(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 September 2020 (24.09.2020)

WIPO | PCT

(10) International Publication Number
WO 2020/186877 A1

(51) International Patent Classification:
G08G 1/00 (2006.01) *H04W 4/02* (2018.01)

(21) International Application Number:
PCT/CN2019/128788

(22) International Filing Date:
26 December 2019 (26.12.2019)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201910216131.6 20 March 2019 (20.03.2019) CN

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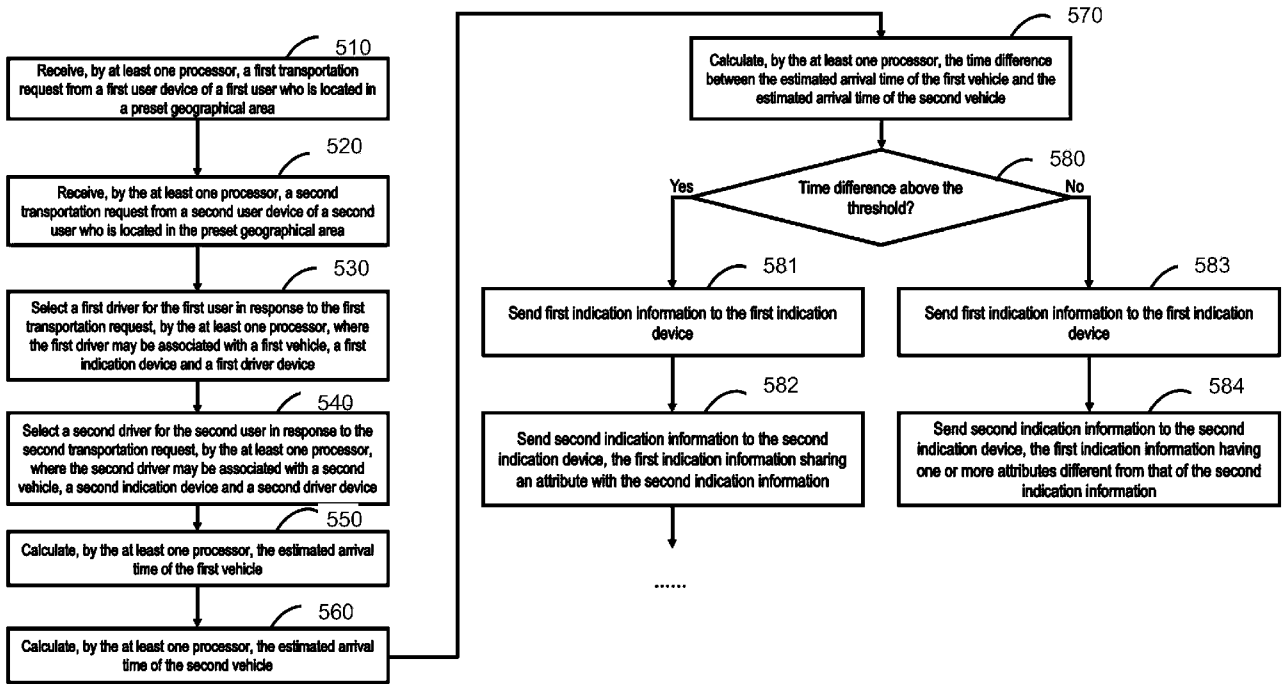
(54) Title: SYSTEMS AND METHODS FOR ONLINE-TO-OFFLINE SERVICES



(57) Abstract: Systems and methods for online-to-offline services are provided. The method may include receiving a first transportation request including a first passenger pick-up location in a preset geographical area and a second transportation request including a second passenger pick-up location in the preset geographical area. The first transportation request may match with a first vehicle associated with a first indication device. The second transportation request may match with a second vehicle associated with a second indication device. The method may further include determining a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area. The method may further include sending, based at least in part on the time difference, the first indication information to the first indication device and the second indication information to the second indication device. The methods can provide effective indication information with less complexity for user.

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(81) **Designated States** *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

SYSTEMS AND METHODS FOR ONLINE-TO-OFFLINE SERVICES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority of Chinese Patent Application No. 201910216131.6, filed on March 20, 2019, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to systems and methods for online-to-offline services, and more particularly, to systems and methods for providing indication information for a user to identify a service provider and /or a service requester.

BACKGROUND

[0003] Online-to-Offline services utilizing Internet technology have become increasingly popular. For instance, nowadays online car-hailing services are an important travel means in people's daily life and it is expected that such services will become more and more prevalent. In some cases, passengers may identify the vehicles matched to their requests through indication information provided by an indication device. For example, the indication information may be in the form of light, patterns or color displayed on a screen, etc. With the increase of users for the online-to-offline services, a server needs to store a large number of different kinds of identification information, which may cause a waste in the communication resources and computing resources of the server. For example, if there are hundreds of thousands of users who need to use taxis in a city, then hundreds of thousands of different kinds of identification information may need to be assigned to different taxis. However, such an approach will likely reduce the recognition effectiveness. For example, since the size of the indication device (e.g., a screen) is usually limited, when a pattern is used as the identification information, the more complex the pattern is, the lower the recognition effectiveness is. Hundreds of thousands of pieces of recognition information mean that hundreds of thousands of pictures must be displayed on the indication device, which certainly requires complex

content of the pattern. In fact, since these users don't request vehicles at the same place at the same time, this level of complex storage and assignment of identification information is largely unnecessary. Therefore, it is desirable to provide systems and methods for providing effective indication information with less complexity for a user to identify a service provider and/or a service requester in transportation services.

SUMMARY

[0004] According to an aspect of the present disclosure, a method for online-to-offline services is provided. The method may be implemented on a computing device having at least one processor and at least one non-transitory storage medium. The method may include receiving, by the at least one processor, a first transportation request including a first passenger pick-up location in a preset geographical area. The first transportation request may match with a first vehicle associated with a first indication device. The method may further include receiving, by the at least one processor, a second transportation request including a second passenger pick-up location in the preset geographical area. The second transportation request may match with a second vehicle associated with a second indication device. The method may further include determining, by the at least one processor, a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area. The method may further include sending, by the at least one processor, first indication information to the first indication device based at least in part on the time difference, and sending, by the at least one processor, second indication information to the second indication device based at least in part on the time difference.

