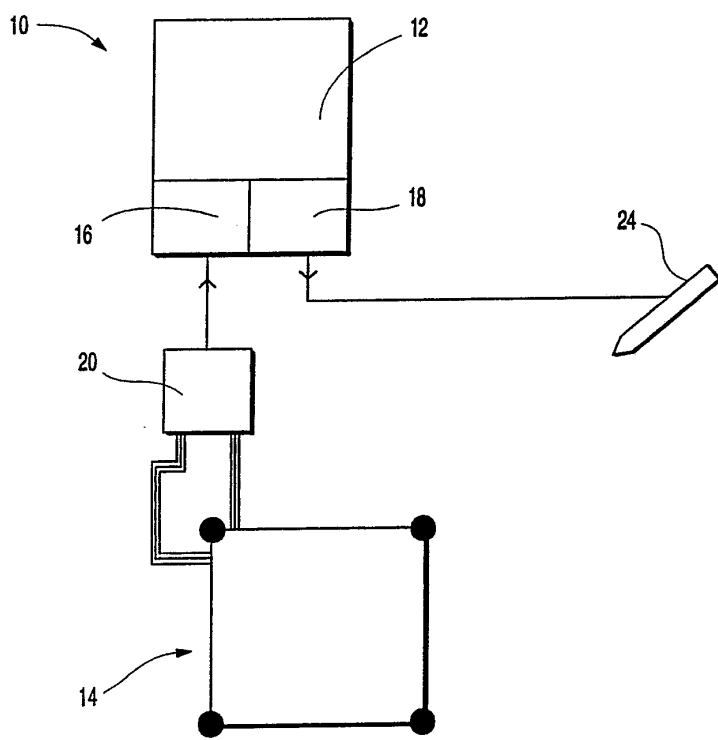




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(54) Title: INPUT DEVICE WITH TACTILE FEEDBACK



(57) Abstract

A computer system comprising means for displaying output to the user and means for enabling a user to provide input by selecting positions on the input means characterised by means for providing tactile feedback to a user according to the selected positions.

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INPUT DEVICE WITH TACTILE FEEDBACK

The present invention relates to computer user
5 interfaces.

Presently available computer user interfaces are many
and varied. Several graphical user interfaces are available
and most of these are windows-based, eg, XWindows,
10 MSWindows. Generally, particular areas of the screen have
special significance in enabling the user to make selections
and perform tasks. For example, the user may be presented
with soft function keys, icons representing applications or
work items, windows having borders with sections for sizing,
15 scrolling, etc. Often, selection of such screen areas is
accompanied by visual feedback for the user, such as a
colour change or flashing effect. It is also known to
provide audible feedback in some systems, such as a
selection of particular icons.

20

It is also common to provide an accessory for enabling
a user to provide input to a computer system, such as a
touch screen overlay or a digital tablet. In the case of a
digital tablet or other input accessory separate from the
25 output display screen the user may make selections by
touching the surface of the accessory. The surface of the
accessory may correspond to the screen surface to allow a
user to make selections from displayed output or may be
independent of the displayed output, eg, in a CAD system.

30

The present invention aims to provide an improvement
relating to computer user interfaces.

According to the present invention we provide a
35 computer system comprising means for displaying output to a
user and means for enabling a user to provide input by
selecting positions on the input means characterised by

means for providing tactile feedback to a user according to the selected positions.

5 The provision of tactile feedback enhances a user interface from the human perspective and can be used to provide additional information to the user.

10 Preferably, the system comprises means for varying the tactile feedback according to the selected positions. For example, the tactile feedback given when a user selects a soft function key may be different from that given when an icon is selected.

15 In the embodiments to be described, the system comprises means for providing vibrational tactile feedback to a user. Preferably, the system comprises means for varying the frequency and/or amplitude of the vibrational tactile feedback according to the selected positions. Humans are sensitive to low frequency vibration and a
20 preferred system comprises means for giving vibrational tactile feedback at a frequency of less than 200 Hertz to a user.

25 The feedback may be continuous vibrational feedback or pulsed vibrational feedback. In the latter case, varying the pulse envelopes may alter the effect experienced by a user.

30 Preferably, the system comprises means for varying one or more characteristics of the vibrational feedback in dependence upon the speed of movement of the user across the surface of the input means. This feature is particularly relevant in providing textural feedback and/or edge effects to a user as the user moves across the surface of the input
35 means.

The system may be configured to enable the user to provide input using a movable input device, such as a stylus or a mouse. In a preferred embodiment, the movable input device comprises means for providing tactile feedback to a user.

The input means may be integral with the screen so that a user can provide input by touching the screen.

Alternatively, the system may comprise input means in the form of an accessory having a surface corresponding to all or part of the screen and configured to enable a user to provide input to the system by touching the surface of the input means. The input means may be adapted to respond to human touch or to the touch of an input device, such as a stylus.

The term "touching" in this context shall be taken to cover close proximity as well as actual contact, eg, a light pen may not need actually to make contact with a screen to have effect.

In a further embodiment to be described, the input means comprises means for providing tactile feedback to a user. Preferably, the system comprises means for vibrating the input means.

The input means may comprise the screen of a touch-screen computer system or a touch-screen overlay for a computer screen. Alternatively, the input means may comprise an accessory, such as a digital tablet.

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

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