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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) MONITORING SYSTEM, BULB USED FOR THE MONITORING SYSTEM AND METHOD FOR MONITORING A TARGET

(57) This disclosure concerns a monitoring system for monitoring a target 8 within a space 10, comprising: a first device 2 located in the space 10, wherein the first device 2 is configured to send a plurality of first signals into the space 10, a second device 4 located in the space 10, wherein the second device 4 is configured to receive a plurality of second signals, each second signal comprises components of the first signals reflected at least by the target 8, and a third device 6 configured to determine a condition of the target based on predefined characteristics of the second signals, wherein one of the first and the second devices 2, 4 is arranged in the space above the target 8.

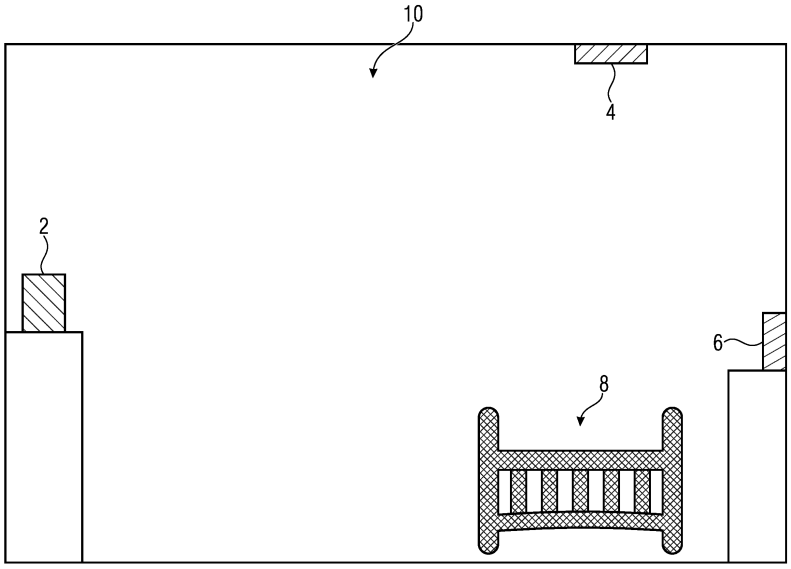

Fig. 1

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Description

Technical Filed

[0001] Embodiments of the present disclosure relate to a monitoring system for monitoring a target in a space, a bulb used for the monitoring system and a method for monitoring a target within a space.

Back ground of the invention

[0002] The present disclosure is concerned with monitoring a target, e.g., a baby, a bedridden person, a patient in a bed at a hospital, in a space, whether any abnormality has been occurred to the target. For example, in case a baby is in a separate individual room and not with the parents, it is necessary to monitor the condition of the baby. Especially, it is important to monitor the baby sleeping in the individual room, there are risks of a baby having SIDS (Sudden Infants Death Syndrome). The exact cause of SIDS is unknown; however, it is believed that environmental stress could be one of the causes of SIDS, e.g., getting tangled in bedding, a minor illness or a breathing obstruction. Therefore, it is required to monitor the baby and provide alert if there is any abnormality to the baby.

[0003] As a baby monitoring device, it is known having a mattress to monitor breathing of the baby, e.g., GB 2170 100 A, and having cameras to obtain video data, i.e., visual and sound data, of the baby, e.g., US 2022/238000 A1. However, the mattress to monitor the baby has some technical difficulty such as the baby has to be directly on the mattress on a bed, and, if any other obstacle occurs, then, it is difficult to detect the abnormality of the baby. In case the baby monitoring device using the cameras, there are also technical difficulties, e.g., for monitoring the sleeping baby in the night, it is dark, and, therefore, it is required to have night vision camera.

[0004] Further, JP2006 302173 A discloses an infant-monitoring device having a sound sensor which detects abnormal voice of an infant and send an email to the registered email address to inform the abnormal condition. JP2012 249259 A discloses a room monitoring system comprising voice monitoring means, judgment means to judge whether the voice is getting larger or smaller, and a technology to send a warning to a registered device, e.g., mobile phone. However, only having the sound/voice sensors, it is difficult to appropriately detect the condition of the baby, e.g., it is difficult to determine whether the baby is sleeping or having a breathing obstruction.

[0005] In addition, for example, US 2018 131554 A1 discloses a monitoring system using a location-specific wireless waveforms to determine a condition of a target, e.g., baby breathing monitoring. According to the baby breathing monitoring, a pair of transceivers are placed outside a baby room to monitor the breathing of the baby. It is possible to determine the baby condition by using the wireless waveforms, however, the transceivers are placed outside a baby room, and, therefore, it could be difficult to detect precise condition change of the baby. Especially, it is necessary to immediately detect and provide alert to the parents or a nanny to reduce the risk of the SIDS, and, therefore, it is required to preciously detect the baby's condition.

[0006] Thus, it is an object of the present invention to provide a monitoring system to preciously detect abnormality of a target in a space and also easy to introduce the system into the space at where the target is located.

Summary of the invention

[0007] An embodiment according to the invention provides a monitoring system for monitoring a target within a space, e.g., a baby, a bedridden person, a patient in a bed at a hospital, the monitoring system comprises: a first device, e.g., a first wifi unit, located in the space, wherein the first device is configured to send a plurality of first signals, e.g., wireless signals, into the space, a second device, e.g., a second wifi unit, located in the space, wherein the second device is configured to receive a plurality of second signals, each second signal comprises components of the first signals reflected at least by the target, and a third device, e.g., a third wifi unit, configured to determine a condition of the target, e.g., whether the target has any abnormality or not, based on predefined characteristics of the second signals, wherein one of the first and the second devices is arranged in the space above the target. That is, wireless signals (first signals) sent from the first device is transmitted via the target and through a multipath channel to the second device. The wireless signals, i.e., the second signals, received by the second device, i.e., each of the second signals comprise components of the first signals reflected at least by the target. The wireless signal has predefined characteristics, and, the predefined characteristics are changed when they are reflected by the target or any other obstacles. Therefore, it is possible to determine the condition of the target, e.g., whether the target breathing is ordinary or not, based on the predefined characteristics of the second signals at the third device.

[0008] In a preferred embodiment, there are no obstacles between the arranged device and the target. Therefore, it is possible to avoid unnecessary reflection of the wireless signals, e.g., the first and the second signals, and, hence, it is possible to determine the condition of the target more precisely.

