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(54) ASSEMBLY FOR WRISTWATCH AND WRISTWATCH PROVIDING DATA EXCHANGE

(57) The invention concerns an assembly for a wristwatch (1,1') comprising: a keeping time electronic module, a wireless communication module for two-way communication, a control unit having computational capabilities and a data storage memory for storing a first data. The assembly is configured for sending a first positioning reference (303,304,305) to a first device (1, 60, 61) through the wireless communication module, and for receiving a second positioning reference (300,301,302) from a second device (50, 51, 52) through the wireless communication module. The assembly is configured for defining a positioning criterion and for sending the first data (401,403,404,405) to the first or second device when the first or the second positioning reference meets the positioning criterion.

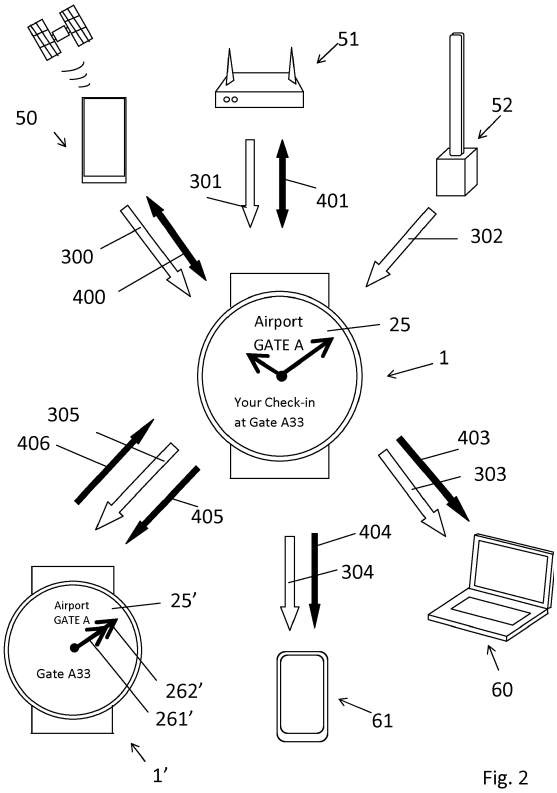

Fig. 2

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Description

Field of the invention

[0001] The present invention concerns an assembly for wristwatch and a wristwatch providing data exchange, in particular, configured to exchange data based within a specific location.

Description of related art

[0002] There are an increasing interest for portable devices suitable for exchanging predefined data when the user is located within a specific location, e.g. for shopping and financial services, user's navigation and orientation, as well as for providing accessing or admission credentials.

[0003] WO14143997 discloses a transportable device collecting the positioning of the user in order to provide him location-specific information through his watch, when the user is located within one of the predefined locations.

[0004] WO14143916 discloses a watch storing user's account identifiers and connectable to a host device for providing him an access to various functionalities, such as financial transactions with a point-of-sale terminal.

[0005] US5627548 discloses a navigation wristwatch providing navigation that integrates a GPS receiver and receives differential corrections over a radio link from a reference station.

[0006] US8059491 discloses a watch comprising a GPS receiver for providing emergency location assistance.

[0007] However, these wearable devices are configured for executing few manufacturing-defined tasks.

Brief summary of the invention

[0008] The aim of the invention is to provide a portable device supporting a wider range of applications making use of location-based data exchanging, with respect to prior art.

[0009] Another aim is to provide a portable device that is easily and daily transportable by the user.

[0010] According to the invention, these aims are achieved by means of the assembly of claim 1 and the wristwatch of claim 21.

[0011] The watch assembly and wristwatch provide a portable device that is easily wearable by a user all long the day as being a standalone device integrating a time keeping function. With respect to prior art, the watch assembly and wristwatch provide a wider compatibility with various typologies of external devices as they can be operate both as mobile beacon and beacon client, wherein the operating mode is customizable by the watchmaker and/or by the end-user. Moreover, the watch assembly and wristwatch provide a support for a wider range of applications using location-based data exchanging as well as reducing the Time-to-Market of those applications.

Brief Description of the Drawings

[0012] The invention will be better understood with the aid of the description of an embodiment given by way of example and illustrated by the figures, in which:

Fig. 1 shows a schematic cross section of the assembly and the wristwatch, according to the invention;

Fig.2 shows a schematic view of the wristwatch of the Figure 1 while operating in a beacon and in a beacon client mode, according to the invention;

Figs. 3 and 4 show schematic views of exemplary applications executable on the wristwatch of Figure 1, according to the invention.

Detailed Description of possible embodiments of the Invention

[0013] Figures 1 and 2 show a wristwatch 1 having a casing 11, a glass 12 and an assembly 2 retained inside the casing and visible through the glass. The assembly 2 is an electro-mechanical movement that comprises a keeping time electronic module 21 and a watch dial 25.

[0014] The assembly 2 comprises a motorized unit 26 cooperating with the keeping time electronic module 21 and with the dial 25 for displaying one or more time functions. The motorized unit 26 is provided with a hand shaft 263 that extends from an opening 251 of the dial 25 for actuating a hour hand 261, a minute hand 262 and a second hand (not illustrated) over the watch dial 25. Preferably, the diameter of the opening 251 of the dial is dimensioned in order to permit an operational fixation of the wristwatch hands 261, 262 on the hand shaft 263 while keeping the opening as small as possible, e.g. for esthetical purpose.

[0015] The dial of the assembly 2 is destined to be visible when the assembly 2 is mounted in the wristwatch casing 11, through the glass 12 of the wristwatch 1. The dial comprises a digital display 25 for displaying a series of symbols or signs spatially cooperating with the rotational speed and/or angular positioning of the hour hand 261, the minute hand 262 and/or the second hand, through the hand shaft 263.

[0016] The digital display 25 can be any digitally controlled display that is able to display at least dial signs, digits and alphanumerical characters. Preferably, the digital display is a 2-dimensional display destined to presents digital images, such as an electroluminescent display (ELD) and an organic light-emitting diode display (OLED).

[0017] The digital display 25 can be constituted by a single unit. Alternatively, the digital display can be con-

stituted by a plurality of distinct numerical display units that are spatially arranged on the visible surface of the dial, either juxtaposed or scattered arranged on the surface of the dial.

[0018] The display 25 shown in Figure 1 is a single display unit covering substantially the entire, visible surface of the dial so as to provide a wide surface for displaying dial signs, digits and alphanumerical characters.

[0019] Alternatively, the digital display 25 can cover a portion of the dial visible surface, e.g. the lower/higher half of the dial, so as for pursuing particular esthetical effects and/or others functionalities.

[0020] The motorized unit 26 and the digital display 25 are controlled by a control unit 23 for providing display functionalities. The control unit 23 has computational capabilities, i.e. it comprises electronic circuits configured to process digital signals. The electronic circuits can be a microprocessor or a programmable electronic circuit. In particular, the control unit is configurable to execute an application, preferably a plurality of applications running substantially simultaneously on the assembly.

[0021] The assembly 2, through the control unit 23, is configured to permit a user to select a displaying functionality he wishes to be displayed on his wristwatch 1, in particular from a list of predefined display functionalities, by means of wristwatch user interfaces (not illustrated), e.g. watch buttons, touch-sensitive elements, a watch crown and a rotational watch bezel.

