(12) International application published based on the Patent Cooperation Treaty

(19) World Intellectual Property Organization International Bureau

(43) International Publication Date
February 14, 2002

PCT

(10) International Publication Number
WO 02/12991 A1

(51) International Patent Classification[7]: G06F3/02, 3/033

(21) International Application Number: PCT/JP01/06680

(22) International Application Date: August 3, 2001

(25) Language of International Application: Japanese

(26) Language of International Publication: Japanese

(30) Priority Rights Data
Patent Application 2000-240473 August 8, 2000 JP
Patent Application 2001-228390 July 27, 2001 JP

(71) Patent Applicant (for all designated countries excluding USA) NTT DoCoMo, Inc. [JP/JP]; **2-11-1, Nagata-cho, Chiyoda-ku**, Tokyo (JP) 100-6150

(72) Inventor; and

(75) Inventor/Applicant *(only for USA)* **Masaaki FUKUMOTO** [JP/JP]; 9-2-12 B-507 **Sugita, Isogo-ku, Yokohama-shi, Kanagawa-ken** 235-0033 (JP). **Toshiaki SUGIMURA** [JP/JP] 3-51-1 E-405 **Nokendai, Kanazawa-ku, Yokohama-shi**, Kanagawa-ken 236-0057 (JP)

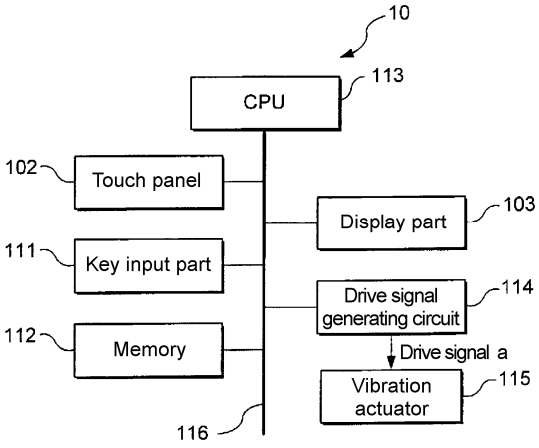
(74) Agent Kenji KAWASAKI; Asahi Patent Office, Toyo Building 7th Floor, 1-2-10 Nipponbashi, Chuo-ku, Tokyo 103-0027 (JP).

(81) Designated countries *(domestic)* AU, CN, KR, SG, US

/Continued below/

(54) Title: ELECTRONIC APPARATUS, VIBRATION GENERATOR, VIBRATORY INFORMING METHOD AND METHOD FOR CONTROLLING INFORMATION

(**54) Title of the Invention: ELECTRONIC APPARATUS, VIBRATION GENERATOR, VIBRATORY INFORMING METHOD AND METHOD FOR CONTROLLING INFORMATION**



102…TOUCH PANEL
103…DISPLAY SECTION
111…KEY INPUT SECTION
112…MEMORY
114…DRIVE SIGNAL GENERATING CIRCUIT
115…VIBRATORY ACTUATOR
a…DRIVE SIGNAL

(57) Abstract: An electronic apparatus generates a vibration by actuating a vibratory actuator upon detecting a fact that an operational input to a touch panel or an operating key is received. The electronic apparatus vibrates the touch panel and the operating key in the direction perpendicular to the surface thereof or vibrates the housing of the electronic apparatus. The vibratory actuator comprises a weight, a member for supporting the weight reciprocating in the air and coupled with a member of the electronic apparatus to be vibrated, e.g. the touch panel or the housing, or the base member of the vibratory actuator abutting on the member to be vibrated, and a mechanism for reciprocating the weight by applying a magnetic force or an electrostatic force thereto.

WO 02/12991 A1

(84) Designated countries (broad): Europe Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

Petition prescribed in Rule 4.17:
- Petition related to disclosure that is not disadvantageous for specifying KR, and exemption for lack of novelty (Rule 4.17 (v))
- Petition related to disclosure that is not disadvantageous for specifying KR, and exemption for lack of novelty (Rule 4.17 (v))
- Petition related to disclosure that is not disadvantageous for specifying KR, and exemption for lack of novelty (Rule 4.17 (v))

Attached publications:
- International Search Report
- Petition related to disclosure that is not disadvantageous, and exemption for lack of novelty

For 2 character codes and other abbreviations, refer to "Guidance Notes for Codes and Abbreviations" included at the beginning of each PCT Gazette

(57) Abstract:

An electronic apparatus drives a vibration actuator when it is detected that an operation input to a touch panel or operation key has been received, and generates a vibration. The electronic apparatus causes vibration of the touch panel or operating key by this vibration in a direction perpendicular to the surface of the touch panel or operating key. Alternatively, the housing of the electronic apparatus is made to vibrate. Furthermore, the vibration actuator contains a weighted body, a supporting member that supports the weighted body in a reciprocally movable manner, and is connected to a vibrated member of the electronic apparatus such as the touch panel or housing, or the like, or to a base member of the vibration actuator that contacts with the vibrated member, and a mechanism that provides a magnetic force or an electrostatic force or the like to the weighted body in order to cause reciprocal movement.

Specification

Title of the Invention: ELECTRONIC APPARATUS, VIBRATION GENERATOR, VIBRATORY INFORMING METHOD AND METHOD FOR CONTROLLING INFORMATION

TECHNICAL FIELD

The present invention relates to a user interface for an electronic apparatus, and to a vibration generating mechanism.

BACKGROUND TECHNOLOGY

Various types of electronic apparatuses such as Personal Digital Assistants (PDA), personal computers, and Automatic Teller Machines (ATM) and the like have a user interface such as, for example, operating buttons, a keyboard, a touch panel, and the like. The user inputs characters through the user interface and inputs operations to the electronic apparatus such as selection of a process to execute, and the like.

Incidentally, mobile electronic apparatuses with a keyboard or operating buttons have poor pressing feel when a key or operating button is pressed because the keys and operating buttons have been made small, lightweight, and thin, in conjunction with the move to reduce the size, weight, and thickness of mobile electronic apparatuses. Therefore, the user must look at the display contents of the screen to confirm whether or not a pressing operation of a key or the operating button has been received by the mobile electronic apparatus.

Furthermore, the touch operation is performed on the touch panel using the fingertip or an accessory pen on electronic apparatuses provided with a touch panel, for example. At this time, if the manner of touching by the fingertip or pen on the touch panel is poor, or if the level of pressing is weak, the touch operation will be ineffective. Therefore, the user still must look at the display contents of the screen to confirm whether or not the touch operation on the touch panel has been received by the electronic apparatus.

Furthermore, there are electronic apparatuses that notify the user that an operation input has been received using a beep sound, but notification by these sounds are mostly ineffective in noisy areas such as when on the town, for example.

DISCLOSURE OF THE INVENTION

An object of the present invention is to provide an electronic apparatus that can easily confirm that an operation input has been received or a response of the electronic apparatus to an operation input, without the user looking at the screen, and also to provide a vibration generator notification method using vibration, and a method of controlling notification.

In order to achieve the aforementioned object, the present invention provides an electronic apparatus containing an operating part that receives an operation input, a vibration generator that provides vibration to a grasping part of the electronic apparatus, and vibration controlling means that generates vibration from the vibration generator when receipt of an operation input to the operating part is detected. Furthermore, the present invention provides a method for notifying by vibration in an electronic apparatus causing vibration of a grasping part of the electronic apparatus by causing generation of vibration from a vibration generator contained in the electronic apparatus, when receipt of an operation input to the operating part is detected.

With the present invention, the electronic apparatus notifies the operator that an operation input was received by vibrating a grasping part of the electronic apparatus.

Furthermore, the present invention provides an electronic apparatus, comprising: an operating part that receives an operation input; a vibration generator that provides vibration to the operating part; and vibration controlling means that generates vibration from the vibration generator when receipt of an operation input to the operating part is detected; the vibration generator comprising: a weighted body; a supporting member that supports in air the weighted body in a reciprocally movable manner, and is connected to the operating part, or a base member of the vibration generator that is in contact with the operating part; and motive force generating means that provides a motive force for causing reciprocal motion in the weighted body. Furthermore, the present invention provides a method of notifying by vibrating an electronic apparatus, comprising: driving a vibration generator contained in the electronic apparatus, and causing vibration of the operating part by causing reciprocal motion in a weighted body supported in air in a reciprocally movable manner by a supporting member that is connected to the operating part or a base member of the vibration generator that is in contact with the operating part.

With the present invention, the electronic apparatus notifies the operator that an operation input was received by vibrating an operating part.