[0009] In a preferred embodiment, the predefined characteristics comprises at least one of: a frequency of a pseudo-periodic motion of the target, a frequency characteristic, a frequency spectrum, a time period of the pseudo periodic motion, a temporal characteristic, a temporal profile, a timing of the pseudo-periodic motion, a motion type of a motion of the target, a motion classifi-

cation, a starting time, an ending time, a duration, a history of motion, a location of the target, a speed, a displacement, an acceleration, a rotational speed, a rotational characteristic, a gait cycle of the target, a transient behavior of the target, a transient motion, a change in pseudo-periodic motion, a change in frequency of pseudo-periodic motion, a change in gait cycle, and an event associated with the pseudo-periodic motion, an event associated with the transient motion, a sudden-motion event, or a fall-down event associated with the target. That is, by combining a plurality of different types of characteristics, it is possible to determine the condition of the target further preciously.

[0010] In a preferred embodiment, the space is a room in a housing, and the space above the target is a celling of the room, i.e., one device is on the celling and the other two devices can be located at any place in the same room, and the device on the celling could be any one of a light bulb, a fire alarm, fluorescent light tubes and an air conditioner, i.e., any device to which the power is supplied. That is, one of the first and the second devices is arranged on the celling of the room, and, therefore, the arranged device could cover almost all area in the room because the wireless signals, i.e., the wifi radio waves, are not obstructed by obstacles. Further, by using, e.g., a light bulb, as the device arranged on the ceiling of the room, the power is supplied without providing any additional equipment as a power source, and, therefore, the monitoring system could be easily introduced.

[0011] In a preferred embodiment, the system further comprises at least one sensor to detect a sound in the space, and the detected sound is provided to the third device to determine the condition of the target. That is, a sound sensor is provided in the space, and, therefore, the condition of the target is determined more preciously. The sound sensor could be also provided in one of the first, the second, and the third devices.

[0012] In a preferred embodiment, the system further comprises a fourth device, e.g., any registered device, mobile device (smartphone, tablet) or desktop computer (at the nurse station), arranged in further space different from the space where the target is located, the fourth device is configured to receive and output the determined condition of the target sent from the third device, e.g., warning or regular notices. That is, the condition of the target is regularly provided to a registered person, e.g., parents, a guardian, a nurse, a nanny, an observer, and so on, who is not in the same space where the target is located. Then, in case the target has any abnormalities, the person who receives the warning could react immediately to save the target. Therefore, for example, it is possible to reduce the risk of SIDS, or to detect any change of the target condition to be reacted.

[0013] In a preferred embodiment, the third device is included in the first device or the second device. That is, the first or the second device could have a function of the third device.

[0014] In a preferred embodiment, a light bulb used for the monitoring system for monitoring a target with in a space, wherein the arranged device is the light bulb. That is, the light bulb is arranged above the target, and, therefore, it is easy to introduce the monitoring system. Further, the light bulb is configured to change at least one of color of the light, brightness of the light and blinking pattern of the light depending on the condition of the target, e.g., it is possible to provide comfortable atmosphere to the target, and also it is possible to provide awareness feedback to a person who monitors the target.

[0015] In a preferred embodiment, a method for monitoring a target within a space, comprising: sending a plurality of first signals into the space from a first device located in the space, receiving a plurality of second signals, each second signal comprises components of the first signals reflected at least by the target, at a second device located in the space, and determining a condition of the target based on predefined characteristics of the second signals at the third device, wherein one of the first and the second devices is arranged in the space above the target. Further, the method further comprises: transmitting the determined condition to a fourth device arranged in further space different from the space, and receiving an outputting the determined condition of the target at the fourth device.

Brief Description of the Figures

[0016] Embodiments according to the invention will subsequently be described taking reference to the enclosed figures in which:

Fig. 1 shows a schematic diagram of a monitoring system according to embodiments of the present invention,

Fig. 2 shows a schematic diagram of a first device according to embodiments of the present invention,

Fig. 3 shows a schematic diagram to explain the detection mechanism of the condition of the target by using wireless signals of the monitoring system of Fig. 1 according to an embodiment of the present invention,

Fig. 4 shows a schematic diagram of a monitoring system according to another embodiment of the present invention,

Fig. 5 shows a schematic diagram of a monitoring system according to further embodiment of the present invention, and

Fig. 6 shows a flowchart of a method for monitoring a target within a space according to an embodiment of the present invention.

Detailed Description of the Embodiments

[0017] Equal or equivalent elements or elements with equal or equivalent functionality are denoted in the following description by equal or equivalent reference numerals.

[0018] A monitoring system according to the claimed invention could be used also in hospitals, neonatal wards as a bed, and at a home to monitor a baby or an elderly person who needs a care in a bed.

[0019] Fig. 1 shows a schematic diagram of a monitoring system according to embodiments of the present invention. As depicted in Fig.1, a baby (target) 8 on a baby bed is located in a space 10 and a first device 2, a second device 4, and a third device 8 are located in the space 10.

[0020] The first device 2 is located on a furniture in the space 10, the second device 4 is located above the baby 8, and the third device 6 is located on another furniture in the space 10. The first device 2 generates a plurality of wireless signals as a plurality of first signals, and generated first signals are send into the space 10. The second device 4 receives a plurality of second signals which comprises components of the first signals reflected at least by the baby 8, i.e., the first signals sent from the first device 2 into the space 10 are reflected by the baby 8 or any other obstacles exist in or consist of the space 10 and received by the second device 4. The third device 6 determines a condition of the baby 8 based on predefined characteristics of the second signals.

[0021] As shown in Fig. 2, the first device 2 can include one or more processors 202, like a special purpose or a general purpose digital signal processor. The processor 202 is connected to a communication infrastructure 204, like a bus or a network. The first device 2 includes a main memory 206, e.g., a random access memory (RAM), and a secondary memory 208, e.g., a hard disk drive and/or a removable storage drive. The secondary memory 208 may allow computer programs or other instructions to be loaded into the first device 2. The first device 2 may further include a communications interface 210 to allow software and data to be transferred between the first device 2 and the second (third) device 4 (6). The communication may use a wireless communication, e.g., an RF link and other communications channels 212. The second device 4 and the third device 6 could have the same feature configuration as the first device 2.