[0022] The control unit 23 drives thus the motorized unit 26 and the digital display 25 providing the selected display function by simultaneously displaying symbols on the digital display 25 while controlling the angular positions and the rotational movements of the hour, minute and second hands 261, 262 through the hand shaft. The displayed symbols are, for example, numerical and graphical signs providing visual information to the user in cooperation with the angular position of the wristwatch hands 261,262.

[0023] The assembly 2 comprises at least a data storage memory 24 for storing executable codes and operational data for executing the application on the wristwatch 1 through the control unit 23 as well as for storing personal data of the user. The data storage memory can comprise dedicated memory units, e.g. one for storing application executable codes and operational data, and the other for storing the user personal data.

[0024] Advantageously, the assembly 2 comprises a sensor unit 28 providing navigation and positioning aid data to the control unit 23. The sensor unit 28 can comprise an inertial sensor, such as accelerometers (e.g. 3D accelerometer) and a gyroscope, for providing relative positioning, orientation and velocity of the assembly. Advantageously, the sensor unit 28 can comprises an electronic compass and/or an electronic altimeter.

[0025] Alternatively or complementarily, the sensor unit can comprise an absolute positioning systems, such as a Global Navigation Satellite Systems (e.g. GPS, Galileo and GLONASS receiver), providing a position, an orientation and a velocity of the assembly with respect to a predefined coordinate system or geometric model.

[0026] The assembly is further configurable to detect a gesture and/or a movement of the user. In particular the control unit can detect and/or identify a predefined movement of the user, such as a walk or a run, by analyzing a series of successive data provided by the inertial and/or by the absolute positioning system.

[0027] In particular, a hand or arm gesture of the user (e.g. hand shaking, greeting, paying, watch consulting, door opening/closing) can be detected and/or identified by control unit by analyzing data provided by the inertial sensor (in particular by the accelerometers) and/or electronic compass of the sensor unit.

[0028] The assembly 2 comprises a communication module 22 controlled by the control unit 23 and providing a two-way wireless communication, notably permitting a dispatching and a reception of data, to/from another device provided with suitable communication means.

[0029] The communication module 22 is able to broadcast digital data by means a wireless hardware transmitter and to receive broadcasted numerical data through a wireless hardware receiver. Advantageously, the wireless hardware transmitter and the wireless hardware receiver can comprise a plurality of transmitter and/or emitter units for implementing various wireless standards, advantageously the most wide popular ones, such as a Wi-Fi, a Bluetooth ®, a Bluetooth low energy, an ANT® standard. The capability of communicating via a plurality of standards provides communication with different typologies of external devices.

[0030] The communication module can be used for updating applications stored in the data storage memory as well as for downloading new applications into the data storage memory.

[0031] The communication module 22 can be set up, through the control unit, for either simultaneously or sequentially operating as a beacon device (beacon mode) and as a beacon receiver (beacon-client mode).

[0032] In the beacon mode, the wristwatch 1 is able to send a first positioning reference 303, 304, 305 to a client device 1', 60, 61 by means of the wireless communication module 22.

[0033] The client device can be a wearable, portable, transportable or fixed device, such as a wireless phone, a smartphone 61, a tablet, a PDA, a laptop 60, a tower PC, a server, a portable navigation device or an application-dedicated device. The client device can be another wristwatch 1' comprising the assembly 2 operating in the beacon-client mode.

[0034] The positioning reference can be a positioning of an entity defined according to a positioning system or model. The positioning reference can be a partial positioning of the entity defined according to a positioning system or model, i.e. a subset of the positioning of the entity defined according to the positioning system or model (e.g. a 2D positioning within a 3D coordinate system). The positioning reference can be a geographical

or spatial definition, a geographical identity, a spatial description or relationship related to the positioning of an entity, preferably selected within a list of possible items.

[0035] The first positioning reference 300-305 can comprise an absolute positioning reference.

[0036] The absolute positioning reference can be a spatial or geographical positioning of the wristwatch with respect to a predefined, either local or global, coordinate system or geographic model, e.g. the WGS 84 world geodetic system, the Greenwich-based geographic coordinate system based on latitude, longitude and elevation and national or local coordinate system such as the Swiss coordinate system (SRID 21781). The absolute positioning reference can be a partial spatial or geographical positioning, e.g. a 1 D, preferably a 2D positioning with respect to the coordinate system or geographic model.

[0037] The absolute positioning reference can be a local or global geographical definition, such as international recognized names of towns' quarter, street and road crossing. The absolute positioning reference can be a widely accepted or customized identity, e.g. building floors numbers, hallway, staircase, hall and room names or IDs.

[0038] The absolute positioning reference can be an absolute positioning reference of the wristwatch that was previously stored in the data storage memory, e.g. by means of a dedicated application running on the control unit and/or by the user.

[0039] The absolute positioning reference can be an absolute positioning reference of a device interacting with the wristwatch that has been previously transmitted to the assembly 2, e.g. through the wireless communication module 22 and stored in the data storage memory. The device interacting with the wristwatch can be a device acting as a beacon, e.g. a portable or wearable device equipped with global positioning capabilities and providing an absolute positioning reference to the wristwatch, or a dedicated device such as a reference beacon or GPS standalone receiver.

[0040] Alternatively or complementarily, the absolute positioning reference can be an absolute positioning that is directly (or extracted from data) provided by the sensor unit 28.

[0041] The first positioning reference 300-305 can comprise, alternatively or complementarily, a relative positioning reference between the assembly 2 and the client device 1', 60, 61.

[0042] The relative positioning reference can represent a relative positioning of the assembly with respect to the client device (and/or a relative positioning of the client device with respect to the assembly) that is expressed according to an international recognized unit, i.e. International System of Units (SI). For example, the relative positioning reference can be a sightline distance between the assembly (i.e. the wristwatch) and the client in meters or centimeters, and a 2D relative orientation in degrees.

[0043] The relative positioning reference can be a spatial or geometrical relationship between the assembly and the client device, such as near/far away, on the right/left, upper/down, etc. Advantageously, the relationship is selected within a list of possible relationships.

[0044] The relative positioning between the assembly and the client device can be extrapolated from electromagnetically properties and/or timing details of previously exchanged messages between the client device and the assembly. The extrapolated relative positioning can be distance-and orientation-related positioning between the assembly (i.e. the wristwatch) and the client device.

[0045] The relative positioning can be calculated, e.g. via the control unit, from known absolute positioning of the assembly 2 and the client device. For example, the absolute positioning reference of the client device can be previously communicated to the assembly, e.g. via a wireless communication and stored in the data storage memory, notably when the client device is a device (temporarily or long-term) immobilized or moving within a delimited region.

[0046] In case the accuracy of the calculated absolute positioning references does not meet the minimal accuracy required by the user and/or the application running on the assembly, the calculated relative distance can be confirmed, refined or corrected by data extrapolated from electromagnetically properties and/or timing details.

[0047] In the beacon-client mode, the wristwatch is able to receive a second positioning reference 300,301,302 from a beacon device 50, 51, 52 through the wireless communication module 22.

