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Pedersen

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(54) **SYSTEM COMPRISING A PORTABLE ELECTRONIC DEVICE WITH A TIME FUNCTION**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 210 days.

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Foreign Application Priority Data

Apr. 26, 2011 (EP) 11163700

(51) **Int. Cl.**
H04R 25/00 (2006.01)

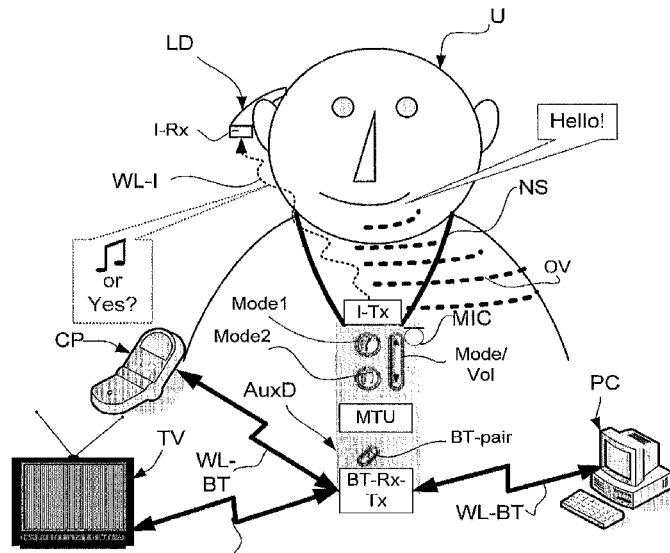
(52) **U.S. Cl.**
USPC **381/315; 381/312**

(58) **Field of Classification Search**
USPC 381/312-315, 320-321
See application file for complete search history.

(57) **ABSTRACT**

A portable electronic device and an auxiliary device each having an interface allowing the establishment of a communication link between them, at least to be able to transmit data representative of a status information from the auxiliary device to the portable electronic device, and-a method of establishing a measure of an absolute elapsed time in a listening device. The problem is solved in that the portable electronic device has a timing unit for determining a time interval and a memory for storing data, and wherein the auxiliary device has a master timing unit for providing a signal representative of the present time, and wherein the system is adapted to transfer a signal representative of the present time from the auxiliary device to the portable electronic device and to store it in the memory.