[0022] That is, as shown in Fig. 3, the first signals sent from the first device 2 into the space 10 are reflected by the baby 8, a side area (e.g., a side wall) of the space 10, an upper area (e.g., a celling) of the space 10 and received by the second device 4, i.e., the first signals are received by the second device 4 through a multipath associated with the space 10. In a state A, the baby 8 is in an exhale state, for instance, and there is no obstacle in a channel of first signal with a dotted line, i.e., the first signal is received by the second device 4 as the second signal through a channel without reflecting by the baby 8 or any obstacles in the space 10. In a channel of first signal with a double dashed line, the first signal is reflected by the upper area of the space 10 before receiving the second device 4, and in a channel of a first signal with a long-dotted line, the first signal is reflected by the baby 8 and a side area of the space 10 before receiving the second device 4, and in a channel of a first signal with a long-dashed line, the first signal is reflected by a side area of the space 10, the upper area of the space 10, and the baby 8 before receiving the second device 4. Then, the predefined characteristics of the first signals are changed dependent of the channel condition, e.g., dependent of the number of reflections before receiving by the second device 4. The information regarding the predefined characteristics of the received signals, i.e., the second signals, is provided to the third device 6 from the second device 4.

[0023] Then, in a state B, the baby breathes in, for instance, and, there is no obstacle in a channel of first signal with a dotted line, i.e., the first signal is received by the second device 4 through a channel without reflecting by the baby 8 or any obstacles in the space 10. In a channel of first signal with a double dashed line, the first signal is reflected by the upper area of the space 10 before receiving the second device 4, and in a channel of a first signal with a long-dotted line, the first signal is reflected by the baby 8, a side area of the space 10, another side area of the space, and the upper area of the space 10 before receiving the second device 4, and in a channel of a first signal with a long-dashed line, the first signal is reflected by a side area of the space 10, the upper area of the space 10, the baby 8, and another side area of the space 10 before receiving the second device 4. As already mentioned, the predefined characteristics of the first signals are changed dependent of the channel condition, e.g., dependent of the number of reflections before receiving by the second device 4. The data regarding the predefined characteristics of the received signals, i.e., the second signals, is provided to the third device 6 from the second device 4.

[0024] In the third device 6, data regarding the predefined characteristics in the state A and in the state B are stored into the memory in a chronicle order. Then, as already explained above, the predefined characteristics of the second signals in the state A are changed in the state B, and, therefore, by comparing the predefined characteristics of the second signals in the state A and in the state B, it is possible to determine the condition of the baby 8. For example, based on the data of the second signals in the chronicle order, it is possible to determine a breathing interval of the baby 8, and, therefore, in case the baby 8 does not breath appropriately, it is possible to determine that breathing is not normal.

[0025] In Fig. 1, the second device 4 is located on the upper area of the space 10, however, the second device can be located anywhere above the baby 8, e.g., on an upper space of the side area, or on the top of higher furniture located in the space 10. However, it is preferable that there are no obstacles between the second device

6 and the baby 8.

[0026] Further, in Fig. 1, the second device 4 is located on the upper area of the space 10, however, the location of the second device 4 and the first device 2 is interchangeable. Also, the location of the first device 2 and the third device 6 is interchangeable.

[0027] The predefined characteristics of the second signals comprises at least one of: a frequency of a pseudo-periodic motion of the target, a frequency characteristic, a frequency spectrum, a time period of the pseudo periodic motion, a temporal characteristic, a temporal profile, a timing of the pseudo-periodic motion, a motion type of a motion of the target, a motion classification, a starting time, an ending time, a duration, a history of motion, a location of the target, a speed, a displacement, an acceleration, a rotational speed, a rotational characteristic, a gait cycle of the target, a transient behavior of the target, a transient motion, a change in pseudo-periodic motion, a change in frequency of pseudo-periodic motion, a change in gait cycle, and an event associated with the pseudo-periodic motion, an event associated with the transient motion, a sudden-motion event, or a fall-down event associated with the target. As a technical process (mechanism) to determine the condition of the target by using the predefined characteristics of the wireless signals, the process (mechanism) disclosed in US 2018 131554 A1 is used. The detailed process (mechanism) disclosed in US 2018 131554 A1 is hereby incorporated by reference.

[0028] The space 10 is a room in a housing, and the space above the baby 8 is a celling of the room, i.e., in case of the embodiment depicted in Fig. 1, the second device 4 is located on the celling of the room, e.g., the second device could be any one of a light bulb, a fire alarm, fluorescent light tubes and an air conditioner, i.e., any device to which the power is supplied. In addition, in Fig. 1, the first device 2 and the third device 6 are located on the furniture in the room, however, they can be located at any place in the same room.

[0029] In Fig. 1, it is not depicted, however, the monitoring system further comprises at least one sensor to detect a sound, i.e., sound sensors, in the space 10, and the detected sound is provided to the third device 6 to determine the condition of the baby (target) 8. For example, at least one sound sensor is provided on the bed where the baby 8 lays. By using the sound sensors, the baby's condition is determined more preciously, e.g., it is possible to know whether the baby is crying or not.

[0030] Fig. 4 shows a schematic diagram of a monitoring system according to another embodiment of the present invention. This embodiment is different from the embodiment of Fig. 1 that the monitoring system includes a fourth device 12 arranged in a further space 20 different from the space 10, where a Guardian (parents or any other family member or nanny or any other person) 14 is located. The fourth device 12 is any registered device, e.g., mobile device (smartphone, tablet), desktop computer (at the nurse station), and so on. The third device 6 transmits the data regarding the condition of the target 8 to the fourth device 12 by using a wireless communication channel. The fourth device 12 receives the data sent from the third device 6, and output the determined condition of the target 8. That is, the fourth device 12 receives the data regarding the condition of the target 8 in a predetermined time interval as a regular notice, and, in case any abnormality has been occurred, the newest condition of the target 8 is received by the fourth device 12. The notice is any one of a short message, an email, an instant message or a message of any other known messenger system. The warning could be other form as a message or an email, e.g., calling a smart phone, displaying an emergency message with a red background and blinking, or any other way to awake attentions of the Guardian 14.

[0031] Fig. 5 shows a schematic diagram of a monitoring system according to further embodiment of the present invention. In this embodiment, it is different from the embodiment of Fig. 1 that a bulb 4' is used as the second device, and the third device is included in the first device 2. In case of the embodiment of Fig. 1, the third device 6 could be included in the first device 2 or the second device 4.