[0005] In some embodiments, the first transportation request may be intended for requesting a transportation service to be provided to a first user using a first user device, and the second transportation request may be intended for requesting a transportation service to be provided to a second user using a second user device. The method may further include sending, by the at least one processor, the first indication information to the first user device, and sending, by the at least one processor, the second indication information to the second user device.

[0006] In some embodiments, the method may further include determining that the time difference exceeds a preset threshold; and selecting, by the at least one processor, one or more same attributes for the first indication information and the second indication information.

[0007] In some embodiments, the method may further include determining that the time difference is less than a preset threshold, and selecting, by the at least one processor, one or more different attributes for the first indication information and the second indication information.

[0008] In some embodiments, the preset threshold may be determined based on a plurality of historical transportation requests associated with the preset geographical area.

[0009] In some embodiments, the method may further include receiving, by the at least one processor, an indication information change request from the first user device, and sending, by the at least one processor, third indication information to the first indication device according to the indication information change request to replace the first indication information. The third indication information may have one or more attributes that are different from one or more attributes of the second indication information.

[0010] In some embodiments, the method may further include receiving, by the at least one processor, an indication information change request from the first user device; verifying, by the at least one processor, that the first vehicle and the second vehicle are located in the preset geographical area; and sending, by the at least one processor, third indication information to the first indication device according to the verification result to replace the first indication information. The third indication information may have one or more attributes that are different from one or more attributes of the second indication information.

[0011] In some embodiments, the method may further include detecting, by the at least one processor, that the first vehicle and the second vehicle are located in the preset geographical area, and sending, by the at least one processor, the third indication information to the first indication device to replace the first indication information. The third indication information may have one or more attributes that are different from one or more attributes of the second indication information.

[0012] In some embodiments, the method may further include sending, by the at least one processor, a notification to the first user device to inform the first user that the first indication information has been replaced.

[0013] In some embodiments, the preset geographical area may have a shape of a regular polygon.

[0014] In some embodiments, the preset geographical area may have a shape of a regular hexagon.

[0015] According to another aspect of the present disclosure, a method for online-to-offline services is provided. The method may be implemented on a computing device having at least one processor and at least one non-transitory storage medium. The method may include receiving, by at least one processor, a plurality of transportation requests including a plurality of passenger pick-up locations in a preset geographical area and identifying, by the at least one processor, a first transportation request associated with a first vehicle from the plurality of transportation requests and a second transportation request associated with a second vehicle from the plurality of transportation requests. The first vehicle and the second vehicle may be detected to be located in the preset geographical area. The method may further include determining, by the at least one processor, that first indication information assigned with the first transportation request shares a same attribute with second indication information assigned with the second transportation request; and adjusting, by the at least one processor, the first indication information so that the first indication information has one or more attributes that are different from one or more attributes of the second indication information.

[0016] In some embodiments, the method may further include sending, by the at least one processor, the adjusted indication information to an indication device associated with the first vehicle.

[0017] In some embodiments, the method may further include sending, by the at least one processor, the adjusted indication information to a user device used by a user, wherein the user is to be picked up by the first vehicle.

[0018] According to another aspect of the present disclosure, a system for online-to-offline

services is provided. The system may include at least one storage device storing a set of instructions and at least one processor in communication with the storage device. When executing the set of instructions, the at least one processor may be directed to cause the system to receive the first transportation request including a first passenger pick-up location in a preset geographical area. The first transportation request may match with a first vehicle associated with a first indication device. The at least one processor may be further directed to cause the system to receive the second transportation request including a second passenger pick-up location in the preset geographical area. The second transportation request may match a second vehicle associated with a second indication device. The at least one processor may be further directed to cause the system to determine a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area. The at least one processor may be further directed to cause the system to send first indication information to the first indication device based at least in part on the time difference and send second indication information to the second indication device based at least in part on the time difference.

[0019] According to another aspect of the present disclosure, a system for online-to-offline services is provided. The system may include at least one storage device storing a set of instructions and at least one processor in communication with the storage device. When executing the set of instructions, the at least one processor may be directed to cause the system to receive a plurality of transportation requests including passenger pick-up locations in a preset geographical area and identify a first transportation request associated with a first vehicle and a second transportation request associated with a second vehicle, wherein the first vehicle and the second vehicle are detected to be located in the preset geographical area. The at least one processor may be further directed to cause the system to determine that first indication information assigned with the first transportation request shares one or more same attributes with second indication information assigned with the second transportation request, and adjust the first indication information so that the first indication information has one or more attributes that are different from one or more attributes of the second indication information.

[0020] According to still another aspect of the present disclosure, a non-transitory computer-readable medium storing computer instructions is provided. When executed by at least one processor, the computer instructions may perform a method for online-to-offline services. The method may include receiving, by the at least one processor, a first transportation request including a first passenger pick-up location in a preset geographical area. The first transportation request may match with a first vehicle associated with a first indication device. The method may further include receiving, by the at least one processor, a second transportation request including a second passenger pick-up location in the preset geographical area. The second transportation request may match with a second vehicle associated with a second indication device. The method may further include determining, by the at least one processor, a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area. The method may further include sending, by the at least one processor, first indication information to the first indication device based at least in part on the time difference, and sending, by the at least one processor, second indication information to the second indication device based at least in part on the time difference.

[0021] According to still another aspect of the present disclosure, a non-transitory computer-readable medium storing computer instructions is provided. When executed by at least one processor, the computer instructions may perform a method for online-to-offline services. The method may include receiving, by at least one processor, a plurality of transportation requests including a plurality of passenger pick-up locations in a preset geographical area and identifying, by the at least one processor, a first transportation request associated with a first vehicle from the plurality of transportation requests and a second transportation request associated with a second vehicle from the plurality of transportation requests. The first vehicle and the second vehicle may be detected to be located in the preset geographical area. The method may further include determining, by the at least one processor, that first indication information assigned with the first transportation request shares a same attribute with second indication information assigned with the second transportation request; and adjusting, by the

at least one processor, the first indication information so that the first indication information has one or more attributes that are different from one or more attributes of the second indication information.