[0048] The beacon device can be any device arranged to operate as a beacon, such as a location-fixed beacon 52, a data access-point 51 having beacon capabilities or a portable device 50 having positioning capabilities like an indoor positioning unit or a GNNS receiver. The beacon device can be another wristwatch comprising the assembly 2 operating in the beacon mode.

[0049] The second positioning reference 300-305 can comprise an absolute positioning reference that is related to the beacon device.

[0050] Similarly to the absolute positioning reference of the first positioning reference, the absolute positioning reference of the second positioning reference can be a spatial or geographical positioning of the beacon device, a local or global geographical definition, and a widely accepted or customized identity. The typology of the absolute references of the first and the second positioning references can be the same or differs one from the other.

[0051] The second positioning reference 300-305 can comprise a relative positioning reference related to the assembly 2 and the the beacon device 50, 51, 52.

[0052] Similarly to the relative positioning reference of the first positioning reference, the relative positioning reference of the second positioning reference can represent a relative positioning of the assembly with respect to the beacon device (and/or a relative positioning of the beacon device with respect to the assembly) according to an international recognized unit, or a spatial or geometrical

relationship between the assembly and the beacon device. The typology of the relative references of the first and the second positioning references can be the same or differs one from the other.

[0053] The assembly handles the first and the second positioning reference in a digital format so to be able to numerical processing these references by means of the control unit 23. Advantageously, the assembly 2 handles (and if necessary convert) the most common 3D spatial data formats, such as GPS Exchange Formats (GPX), CAD drawings DXF format, Goggle Earth ® KML and SHX shapefile format. Advantageously, the assembly 2 handles (and if necessary it converts) various typologies and combination of numerical 2D/3D spatial data and digital geographical definitions.

[0054] The control unit places the received positioning reference, notably the absolute and/or relative positioning reference, at disposal of the user and to the running applications, e.g. by storing it in the data storage memory. The control unit can be further configured to transmit stored positioning reference to a selected remote device (by the application and/or by the wristwatch user) though the wireless communication module, e.g. for providing input to other applications or services running on remote devices.

[0055] The received positioning reference, notably the absolute and/or relative positioning reference, can be used by the assembly, via the control unit, for determining and/or updating the absolute positioning reference of the assembly. The reference can be, alternatively or complementarily used for determining and/or calculating the relative positioning reference between the assembly and the beacon device.

[0056] Advantageously, the assembly updates the absolute positioning of the assembly and/or the relative positioning of the assembly with respect to the beacon device, upon a receipt of the second positioning reference or of a successive positioning reference from the beacon device. The updating operation can be submitted to a precision criterion that the received positioning reference has to meet, e.g. the accuracy of the provided reference is equally or more precise than those defined by the precision criterion.

[0057] The assembly 2 permits a user and/or the running application to activate/deactivate and to setup the operational mode of the assembly, in particular the beacon mode and the client-beacon mode, especially by means of the control unit 23 and the wristwatch user interfaces.

[0058] A second wristwatch 1' containing the assembly of the invention can be considered as a client device and/or as a beacon device by the first assembly 2 (i.e. by the first wristwatch 1) depending on the operation mode of the second wristwatch, i.e. beacon and/or beacon-client mode.

[0059] The assembly 2 allows the user and/or the application running on the assembly (e.g. via the control unit) to define, or select, a positioning criterion for sending a predefined data that is stored in the data storage memory of the assembly. The positioning criterion applies to a positioning of the assembly, of the client device and/or of the beacon device. The data can be sent to the beacon device and/or to the client device, notably depending on the user and/or application requirements.

[0060] The positioning criterion can comprises an absolute positioning criterion, a relative positioning criterion or a combination of an absolute and a relative positioning criterion that the wristwatch, the beacon device and/or the client device has to meet. In case an absolute and a relative positioning criterion are set, the user and/or the application has the possibility to choose if both criteria are either cumulative or alternative.

[0061] The absolute positioning criterion can define a 2D/3D portion of a predefined coordinate system or geographic model. Alternatively or complementarily, the absolute positioning criterion can be a local or global geographical definition or a widely accepted identity, preferably selected within a list of geographical definitions and identities provided by the assembly.

[0062] Moreover, the assembly permits the user and the running application to set up the accuracy applying to the positioning criterion, e.g. by defining the smallest unit of measurement (e.g. kilometer, meter, decimeter) or by selecting an application-dependent precision range from a list of precisions ranges (e.g. rough/mid/precise).

[0063] The relative positioning criterion can be a minimal or a maximal distance threshold, or a distance range defined by a minimal and a maximal distance, between the wristwatch and the client or beacon device.

[0064] As illustrated in Figure 2, the assembly sends the predefined data 403-405 to the client device 1', 60, 61 when the first positioning reference 303-305, e.g. the absolute positioning of the wristwatch and/or the relative positioning between the wristwatch and the client device, meets the positioning criterion.

[0065] The assembly 2 of Figure 2 sends the predefined data 400-401 to the beacon device 50-52 when the second positioning reference 303-305, e.g. the absolute positioning of the beacon device and/or the relative positioning between the wristwatch and the beacon device, meets the positioning criterion.

[0066] The predefined data is defined by the user and/or the application running on the assembly. The predefined data can be any data stored in the assembly, notably user-dependent data. The predefined data can eventually comprise application-dependent data and/or assembly-dependent data.

[0067] The assembly is able to detect and/or identify a plurality of user's movements or gestures, by analyzing the data provided by the sensor of the assembly and/or the received positioning references. The movements that the assembly is capable to detect/identify are, for example running and walking. The plurality of gestures can comprise, for example, hand shaking, greeting, paying, watch consulting and/or door opening/closing.

[0068] The ability of identifying and/or detecting user's

movements or gesture permits the user and/or the running application permit the user and/or the running application to further setup of a movement/gesture criterion that he assembly has to detect/identify for sending the predefined data. Advantageously, the setup can be realized by selecting the desired movement from a list of predefined movement and hand gestures.

[0069] The assembly provides a connection with a network wireless access point 51, through the wireless communication module, for providing data exchange with a remote, network-connected device. Advantageously, the assembly is configured for selectively providing a network access to the user, to the application running on the assembly, to the beacon device and/or to the client device.

[0070] The control unit 23 drives the digital display for displaying the first positioning reference and the second positioning reference, upon the positioning reference is received, or sent respectively.

[0071] The user and/or the application can configure the control unit 23 for, alternatively or complementarily, displaying the data 400, 401, 403-405 sent to the client device, to the beacon device and/or to the network wireless access point 51 through the wireless communication module 22.

[0072] Additionally or alternatively, the control unit 23 drives the digital display 25 for displaying a data that is received from the client device, the beacon device and/or from other devices, in particular through the network wireless access point 51.

[0073] The control unit 23 can drive the digital display 25 for displaying the predefined data that is stored in the data storage memory 24. The predefined data can be displayed once the selected positioning criterion, and/or a dedicated (absolute and/or relative) positioning criterion defined by the user and/or the running application, is met.

[0074] Advantageously, the control unit modifies the display function for signalizing the user an occurrence of a predefined event, e.g.:

- a transmission of the first positioning reference 303-305 to the client device 1', 60, 61,
- a reception of the second positioning reference 300-303 from the beacon device 50-52,
- a transmission of data to the client device, beacon device and/or to a remote device though the network wireless access point, and/or
- a reception of data from the client device, beacon device and/or from another device though the network wireless access point.

