HUMAN INTERACTION SYSTEMS USING KINESTHETIC FEEDBACK AND OPERATING METHOD THEREOF

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to human interaction systems using kinesthetic feedback and an operating method thereof, and more particularly, to human interaction systems using kinesthetic feedback and an operating method thereof for allowing users of at least two human interaction systems to deliver/receive kinesthetic feedbacks corresponding to their operations to/from each other.

[0003] 2. Background of the Related Art

[0004] Recently, a mobile terminal used for mobile communication or a portable device such as a PMP, a PDP and a navigation system has been widely used. The mobile terminal has a basic function of telephone call or scheduling. However, the utilization range of the mobile terminal becomes wider to reach capturing images through a digital camera attached to the mobile terminal, watching satellite broadcasting and playing mobile games.

[0005] Furthermore, devices and methods that attach a motion sensor to a mobile terminal and handle the motion and tilting of the mobile terminal to operate the mobile terminal without depending only on a keypad composed of buttons or a touch screen are widely spread.

[0006] However, the conventional devices generate only vibratactile feedback corresponding to their motions, such as vibrations generated at a liquid crystal display panel or a keypad. Further, the motion or tilting of the mobile terminal also generates only feedback corresponding to a reaction to the motion or tilting. This limited feedback cannot allow a person to deliver his/her intension to the other person or the two persons to respond to each other.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and it is a primary object of the present invention to provide human interaction systems using kinesthetic feedback and an operating method thereof for allowing users of at least two human interaction systems to deliver/receive kinesthetic feedbacks corresponding to their operations to/from each other.

[0008] To accomplish the above object of the present invention, according to the present invention, there is provided human interaction systems using kinesthetic feedback, which are connected to each other through communication, each human interaction system including a driver driving the human interaction system according to handling of a user and generating kinesthetic feedback; a sensor measuring force, physical quantity and path applied by the driver;

[0009] a converter converting a motion signal of the driver, measured by the sensor, into an electric signal in order to transmit and receive the motion signal; and a communication module transmitting and receiving the electric signal.

[0010] The human interaction systems may use folder type mobile terminals, slide type mobile terminals, or flexible displays.

[0011] The driver may use a DC motor, a linear motor or an SMA and include a brake, such as a magnetic particle brake, a linear brake or a shape memory alloy (SMA), for restricting motions of the human interaction systems.

[0012] The converter **500** includes an encoder encoding motion information measured by the sensor into an electric signal; and a decoder decoding an electric signal received through the communication module. The encoder may correspond to a linear encoder.

[0013] According to another aspect of the present invention, there is provided a method of operating first and second human interaction systems connected to each other through communication, which includes a first step in which a user **10** applies a force to the first human interaction system to handle the first human interaction system; a second step in which a sensor included in the first human interaction system measures the motion magnitude and path of the first human interaction system; a third step of converting a motion signal of the first human interaction system, measured by the sensor, into an electric signal; a fourth step of transmitting the electric signal to the second human interaction system; a fifth step of converting the electric signal received by the second human interaction system into a motion signal; and a sixth step of making the second human interaction system move by the same magnitude and path as those of the motion of the first human interaction system.

[0014] The first through sixth steps may be performed by a DC motor, a linear motor or an SMA.

[0015] The method may further include a seventh step of transmitting kinesthetic feedback corresponding to a force caused by an obstacle or an external force to the first human interaction system when the second human interaction system is obstructed by the obstacle or the external force is applied to the second human interaction system.

[0016] The seventh step includes a first step of applying the external force having magnitude different from that of the motion of the first human interaction system **100** to the second interaction device; a second step in which a sensor included in the second human interaction system measures motion information corresponding to the external force; a third step of converting the motion information into an electric signal; a fourth step of transmitting the electric signal from the second human interaction system to the first human interaction system; a fifth step of converting the electric signal received by the first human interaction system into a motion signal; and a sixth step of providing kinesthetic feedback corresponding to the motion signal to the user.

[0017] The fifth step may include a step of comparing the motion signal received from the second human interaction system with a motion signal generated by the user and moving the first and second human interaction systems to a predetermined position.

[0018] There may be two, three or four human interaction systems. Two or more human interaction systems can be broadcasted via a network.

[0019] According to the present invention, a user can deliver kinesthetic feedback corresponding to his/her motion as well as voices to the other person through a mobile terminal. Accordingly, the user can deliver various feelings in addition to voices. Furthermore, the user can deliver his/her intention to the other person in a conference where the user is restrained from speaking. Moreover, the user can enjoy more realistic games through kinesthetic feedback when performing interaction games through the mobile terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The above and other objects, features and advantages of the present invention will be apparent from the fol-