[0022] Additional features may be set forth in part in the description which follows, and in part may become apparent to those skilled in the art upon examination of the following and the accompanying drawings or may be learned by production or operation of the examples. The features of the present disclosure may be realized and attained by practice or use of various aspects of the methodologies, instrumentalities and combinations set forth in the detailed examples discussed below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The present disclosure is further described in terms of exemplary embodiments. These exemplary embodiments are described in detail with reference to the drawings. These embodiments are non-limiting exemplary embodiments, in which like reference numerals represent similar structures throughout the several views of the drawings, and wherein:

[0024] FIG. 1 is a block diagram illustrating an exemplary system for providing indication information according to some embodiments of the disclosure;

[0025] FIG. 2 is a schematic diagram of an exemplary method for determining a time difference between vehicle arrivals to configure an indication device according to some embodiments of the disclosure;

[0026] FIG. 3 is a schematic diagram illustrating an exemplary terminal device according to some embodiments of the present disclosure;

[0027] FIG. 4 is a block diagram illustrating an exemplary processor according to some embodiments of the present disclosure;

[0028] FIG. 5 is a flowchart of an exemplary method for configuring an indication device to provide transportation services according to some embodiments of the disclosure;

[0029] FIG. 6A is a flowchart of an exemplary method for configuring an indication device to avoid mismatches according to some embodiments of the disclosure.

[0030] FIG. 6B is a flowchart of another exemplary method for configuring an indication

device to avoid mismatches, according to some embodiments of the disclosure;

[0031] FIG. 6C is a flowchart of yet another exemplary method for configuring the indication device to avoid mismatches, according to embodiments of the disclosure; and

[0032] FIG. 7 is a flowchart of another exemplary method for configuring the indication device to provide transportation service, according to embodiments of the disclosure.

DETAILED DESCRIPTION

[0033] The following description is presented to enable any person skilled in the art to make and use the present disclosure, and is provided in the context of a particular application and its requirements. Various modifications to the disclosed embodiments may be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the present disclosure. Thus, the present disclosure is not limited to the embodiments shown, but is to be accorded the widest scope consistent with the claims.

[0034] The terminology used herein is for the purpose of describing particular example embodiments only and is not intended to be limiting. As used herein, the singular forms "a," "an," and "the" may be intended to include the plural forms as well, unless the context clearly indicates otherwise. It may be further understood that the terms "comprises," "comprising," "includes," and/or "including" when used in this disclosure, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0035] These and other features, and characteristics of the present disclosure, as well as the methods of operations and functions of the related elements of structure and the combination of parts and economies of manufacture, may become more apparent upon consideration of the following description with reference to the accompanying drawing(s), all of which form part of this specification. It is to be expressly understood, however, that the drawing(s) are for the purpose of illustration and description only and are not intended to limit the scope of the present disclosure. It is understood that the drawings are not to scale.

[0036] The flowcharts used in the present disclosure illustrate operations that systems implement according to some embodiments of the present disclosure. It is to be expressly understood, the operations of the flowcharts may be implemented not in order. Conversely, the operations may be implemented in inverted order or simultaneously. Moreover, one or more other operations may be added to the flowcharts. One or more operations may be removed from the flowcharts.

[0037] Moreover, while the systems and methods disclosed in the present disclosure are described primarily regarding speech recognition in transportation services, it should also be understood that this is only one exemplary embodiment. The system or method of the present disclosure may be applied to user of any other kind of scenarios that requires speech information to be recognized. For example, the system or method of the present disclosure may be applied to an E-business service, an online shopping service, a voice controlling system, or the like, or any combination thereof. The application scenarios of the system or method of the present disclosure may include a webpage, a plug-in of a browser, a client terminal, a custom system, an internal analysis system, an artificial intelligence robot, or the like, or any combination thereof.

[0038] The terms "passenger," "requester," "requestor," "service requester," "service requestor," and "customer" in the present disclosure are used interchangeably to refer to an individual, an entity or a tool that may request or order a service. Also, the terms "driver," "provider," "service provider," and "supplier" in the present disclosure are used interchangeably to refer to an individual, an entity or a tool that may provide a service or facilitate the providing of the service. The term "user" in the present disclosure refers to an individual, an entity or a tool that may request a service, order a service, provide a service, or facilitate the providing of the service. In the present disclosure, terms "requester" and "requester terminal" may be used interchangeably, and terms "provider" and "provider terminal" may be used interchangeably.

[0039] The terms "request," "service," "service request," and "order" in the present disclosure are used interchangeably to refer to a request that may be initiated by a passenger, a requester,

a service requester, a customer, a driver, a provider, a service provider, a supplier, or the like, or a combination thereof. The service request may be accepted by any one of a passenger, a requester, a service requester, a customer, a driver, a provider, a service provider, or a supplier. The service request may be chargeable or free.

[0040] The positioning technology used in the present disclosure may include a global positioning system (GPS), a global navigation satellite system (GLONASS), a Galileo positioning system, a quasi-zenith satellite system (QZSS), a Beidou navigation satellite system, a wireless fidelity (WiFi) positioning technology, or the like, or any combination thereof. One or more of the above positioning technologies may be used interchangeably in the present disclosure. For example, the GPS-based method and the WiFi-based method may be used together as positioning technologies to locate the wireless device.

[0041] FIG. 1 is a block diagram illustrating an exemplary system for providing indication information according to some embodiments of the disclosure. In some embodiments of the present disclosure, system 100 may include different modules in a same device, such as an integrated circuit chip like Application Specific Integrated Circuit (ASIC) or Field Programmable Gate Array (FPGA). System 100 may include different modules with specific functions located in different devices. Components of system 100 may be integrated in an integrated device or distributed in different devices, but may communicate with each other through network or bus.

[0042] In some embodiments of the present disclosure, system 100 may receive a transportation request from at least one user device 114, and each user device 114 may be operated by a user 116 to transmit the transportation request to system 100. If user 116 needs to take a vehicle from location A to location B, the transportation request may be used to instruct system 100 to provide transportation services to meet the transportation needs of user 116. When system 100 receives the transportation request, it may select one vehicle (i.e., a service provider) from multiple vehicles to match user 116 (i.e., a service requester). For example, system 100 may select a vehicle 110 operated by a driver 120 to match user 116. Having matched the user's transportation request with vehicle 110, system 100 may officially generate

an order and send the order information to user device 114 and vehicle 110.

