was not exceeded, then the system classifies the input as a hold in step **310** and proceeds to point C **311**. If the second move threshold was exceeded, then the system classifies the input as a 'hold and drag' in step **312** and moves to point D **313**.

FIG. 4 shows point A as starting point **401**. Here, the system classified the input as a stroke and begins stroke processing in step **402**. In step **403**, the system determines if the stroke started on a draggable object. If yes, the system determines in step **404** whether drag threshold was exceeded (for example, 0.25 inches, 0.25 inches per second and the like). If so, the system classifies the stroke as a drag in step **405** and performs a function that is dependent on the object. For example, the drag may extend a selection as described in greater detail in "Selection Handles in Editing Electronic Documents," filed concurrently with the present application (attorney docket 03797.00069), and expressly incorporated by reference. Also, the drag may operate a bungee tool as described in Ser. No. (Atty docket 3797.00070), entitled "Insertion Point Bungee Space Tool", and filed concurrently with the present application, and expressly incorporated herein.

If, in step **404**, the drag threshold has not been exceeded, the system maintains the current state (with the object being selected or not) in step **407**. If the stroke was not over a draggable object in step **403**, the system determines if the area under the contact point is inkable in step **408**. For example, inkable may mean an area capable of receiving ink (including drawings, annotations, or writing) as detailed in serial No. 60/212,825, filed Jun. 21, 2000, and expressly incorporated herein by reference for essential subject matter. By contrast, a control button (for copy, save, open, etc.) may not be inkable. If inkable in step **408**, the system permits inking (drawing, writing, annotating and other related functions) in step **409**. If not inkable, the system maintains the current state (objects selected or not) in step **407**.

In FIG. **5A**, the system starts at point B **501** and operates on the input as a tap **502**. The system determines whether the tap was on an area or object that is inkable in step **503**. If yes, the system determines whether any ink was recently added or "wet" (for example, less than 0.5 or 1 second old) in step **504**. If so, the system considers the tap as a dot to be added to the ink in step **505** (and adds the dot). If no wet ink exists, then the system determines if the tap was over a selectable object in step **506** It is noted that steps **503** and **504** may be combined. If the tap was over a selectable object, then the system determines if the object was already selected in step **507**. If it was not, then the system selects the tapped object in step **508**. If a previous object had been selected, the system cancels the previous or old selection in step **509**. If the object was previously selected as determined by step **507**, the system performs an action relevant to the object in step **510**. This action may include editing the object, performing a predefined operation (for example, enlarge, shrink and the like). From step **506**, if the tap was not on a selectable object, then the system proceeds to point BB **512**.

FIG. **5B** shows additional processing to FIG. **5A**. As point BB **512**, the system determines if the tap was in a space between text (referred to herein as an inline space) in step **513**. If yes, the system places an insertion point at the tap point in step **514**. As shown in a broken lined box, the system may also cancel any old or previous selections in step **515**. If no, then the system determines if the tap point has ink nearby in step **518**. If the system determines that the tap was nearby ink, then the system adds a dot to the ink in step **516**. If there was an old selection, then the system cancels the old selection in step **517** (as shown by a broken line box).

If not nearby ink in step **518**, the system determines if the tap is on an active object in step **519**. If the tap was not on an active object, the system places an insertion point at the tap point or performs some other definable action in step **520**. Again, if there was an old selection, then the system cancels the old selection in step **521** (as shown by a broken line box). If the tap was on an active object as determined by step **519**, the system performs an action in step **522**. The action may be definable by the user or relate to any function desirable. In one embodiment, the action may be to perform a function to operate a selection handle or bungee space tool as described in "Selection Handles in Editing Electronic Documents," filed concurrently with the present application (attorney docket 03797.00069), and expressly incorporated by reference. Also, the drag may operate a bungee tool as described in Ser. No. (Atty docket 3797.00070), entitled "Insertion Point Bungee Space Tool", and filed concurrently with the present application, and expressly incorporated herein. Other operations are known in the art and incorporated herein.