[0032] In case the light bulb is used as the second device, the light bulb is configured to change at least one of color of the light, brightness of the light and blinking pattern of the light depending on the condition of the target. That is, it is possible to provide comfortable atmosphere to the target, and also it is possible to provide awareness feedback to a person who observes the target, e.g., by changing color of the light and blinking it, it is possible to give a warning that something abnormal is occurred. Further, it is possible to indicate the warning level by changing any one or more of the color of the light, the brightness of the light and the blinking patter of the light. For example, there is a deviation of breathing pattern, however, the deviation is little bit more than a predetermined threshold, then, the blinking pattern has a long interval. Contrary to that, for example, it is detected that the baby is not in the bed, then, the blinking pattern is very short interval, the color is of the light is red, and the brightness of the light is maximum. The combination of the color, brightness and blinking patters could be preliminary defined at the third device.

[0033] Fig. 6 shows a flowchart of a method for monitoring a target within a space according to embodiment of the present invention. As indicates in Fig. 6, a plurality of first signals is send into the space (S10), i.e., the plurality of first signals is send into the space from a first device located in the space. Then, a plurality of second signals is received (S12), i.e., the plurality of second signals, each second signal comprises components of the first signals reflected at least by the target, is received at a second device located in the space, and a condition of the target is determined (S14), i.e., the condition of the target is determined based on predefined characteristics of the second signals at a third device. In case the mon-

itoring system includes a fourth device, further steps are implemented, i.e., the determined condition is transmitted to the fourth device. The fourth device is arranged in a different space from the space where the target is located. Then, the transmitted determined condition is received at the fourth device and received condition is outputted at the fourth device. That is, as already explained above, the fourth device displays the received condition or beep out as a warning.

[0034] While this disclosure has been described with reference to illustrative embodiments, this description is not intended to be construed in a limiting sense. Various modifications and combinations of the illustrative embodiments, as well as other embodiments of this disclosure, will be apparent to persons skilled in the art upon reference to the description. It is therefore intended that the appended claims encompass any such modifications or embodiments.

Claims

1. A monitoring system for monitoring a target (8) within a space (10), comprising:

a first device (2) located in the space (10), wherein the first device (2) is configured to send a plurality of first signals into the space (10),
a second device (4) located in the space (10), wherein the second device (4) is configured to receive a plurality of second signals, each second signal comprises components of the first signals reflected at least by the target (8), and
a third device (6) configured to determine a condition of the target based on predefined characteristics of the second signals,

wherein
one of the first and the second devices (2, 4) is arranged in the space above the target (8).

2. The monitoring system according to claim 1, wherein there are no obstacles between the arranged device and the target (8).

3. The monitoring system according to claim 1 or 2, wherein the predefined characteristics comprises at least one of:

a frequency of a pseudo-periodic motion of the target (8), a frequency characteristic, a frequency spectrum, a time period of the pseudo periodic motion, a temporal characteristic,
a temporal profile, a timing of the pseudo-periodic motion,
a motion type of a motion of the target (8), a motion classification, a starting time, an ending time, a duration, a history of motion,
a location of the target, a speed, a displacement, an acceleration, a rotational speed, a rotational characteristic, a gait cycle of the target (8),
a transient behavior of the target (8), a transient motion, a change in pseudo-periodic motion, a change in frequency of pseudo-periodic motion, a change in gait cycle, and
an event associated with the pseudo-periodic motion, an event associated with the transient motion, a sudden-motion event, or a fall-down event associated with the target (8).

4. The monitoring system according to any one of claims 1 to 3, wherein

the space (10) is a room in a housing, and
the space above the target (8) is a celling of the room.

5. The monitoring system according to any one of claims 1 to 4, wherein the system further comprises at least one sensor to detect a sound in the space (10), and
the detected sound is provided to the third device (6) to determine the condition of the target (8).

6. The monitoring system according to any one of claims 1 to 5, wherein

the system further comprises a fourth device (12) arranged in a further space (20) different from the space (10),
the fourth device (12) is configured to receive and output the determined condition of the target (8) sent from the third device (6).

7. The monitoring system according to any one of claims 1 to 6, wherein
the third device (6) is included in the first device (2) or the second device (2).

8. A light bulb used for the monitoring system for monitoring a target (8) within a space (10) according to any one of claims 1 to 7, wherein the arranged device is the light bulb (4').

9. The light bulb according to claim 8, wherein
the light bulb (4') is configured to change at least one of color of the light, brightness of the light and blinking pattern of the light depending on the condition of the target (8).

10. A method for monitoring a target (8) within a space (10), comprising:

sending a plurality of first signals into the space from a first device (2) located in the space (10),
receiving a plurality of second signals, each sec-

ond signal comprises components of the first signals reflected at least by the target (8), at a second device (4) located in the space (10), and determining a condition of the target (8) based on predefined characteristics of the second signals at a third device (6),

wherein
one of the first and the second devices (2, 4) is arranged in the space above the target (8).

11. The method for monitoring according to claim 10, wherein the method further comprises:

transmitting the determined condition to a fourth device (12) arranged in further space (20) different from the space (10), and
receiving an outputting the determined condition of the target (8) at the fourth device (12).

Amended claims in accordance with Rule 137(2) EPC.

1. A monitoring system for monitoring a target (8) within a space (10), comprising:

a first device (2) located in the space (10), wherein the first device (2) is configured to send a plurality of first signals into the space (10),
a second device (4) located in the space (10), wherein the second device (4) is configured to receive a plurality of second signals, each second signal comprises components of the first signals reflected at least by the target (8), and
a third device (6) configured to determine a condition of the target based on predefined characteristics of the second signals,
wherein
one of the first and the second devices (2, 4) is arranged in the space above the target (8),
characterized in that
the system further comprises a fourth device (12) arranged in a further space (20) different from the space (10),
the fourth device (12) is configured to receive and output the determined condition of the target (8) sent from the third device (6).

2. The monitoring system according to claim 1, wherein there are no obstacles between the arranged device and the target (8).