[0043] Vehicle 100 may be associated with an indication device 112 and a driver device 118. Vehicle 110 may be equipped with indication device 112 so that indication device 112 may send indication information to user 116 to indicate to user 116 that vehicle 110 is the matching vehicle dispatched by the system 100 to provide transportation services when vehicle 110 approaches user 116. Driver device 118 may be operated by driver 120. For example, driver device 118 may be a driver's mobile phone and/or another portable electronic device carried at all times or vehicle electronic equipment installed or fixed in vehicle 110. Driver device 118 may receive user information from system 100. For example, after the system has matched vehicle 110 with user 116, an order containing the information of user 116 may be sent to driver device 118, where the information includes the name, contact information (e.g., telephone number), location information (e.g., passenger pick-up location information), destination, and the like, of user 116.

[0044] In some embodiments of the present disclosure, after system 100 has matched vehicle 110 with user 116, system 100 may generate a piece or pieces of specific indication information and send the indication information to user device 114. The indication information may be used to configure indication device 112 to send corresponding information so that indication device 112 may inform user 116 of the matching vehicle when vehicle 110 approaches user 116. At the same time, user 116 may receive the indication information through user device 114 and compare the indication information with the information sent by indication device 112 to identify the matching vehicle. Consistent with some embodiments of the present disclosure, indication information may also configure user device 114 to send corresponding information to indicate to driver 120 user 116 that is matched to the vehicle. At the same time, system 100 may send the indication information to driver device 118 so that driver 120 may compare the indication information with the information sent by user device 114 to identify a matching user.

[0045] In some embodiments of the present disclosure, system 100 may directly send the indication information to indication device 112 and user device 114. Consistent with some

embodiments of the present disclosure, system 100 may send the indication information to vehicle 110, and then vehicle 110 may forward the indication information received to indication device 112. Consistent with some embodiments of the present disclosure, system 100 may send the indication information to driver device 118, and then driver device 118 may forward the indication information received to indication device 112. In other embodiments of the present disclosure, system 100 may only send the indication information to driver device 118. Driver 120 may identify the matching user (e.g., user 116) according to the indication information received.

[0046] Indication device 112 may be a device that can emit visible light (e.g., red, green, or blue light), display content (e.g., image and video) and/or output audio signals and can be installed inside or outside the vehicle. The indication device may be installed on a specific entrance or door of the vehicle to indicate to a user where to get in the vehicle or a place easy to see by a user, (e.g., the front window, the rear window, the place beside the license plate, etc.). The indication device may also be integrated in driver device 118 or realized by the screen, searchlight or speaker of driver device 118. In some embodiments of the present disclosure, when a vehicle approaches a user, the indication device installed on the vehicle may display the indication information used to configure the indication device to help the user identify the matching vehicle.

[0047] In some embodiments of the present disclosure, the indication information can be used to configure the way for the indication device to output content. For example, the indication information may be used to configure the indication device to output light of at least one color, at least one pattern, at least one mode and/or at least one lighting sequence. Consistent with some embodiments of the present disclosure, the light of at least one color may include any visible light, such as at least one type of white light, red light, orange light, yellow light, green light, blue light and purple light. The pattern may include any shape or text. For example, the pattern may include column, triangle, rectangle, circle, hash pattern, dot, etc. The pattern may also include a user's name, a vehicle's license plate, a pattern defined by user or driver, etc. The lighting sequence means that a plurality of light sources in the indication device may

be lit in a predetermined sequence. For example, the indication device may include a plurality of light sources. The lighting sequence may include lighting from the middle to the four sides, lighting from the four sides to the middle, lighting from top to bottom, lighting from bottom to top, lighting from left to right, lighting from right to left, etc. A mode may refer to a particular arrangement for the indication device to output light. For example, the indication device may output color and pattern periodically, output color and pattern gradually or output color and pattern by fading in or fading out. Consistent with some embodiments of the present disclosure, the mode may also include the indication device output time. For example, the mode may include controlling the indication device to periodically fade in and fade out between two colors. For example, the indication device is controlled to output yellow light for 2 seconds then switch to white light for 1 second, and then switch back to yellow light for 2 seconds. Or, the mode may also include controlling the indication device to keep lighting for a predetermined period of time, such as 10 seconds, 20 seconds, etc.

[0048] In some embodiments of the present disclosure, the indication device may be mounted to the vehicle with different shapes or features of shell. For example, the indication device may include a body, a power supply or a power input port, a communication interface and a base. Consistent with some embodiments of the present disclosure, the body may be formed at least in part of a sub transparent, translucent, or transparent material. In other embodiments of the present disclosure, the body may include a display device (e.g., a flat panel display) that can output content. In other embodiments of the present disclosure, the body may include at least one surface that is substantially flat and whose length is much larger than its height and width (e.g., twice or more times larger), and/or whose height is much larger than its width (e.g., twice or more times larger). For example, the body may be in the shape of a blade. The body can output content or light according to the indication information.

[0049] The body may also be coupled to a base extending at least partially along the length direction of the body. The base may include at least one fastening mechanism or structure to enable the indication device to couple or fasten to the vehicle (e.g., permanently or temporarily). In some embodiments of the present disclosure, the base may accommodate one or more

components of the indication device, such as a communication interface, a light source, a power supply or a power port, a display controller, a wire or a connecting component, etc. The communication interface may enable the indication device to communicate with a driver device (e.g., wirelessly or via wires or cables) to receive indication information.

[0050] A user device 114 and / or a driver device 118 may include a desktop computer, a cellular device or a smart phone, a personal digital assistant (PDA), a laptop computer, a tablet device and a television (IP television), which may provide network connection and process resources to communicate with system 100 through network. Driver device 118 may also include, for example, an on-board computing system or customized hardware. User device 114 and/or driver device 118 may also run designated service applications respectively. Furthermore, although some embodiments of the present disclosure described herein relate to transportation requests, the system described herein may be used to provide other requests, such as food truck service requests, delivery requests, entertainment requests, etc.

[0051] In some embodiments of the present disclosure, vehicle 110 may include a manned or unmanned vehicle. The unmanned vehicle may include an automatic driving vehicle or a semi-automatic driving vehicle. In other embodiments of the present disclosure, vehicle 110 may include an unmanned aerial vehicle (UAV). When vehicle 110 is an unmanned vehicle, the matching between passenger and vehicle may mainly rely on indication device 112 on vehicle 110 to send indication information, which may be identified by user 116.