FIG. **6** relates to holding a stylus beyond a time threshold. Starting from point C **601**, the system classifies the user input as a hold operation in step **602**. Next, the system simulates a right mouse button click or other definable event in step **603**. The functions associated with step **603** are described in greater detail in U.S. application Ser. No. (Atty docket 3797.00072), entitled "Simulating Gestures of a Mouse Using a Stylus and Providing Feedback Thereto", filed Nov. 10, 2000, whose contents are expressly incorporated herein by reference.

FIG. **7** relates to holding a stylus beyond a time threshold and moving the stylus. Starting from point D **701**, the system classifies the user input as a hold and drag operation in step **702**. Next, in step **703** the system drags the selected object as directed by the user.

There are a number of alternatives associated with dragging. If the hold and drag relates to an inline space, the system may use this hold and drag function to select text. Similarly, one may use this function to select a drawing encountered by the dragged stylus. Further, one may select both text and drawings in this manner. Also, the cursor's point may become a selection tool that leaves a trail behind it. In this regard, the user may loop a number of objects, drawing or text in this regard. The looping of the objects may result in the selecting of the objects.

An alternate embodiment of the present invention relates to modifying ink drawings or annotations. For example, if one added an annotation (from step **409**) to text, one may manipulate the text (for example, by inserting new text) and have the annotation track the manipulation of the text. So, if one circled text then added text to the circled text, the annotation would expand to include the added text as well. This is described in relation to in U.S. Pat. Ser. No. 60/212,825, filed Jun. 21, 2000, entitled "Methods for Classifying, Anchoring, and Transforming Ink Annotations" and incorporated by reference.

While exemplary systems and methods embodying the present invention are shown by way of example, it will be understood, of course, that the invention is not limited to these embodiments. Modifications may be made by those skilled in the art, particularly in light of the foregoing teachings. For example, each of the elements of the aforementioned embodiments may be utilized alone or in combination with elements of the other embodiments.

We claim:

1. A method for classifying a user input to a digitizer, comprising steps of:

receiving the user input by the digitizer;

first determining whether the user input moves at least a first distance;

second determining whether the user input ends before a certain amount of time; and

responsive to the user input failing to move at least the first distance within the certain amount of time and failing to end before the certain amount of time, third determining whether the user input moves at least a second distance larger than the first distance.

2. The method of claim **1**, wherein the user input is caused by a stylus contacting the digitizer, and the user input ends when the stylus no longer contacts the digitizer.

3. The method of claim **1**, further including steps of:

responsive to the user input moving at least the first distance as determined by the step of first determining, classifying the user input as a first type of input;

responsive to the user input ending before the certain amount of time as determined by the step of second determining, classifying the user input as a second type of input different from the first type of input; and

responsive to an outcome of the step of third determining, classifying the user input as either a third type of input different from the first and second types of input or a fourth type of input different from the first, second, and third types of input.

4. The method of claim **1**, further including a step of, responsive to the user input moving at least the first distance as determined by the step of first determining, fourth determining whether the input begins on a draggable object.

5. The method of claim 4, further including a step of, responsive to the user input beginning on a draggable object as determined by the step of fourth determining, fifth determining whether the user input satisfies a drag threshold.

6. The method of claim 4, further including a step of, responsive to the user input not beginning on a draggable object as determined by the step of fourth determining, fifth determining whether the user input is in an inkable location.

7. A method for classifying a user's input to a computer comprising the steps of:

receiving a user's input; and

first determining whether the input is a stroke based on a first move threshold;

if the input is not a stroke, then second determining whether the input is a tap based on a time threshold;

if the input is neither a stroke nor a tap, then third determining whether the stroke is a hold or a hold and drag.

8. The method of classifying a user's input according to claim 7, wherein, if said input satisfies said first move threshold, the input is classified as a stroke.

9. The method of classifying a user's input according to claim 7, wherein, if said input does not satisfy said first move threshold and said input does not satisfy said time threshold, the input is classified as a tap.

10. The method of classifying a user's input according to claim 7, wherein, if said input does not satisfy said time threshold and said input does not satisfy said second move threshold, said input is classified as a hold.

