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- (71) **Applicant:** EYECONIT LTD. [IL/IL]; P.O.B. 12855, 20 Galgalei Ha-Plada Street, 4672220 Herzliya (IL).
- (72) **Inventors:** FRIEDMAN, Itamar; 16/5 Brodetzki Street, 6905127 Tel Aviv (IL). HEVER, Amir; 9 Greenberg Street, 6937915 Tel-Aviv (IL).
- (74) **Agent:** HAUSMAN, Ehud; Reinhold Cohn and Partners, P.O. BOX 13239, 6113102 Tel Aviv (IL).
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(54) **Title:** TRANSFERRING MESSAGES BETWEEN DEVICES

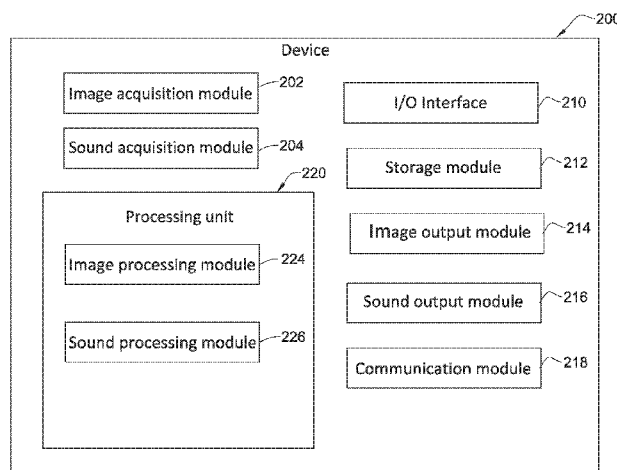


Fig. 2

(57) **Abstract:** A method for transferring messages between a first device and a second device. The method includes conveying a first message that includes a first informative message content, by presenting on the first device screen a visual code indicative of the first message. Then, conveying a second message that includes a second informative message content, by transmitting using the first device speaker a sound code indicative of the second message. The method further includes receiving the first message including scanning the visual code using the second device camera and extracting the first informative content, and receiving the second message including receiving the sound code using the second device microphone and extracting the second informative message content, wherein said extraction of the first informative message content is performed without utilizing the second message, and wherein said extraction of the second informative message content is performed without utilizing the first message.



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TRANSFERRING MESSAGES BETWEEN DEVICES

FIELD OF THE INVENTION

5 The presently disclosed subject matter relates to a method and system for transferring messages between devices.

BACKGROUND OF THE INVENTION

Communication between two mobile devices is very common and is used for applications such as, but not limited to, payment, social platforms, and data transfer.

10 Such mobile devices can be, for example, smartphones.

Possible communication channels may be for example Bluetooth, Data over Sound (using a microphone and speaker), Visual Code (using the display and camera) and Near Field Communication (NFC). Each communication channel has its capabilities and properties.

15 Visual Codes are very common and are used, for example, to initiate communication for various applications. An advantage of Visual Codes is that they can be seen by the human eye, and give an indication to one or more users that a communication channel is available. Another possible advantage is that Visual Codes are not affected by surrounding sound noises, acoustic conditions or other
20 electromagnetic based noise.

Sound Codes is another option to initiate communication and is common in various applications. An advantage of Sound Codes (or transmitting data over sound) is that they cannot be detected by most human ears, and do not disturb the majority of humans surrounding the sound source. Another possible advantage is that Sound Codes
25 are not affected by surrounding lighting noises or lighting conditions. A possible disadvantage of Sound Codes is that this communication channel is sensitive to sound noise and acoustic conditions.

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GENERAL DESCRIPTION

There is a need in the art for a new communication channel based on both Visual Codes and Sound Codes that can provide a more robust, user friendly and secure data transfer and applications.

5 In accordance with an aspect of the presently disclosed subject matter, there is provided a method for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module, comprising: at least by the processor of the first device:

10 i) conveying a first message that includes a first informative message content, by presenting on the first device image output module a visual code indicative of the first message;

ii) conveying a second message that includes a second informative message content, by transmitting using the first device sound output module a sound code indicative of the second message;

15 the method further comprising: at least by the processor of the second device

iii) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;

20 iv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative message content;

wherein the extraction of the first informative message content is performed without utilizing the second message, and wherein the extraction of the second informative message content is performed without utilizing the first message.

25 In accordance with an embodiment of the presently disclosed subject matter, there is further provided a method, further comprising determining at least one consolidated message based on at least: the first informative message content and the second informative message content.

30 In accordance with an embodiment of the presently disclosed subject matter, there is further provided a method, further comprising performing an action based on

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the extracted first informative message content and the second informative messages content.

In accordance with an embodiment of the presently disclosed subject matter, there is further provided a method, further comprising: checking if the first and second
5 informative messages match according to a matching criterion and only upon meeting the matching criterion, performing the action.

In accordance with an embodiment of the presently disclosed subject matter, there is further provided a method, wherein the first informative message being encoded and further comprising obtaining a decoded first informative message from the encoded
10 first informative message using a key that is derivable from the second informative message, whereby the matching criterion is met.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the second informative message being encoded and further comprising obtaining a decoded second informative message from
15 the encoded second informative message using a key that is derivable from the first informative message, whereby the matching criterion is met.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, further comprising at least by the processor of the second device, and utilizing the decoded first informative message for performing
20 the action.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the second device further includes a sound output module and wherein the first informative message content includes a first portion of an encoding key and wherein the second informative message content
25 includes a second portion of an encoding key, and wherein the first and second informative messages match according to the matching criterion that includes at least a valid encoding key which is derivable based on the first portion of the encoding key and second portion of the encoding key, and wherein the action includes: at least by the processor of the second device:

30 (i) encoding a third informative message content of a third message using at least the valid encoding key, and

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(ii) conveying the third message by transmitting using the second device sound output module a sound code indicative of the third message,

5 thereby exempting the necessity keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the entire third message transmission duration.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first informative message content
10 includes a first portion of an encoding key and wherein the second informative message content includes a second portion of an encoding key, and wherein the first and second informative messages match according to the matching criterion if at least a valid encoding key is derivable based on the first portion of the encoding key and second portion of the encoding key, and wherein the action includes, at least by the processor of
15 the second device:

(iii) encoding a third informative message content of third message using at least the valid encoding key, and performing either or both of the following (viii) wherein the second device includes a screen and (ix) wherein the second device further includes an
20 sound output module

(iv) conveying the third message by presenting on the second device image output module a visual code indicative of the third message

(v) conveying the third message by transmitting using the second device sound output module a sound code indicative of the third
25 message.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first informative message content includes a first digital wallet identifier portion of a user of the first device, and wherein the second informative message content includes a second digital wallet identifier
30 portion of the user of the first device, and wherein the first and second informative messages match according to the following matching criterion (a) and (b)

a) the valid encoding key is derivable based on the first portion of the encoding key and second portion of the encoding key; and

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- b) a valid digital wallet identifier is derivable based on the first digital wallet identifier portion and second digital wallet identifier portion

and wherein the third informative message content includes a sum to be paid to a user identified by the valid digital wallet identifier;

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the method further comprising at least by the processor of the first device,

performing either or both of the following (x) wherein the first device includes an image acquisition device and (xi) wherein the first device includes a sound acquisition module in a coordinated fashion with (viii) and (ix)

10

- (vi) receiving the third message including scanning the visual code using the first device image acquisition device and extracting the encoded third informative content;

- (vii) receiving the third message including receiving the sound code using the first device sound acquisition module and extracting the encoded third informative content

15

- (viii) decoding the encoded third information image using the valid encoding key;

- (ix) cease to convey the first and second message; and

- (x) performing an action that related to the sum and the digital wallet number.

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In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, further comprising, at least by the processor of the first device:

- (xi) encoding an informative acknowledgement message content of a fourth message using an encoding key and performing either or both of the following (xvi) and (xvii)

25

- (xii) conveying the fourth message that includes the encoded informative acknowledgement message content by presenting on the first device image output module a visual code indicative of the fourth message;

30

- (xiii) conveying the fourth message that includes the encoded informative acknowledgement message content by transmitting

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using the first device sound output module a sound code indicative of the fourth message;

the method further comprising at least by the processor of the second device,

performing either or both of the following (xviii) and (xix) in a coordinated

5 fashion with (xvi) and (xvii)

(xiv) receiving the fourth message including scanning the visual code using the second device image acquisition device and extracting the encoded informative acknowledgement message;

10 (xv) receiving the fourth message including receiving the sound code using the second device sound acquisition module and extracting the encoded informative acknowledgement message;

(xvi) decoding the encoded informative acknowledgement message using at least the encoding key and

(xvii) ceasing to convey said third message.

15 In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first device and second device being cellular devices.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein neither the first device nor said second
20 device are connected to the Internet throughout at least said stages (i) to (iv).

In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a method for transferring a message between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image
25 acquisition device and a sound acquisition module, comprising, at least by the processor of the first device:

(i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message;

30 (ii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message;

the method further comprising, at least by the processor of the second device;

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- 5 (iii) attempting to receive the first message and extract the first informative message content and attempting to receive the second message and extract the second informative message content, wherein receiving the first message includes scanning the visual code using the second device image acquisition device and extracting the first informative message content; and wherein receiving the second message includes receiving the sound code using the second device sound acquisition module and extracting the second informative content; and
- 10 (iv) performing an action in accordance with informative message content of the first to be received message from among said first message and second message without needing to wait for receiving the other message from among the first and second messages.

15 In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first and second informative messages are identical.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first and second informative message
20 contents include a social identifier information of a first user of the first device and wherein (iv) includes performing the action utilizing the social identifier information of the first user.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the social identifier information being at
25 least one of: first user Facebook name, first user Linkedin name, first user WeChat ID, first user Sina Weibo ID, first user What'sapp ID, first user phone number and first user Line ID.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein neither the first device nor said second
30 device are connected to the Internet throughout at least stages (i) to (iv).

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, further comprising, at least by the processor of the second device:

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(v) after performing the action, conveying a third message that includes a confirmation informative message content by transmitting, using the second device sound output module, a sound code indicative of the third message;

the method further comprising, at least by the processor of the first device:

- 5 (vi) receiving the third message including receiving the sound code using the first device sound acquisition module and extracting the acknowledgement informative content, and
- (vii) ceasing to convey the first and second messages.

In accordance with an embodiment of the presently disclosed subject matter,
10 there is yet further provided a method, wherein the first informative message content includes an encoding key and wherein the action includes, at least by the processor of the second device:

- (v) encoding a third informative message content of third message using at least the encoding key, and
- 15 (vi) conveying the third message by transmitting using the second device sound output module a sound code indicative of the third message,
- thereby exempting the necessity to keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the entire third message transmission duration.
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In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first device and second device being a cellular device.

25 In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein neither the first device nor the second device are connected to the Internet throughout at least stages (i) to (iv).

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the image acquisition device being a
30 camera fitted in the cellular device.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the image acquisition device being a camera fitted in the cellular device.

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In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a method for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising, at least by the processor of the first device:

v) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, the first informative message content including an encoding key;

the method further comprising: at least by the processor of the second device

vi) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;

vii) encoding a second informative message content of a second message using at least the encoding key, and

viii) conveying the second message by transmitting using the second device sound output module a sound code indicative of the second message,

thereby exempting the necessity to keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the third message transmission duration.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the first device and second device being a cellular device.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein neither the first device nor said second device are connected to the Internet throughout at least stages (i) to (iv).

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the image acquisition device being a camera fitted in the cellular device.

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In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a method for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising, at least by the processor of the first device:

ix) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, wherein the first message content additionally includes at least an additional robust informative portion, such that under degraded visual conditions at least the robust informative portion is capable of being acquirable by an image acquisition device and is extractable;

x) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message

the method further comprising: at least by the processor of the second device

xi) receiving the at least part of the first message including scanning at least part of the visual code using the second device image acquisition device and extracting at least the robust informative portion;

xii) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative content.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method further comprising determining at least one consolidated message based on at least the extracted robust informative portion and the extracted second informative message content.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, further comprising performing an action based on at least the extracted robust informative portion and the extracted second informative message content.

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In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, further comprising: checking if the at least the extracted robust informative portion and the extracted second informative message
5 content match according to a matching criterion and only upon meeting the matching criterion, performing the action.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the degraded visual conditions includes at least one of: (i) degraded ambient lighting conditions; and (ii) conditions that
10 interfere with ongoing LOS between the first device image output module that displays the first message and the image acquisition device of the second device, while presenting the visual code; and (iii) the image acquisition device of the second device is not focused on the visual code or its white balance is not appropriately configured to scan the visual code.

15 In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the visual code being two-dimensional code.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the two-dimensional code being
20 Quick Response (QR) code.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the visual code being two-dimensional code.

25 In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the visual code being two-dimensional code.

In accordance with an embodiment of the presently disclosed subject matter, there is yet further provided a method, wherein the visual code being two-dimensional code.

30 In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a system for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image

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acquisition device and a sound acquisition module, comprising at least by the processor of the first device:

- xiii) conveying a first message that includes a first informative message content, by presenting on the first device image output module a visual code indicative of the first message;
- xiv) conveying a second message that includes a second informative message content, by transmitting using the first device sound output module a sound code indicative of the second message;

the system further comprising at least by the processor of the second device:

- xv) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;
 - xvi) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative message content;
- wherein the extraction of the first informative message content is performed without utilizing the second message, and wherein the extraction of the second informative message content is performed without utilizing the first message.

In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a system for transferring a message between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module, comprising at least by the processor of the first device:

- (i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message;
- (ii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message;

the system further comprising at least by the processor of the second device;

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- 5 (iii) attempting to receive the first message and extract the first informative message content and attempting to receive the second message and extract the second informative message content, wherein receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative message content; and wherein receiving the second message includes receiving the sound code using the second device sound acquisition module and extracting the second informative content; and
- 10 (iv) performing an action in accordance with informative message content of the first to be received message from among the first message and second message without needing to wait for receiving the other message from among the first and second messages.

15 In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a system for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising, at least by the processor

20 of the first device:

- xvii) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, the first informative message content including an encoding key;
- 25 the system further comprising at least by the processor of the second device:
- xviii) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;
- xix) encoding a second informative message content of a second message using at least the encoding key, and
- 30 xx) conveying the second message by transmitting using the second device sound output module a sound code indicative of the second message,

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thereby exempting the necessity to keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the third message transmission duration.

5 In accordance with an aspect of the presently disclosed subject matter, there is yet further provided a system for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising at least by the processor
10 of the first device:

xxi) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, wherein the first message content additionally includes at least an additional robust
15 informative portion, such that under degraded visual conditions at least the robust informative portion is capable of being acquirable by an image acquisition device and extractable;

xxii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message
20

the system further comprising: at least by the processor of the second device

xxiii) receiving the at least part of the first message including scanning at least part of the visual code using the second device image acquisition device and extracting at least the robust informative
25 portion;

xxiv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative content.

30 Note that the various embodiments described with reference to the various method aspects of the presently disclosed subject matter may likewise be applied to any of the system and/or non-transitory computer readable storage medium of the presently disclosed subject matter.

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Note also that whereas the system and method aspects of the presently disclosed subject matter are defined with reference to two devices, each of which may apply *mutatis mutandis* to more than two devices e.g. as exemplified with reference to three devices below.

5 Note also that whereas the system aspect of the presently disclosed subject matter refers to two or more devices for the purpose of transferring messages between the devices, in accordance with other aspects of the presently disclosed subject matter a single device may be defined for use in a system that includes two or more devices for transferring messages, *mutatis mutandis*.