[0075] The modification of the display function can comprise a temporarily (i.e. for a predefined time period or up to a command entered by the user) modification of the angular position and/or the rotational movement of the hour, minute and/or second hands 261, 262.

[0076] The modification of the display function can comprise a rotation of the hour and the minute hands 261, 262, one in a clockwise, the other anticlockwise, for a predefined number of turns.

[0077] The modification of the display function can comprise a temporarily orientation of both the hour and the minute hands 261, 262, in a particular angular position. The angular orientation can indicate a physical element located in the neighboring space to the user, e.g. the location of the beacon or of the client device interacting with the wristwatch. Alternatively, the angular orientation can indicate a displayed text or graphical signs on the digital display to the user.

[0078] The assembly 2 is powered by a power pack, such as a battery 27 or an accumulator unit. The power pack can be either removable attached or physically integrated in the assembly 2, i.e. unmovable fixed to the assembly 2.

[0079] Various applications based on location-based data exchange could thus be realized or implemented by means of one or more wristwatches comprising the assembly 2 of the invention.

[0080] A first example is a navigation aid application illustrated in Figure 2.

[0081] A user wearing the wristwatch 1 configured his wristwatch 1, in particular by means of a dedicated navigation aid application running on the assembly, to operate as a navigation aid device. In this exemplary case, the user want to use his wristwatch 1 for aiding him to meet his work colleague in view of taking a flight at the town's airport. The work colleague wears a second wristwatch 1' comprising a second assembly running the same or a compatible navigation aid application.

[0082] The user of the wristwatch 1 selects the town's airport as an absolute positioning criterion, while he selects the second wristwatch 1' as the target device, e.g. by selecting the ID of the second wristwatch 1'. The user selects the meeting agenda, the electronic flight ticker of the work colleague and flight information data as data to be provided to him once they will meet together at the airport.

[0083] Once the wristwatch 1 is activated as navigation aid device, e.g. by activating the navigation aid application, the wristwatch 1 is set to operate in both the beacon and beacon-client mode. The assembly starts thus to determine and to update the current absolute positioning of the wristwatch. The absolute positioning of the wristwatch is thus successively computed by analyzing the data provided by the positioning sensor unit 28 of the wristwatch and/or by receiving absolute positioning references 300, 3001, 302 from a mobile beacon 50 transported by the user (e.g. GPS equipped smartphone) and by immobile beacon devices 51, 52 located in proximity of the wristwatch on the way from the town city to town's airport.

[0084] Upon the user reach the town airport, his wristwatch 1 receives an absolute positioning reference indicating that the user reached the gate A of the Airport. As the absolute positioning criterion is met, the wristwatch

1 is enabled to transmit the selected data to the wristwatch 1', when a communication between the wristwatches 1,1' will be establish.

[0085] In this exemplary case, the wristwatch 1 informs the user that the selected absolute positioning criterion is met, e.g. by displaying the current positioning of the wristwatch on digital display 25.

[0086] The running application can further configure the wristwatch 1 to access a WLAN Access point 51 for collecting and updating information 401 about the flight. Upon a reception of information, for example the checking gates of the flight, this information are displayed on the digital display of the wristwatch. Furthermore, the wristwatch can aid the user indicating him an optimal path for reaching the indicated gate, e.g. by means of the angular positioning of the watch hands.

[0087] The arrival of work colleague in proximity of the town's airport gate A permit a first communication between both wristwatches 1,1" by means of theirs wireless communication modules.

[0088] During this communication, the wristwatch 1 of the user can, for example, transmit his currently absolute positioning 405 to the wristwatch of the work colleague. This absolute positioning reference can thus be used by the wristwatch 1' of the work colleague for determine and/or update his positioning.

[0089] In response of the position transmission 305, the wristwatch of the work colleague identifies itself, e.g. by means of a massage-based identification protocol 406. The identification operation can be submitted to a position criterion that was previously set up, advantageously automatically by the running aid application.

[0090] As the defined absolute positioning criterion is met, the wristwatch 1 of the user transmits the predefined data 405 to the wristwatch 1" of the work colleague as being correctly identified as the target device.

[0091] The wristwatch 1' of the work colleague can acknowledge the reception of the data, e.g. by rotating or positioning the hour and minutes Hands 261, 262, eventually accompanied by an acoustic signal, and by displaying the receipt information on the digital display.

[0092] Once both wristwatches are paired, the wristwatch of the user can further operate as a WLAN Access point (through the WLAN Access point 51) for the second wristwatch 1', e.g. permitting him to register his baggage by means of the Airport internet webpage.

[0093] A second example of location-based data exchange application executable in the wristwatch 1 is a business card exchanging application, as illustrated in Figure 3.

[0094] The user of the wristwatch1 is, in this exemplary case, interested in using his wristwatch 1 for automatically exchange his business card when he meets an interesting person.

[0095] The user configures thus his wristwatch 1, in particular through a business card exchanging application running on the assembly of his wristwatch, to automatically exchange his business card.

[0096] The user stores thus his business card in data storage memory of his wristwatch. The user sets his wristwatch 1 to provide this service only when he approaches a person, e.g. for handshaking, during a particular event. The user selects the reception hall of the particular event as the absolute positioning criterion. Additionally, the user selects a relative positioning criterion as a cumulative criterion, .e.g. a maximal distance threshold, in such a way to automatically exchange his business card only when he approach a person for handshaking. In this exemplary case, the user selects the detection of a handshake as a cumulative gesture criterion.

[0097] Once the wristwatch 1 activated as business card exchanging device, the wristwatch 1 starts to determine and to update the absolute positioning of the wristwatch 1. Once the user reaches the reception hall, his wristwatch 1 updates his absolute positioning e.g. by means of a reception of a positioning reference 307 provided by an Indoor navigation beacon device 54.

[0098] As long as the current positioning of the wristwatch meets the absolute positioning criterion, the wristwatch 1 starts to determine his relative distance with respect to each compatible device (i.e. a device able to receiving a business card) in the reception hall and to compare it with the selected relative criterion.

[0099] One of the compatible devices in the hall is a second wristwatch 1' comprising a second assembly running the same or a compatible business card exchanging application.

[0100] In this exemplary case, the wristwatch 1 determines the relative distance with respect to the second wristwatch 1' by extrapolating electromagnetically properties and/or timing details from messages exchanged with this one, e.g. a previously exchanged message 306.

[0101] Upon the user of the first wristwatch 1 approaches the person wearing the second wristwatch 1' for hand shaking, his wristwatch detects that the relative distance between the wristwatches 1, 1" becomes lower up to become lower than the selected relative distance threshold.

[0102] In response of the validation of this cumulative criterion, the wristwatch 1 starts to analyze the data provided by the sensor for detecting and/or identifying a pattern permitting to indicate an hand-shaking.

[0103] Upon this additional criterion is met, the first wristwatch send the user business card 406 to the second wristwatch.

[0104] The second wristwatches 1" stores then the received business card in his data storage memory 24.