[0052] In some embodiments of the present disclosure, user device 114 may be a smart phone of user 116, and indication device 112 may be a smart phone of driver 118. For example, user 116 may send a transportation request to system 100 through a smart phone. System 100 may match user 116 with vehicle 110 according to the transportation requests. Vehicle 110 may travel to the location where user 116 is located according to the preset route to pick up user 116 to provide transportation service. After the matching is completed, system 100 may send indication information of same attribute(s) to user device 114 and driver device 116 to enable user 116 and driver 120 to identify each other. The attributes may include at least one of color, pattern, lighting sequence, lighting mode, sound or light. For example, system 100 may send

indication information with same color (e.g., red, blue) to user device 114 and driver device 118, or indication information with same pattern or sound. For example, system 100 may send to user device 114 and driver device 118 indication information with same icon, same light flashing mode or same color changing mode, etc. After receiving the indication information, user 116 can identify vehicle 110 driven by driver 120 according to the indication information. Similarly, after receiving the indication information, driver 120 may also identify user 116 according to the indication information.

[0053] As illustrated in FIG. 1, system 100 may include a processor 102, a user device interface 104, a driver device interface 106, and a memory 108. These modules may be hardware units of system 100 (e.g., different parts of an integrated circuit), configured to be used with other components or to execute computer programs. The computer programs may be stored in a computer-readable medium (e.g., memory 108). When the computer programs are executed by system 100, system 100 can perform the functions and methods disclosed in the invention. In other embodiments of the present disclosure, processor 102, user device interface 104, driver device interface 106, and memory 108 may be distributed in different processors or may communicate remotely with each other.

[0054] User device interface 104 may be used to send data to or receive data from user device 114. In some embodiments of the present disclosure, user device 114 may send a transportation request to user device interface 104 for indicating to system 100 the transportation needs of user 116. User device interface 104 may send the transportation request to processor 102. In response to the transportation request, processor 102 may send vehicle information of the matching vehicle to user device 114 through user device interface 104. For example, processor 102 may send information such as the vehicle owner's identity, the license plate number of the vehicle and the like to user device 114 through the user device interface. In some embodiments of the present disclosure, user device interface 104 may be used to send indication information to user device 114 to help the user identify the matching vehicle.

[0055] Driver device interface 106 may be configured to send data to at least one of vehicle

110, indication device 112, or driver device 118. In some embodiments of the present disclosure, processor 102 may send information of a matching user to driver device 118 through driver device interface 106. For example, processor 102 may send the user's name, contact information (e.g., telephone number), location information (e.g., passenger pick-up information), destination and the like to driver device 118 through driver device interface 106. In some embodiments of the present disclosure, driver device interface 106 may be used to send indication information to vehicle 110, indication device 112, or driver device 118. In other embodiments of the present disclosure, driver device interface 106 may be used to receive information from driver device 118 or vehicle 110. For example, driver device interface 106 may be used to receive information such as vehicle location, vehicle speed, vehicle status and the like from the vehicle. For another example, driver device interface 106 may receive information such as the vehicle owner's identity, the plate number of the vehicle and the like from driver device 118.

[0056] Processor 102 may be configured to match users and vehicles according to transportation requests, and to send indication information to the users and the vehicles after the matching is completed. For example, processor 102 may receive a transportation request from user device 114 through user device interface 104, and processor 102 may match vehicle 110 to the user according to the transportation request. Processor 102 may send matching information to driver device 118 through driver device interface 106, or processor 102 may send the matching information to user device 114 through user device interface 104. In some embodiments of the present disclosure, processor 102 may send indication information to user device 114 through user device interface 104, or processor 102 may send the indication information to at least one of vehicle 110, indication device 112, or driver devices 118 through the driver device interface.

[0057] Processor 102 may include but not be limited to microcontroller, reduced instruction set computer (RISC), application specific integrated circuits (ASIC), application- specific instruction-set processor (ASIP), central processing unit (CPU), physics processing unit (PPU), digital signal processor (DSP), field programmable gate array (FPGA), etc.

[0058] Memory 108 may be configured to store data. Memory 108 may include but not limited to read-only memory (ROM), random-access memory (RAM), programmable read-only memory (PROM), electrically erasable programmable read-only memory (EEPROM), etc. The memory may include a non-transitory computer-readable medium having stored thereon code, logic or instructions for performing at least one step described elsewhere herein. System 100 may perform at least one step, individually or collectively, in accordance with the code, logic, or instructions of the non-transitory computer-readable medium described herein.

[0059] In some embodiments of the present disclosure, memory 108 may store map data. For example, processor may access memory 108 to obtain the data of each geographical area of the map, such as the shape, area, location, population density, vehicle density and other information of the geographical area. The geographical area can be used to assist vehicle arrangement.

[0060] In some embodiments of the present disclosure, system 100 may configure indication information by determining the estimated time when the vehicle may arrive at the passenger pick-up point (hereinafter referred to as "arrival time"). For example, if a time difference between estimated arrival time of two vehicles is great (e.g., above a preset threshold), system 100 may assign indication information of same attribute(s) to the two vehicles. Because it is unlikely that two vehicles may pick up passengers at the same place and at the same time, users associated with the two vehicles may not take a wrong vehicle because of the same color. If the time difference between estimated arrival time of the two vehicles is relatively small (e.g., below a preset threshold), system 100 may assign indication information of different attributes to the two vehicles so that the users associated with the two vehicles may not take a wrong vehicle. Merely by way of example, the preset threshold may be 30 seconds, 60 seconds, 2 minutes, 5 minutes, etc.

[0061] In some embodiments of the present disclosure, the preset thresholds may be determined based on historical data. For example, the historical data may include a plurality of historical service requests (e.g., transportation requests), of which the pick-up locations may be within the preset geographical area. Such historical service requests are also referred to as

"historical service requests in the preset geographical area". In some embodiments, the preset threshold corresponding to a preset geographical area may be determined based on a total number count of historical service requests during a day. In some embodiments, the processor 102 may determine a series of preset thresholds corresponding to different time periods based on the number count of historical service requests during different time periods. For example, the preset threshold corresponding to rush hours may be relatively longer, and the preset threshold corresponding to non-rush hours may be relatively shorter.

[0062] In some embodiments, the processor 102 may adjust the complexity of the indication information based on the number count of historical service requests during a current time period. For example, in response to a determination that the number count of historical service requests in the preset geographical area is less than a preset number threshold, the indication information may have relatively fewer attributes that are identifiable by the user. For instance, the first indication device may generate a blue light as the first indicating information, and the second indication device may generate a purple light as the second indicating information. The single identifiable attribute is the color of the light. As another example, when the number count of historical service requests in the preset geographical area is less than a preset number threshold, the first indication device (e.g., a screen) may display a blue triangle as the first indication information, and the second indication device may display a purple circle as the second indication information. The identifiable attributes are the color and the pattern.