10 **BRIEF DESCRIPTION OF THE DRAWINGS:**

In order to better understand the subject matter that is disclosed herein and to exemplify how it may be carried out in practice, embodiments will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

15 **Fig. 1A-E** illustrate exemplified illustrations of different kinds of two-dimensional codes each embedding an input image;

Fig. 2 illustrates a generalized system architecture of a device, in accordance with certain embodiments of the presently disclosed subject matter;

20 **Figs. 3A-C** illustrates schematically first and second devices for use in certain embodiments of the presently disclosed subject matter;

Fig. 3D illustrates schematically first, second and third devices for use in certain embodiments of the presently disclosed subject matter;

25 **Fig. 4A1** illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 4A2 illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain other embodiments of the presently disclosed subject matter;

30 **Fig. 4B** illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain yet other embodiments of the presently disclosed subject matter;

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Fig. 4C illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with still certain other embodiments of the presently disclosed subject matter;

Fig. 4D1 illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 4D2 illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain other embodiments of the presently disclosed subject matter;

Fig. 5Ai illustrates schematically a flow chart of partial sequence of operations for transferring messages between devices as performed by a device, in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 5Aii illustrates schematically an operational stage performed by a device in the context of transferring messages between devices, in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 6 illustrates schematically a flow chart of a sequence of operations for transferring encoded messages between devices, in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 7 illustrates schematically a flow chart of a sequence of operations for transferring encoded messages between devices, in accordance with certain other embodiments of the presently disclosed subject matter;

Fig. 7A illustrates schematically a flow chart of a partial (acknowledgement) sequence of operations, in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 7B illustrates schematically a flow chart of a partial (acknowledgement) sequence of operations, in accordance with certain embodiments of the presently disclosed subject matter;

Figs. 8-8A illustrate schematically a flow chart of a sequence of operations, for conducting secured payments in accordance with certain embodiments of the presently disclosed subject matter;

Fig. 9 illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain other embodiments of the presently disclosed subject matter; and

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Fig. 10 illustrates schematically a visual code for use in the sequence of operations described with reference to **Fig. 9**.

5 DETAILED DESCRIPTION OF EMBODIMENTS

The term "visual code" used herein should be expansively construed to include any kind of machine-readable optical label that use standardized encoding modes to encode data and store information. By way of example, a visual code can be a one-dimensional barcode, or alternatively it can be a two-dimensional code. The term "two-dimensional code" used herein should be expansively construed to include any optical machine-readable representation of data in the form of a two-dimensional pattern of symbols. One example of a known two-dimensional code is matrix code which represents data in a way of dot distribution in a matrix grid, such as, for example, Quick Response (QR) code and EZcode, etc.

Visual code can be a two-dimensional code having an input image or graphic embedded therein that are described for instance in US patent No. 8,978,989 (issued on date March 17, 2015, which is incorporated herein in its entirety by reference.

Attention is first drawn to **Figs. 1A-1D** (which show exemplified illustrations of different kinds of two-dimensional codes each embedding an input image. **Fig. 1A** and **Fig. 1B** are two-dimensional codes that have input images superimposed thereon. The superimposing is performed, e.g., by changing the transparency of the dots/cells in the two-dimensional code without changing the distribution of the dots or adjusting the decoded values thereof, such that the two-dimensional code, after being superimposed on the input image, is still machine-readable. **Fig. 1C** shows a different kind of two-dimensional code (similar to the visual codes illustrated in view 106 and view 110 in **Fig. 1E**) in which the input image is not only simply superimposed thereon as described with respect to **Fig. 1A** and **Fig. 1B**. In the two-dimensional code illustrated in **Fig. 1C**, the decoded values of dots that correspond to the encoded data are in fact determined such that the appearance of the two-dimensional code complies with a visual similarity criterion when compared with the input image.

Furthermore, **Fig. 1D** shows another kind of two-dimensional code having an input image embedded therein. The input image can be associated with an image

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descriptor which is used to verify the authenticity of the two-dimensional code in the reading process thus rendering the code to be functionally safer. The dots having decoded values corresponding to the encoded data in the two-dimensional code can be positioned in one or more encoding regions relative to the function patterns and a portion of the input image, rendering the two-dimensional code appears visually more appealing. An exemplified illustration of such two-dimensional code is described in PCT Application No. PCT/IL2015/051029 filed on date October 15, 2015, which is incorporated herein in its entirety by reference.

Furthermore, **Fig. 1E** shows another kind of a visual code. The printed medium is **104** capable of presenting a plurality of views of a machine-readable image when being observed from different viewpoints, each of the plurality of views having a respective visual element embedded therein, wherein at least one of the plurality of views is embedded with a visual element being a visual code having data encoded therein having a few input images embedded therein. For example, view1 having input image **106** and embedded with visual code **107** and view3 having input image **110** and embedded with visual code **111**.

Bearing all this in mind, attention is drawn to **Fig. 2** illustrating a generalized system architecture of a device, in accordance with certain embodiments of the presently disclosed subject matter. As shown, the device may include a processing unit **(220)** that includes in accordance with certain embodiments an image processing module **(224)**, a sound processing module **(226)**, whose operation will be described in greater detail below.

Note that the invention is not bound by the specified modules described herein with reference to the various embodiments of the presently disclosed subject matter and which are provided for illustrative purposes only.

As further shown in Fig. 2, the device may include an image acquisition module **(202)** and sound acquisition module **(204)** as well as image output module **(214)** and sound output module **(216)**.

In accordance with certain embodiments, the image output module may include one or more display screens. In accordance with certain embodiments, the sound output module may include one or more speakers. In accordance with certain embodiments, the image acquisition module may include one or more cameras. In accordance with certain

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embodiments, the sound acquisition module may include one or more microphones. Note that the invention is not bound by these examples.

For simplicity, throughout the description the more specific terms of speaker, camera, microphone and screen may be used. Those versed in the art will readily appreciate that the reference to these specific examples of modules is by no means binding.

In accordance with certain embodiments the device may include the image acquisition module (202) and sound acquisition module (204).

In accordance with certain embodiments the device may include the image output module (214) and sound output module (216).

In accordance with certain embodiments the device may include the image output module (214) and sound acquisition module (204). Other variants are also applicable depending upon the particular application.

Device (200) may also include an I/O interface module (210) such as for instance a keypad and/or touch screen, as well as Storage module 212 and communication module 216 facilitating communication in one or more communication protocols: e.g. Bluetooth, 3G and or 4G, WiFi and/or others. The invention is not bound by any of the specified protocols.

Note that the invention is not bound by the specified modules.

Device 200 may be a cellular device such as cellular phone (e.g. smart phones), IPAD etc.

Those versed in the art will readily appreciate that the teachings of the presently disclosed subject matter are not bound by the system illustrated in Fig. 2. Equivalent and/or modified functionality can be consolidated or divided in another manner and can be implemented in any appropriate combination of software, firmware and hardware.

It is appreciated that the processing unit shown in Fig. 2 and described here with reference to Fig. 2, can be a distributed device or system, which includes several components which reside locally or in distributed environment.

Bearing this in mind, attention is drawn to Figs. 3A-C illustrating schematically first and second devices for use in certain embodiments of the presently disclosed subject matter. As shown in Fig 3A there are two devices 301 and 302 where 301

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accommodates a camera 301' and a microphone 301'', 302 accommodates a screen 302' and a speaker 302''.

Note that whilst in Fig. 3 and various embodiments described below, only two devices are illustrated, the presently disclosed subject matter is not bound by these example, and accordingly the various embodiments described below may apply to more than two devices *mutatis mutandis*.

As further shown in Fig 3B there are two of devices 303 and 304 where 303 accommodates a camera 303' and a speaker 303'', and 304 accommodates a screen 304' and a microphone 304''.

As further shown in Fig 3C there are two of devices 305 and 306, where 305 accommodates a camera 305', a screen 305'', a microphone 305''' and a speaker 305^(iv), and where 306 accommodates a camera 306', a screen 306'', a microphone 306''' and a speaker 306^(iv).

In certain embodiments of the presently disclosed subject matter more than two devices are used. For example, three devices may be used. Bearing this in mind, attention is drawn to Figs. 3D illustrating schematically first, second and third devices for use in certain embodiments of the presently disclosed subject matter. As shown in Fig 3D there are three devices 307, 308 and 309 where 307 accommodates a camera 307', a screen 307'', a microphone 307''' and a speaker 307^(iv), and where 308 accommodates a camera 308', a screen 308'', a microphone 308''' and a speaker 308^(iv), and where 309 accommodates a screen 309' a microphone 309''. In accordance with certain embodiments, devices 307 and 309 may have an additional I/O communication channel that may allow them to communicate with each other, such as, but not limited to, Bluetooth. By way of example, devices 307 and 308 may be two smart-phone devices, and device 309 may be a smart-watch device.

Note that the presently disclosed subject matter is not bound by the specific configurations depicted in Figs. 3A-D.

It is to be noted that the present disclosure is not bound by the specific sequence of operation steps described with reference to the methods illustrated in Figs. 4A1, 4A2, 4B, 4C, 4D1, 4D2, 5Ai, 5Aii, 6, 7, 7A, 7B, 8, 8A and 9. One or more stages or steps illustrated in any of the figures may be executed in a difference order and/or one or more groups of stages may be executed simultaneously or vice versa. One or more steps may be added and/or other(s) may be deleted.

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According to examples of certain embodiments of the presently disclosed subject matter, the various flow charts described herein with reference to any of Figs. 4A1, 4A2, 4B, 4C, 4D1, 4D2, 5Ai, 5Aii, 6, 7, 7A, 7B, 8, 8A and 9 can be implemented on the device shown in Figs. 2 and using processing unit **220** that may be implemented
5 e.g. as a general purpose computer, such as is shown in Fig. 2 and described above with reference to Fig. 2. However, it is appreciated that the various flow charts can be implemented on any other suitable hardware, and/or possibly on suitable hardware in combination with software which provide a special purpose computer that is configured to perform the operations of any of the flow charts described herein with reference to
10 Figs. 4A1, 4A2, 4B, 4C, 4D1, 4D2, 5Ai, 5Aii, 6, 7, 7A, 7B, 8, 8A and 9.

Turning now to Fig. 4A1, it illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain embodiments of the presently disclosed subject matter.

The specified sequence of operations may be implemented by the processor unit
15 **220** associated with each of the devices (**200**), respectively –see for example the first device (e.g. **302** of Fig. 3A) and second device (e.g. **301** of Fig. 3A).

Bearing this in mind, the processor may be configured to convey a first message that includes a first informative message content, by presenting on the first device screen (e.g. **302'**) a visual code indicative of the first message (**410**). Such a visual code
20 may be generated by image processing module **224** of Fig. 2 possibly utilizing the storage module **212**.

The processor may be further configured to convey a second message that includes a second informative message content, by transmitting using the first device speaker **302''** a sound code indicative of the second message (**420**). Such a sound code
25 may be generated in sound processing module **226** of Fig. 2 possibly utilizing the storage module **212**.

Turning now to the second device **301**, the processor may be configured to receive the first message including scanning the visual code using the second device camera **301'** and extracting the first informative content (**430**).

30 The processor may be further configured to receive the second message including receiving the sound code using the second device sound acquisition module **301''** and extracting the second informative message content (**440**),

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wherein the extraction of the first informative message content is performed without utilizing the second message, and wherein said extraction of the second informative message content is performed without utilizing the first message. Thus, in order to extract the first informative message, there is no need to utilize the second
5 informative message and vice versa.

It should be noted that the informative message may include data that is of interest to the second device. The message in turn may encompass other data such as data which characterizes the first informative message. A header that characterizes the informative message may be an example of data included in the first message.

10 The presently disclosed subject matter is not bound by this example. Note also, that depending upon the particular application, the constituents of the message and the informative message may vary. For instance, the marker **103** in Fig. 1E may constitute part of the first message (facilitating the extraction of the first informative message by the second device), Note that the message carries the informative message in a way that
15 it is able to transfer it, using a visual code and/or a sound code. The message may include additional data, further to the informative message, that enables reading and decoding the message when being represented as a visual code or a sound code. The invention is not bound by these examples.

Note that in the presently disclosed subject matter, reference is made to an
20 informative message; it may apply to the informative message as a whole or to one or more portions thereof.

Note that the description of the various embodiments of the presently disclosed subject matter may refer occasionally to a pair of devices, e.g. those depicted with reference to Fig. 3A. Those versed in the art will readily appreciate that it may likewise
25 refer to any of the other not limiting examples illustrated in Figs. 3B-C.

Note also that the utilization of the various modules depicted in Fig. 2 with reference to the flow chart described with reference to Fig. 4A1 is by no means binding. This applies to the various other flow charts described with reference to certain embodiments of the presently disclosed subject matter that will be described with
30 reference to any of the following drawings 4A2 to 9, *mutatis mutandis*.

Turning now to Fig. 4D1, it illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain

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embodiments of the presently disclosed subject matter, and similar to the one illustrated in Fig.4A1 with a difference mentioned below.

The specified sequence of operations may be implemented by the processor unit 220 associated with each of the devices (200), respectively –see for example the first device (e.g. 307 of Fig. 3D), second device (e.g. 308 of Fig. 3D) and third device (e.g. 309 of Fig. 3D).

Bearing this in mind, the first and third device may communicate with each other using their communication modules. In accordance with a certain example, such communication may be in order to transmit the first message from first device to the third device in order to be later further conveyed by the third device. By further examples, such communication may be in order to synchronize the transmission of the first and second message to be conveyed by the first and third device (406).

The processor may be configured to convey a first message that includes a first informative message content, by presenting on the third device screen (e.g. 309') a visual code indicative of the first message (412). Such a visual code may be generated by image processing module 224 of Fig. 2 possibly utilizing the storage module 212.

The processor may be further configured to convey a second message that includes a second informative message content, by transmitting using the first device speaker 307'' a sound code indicative of the second message (420 – similar to what has been described with reference to Fig. 4A1). Such a sound code may be generated in sound processing module 226 of Fig. 2 possibly utilizing the storage module 212. Also as described with reference to Fig. 4A1, device2 is configured to receive the first and second messages ((430) and (440)).

It should be appreciated that the specified sequence of operations is not binding, for instance first device and the third device can switch their functionality.

For a better understanding of the foregoing, consider the following exemplary scenario. A first user has a first device (say a cellular phone) and a third device (say a wearable device such as a smart watch). The first and third devices communicate between them (406) in order to determine that a first (visual) message will be conveyed to a second device (e.g. a cellular phone of a second user) from the smart watch of the first user (412) and a second (audio message) will be conveyed from the cellular phone of the first user to the cellular phone of the second user (420). The cellular phone of the

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second user will be configured to receive the specified first and second messages (430 and 440).

Bearing this in mind, and revering to the example that only first and second devices are utilized as described e.g. with reference to Fig.. 4A1, attention is now drawn to 5Ai illustrating schematically a flow chart of a partial sequence of operations for transferring messages between devices as performed by a second device, in accordance with certain embodiments of the presently disclosed subject matter as well as to Fig. 5Aii illustrating schematically an operational stage performed by a device in the context of transferring messages between devices, in accordance with the presently disclosed subject matter.

Thus, in step 510 after extracting the first and second informative messages, they may be checked to ascertain if the first and second informative messages match according to a matching criterion and only upon meeting the matching criterion performing an action 520.

Note that in accordance with certain embodiments of the presently disclosed subject matter, a match according to a matching criterion may include verifying that two informative messages are identical, or in accordance with other embodiments a certain part of the two informative messages are identical (whereas in addition each informative message contains an additional different part of the entire conveyed information). In accordance with certain other embodiments, the messages or part of them returns together a positive answer for a security functions that is applied on both informative messages or part of the informative messages. Another non-limiting example is that the matching criterion is met if an encoded first informative message can be decoded using the second informative message which serves as a decoding key, or vice versa.

Note that the invention is not bound by the specified matching criterion.

In accordance with certain embodiments as depicted for instance in Fig, 5Aii, the specified matching check may be skipped and an action may be performed based on the extracted first informative message content and the second informative messages.

Note that in accordance with certain embodiments at least one consolidated message may be constructed based on at least: the first informative message content and the second informative message content and the embodiments described above may apply to the consolidated message *mutatis mutandis*.

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Note that whenever reference is made to an informative message it may apply also to one or more portions thereof.

In accordance with certain embodiments, utilizing both the visual channel and the sound channel (by conveying the visual code and sound code, respectively) for performing an action based on matching criterion that is met with reference to both the first and second informative messages, enhances the security level of communication between the devices. For instance, if an eavesdropper intercepts the transmissions of only one channel e.g. scans the visual code or receives the sound code (and extracts the corresponding informative message) but not of the other channel (therefore failing to obtain the other informative message), he/she cannot perform the action because the latter may require meeting the matching criterion in respect of both the first and second informative messages. In other words, in order to break the security of a system operating in accordance with the specified embodiments, the eavesdropper must intercept the messages of both the visual and sound channels.

Another example of enhancing the security level of the system is by preventing a scenario where, for instance, a malicious mobile malware covering a designated Visual Code, is presented on the mobile screen by designated mobile app, with a malicious Visual Code, for example for phishing purpose. Thus, because the covered designated code (with its associated informative message) will not be received by the second device, the matching criterion between the informative messages will not be met and the action will not be performed contrary to the explicit goal of using the malicious visual code. Another scenario that can be prevented is by a malicious mobile malware stopping a designated Sound Code, being meant to be transmitted using a speaker by a designated mobile app, and instead transmitting a malicious Sound Code, for example for phishing purposes.