3. The monitoring system according to claim 1 or 2, wherein the predefined characteristics comprises at least one of:

a frequency of a pseudo-periodic motion of the target (8), a frequency characteristic, a frequency spectrum, a time period of the pseudo periodic motion, a temporal characteristic,
a temporal profile, a timing of the pseudo-periodic motion,
a motion type of a motion of the target (8), a motion classification, a starting time, an ending time, a duration, a history of motion,
a location of the target, a speed, a displacement, an acceleration, a rotational speed, a rotational characteristic, a gait cycle of the target (8),
a transient behavior of the target (8), a transient motion, a change in pseudo-periodic motion, a change in frequency of pseudo-periodic motion, a change in gait cycle, and
an event associated with the pseudo-periodic motion, an event associated with the transient motion, a sudden-motion event, or a fall-down event associated with the target (8).

4. The monitoring system according to any one of claims 1 to 3, wherein

the space (10) is a room in a housing, and
the space above the target (8) is a celling of the room.

5. The monitoring system according to any one of claims 1 to 4, wherein the system further comprises at least one sensor to detect a sound in the space (10), and
the detected sound is provided to the third device (6) to determine the condition of the target (8).

6. The monitoring system according to any one of claims 1 to 5, wherein
the third device (6) is included in the first device (2) or the second device (2).

7. A light bulb used for the monitoring system for monitoring a target (8) within a space (10) according to any one of claims 1 to 6, wherein the arranged device is the light bulb (4').

8. The light bulb according to claim 7, wherein
the light bulb (4') is configured to change at least one of color of the light, brightness of the light and blinking pattern of the light depending on the condition of the target (8).

9. A method for monitoring a target (8) within a space (10), comprising:

sending a plurality of first signals into the space from a first device (2) located in the space (10),
receiving a plurality of second signals, each second signal comprises components of the first signals reflected at least by the target (8), at a

second device (4) located in the space (10), and determining a condition of the target (8) based on predefined characteristics of the second signals at a third device (6),
wherein
one of the first and the second devices (2, 4) is arranged in the space above the target (8),
characterized in that
transmitting the determined condition to a fourth device (12) arranged in further space (20) different from the space (10), and
receiving an outputting the determined condition of the target (8) at the fourth device (12).