11. The method of classifying a user's input according to claim 10, further comprising the step of:

simulating a right mouse click responsive to said input being classified as a hold.

12. The method of classifying a user's input according to claim 7, wherein, if said input does not satisfy said time threshold and said input satisfies said second move threshold, said input is classified as a hold and drag.

13. The method of classifying a user's input according to claim 12, further comprising the step of:

dragging a selected object responsive to said input being classified as a hold and drag.

14. The method of claim 7, wherein the step of third determining includes determining whether the stroke is a hold or a hold and drag based on a second move threshold larger than the first move threshold.

15. A method for classifying a user input to a digitizer, comprising steps of:

receiving the user input by the digitizer;

classifying the user input as a stroke if the user input satisfies a first move threshold;

classifying the user input as a tap if the user input fails to satisfy both the first move threshold and a time threshold;

classifying the user input as a hold if the user input satisfies the time threshold but fails to satisfy both the first move threshold and a second move threshold different from the first move threshold; and

classifying the user input as a hold and drag if the user input satisfies both the time threshold and the second move threshold but fails to satisfy the first move threshold.

16. The method of claim 15, further including steps of:

responsive to the user input being classified as a stroke, determining whether an object associated with the stroke is draggable;

responsive to the object being draggable, determining whether the user input satisfies a drag threshold; and

responsive to the object not being draggable, determining whether the object is inkable.

17. The method of claim 16, wherein the drag threshold includes a speed threshold.

* * * * *

EXHIBIT 48

US006897853B2

(12) United States Patent
Keely et al.

(10) Patent No.: US 6,897,853 B2
(45) Date of Patent: May 24, 2005

(54) **HIGHLEVEL ACTIVE PEN MATRIX**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 172 days.

(21) Appl. No.: **09/736,170**

(22) Filed: **Dec. 15, 2000**

(65) **Prior Publication Data**

US 2002/0056575 A1 May 16, 2002

Related U.S. Application Data

(60) Provisional application No. 60/247,400, filed on Nov. 10, 2000.

(51) **Int. Cl.**^{7} **G09G 5/00**

(52) **U.S. Cl.** **345/179**; 345/764; 345/769; 382/188; 382/313; 382/314

(58) **Field of Search** 345/642, 585, 345/751, 769, 863, 179; 707/102; 709/231; 382/188, 313, 314

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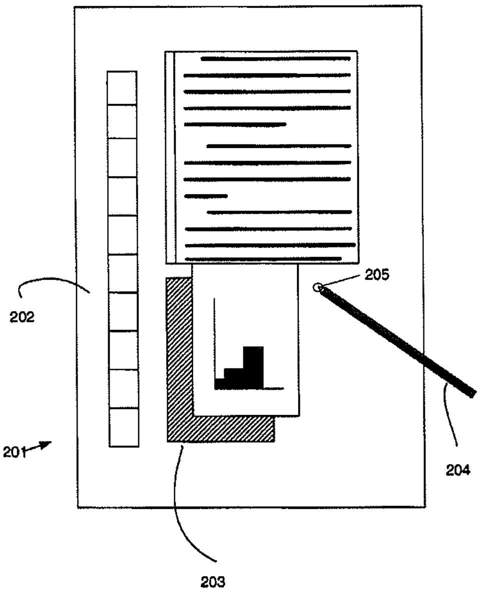
(57) **ABSTRACT**

The present invention relates to a system, method and medium for receiving and acting upon user input. In one embodiment, the user may only have access to a limited input device, like a stylus. Using the present invention, a user is provided with intuitive responses from the system based on inputs from the limited input device.

17 Claims, 7 Drawing Sheets



HIGHLEVEL ACTIVE PEN MATRIX

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is based on U.S. provisional patent application No. 60/247,400, filed Nov. 10, 2000, entitled "Highlevel Active Pen Matrix".

