(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 December 2003 (04.12.2003)

PCT

(10) International Publication Number
WO 03/100590 A2

(51) International Patent Classification[7]: G06F 3/023

(21) International Application Number: PCT/IE03/00037

(22) International Filing Date: 10 March 2003 (10.03.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
S020441 28 May 2002 (28.05.2002) IE

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

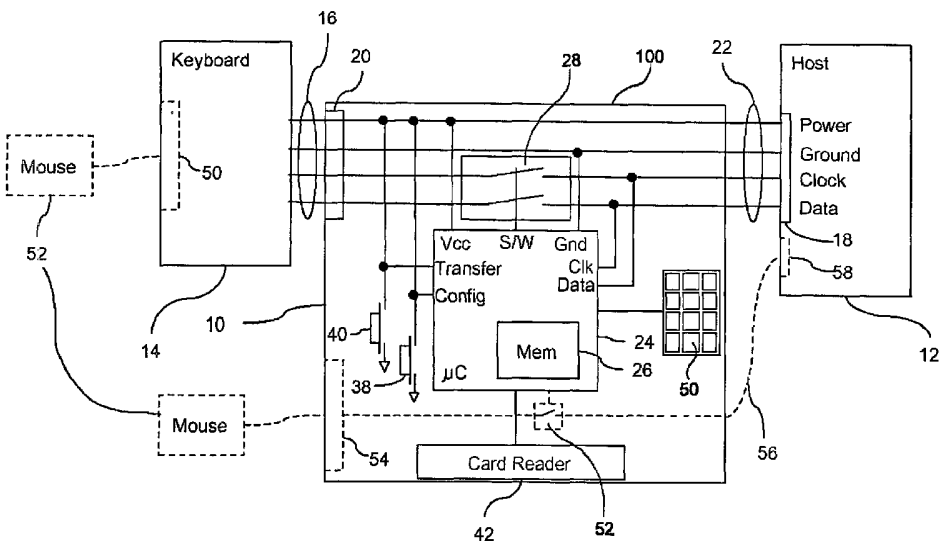
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM,*

[Continued on next page]

(54) Title: A COMPUTER PERIPHERAL



(57) Abstract: A computer peripheral is connectable between a user input device, such as a keyboard 14, and a computer 12 and allows personal data of particular types (e.g. name, address) to be automatically entered into corresponding fields of a software application. The peripheral comprises a microcontroller 24 for monitoring user interactions transmitted from the keyboard to the computer and a memory 26 for storing a type identifier for each field for which data is to be entered. Initially, indications of the field types are entered by a user through the user input device while traversing the corresponding data fields of the application. Subsequently, with the keyboard 14 disconnected by a relay 28 and a "smart" card inserted in a card reader 42, the card containing personal data corresponding to the identified field types, the microcontroller automatically traverses the fields of the software application and enters the personal data read from the medium into the corresponding fields of the application.

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KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A Computer Peripheral

The present invention relates to a computer peripheral.

WO01/18684 (American Express) discloses a method for user profiling of merchant web sites for use with an Internet virtual credit card payment system. In this system, the user client machine has a virtual wallet application which has access to a user's credit card details which may be stored securely either on disk or on a smart-card.

For a "profiled" Internet merchant, the virtual wallet automatically populates the form fields of a merchant check out page with the users credit card and address information.

For an unprofiled site, a user may record a macro when interacting with the check-out page and providing for example, credit card and name and address details. The macro comprising the type of information provided by the user can be supplied as a profile to a server for later use of the web application by other users.

It is also known for general-purpose computers to have separate keyboard and card reader peripherals. Any application running on the computer can be implemented so that when a card is read, the user data stored on the card is imported and used to populate application form fields. Keyboard interaction can then be used to supply the remaining information required by the application.

Both of these solutions, however, require software to be developed and deployed on machines which are to accept user input.

According to the present invention there is provided a computer peripheral for entering data of a particular type into corresponding fields of a software application, the computer peripheral being connectable between a user input device and a computer and comprising:

a microcontroller for monitoring user interactions transmitted from the user input device to the computer;

a memory for storing a type identifier for each field for which data is to be entered, respective indications of the field type identifiers being entered by a user through said user input device while traversing the corresponding data fields of the application;

a reader for a removable storage medium containing personal data corresponding to the identified field types; and

a switch for selectively disconnecting the user input device from the computer;

the microcontroller further being arranged to automatically enter personal data read from the medium into the corresponding fields of the application when the user input device is disconnected.