In such abuse scenarios because the true informative message will not be extracted (whether from the sound code and/or the visual code, whichever the case may be) by the other device, the matching criterion between the informative messages will not be met and the desired action will not be performed. Note that the invention is not bound by the specified examples for enhancing security.

Bearing this in mind, attention is drawn again to certain embodiments where encoding and/or decoding of informative messages are used. To this end, reference is made to Fig. 6 illustrating schematically a flow chart of a sequence of operations for

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transferring encoded messages between devices, in accordance with certain embodiments of the presently disclosed subject matter. Thus, in Step **602** a data to be transferred from a first device e.g. **302** to a second device e.g. **301** is obtained. Then, as shown in **604**, the data is split into a first informative message and a second informative message that are encoded by identical or different keys. Then, first and second messages (that include the respective encoded first and second informative messages) are conveyed to the second device as visual and sound codes (steps **610** and **620**) and received by the second device (in steps **630** and **640**) followed by extraction of the encoded first and second informative messages, all as described in detail with reference to Fig 4A1 above . In case the decoded informative messages are duly decoded into meaningful informative messages, the specified matching criterion is met, an action may be performed based on the extracted first, second or both informative messages (see on this contexts steps **510** and **520** of Fig. 5Ai).

In accordance with certain embodiments, the matching criterion is met if based on the first and second informative messages (constituting each a portion of an encoding key) at least a valid encoding key is derivable. The action includes, at least by the processor of the second device (e.g. **301**), encoding a third informative message content of a third message using at least said valid encoding key, and conveying the third message by transmitting using the second device speaker a sound code indicative of the third message. In accordance with certain embodiments the third message may be sent through either or both or the visual and audio channels. (in which case the first and second devices are likely to be those depicted for instance with reference to Fig. 3C).

In accordance with certain embodiments, the system and method of the invention may be used for file transfer application, e.g. of large files. Thus, in accordance with certain embodiments the so obtained valid key (derivable from the key portions conveyed from device 1 to device 2 through the visual and audio channels, as explained above) may be used for encoding a third informative message (e.g. one or more files) and possibly large files. The third message is conveyed by transmitting using the second speaker a sound code indicative of the third message, thereby exempting the necessity to keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the entire third message transmission duration.

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It is thus noted that whereas for the purpose of transmission of the visual code (that includes the specified first portion of the key), a LOS should be maintained between the display of the first device and the camera of the second device, this requirement is obviated when the third message is transmitted, since for conveying a sound code there is no need to maintain a LOS between the speaker of the second device and the microphone of the first device. Thus, consider that the specified devices are cellular phones, then whilst for transmitting the visual code from the display of the first device to the camera of the second device a LOS should be maintained (but for only a fraction of a second), the longer operation of transmitting the file through the (slower) sound channel (which in certain embodiments, depending upon the file(s) size may amount to a few minutes or even more) does not require keeping the LOS, allowing thus a more convenient file transfer. For instance, the two cellular telephones may be placed on a desk in a room with each screens facing upwardly or downwardly (i.e. no LOS) and the file(s) would nevertheless be transmitted from device 2 and received by device 1. This goal would obviously not be achieved had the visual channel be used for transmitting the files (through visual code) unless a LOS had been maintained throughout the entire process between the display of the second device and the camera of the first device entailing thus inconvenience to the users of the cellular phones that were compelled to place the phones such that LOS is retained throughout the transmission process.

Attention is now drawn to Fig. 8, illustrating schematically a flow chart of a sequence of operations, for conducting secured payments in accordance with certain embodiments of the presently disclosed subject matter. By this embodiment, said first informative message content includes a first digital wallet identifier portion of a user of the first device and a first portion of an encoding key, and wherein said second informative message content includes a second digital wallet identifier portion of the user of the first device and includes a second portion of an encoding key, and wherein the first and second informative messages match according to the following matching criterion (a) and (b)

- a) a valid encoding key is derivable based on said first portion of the encoding key and second portion of the encoding key; and
- b) a valid digital wallet identifier is derivable based on said first digital wallet identifier portion and second digital wallet identifier

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portion. The matching criterion may be met if for example the first and second portions are concatenated to yield a valid wallet identified, or a different and/or more complicated check. Note also that one or more of the specified portions may be encoded and therefore it should be decoded before actually deriving the wallet id.

Thus, as shown in steps **802** and **804**, data (e.g. including digital wallet identifier of the user) is split and included in respective first and second informative messages as well as an encoding key which may be split and each portion being included in said first and second informative message. Then, as shown in steps **810** and **820** first and second messages that include the specified informative messages are conveyed including presenting the visual code and transmitting the sound code (using e.g. first device **306** of Fig. 3C). Thereafter, as shown in steps **830** and **840** the second device (e.g. **305** of Fig. 3C) receives the first message including scanning the visual code and receives the second message including receiving the sound code. The first informative message is extracted from the first message and the second informative message is extracted from the second message. Note that the wallet ID can only be derived if both the first and second informative messages are duly extracted (each including a portion of the valid wallet ID). As arises from step **842** a third informative message content that includes a sum to be paid to a user identified by the valid digital wallet identifier is constructed and encoded using the key that is extracted from the first and second informative messages. It is thus evident that only if both messages are duly received through both the visual and the sound channels a valid key may be constructed, thereby enhancing the security of the system. Next in step **843**, the second device conveys a third message by transmitting a sound code (through the speaker) where the message includes the third informative message. Then, the first device receives the third message including receiving the sound code using the first device microphone and extracting the encoded third informative content. Using the encoding key the third informative message may be extracted therefore actually transferring the sum to be paid from the second user to the first user having the specified wallet ID (**844**).

Once receiving the third message, the first device ceases to convey the message (**846**) and may indicate on the screen that the transaction has been completed (**848**).

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Next, as shown in Fig. 8A, the first device may send an acknowledgment (confirmation) message (by conveying a message including transmitting a sound code) (852). The acknowledgement message may be encoded using the specified or other key.

The sound code is received and the (encoded) conformation message is extracted
5 (and decoded) (858). This leads to stopping transmission of the sound code (with the third informative message) (864) and possibly indicating (e.g. through the screen of the second device) that the payment transaction has been duly completed (870).

It should be noted that throughout various embodiments of the presently disclosed subject matter a message may be presented by means of a visual code
10 (through the visual channel) or transmitted by means of a sound code (through the sound channel). The latter has been exemplified in steps 852 and 858 above.

It should be noted that in accordance with various embodiments of the presently disclosed subject matter, an informative message may be conveyed (by one device) in either or both of the visual and or sound channels and in this case the other device may
15 receive the message in a coordinated fashion. Thus, if the message is presented on the screen by means of a visual code then the other device is configured to receive it including scanning it by means of its camera. If, on the other hand, the message is transmitted through the speaker by means of a sounds code then the other device is may receive the sound code by means of its microphone. If the message is presented on the
20 screen and transmitted by the speaker (utilizing visual code and sound code, respectively) the other device may receive it both scanning it with the camera and receiving it through the microphone.

Note that utilizing the encoded/ decoded informative message(s) in accordance with the various embodiments of the presently disclosed subject matter are by no means
25 binding and accordingly, instead or in addition, other forms of utilizing encoded /decoded informative messages may be used.

Note also that in the various embodiments of the presently disclosed subject matter, whenever reference is made to encoding informative message it should be construed as including at least one of the following: encryption (using symmetric or
30 asymmetric keys), applying one way function, applying hashing function, calculating code-words representing the informative message constructed based on the informative message, etc. The same holds true to decoding informative messages *mutatis mutandis*.

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It should be further noted in the various embodiments of the presently disclosed subject matter, that whenever reference is made to usage of key for encoding or decoding it should be construed to include a usage based on the key, including but not limited to a function that is dependent on the key, another data which together with the key serves for encoding or decoding and so forth.

Bearing this in mind, attention is drawn to another aspect of the invention. Thus, an advantage of the Visual Code is that it can be seen by the human eye, and giving an indication to one more users that a communication channel is available. Another possible advantage is that Visual Codes are not affected by surrounding sound noises, acoustic conditions or other electromagnetic based noise. A possible disadvantage of Visual Codes is that this communication channel is sensitive to lighting conditions.

An advantage of the Sound Code, in its turn, is that it cannot be detected by most human ears, and does not disturb the majority of humans surrounding the sound source. Another possible advantage is that Sound Codes are not affected by surrounding lighting noises or lighting conditions. A possible disadvantage of the Sound Codes is that this communication channel is sensitive to sound noise and acoustic conditions.

Thus, in accordance with certain embodiments of the presently disclosed subject matter, the robustness of the system is enhanced in that both the visual and the sound channels may be utilized to convey an informative message and even if one of the informative messages is duly received and extracted (either from the visual code or the sound code), the specified action is performed. Thus, for example, consider a scenario where the visual code presented by the first device is not adequately received by the second device due to degraded ambient lighting conditions (e.g. the visual code is not adequately scanned and the informative message is not duly extracted because of degraded lighting conditions), however the sound code is properly received and the informative message is duly extracted because the sound code is indifferent to lighting conditions. In accordance with certain embodiments an action may be performed notwithstanding that due to poor lighting conditions only the sound code has been duly received and the corresponding informative message has been extracted.

Bearing this in mind, attention is drawn to **Fig. 4A2** illustrating schematically a flow chart of a sequence of operations for transferring messages between devices (for instance **306** and **305** of Fig. 3C and the pertinent modules and processor unit (e.g. **220**)

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described by way of example with reference to Fig. 2), in accordance with certain other embodiments of the presently disclosed subject matter.

Thus, the first device may convey a first message that includes a first informative message content by presenting on the first device screen a visual code
5 indicative of the first message **410'**.

The first device may further convey a second message that includes a second informative message content by transmitting using speaker a sound code indicative of the second message **420'**. The first and second informative messages may be identical.

The second device may attempt to receive the first message and extract said first
10 informative message content and attempt to receive the second message and extract the second informative message content **432'**, wherein receiving the first message includes scanning the visual code using the second device camera and extracting the first informative message content; and wherein receiving the second message includes receiving the sound code using the second device microphone and extracting the second
15 informative content. If either of the first and second informative message has been successfully extracted (**434'**, **436'**) an action can be performed in accordance with informative message content of the first to be received message from among said first message and second message without needing to wait for receiving the other message from among the first and second messages.

20 Note that an attempt may fail (in either the visual channel due to say degraded lighting conditions or the sound channel due to say overly noisy ambient conditions) leading thus to a result that the appropriate message may not be duly received by the second device or may be received in a corrupted or non-complete manner that does not allow the processor unit (e.g. **220**) to duly extract the corresponding informative
25 message. The latter are only examples of illustrating failure in the attempt to receive the message.

Note that the other message may or may not be eventually received but the second device does not need to wait for the specified other message to be received (and the corresponding informative message to be extracted) in order to perform the action.

30 Thus, in accordance with certain embodiments, the robustness of the system is enhanced, e.g. to cope with inherent communication limitations of either the visual or the sound channels.

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Turning now to Fig. 4D2, it illustrates schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain embodiments of the presently disclosed subject matter, and similar to the one illustrated in Fig.4A2 with a difference mentioned below.

5 The specified sequence of operations may be implemented by the processor unit 220 associated with each of the devices (200), respectively –see for example the first device (e.g. 307 of Fig. 3D), second device (e.g. 308 of Fig. 3D) and third device (e.g. 309 of Fig. 3D).

 Bearing this in mind, the first and third device may communicate with each other using their communication modules. In accordance to certain example, such
10 communication may be in order to transmit the first message from first device to the third device in order to be later further conveyed by the third device. By further examples, such communication may be in order to synchronize the transmission of the first and second message to be conveyed by the first and third device (406').

15 The processor may be configured to convey a first message that includes a first informative message content, by presenting on the third device screen (e.g. 309') a visual code indicative of the first message (412'). Such a visual code may be generated by image processing module 224 of Fig. 2 possibly utilizing the storage module 212. The other operations 420', 432', 434' and 436' that are depicted in Fig. 4D2 are similar
20 to those described with reference to Fig, 4A2 above, *mutatis mutandis*. Reverting now to the example of utilizing only two devices, the utilization of the first to be arrived message that has been described above (with reference to Fig. 4A2) will now be described with reference to Fig 7 illustrating schematically a flow chart of a sequence of operations for transferring encoded messages between devices, in accordance with
25 certain other embodiments of the presently disclosed subject matter and to Fig. 7A illustrates schematically a flow chart of a partial (acknowledgement) sequence of operations, in accordance with certain embodiments of the presently disclosed subject matter.

 Thus, in accordance with certain aspects of the presently disclosed subject
30 matter, the data to be transferred from the first device to the second device is associated with e.g. social identifier information of a first user 702, and the same social identifier is encoded both in the first and second messages 704. By a way of example, such social identifier could be for example the first user Facebook name, Linkedin name, WeChat

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ID, Sina Weibo ID, What'sapp ID, phone number or Line ID.

Then, the specified sequence of operations for presenting visual code, transmitting the sound code and attempt to receiving them at the other device, as outlines in steps 710, 720, 732 and 734 correspond to the counterpart sequence of operations described in steps 410', 420', 432' and 434' (*mutatis mutandis*) with
5 reference to Fig. 4A2 above.

In accordance with certain aspects of the presently disclosed subject matter, the action performed by the second device (736) can be in accordance with the data associated with the first user (extracted from the first to be received message though either the visual or sound channels). By a way of example, in case the data is a pointer
10 to the user social identity, for example a WeChat ID, the device can initiate an action to connect between the second user WeChat user to the first user WeChat user.

With reference to Fig. 7A, in accordance with certain aspects of the presently disclosed subject matter, after the second device performs an action in accordance with the data associated with the first user the second device may convey a confirmation
15 message using a sound code transmitted using the second device speaker 744. By a way of example, the confirmation message may also include data associated with the second user. The first device may receive the confirmation message encoded as a code using the first device microphone 746. The first device may then cease to convey the message including stopping the presentation and transmission of the visual and sound codes
20 (748) and may provide an indication of a successful transmission 750. For example, the indication can be a visual indication using the first device screen. In another example the indication can be a sound indication using the first device speaker. The specified manner of indication may likewise apply to other embodiments of the presently disclosed subject matter *mutatis mutandis*.
25

Fig. 7B illustrates schematically a flow chart of a partial (acknowledgement) sequence of operations, in accordance with certain embodiments of the presently disclosed subject matter. The latter embodiment refers to the utilization of three devices, e.g. with reference to what has been described (by way of example) with reference to
30 Fig. 4D2 above. Note that in contrast to Fig. 7B, the acknowledgement embodiment described with reference to Fig. 7A above referred to the utilization of only two devices as has been described (by way of example) with reference to Fig. 4A2 above.

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Bearing this in mind, the main difference of the sequence of operations of Fig. 7B compared to those of Fig. 7A, is that in step **746** the third device (rather than the first device) receives the confirmation message encoded as sound. In step **748**, the third device stops transmitting the first message, updates the first device accordingly and the latter also stops transmitting the first message. By this embodiment, the first device (accommodating a display) will provide a visual indication that the transmission has been successfully achieved (**750**).

Note that whereas the utilization of the first to arrive message concept described e.g. with reference to Fig. 4A2 and 4D2 and exemplified in Figs. 7 and 7A and 7B is by no means binding and other applications thereof may be applicable e.g. with reference to certain other embodiments of the presently disclosed subject matter.

It should be noted that both Sound Codes and Visual Codes can be utilized in an offline communication channel, namely that two devices can communicate without requirement for Internet access throughout portion or the entire communication session between the first and second device (and vice versa). This may be advantageous in geographic areas in which there is no or limited Internet coverage. It may likewise apply to various other embodiments of the presently disclosed subject matter, depending upon the particular application.

It should be noted that in accordance with certain embodiments, an Internet connection may be used, e.g. for recording the transaction, giving it a unique transaction ID and final approval of it.

In accordance with certain embodiments of an aspect of the presently disclosed subject matter (described with reference to Fig. 4B), there is provided a method for transferring messages between two devices, comprising: a first device (e.g. **306** of Fig. **3C**) configured to convey a first message by presenting a visual code on the first device screen (**452**) and a second device (e.g. **306** of Fig. **3C**) configured to receive the first message by scanning the visual code using the second device camera and extracting therefrom a first informative message (**456**). The second device is configured to convey a second message including transmitting a sound code using the second device speaker where a second informative message is in accordance with the so extracted first informative message (**462**). The first device is configured to receive the second message including receiving the sound code using the first device microphone and extracting the second informative message.