[0105] Both the wristwatches 1, 1" indicates that a business card has been send, respectively received, e.g. by orienting the hour and the minute hands in such a way to pointing at a corresponding indication displayed on the digital display 25. The display 25 of each wristwatch can further display some preselected data of the business card.

[0106] A third example of location-based data exchange application executable in the wristwatch 1 is an accessing or exiting control application (not illustrated).

[0107] The user of the wristwatch is, for example, interested in using his wristwatch for accessing a restricted area by providing his credential. A restricted-access area can be, for example, a hotel room, a cinema, a restricted access room of an industrial factory, a car parking. The credential can be a user ID, a digital authorization or a digital ticket or key.

[0108] The user of the wristwatch 1 configured his wristwatch, in particular by means of an accessing control application running on the assembly, to store dedicated credentials and to send it uniquely when the wristwatch is located within a selected absolute and/or relative positioning with respect to the device checking for credential. The positioning criterion reduces the risk of credential spoofing as the wristwatch emits no credential outside the selected area.

[0109] Similarly, the wristwatch can be configured to act as a controlling device for leaving a sensible area by providing credentials, e.g. for providing records of leaving or by impeding the leaving of unauthorized persons, e.g. a controlled hospital sector, a hospice, and a school courtyard.

[0110] The wristwatch is thus configured, in particular by means of a dedicated application running on the assembly, to send the predefined credential when the wristwatch is located within a selected absolute and/or relative positioning with respect to one or more predefined devices checking for credential.

[0111] In an exemplary case, a person hospitalized is equipped with a wristwatch 1 for providing him free access to predefined floors of the hospital building (e.g. the cafeteria and television room floors), while impeding him to leave the hospice.

[0112] Upon the wristwatch 1 of the hospitalized user detects that he is leaving the defined area, i.e. the wristwatch is located within a selected absolute and/or relative positioning with respect to devices checking for credential, the wristwatch starts to send a predefined message to the leaving controlling system, In response of the send credential, the system can authorize him to leave, eventually by automatically opening the exit doors. Otherwise, the system can stop them, e.g. by temporarily blocking the exit doors and to trigs an alert and sent the provided credential to health or security workers for taking care of the user wearing the wristwatch.

[0113] Advantageously, the health or security workers can be equipped with wristwatches running a compatible application that provides them the ID of the person trying to leave the hospital as well as his location for a rapidly caring. Furthermore, the wristwatches of health or security workers can be configured upon reaching the user to receive other information about the user that is stored in his wristwatch.

[0114] A fourth example of location-based data exchange application executable in the wristwatch 1 is a financial application (not illustrated).

[0115] The user of the wristwatch is, for example, interested in using his wristwatch for authorizing payment by providing stored credentials or IDs. The wristwatch 1 is thus configured, in particular by means of a dedicated financial application running on the assembly, to send the predefined credential and/or ID_S when the wristwatch is located within a selected absolute and a relative positioning with respect to a predefined payment-interface device.

[0116] Advantageously, the financial application can store a list of accredited payment-interface devices with their absolute and relative positioning criteria. The setting of absolute and relative positioning criteria reduces thus the risk of payment spoofing as the wristwatch emits no credentials outside the selected area.

[0117] A fifth example of location-based data exchange application executable in the wristwatch 1 is an indoor guiding application (not illustrated).

[0118] The user of the wristwatch1 is, for example, interested in using his wristwatch for visiting an art gallery by means of a dedicated visiting application.

[0119] The dedicated visiting application guides the user wearing the wristwatch1 for buying a ticket, e.g. for visiting an art gallery. An electronic ticket is thus downloaded into the data storage memory of the wristwatch, while absolute and relative positioning criteria related to the emplacement of the art gallery is automatically set up.

[0120] Once the user wearing the wristwatch approaches the ticket office at the entry of the art gallery, the wristwatch 1 send the electronic ticket for providing access to the art gallery.

[0121] The visiting application can provides further services, e.g. configuring the wristwatch to receive positioning and data all long his movement within the art gallery (e.g. through a series of beacon devices) so as to guide the user by providing them selected comments and audio-description of the exposed arts when he approaches them.

[0122] Another example of location-based data exchange application executable in the wristwatch 1 is a meeting application, as illustrated in Figure 4

[0123] The user of the wristwatch1 is, for example, interested in using his wristwatch for meeting persons sharing similar interests and equipped with a compatible electronic device.

[0124] In this exemplary case, the compatible device is a second wristwatch 1' comprising a second assembly running the same or a compatible meeting application.

[0125] Both wristwatches 1 are configured, in particular by means of a meeting application running on their assembly, to store predefined personal data or IDs (e.g. nickname) as well as the desired profile criteria for meeting another person. The application can further provide a link for accessing a web-based meeting service, e.g. for providing profile verification and additional information in response of a submitted registered user IDs or nickname.

[0126] Depending on the typology of the meeting event, a positioning criterion is selected by the user and/or by the application. In case of desiring or encour-

aging a chance encounter, a relative positioning criterion can be selected so as to permit an occasional meet with another user complying with user's selected criterion, no matter where. In case of a programmed meeting event, an absolute positioning criterion can be selected in order to limit the contacts within the event location, e.g. avoiding unwanted contact with undesired users or contact in sensible areas, e.g. work places.

[0127] Once the application being activated, the wristwatch 1,1' starts to determine and to update the current absolute positioning of the wristwatch, e.g. by analyzing the data provided by the positioning sensor unit 28 and by receiving absolute positioning references 309, 311 from beacon 55, 56. In this exemplary case, successive absolute positioning are provided by user's GPS equipped smartphones and by a beacon device 57. Further positioning references 410, 412 can be received from other wristwatches equipped with the assembly that are located in proximities, i.e. within the operational range of the wireless communication modules of the assemblies.

[0128] Upon the wristwatch 1 of the user verify that the selected (absolute or relative) positioning criteria are meet, it starts a communication 310, 312 with the second wristwatch 1' according to a predefined application protocol for verifying a mutual compatibility with the selected profile criteria.

[0129] The application protocol can comprise an exchange of the user's registered profile so as each wristwatch can verify and eventually acknowledge the compatibility with his selected profile criteria.

[0130] Advantageously, the application can access to the web-based meeting service, e.g. through a WAN access point and/or the smartphones 55, 56, for a verification of the user's profiles and eventually an acknowledge of a mutual compatibility with the registered profile criteria.

[0131] Once the compatibility has been mutually validated, the wristwatch indicates a contact with another user, e.g. by displaying the nickname or ID permitting to identify the other user.

[0132] The application running on both wristwatches can further facilitate a date, for example by guiding them, one towards the other, by positioning the hours/minute hands of each the wristwatches 1,1' in such a way to show the shortest path toward the other user.

[0133] According to another aspect of the invention, the invention concern an assembly 2 for a wristwatch 1,1',1" comprising a keeping time electronic module 21, a wireless communication module 22 for two-way communication and a control unit 23 having computational capabilities and, preferably, a data storage memory 24. The control unit is configured to control the wireless communication module 22 and the keeping time electronic module 21.

[0134] The assembly 2 is configured for connecting an access point of a computer network through the wireless communication module 22 in such a way to provide data exchange with a device connected to said computer network.

[0135] The computer network can be a public internet, i.e. a computer network using the Internet protocol suite (TCP/IP) to link devices worldwide.