20 Claims, 3 Drawing Sheets



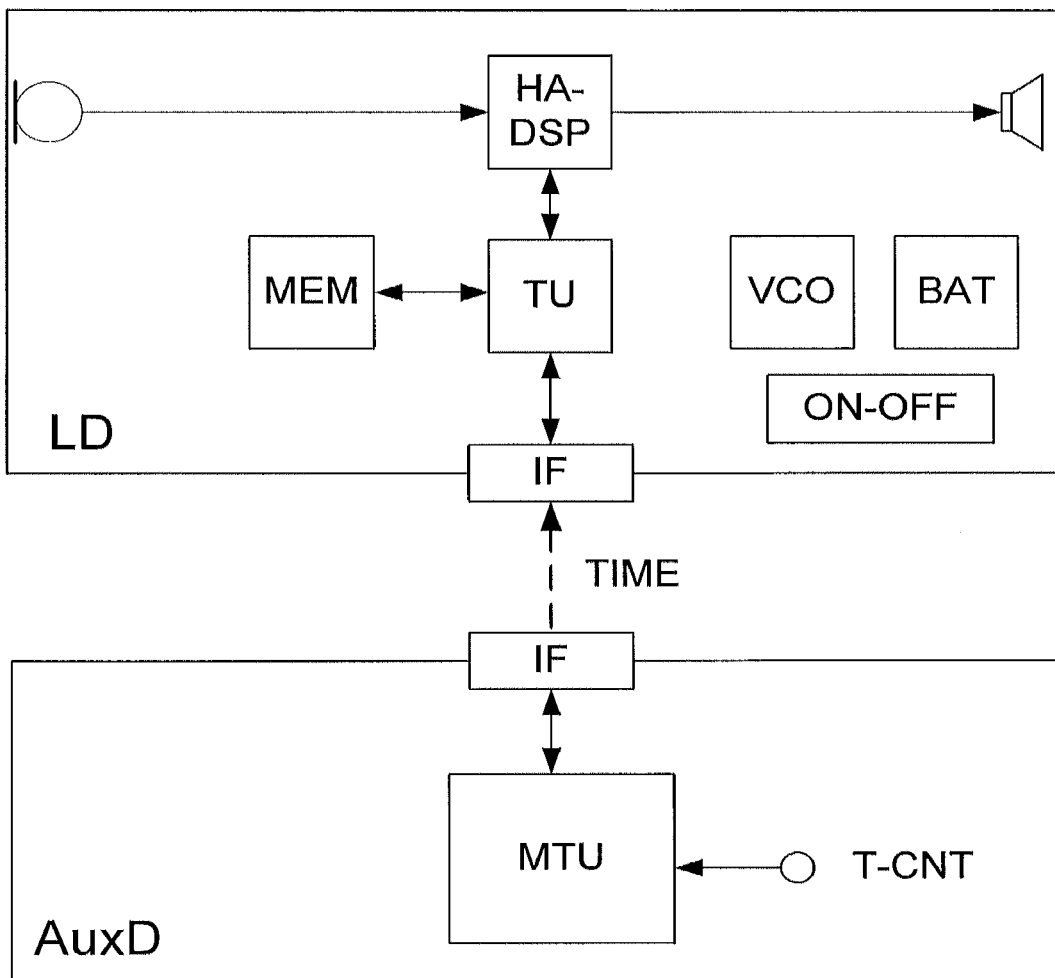


FIG. 1

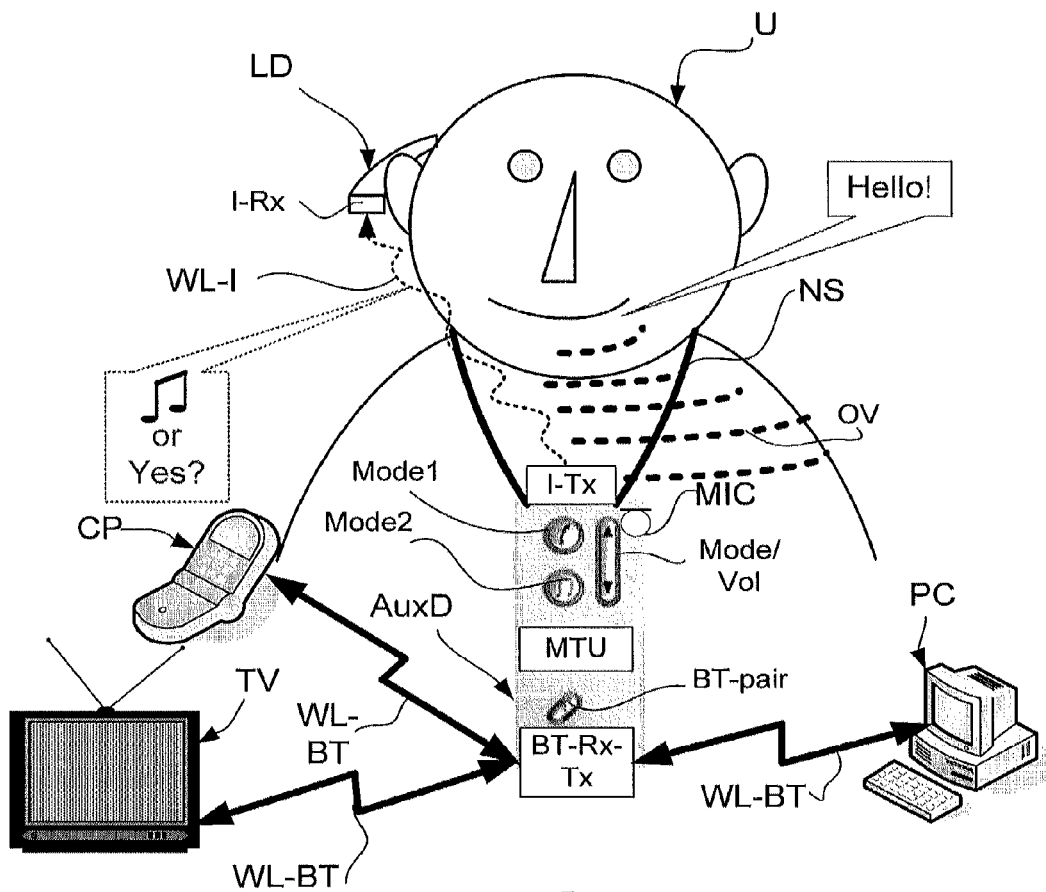


FIG. 2

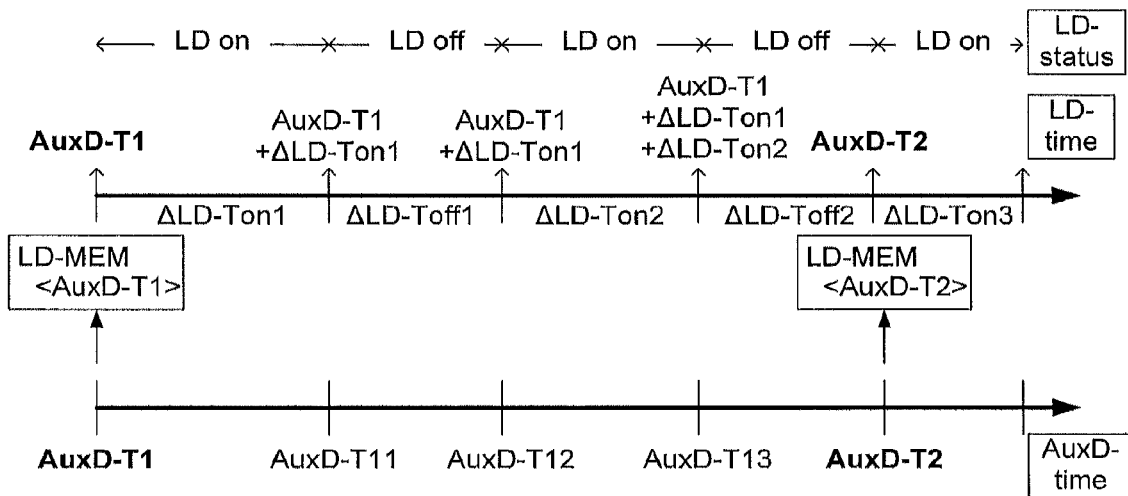


FIG. 3

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SYSTEM COMPRISING A PORTABLE ELECTRONIC DEVICE WITH A TIME FUNCTION

TECHNICAL FIELD

The present application relates to a portable electronic device comprising a local energy source, e.g. a listening device, in particular to the provision of an absolute time indication in such device. The disclosure relates specifically to a system comprising a portable electronic device and an auxiliary device, the portable electronic device and the auxiliary device each comprising an interface allowing the establishment of a communication link between them, at least to be able to transmit data representative of a status information from the auxiliary device to the portable electronic device. The application furthermore relates to a method of establishing a measure of an absolute elapsed time in a portable electronic device.

The disclosure may e.g. be useful in applications where low power consumption is an important issue, e.g. in listening devices, such as hearing aids, headsets, ear phones, active ear protection systems, etc.

BACKGROUND ART

In portable electronic devices, e.g. listening devices, that are turned on and off according to need, in particular battery driven devices, e.g. to conserve power, an account of absolute time elapsed from a given start time (including the time where the device has been turned off) may be difficult to estimate with an appropriate precision in the device without a (power consuming) real time clock circuit.