Preferably the microcontroller is arranged to determine each field type identifier from a particular example of the type of data required by the field and entered by a user.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a diagram of a computer system including a peripheral according to an embodiment of the invention;

Fig. 2 is a block diagram of the system of Fig. 1; and

Fig. 3 is an external perspective view of a peripheral according to the embodiment.

It will be understood that, for clarity, not all discrete circuitry required to implement the particular embodiment has been shown in Fig. 2.

The peripheral of the preferred embodiment comprises a device 10 interposed between a host personal computer (PC) 12 and a keyboard 14, Fig. 1. In the absence of the device 10 the keyboard lead 16 would be plugged directly into a keyboard socket 18 on the computer. However, when the device 10 is used the keyboard 14 is plugged into a keyboard socket 20 on the device 10 and the device includes a lead 22 which is plugged into the keyboard socket 16 of the computer.

Running through the leads 16, 22 from the keyboard 14 to the PC 12 are four conductive wires (lines): Power, Ground, Clock and Data, Fig. 2. The device 10, contained within a housing 100 (see also Fig. 3), includes a microcontroller 24, including related memory 26, which is powered from the Power and Ground lines. Within the device 10 the Clock and Data lines are switched by a relay 28 controlled by a microcontroller output SW. When the relay 28 is open, the keyboard 14 is functionally disconnected from the PC 12. When the relay 28 is closed the keyboard 14 operates as normal. From the PC side of the relay, the Clock and Data lines are connected to respective inputs Clk, Data of the microcontroller, the Data line being bi-directional. When the relay 28 is closed, the microcontroller 24 can listen to (monitor) the keyboard strokes transmitted from the keyboard 14 to the PC 12.

The device 10 further includes two buttons, a Config (configuration) button 38 and a Transfer button 40, which are connected to corresponding microcontroller inputs. Each button preferably has an associated indicator light to show it has been pressed and that that the device is configuring or transferring, as the case may be.

When a software application on the PC 12 is to be profiled, the Config button 38 is pressed (at this point the relay 28 is closed and remains closed). The application will either have been launched previously or is then launched by pressing the button. In the example of Fig. 1, the application requires a user to provide personal details into various data fields 30 of a form 32. In this case, the user traverses each of the form fields and, for each field, inputs an indicator of the type of field at that point. Thus, in the "Name" frame 34 the operator may enter "Title", TAB, "Forename", TAB, "Surname". In the address frame 36 the user may enter "Add_1", TAB, "Add_2", TAB, "City" and so on for the remaining fields. It will be understood that at this stage (i.e. during configuration) the user does not enter data specific to him/herself or to any particular person, but only the generic field types "Forename", "Surname", etc., as indicated above.

When finished the user hits the Config button 38 again. Alternatively, the microcontroller 24 may determine user interaction has completed after a time out following the last keystroke.

During the configuration the microcontroller 24 monitoring the keyboard strokes detects the generic field type information relating each field of the form. So, for example, when the microcontroller detects the key sequence "Title", it knows that a user's title, e.g. Mr/Miss/Ms,

must be inserted into the currently addressed field in the form. This configuration information is stored in the on-board memory 26 within (or possibly outside) the microcontroller.

It will be understood that the microcontroller 24 could also, or alternatively, be programmed to identify the particular field type of the current field 30 by generalisation from specific data provided during configuration and this may make the task of configuration less onerous for a non-technical user. For example, instead of typing "Title", the user may simply type "Mr". The microcontroller 24 would be programmed to determine that the current field 30 is a "Title" field type. Similarly, where "John" or "Mary" were entered the microcontroller 24 would determine from a suitable dictionary or look-up table, which it includes or to which it is connected, that these are forenames, and the microcontroller would therefore determine that the current field 30 is a "Forename" field type. Other examples are ZIP or Post Codes. Where a particular entry is ambiguous, e.g. "London" could be a place or a surname, a display associated with the microcontroller 24 may indicate to the user the various field types associated with that entry and allow selection by the user of a particular one of the field types displayed.