[0136] Advantageously, the wireless communication module 22 of the assembly 2 is Wi-Fi compliant, i.e. providing communication based on the IEEE 802.11 standards, so as to provide a connection with an access point being a wireless access point (WAP) 70.

[0137] Alternatively or complementarily, the wireless communication module 22 of the assembly 2 provide communication on a cellular or mobile network, such as a GSM, GPRS, 3G or 4G mobile network. The assembly 2 can thus provide a connection with an access point being a gateway between the cellular or mobile network and the computer network.

[0138] The assembly 2 is thus configured to operate as a tethering or portable hotspot for providing operational access to the computer network via the wireless communication module to an external device being connected to the assembly 2, e.g. for exchanging data with a device connected to said computer network.

[0139] The external device can be connected to the assembly 2 through the wireless module 22.

[0140] Advantageously, the external device is a wristwatch comprising one of the above described assemblies 2.

[0141] The assembly 2 can be configured by means of the control unit, in particular by means of a running application stored in the data storage memory 24.

List of reference numerals

[0142]

1,1',1"	Wristwatch
11	Casing
12	Glass
2	Module for wristwatch
21	keeping time electronic module
22	Communication module
23	Control unit
24	Data storage memory
25,25'	Display
251	Opening
26	Motorized unit
261,261'	Hour Hand
262,262'	Minute Hand
263	Hands axes
27	Battery
28	Positioning/orientation sensor
300-308	Positioning reference
400-406	Data
50,55,56	Smartphone with GNSS receiver
51,57	WLAN Access point
52	Beacon device
53	Indoor navigation beacon device

60 Laptop
61 Smartphone

Claims

1. An assembly (2) for a wristwatch (1,1',1") comprising:

   a keeping time electronic module (21);
   a wireless communication module (22) for two-way communication;
   a control unit (23) having computational capabilities and a data storage memory (24) for storing a first data;

   the assembly (2) being configured for:

   sending a first positioning reference (303,304,305) to a first device (1, 1",60, 61) through the wireless communication module (22), and
   receiving a second positioning reference (300,301,302,306) from a second device (1', 50, 51, 52) through the wireless communication module (22);

   wherein
   the assembly (2) is further configured

   for defining a positioning criterion and
   for sending said first data (401,403,404,405,406) to the first device (1',60, 61) or to the second device (1 ", 50, 51, 52) when the first (303,304,305) or second positioning reference (300,301,302,306) meets the positioning criterion.

2. The assembly (2) according to claim 1, wherein the first positioning reference comprises an absolute positioning of the assembly (2) and/or wherein the second positioning reference comprises an absolute positioning of the second device (1", 50, 51, 70).

3. The assembly (2) according to any one of the previous claims, wherein the data storage memory (24) is configured for storing said first positioning reference and/or second positioning reference.

4. The assembly (2) according to any one the previous claims, further comprising a positioning sensor for generating and/or updating the first positioning reference.

5. The assembly (2) according to any one of the previous claims, wherein the wireless communication module (22) is further arranged for providing a relative positioning between the assembly (2) and the first (1',60, 61) or second device (1 ", 50, 51, 70).

6. The assembly (2) according to any one of the previous claims, wherein the positioning criterion comprises an absolute positioning criterion for sending said first data and/or defines a local or geographical area or a portion of the earth surface.

7. The assembly (2) according to any one of the previous claims, further configured for connecting a network wireless access point (70) through the wireless communication module (22) in such a way to exchange data with a network-connected device.

8. The assembly (2) according to the previous claim, being further configured for providing a network access to the first device (1',60, 61) and/or the second device (1", 50, 51, 70).

9. The assembly (2) according to any one the previous claims, further comprising a digital display (25) controlled by the control unit (23); wherein the control unit (23) is configured for displaying a numerical representation of the first positioning reference, the second positioning reference and/or the first data on said numerical display (25).

10. The assembly (2) according to any one of claims 7 to 9, being further configured for receiving a second data from the first, second device and/or from the network wireless access point (70) through the wireless communication module (22).

11. The assembly (2) according to any one of the previous claims, comprising a motorized unit (26) cooperating with the keeping time electronic module (21) and having a hand shaft (263) for actuating at least a watch hand (261, 262).

12. The assembly (2) according to claim 11, the motorized unit being controlled by the control unit (23); the control unit (23) being configured to modify the angular position and/or the rotational movement of said at least a watch hand (261, 262) in response of a dispatch of the first positioning reference, a reception of the second positioning reference, a dispatch of said first data to first or second device, and/or a reception of said second data from the first or second device or the network wireless access point.

13. The assembly (2) according to claim 11 or 12, the angular position and/or the rotational movement of said at least a watch hand (261, 262) being modified in such a way to spatially cooperate with symbols displayed on the numerical display for providing a visual information to the user.

14. The assembly (2) according to any one of the previ-

ous claims, the control unit (23) being configured to provide navigation aid, business card exchange, accessing or exiting control, indoor guide, meeting aid, payment authorization and/or trading.

