

DEVICE IMPLEMENTING METHOD TO TRANSFER POWER BETWEEN EXTERNAL ELECTRONIC DEVICES

TECHNICAL FIELD

Embodiments of the present disclosure relate to a method to transfer power between two or more external battery-powered electronic devices, and more specifically to a device implementing the aforesaid method.

BACKGROUND ART

Despite the widespread availability of battery-powered electronic devices, these devices are completely dependent upon external sources of power, for example a wall socket, to charge their internal batteries for usage and performance of electronic functions.

However, where such an external source of power is not available, the battery-powered electronic device cannot be charged. This is in spite of the fact that there may be many similar battery-powered devices in the vicinity near the battery-powered electronic device which is low in power.

DISCLOSURE OF INVENTION

SOLUTION TO PROBLEM

It may be possible to use a device which allows one battery-powered electronic device to be used as a power source for recharging the battery of another electronic device. For example, an electronic device acting as a Charger may supply power to another electronic device acting as the Chargee. The present invention relates to a device which allows for the transfer of power between electronic devices, such as two battery-powered mobile phones or two battery-powered Personal Data Assistants (PDAs).

In general, the word “Charger”, as used herein, refers to an originating electronic device, for example, a mobile phone or a PDA, which for the purposes of this disclosure, acts as a source of power for the Chargee. In general, the word “Chargee”, as used herein, refers to a destination electronic device, for example, a mobile phone or PDA, which for the purposes of this disclosure, receives power from the Charger.

[Figure 1] is a diagram illustrating a block configuration of the device attached to two external battery-powered electronic devices according the present disclosure. Referring to [Figure 1], the electronic device may include a Host Controller Hardware **2**, a Voltage Regulator **3**, a Microcontroller Device **4**, and peripheral support **5** which may, for example, be either a device or a program on the device, and another Host Controller Hardware **6**. The operation of the device is as follows:

A Host Controller Hardware **2**, for example, a USB connection interface, may provide a source of power from one external electronic device **1** (referred to as the “Charger”) to the device. For example, a mobile phone or PDA acting as a Charger may supply power to the device. Another Host Controller Hardware **6**, for example, another USB connection interface, may provide a source of power to another external electronic device **7** (referred to as the “Chargee”) from the device. For example, a mobile phone or PDA acting as a Chargee may be supplied power from the device.

A Voltage Regulator **3** may control the voltage of the current in the form of power passed from external battery-powered electronic device **1**, via instruction from microcontroller device **4** via instruction from peripheral support **5**. That is, microcontroller device **4** may control the functions for supplying power while communicating with peripheral support **5** which may be, for example, an external electronic device capable of communication or an application and/or program which may be available on either external battery-powered electronic device **1** or external battery-powered electronic device **7** or both simultaneously. Peripheral support **5** may communicate with such a device capable of communication or an application and/or program via, for example, wired or wireless mediums.

Further, the microcontroller device **4** may execute a charging control program to prepare the host controller hardware **2** to receive power from external electronic device **1**, while simultaneously causing host controller hardware **6** to supply power drawn from originating external electronic device **1** to destination external electronic device **7**.

BRIEF DESCRIPTION OF DRAWINGS

For the purposes of explanation, several aspects of the present disclosure are set forth in the following figures.

[Figure 1] is a diagram illustrating a block configuration of the device attached to two external battery-powered electronic devices according the present disclosure; and

[Figure 2] is a diagram illustrating the procedure of charging according to the method embodied in the present disclosure;

[Figure 3] is a diagram illustrating the procedure of the communications handshake and authentication between the Charger and Chargee devices.

BEST MODE FOR CARRYING OUT INVENTION

The operation of the device is illustrated by **[Figure 2]**, which is a diagram illustrating the procedure of charging according to the method embodied in the present disclosure.

Referring to **[Figure 2]**, the device may determine if a Charger source has been connected to Host Controller Hardware **2**, as determined by Microcontroller Device **4**. If there is no device connected to Host Controller Hardware **2**, then the method of charging as embodied in the present disclosure cannot begin.

If there is a device connected to Host Controller Hardware **1**, the device may query as determined by Microcontroller Device **4** if the Charger source is authorized to discharge power to the device. The process for obtaining authorisation to discharge power to the device may be stored electronically in Microcontroller Device **4** in the form of, for example, an electronic program. The behaviour of Microcontroller Device **4** may be varied by Peripheral Support **5**.