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Fig. 4C describes the alternative approach of first transmitting the sound code from the first device (e.g. **306**) to the second device (e.g. **305**) (see-steps **480** and **486**), for extracting the first informative message and then presenting a visual code in the second device for scanning it in the second device (see steps **492** and **498**) and
5 extracting the second informative message (where a second informative message is in accordance with the so extracted first informative message).

Attention is now drawn to **Fig. 9** illustrating schematically a flow chart of a sequence of operations for transferring messages between devices, in accordance with certain other embodiments of the presently disclosed subject matter and to **Fig. 10**
10 which illustrates schematically a visual code for use in the sequence of operations described with reference to Fig. 9.

In accordance with an aspect of the invention, there is provided a method for transferring messages between a first device (e.g. **306** of Fig. 3) that includes a processor (see e.g. processing unit **220** of Fig. 2) and associated storage, (e.g. **212** of Fig.2) image output module (such as display screen) and sound output module (such as a speaker) and a second device (e.g. **306** of Fig. 3) that includes a processor (see e.g. processing unit **220** of **Fig. 2**) and associated storage (e.g. **212** of Fig.2), image acquisition module (such as a camera) and a sound acquisition module (such as a microphone). The method comprises, at least by the processor of the first device:

- 20 i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, wherein the first message content additionally includes at least an additional robust informative portion, such that under degraded visual conditions at
25 least the robust informative portion is capable of being acquirable by an image acquisition device and is extractable;
- ii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message;
- 30 the method further comprising: at least by the processor of the second device
- iii) receiving the at least part of the first message including scanning at least part of the visual code using the second device image

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acquisition device and extracting at least said robust informative portion;

iv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative content.

5 In accordance with certain embodiments of the presently disclosed subject matter, said degraded visual conditions includes at least one of: (i) degraded ambient lighting conditions; and (ii) conditions that interfere with ongoing LOS between the first device image output module that displays the first message and the image acquisition device of the second device, while presenting said visual code; and (iii) the image acquisition device of the second device is not focused on the visual code or its white balance is not appropriately configured to scan the visual code.

For a better understanding of the foregoing, attention is directed to Fig 10. Thus, visual code **1001** includes an additional robust informative portion (by this example 4 large colored squares **1002** to **1005** marked Yellow, Green, Red and Blue, respectively), such that under degraded visual conditions (e.g. degraded ambient lighting conditions) at least the robust informative portion is capable of being acquirable by an image acquisition device and is extractable. By this embodiment the color's square may represent an informative message according to the encoded color (or ordered colors) of the square. Thus, assuming that each square may have one out of four colors (i.e. 2 bits representation), a total of four squares may represent an 8 bit informative message. The shape as well as the colors may be *a priori* chosen such that the robust informative message content (by this example the 8 bit message) may be extracted (by the second device) even under degraded lighting conditions. Visual codes **1010**, **1020**, **1030**, **1040** and **1050** represent other examples of presenting a different color combination from which the informative message may be extracted.

The specified action may require matching between the extracted robust informative message and the second extracted informative message, for instance a consolidated message. By way of non-limiting example the extracted robust informative message (e.g. the specified 8 bit data) may serve as a key for decoding an extracted (encoded) second informative message (decoded from a sound code transmitted through the sound channel) and an action may be performed based on the so decoded second informative message. Thus, in accordance with certain embodiments, the robust portion

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of the visual code (being an example of the two dimensional code) is an essential characteristics in transferring message(s) between the devices.

Whilst the example of Fig. 10 illustrates a robust portion that is formed by a given shape and varying colors, those versed in the art will readily appreciate that other
5 variants are applicable, for instance different shapes (for example instead of X colors, X different shapes) and so forth.

In accordance with certain other embodiments the robust portion forms part of the sound code (e.g. a certain tone that can be received by the microphone even under noisy conditions).

10 Returning now to Fig. 5Ai, in accordance with certain embodiments the first device may use its camera to take photos or videos from the surroundings, and one or more descriptors of visual features of said photos or videos may be incorporated in one of the conveyed messages, e.g. a second messages transmitted using a sound code. Furthermore, when the second device captures a visual code message it may also
15 capture photos or videos of the surroundings. The second device may extract descriptors of visual features from the said photos or videos and consider them part of the second informative message. Then, in step 510, the check may include that the transmitted visual features captured by the first device fit with according to a matching criterion to the visual features extracted by the second device.

20 Such compression may increase the certainty for the second device that the first device is conveying up-to-date original messages.

The invention is not bound by these examples.

Note that the various embodiments of the presently disclosed subject matter with reference to possibly require to meet a matching criterion before an action is made (or
25 performing an action without meeting the specified criterion), and/or the utilization of encoding/decoding of informative messages as described with various embodiments of the presently disclosed subject matter and/or other features described with reference to the various embodiments of the presently disclosed subject matter may apply *mutatis mutandis* also to the embodiment described with reference to Figs. 9 (and exemplified in
30 Fig. 10).

The description with reference to a method is likewise applicable to a system *mutatis mutandis*.

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Note that whenever reference is made to informative message (content), it may represent the content itself or data indicative of the content.

The terms "non-transitory memory" and "non-transitory storage medium" as used herein should be expansively construed to cover any volatile or non-volatile
5 computer memory suitable to the presently disclosed subject matter.

It will also be understood that the system according to the presently disclosed subject matter can be implemented, at least partly, as a suitably programmed computer. Likewise, the presently disclosed subject matter contemplates a computer program being readable by a computer for executing the disclosed method. The presently
10 disclosed subject matter further contemplates a machine-readable memory tangibly embodying a program of instructions executable by the machine for executing the disclosed method.

The operations in accordance with the teachings herein may be performed by a computer specially constructed for the desired purposes or by a general-purpose
15 computer specially configured for the desired purpose by a computer program stored in a non-transitory computer-readable storage medium. Processing unit 220 is a non limiting example.

It is noted that the teachings of the presently disclosed subject matter are not bound by the system described with reference to **Fig. 2**. Equivalent and/or modified
20 functionality can be consolidated or divided in another manner and can be implemented in any appropriate combination of software with firmware and/or hardware and executed on a suitable device.

Embodiments of the presently disclosed subject matter are not described with reference to any particular programming language. It will be appreciated that a variety
25 of programming languages may be used to implement the teachings of the presently disclosed subject matter as described herein.

Unless specifically stated otherwise, as apparent from the following discussions, it is appreciated that throughout the specification discussions utilizing terms such as "representing", "matching", "conveying", "transferring" or the like, refer to the
30 action(s) and/or process(es) of a computer that manipulate and/or transform data into other data, said data represented as physical, such as electronic, quantities and/or said

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data representing the physical objects. The term “computer” should be expansively construed to cover any kind of hardware-based electronic device with data processing capabilities including, by way of non-limiting example, processing unit **220** disclosed in the present application.

5 It is appreciated that, unless specifically stated otherwise, certain features elements, steps etc. of the presently disclosed subject matter, which are, for clarity, described in the context of a given embodiment or aspect, may also be provided in other embodiment(s) or aspect(s) of the presently disclosed subject matter.

10 It is to be understood that the invention is not limited in its application to the details set forth in the description contained herein or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Hence, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting. As such, those skilled in the art will appreciate that the conception upon which
15 this disclosure is based may readily be utilized as a basis for designing other structures, methods, and systems for carrying out the several purposes of the presently disclosed subject matter.

20 Those skilled in the art will readily appreciate that various modifications and changes can be applied to the embodiments of the invention as hereinbefore described without departing from its scope, defined in and by the appended claims.

25

30

CLAIMS:

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1. A method for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module, comprising: at least by the processor of the first device:

- i) conveying a first message that includes a first informative message content, by presenting on the first device image output module a visual code indicative of the first message;
- ii) conveying a second message that includes a second informative message content, by transmitting using the first device sound output module a sound code indicative of the second message;

the method further comprising: at least by the processor of the second device

- iii) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;
 - iv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative message content;
- wherein said extraction of the first informative message content is performed without utilizing the second message, and wherein said extraction of the second informative message content is performed without utilizing the first message.

2. The method according to Claim 1, further comprising determining at least one consolidated message based on at least: the first informative message content and the second informative message content.

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3. The method according to Claim 1, further comprising performing an action based on the extracted first informative message content and the second informative messages content.
- 5 4. The method according to Claim 3, further comprising: checking if the first and second informative messages match according to a matching criterion and only upon meeting the matching criterion, performing said action.
- 10 5. The method according to Claim 4, wherein the first informative message being encoded and further comprising:
obtaining a decoded first informative message from said encoded first informative message using a key that is derivable from the second informative message, whereby said matching criterion is met.
- 15 6. The method according to Claim 4, wherein the second informative message being encoded and further comprising:
obtaining a decoded second informative message from said encoded second informative message using a key that is derivable from the first informative message, whereby said
20 matching criterion is met.
7. The method according to Claim 5, further comprising: at least by the processor of the second device:
utilizing the decoded first informative message for performing the action.
- 25 8. The method according to Claim 4, wherein said second device further includes a sound output module and wherein said first informative message content includes a first
30 portion of an encoding key and wherein said second informative message content includes a second portion of an encoding key, and wherein the first and second informative messages match according to the matching criterion that includes at least a valid encoding key which is derivable based on said first portion of the encoding key

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and second portion of the encoding key, and wherein said action includes: at least by the processor of the second device:

- (xviii) encoding a third informative message content of a third message using at least said valid encoding key, and
- 5 (xix) conveying the third message by transmitting using the second device sound output module a sound code indicative of the third message, thereby exempting the necessity keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the entire third message transmission duration.

9. The method according to Claim 4, wherein said first informative message content includes a first portion of an encoding key and wherein said second informative message content includes a second portion of an encoding key, and wherein the first and second informative messages match according to the matching criterion if at least a valid encoding key is derivable based on said first portion of the encoding key and second portion of the encoding key, and wherein said action includes, at least by the processor of the second device:

- 20 (xx) encoding a third informative message content of third message using at least said valid encoding key, and performing either or both of the following (viii) wherein said second device includes a screen and (ix) wherein the second device further includes an sound output module
- 25 (xxi) conveying the third message by presenting on the second device image output module a visual code indicative of the third message
- (xxii) conveying the third message by transmitting using the second device sound output module a sound code indicative of the third message.

30

10. The method according to Claim 9, wherein said first informative message content includes a first digital wallet identifier portion of a user of the first device, and

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wherein said second informative message content includes a second digital wallet identifier portion of the user of the first device, and wherein the first and second informative messages match according to the following matching criterion (a) and (b)

- 5 a) the valid encoding key is derivable based on said first portion of the encoding key and second portion of the encoding key; and
- c) a valid digital wallet identifier is derivable based on said first digital wallet identifier portion and second digital wallet identifier portion

10 and wherein the third informative message content includes a sum to be paid to a user identified by the valid digital wallet identifier;
 the method further comprising at least by the processor of the first device,
 performing either or both of the following (x) wherein said first device includes an image acquisition device and (xi) wherein said first device includes a sound
 15 acquisition module in a coordinated fashion with said (viii) and (ix)

- (xxiii) receiving the third message including scanning the visual code using the first device image acquisition device and extracting the encoded third informative content;
- 20 (xxiv) receiving the third message including receiving the sound code using the first device sound acquisition module and extracting the encoded third informative content
- (xxv) decoding the encoded third information image using said valid encoding key;
- 25 (xxvi) ceasing to convey said first and second message; and
- (xxvii) performing an action that related to the sum and the digital wallet number.

11. The method according to Claim 10, further comprising, at least by the processor
 30 of the first device:

- (xxviii) encoding an informative acknowledgement message content of a fourth message using an encoding key and performing either or both of the following (xvi) and (xvii)

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- (xxix) conveying the fourth message that includes the encoded informative acknowledgement message content by presenting on the first device image output module a visual code indicative of the fourth message;
- 5 (xxx) conveying the fourth message that includes the encoded informative acknowledgement message content by transmitting using the first device sound output module a sound code indicative of the fourth message;
- the method further comprising at least by the processor of the second device,
- 10 performing either or both of the following (xviii) and (xix) in a coordinated fashion with said (xvi) and (xvii)
- (xxxi) receiving the fourth message including scanning the visual code using the second device image acquisition device and extracting the encoded informative acknowledgement message;
- 15 (xxxii) receiving the fourth message including receiving the sound code using the second device sound acquisition module and extracting the encoded informative acknowledgement message;
- (xxxiii) decoding the encoded informative acknowledgement message using at least said encoding key and
- 20 (xxxiv) cease to convey said third message.

12. The method according to Claim 1, wherein said first device and second device being cellular devices.
- 25 13. The method according to Claim 1, wherein neither said first device nor said second device are connected to the Internet throughout at least said stages (i) to (iv).
14. A method for transferring a message between a first device that includes a processor and associated storage, image output module and sound output module and a
30 second device that includes a processor and associated storage, image acquisition device and a sound acquisition module, comprising, at least by the processor of the first device:

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- (vii) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message;
- (viii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message;
- 5 the method further comprising, at least by the processor of the second device;
- (ix) attempting to receive the first message and extract said first informative message content and attempting to receive the second message and extract the second informative message content, wherein receiving the first message includes scanning the visual code using the second device image acquisition device and extracting the first informative message content; and wherein receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative content; and
- 10
- (x) performing an action in accordance with informative message content of the first to be received message from among said first message and second message without needing to wait for receiving the other message from among the first and second messages.
- 15
- 20

15. The method according to Claim 14, wherein said first and second informative messages are identical.

25

16. The method according to Claim 15, wherein said first and second informative message contents include a social identifier information of a first user of said first device and wherein said (iv) includes performing said action utilizing the social identifier information of the first user.

30

17. The method according to Claim 16, wherein said social identifier information being at least one of: first user Facebook name, first user Linkedin name, first user

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WeChat ID, first user Sina Weibo ID, first user What'sapp ID, first user phone number and first user Line ID.

5 **18.** The method according to Claim 17, wherein neither said first device nor said second device are connected to the internet throughout at least said stages (i) to (iv).

19. The method according to Claim 15, further comprising, at least by the processor of the second device:

10 (v) after performing said action, conveying a third message that includes a confirmation informative message content by transmitting, using the second device sound output module, a sound code indicative of the third message;

the method further comprising, at least by the processor of the first device:

15 (vi) receiving the third message including receiving the sound code using the first device sound acquisition module and extracting the acknowledgement informative content, and

(vii) ceasing to convey said first and second messages.

20

20. The method according to Claim 15, wherein said first informative message content includes an encoding key and wherein said action includes, at least by the processor of the second device:

25 (xi) encoding a third informative message content of third message using at least said encoding key, and

(xii) conveying the third message by transmitting using the second device sound output module a sound code indicative of the third message,

30 thereby exempting the necessity to keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the entire third message transmission duration.

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21. The method according to Claim 14, wherein said first device and second device being a cellular device.

22. The method according to Claim 14, wherein neither said first device nor said
5 second device are connected to the Internet throughout at least said stages (i) to (iv).

23. The method according to Claim 21, wherein said image acquisition device being a camera fitted in said cellular device.

10

24. The method according to Claim 12, wherein said image acquisition device being a camera fitted in said cellular device.

15 25. A method for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising, at least by the processor of the first device:

20 i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, said first informative message content including an encoding key;

the method further comprising: at least by the processor of the second device

25 ii) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;

iii) encoding a second informative message content of a second message using at least said encoding key, and

30 iv) conveying the second message by transmitting using the second device sound output module a sound code indicative of the second message,

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thereby exempting the necessity keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the third message transmission duration.

5

26. The method according to Claim 25, wherein said first device and second device being a cellular device.

27. The method according to Claim 25, wherein neither said first device nor said
10 second device are connected to the Internet throughout at least said stages (i) to (iv).

28. The method according to Claim 26, wherein said image acquisition device being a camera fitted in said cellular device.

15

29. A method for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising, at least by the processor of the first device:

20 i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, wherein the first message content additionally includes at least an additional robust informative portion, such that under degraded visual conditions at
25 least the robust informative portion is capable of being acquirable by an image acquisition device and extractable;

ii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message

30 the method further comprising: at least by the processor of the second device

iii) receiving the at least part of the first message including scanning at least part of the visual code using the second device image

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acquisition device and extracting at least said robust informative portion;

- iv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative content.