Turning now to the normal operation of the device, when the software application is in the same state as it was when the Config button 38 was first pressed (i.e. displaying the form 32 with blank fields 30), a user introduces a card (not shown) into a card reader 42 connected to the microcontroller 24. This may be a magnetic card or a smart card or indeed any storage medium, not necessarily a card. The card (or other medium) contains personal data relating to the cardholder and, in particular, data, identified by

type, relating to each of the form fields 30. It is referred to in this embodiment simply as a storage card.

The user then presses the Transfer button 40 on the device 10 causing the microcontroller 24 to cause the SW output to open the relay 28. The microcontroller 24 then reads the personal data stored on the card to identify the data required to populate the various fields 30 of the form 32, and generates a corresponding key sequence to drive the Clk and Data outputs to mimic a keyboard output where the key sequence is typed. In the above example, the device 10 might populate the name and address frames by automatically generating the following key sequence:
Mr-TAB-George-TAB-Bush-TAB-1600 Pennsylvania Avenue, etc.

The device 10 may incorporate its own simple (numeric) keyboard 50, to provide for protecting confidential data by keeping it in sectors of the storage card which can only be accessed with a pin code or access password.

If the form 32 requires information which is saved on confidential sectors of the storage card, the device 10 will stop filling in the form at PIN protected fields and will ask for a PIN code, or password. After the correct code is given the device will continue filing in the form. To give increased security the microprocessor 24 can be programmed to stop working after a defined number of incorrect PIN code entries, and the holder of the storage card can stipulate that in that case the card will automatically erase all data.

It will be seen that the invention is not limited to supplying text data. Where a field is to contain, for example, a picture or even to be associated with some form of user biometric identification data, this can be

indicated to the microcontroller during configuration and the information supplied from the microcontroller to the host application via the keyboard port as a series of keystrokes - in much the same way as UUEncoding binary data.

It should be seen that the embodiment described above operates where the software application is at least partly or optionally keyboard driven. Where, for example, only mouse interaction may drive an application, the above embodiment will not operate. The invention can, however, be adapted to operate with an application where information is input through mouse interaction.

Referring now to Figure 2, many current keyboards 14 connect to a host computer 12 via a USB (Universal Serial Bus) port (in this case, the signals Clock and Data are replaced by Data+ and Data-.) Such keyboards often include a USB socket 50 into which a mouse 52 may be connected. In such cases, it will be seen that data indicating the mouse movement is transmitted through the leads 16, 22 and so the controller 24 can be programmed to record mouse movement during configuration of an application and to replay mouse movement during normal operation of the device.

In relation to mouse movement, it should be seen that the indications provided by the mouse are relative x, y movements (as well as mouse button clicks and wheel movements). It is therefore important to ensure that the user begins the normal interaction with an application with the mouse pointer in a position corresponding to the initial mouse pointer position when the device was configured. It is also important to note that in cases like this, if a Windows operating system is used, the window scaling should be the same during normal operation

as during configuration. This can be ensured by, for example, having the user configure the application by first maximizing the window into which information is to be input. The maximizing keystrokes are recorded by the device during configuration and so when replayed during normal operation ensure proper operation of the device.

In a further variation, the keyboard may not have a mouse socket and so the device 10 includes an additional socket 54 into which the mouse lead may be plugged. The socket is connected via a further relay 52 to a further lead 56 through which the device 10 connects to the mouse port 58 of the host computer 12. The microcontroller 24 listens to the mouse communications and disconnects and replays mouse movement in a manner analogous to that described in the case of the keyboard.

It should be seen from the above examples that the invention is applicable to recording and replaying user interaction with a computer through any user input device.

It will be seen that the device buttons Transfer, Config are not strictly necessary to perform the invention and the invention could equally be implemented by having the microcontroller respond to a specific keystroke combination, for example, Alt-F12.

Since the Data line is bi-directional, it is possible for the storage card to store information not directly related to its function as a mimic for form-filling. For example, organising the storage card in different sectors allows the storage of different types of data on the same card. For example, text data, images, medical data, graphic signs, specimen signature or voice samples, etc. This means that the same card can be used as an electronic business card,

access card, library card, electronic prescription, or for personal data storage. In fact it may be used for any purpose which requires the storage of data and the transfer of that data to a standardised form. The card may also be used as a removable drive for a computer, especially if it is adapted for connection to the computer's USB port.

