ing to "S". Subsequently, the user keeps the mobile device in a standstill while pressing and holding down a button **510**. Then, the signal generation unit **230** generates a signal corresponding to "U" according to a combination of the user's key input and motion pattern. Next, the user moves the hand holding the mobile device to the left while pressing and holding down a button **520**. Then, the signal generation unit **230** generates a signal corresponding to "M". Through such operations, the user can enter "SUM".

[**0077**] **FIG. 6** illustrates a character input method using a combination of a user's key input and motion according to a third embodiment of the present invention. In **FIG. 6**, the Korean word "한국" is entered.

[**0078**] When the user moves a mobile device to the right while pressing and holding down a button **600**, a character "ㅎ" is entered. When the user moves the mobile device to the right while pressing and holding down a button **610**, "하" is displayed through the display unit **260**. When the user keeps the mobile device still at least a designated period of time while pressing and holding down a button **620**, "한" is displayed through the display unit **260**. Next, when the user keeps the mobile device in a standstill at least the designated period of time while pressing and holding down a button **630**, a character "ㄱ" is entered. When the user moves the mobile device to the right while pressing and holding down a button **640**, "구" is displayed through the display unit **260**. When the user keeps the mobile device still at least the designated period of time while pressing and holding down the button **630**, "국" is displayed through the display unit **260**. Through such key inputs and motions, the user can enter "한국" in the mobile device such as a mobile phone.

[**0079**] **FIG. 7** is a table illustrating a method of matching a combination of a user's key input and a motion pattern with a function of a mobile phone according to an embodiment of the present invention. When a network button and a motion pattern B are input, a function of connecting the mobile phone to a ringtone setting service through a wireless network is executed in correspondence to the combination. When the network button and a motion pattern M are input, a function of connecting the mobile phone to a mail service through the wireless network is executed in correspondence to the combination.

[**0080**] When a menu button and the motion pattern B are input, a ringtone setting function is executed in correspondence to the combination. When the menu button and the motion pattern M are input, a message input function is executed in correspondence to the combination.

[**0081**] **FIGS. 8A through 8C** illustrate graphs of an output signal of an inertial sensor with respect to a user's motion. **FIG. 8A** illustrates graphs of output signals of an angular velocity sensor and an acceleration sensor, respectively, with respect to a user's leftward motion. **FIG. 8B** illustrates graphs of output signals of an angular velocity sensor and an acceleration sensor, respectively, with respect to a user's standstill motion. **FIG. 8A** illustrates graphs of output signals of an angular velocity sensor and an acceleration sensor, respectively, with respect to a user's rightward motion. Accordingly, three angular velocity sensor output signals and three acceleration sensor outputs are illustrated, and two output signals are illustrated with respect to each motion. Referring to **FIGS. 8A through 8C**, the leftward motion, the standstill motion, and the rightward motion can be distinguished from one another according to an output signal of a sensor.

[**0082**] **FIG. 9** illustrates examples of a user's motion trajectory. **FIG. 10** illustrates graphs of output signals of an inertial sensor with respect to motion trajectories of numbers **0** through **5** among the motion trajectories shown in **FIG. 9**.

[**0083**] Hereinafter, a method by which the pattern recognition unit **220** shown in **FIG. 2** recognizes a motion pattern from a motion signal sensed from a user's motion will be described in detail. The pattern recognition method is usually used as follows.

[**0084**] Firstly, a large amount of data on {Input X, Class C} is collected from a user. Secondly, the collected data is divided into learning data and test data. Thirdly, the learning data is provided to a pattern recognition system to perform learning. Then, model parameters of the pattern recognition system are changed in accordance with the learning data. Lastly, only Input X is provided to the pattern recognition system so that the pattern recognition system outputs Class C.

[**0085**] **FIG. 11** is a block diagram of the pattern recognition unit **220** included in the function input apparatus shown in **FIG. 2**.

[**0086**] Referring to **FIGS. 2 and 11**, the pattern recognition unit **220** recognizes a motion pattern from a motion signal using an artificial neural network **1100**. The pattern recognition unit **220** may recognize one among a plurality of designated motion patterns as a current user's motion pattern using the artificial neural network **1100**. The artificial neural network **1100** is a model obtained by simplifying a neurotransmission process of an organism and analyzing it mathematically. In the artificial neural network **1100**, an operation is analyzed through a sort of learning process in which weights on connections between neurons are adjusted according to the types of connections. This procedure is similar to a procedure in which people learn and memorize. Through this procedure, inference, classification, prediction, etc., can be carried out. In the artificial neural network **1100**, a neuron corresponds to a node, and intensities of connections between neurons correspond to weights on arcs between nodes. The artificial neural network **1100** may be a multi-layer perceptron neural network including a plurality of single-layer perceptrons and may learn using back-propagation learning.

[**0087**] The back-propagation learning is created by generalizing a Widrow-Hoff learning rule to multiple-layer networks and nonlinear differentiable transfer functions and is usually used for character recognition and nonlinear prediction. Each node in a neural network uses one of diverse differentiable transfer functions to generate an output. A log sigmoid transfer function (i.e., logsig) shown in Equation **1** is most widely used.

$$f(x) = \frac{1}{1 + e^{-x}} \tag{1}$$

[**0088**] This function outputs a value ranging from **0** to **1** according to an input value ranging from minus infinity to