5

30. The method according to Claim 29 further comprising determining at least one consolidated message based on at least said extracted robust informative portion and the extracted second informative message content.

10

31. The method according to Claim 29, further comprising performing an action based on at least said extracted robust informative portion and the extracted second informative message content.

15

32. The method according to Claim 31, further comprising: checking if the at least said extracted robust informative portion and the extracted second informative message content match according to a matching criterion and only upon meeting the matching criterion, performing said action.

20

33. The method according to Claim 29, wherein said degraded visual conditions includes at least one of: (i) degraded ambient lighting conditions; and (ii) conditions that interfere with ongoing LOS between the first device image output module that displays the first message and the image acquisition device of the second device, while presenting said visual code; and (iii) the image acquisition device of the second device is not focused on the visual code or its white balance is not appropriately configured to scan the visual code.

25

34. The method according to Claim 1, wherein said visual code being two-dimensional code.

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35. The method according to Claim 34, wherein said two-dimensional code being Quick Response (QR) code.

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36. The method according to Claim 14, wherein said visual code being two-dimensional code.

5 37. The method according to Claim 25, wherein said visual code being two-dimensional code.

38. The method according to Claim 29, wherein said visual code being two-dimensional code.

10 39. A system for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module, comprising at least by the processor of the first device:

15 i) conveying a first message that includes a first informative message content, by presenting on the first device image output module a visual code indicative of the first message;

ii) conveying a second message that includes a second informative message content, by transmitting using the first device sound output module a sound code indicative of the second message;

20 the system further comprising at least by the processor of the second device :

iii) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;

25 iv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative message content;

wherein said extraction of the first informative message content is performed without utilizing the second message, and wherein said extraction of the second informative message content is performed without utilizing the first message.

30

40. A system for transferring a message between a first device that includes a processor and associated storage, image output module and sound output module and a

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second device that includes a processor and associated storage, image acquisition device and a sound acquisition module, comprising at least by the processor of the first device:

- 5 (v) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message;
- (vi) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message;

the system further comprising at least by the processor of the second device;

- 10 (vii) attempting to receive the first message and extract said first informative message content and attempting to receive the second message and extract the second informative message content, wherein receiving the first message including scanning the visual code using the second device image acquisition device and
15 extracting the first informative message content; and wherein receiving the second message includes receiving the sound code using the second device sound acquisition module and extracting the second informative content; and
- 20 (viii) performing an action in accordance with informative message content of the first to be received message from among said first message and second message without needing to wait for receiving the other message from among the first and second messages.

25 **41.** A system for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising, at least by the processor of the first device:

- 30 i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, said first informative message content including an encoding key;

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the system further comprising at least by the processor of the second device:

- ii) receiving the first message including scanning the visual code using the second device image acquisition device and extracting the first informative content;
- 5 iii) encoding a second informative message content of a second message using at least said encoding key, and
- iv) conveying the second message by transmitting using the second device sound output module a sound code indicative of the second message,
- 10 thereby exempting the necessity keep Line of Sight (LOS) between the display of the first device and the image acquisition device of the second device throughout the third message transmission duration.

15

42. A system for transferring messages between a first device that includes a processor and associated storage, image output module and sound output module and a second device that includes a processor and associated storage, image acquisition device and a sound acquisition module comprising at least by the processor of the first device:

- 20 i) conveying a first message that includes a first informative message content by presenting on the first device image output module a visual code indicative of the first message, wherein the first message content additionally includes at least an additional robust informative portion, such that under degraded visual conditions at
- 25 least the robust informative portion is capable of being acquirable by an image acquisition device and extractable;
- ii) conveying a second message that includes a second informative message content by transmitting using the first device sound output module a sound code indicative of the second message

30 the system further comprising: at least by the processor of the second device

- iii) receiving the at least part of the first message including scanning at least part of the visual code using the second device image

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acquisition device and extracting at least said robust informative portion;

- iv) receiving the second message including receiving the sound code using the second device sound acquisition module and extracting the second informative content.

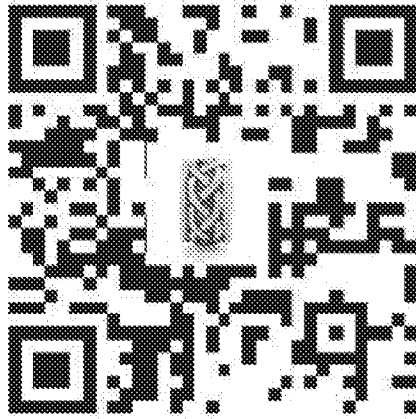


Fig. 1A

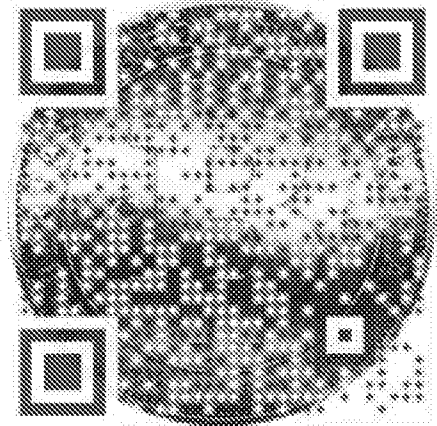


Fig. 1B

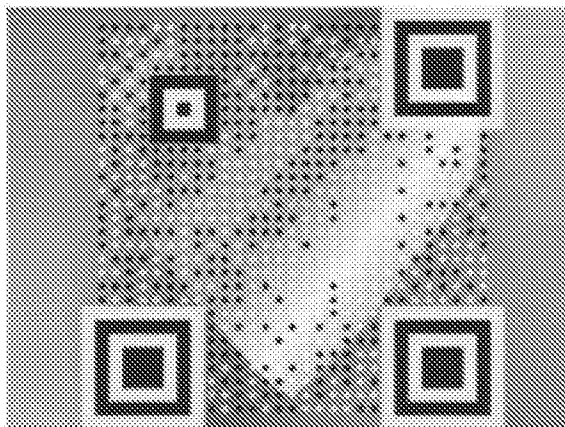


Fig. 1C



Fig. 1D

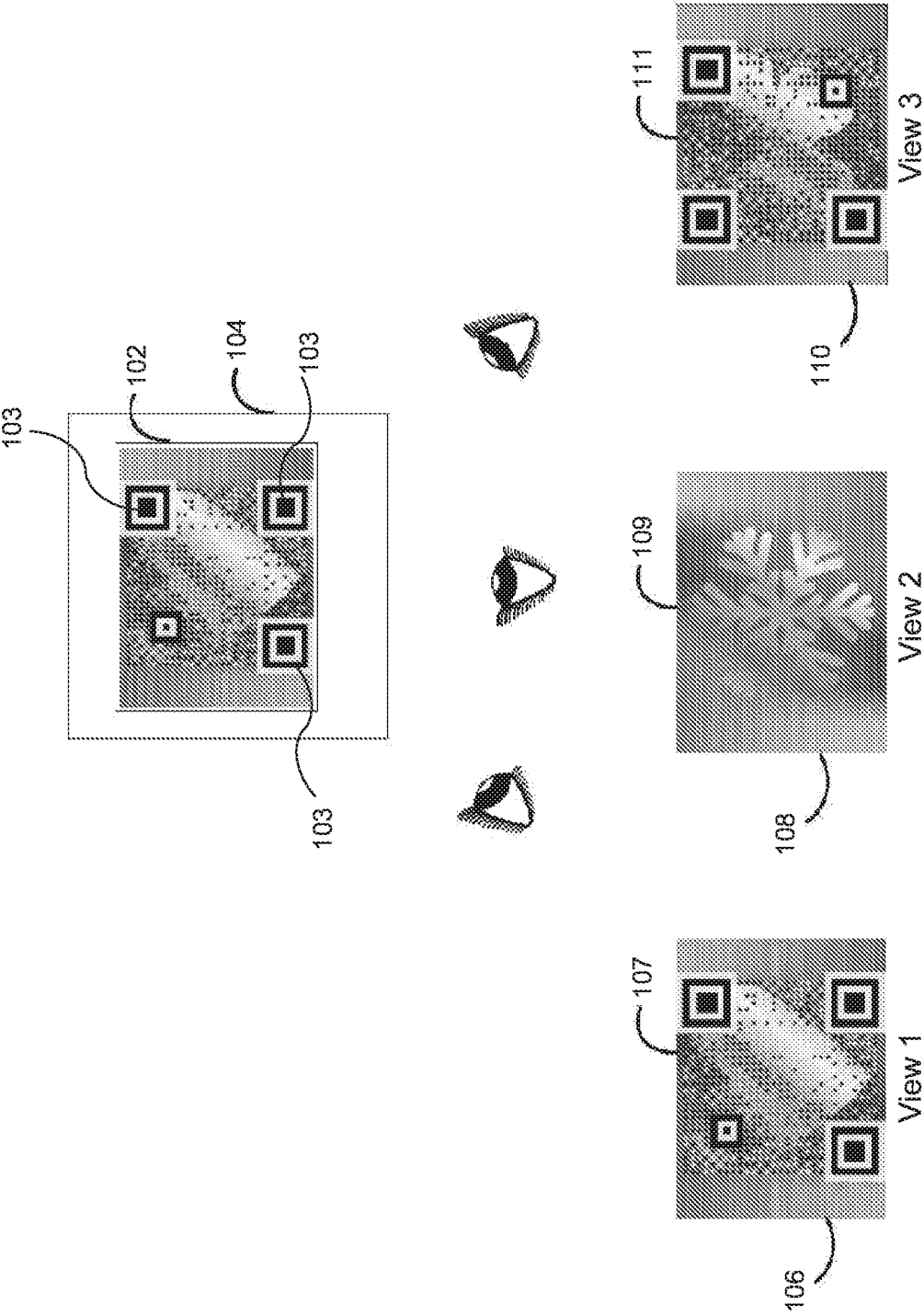


Fig. 1E

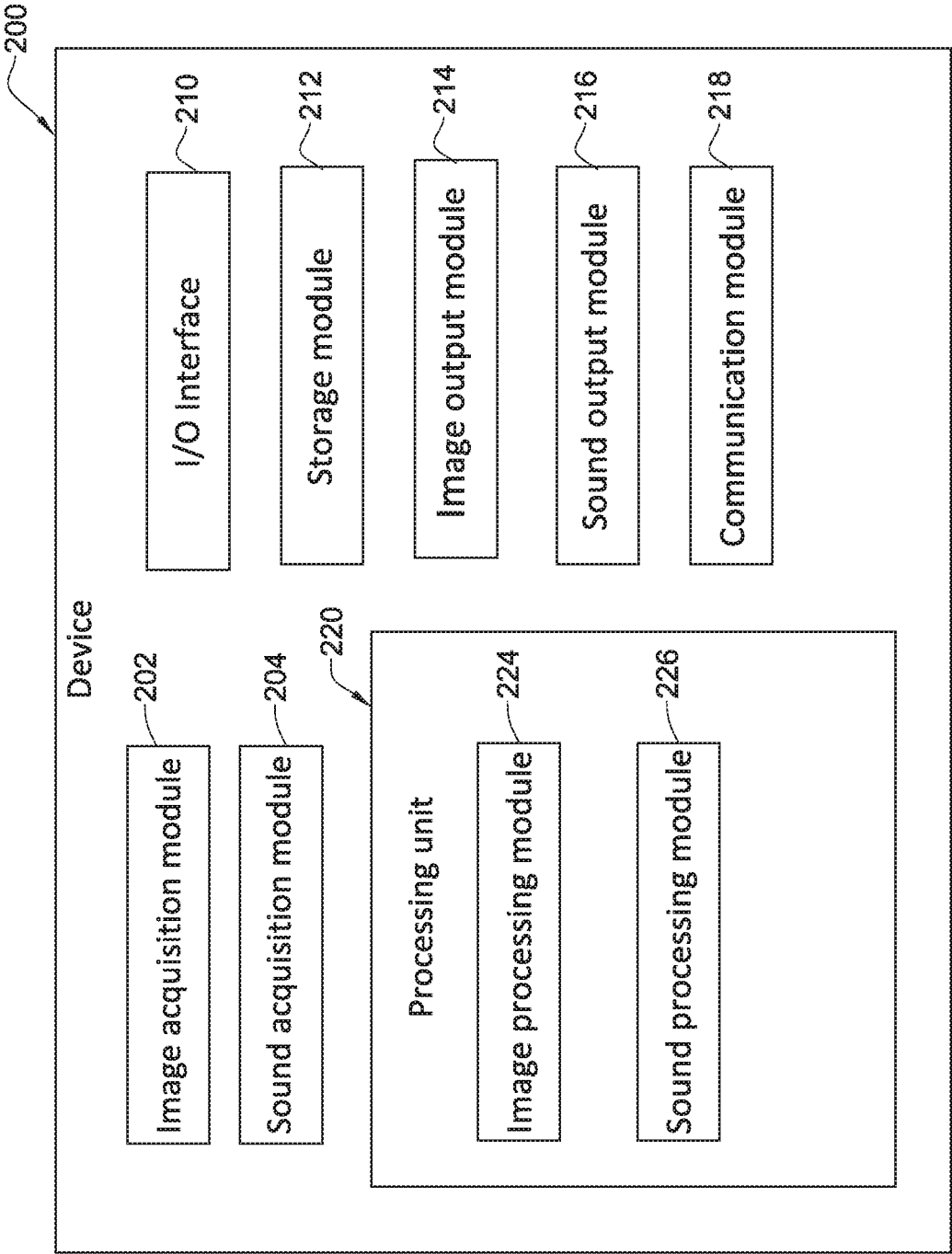


Fig. 2

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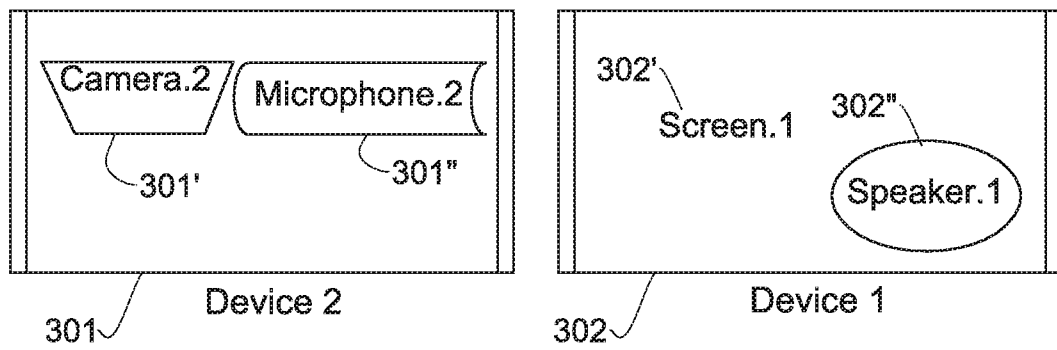