[0063] FIG. 2 is a schematic diagram of an exemplary method for determining a time difference between vehicle arrivals to configure an indication device according to some embodiments of the disclosure. A user 210 and user 220 may be located in a preset geographical area 201. The preset geographical area may be a geographical area predetermined by system 100 according to at least one parameter. The at least one parameter may include population density, vehicle density, transportation request density, etc. In some embodiments of the present disclosure, the shape of the preset geographical area may be a regular polygon (e.g., regular triangle, square, regular hexagon, etc.). The preset geographical

area may also be of other suitable shapes, such as a circle, ellipse, rectangle, trapezoid, or irregular shape. The preset geographical area may not necessarily be of the same shape or size. For example, the preset geographical area in the downtown area may be relatively smaller, while the preset geographical area in the remote area may be relatively larger.

[0064] In some embodiments of the present disclosure, user 210 may send a transportation request to system 100 through a user device 212. System 100 may match a vehicle 214 with user 210 according to the transportation request. Vehicle 214 may be associated with a driver 211, a driver device 218, and an indication device 216. Driver 211 may drive vehicle 214 to the place where user 210 is located following a route 215 to pick up user 210 to provide transportation service. Similarly, a user 220 may use user device 222 to send a transportation request to system 100. System 100 may match vehicle 224 with user 220 according to the transportation request. Vehicle 224 may be associated with driver 221, a driver device 228, and an indication device 226. Driver 221 may drive vehicle 224 following a route 225 to the place where user 220 is located to pick up user 220 to provide transportation service.

[0065] In some embodiments of the present disclosure, system 100 may determine the estimated time (a first estimated arrival time) for vehicle 214 to arrive at the place where user 210 is located, i.e., the time required for taking route 215. Similarly, system 100 may determine the estimated time (a second estimated arrival time) for vehicle 224 to arrive at the place where user 220 is located, i.e., the time required for taking route 225. Furthermore, system 100 may determine the time difference between the first estimated arrival time and the second estimated arrival time. When the time difference exceeds than a preset threshold value, system 100 may send first indication information to indication device 216 and second indication information to indication device 226, where the first indication information may share one or more attributes with the second indication. When the time difference is less than the preset threshold value, system 100 can send the first indication information to indication device 216 and the second indication information to indication device 226, where the first indication information may have one or more attributes that are different from that of the second indication information. The one or more attributes may include at least one of color,

pattern, sequence, mode, sound or light.

[0066] In some embodiments of the present disclosure, system 100 may determine that the time difference exceeds the preset threshold. However, the time difference may be gradually reduced and become below the preset threshold due to traffic jam. In this case, user 210 or user 220 may see two vehicles with indication information of one or more same attribute(s) in preset geographical area 201. For example, the indication devices of the two vehicles may share a color. At this time, system 100 may further alter the configuration of the indication device to help user 210 and user 220 confirm the matching vehicle.

[0067] In some embodiments of the present disclosure, a user may operate a user device to send an indication information change request to system 100. For example, user 210 may operate user device 212 to send an indication information change request to system 100. After receiving the indication information change request, system 100 may send third indication information to indication device 216 and user device 212 to replace the first indication information. The third indication information may no longer have the same attribute(s)(s) as the second indication information, but rather have one or more attributes different from that of the second indication information.

[0068] In some embodiments of the present disclosure, a user may operate a user device to send an indication information change request to system 100. For example, user 210 may operate user device 212 to send an indication information change request to system 100. After receiving the indication information change request, system 100 may determine whether vehicle 214 and vehicle 224 are located in preset geographical area 201. If so, system 100 may send third indication information to indication device 216 and user device 212 to replace the first indication information. The third indication information may no longer have the same attribute(s) as the second indication information, but rather have one or more attributes different from that of the second indication information.

[0069] In some embodiments of the present disclosure, system 100 may verify whether there exist two vehicles sharing same attribute(s) of indication information in preset geographical area 201. If so, system 100 may reassign indication information to help a user identify a

matching vehicle. For example, system 100 may verify whether both vehicle 214 and vehicle 224 are located in preset geographical area 201. If so, system 100 may send third indication information to indication device 216 and user device 212 to replace the first indication information. The third indication information may have one or more attributes different from that of the second indication information. System 100 may send the third indication information to indication device 226 and user device 222 to replace the second indication information, achieving an effect of altering the configuration. Consistent with some embodiments of the present disclosure, system 100 may also send a notification to the user after sending the third indication information to inform the user that the first indication information has been replaced. For example, system 100 may push a notification to user device 212 to inform the user that the first indication information has been replaced.

[0070] In some embodiments of the present disclosure, system 100 may receive a plurality of transportation requests, where the plurality of transportation requests may include passenger pick-up points located in a preset geographical area (e.g., preset geographical area 201). The passenger pick-up points may be manually input by a user when making a transportation request, or it may be generated by system 100 through automatically detecting the user's location. In some embodiments of the present disclosure, the user can order the transportation service for a friend, colleague, or family member who may be elsewhere so that the passenger pick-up points need not to be the same as the location of the user. System 100 can identify the first transportation request that matches vehicle 214 and the second transportation request that matches vehicle 224, and system 100 can detect that vehicle 214 and vehicle 224 are both located in preset geographical area 201. At this time, system 100 may determine whether the indication information assigned with the first transportation request shares one or more same attributes with the second indication information assigned with the second transportation request. If so, it is easy to cause confusion, and then system 100 may adjust the first indication information or the second indication information so that the first indication information may no longer have the same attribute(s) as the second indication information, but rather have one or more attributes different from that of the second indication information.

[0071] In some embodiments of the present disclosure, system 100 may send the adjusted indication information to indication device 216. Consistent with some embodiments of the present disclosure, system 100 may send the adjusted indication information to user device 212. Similarly, system 100 may send the adjusted indication information to indication device 226 and/or user device 222.