If the Charger source is not authorised to discharge power to the device, the device may prompt the user of the device to authorise power discharging from the Charger device, via Microcontroller Device **4** communicated to the Charger source by, for example, a notification displayed electronically on the Charger source. If the device is authorised to discharge power to the device, the device may query as determined by Microcontroller Device **4** if the Chargee is connected to Host Controller Hardware **6**.

If the Chargee is not connected to Host Controller Hardware **6**, the device may prompt the user of the device to connect the Chargee device to Host Controller Hardware **6** by, for example, a notification displayed electronically on the Charger source. If the Chargee is connected to Host Controller Hardware **6**, then Microcontroller Device **4** may signal ready for the communications handshake to take place.

[Figure 3] is a diagram illustrating the procedure of the communications handshake and authentication between the Charger and Chargee devices. Prior to the operation of the device by the procedure of charging according to the method embodied in the present disclosure, a communications handshake and authentication process may take place.

Referring to **[Figure 3]**, the Charger device may, at the command of Microcontroller Device **4**, send, for example, a public certificate to the Chargee device through the established communications channel as illustrated in **[Figure 2]**, provided by the connection of the Charger device to the device via Host Controller Hardware **2**, and the connection between of the Chargee device to the device via Host Controller Hardware **6**.

The Chargee device may compare the public certificate received from the Charger device. If both keys are not similar, the Chargee may send a response to the Charger device via the same established communications channel that the public certificate is incompatible with the Chargee certificate. The Chargee may request a new public certificate which may, for example, be displayed as an electronic message on the Charger device.

If the public certificate received from the Charger device by the Chargee device is similar to the public certificate on the Chargee device, the Chargee device may sign the message containing session variables using the public key on the Chargee device and, for example, a common public certificate as provided by Microcontroller Device **4**. The session variables as mentioned in the previous sentence may include, for example, the requested charge, the voltage amount, and/or a countdown number as may be defined by the Chargee device.

The Charger device may receive the signal message from the Chargee device and may decode the said signal message using, for example, a private key available on the Charger device. The said signal message may be sent from the Chargee device to the Charger device using, for example, the communications channel as set out above. The Charger device may query if the session variables requested by the Chargee device are acceptable by, for example, a program found on the Charger device.

If the session variables requested by the Chargee device not acceptable by the Charger device, the Charger device may reply with a signal message to the Chargee device via, for example, the communications channel as set out above, asking for a new request to be made. This signal message may be displayed on the Chargee device as, for example, an electronically-displayed message on the Chargee device.

If the session variables requested by the Chargee device are acceptable by the Charger device, the device may by Microcontroller Device **4** signal the Voltage Regulator **3** to commence electrical flow at the requested session variables as sent by the Chargee. Power flow may then be transferred and controlled from the Charger device to the Chargee device via the method illustrated in this section.

CLAIMS

- [Claim 1] A method comprising:
- Providing power from one battery-powered electronic device (the “Charger”) to another battery-powered electronic device (the “Chargee”),
- using a device that allows power to pass through from the Charger to the Chargee.
- [Claim 2] The method of Claim 1, wherein allowing power to pass through from the Charger to the Chargee, comprises:
- determining that both Charger and Chargee are connected to the device via Host Controller Hardware respectively;
- a Microcontroller Device signalling that a communications handshake is ready to take place; and
- such a communications handshake and authentication takes place between the Charger and Chargee with session variables as provided for by the user of the device.
- [Claim 3] The method of Claim 2, comprising of the methods as illustrated by [Figure 2] and [Figure 3].
- [Claim 4] A device implementing the method of Claim 1, wherein the electronic device comprises a Host Controller Hardware capable of connection with the Charger, connected to a Voltage Regulator, connected to a Microcontroller Device which may be connected to Peripheral Support, connected to a Host Controller Hardware capable of connection with the Chargee.
- [Claim 5] The method of Claim 2, wherein allowing the communications handshake and authentication to take place, comprises:
- A common public certificate made available to both Charger and Chargee devices which may be imputed into either device by external means;
- A public and private encryption key respectively unique to the Charger;
- A public and private encryption key respectively unique to the Chargee; and
- A Microcontroller Device on the electronic device in Claim 4 which may control all aspects of the device functionality such as to manipulate a Voltage Regulator to certain session variables as defined by the end user on the Charger device.