In this regard, it will be seen that there are many applications where the above described aspects of the device (mimicing and storage) are cooperable. For example, if an application required a user to provide a file which was stored on the card when acting as a removable drive, the application could be set up to have the interaction required to import the file into the application mimiced by the device e.g. by supplying the keystrokes:

Alt-FI filepath <CR>

where Alt-FI mimics the keys required to select a file import menu option; and filepath includes the drive identifier for the card and the required filename. It will be seen that this provides a simpler mechanism for extracting information from the card than for example specially coding information for transmission through the keyboard interface. It also requires no changes to the application software requiring the file.

Individual sectors on the card can be dedicated to store specific data, which can be assessed only with a pin code. This means that, for example, a credit card company can reserve a sector on the card and store the credit card code on the chip. By the use of a mathematical algorithm the code can be automatically "on chip" changed after each operation if required. Thus, in the event of any suspect activity the data on the card can be automatically erased. As a result the code on the electronic card is much more

secure than on the magnetic strip of a traditional credit card.

Essentially this means that the private card of "John Smith" can simultaneously be his card with all his personal data and photograph, access card to the office, medical insurance card with all results of his medical tests, hotel discount card, parking card, credit card, etc. Therefore, apart from the primary use of the card as a mimic for form filling, there is scope for the storage and usage of a wide variety of data for different purposes.

The amount of data to be stored on the card is limited only by storage capacity of the card's chip (which is expanding together with technological progress). The primary system is completely open to the incorporation of any computer technology changes.

The invention is not limited to the embodiments described herein which may be modified or varied without departing from the scope of the invention.

Claims

1. A computer peripheral for entering data of a particular type into corresponding fields of a software application, the computer peripheral being connectable between a user input device and a computer and comprising:

a microcontroller for monitoring user interactions transmitted from the user input device to the computer;

a memory for storing a type identifier for each field for which data is to be entered, respective indications of the field type identifiers being entered by a user through said user input device while traversing the corresponding data fields of the application;

a reader for a removable storage medium containing personal data corresponding to the identified field types; and

a switch for selectively disconnecting the user input device from the computer;

the microcontroller further being arranged to automatically enter personal data read from the medium into the corresponding fields of the application when the user input device is disconnected.

2. A computer peripheral as claimed in claim 1, wherein the microcontroller is arranged to determine each field type identifier from a particular example of the type of data required by the field and entered by a user.

3. A computer peripheral as claimed in claim 1 or 2, wherein the user input device is at least one of a keyboard and a mouse.

