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(54) **Title**: A COMMUNICATION DEVICE WITH A MEMORY INTERFACE

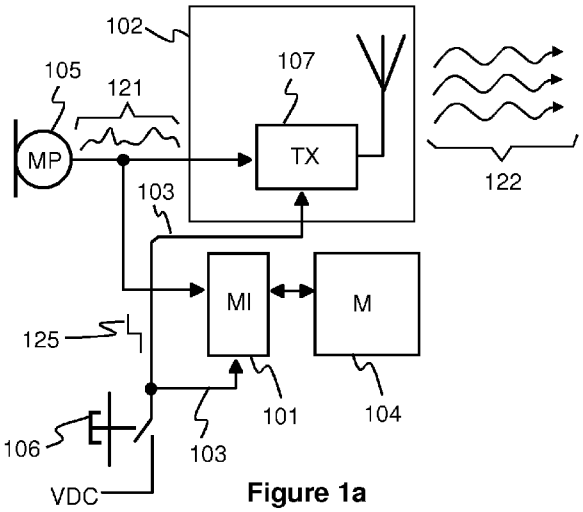

Figure 1a

(57) **Abstract**: The invention relates to a method and arrangement for controlling a memory interface (101) of a communication device. The communication device comprises a transmitter (102) capable of producing a transmission signal containing an audio signal and a control circuitry (103) arranged to activate, as a response to a situation in which the control circuitry receives an activation signal, both the transmitter to produce the transmission signal and the memory interface to write the audio signal into a memory device (104) connected to the memory interface. The activation signal can be produced e.g. with a push-to-talk button, with a voice command detector, or with a speech recognizer. Hence, the control of the transmitter is utilized also in controlling the memory interface. Therefore, the amount of control actions those have to be performed by a user of the communication device for controlling the memory interface can be reduced.

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A communication device with a memory interface

Field of the invention

The invention relates generally to communication device, and more particularly, to a method and arrangement for controlling a memory interface of a communication device. The invention further relates to a wearable or handheld apparatus, e.g. a breathing protection apparatus, comprising a communication device.

Background

A portable device, e.g. a handheld apparatus or a wearable apparatus such as a breathing mask, can be equipped with or connected to a communication device in order to enable the user of the equipment to communicate with other persons. The communication can be typically voice, data, and/or image/video communication. Additionally, the data can be digitally packetized audio, video, textual data, and/or image. The communication device comprises typically a microphone, a speaker, a microcontroller/CPU core (Central Processing Unit), and an audio amplifier and/or a radio transceiver; additionally the communication device may comprise a display unit. It is also possible that the communication device does not comprise a microphone and/or a speaker but the communication device comprises a connector for coupling to e.g. a detachable headset. A user of the communication device can be a member of an operational team where every team member has to be able to communicate with other team members and/or with persons located outside an incident or operating area. It is also possible that there is a need to transfer images, video clips, and/or other data between communication devices of the team members and communication devices of other persons. For example, a fire fighter wearing a breathing mask has to be able to communicate with other fire fighters and with fire chiefs. As another example, a policeman that operates on an incident area has to be able to communicate with other policemen and with his superiors. From the viewpoint of judicial relief of a person, e.g. a fire fighter or a policeman, who has been acting in an emergency or other difficult situation it is, in many cases, important to be able to afterwards prove what the said person has spoken during the situation and, in some cases, also what kind of oral orders has been given to him during the situation.

In a solution according to the prior art, a communication device is equipped with a memory device that can be a fixed memory device or a detachable memory device

such as e.g. a detachable memory card. A detachable memory card can be, for example, a flash memory card. The communication device comprises a memory interface for executing reading from the memory device and writing into the memory device. A solution of the kind described above is disclosed for example in publication US2007253251. An inherent challenge associated with a communication device equipped with a memory device is related to controlling of recording action. For example, a fire fighter or a policeman should be able to determine in a sufficiently convenient and easy manner the time intervals during which, for example, his speech is recorded into a memory device of a communication device. Generally, it is highly important that using and controlling a communication device do not excessively limit the freedom of action of a user of the communication device.

Summary

It is therefore an object of the present invention to provide a communication device that is equipped with a fixed memory device and/or can be equipped with a detachable memory device and is suitable for personnel operating in challenging situations.

In accordance with a first aspect of the invention, there is provided a new arrangement for controlling a memory interface of such a communication device that comprises at least the following:

- a transmitter capable of producing a transmission signal containing an audio signal, and
- a control circuitry arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal.

In the arrangement according to the invention the control circuitry is arranged to also activate, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into the memory device connected to the memory interface.

The activation signal can be generated, for example, with a push button of a push-to-talk controlled communication device, with a voice command detector, or with a speech detector.

The memory device can be fixed memory device that is an integral part of the communication device or the memory device can be a detachable memory device such as e.g. a memory card.

In accordance with a second aspect of the invention, there is provided a new communication device. The communication device comprises at least the following:

- a memory interface,
- a transmitter capable of producing a transmission signal containing an audio signal, and
- a control circuitry arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal,

wherein the control circuitry is further arranged to activate, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into a memory device connected to the memory interface.

The communication device can be, for example, a portable communication device of a fire fighter, a police man, or a security guard.

In accordance with a third aspect of the invention, there is provided a new breathing protection apparatus. The breathing protection apparatus comprises at least the following:

- a breathing mask,
- a memory interface,
- a transmitter capable of producing a transmission signal containing an audio signal, and
- a control circuitry arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal,

wherein the control circuitry is further arranged to activate, as a response to the situation in which the control circuitry receives the activation signal, the memory in-

terface to write the audio signal into a memory device connected to the memory interface.

In accordance with a fourth aspect of the invention, there is provided a new method for controlling a memory interface of such a communication device that comprises at least the following:

- a transmitter capable of producing a transmission signal containing an audio signal, and
- a control circuitry arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal.

The method according to the invention comprises activating, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into a memory device connected to the memory interface.

In accordance with a fifth aspect of the invention, there is provided a new computer program for controlling a memory interface of such a communication device that comprises at least a transmitter capable of producing a transmission signal containing an audio signal and a programmable processor connected to the transmitter and to the memory interface.

The computer program according to the invention comprises:

- software modules for making the programmable processor to activate the transmitter to produce the transmission signal as a response to a situation in which the programmable processor receives an activation signal, and
- software modules for making the programmable processor to also activate, as a response to the situation in which the programmable processor receives the activation signal, the memory interface to write the audio signal into a memory device connected to the memory interface.

A benefit provided by embodiments of the present invention when compared with prior art solutions of the kind described in this document is that a control of a transmitter of a communication device is utilized also in controlling a memory interface of the communication device. Therefore, the amount of control actions those

have to be performed by a user of the communication device for controlling the memory interface can be reduced.

Various embodiments of the invention both as to constructions and to methods of operation, together with additional objects and advantages thereof, will be best understood from the following description of exemplifying embodiments when read in connection with the accompanying drawings.

The embodiments of the invention presented in this document are not to be interpreted to pose limitations to the applicability of the appended claims. The verb "to comprise" is used in this document as an open limitation that does not exclude the existence of also unrecited features. The features recited in depending claims are mutually freely combinable unless otherwise explicitly stated.

Brief description of the figures

Embodiments of the invention presented in the sense of examples and their advantages are explained in greater detail below with reference to the accompanying drawings, in which

each of figures 1a, 1b, 1c, and 1d shows a block diagram of a communication device that comprises an arrangement according to an embodiment of the invention for controlling a memory interface of the communication device,

figure 2 shows a communication device according to an embodiment of the invention,

figure 3 shows a breathing protection apparatus according to an embodiment of the invention,

figure 4 shows a breathing protection apparatus according to an embodiment of the invention, and

figure 5 is a flow chart of a method according to an embodiment of the invention for controlling a memory interface of the communication device.