The present application is also related to application Ser. No. (Atty docket 3797.00066), entitled "Method and Apparatus For Improving the Appearance of Digitally Represented Handwriting", filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00069), entitled "Selection Handles in Editing Electronic Documents", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00070), entitled "Insertion Point Bungee Space Tool", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00072), entitled "Simulating Gestures of a Mouse Using a Stylus and Providing Feedback Thereto", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00074), entitled "System and Method For Accepting Disparate Types Of User Input", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00075), entitled "In Air Gestures", and filed concurrently with the present application; to application Ser. No. (Atty docket 3797.00076), entitled "Mouse Input Panel Windows Class List", and filed Nov. 10, 2000; to application Ser. No. (Atty docket 3797.00077), entitled "Mouse Input Panel and User Interface", and filed Nov. 10, 2000; and to application Ser. No. (Atty docket 3797.00079), entitled "System and Method For Inserting Implicit Page Breaks", and filed Nov. 10, 2000; each of which is incorporated by reference herein.

FIELD OF THE INVENTION

Aspects of the present invention are directed generally to apparatus and methods for controlling a graphical user interface (GUI). More particularly, the present invention relates to receiving user input, determining based on the user input what the user wants to do, and performing a function related to the desired input.

BACKGROUND OF THE INVENTION

Typical computer systems, especially computer systems using graphical user interface (GUI) systems such as Microsoft WINDOWS, are optimized for accepting user input from one or more discrete input devices such as a keyboard and for entering text, and a pointing device such as a mouse with one or more buttons for driving the user interface. Virtually all software applications designed to run on Microsoft WINDOWS are optimized to accept user input in the same manner. For instance, many applications make extensive use of the right mouse button (a "right click") to display context-sensitive command menus. The user may generate other gestures using the mouse such as by clicking the left button of the mouse (a "left click"), or by clicking the left or right button of the mouse and moving the mouse while the button is depressed (either a "left click drag" or a "right click drag").

In some environments, a mouse is not usable or desirable. For example, in a digitizer tablet environment, the primary input device may be a stylus. While a stylus attempts to provide pad and paper-like feel to a computing environment, current systems are limited. For example, the use of a stylus in a graphical user interface is limited to tapping on various items for selection. See, for example, the Palm-series of products using the Palm OS 3.0 operating system. Further,

in stylus-based input environments, a user is continually forced to select tools or operations from a remote tool bar, generally on a top or bottom of a screen. While a user can type in letters or have the digitizer recognize handwriting, these operations require selecting a keyboard input mode and writing in a predefined portion of the digitizer, respectively. In short, requiring a user to tell the computer, for every new input, what a user wants to do makes stylus-based computing difficult for the average user. Accordingly, stylus based inputs have been relegated to personal data assistants (PDAs) where significant user input is not possible. Mainstream computing still requires the use of at least a keyboard and mouse (or mouse-based input device, for example, trackballs, touch-pads, and other mouse substitutes).

Accordingly, a need exists for permitting a user to perform all operations of a mouse-type device using a stylus.

SUMMARY OF THE INVENTION

As discussed in the various copending patent applications incorporated herein by reference, aspects of the present invention are directed to a tablet-like computer that allows users to directly write on a display surface using a stylus. The display surface may physically, optically, and or electro magnetically detect the stylus. The computer may allow the user to write and to edit, manipulate, and create objects through the use of the stylus. Many of the features discussed in these copending applications are more easily performed by use of the various aspects of the present invention discussed herein.

An aspect of the present invention is directed to methods and apparatus for simulating gestures of a mouse by use of a stylus on a display surface. The present invention determines the operation a user wants to perform based on the user's input. This determination may include reference to other information including the location of the user's input on a digitizer (e.g., location on a screen) and the status of other objects or elements as displayed. By using this information, the system determines what the user wants to do and implements the action.

A number of inputs with a stylus are possible. For example, a user may Lap a stylus, stroke the stylus, hold the stylus at a given point, or hold then drag the stylus. Other inputs and combinations are possible as noted by the above-identified applications, which are expressly incorporated herein by reference.

In response to a stroke operation, the system may drag an object, may maintain a current state or operation, or perform inking. Inking may include writing, drawing, or adding annotations as described in greater detail in U.S. Ser. No. 60/212,825, filed Jun. 21, 2000, entitled "Methods for Classifying, Anchoring, and Transforming Ink Annotations" and incorporated by reference.