[0072] FIG. 3 is a schematic diagram illustrating exemplary hardware and/or software components of a terminal device according to some embodiments of the present disclosure. In some embodiments, the user device 114 may be implemented on the terminal device 300 shown in FIG. 3. The terminal device 300 may be a mobile device, such as a mobile phone of a passenger or a driver, a built-in device on a vehicle driven by the driver. As illustrated in FIG. 3, the terminal device 300 may include a communication platform 310, a display 320, a graphic processing unit (GPU) 330, a central processing unit (CPU) 340, an I/O 350, a memory 360, and a storage 390. In some embodiments, any other suitable component, including but not limited to a system bus or a controller (not shown), may also be included in the terminal device 300.

[0073] In some embodiments, a mobile operating system 370 (e.g., iOS™, Android™, Windows Phone™, etc.) and one or more Apps (applications) 380 may be loaded into the memory 360 from the storage 390 in order to be executed by the CPU 340. In some embodiments, the terminal device 300 may include a microphone or the like for acquiring speech information. The microphone may continuously acquire speech information when the terminal device 300 is working or when an App 380 for online-to-offline services is running. For instance, the speech-related App 380 may include an online transportation service App (e.g., DiDi Taxi), an E-business App (e.g., Taobao, Ebay, Amazon), a voice control App (e.g., Siri™), etc. The microphone 315 may continuously acquire speech information when a user opens the App 380. In some embodiments, the terminal device 300 may receive indication information from the server (e.g., the processor 102). For example, the terminal device 300 may present the indication information to the user via the display 320. Alternatively or additionally, the user may send an indication information change request to the server via the

terminal device 300. User interactions may be achieved via the I/O 350 and provided to the server and/or other devices via the network 120.

[0074] FIG. 4 is a block diagram illustrating an exemplary processor according to some embodiments of the present disclosure. The processor 102 may be in communication with a storage medium (e.g., the memory 104, and/or the storage 390 of the terminal device 300), and may execute instructions stored in the storage medium. In some embodiments, the processor 102 may include a receiving module 410, a determination module 420, and a sending module 430. In some embodiments, the processor 102 may be integrated into a server.

[0075] The receiving module 410 may be configured to receive one or more service requests. For example, the one or more service requests may include a first transportation request associated with a first user and a second transportation request associated with a second user. A first pick-up location (also referred to as "pick up point") for the first user and a second pick-up location for the second user may be in a preset geographical area. A first vehicle (as a service provider) and a second vehicle may arrive in the preset geographical area to pick up the first user and the second user, respectively. In some embodiments, when a user found that the same indication information is presented by two different indication devices associated with two vehicles, the user may send an indication information change request. The receiving module 410 may receive the indication information change request and send it to the determination module 420.

[0076] The determination module 420 may determine a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area. In response to a determination that the time difference exceeds a preset threshold, the determination module 420 may select one or more same attribute(s) for the first indication information and the second indication information. Since the time difference exceeds the preset threshold, it is unlikely for the first user or the second user to find the first vehicle and the second vehicle in the preset geographical area at the same time. If the indication information received by the first user device is the same as the indication information presented by an indication device of a vehicle,

the first user may determine that this vehicle is the vehicle assigned by the system 100. In response to a determination that the time difference is less than a preset threshold, the determination module 420 may select one or more different attributes (e.g., different colors, patterns, or the like) for the first indication information and the second indication information.

[0077] In some embodiments, the first indication information and the second indication information may be the same. When the determination module 420 identifies that the first vehicle and the second vehicle are in the preset geographical area at the same time, or when the receiving module 410 receives an indication information change request, the determination module 420 may determine that the first indication information or the second indication information needs to be replaced. For example, the determination module 420 may generate third indication information, which may have one or more attributes that are different from one or more attributes of the second indication information, for replacing the first indication information.

[0078] The sending module 430 may send the first indication information to a first user device of the first user, and send the second indication information to a second user device of the second user, so as to inform the first user and the second user of the first indication information and the second indication information, respectively. In some embodiments, the sending module 430 may send the first indication information to a first indication device of a first vehicle, and send the second indication information to a second indication device of a second vehicle. The first indication device and the second indication device may present the first indication information and the second indication, respectively. The first user or the second user may identify a vehicle matching with his/her transportation request based on the first indication information or the second indication information. In some embodiments, the sending module 430 may send the third indication information to the first user device as well as the first indication device. In some embodiments, the sending module 430 may further send a notification (e.g., a text message, a voice message) to the first user device to inform the first user that the first indication information is replaced.

[0079] The modules in FIG. 4 may be connected to or communicate with each other via a

wired connection or a wireless connection. The wired connection may include a metal cable, an optical cable, a hybrid cable, or the like, or a combination thereof. The wireless connection may include a Local Area Network (LAN), a Wide Area Network (WAN), a Bluetooth, a ZigBee, a Near Field Communication (NFC), or the like, or a combination thereof. In some embodiments, two or more of the modules may be combined into a single module, and any one of the modules may be divided into two or more units.

[0080] FIG. 5 is a flowchart of an exemplary method for configuring an indication device to provide transportation services according to some embodiments of the disclosure. In some embodiments of the present disclosure, the method illustrated in FIG. 5 may be executed by system 100 (e.g., executed by processor 102). The method illustrated in FIG. 5 may include steps 510-584 described below. It is worth noting that some of these steps are optional for the implementation of the present invention. Furthermore, some of these steps can be performed at the same time or in a different order from that illustrated in FIG. 5.

[0081] As illustrated in FIG. 2 and FIG. 5, in step 510, processor 102 may receive a first transportation request from a first user device of a first user who is located in a preset geographical area. In some embodiments of the present disclosure, processor 102 may receive the first transportation request from user device 212 operated by user 210 who is located in preset geographical area 201.

[0082] In step 520, processor 102 may receive a second transportation request from a second user device of a second user who is located in the preset geographical area. In some embodiments of the present disclosure, processor 102 may receive the second transportation request from user device 222 operated by user 220 who is located in preset geographical area 201.

[0083] In step 550, in response to the first transportation request, processor 102 may select a first driver for the first user, where the first driver may be associated with a first vehicle, a first indication device and a first driver device. In some embodiments of the present disclosure, in response to the first transportation request, processor 102 may select driver 211 for user 210. Driver 211 may be associated with vehicle 214, indication device 216, and driver device 218.

[0084] In step 540, in response to the second transportation request, processor 102 may select a second driver for the second user, where the second driver may be associated with a second vehicle, a second indication device and a second driver device. In some embodiments of the present disclosure, in response to the second transportation request, processor 102 may select driver 221 for user 220. Driver 221 may be associated with vehicle 224, indication device 226, and driver device 228.