Detailed description of the embodiments

Figure 1a shows a block diagram of a communication device that comprises an arrangement according to an embodiment of the invention for controlling a memory interface (MI) 101 of the communication device. The communication device com-

prises a microphone (MP) 105 arranged to produce an audio signal 121 in an electrical form. The communication device comprises a transmitter 102 capable of producing a transmission signal 122. The transmitter is a radio transmitter (TX) 107 and so the transmission signal 122 is a radio transmission signal. The radio transmission signal 122 can be arranged to contain the audio signal 121. Preferably, the radio transmission signal 122 can also be arranged contain video/image data and/or textual data. The memory interface (MI) 101 is connected to a memory device (M) 104. The memory interface is arranged to execute reading from the memory device and writing into the memory device. The memory device 104 can be a digital memory device capable of recording digital data. The memory interface 101 can comprise, for example, an analog-to-digital converter (ADC) and a memory controller that are arranged to convert the audio signal into a digital form and to write the analog-to-digital converted audio signal 121 into the memory device. The memory device 104 can be as well an analog memory device, such as e.g. a magnetic recording tape or disc that is capable of recording the audio signal 121 in an analog form. The communication device comprises a control circuitry 103 arranged to activate the transmitter 102 to produce the transmission signal 122 as a response to a situation in which the control circuitry receives an activation signal 125.

In the arrangement for controlling the memory interface 101, the control circuitry 103 is further arranged to activate, as a response to the situation in which the control circuitry 103 receives the activation signal 125, the memory interface 101 to write the audio signal 121 into the memory device 104 connected to the memory interface. The arrangement shown in figure 1a comprises a push button 106 that is arranged to produce the activation signal 125 as long as the push button is being pressed. The activation signal 125 is generated by connecting the circuitry 103 to a direct voltage source (VDC). The push button 106 is preferably a push-to-talk (PTT) button of the communication device.

In an arrangement according to an embodiment of the invention the memory interface 101 is also arranged to write video data, image data, and/or textual data into the memory device 104 and to read video data, image data, and/or textual data from the memory device.

In an arrangement according to an embodiment of the invention, the radio transmitter 107 is allowed to produce another radio transmission signal during time periods in which the radio transmitter is not activated to produce the radio transmission signal 122 containing the audio signal 121. The other radio transmission sig-

nal can represent, for example, one or more of the following: a test signal for monitoring a radio link, a data signal carrying video/image and/or textual data, and an update signal for a radio transceiver at a far end of a radio link. The test signal can be used for detecting e.g. a loss of connection in the radio link. The update signal can be used e.g. for maintaining synchronization between the radio transmitter 107 and the radio transceiver at the far end of the radio link.

The memory device 104 can be a fixed memory device that is an integral part of the communication device or the memory device can be a detachable memory device. A detachable memory device can be, for example, a digital memory card or a magnetic recording cassette or disk. A digital memory card can be e.g. a Secure Digital card (SD) or a MultiMedia Card (MMC). The Secure Digital card (SD) is a flash (non-volatile) memory card format developed by Matsushita, SanDisk, and Toshiba for use in portable devices. The MultiMedia Card (MMC) is a flash memory card standard. The MultiMedia Card (MMC) has been unveiled by Siemens AG and SanDisk, and it is based on Toshiba's NAND-based flash memory.

Figure 1b shows a block diagram of a communication device that comprises an arrangement according to an embodiment of the invention for controlling a memory interface (MI) 101 of the communication device. The communication device comprises a microphone (MP) 105 arranged to produce an audio signal 121 in an electrical form. The communication device comprises a transmitter 102 capable of producing transmission signals 122 and 123. The transmitter comprises a radio transmitter (TX) 107 capable of producing the transmission signal 122 that is a radio transmission signal. The radio transmission signal 122 can be arranged to contain the audio signal 121. Preferably, the radio transmission signal 122 can also be arranged contain video/image data and/or textual data. In this exemplifying embodiment of the invention the transmitter comprises also a loud-speaker element (LS) 108 and an amplifier unit 109 that are arranged to produce the transmission signal 123 that is an acoustical transmission signal. The communication device comprises a control circuitry 103 arranged to activate the transmitter 102 to produce the transmission signal 122 as a response to a situation in which the control circuitry receives an activation signal 125. The communication device is preferable provided with control means with the aid of which it is possible to determine whether both the radio transmitter and the loud-speaker element are activated with the activation signal 125, or only the radio transmitter is activated, or only the loud-speaker element is activated.

In the arrangement for controlling the memory interface 101, the control circuitry 103 is further arranged to activate, as a response to the situation in which the control circuitry 103 receives the activation signal 125, the memory interface 101 to write the audio signal 121 into a memory device 104 connected to the memory interface. The arrangement shown in figure 1b comprises a voice command detector (VCD) 110 connected to the microphone 105 of the communication device. The voice command detector 110 is arranged to produce the activation signal 125 as a response to a situation in which a first pre-determined voice command has been detected in the audio signal 121. The first pre-determined voice command can be e.g. pronouncing the phrase: □START TRANSMISSION□The voice command detector 110 is preferably arranged to terminate the production of the activation signal 125 as a response to a situation in which a second pre-determined voice command is detected in the audio signal 121. The second pre-determined voice command can be e.g. pronouncing the phrase: □STOP TRANSMISSION□There are numerous known algorithms and methods for detecting whether the audio signal 121 contains a certain voice command. For example, the voice command detector 110 can comprise an adaptive signal detector that is taught to recognize desired phrases. The adaptive signal detector can be realized, for example, with a neural network or with an adaptive digital filter or with a combination of them.

Figure 1c shows a block diagram of a communication device that comprises an arrangement according to an embodiment of the invention for controlling a memory interface (MI) 101 of the communication device. The communication device comprises a microphone (MP) 105 arranged to produce an audio signal 121 in an electrical form. The communication device comprises a transmitter 102 capable of producing transmission signals 122 and 123. The transmitter comprises a radio transmitter (TX) 107 capable of producing the transmission signal 122 that is a radio transmission signal. The radio transmission signal 122 can be arranged to contain the audio signal 121. Preferably, the radio transmission signal 122 can also be arranged contain video/image data and/or textual data. The transmitter comprises also a loud-speaker element (LS) 108 and an amplifier unit 109 that are arranged to produce the transmission signal 123 that is an acoustical transmission signal. The communication device comprises a control circuitry 103 arranged to activate the transmitter 102 to produce the transmission signal 122 as a response to a situation in which the control circuitry receives an activation signal 125.

In the arrangement for controlling the memory interface 101, the control circuitry 103 is further arranged to activate, as a response to the situation in which the con-

trol circuitry 103 receives the activation signal 125, the memory interface 101 to write the audio signal 121 into a memory device 104 connected to the memory interface. The arrangement shown in figure 1c comprises a speech recognizer (SR) 111 connected to the microphone 105 of the communication device. The speech recognizer 111 is arranged to produce the activation signal 125 as a response to a situation in which speech is detected in the audio signal 121. The arrangement may further comprise a push button 106 with the aid of which the activation signal 125 can be produced too.

There are numerous different algorithms and methods for detecting whether the audio signal 121 contains speech. Some examples will be presented in this document, but any suitable method or algorithm known to a person skilled in the art can be used for detecting whether the audio signal 121 contains speech.

