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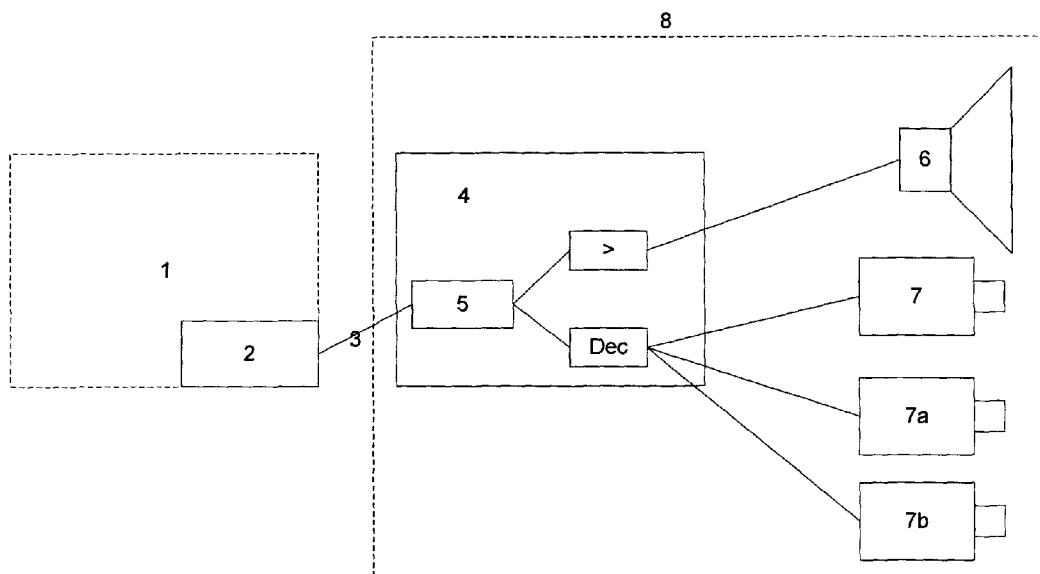
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(54) Title: METHOD FOR CONTROLLING AN EXTERNAL DEVICE VIA THE USB-PORT OF A PERSONAL COMPUTER

(57) Abstract: A method to connect an external device to a personal computer (1) via the USB port (2) in order to make the external device produce a sound and move in synchronisation with the sound. The external device comprises a USB audio chip (5) which will be recognised automatically by the computer's operating system (normally Windows). When a coded audio segment is played by a program on the computer the data is sent to the audio chip. The data is converted to an analogue stereo audio signal. The first channel is amplified and reproduced by a loudspeaker provided in the external device. The second channel which contains a control signal is decoded and used to make the external device move.

METHOD FOR CONTROLLING AN EXTERNAL DEVICE VIA THE USB PORT
OF A PERSONAL COMPUTER

        The present invention relates to a method for
5   controlling an external device by means of a computer,
    using an audio signal.
        The use of an audio signal for controlling an
    external device is very convenient, because, provided it is
    used in the manner described herein, no special software or
10 drivers are needed for controlling the external device. The
    method is in particular attractive in those cases in which
    the external device must also be capable of producing
    sound. The invention is tailored to this aspect. An example
    of such a device is a doll which can move as well as speak,
15 which production of sound and which moving must be
    synchronised, for example speaking and moving the doll's
    mouth.
        Usually an I/O port of the computer (for example a
    COM port, the parallel port or the USB port) is used for
20 such control. It is also possible to make use of a special
    interface card (a so-called digital I/O card). In addition
    to that, the sound signal from a sound card is used in that
    case for having the external device produce sound. This
    approach requires special software, which controls the
25 sound card and the I/O port or interface card in
    synchronisation with each other so as to synchronise the
    movement and the production of sound of the external
    device. Furthermore, several connections between the
    computer and the external device are required (one for the
30 digital I/O and one for the sound). In any case, there is
    always the difficulty to send a control signal and a sound
    signal simultaneously to the hardware from a programme.
        The object of the invention is to have an external
    device make movement and produce sound in a simple manner
35 via the USB (Universal Serial Bus) port of a computer.