15. Wristwatch (1,1',1") comprising the assembly (2) according to any one of the previous claims.

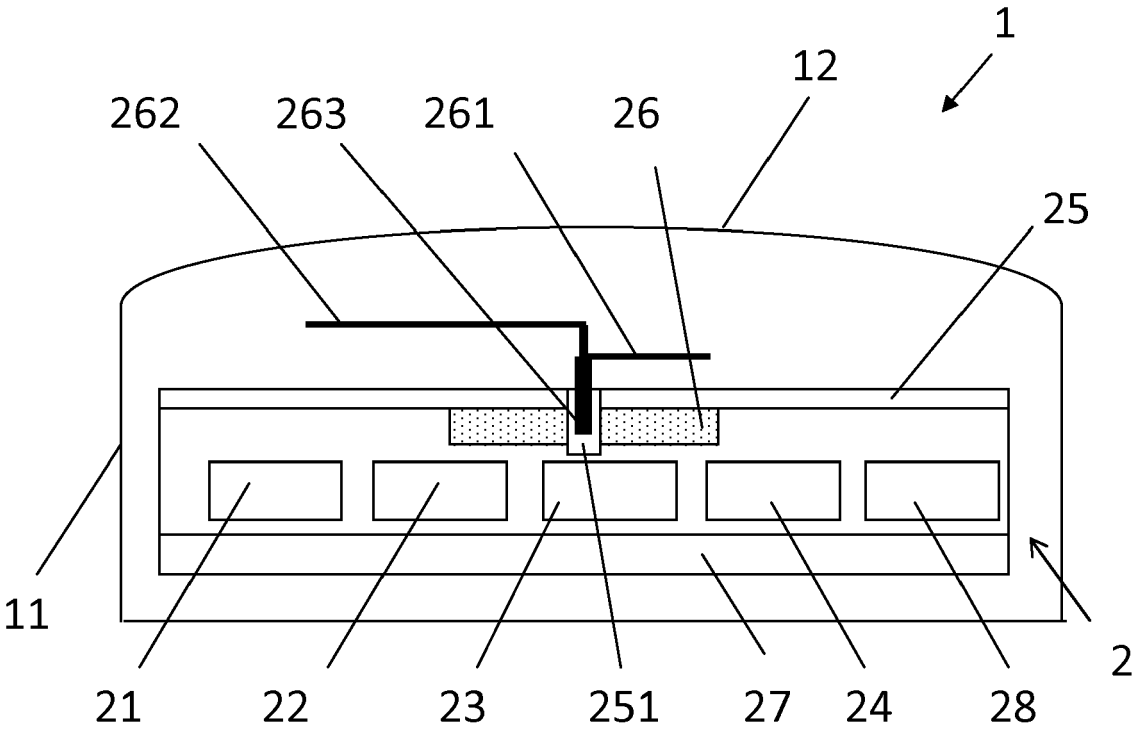

Fig. 1

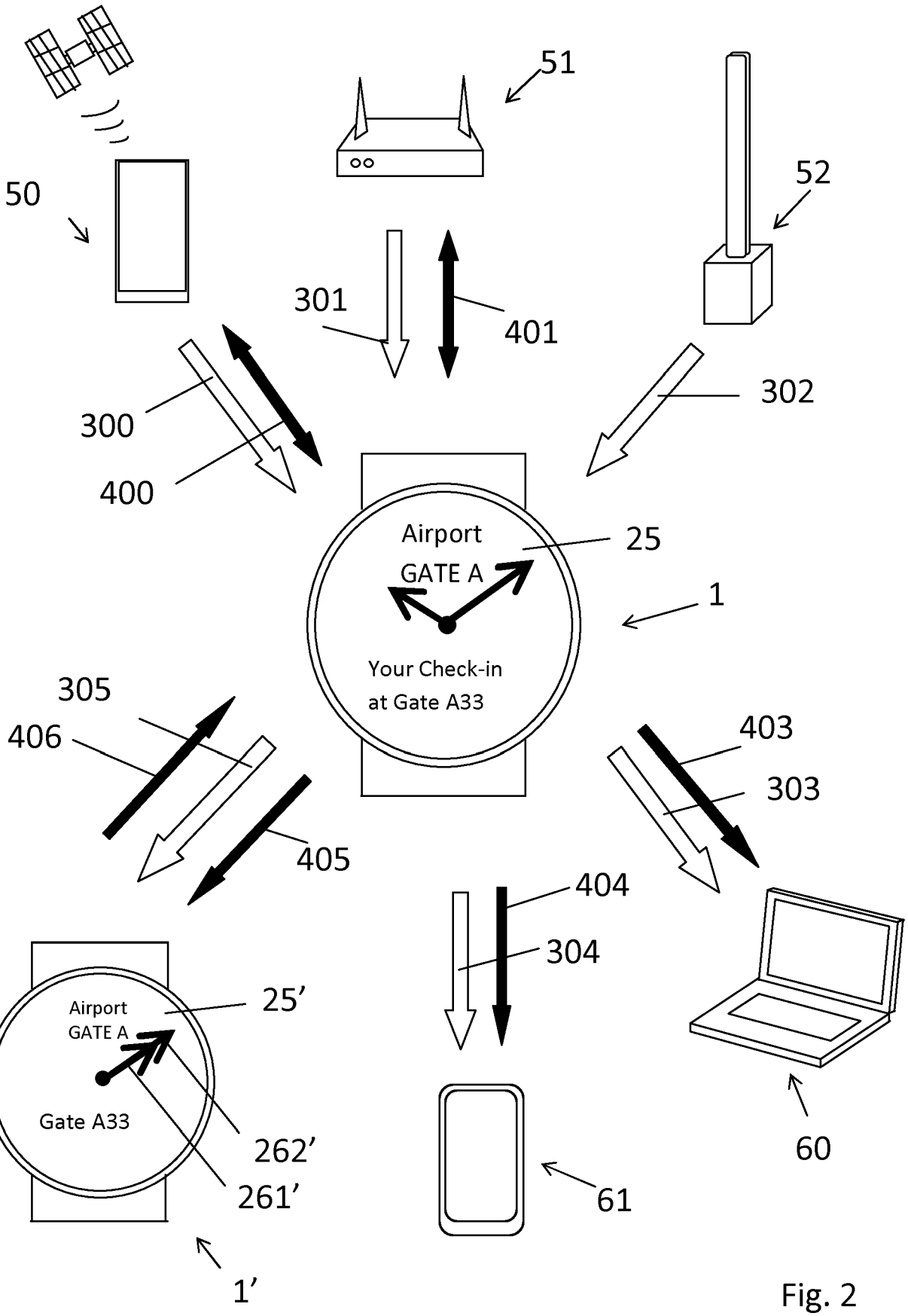
50
51
52
301
401
300
400
302
Airport
GATE A
25
1
Your Check-in
at Gate A33
305
406
405
403
303
404
304
Airport
GATE A
25'
Gate A33
262'
261'
1'
61
60