4. A computer peripheral as claimed in claim 3, wherein the user input device includes both a keyboard and a mouse.

5. A computer peripheral as claimed in claim 4, wherein the mouse is connected in series with the keyboard.

6. A computer peripheral as claimed in claim 4, wherein the mouse is connected in parallel with the keyboard.

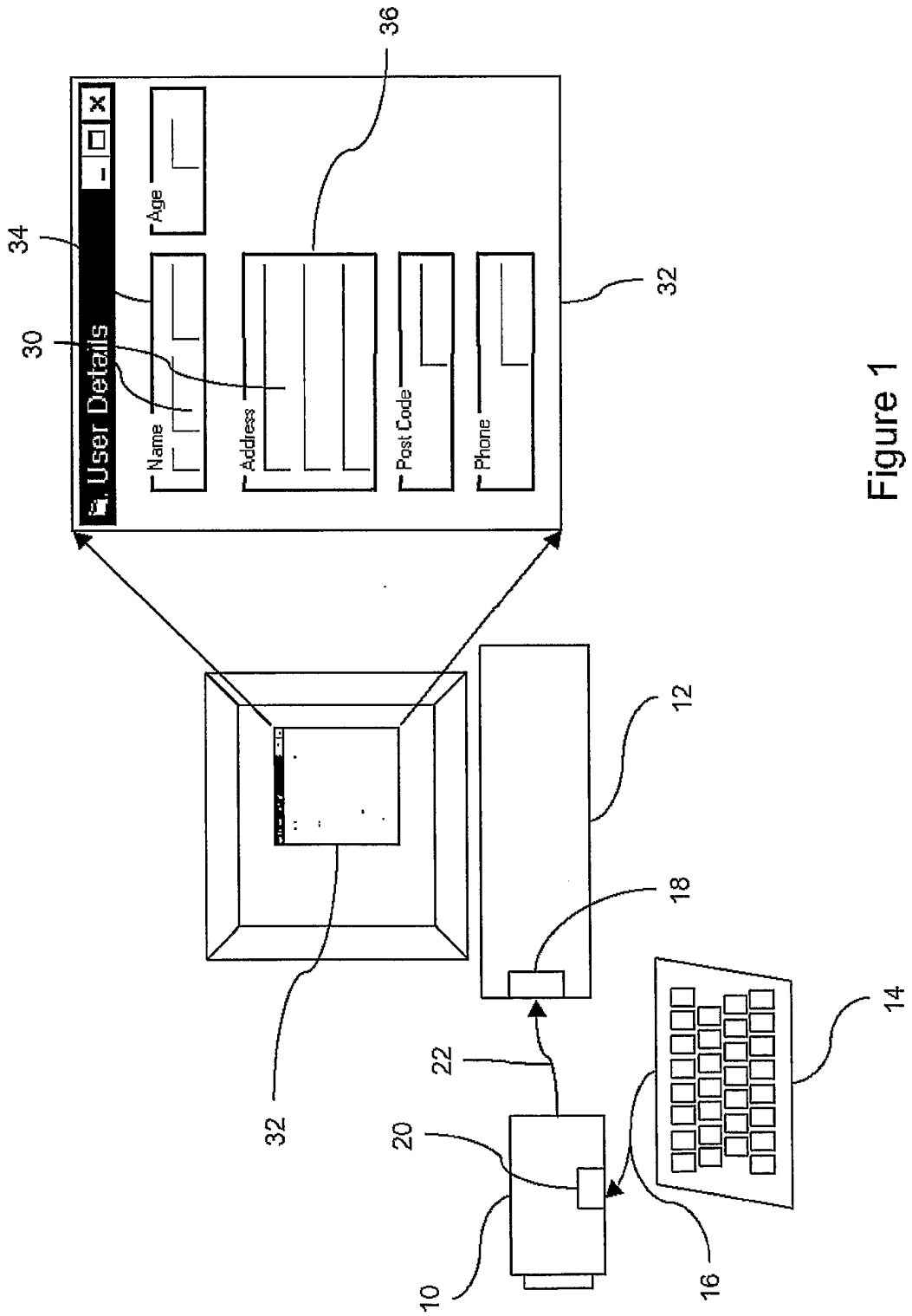
User Details
Name
Address
Post Code
Phone
Age
36
34
30
32
12
18
22
20
10
16
14
32