In an arrangement according to an embodiment of the invention the speech recognizer 111 comprises adaptive means that are taught to recognize at least one component of speech of a user of the communication device. The adaptive means can be realized, for example, with a neural network or with an adaptive digital filter or with a combination thereof. The speech recognizer 111 is arranged to regard a situation in which at least one component of speech of the user of the communication device is detected as the situation in which the audio 121 signal is detected to contain speech.

In an arrangement according to an embodiment of the invention the speech recognizer 111 comprises an analog band-pass filter arranged to attenuate frequency components of the audio signal 121 that locate outside a frequency band of speech. For example, breathing noise has typically a spectrum that is different from that of speech. The electrical audio signal is an input signal of the analog band-pass filter. The speech recognizer 111 is arranged to regard a situation in which level of an output signal of the analog band-pass filter exceeds a pre-determined threshold value as the situation in which the audio 121 signal is detected to contain speech. The pre-determined threshold value can be, for example, zero. The pre-determined threshold value can be used for tuning the operation in order to achieve an acceptable balance between occurrence of situations in which speech is erroneously not detected (a missed detection) and occurrence of situations in which noise is erroneously regarded as speech (a false alarm of speech).

Figure 1d shows a block diagram of a communication device that comprises an arrangement according to an embodiment of the invention for controlling a memory

interface (MI) 101 of the communication device. The communication device comprises a microphone (MP) 105 arranged to produce an audio signal 121 in an electrical form. The communication device comprises a transmitter 102 capable of producing transmission signals 122 and 123. The transmitter comprises a radio transmitter (TX) 107 capable of producing the transmission signal 122 that is a radio transmission signal. The radio transmission signal 122 can be arranged to contain the audio signal 121. Preferably, the radio transmission signal 122 can also be arranged contain video/image data and/or textual data. The transmitter comprises also a loud-speaker element (LS) 108 and an amplifier unit 109 that are arranged to produce the transmission signal 123 that is an acoustical transmission signal. The communication device comprises a control circuitry 103 arranged to activate the transmitter 102 to produce the transmission signal 122 as a response to a situation in which the control circuitry receives an activation signal 125. The communication device comprises a receiver 112 arranged to extract a received audio signal 127 from a received radio signal 126.

In the arrangement for controlling the memory interface 101, the control circuitry 103 is further arranged to activate, as a response to the situation in which the control circuitry 103 receives the activation signal 125, the memory interface 101 to write the audio signal 121 into a memory device 104 connected to the memory interface. The arrangement shown in figure 1d comprises a speech recognizer (SR) 111 connected to the microphone 105 of the communication device. The speech recognizer 111 is arranged to produce the activation signal 125 as a response to a situation in which speech is detected in the audio signal 121. The arrangement may further comprise a push button 106 with the aid of which the activation signal 125 can be produced too. The arrangement further comprises a control circuitry 117 arranged to activate, as a response to a situation in which the control circuitry 117 receives another activation signal 128, the memory interface 101 to write the received audio signal 127 into the memory device 104.

An arrangement according an embodiment of the invention comprises a push button 114 arranged to produce the activation signal 128 as a response to a situation in which the push button 114 is being pressed.

An arrangement according an embodiment of the invention comprises a voice command detector (VCD) 115 connected to the receiver 112. The voice command detector 115 is arranged to produce the activation signal 128 as a response to a situation in which a pre-determined voice command is detected in the received audio signal 127.

An arrangement according an embodiment of the invention comprises a speech recognizer (SR) 116 connected to the receiver 112. The speech recognizer 116 is arranged to produce the activation signal 128 as a response to a situation in which speech is detected in the received audio signal 127.

Figure 2 shows a communication device according to an embodiment of the invention. The communication device comprises a microphone 205 arranged to produce an audio signal in an electrical form. A unit 240 of the communication device comprises a memory interface arranged to execute reading from a memory device 204 and writing into the memory device. The unit 240 comprises a radio transmitter capable of producing a radio transmission signal containing the audio signal produced with the microphone. The unit 240 comprises a control circuitry that is arranged to activate the radio transmitter to produce the radio transmission signal as a response to a situation in which the control circuitry receives an activation signal. The control circuitry is further arranged to activate, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into the memory device 204. The activation signal can be produced, for example, with a push button 206, with a voice command detector connected to the microphone 205, and/or with a speech recognizer connected the microphone 205. The push button 206 is preferably a push-to-talk (PTT) button of the communication device. The memory device 204 can be, for example, a digital memory card or a magnetic recording cassette or disk. A digital memory card can be e.g. a Secure Digital card (SD) or a MultiMedia Card (MMC).

In a communication device according to an embodiment of the invention, the unit 240 comprises a radio receiver that is arranged to extract a received audio signal from a received radio signal. The unit 240 comprises another control circuitry that is arranged to activate, as a response to a situation in which the other control circuitry receives another activation signal, the memory interface to write the received audio signal into the memory device 240. The communication device may also comprise a speaker element 213 arranged to convert a received audio signal from an electrical form into a form of voice. The other activation signal can be produced, for example, with a push button, with a voice command detector connected to the radio receiver, and/or with a speech recognizer connected to the radio receiver.

In a communication device according to an embodiment of the invention, the radio transmitter is arranged to transmit digital data to a radio path and the radio receiver is arranged to receive digital data from the radio path. The radio transmitter

can be adapted to use e.g. the quadrature amplitude modulation (QAM) line code or the carrierless amplitude and phase modulation (CAP) line code. Correspondingly, the radio receiver can be adapted to use e.g. the quadrature amplitude modulation (QAM) line code or the carrierless amplitude and phase modulation (CAP) line code.

A communication device according to an embodiment of the invention is arranged to support the Bluetooth® data transfer protocol.

A communication device according to an embodiment of the invention is arranged to support a data transfer protocol of a wireless local area network (WLAN).

A communication device according to an embodiment of the invention is arranged to support the WiMax data transfer protocol. The WiMax data transfer protocol is described e.g. in the IEEE 802.16 specification (Institute of Electrical and Electronics Engineers).

A communication device according to an embodiment of the invention is arranged to support the DECT data transfer protocol. The DECT i.e. Digital Enhanced Cordless Telecommunications (formerly Digital European Cordless Telephone) is an ETSI standard (European Telecommunication Standardization Institute) for digital portable phones.

A communication device according to an embodiment of the invention is arranged to support both the Bluetooth® data transfer protocol and the data transfer protocol of a wireless local area network (WLAN).

A communication device according to an embodiment of the invention comprises an RSM-device (Remote Speaker Microphone) that is connected to the unit 240 via a corded link. The RSM-device comprises a microphone and a push-to-talk (PTT) button. The push-to-talk button is preferably used for producing the activation signal for the radio transmitter and for the memory interface. The RSM-device is not shown in figure 2.

Figure 3 shows a breathing protection apparatus 330 according to an embodiment of the invention. The breathing protection apparatus comprises a breathing mask 331 having an eye shield and a filter element that is arranged to filter the air inhaled by a wearer of the breathing protection apparatus. The breathing mask 331 is shown as a partial section view in figure 3. The breathing protection apparatus comprises a communication device according to an embodiment of the invention.