Fig. 2

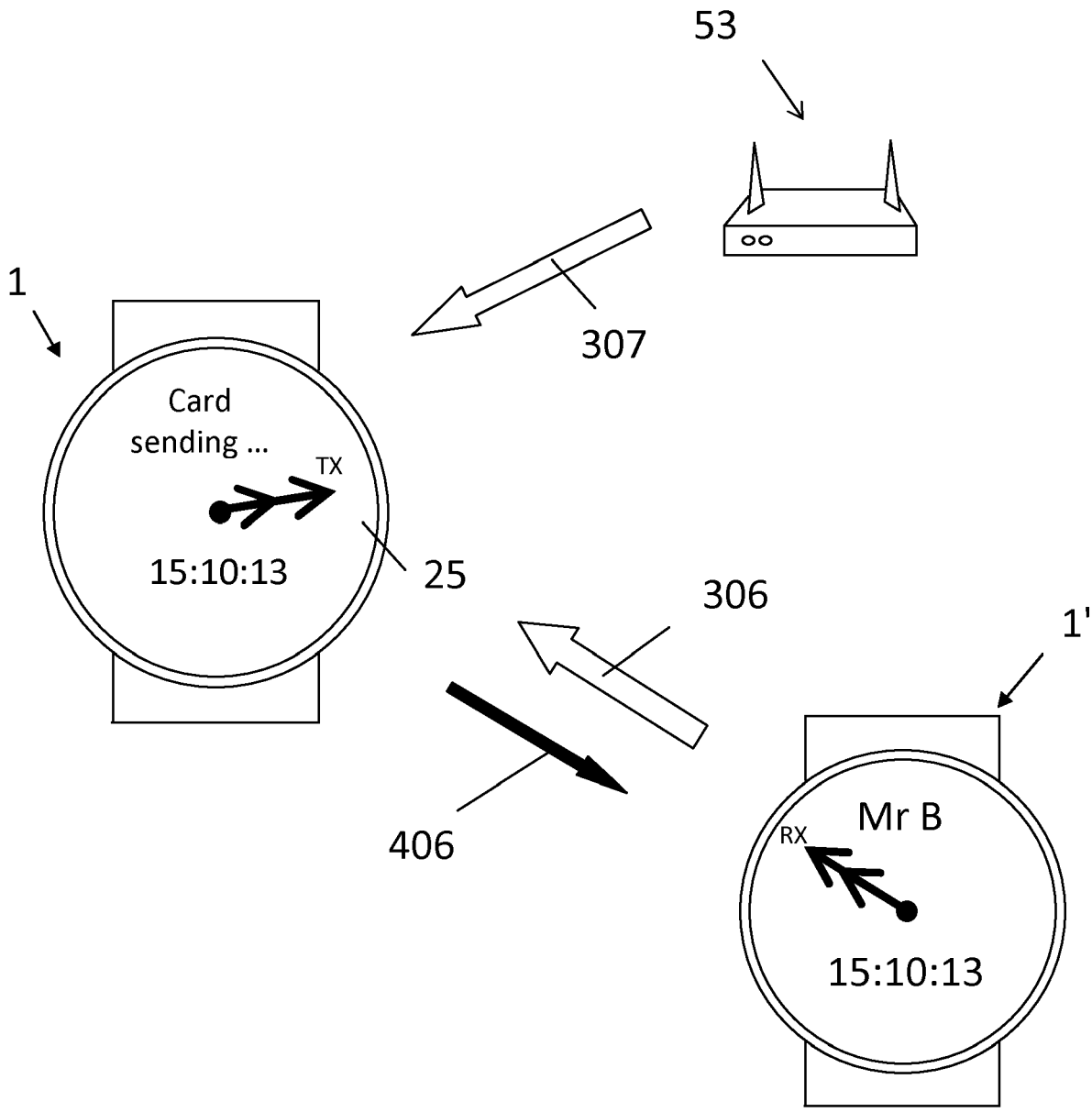

Fig. 3

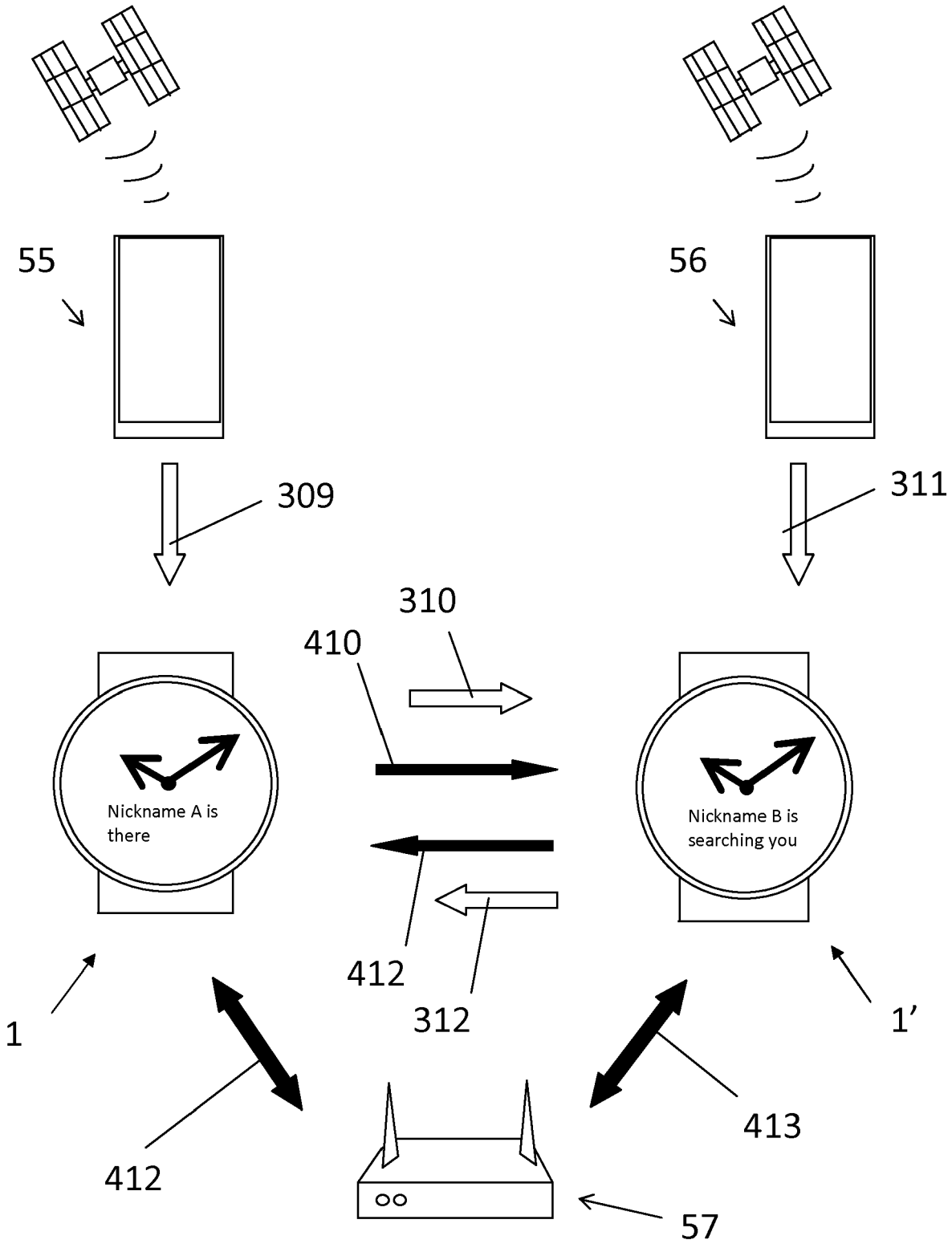
55
56
309
311
310
410
Nickname A is there
Nickname B is searching you
412
312
1
1'
412
413
57

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 4874

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 3 101 881 A1 (LG ELECTRONICS INC [KR]) 7 December 2016 (2016-12-07) * abstract * * paragraph [0013] - paragraph [0016] * * paragraph [0021] * * paragraph [0028] - paragraph [0029] * * paragraph [0058] * * paragraph [0064] * * paragraph [0090] - paragraph [0091] * * paragraph [0099] - paragraph [0100] * * paragraph [0108] * * paragraph [0115] - paragraph [0134] * * figures 1A,2-4 * -----	1-15	INV. G04G21/04
A,D	WO 2014/143997 A1 (BODHI TECHNOLOGY VENTURES LLC [US]) 18 September 2014 (2014-09-18) * abstract * * paragraph [0063] - paragraph [0066] * * paragraph [0071] - paragraph [0073] * * paragraph [0080] * * paragraph [0144] * * paragraph [0217] - paragraph [0219] * * paragraph [0248] - paragraph [0249] * * paragraph [0266] - paragraph [0267] * * figures 1-3,17,20,28 * -----	1-15	TECHNICAL FIELDS SEARCHED (IPC) G04G G04R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 June 2017	Jacobs, Peter

CATEGORY OF CITED DOCUMENTS

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13-06-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3101881 A1	07-12-2016	CN 106254621 A	21-12-2016
		EP 3101881 A1	07-12-2016
		KR 20160143136 A	14-12-2016
		US 2016360344 A1	08-12-2016
WO 2014143997 A1	18-09-2014	CN 105122151 A	02-12-2015
		EP 2954375 A1	16-12-2015
		US 2017150305 A1	25-05-2017
		WO 2014143997 A1	18-09-2014

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Patent documents cited in the description

- WO 14143997 A **[0003]**
- WO 14143916 A **[0004]**
- US 5627548 A **[0005]**
- US 8059491 B **[0006]**