As to a tap operation, the system may add to existing writing, may select a new object, insert a cursor or insertion point, or may perform an action on a selected object.

As to a hold operation, the system may simulate a right mouse button click or other definable event.

As to a hold and drag operation, the system may drag a selected object or perform other functions.

These and other features of the invention will be apparent upon consideration of the following detailed description of preferred embodiments. Although the invention has been defined using the appended claims, these claims are exemplary in that the invention is intended to include the elements and steps described herein in any combination or subcommunications link between the computers can be used. The existence of any of various well-known protocols such as TCP/IP, Ethernet, FTP, HTTP and the like is presumed, and the system can be operated in a client-server configuration to permit a user to retrieve web pages from a web-based server. Any of various conventional web browsers can be used to display and manipulate data on web pages.

FIG. **2** illustrates a tablet PC **201** that can be used in accordance with various aspects of the present invention. Any or all of the features, subsystems, and functions in the system of FIG. **1** can be included in the computer of FIG. **2**. Tablet PC **201** includes a large display surface **202**, e.g., a digitizing flat panel display, preferably, a liquid crystal display (LCD) screen, on which a plurality of windows **203** is displayed. Using stylus **204**, a user can select, highlight, and write on the digitizing display area. Examples of suitable digitizing display panels include electromagnetic pen digitizers, such as the Mutoh or Wacom pen digitizers. Other types of pen digitizers, e.g., optical digitizers, may also be used. Tablet PC **201** interprets marks made using stylus **204** in order to manipulate data, enter text, and execute conventional computer application tasks such as spreadsheets, word processing programs, and the like.

A stylus could be equipped with buttons or other features to augment its selection capabilities. In one embodiment, a stylus could be implemented as a "pencil" or "pen", in which one end constitutes a writing portion and the other end constitutes an "eraser" end, and which, when moved across the display, indicates portions of the display are to be erased. Other types of input devices, such as a mouse, trackball, or the like could be used. Additionally, a user's own finger could be used for selecting or indicating portions of the displayed image on a touch-sensitive or proximity-sensitive display. Consequently, the term "user input device", as used herein, is intended to have a broad definition and encompasses many variations on well-known input devices.

Region **205** shows a feed back region or contact region permitting the user to determine where the stylus as contacted the digitizer. In another embodiment, the region **205** provides visual feedback when the hold status of the present invention has been reached.

FIGS. **3**–**7** show various flowcharts for determining what a user wants to do based on a user's interaction with the digitizer. As will be discussed below, the user contacts the digitizer where the user wants to begin writing, tapping, annotating, dragging, etc. In the case where the digitizer is superimposed over a display, the user's contact with the digitizer is directed at operating at (or near) the contact point between the user's stylus and the currently displayed information at or near the contact point.

In step **301**, the system senses a contact or other indication of an action. In one embodiment the contact may be the stylus contacting the surface of the digitizer. In another embodiment, the action may be bringing the tip of the stylus near the digitizer's surface. Further, if the stylus includes another signaling method (for example, a radio transmitter transmitting a signal to the digitizer signaling a user's input), the digitizer (or related input mechanism or mechanisms) interpret the received signal as a user's input. Other methods of starting an operation or writing or contact with a digitizer are known in the art. For purposes of illustration and description, the system and method reference physical contact with the digitizer. All other ways of providing signals to a processor are considered within the scope of the invention and are not mentioned here for simplicity.

In step **302**, the system determines the contact position and what lies beneath the contact position (for example, an object, a drawing, blank space, ink, and the like). In step **303**, the system determines if the stylus has moved beyond a first threshold (time, distance, rate, or acceleration, and the like). In one embodiment, the threshold is set to the minimum resolvable movement. In another embodiment, the threshold is set higher to account for shaky hands, vibrations of the digitizer or tablet pc (for example, if trying to use the system while driving in a car over a bumpy road). It is noted that objects may have all the same threshold. Alternatively, objects may have different thresholds. This may be dependent on the object, the size of the object, the state of the system, the state of the object, and the like.