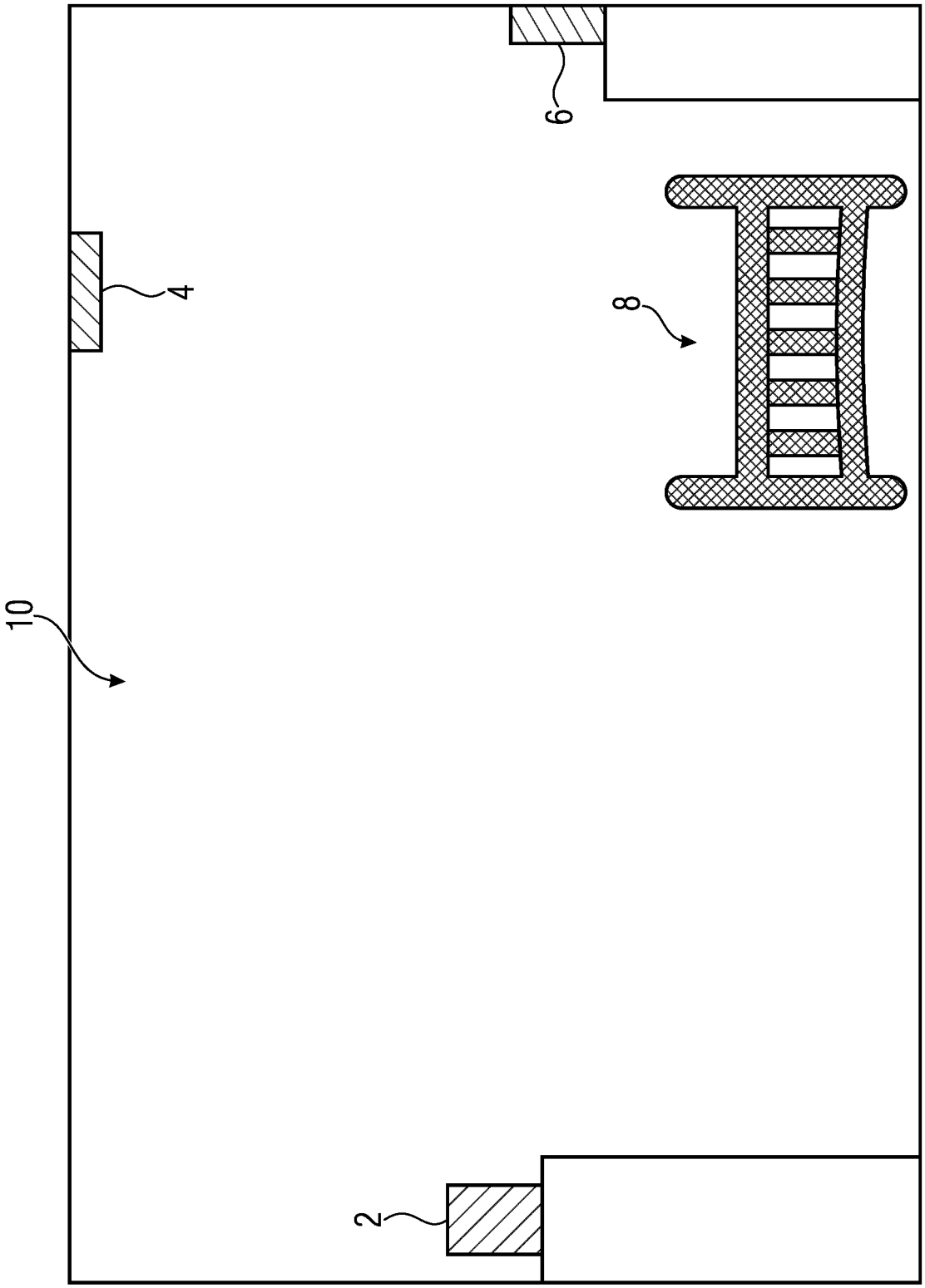

Fig. 1

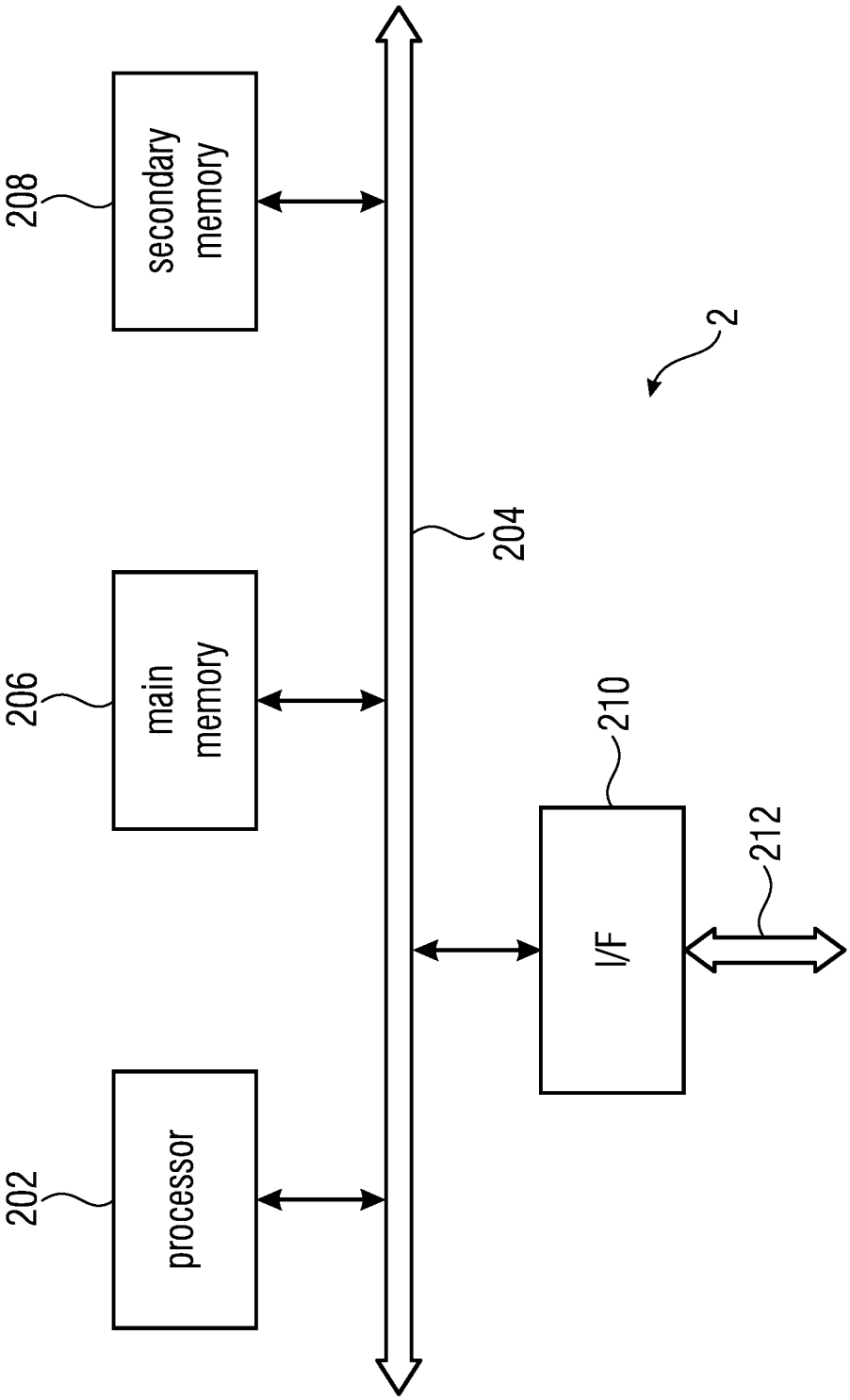
208
secondary memory
206
main memory
202
processor
204
2
210
I/F
212