Some processing algorithms need an estimate of a real time elapsed, which is longer than a typical time of operation (uptime) of the device in question.

An uptime clock for measuring a time in which the device is in operation, and/or a power-up counter for counting a number of power-ups of device may be used to provide an estimate of a real time elapsed. An estimate of a real time elapsed may be based on the uptime multiplied by a predetermined factor, depending on the application of the device in question. Alternatively an estimate of a real time elapsed may be based on the number of power-ups multiplied by a predetermined time-value, depending on the application of the device in question, cf. e.g. US 2009/0154743 A1. These estimates are, however, subject to a substantial uncertainty due to the variance in use of the device from person to person and/or over time (e.g. from day to day).

US 2002/0044669 A1 describes a hearing aid adapted for detecting whether it is located in the immediate vicinity of an external transmitter with and thereby automatically choosing a hearing aid program depending on the external transmitter. In addition, the current time of day and the day of the week may influence the choice of the active hearing aid program.

US 2006/0023904 A1 describes a hearing aid adapted for emitting a voice signal to announce the current time of day. Preferably only the voice signal for the current time of day is saved in the hearing aid and to constantly update this voice signal by means of an external transmitter, preferably a remote controller. In this way, less memory space is thus required in the hearing aid for the time announcement.

DISCLOSURE OF INVENTION

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portable electronic device and adapted to transfer time information to the portable electronic device. The auxiliary device may be a stand-alone device or e.g. be integrated with a battery charger, a cell phone, an audio gateway, an FM transmitter or a storage box or other device which the portable electronic device is expected to occasionally encounter. An internal clock of the portable electronic device can thereby be adjusted every time the portable electronic device is located near (the or) a matching auxiliary device. The term 'when the portable electronic device is located near the (or an) auxiliary device' is in the present context taken to mean whenever the two devices are able to communicate with each other (e.g. within an operational range of communication of a wireless link between them or when the two devices are electrically connected, e.g. via a galvanic connection).

This has the advantage that the daily use and non-use pattern can be estimated. A further advantage is that an absolute elapsed time (extending over a continuous time of operation of the device) including down-time of the device, where the device is in a non-operational state (e.g. turned off) can be estimated. Algorithms or detectors needing information about elapsed time extending over more than a normal time of operation of the device, e.g. more than 8 hours or more than one day can thereby receive a more reliable input.

The time synchronization with the portable electronic device can be established through a wired connection, e.g. where the auxiliary device form part of a charger or it can be established via wireless connection, e.g. where the auxiliary device form part of a storage box or an audio gateway or a cellular telephone or the like.

An object of the present application is to make available a system and a method wherein an improved absolute time estimate is provided in a portable electronic device. It is an object of embodiments of the disclosure to provide an improved estimate of a time interval in a portable electronic device, said time interval being larger than an operating time of the portable electronic device from a power-on-time to a power-off-time.

Objects of the application are achieved by the invention described in the accompanying claims and as described in the following.

A system comprising a portable electronic device:

An object of the application is achieved by a system comprising a portable electronic device and an auxiliary device, the portable electronic device and the auxiliary device each comprising an interface allowing the establishment of a communication link between them, at least to be able to transmit data representative of a status information from the auxiliary device to the portable electronic device, wherein the portable electronic device comprises a timing unit for determining a time interval and a memory for storing data, and wherein the auxiliary device comprises a master timing unit for providing a signal representative of the present time, and wherein the system is adapted to transfer said signal representative of the present time from the auxiliary device to the portable electronic device and to store it in said memory.

This has the advantage that an elapsed time, including a time where the portable electronic device has been turned off, can be estimated by the device itself.

Preferably, the portable electronic device is adapted for monitoring and storing an operating time from a power-on-time to a power-off-time of operation of the portable electronic device.

Preferably, the system is adapted to transfer a signal representative of the present time from the auxiliary device to the

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