Figure 1

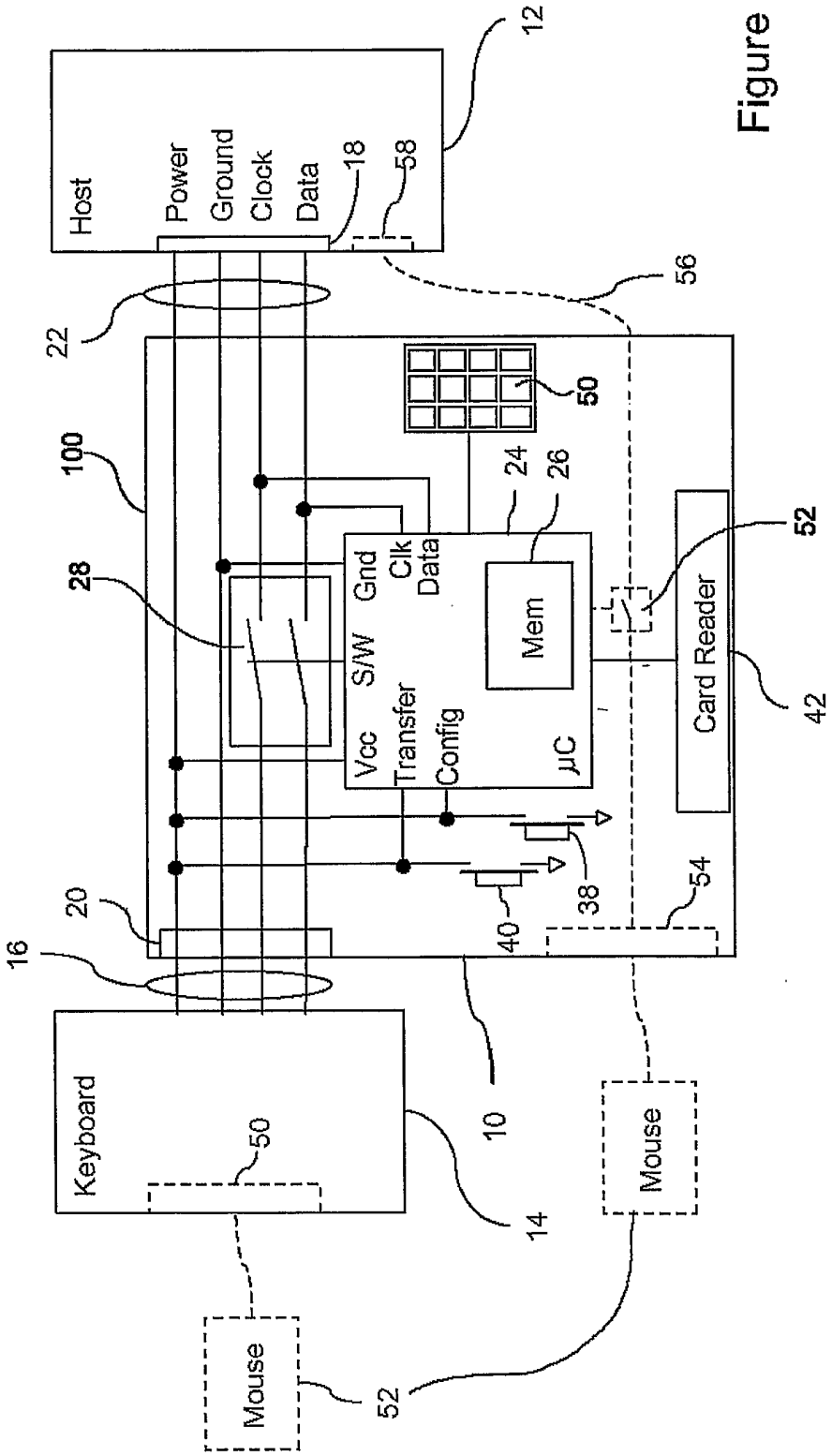
Host
Power
Ground
Clock
Data
18
58
12
56
22
50
100
24
26
28
Gnd
Clk
Data
S/W
Mem
52
Vcc
Transfer
Config
µC
Card Reader
42
20
16
38
54
40
Keyboard
50
10
14
Mouse
Mouse
52

Figure 2

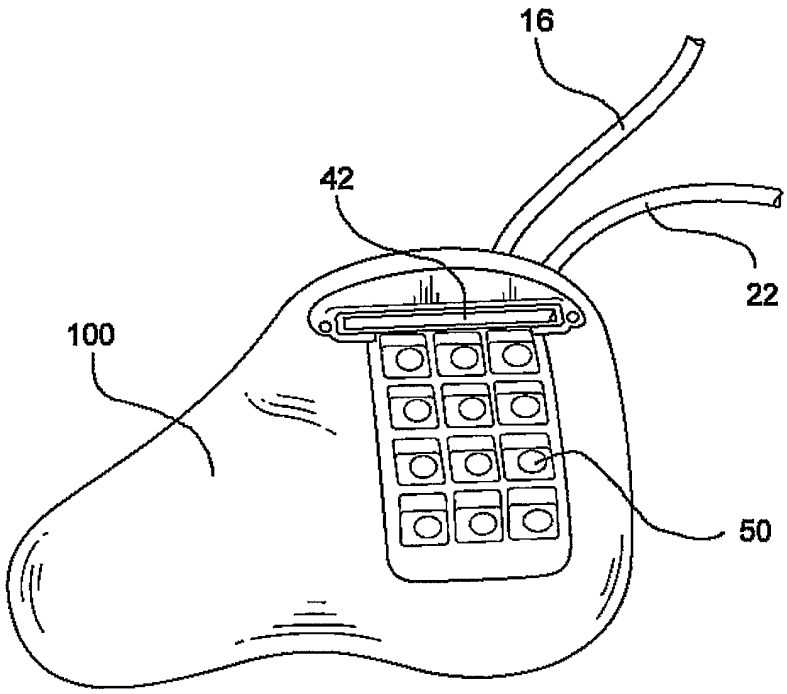

Figure 3