The communication device comprises a microphone 305 arranged to produce an audio signal in an electrical form. A unit 340 of the communication device comprises a memory interface arranged to execute reading from a memory device 304 and writing into the memory device. The unit 340 comprises a radio transmitter capable of producing a radio transmission signal containing the audio signal produced with the microphone. The unit 340 comprises a control circuitry that is arranged to activate the radio transmitter to produce the radio transmission signal as a response to a situation in which the control circuitry receives an activation signal. The control circuitry is further arranged to activate, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into the memory device 304. The activation signal can be produced, for example, with a push button 306, with a voice command detector connected to the microphone 305, and/or with a speech recognizer connected the microphone 305. The push button 306 is preferably a push-to-talk (PTT) button of the communication device. The memory device 304 can be, for example, a digital memory card or a magnetic recording cassette or disk. A digital memory card can be e.g. a Secure Digital card (SD) or a MultiMedia Card (MMC).

In a breathing protection apparatus according to an embodiment of the invention, the unit 340 comprises a radio receiver that is arranged to extract a received audio signal from a received radio signal. The unit 340 comprises another control circuitry that is arranged to activate, as a response to a situation in which the other control circuitry receives another activation signal, the memory interface to write the received audio signal into the memory device 340. The communication device preferably comprises an earphone 313 arranged to convert a received audio signal from an electrical form into a form of voice. The other activation signal can be produced, for example, with a push button, with a voice command detector connected to the radio receiver, and/or with a speech recognizer connected to the radio receiver.

In the breathing protection apparatus shown in figure 3, the unit 340 that includes the radio transmitter of the communication device and the memory interface of the communication device is physically integrated with the breathing mask 331. An alternative construction for a breathing protection apparatus 430 is shown in figure 4. A unit 440 that comprises a radio transmitter of a communication device and a memory interface of the communication device is connected to a breathing mask 431 via a corded link 452. The unit 440 can be carried, for example, on a belt 450 of a wearer of the breathing protection apparatus 430. The corded link 452 and the

breathing mask 431 have electrical connectors 451 that can be connected to each other. The breathing mask 431 comprises a microphone 405 and an earphone 413.

A benefit provided by the breathing protection apparatuses 330 and 430 shown in figures 3 and 4, respectively, is that the control of a transmitter of a breathing protection apparatus is utilized also in controlling a memory interface of the breathing protection apparatus. Therefore, the amount of control actions those have to be performed by a user of the breathing protection apparatus for controlling the memory interface can be reduced.

Figure 5 is a flow chart of a method according to an embodiment of the invention for controlling a memory interface of the communication device. The communication device includes a transmitter capable of producing a transmission signal containing an audio signal and a control circuitry arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal. In phase 501, it is determined whether the control circuitry receives the activation signal. If the control circuitry receives the activation signal (a YES-branch) the next phase is a phase 502. In the phase 502, the transmitter is activated to produce a transmission signal that contains the audio signal, and the memory interface is activated to write the audio signal into a memory device connected to the memory interface.

In a method according to an embodiment of the invention the activation signal is produced by pressing a push button of the communication device.

In a method according to an embodiment of the invention the activation signal is produced with a voice command detector connected to a microphone of the communication device. The voice command detector is arranged to produce the activation signal as a response to a situation in which a pre-determined voice command is detected.

In a method according to an embodiment of the invention the activation signal is produced with a speech recognizer connected to a microphone of the communication device. The speech recognizer is arranged to produce the activation signal as a response to a situation in which speech is detected.

In a method according to an embodiment of the invention the memory device is one of the following detachable memory cards: a Secure Digital card (SD) and a MultiMedia card (MMC).

A method according to an embodiment of the invention further comprises making the memory interface to read from the memory device and to write into the memory device at least one of the following: video data, image data, and textual data.

A method according to an embodiment of the invention further comprises activating, as a response to a situation in which another control circuitry receives another activation signal, the memory interface to write another audio signal that is received with a receiver of the communication device into the memory device.

In a method according to an embodiment of the invention the other activation signal is produced by pressing a push button of the communication device.

In a method according to an embodiment of the invention the other activation signal is produced with a voice command detector connected to the receiver of the communication device. The voice command detector is arranged to produce the other activation signal as a response to a situation in which a pre-determined voice command is detected in the other audio signal.

In a method according to an embodiment of the invention the other activation signal is produced with a speech recognizer connected to the receiver of the communication device. The speech recognizer is arranged to produce the other activation signal as a response to a situation in which speech is detected in the other audio signal.

A computer program according to an embodiment of the invention comprises software modules for controlling a memory interface of such a communication device that comprises a transmitter capable of producing a transmission signal containing an audio signal and a programmable processor connected to the transmitter and to the memory interface. The above mentioned software modules include:

- software modules for making the programmable processor to activate the transmitter to produce the transmission signal as a response to a situation in which the programmable processor receives an activation signal, and

- software modules for making the programmable processor to activate, as a response to the situation in which the programmable processor receives the activation signal, the memory interface to write the audio signal into a memory device connected to the memory interface.

A computer program according to an embodiment of the invention further comprises software modules for making the programmable processor to activate, as a response to a situation in which the programmable processor receives another activation signal, the memory interface to write another audio signal that is received with a receiver of the communication device into the memory device.

The software modules can be, for example, subroutines and/or functions coded with any suitable programming language.

A computer program product according to an embodiment of the invention is a computer readable medium arranged to store a computer program according an embodiment of the invention. The computer readable medium can be, for example, an optical compact disk or an electronic memory device like a RAM (random access memory) or a ROM (read only memory).

A computer program product according to an embodiment of the invention is a signal arranged to carry a computer program according an embodiment of the invention. The signal can be, for example, a signal that receivable from a data communication network, e.g. Internet.

While there have been shown and described and pointed out fundamental novel features of the invention as applied to embodiments thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices and methods described may be made by those skilled in the art without departing from the spirit of the invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Moreover, it should be recognized that structures and/or elements and/or method steps shown and/or described in connection with any disclosed form or embodiment of the invention may be incorporated in any other disclosed or described or suggested form or embodiment as a general matter of design choice. The specific examples provided in the description given above should not be construed as limiting. Therefore, the invention is not limited merely to the embodiments described above, many variants being possible without departing from the scope of the inventive idea defined in the independent claims.

What is claimed is:

1. An arrangement for controlling a memory interface (101) of a communication device, the communication device comprising:

- a transmitter (102) capable of producing a transmission signal (122, 123) containing an audio signal (121), and

- a control circuitry (103) arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal (125),

characterized in that the control circuitry is further arranged to activate, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into a memory device (104) connected to the memory interface.

2. An arrangement according to claim 1, **characterized** in that the arrangement comprises a push button (106) arranged to produce the activation signal as a response to a situation in which the push button is being pressed.

3. An arrangement according to claim 1, **characterized** in that the arrangement comprises a voice command detector (110) connected to a microphone (105) of the communication device and the voice command detector is arranged to produce the activation signal as a response to a situation in which a pre-determined voice command is detected.

4. An arrangement according to claim 1, **characterized** in that the arrangement comprises a speech recognizer (111) connected to a microphone (105) of the communication device and the speech recognizer is arranged to produce the activation signal as a response to a situation in which speech is detected.

5. An arrangement according to claim 1, **characterized** in that the memory interface is a memory card interface capable of being connected to at least one of the following detachable memory cards: a Secure Digital card (SD) and a Multi-Media card (MMC).

6. An arrangement according to claim 1, **characterized** in that the memory interface is arranged to read from the memory device and to write into the memory device at least one of the following: video data, image data, and textual data.

7. An arrangement according to claim 1, **characterized** in that the arrangement comprises another control circuitry (117) arranged to activate, as a response to a situation in which the other control circuitry receives another activation signal (128), the memory interface to write another audio signal (127) received with a receiver (112) of the communication device into the memory device.