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The external device is to that end connected to the
USB port of the personal computer. A standard USB audio
chip is incorporated in the external device. Such a chip,
of which several models are commercially available, for
5   example the CM102 and the CM108 of C-Media
(www.cmedia.com.tw) is recognized as standard as an "audio
device" by Windows and Macintosh operating systems and,
once connected, will automatically make the sound that the
computer wants to play available as an audio signal in the
10   external device.

Of said stereo audio signal, one channel (for example
the left-hand channel) is amplified and reproduced by means
of a loudspeaker in the external device. The other channel
(the right-hand channel in this example) is decoded by the
15   electronics in the external device and the information is
used as control commands for the external device, for
example for turning lights on and off or for moving the
mouth, the arms, the legs or the eyes.

To that end the sound that is played (also called
20   "sample") must first be encoded, with audio signals being
placed on one channel and control commands being placed on
the other channel. Said control commands are generated by
forming groups of different sinuses having different
frequencies for encoding "ones" and "zeros".

25   In this way a doll, for example, can speak and make
controlled movements by playing sound.

The advantage of this method is that controlling the
external device only requires the playing of sound on the
computer. The fact is that very much software supports the
30   playing of sounds. Think in this connection of
screensavers, Windows theme sounds, Web pages on the
Internet, Messaging programmes, media players, educative
programmes, etc, etc. All these programmes can be used for
controlling the external device merely by adapting the
35   audio signal (the sample).

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A second advantage is that a separate driver is not needed, as most Operating systems (Windows and Macintosh, among other systems), support the USB audio chip as standard.

A third advantage is that the method is very robust; even after compression (for example MP3 compression or WMA compression) the sinuses of the control commands are still recognized by the electronics in the external device.

Another advantage is that the external device can make use of the power supply on the USB port and consequently does not require its own power supply (adapter or batteries).

The method will not be explained with reference to figures 1 and 2, in which:

Reference numeral 1 indicates the computer, numeral 2 indicates the USB port, numeral 3 indicates the USB cable connected to the USB port, numeral 4 indicates the electronics in the external device 8, numeral 5 indicates the USB audio chip in the electronics 4, numeral 6 indicates the loudspeaker, numerals 7, 7a, 7b etc indicate the motors and the solenoids via which the external device 8 can be made to move, numeral 8 indicates the external device itself, numeral 9 indicates a digital sound fragment, numeral 10 indicates control commands comprising sinuses or other waveforms characterising ones and zeros, and numeral 11 indicates the encoded stereo sample.

The method works as follows:

A programme in the computer 1 wants to play an encoded stereo sample in order to thus cause the external device 8 to move and produce sound in synchronisation therewith. The operating system (Windows or Macintosh) will send said encoded stereo sample to the USB audio chip 5 of the electronics 4 via the USB port 2. The USB chip 5 will

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subsequently convert said digital sample into an analog
stereo audio signal. One channel of said analog stereo
audio signal is amplified in the electronics 4 (>) and sent
to the loudspeaker 6. The other channel is decoded in the
electronics 4 (DEC), and the data is used for controlling
the motors and solenoids 7, 7a, 7b, etc. The external
device 8 will now move and produce sound in synchronisation
therewith.

The encoding of the stereo sample will now be
explained with reference to figure 2:
A mono digital sound fragment 9 is placed on the one
channel of a stereo sample. The control commands 10 are
placed on the other channel of said stereo sample. The
stereo sample thus formed therefore comprises audio data on
one channel and control commands on the other channel. Said
sample is now an encoded stereo sample 11.

A doll thus made can pass on information in a very
interactive and visual manner, depending on the software
being used, and is thus highly suitable for use by way of
supplement to learning programmes for young children, to
whom a speaking doll appeals more and for whom the
instructions the doll gives are easier to accept. In
addition to that, such a doll may be a welcome addition to
the existing peripheral equipment of the computer, since
the doll, in combination with the right software, gives the
computer a more "personal" feel. Other products, for
example an entertainment centre, may make use of this
method as well.
A number of further possibilities of programmes will
be discussed hereinafter:
The external device can be used very well in so-
called "screensavers". The external device can for example
make comments on what is happening on the screen.

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The external device can act as a storyteller in a so-called "adventure game".

The external device can tell fairy tales in an animated manner.

The external device can become a so-called "virtual pet", an animal that must be taken care of and that can be played with. Normally, such an animal is graphically displayed on the screen. When using the invention, a doll that is physically present can act as a virtual pet.