Fig. 3A

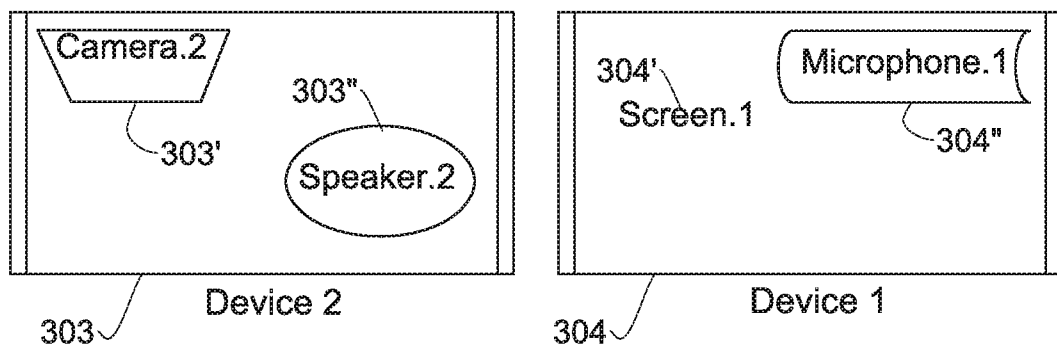


Fig. 3B

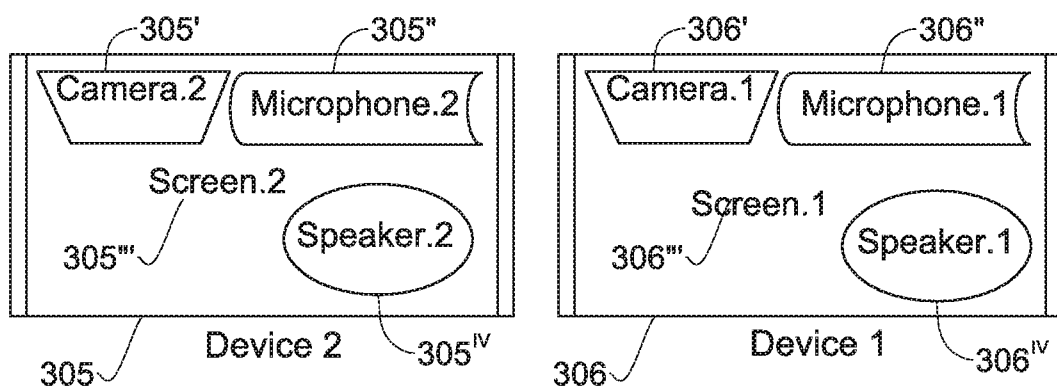


Fig. 3C

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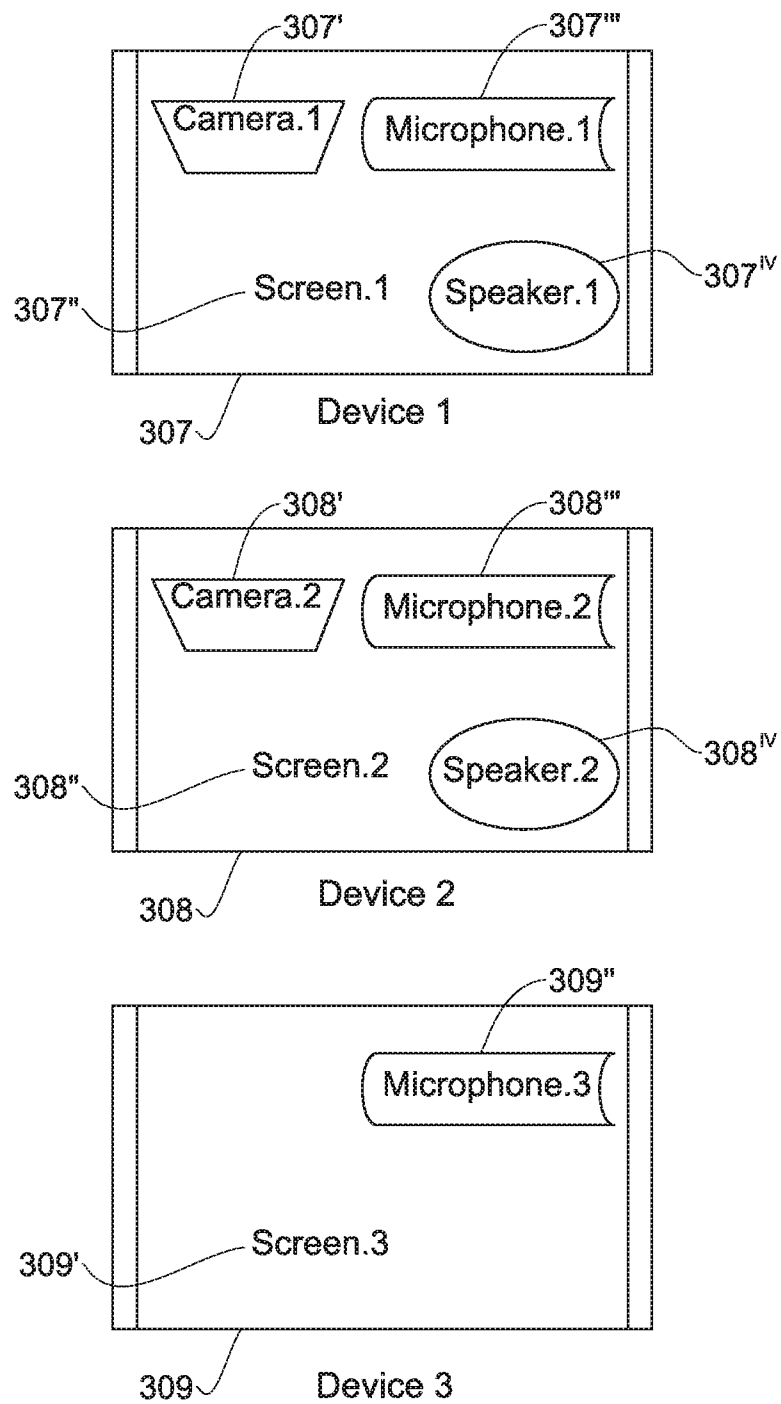
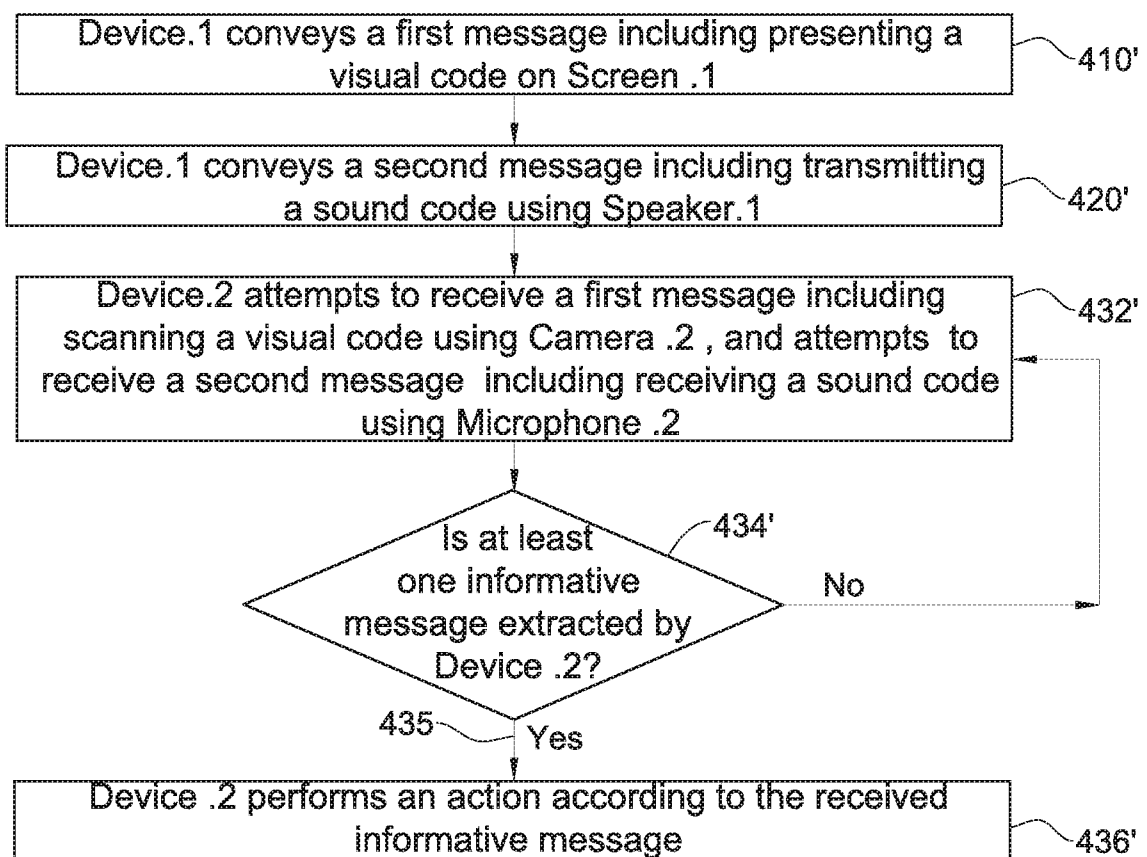
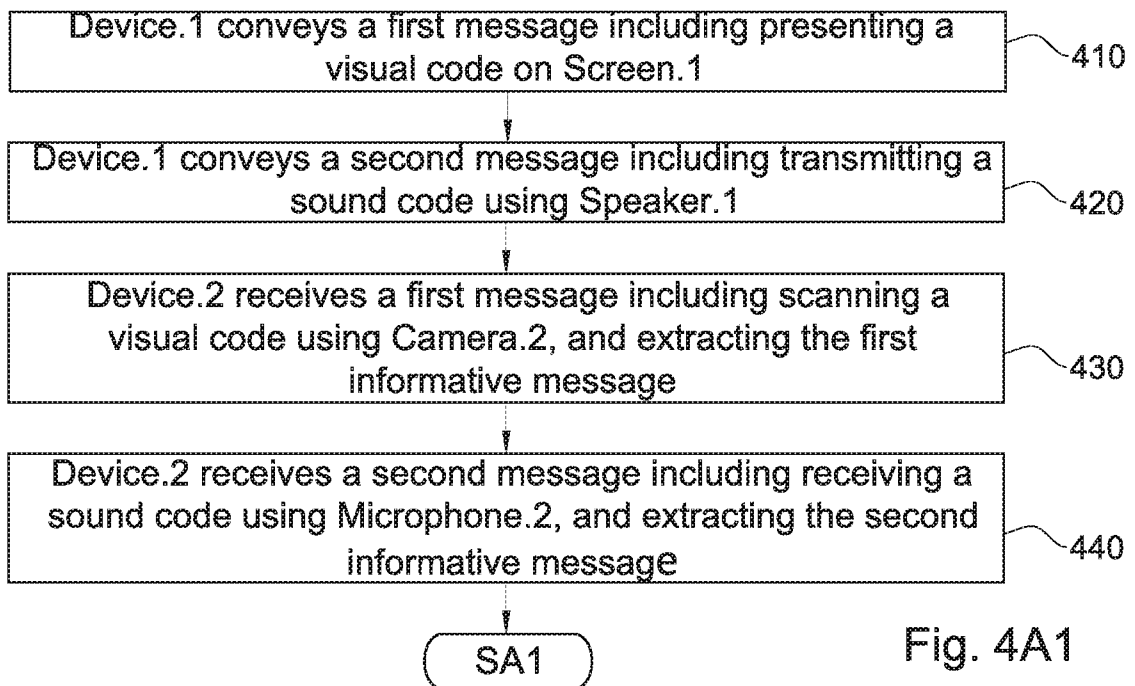


Fig. 3D

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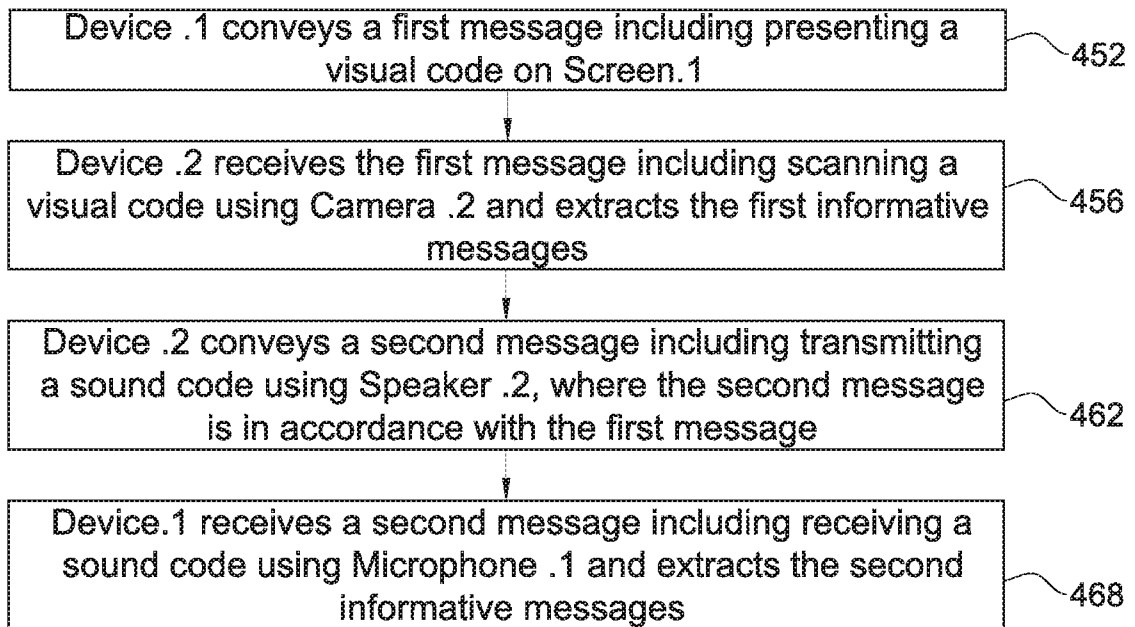


Fig. 4B

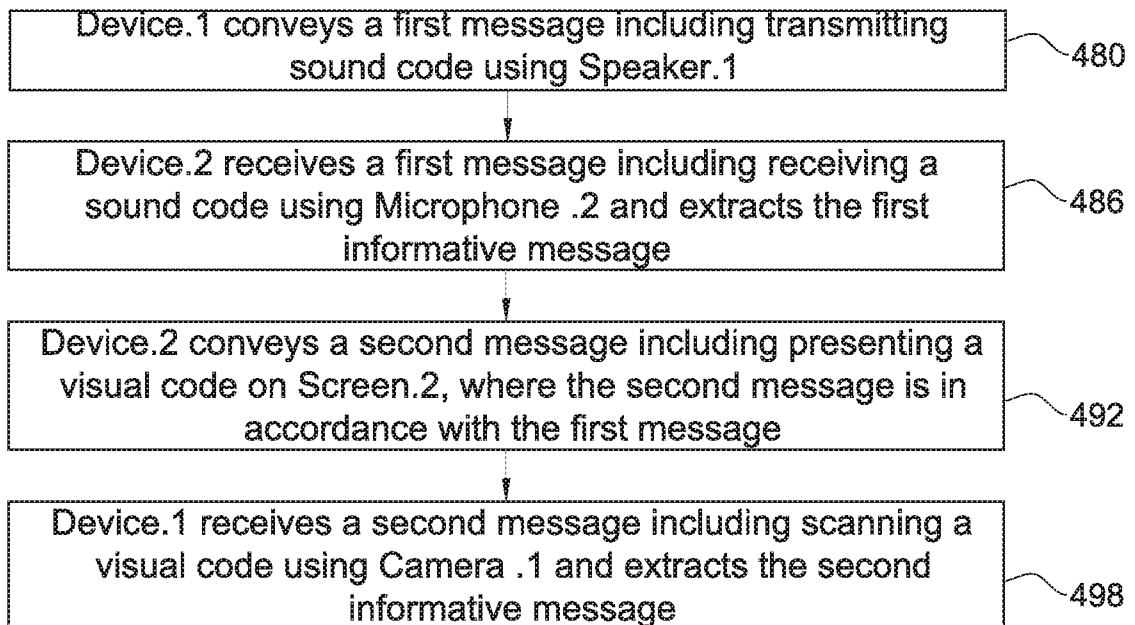


Fig. 4C

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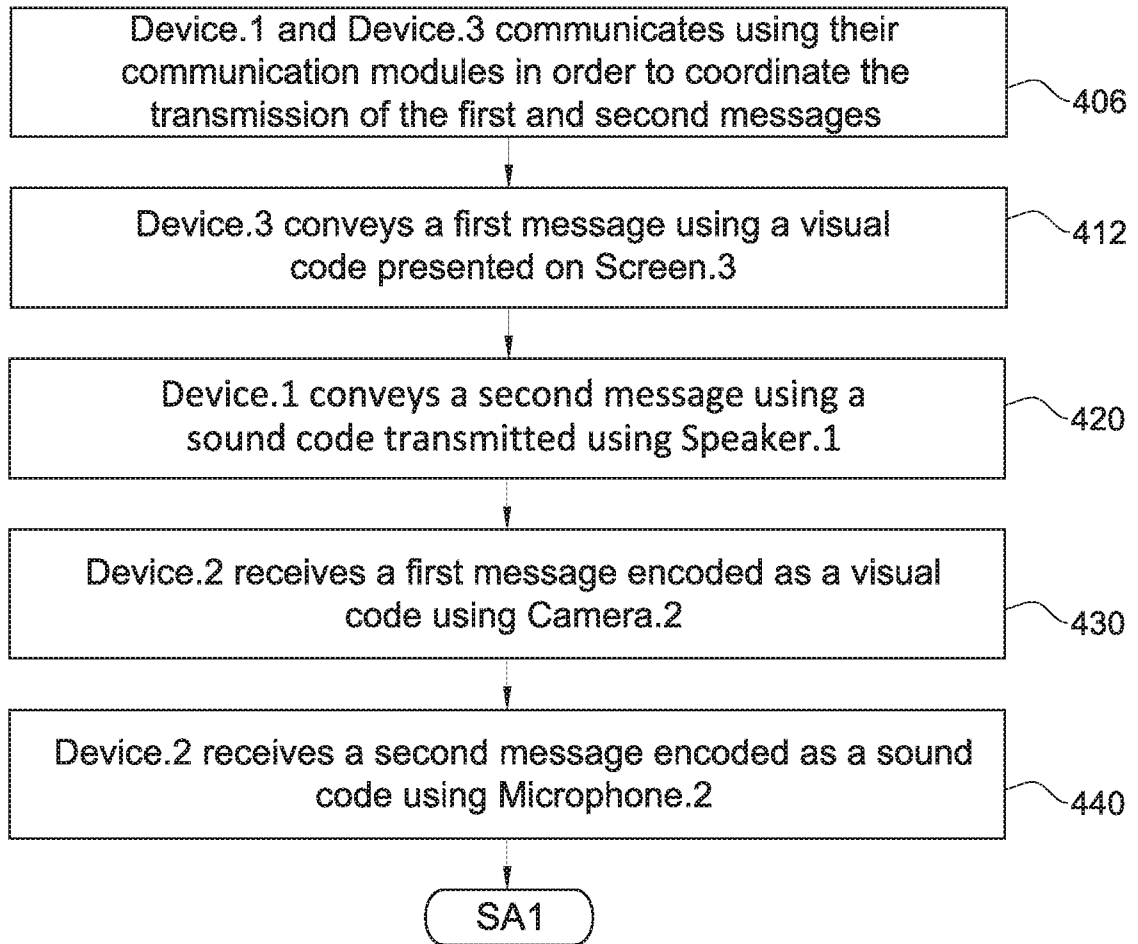