8. An arrangement according to claim 7, **characterized** in that the arrangement comprises a push button (114) arranged to produce the other activation signal as a response to a situation in which the push button is being pressed.

9. An arrangement according to claim 7, **characterized** in that the arrangement comprises a voice command detector (115) connected to the receiver of the communication device and the voice command detector is arranged to produce the other activation signal as a response to a situation in which a pre-determined voice command is detected.

10. An arrangement according to claim 7, **characterized** in that the arrangement comprises a speech recognizer (116) connected to the receiver of the communication device and the speech recognizer is arranged to produce the other activation signal as a response to a situation in which speech is detected.

11. A communication device comprising:

- a memory interface (101),
- a transmitter (102) capable of producing a transmission signal (122, 123) containing an audio signal (121), and
- a control circuitry (103) arranged to activate the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives an activation signal (125),

characterized in that the control circuitry is further arranged to activate, as a response to the situation in which the control circuitry receives the activation signal, the memory interface to write the audio signal into a memory device (104) connected to the memory interface.

12. A communication device according to claim 11, **characterized** in that the communication device comprises a receiver (112) and another control circuitry (117), the other control circuitry being arranged to activate, as a response to a situation in which the other control circuitry receives another activation signal

(128), the memory interface to write another audio signal (127) received with the receiver into the memory device.

13. A communication device according to claim 11, **characterized** in that the communication device is physically integrated with a breathing mask (331) of a breathing protection apparatus (330).

14. A breathing protection apparatus (330, 430) comprising a breathing mask (331, 431), **characterized** in that the breathing protection apparatus further comprises a communication device according to claim 11.

15. **Use** of a communication device according to claim 11 as a portable communication device of one of the following: a fire fighter, a police man, and a security guard.

16. A method for controlling a memory interface of a communication device, the communication device comprising:

- a transmitter capable of producing a transmission signal containing an audio signal, and
- a control circuitry arranged to activate (502) the transmitter to produce the transmission signal as a response to a situation in which the control circuitry receives (501) an activation signal,

characterized in that the method comprises activating (502), as a response to the situation in which the control circuitry receives (501) the activation signal, the memory interface to write the audio signal into a memory device connected to the memory interface.

17. A method according to claim 16, **characterized** in that the activation signal is produced by pressing a push button of the communication device.

18. A method according to claim 16, **characterized** in that the activation signal is produced with a voice command detector connected to a microphone of the communication device, the voice command detector being arranged to produce the activation signal as a response to a situation in which a pre-determined voice command is detected.

19. A method according to claim 16, **characterized** in that the activation signal is produced with a speech recognizer connected to a microphone of the communica-

tion device, the speech recognizer being arranged to produce the activation signal as a response to a situation in which speech is detected.

20. A method according to claim 16, **characterized** in that the memory device is one of the following detachable memory cards: a Secure Digital card (SD) and a MultiMedia card (MMC).

21. A method according to claim 16, **characterized** in that the method further comprises making the memory interface to read from the memory device and to write into the memory device at least one of the following: video data, image data, and textual data.

22. A method according to claim 16, **characterized** in that the method comprises activating, as a response to a situation in which another control circuitry receives another activation signal, the memory interface to write another audio signal received with a receiver of the communication device into the memory device.

23. A method according to claim 22, **characterized** in that the other activation signal is produced by pressing a push button of the communication device.

24. A method according to claim 22, **characterized** in that the other activation signal is produced with a voice command detector connected to the receiver of the communication device, the voice command detector being arranged to produce the other activation signal as a response to a situation in which a pre-determined voice command is detected.

25. A method according to claim 22, **characterized** in that the other activation signal is produced with a speech recognizer connected to the receiver of the communication device, the speech recognizer being arranged to produce the other activation signal as a response to a situation in which speech is detected.

26. A computer program for controlling a memory interface of a communication device that comprises a transmitter capable of producing a transmission signal containing an audio signal and a programmable processor connected to the transmitter and to the memory interface, the computer program comprising software modules for making the programmable processor to activate the transmitter to produce the transmission signal as a response to a situation in which the programmable processor receives an activation signal, **characterized** in that the computer program further comprises software modules for making the programmable processor to activate, as a response to the situation in which the program-

mable processor receives the activation signal, the memory interface to write the audio signal into a memory device connected to the memory interface.

27. A computer program according to claim 26, **characterized** in that the computer program further comprises software modules for making the programmable processor to activate, as a response to a situation in which the programmable processor receives another activation signal, the memory interface to write another audio signal received with a receiver of the communication device into the memory device.