Furthermore, the present invention provides an electronic apparatus containing an operating part that receives an operation input, a vibration generator that provides vibration to an operator, and vibration controlling means that generates vibration from the vibration generator when execution of a process that was instructed by the operation input to the operating part is detected as completed. Furthermore, the present invention provides a method for notifying by vibration in an electronic apparatus comprising: providing vibration to a user by causing generation of vibration from a vibration generator provided in the electronic apparatus when completion of execution of a process instructed by the operating input to the operating part is detected.

With the present invention, the electronic apparatus notifies the operator that execution of the process instructed by the operating input is completed.

Furthermore, the present invention provides an electronic apparatus, comprising: an operating part that receives an operation input; a first vibration generator that provides vibration to the operating part; and a vibration generator that provides vibration to a grasping part of the electronic apparatus; and vibration controlling means that generates vibration from at least one of the first vibration generator and the second vibration generator as specified beforehand by the operator, when receipt of an operation input to the operating part is detected.

Furthermore, the present invention provides a method of notifying by vibration in an electronic apparatus, comprising: providing vibration to an operator by causing generation of vibration from at least one of a first vibration generator that provides vibration to the operating part and a second vibration generator that provides vibration to the grasping part of the electronic apparatus, as specified beforehand by the operator, when receipt of an operation input to the operating part is detected.

With the present invention, the electronic apparatus notifies the operator that an operation input was received by vibrating a region specified beforehand by the operator.

Furthermore, the present invention provides an electronic apparatus, comprising: an operating part that receives an operation input;

a first vibration generator that provides vibration to the operating part; and a vibration generator that provides vibration to a grasping part of the electronic apparatus; detecting means that detects if the electronic apparatus is held by an operator; and vibration controlling means that selects at least one of the first vibration generator and the second vibration generator based on the detection results of the detecting means, and causes vibration of the selected vibration generator, when receipt of an operation input to

the operating part is detected. Furthermore, the present invention provides a method of notifying by vibrating an electronic apparatus, comprising selecting one or more of the first vibration generator that provides vibration to the operating part, provided in the electronic apparatus, and a second vibration generator that provides vibration to the grasping part of the electronic apparatus, based on detection results of a sensor that detects whether or not the electronic apparatus is being grasped by an operator, and provides vibration to the operator by causing generation of vibration from the selected vibration generator, when receipt of an operation input to the operating part is detected.

With the present invention, the electronic apparatus notifies the operator that an operation input was received, by vibrating different regions of the electronic apparatus, based on whether or not the electronic apparatus is being grasped by the operator.

Furthermore, the present invention provides an electronic apparatus, comprising: a display panel with a touch panel overlaid thereon;

a vibration generator provided in the display panel; an elastic member configured using an elastic body, that supports the display panel in a manner that can vibrate by the vibration generated from the vibration generator; and vibration controlling means that causes generation of vibration from the vibration generator when receipt of a touch operation to the touch panel is detected; the vibration generator comprising: a weighted body; a supporting member that supports in air the weighted body in a reciprocally movable manner, and is connected to the display panel or a base member of the vibration generator that is in contact with the display panel; and motive force generating means that provides a motive force for causing reciprocal motion to the weighted body.

With the present invention, the electronic apparatus notifies the operator that a touch operation has been received by causing vibration of the touch panel and the display panel.

Furthermore, the present invention provides an electronic apparatus, comprising: a display panel with a touch panel overlaid thereon;

a vibration generator that provides vibration to the display panel and supports the display panel; vibration controlling means that causes generation of vibration from the vibration generator when receipt of a touch operation to the touch panel is detected; the vibration generator comprising: a weighted body; a supporting member that supports in air the weighted body in a reciprocally movable manner, and is connected to the display panel or a base member of the vibration generator that is in contact with the display panel; and motive force generating means that provides a motive force for causing reciprocal motion to the weighted body.

With the present invention, the electronic apparatus notifies the operator that a touch operation has been received by causing vibration of the touch panel and the display panel.

Furthermore, the present invention provides an electronic apparatus, comprising: a display; a touch panel that covers the display surface of the display; a vibration generator provided between the display and the touch panel, that supports the touch panel on the display screen, and that provides vibration to the display panel; vibration controlling means that causes generation of vibration from the vibration generator when receipt of a touch operation to the touch panel is detected.

With the present invention, the electronic apparatus notifies the operator that a touch operation was received by vibrating an the touch panel.

Furthermore, the present invention provides an electronic apparatus, comprising: a display; a touch panel that covers the display surface of the display; a vibration generator that provides vibration to the touch panel and is installed on the touch panel; a vibration absorbing member provided between the display and the

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.