Fig. 2

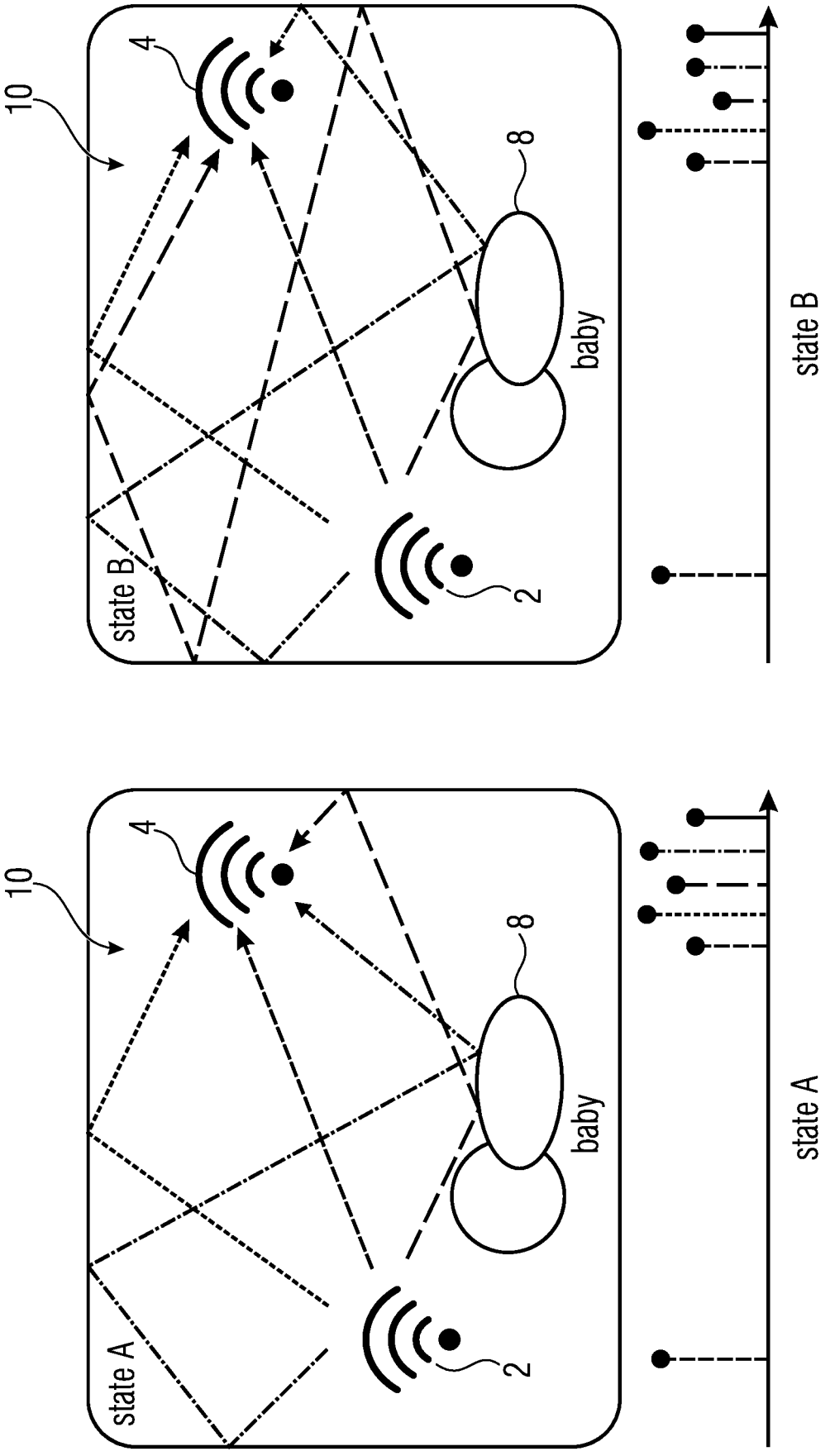

Fig. 3

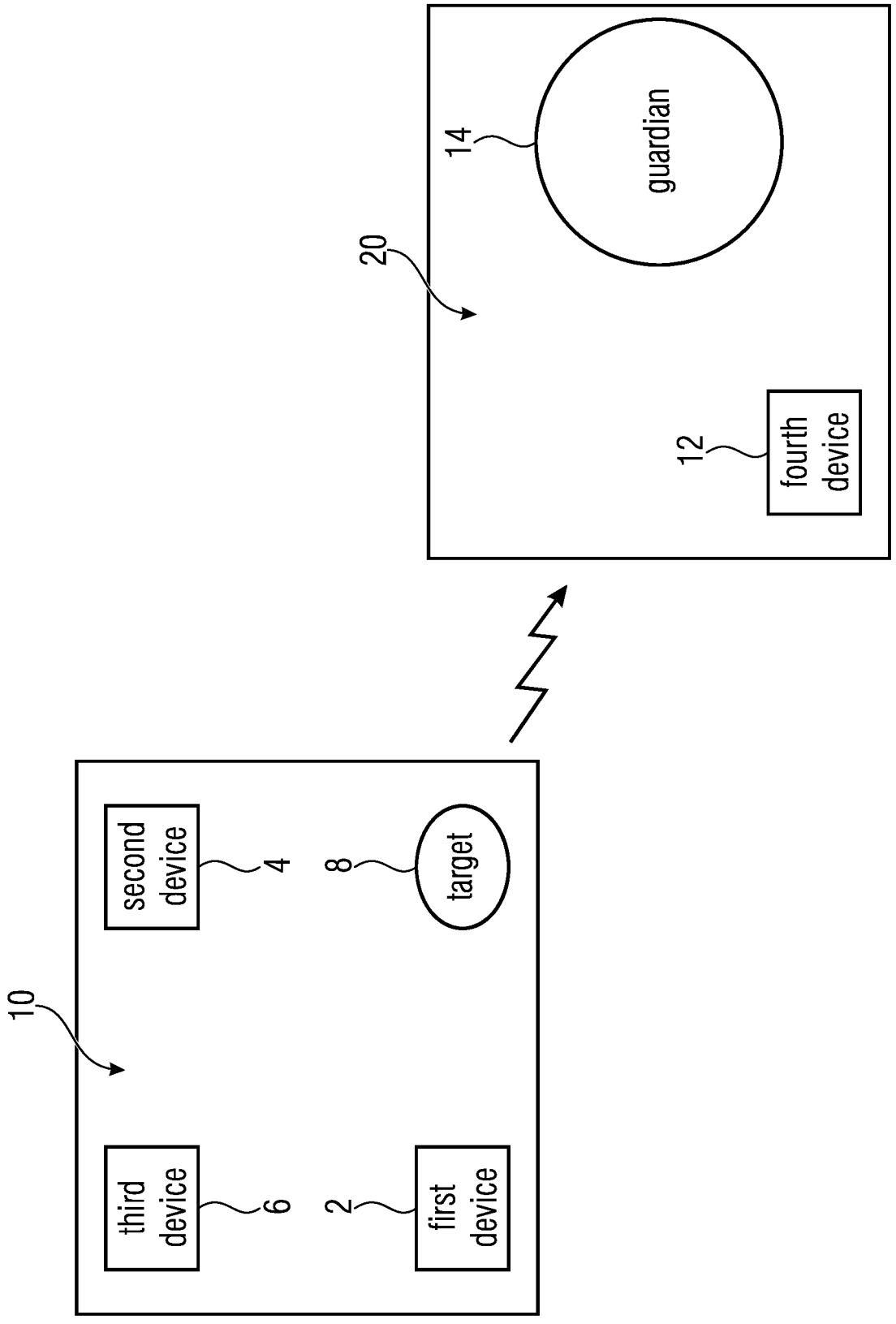
10
third device
6
2
first device
second device
4
8
target
20
14
guardian
12
fourth device