The external device can function very well in combination with the (broadband) Internet, inter-alia by streaming audio.

The external device may be a welcome addition to the multitude of chat programmes that exist. Current chat programmes (such as MSN Messenger) provide a possibility of sending each other special images (emoticons) and animations (winks) so as to liven up the conversation in this manner. The external device can add a dimension to this, because it is possible to control the external device at the location of the conversation partner during the conversation. Thus it is possible to have a doll at the conversation partner's location heave a sigh, blink, shake its head or laugh.

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CLAIMS

1. A method wherein a device to be connected to a processor, which device is capable of producing sound and of moving, is controlled by the processor via a sound channel and a command channel, respectively.

2. A method according to claim 1, characterised in that said sound channel and said command channel form part of a stereo sound channel.

3. A method according to either one of the claims 1-2, characterised in that the device reproduces sound from the sound channel, and that one or more commands associated therewith from the command channel activate(s) motion elements incorporated in the device, such as motors, relays, actuators and/or solenoids.

4. A method according to any one of the claims 1-3, characterised in that the command channel comprises encoded information, in particular in the form of sound information, which, after being decoded, is used in the device for causing the device to move.

5. A method according to any one of the claims 1-4, characterised in that the device is connected to the USB connection of the processor incorporated in a personal computer.

6. A method according to claim 5, characterised in that the software that runs on the personal computer displays images and/or text on a screen, and in that the device makes the sounds and movements associated therewith.

7. A system comprising a personal computer, a device provided with sound signals and movement command signals

connected to the USP port thereof, which is arranged for making sounds and/or movements, wherein the respective signals have been placed on a left-hand channel and a right-hand channel, which lead to a USB stereo audio chip in the device.

8. A device suitable for being used in the method according to any one of the claims 1-6 and for being incorporated in the system according to claim 7, wherein the device can be connected to the USB output of a personal computer of the system, and wherein the device is arranged for making sound and/or movements on the basis of sound and movement command signals that have been placed on a left-hand channel and a right-hand channel of a USB stereo audio chip incorporated in the device.

9. Signals for use in the method, the system and/or the device as defined in the respective preceding claims, which signals comprise sound signals and movement command signals being part of a stereo audio channel that extends between a personal computer and a device connected to the USB output thereof, which device is capable of making sound and movements.