If the first threshold has been exceeded, then the system proceeds to step **304** where the user's input is classified as a stroke and the system steps to point A **305**. If the first threshold has not been exceeded, the system determines if the stylus was still in contact with the digitizer when a time threshold had expired in step **306**. If no (meaning that the stylus was not still in contact with the digitizer surface), the system classifies the input as a tap in step **307** and proceeds to point B **308**.

If the stylus was still in contact with the surface after the time threshold in step **306**, the system determines if a second move threshold was exceeded in step **309**. The first and second move thresholds may be identical or different. For example, both may be 0.25 mm. Or, the first may be 0.5 mm or one mm and the second be 0.3 mm. Further, the first may be 1.2 mm or more and the second may be 0.5 mm or more. In short, any values may be used as long as they are not obtrusive to the user. The second threshold may be determined only after the time threshold of step **306** has expired. In this example, the second threshold may be higher than the first threshold (or it may be the same or smaller).

If the second move threshold was not exceeded, then the system classifies the input as a hold in step **310** and proceeds to point C **311**. If the second move threshold was exceeded, then the system classifies the input as a 'hold and drag' in step **312** and moves to point D **313**.

FIG. **4** shows point A as starting point **401**. Here, the system classified the input as a stroke and begins stroke processing in step **402**. In step **403**, the system determines if the stroke started on a draggable object. If yes, the system determines in step **404** whether drag threshold was exceeded (for example, 0.25 inches, 0.25 inches per second and the like). If so, the system classifies the stroke as a drag in step **405** and performs a function that is dependent on the object. For example, the drag may extend a selection as described in greater detail in "Selection Handles in Editing Electronic Documents," filed concurrently with the present application (attorney docket 03797.00069), and expressly incorporated by reference. Also, the drag may operate a bungee tool as described in Ser. No. (Atty docket 3797.00070), entitled "Insertion Point Bungee Space Tool", and filed concurrently with the present application, and expressly incorporated herein.

If, in step **404**, the drag threshold has not been exceeded, the system maintains the current state (with the object being selected or not) in step **407**. If the stroke was not over a draggable object in step **403**, the system determines if the area under the contact point is inkable in step **408**. For example, inkable may mean an area capable of receiving ink (including drawings, annotations, or writing) as detailed in serial No. 60/212,825, filed Jun. 21, 2000, and expressly incorporated herein by reference for essential subject matter. By contrast, a control button (for copy, save, open, etc.) may not be inkable. If inkable in step **408**, the system permits inking (drawing, writing, annotating and other related functions) in step **409**. If not inkable, the system maintains the current state (objects selected or not) in step **407**.

In FIG. **5**A, the system starts at point B **501** and operates on the input as a tap **502**. The system determines whether the tap was on an area or object that is inkable in step **503**. If yes, the system determines whether any ink was recently added or "wet" (for example, less than 0.5 or 1 second old) in step **504**. If so, the system considers the tap as a dot to be added to the ink in step **505** (and adds the dot). If no wet ink exists, then the system determines if the tap was over a selectable object in step **506** It is noted that steps **503** and **504** may be combined. If the tap was over a selectable object, then the system determines if the object was already selected in step **507**. If it was not, then the system selects the tapped object in step **508**. If a previous object had been selected, the system cancels the previous or old selection in step **509**. If the object was previously selected as determined by step **507**, the system performs an action relevant to the object in step **510**. This action may include editing the object, performing a predefined operation (for example, enlarge, shrink and the like). From step **506**, if the tap was not on a selectable object, then the system proceeds to point BB **512**.

FIG. **5**B shows additional processing to FIG. **5**A. As point BB **512**, the system determines if the tap was in a space between text (referred to herein as an inline space) in step **513**. If yes, the system places an insertion point at the tap point in step **514**. As shown in a broken lined box, the system may also cancel any old or previous selections in step **515**. If no, then the system determines if the tap point has ink nearby in step **518**. If the system determines that the tap was nearby ink, then the system adds a dot to the ink in step **516**. If there was an old selection, then the system cancels the old selection in step **517** (as shown by a broken line box).