Fig. 4

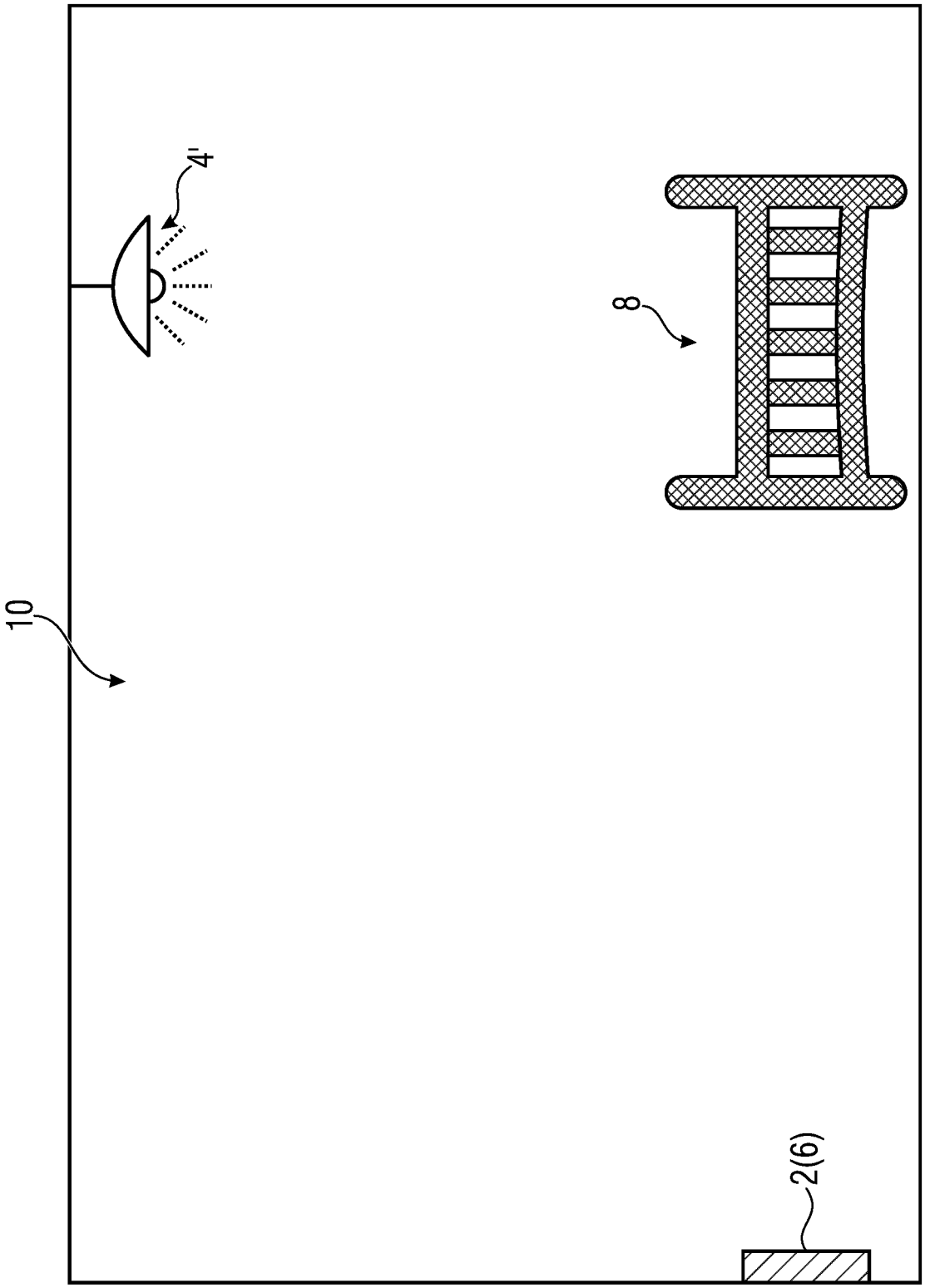

Fig. 5

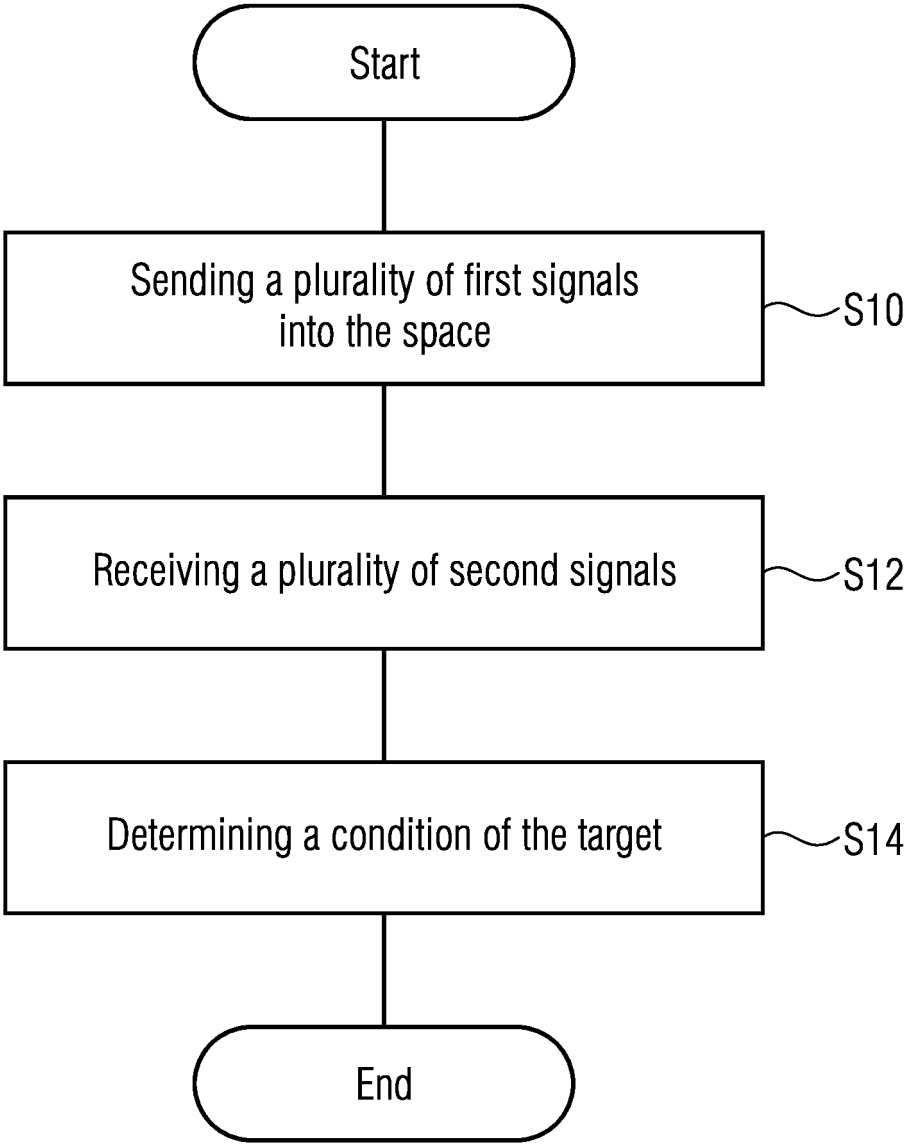
Start
Sending a plurality of first signals into the space
S10
Receiving a plurality of second signals
S12
Determining a condition of the target
S14
End

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 22 19 8812

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Place of search	Date of completion of the search	Examiner
Munich	1 March 2023	Heß, Rüdiger

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