10. Signals according to claim 9, wherein the movement command signals comprise sound frequencies that have been encoded in groups.
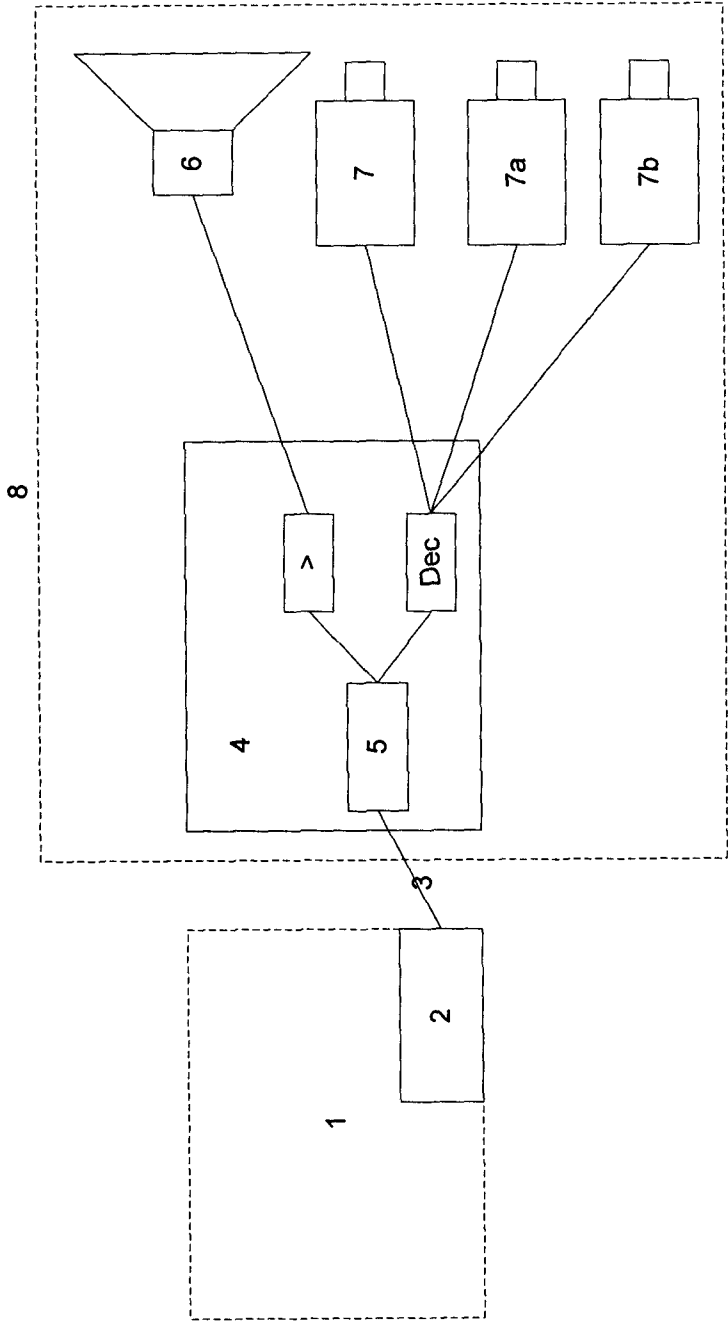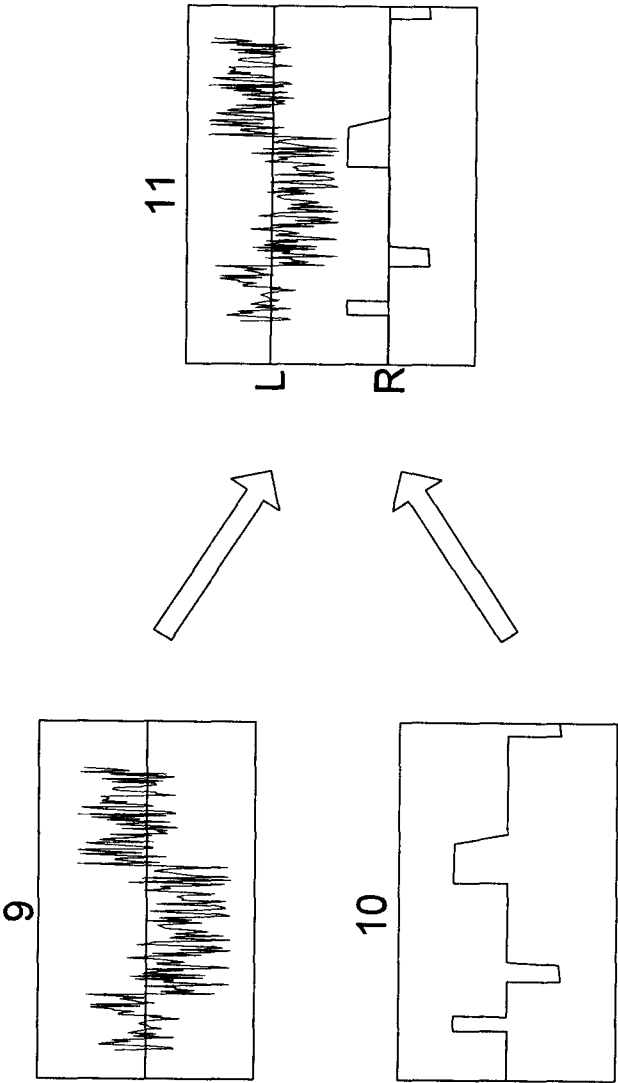
Fig 1

Fig 2

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV. A63H3/28   A63H13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A63H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	the whole document & US 5 108 341 A (DESMET ERIC [BE]) 28 April 1992 (1992-04-28)	5,7-10
Y	US 6 319 010 B1 (KIKINIS DAN [US]) 20 November 2001 (2001-11-20) column 6, lines 4-10	5,7-10
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X	US 5 074 821 A (MCKEEFERY JAMES [US] ET AL) 24 December 1991 (1991-12-24) the whole document	1-4

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[X] Further documents are listed in the continuation of Box C.   [X] See patent family annex.

* Special categories of cited documents :

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 May 2008	20/05/2008

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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