TOUCH INPUT DEVICE AND KEYBOARD DEVICE FOR ELECTRONIC DEVICES

FIELD

The following description relates to peripheral input devices. In particular, the following description relates to keyboard devices and touch input devices designed to pair, both by magnetic coupling and wireless communication, with another input device or a computing system. Regarding the magnetic coupling, each of the keyboard device and the touch input device may include one or more magnets. The coupling and pairing allow for device charging and/or software updates, including firmware updates.

BACKGROUND

Touch input devices, such as keyboard devices and touchpads, are used as input mechanisms to electronic devices such as desktop computers and laptop computers. Keyboard devices include an assembly of keys, with each of the keys providing a recognized input, when depressed, to the electronic device. Touchpads include a flat surface designed to receive a touch input by contact with the flat surface using a finger of a user.

SUMMARY

In one aspect, a touch input device suitable for use with a computing system is described. The touch input device may include a housing separate from the computing system. The housing may define an internal volume. The touch input device may further include a touch sensitive layer disposed in the internal volume and covered by a touch input surface configured to receive a touch input. The touch input device may further include a processor that translates the touch input across the touch input surface. The touch input device may further include an inductive charging module disposed in the internal volume and covered by the touch input surface. The inductive charging module can be configured to inductively provide energy by inductive power transmission to an electronic device located on the touch input surface.

In another aspect, a keyboard device suitable for use with a computing system is described. The keyboard device may include a keyboard device housing that includes keys and an internal volume. The keyboard device may further include a magnet disposed in the internal volume and configured to magnetically couple to a magnet of a touch input device. The keyboard device may further include an inductive charging module that includes a transmitter coil disposed in the internal volume and configured to transmit energy by inductive power transmission to a receiver coil of the touch input device.

In another aspect, a method for charging an electronic device that includes a battery and a receiver coil is described. The method may include receiving, at a touch input device, the electronic device. The touch input device may include a touch input surface through which motion across the touch input surface is translated and provided to a computing system. The method may further include generating an alternating electromagnetic field by a transmitter coil located in an internal volume of the touch input device. The method may further include inducing current at the receiver coil when the electronic device is positioned on the touch input surface. In some instances, at least some of the induced current is stored as energy in the battery.

Other systems, methods, features and advantages of the embodiments will be, or will become, apparent to one of ordinary skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description and this summary, be within the scope of the embodiments, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

FIG. **1** illustrates an isometric view of an embodiment of a system that includes a computing system, a keyboard device, and a touch input device, in accordance with some described embodiments;

FIG. **2** illustrates a plan view of the keyboard device and the touch input device shown in FIG. **1**;

FIG. **3** illustrates a schematic diagram of the keyboard device and the touch input device shown in FIG. **2**, in accordance with some described embodiments;

FIG. **4** illustrates a plan view of the keyboard device and the touch input device shown in FIG. **3**, further showing a portable electronic device positioned on the touch input surface;

FIG. **5** illustrates a circuit diagram of showing a transmitter coil transferring power to a receiver coil through an inductive, or wireless, method, in accordance with some described embodiments;

FIG. **6** illustrates a plan view of an embodiment of a wearable electronic device that can be charged by a touch input device described herein;

FIG. **7** illustrates a plan view of an embodiment of a handheld device that can be charged by a touch input device described herein;

FIG. **8** illustrates a plan view of an embodiment of a pointing device that can be charged by a touch input device described herein;

FIG. **9** illustrates a plan view of an alternate embodiment of a keyboard device that includes an internal power supply designed to store energy usable by the keyboard device and/or to charge another device, in accordance with some described embodiments;

FIG. **10** illustrates an isometric view of an alternate embodiment of a touch input device, in accordance with some described embodiments;

FIG. **11** illustrates a cross sectional view of the touch input device shown in FIG. **10**, further showing a portable electronic device positioned on the touch input surface;

FIG. **12** illustrates an isometric view of an alternate embodiment of a touch input device, showing the touch input device having a display assembly positioned substantially across a surface of the touch input device, in accordance with some described embodiments;

FIG. **13** illustrates an isometric view of an alternate embodiment of a system that includes a computing system, a keyboard device, and a touch input device, showing the touch input device used in conjunction with a handheld device, in accordance with some described embodiments;

FIG. **14** illustrates an isometric view of the embodiment of the system shown in FIG. **13**, showing the display assembly of the touch input device presenting input commands based on the program, or software application, in use