If not nearby ink in step **518**, the system determines if the tap is on an active object in step **519**. If the tap was not on an active object, the system places an insertion point at the tap point or performs some other definable action in step **520**. Again, if there was an old selection, then the system cancels the old selection in step **521** (as shown by a broken line box). If the tap was on an active object as determined by step **519**, the system performs an action in step **522**. The action may be definable by the user or relate to any function desirable. In one embodiment, the action may be to perform a function to operate a selection handle or bungee space tool as described in "Selection Handles in Editing Electronic Documents," filed concurrently with the present application (attorney docket 03797.00069), and expressly incorporated by reference. Also, the drag may operate a bungee tool as described in Ser. No. (Atty docket 3797.00070), entitled "Insertion Point Bungee Space Tool", and filed concurrently with the present application, and expressly incorporated herein. Other operations are known in the art and incorporated herein.

FIG. **6** relates to holding a stylus beyond a time threshold. Starting from point C **601**, the system classifies the user input as a hold operation in step **602**. Next, the system simulates a right mouse button click or other definable event in step **603**. The functions associated with step **603** are described in greater detail in U.S. application Ser. No. (Atty docket 3797.00072), entitled "Simulating Gestures of a Mouse Using a Stylus and Providing Feedback Thereto", filed Nov. 10, 2000, whose contents are expressly incorporated herein by reference.

FIG. **7** relates to holding a stylus beyond a time threshold and moving the stylus. Starting from point D **701**, the system classifies the user input as a hold and drag operation in step **702**. Next, in step **703** the system drags the selected object as directed by the user.

There are a number of alternatives associated with dragging. If the hold and drag relates to an inline space, the system may use this hold and drag function to select text. Similarly, one may use this function to select a drawing encountered by the dragged stylus. Further, one may select both text and drawings in this manner. Also, the cursor's point may become a selection tool that leaves a trail behind it. In this regard, the user may loop a number of objects, drawing or text in this regard. The looping of the objects may result in the selecting of the objects.

An alternate embodiment of the present invention relates to modifying ink drawings or annotations. For example, if one added an annotation (from step **409**) to text, one may manipulate the text (for example, by inserting new text) and have the annotation track the manipulation of the text. So, if one circled text then added text to the circled text, the annotation would expand to include the added text as well. This is described in relation to in U.S. Pat. Ser. No. 60/212,825, filed Jun. 21, 2000, entitled "Methods for Classifying, Anchoring, and Transforming Ink Annotations" and incorporated by reference.

While exemplary systems and methods embodying the present invention are shown by way of example, it will be understood, of course, that the invention is not limited to these embodiments. Modifications may be made by those skilled in the art, particularly in light of the foregoing teachings. For example, each of the elements of the aforementioned embodiments may be utilized alone or in combination with elements of the other embodiments.

We claim:

1. A method for classifying a user input to a digitizer, comprising steps of:

receiving the user input by the digitizer;

first determining whether the user input moves at least a first distance;

second determining whether the user input ends before a certain amount of time; and

responsive to the user input failing to move at least the first distance within the certain amount of time and failing to end before the certain amount of time, third determining whether the user input moves at least a second distance larger than the first distance.

2. The method of claim **1**, wherein the user input is caused by a stylus contacting the digitizer, and the user input ends when the stylus no longer contacts the digitizer.

3. The method of claim **1**, further including steps of:

responsive to the user input moving at least the first distance as determined by the step of first determining, classifying the user input as a first type of input;

responsive to the user input ending before the certain amount of time as determined by the step of second determining, classifying the user input as a second type of input different from the first type of input; and

responsive to an outcome of the step of third determining, classifying the user input as either a third type of input different from the first and second types of input or a fourth type of input different from the first, second, and third types of input.

4. The method of claim **1**, further including a step of, responsive to the user input moving at least the first distance as determined by the step of first determining, fourth determining whether the input begins on a draggable object.