Fig. 4D1

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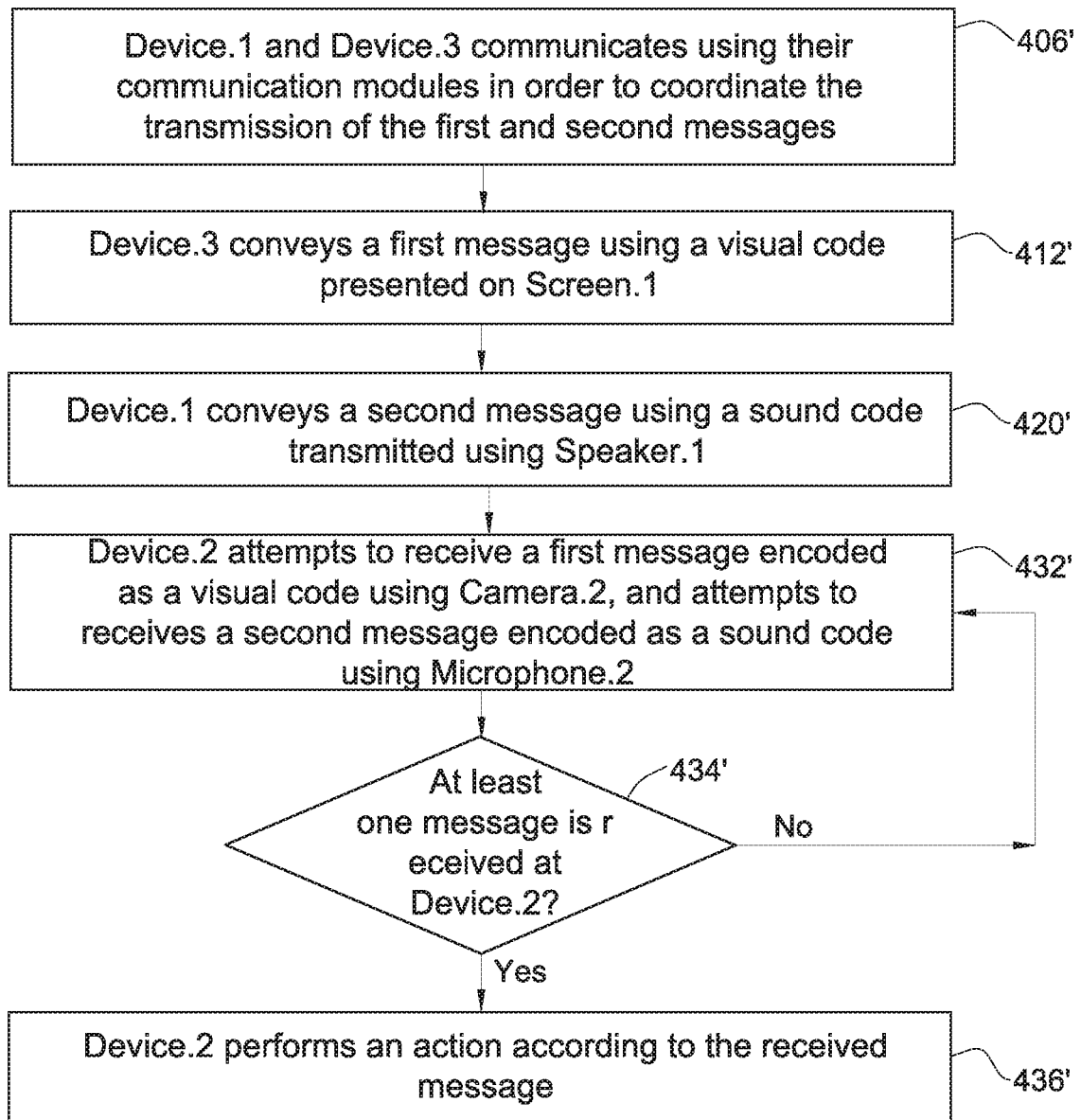


Fig. 4D2

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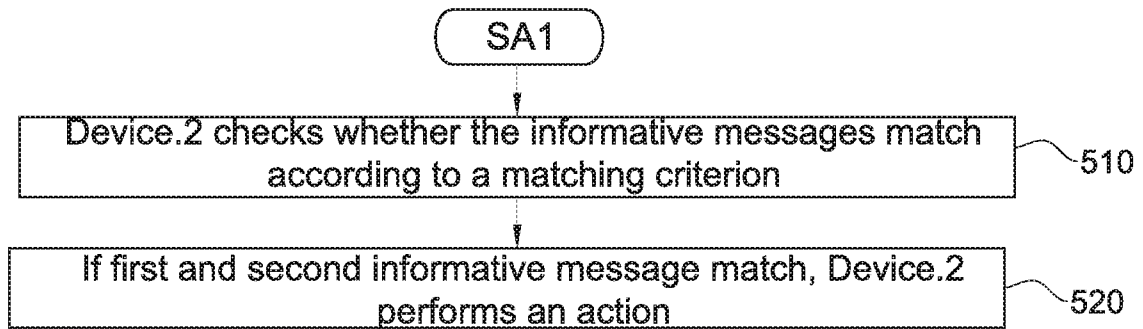


Fig. 5Ai

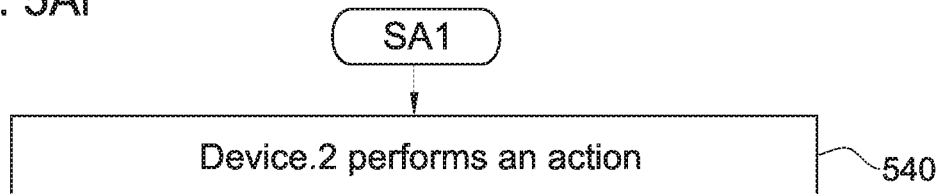


Fig. 5Aii

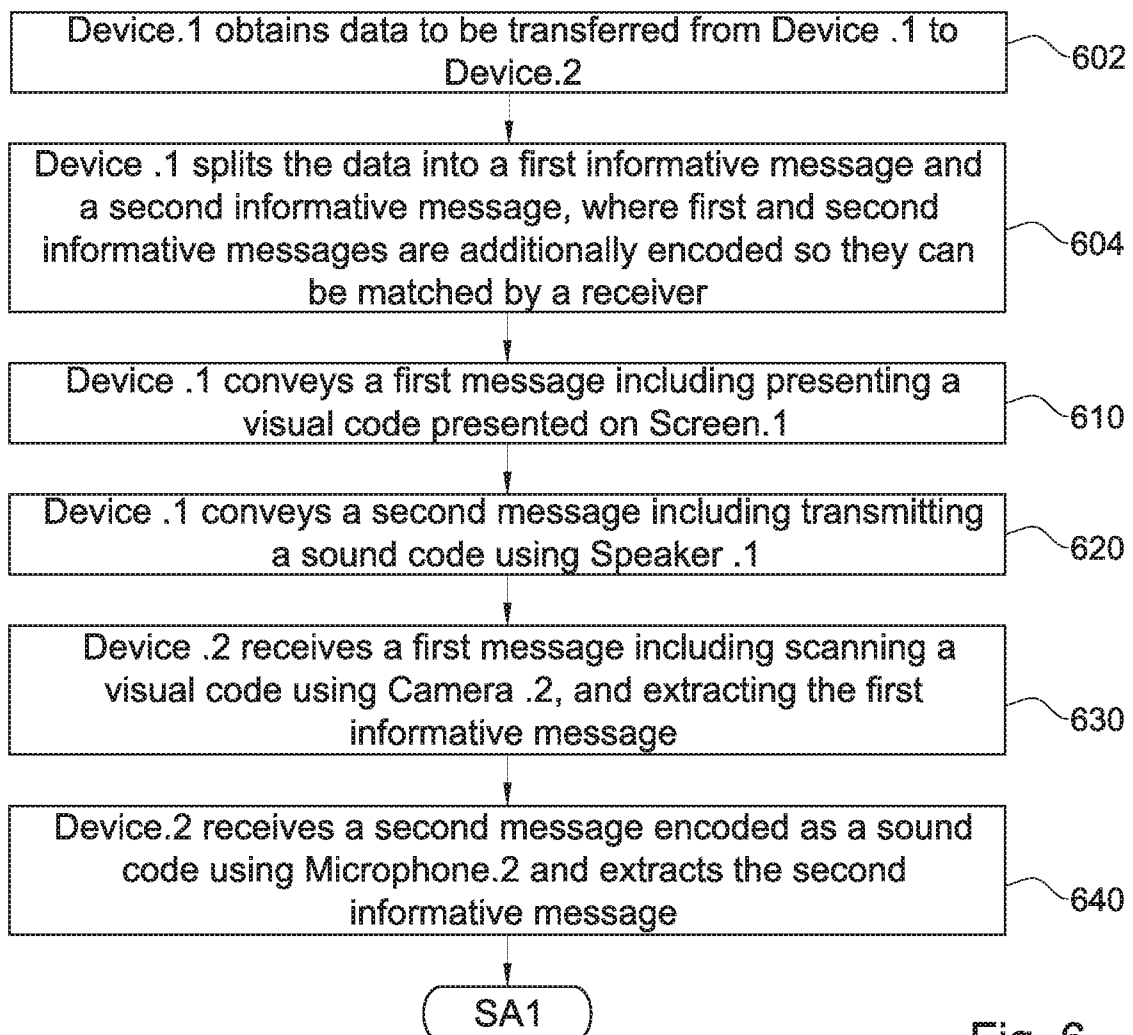


Fig. 6

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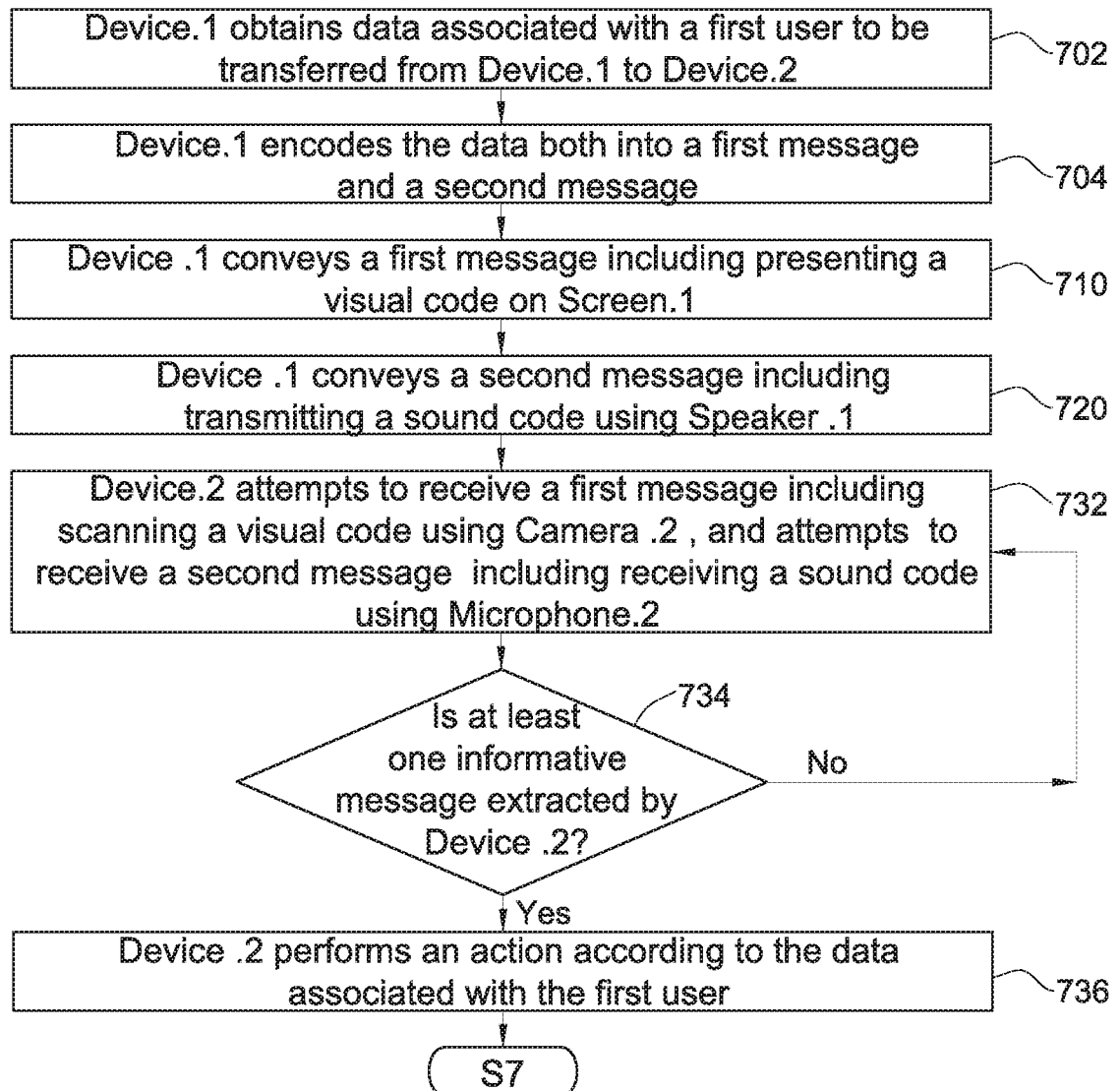


Fig. 7

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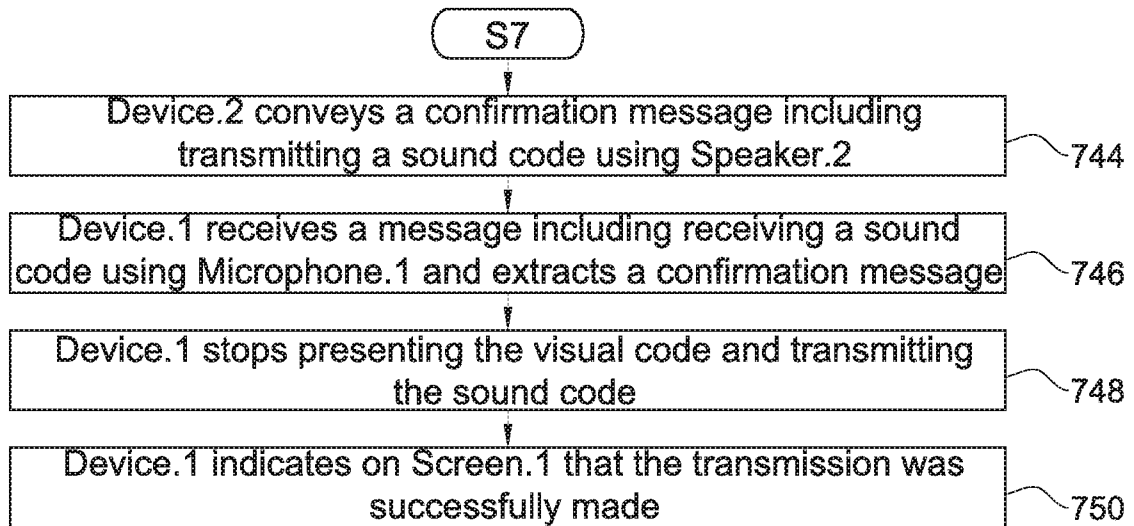