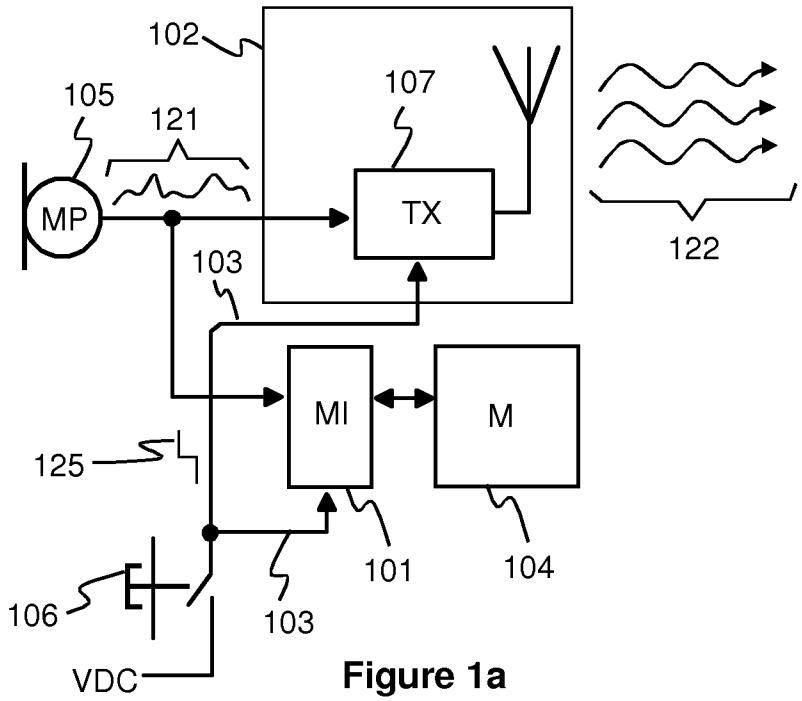

Figure 1a

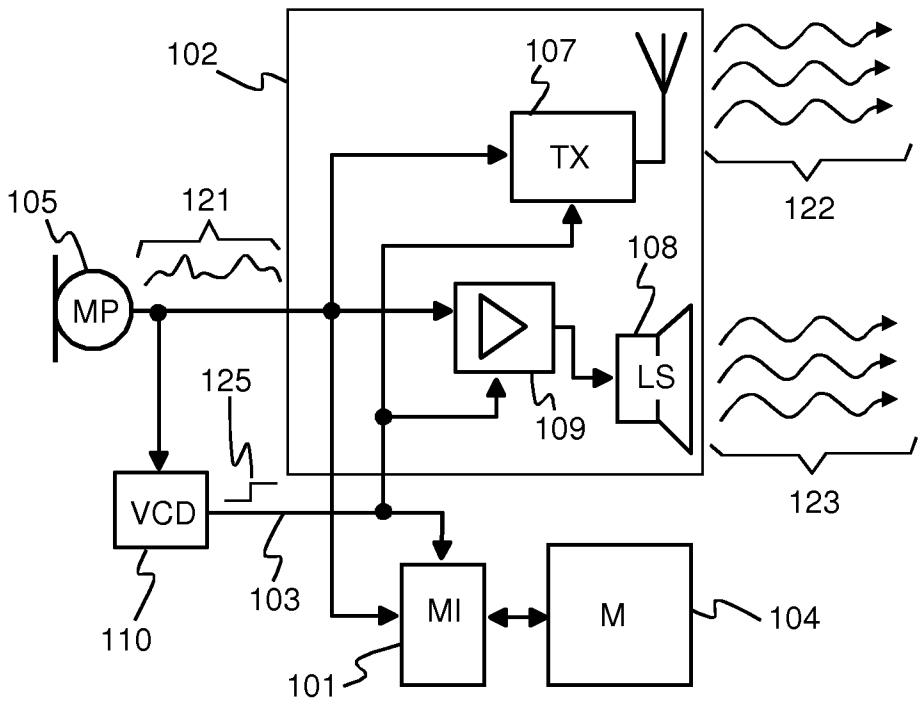

Figure 1b

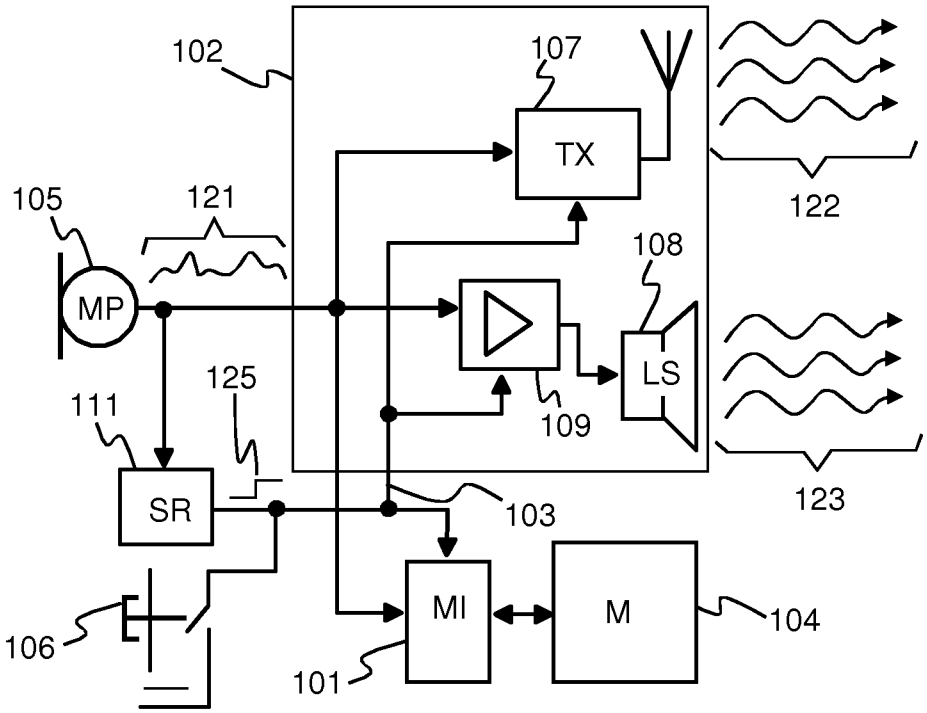
102
107
TX
105
121
122
108
MP
LS
125
111
109
123
SR
103
MI
M
104
106
101

Figure 1c

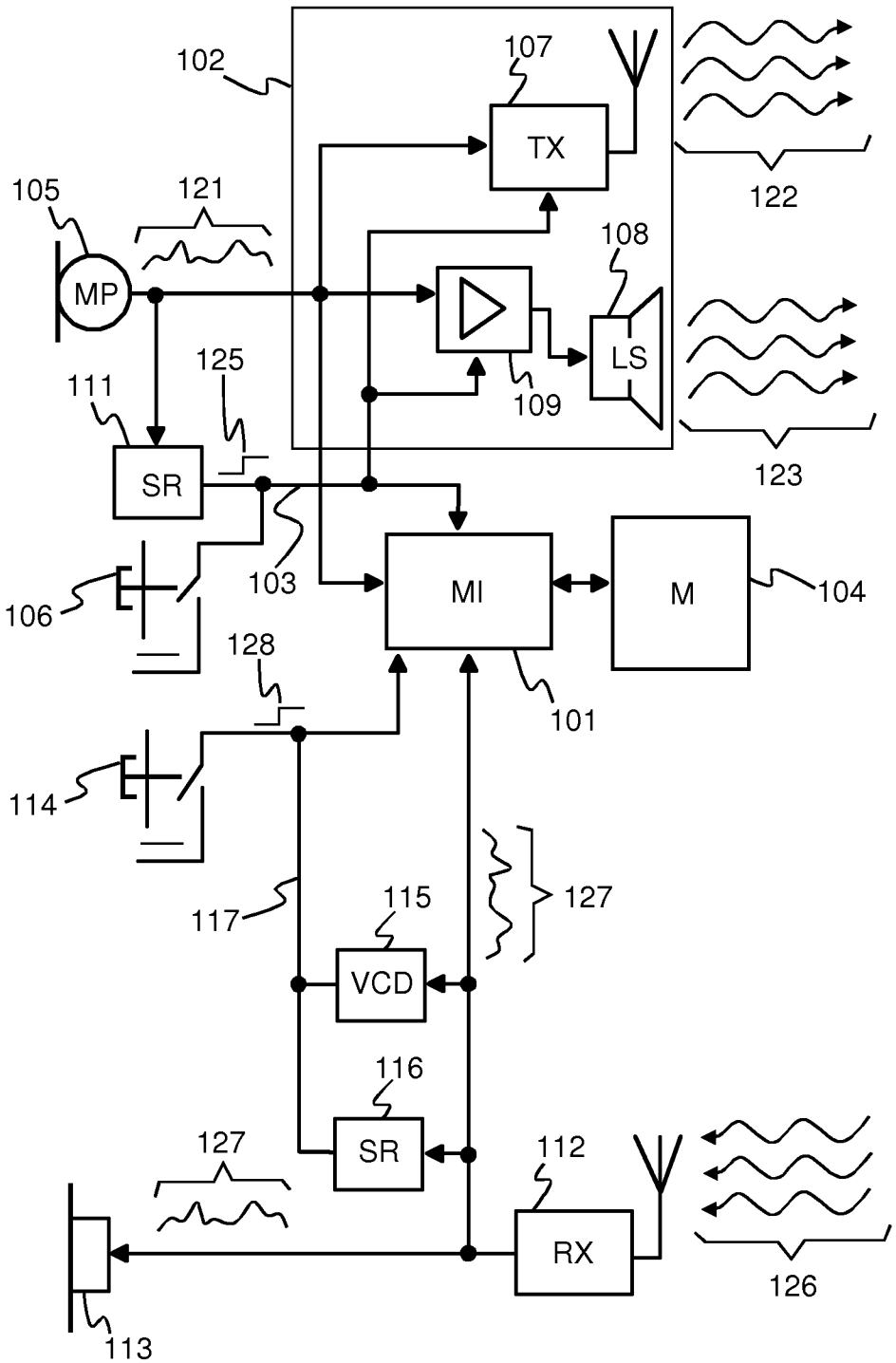
102
107
TX
122
105
121
MP
108
LS
109
123
125
111
SR
103
106
MI
M
104
128
101
114
117
115
127
VCD
116
SR
127
112
RX
126
113

Figure 1d

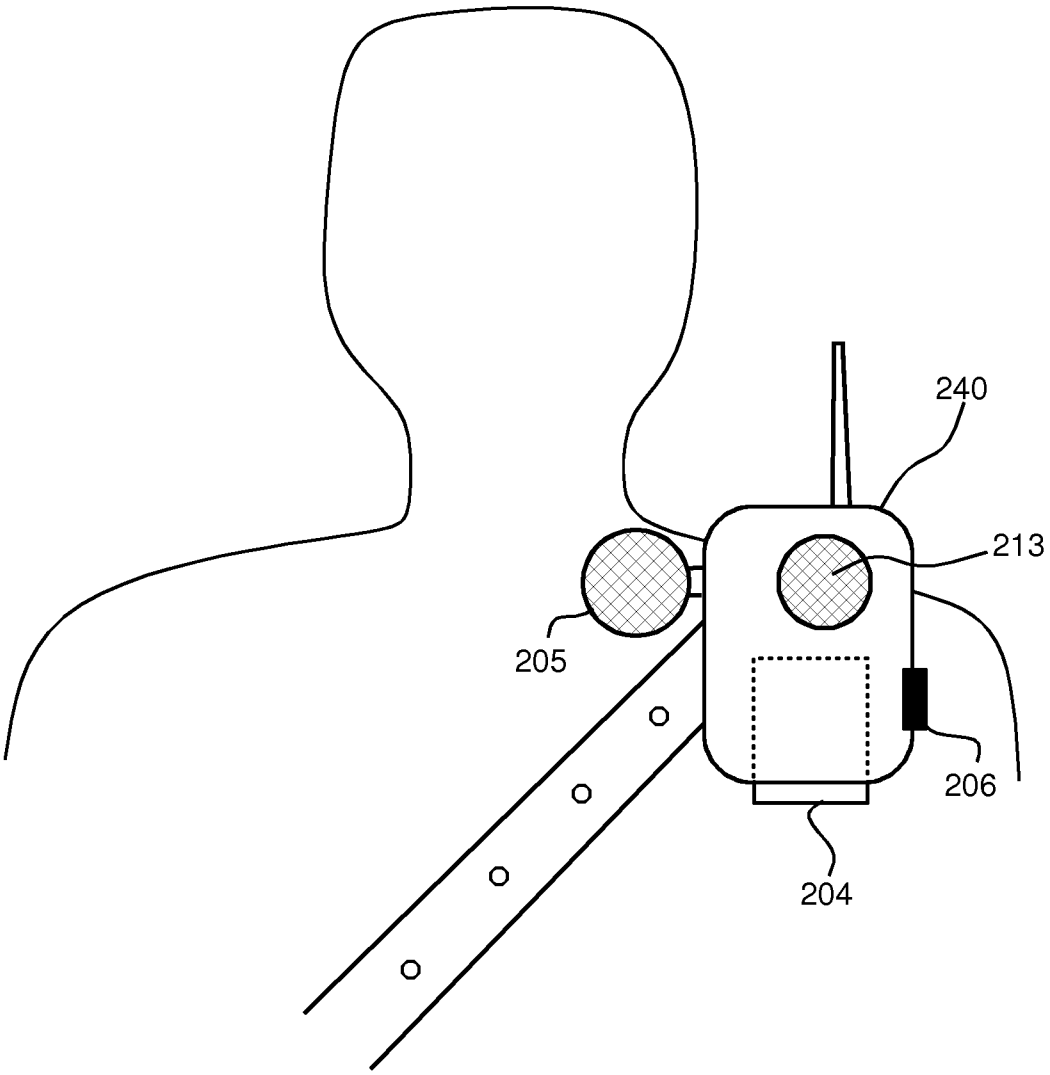

Figure 2

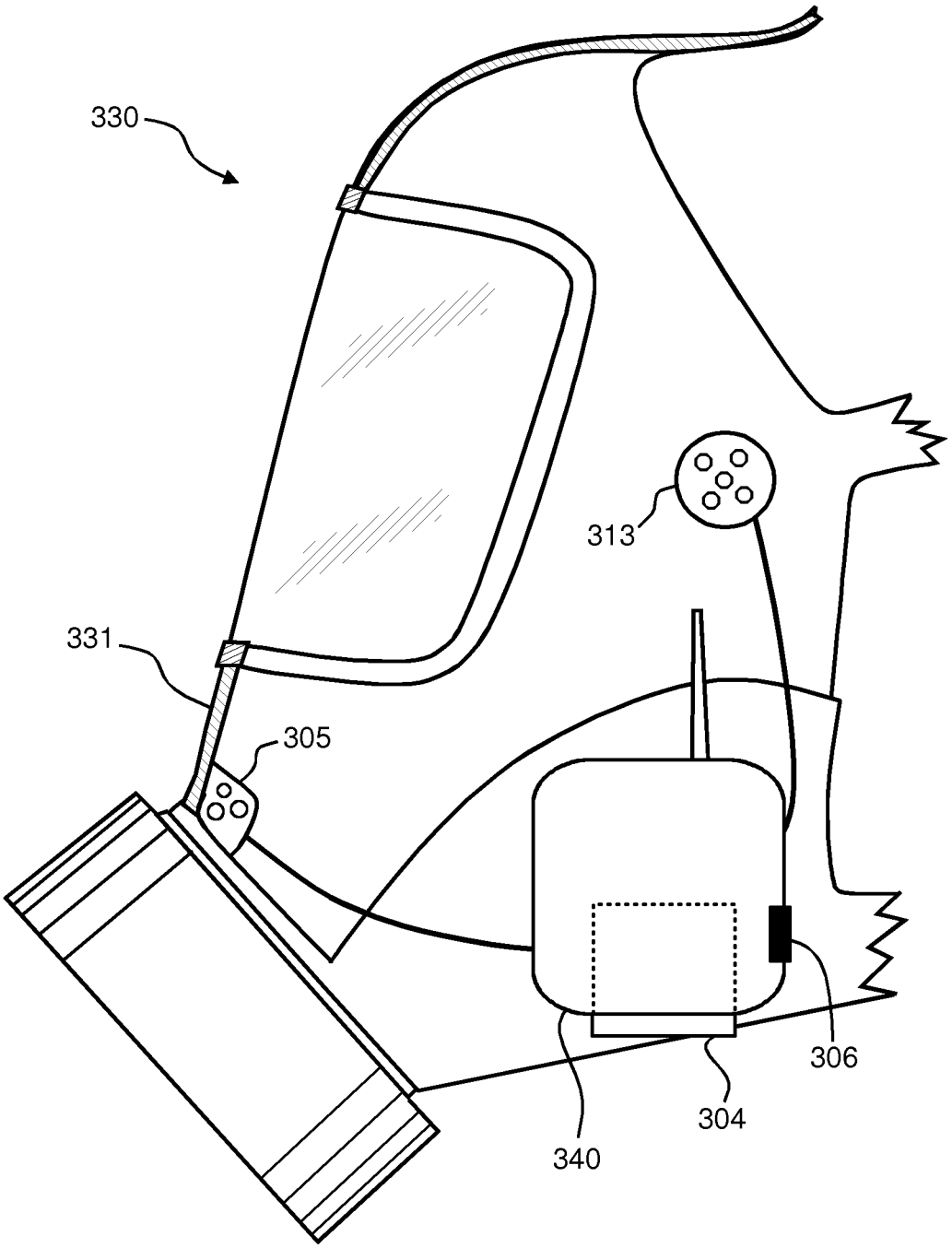

Figure 3

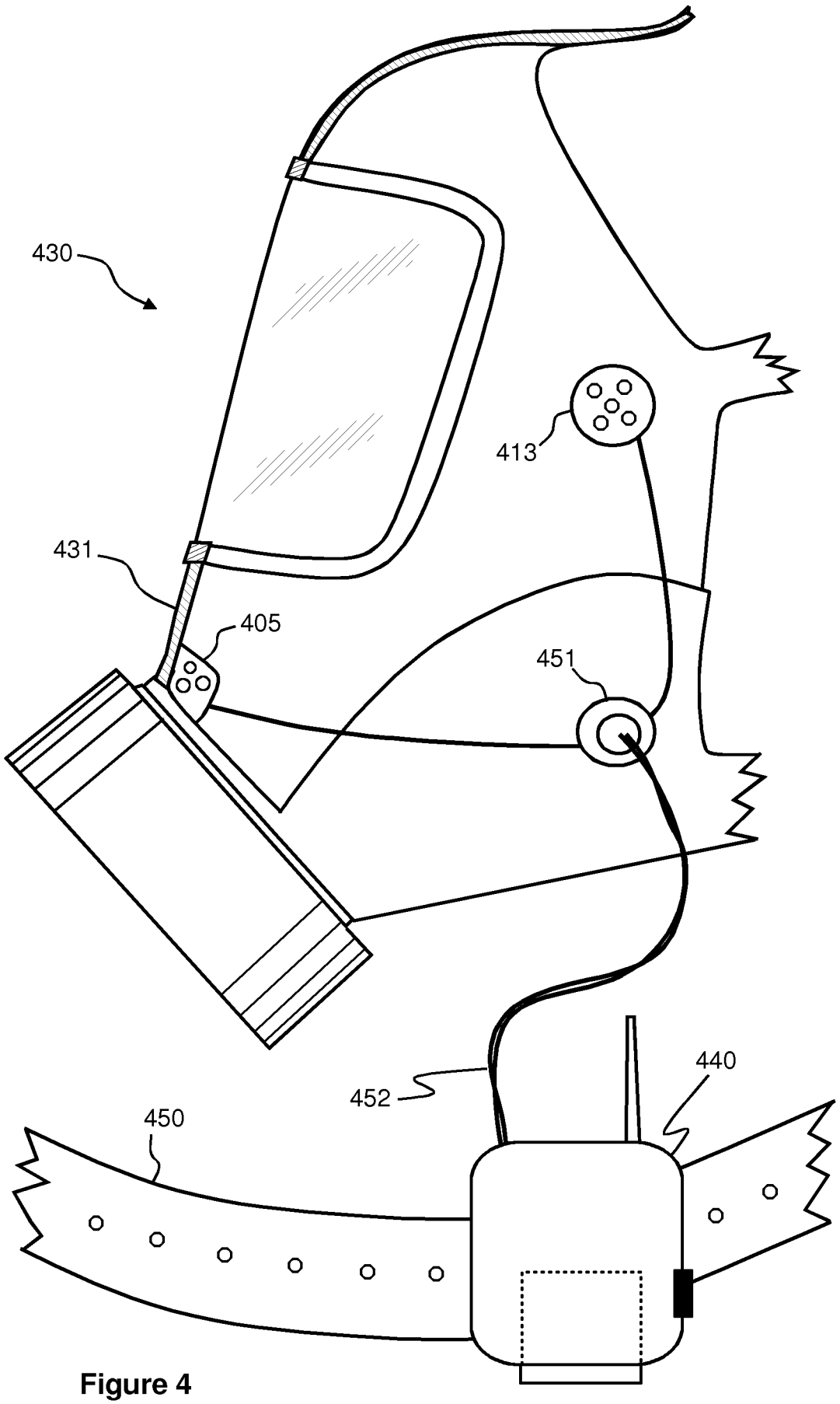

Figure 4

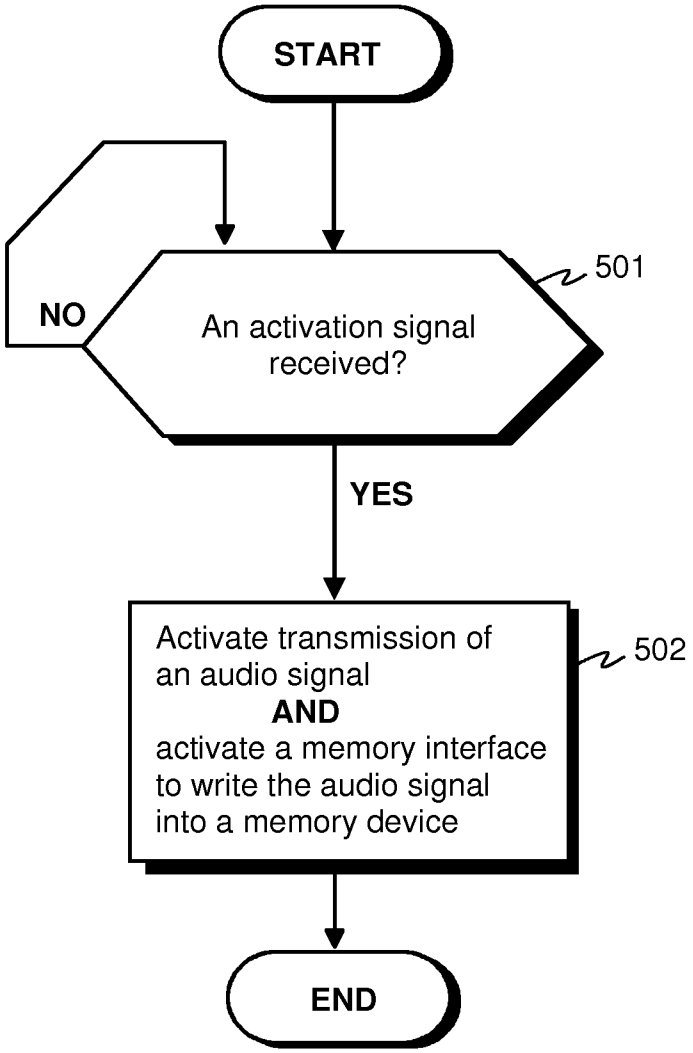
START
501
NO
An activation signal received?
YES
Activate transmission of an audio signal
AND
activate a memory interface to write the audio signal into a memory device
502
END

Figure 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2008/050192

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC 8: H04M, A62B

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

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, 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.
X	EP 1816834 A1 (SUN, W) 08 August 2007 (08.08.2007), paragraphs [0004], [0008], fig. 1	1, 2, 5-7, 8, 11, 12, 16, 17, 20-22, 23, 26, 27
X	US 2003/0210768 A1 (SAHASRABUDHE, RM) 13 November 2003 (13.11.2003) paragraphs [0020], [0025]	1-5, 7-12, 16-20, 22-27
Y		13-15
Y	US 5990793 A (BIEBACK, JS) 23 November 1999 (23.11.1999), column 2, line 55 – column 3, line 32	13-15

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 September 2008 (29.09.2008)	09 January 2009 (09.01.2009)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2008/050192

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
EP 1816834 A1	08/08/2007	None	
US 2003/0210768 A1	13/11/2003	WO 03096670 A2 AU 2003228969 A1	20/11/2003 11/11/2003
US 5990793 A	23/11/1999	US 6121881 A	19/09/2000

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2008/050192

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.
H04M 1/656 (2006.01)
A62B 18/08 (2006.01)