Fig. 7A

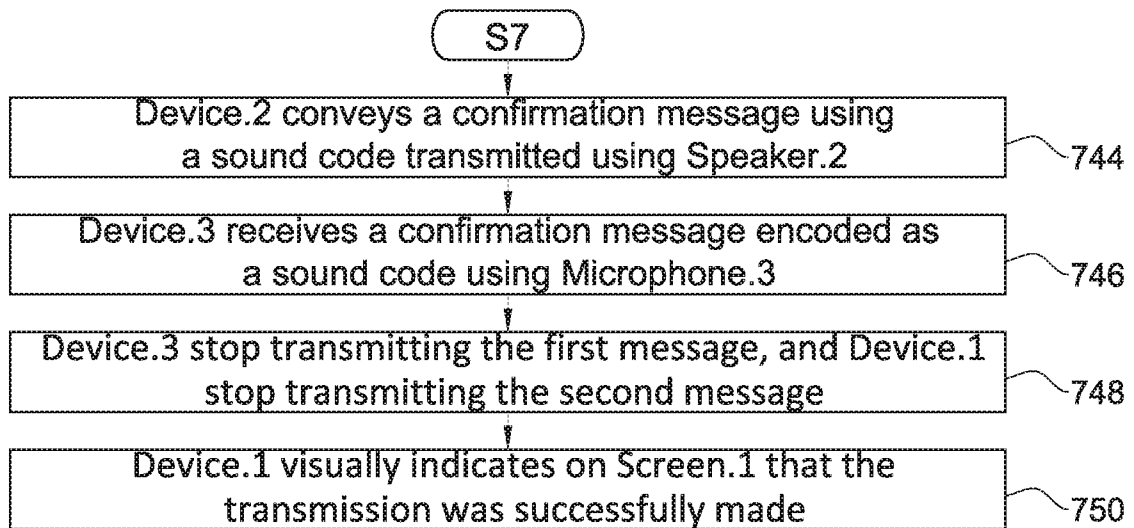


Fig. 7B

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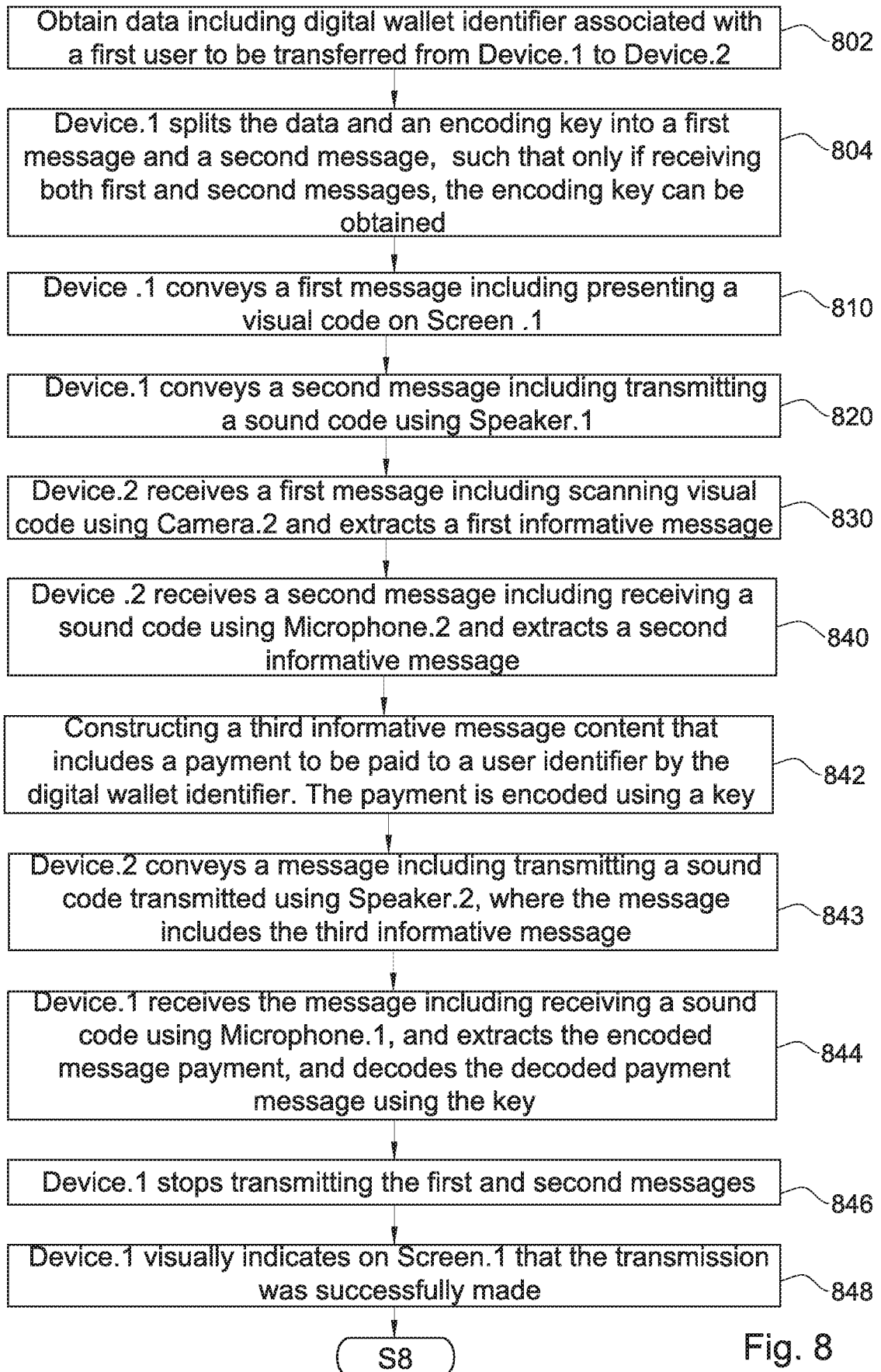


Fig. 8

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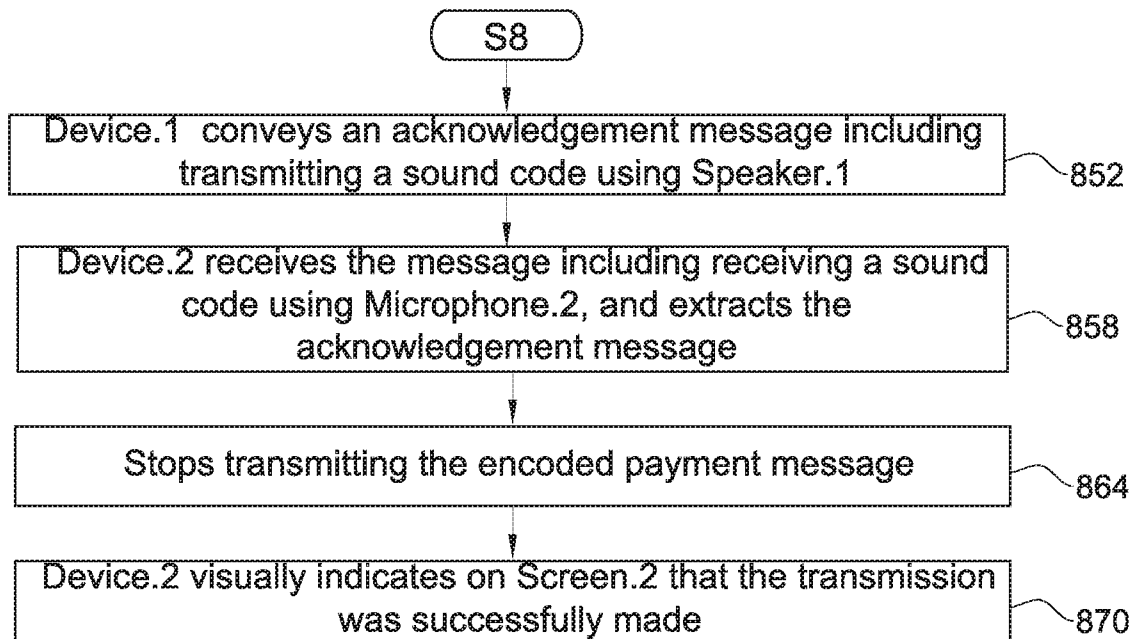


Fig. 8A

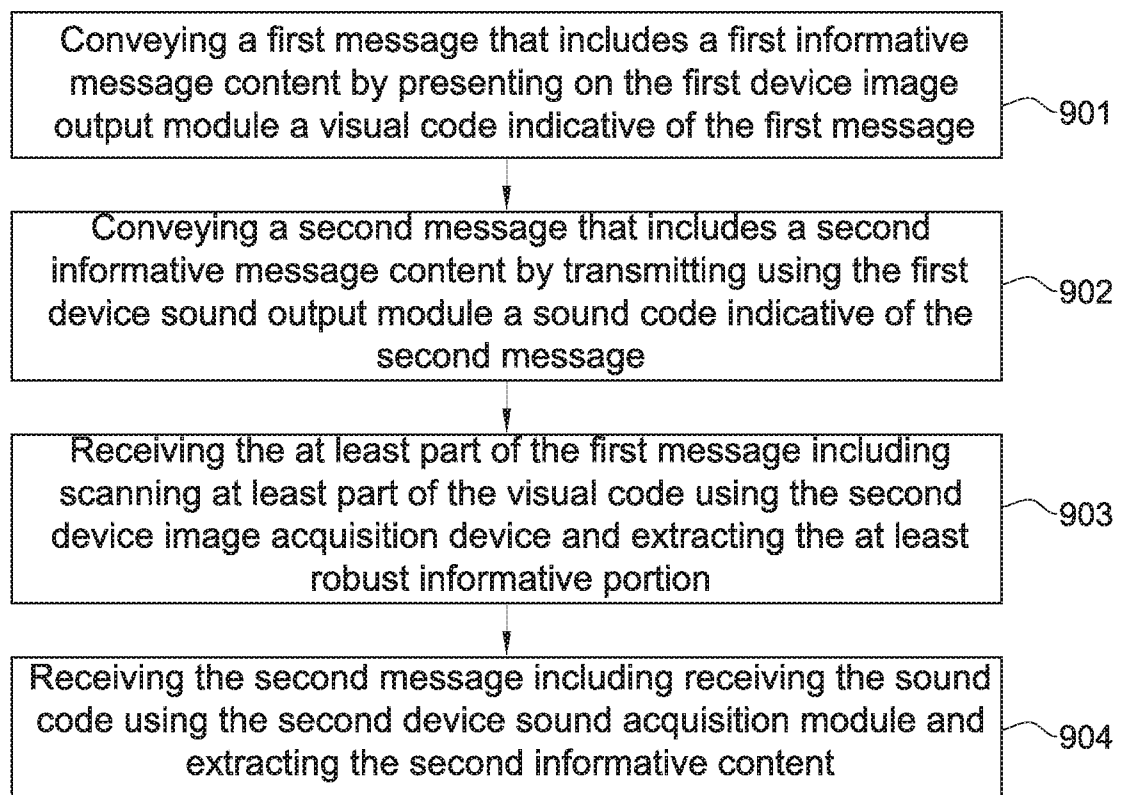


Fig. 9

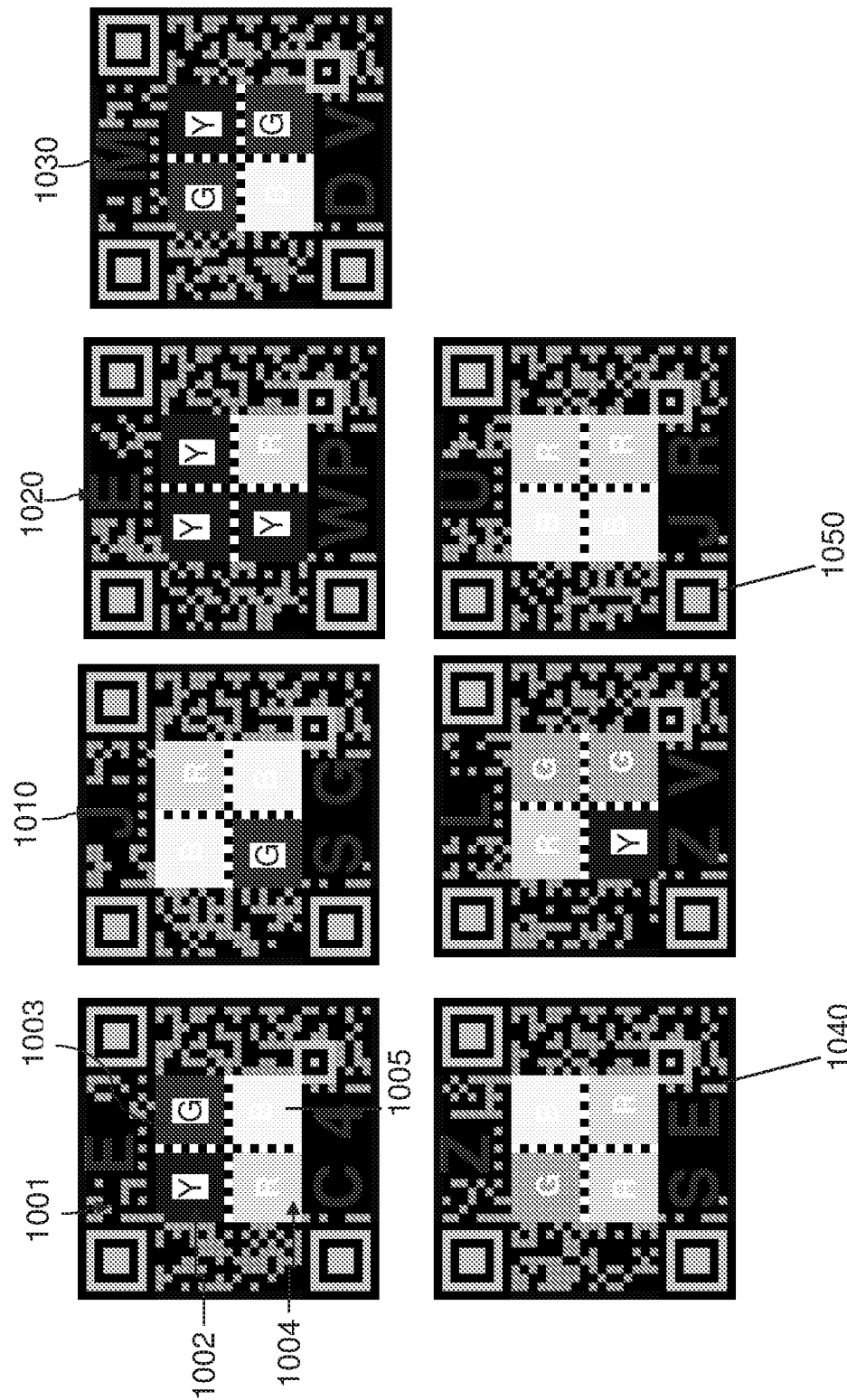


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL2017/050334

A. CLASSIFICATION OF SUBJECT MATTER IPC (2017.01) G06Q 20/32, H04L 9/32 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 (2017.01) G06Q 20/32, H04L 9/32 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 practicable, search terms used) Databases consulted: USPTO, THOMSON INNOVATION		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013237155 A1 KIM MOON J [US] 12 Sep 2013 (2013/09/12) paragraphs [0032], [0045], [0049], [0050], [0053], [0055]	1-42
A	US 2014108252 A1 RIAVERA CORP [CA] 17 Apr 2014 (2014/04/17) the whole document	1-42
A	US 2012214416 A1 KENT JONATHAN DOUGLAS [US] 23 Aug 2012 (2012/08/23) the whole document	1-42
☐ 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 04 Jul 2017		Date of mailing of the international search report 04 Jul 2017
Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616		Authorized officer MOSKOVICH Elad Telephone No. 972-2-5651607

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IL2017/050334

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