[0085] In step 550, processor 102 may determine the estimated time when the first vehicle may arrive at a passenger pick-up point. In some embodiments of the present disclosure, processor 102 may determine the estimated time for vehicle 214 to arrive at the location of user 210 following route 215. For example, processor 102 may acquire the length of route 215, and then divide the length by the speed of vehicle 214 to obtain the estimated arrival time. In other embodiments of the present disclosure, processor 102 may determine and update the estimated arrival time in real time. For example, processor 102 may acquire the speed of vehicle 214 in real time, and then update the estimated arrival time in real time according to the real-time speed. Consistent with some embodiments of the present disclosure, processor 102 may update the estimated arrival time in real time based on traffic condition. For example, processor 102 may acquire the speed and traffic condition of vehicle 214 in real time, and then update the estimated arrival time in real time according to the real-time speed and traffic condition. Consistent with some embodiments of the present disclosure, processor 102 may also use a machine learning model to predict the vehicle arrival time.

[0086] In step 560, processor 102 may determine the estimated arrival time of the second vehicle. In some embodiments of the present disclosure, processor 102 may determine the estimated time for vehicle 224 to arrive at the location of user 220 following route 225. The determinion method is consistent with the one described in step 550, hence it may not be repeated here.

[0087] In step 570, processor 102 may determine the time difference between the estimated arrival time of the first vehicle and the estimated arrival time of the second vehicle. In some embodiments of the present disclosure, processor 102 may determine the time difference

between the estimated arrival time of vehicle 214 and the estimated arrival time of vehicle 224. For example, processor 102 may update the estimated arrival time of vehicle 214 and vehicle 224 in real time and may determine the time difference between the estimated arrival time of vehicle 214 and that of vehicle 224 in real time.

[0088] In step 580, processor 102 may determine whether the time difference exceeds a preset threshold.

[0089] If the time difference exceeds the preset threshold, processor 102 may send the first indication information and the second indication information to the first indication device and the second indication device respectively in step 581 and step 582, where the first indication information shares one or more same attributes with the second indication information. In some embodiments of the present disclosure, processor 102 may send the first indication information to indication device 216 and the second indication information to indication device 226, where the first indication information shares one or more same attributes with the second indication information.

[0090] If the time difference is less than the preset threshold, processor 102 may send the first indication information and the second indication information to the first indication device and the second indication device respectively in step 583 and step 584, where the first indication information may have one or more attributes different from that of the second indication information. In some embodiments of the present disclosure, processor 102 may send the first indication information to indication device 216 and the second indication information to indication device 226, where the first indication information may have one or more attributes different from that of the second indication information.

[0091] In some embodiments of the present disclosure, even though a processor may determine in step 580 that the time difference exceeds the preset threshold, the time difference may be gradually reduced and become below the preset threshold due to traffic jam. At this time, the first vehicle and the second vehicle may enter the preset geographical area (e.g., preset geographical area 201) at a similar time, which may make it difficult for the user to identify the matching vehicle. In this case, processor 102 may further configure the indication device

to help the user identify the matching vehicle and avoid mismatches.

[0092] FIG. 6A is a flowchart of an exemplary method for configuring an indication device to avoid mismatches according to some embodiments of the disclosure.

[0093] Referring to FIG. 6A, in step 610, processor 102 may receive an indication information change request from the first user device. In some embodiments of the present disclosure, after the user finds that two vehicles with indication information of same attribute(s) appear in the preset geographical area, the user can send an indication information change request to processor 102 through the user device to prevent mismatches. For example, user 210 may send the indication information change request to processor 102 through user device 212.

[0094] In step 620, processor 102 may send third indication information to the first indication device to replace the first indication information according to the indication information change request, where the third indication information may have one or more attributes different from that of the second indication information. For example, processor 102 may send third indication information to indication device 216 to replace the first indication information according to the indication information change request, where the third indication information may have one or more attributes different from that of the second indication information.

[0095] FIG. 6B is a flowchart of another exemplary method for configuring an indication device to avoid mismatches, according to some embodiments of the disclosure. Referring to FIG. 6B, in step 630, processor 102 may receive an indication information change request from the first user device. In some embodiments of the present disclosure, after the user finds that two vehicles with indication information of same attribute(s) appear in the preset geographical area, the user can send an indication information change request to processor 102 through the user device to prevent mismatches. For example, user 210 may send the indication information change request to processor 102 through user device 212.

[0096] In step 640, processor 102 may verify that the first vehicle and the second vehicle are located in the preset geographical area. In some embodiments of the present disclosure, processor 102 can obtain the locations of vehicle 214 and vehicle 224 to verify that vehicle 214

and vehicle 224 are indeed located in the preset geographical area, hence it is easy to avoid confusion in matching.

[0097] In step 650, processor 102 may send third indication information to the first indication device to replace the first indication information according to the verification result, where the third indication information may have one or more attributes different from that of the second indication information. In some embodiments of the present disclosure, after processor 102 confirms that vehicle 214 and vehicle 224 are both located in the preset geographical area, processor 102 may send third indication information to indication device 216 to replace the first indication information. The third indication information may have one or more attributes different from that of the second indication information. If processor 102 finds that vehicle 214 and vehicle 224 are not both located in the preset geographical area, it may decide not to change the indication information.

[0098] FIG. 6C is a flowchart of yet another exemplary method for configuring the indication device to avoid mismatches, according to embodiments of the disclosure. Referring to FIG. 6C, in step 660, processor 102 may voluntarily verify that the first vehicle and the second vehicle are located in the preset geographical area when the user has not made an indication information change request. In some embodiments of the present disclosure, processor 102 may acquire the locations of vehicle 214 and vehicle 224 to verify whether vehicle 214 and vehicle 224 are both located in the preset geographical area. The voluntary verification may be carried out periodically or aperiodically. For example, processor 102 may perform the verification only when the vehicle approaches passenger pick-up points, rather than during the travelling. If two vehicles both pass a preset geographical area on the route to their destinations, because it is not a passenger pick-up point, confusion in matching may not happen no matter how short the distance between the two vehicles may be. Alternatively, processor 102 may also choose to verify only in the preset geographical area where the passenger pick-up point of the vehicle is located.

[0099] In step 670, processor 102 may send third indication information to the first indication device to replace the first indication information according to the verification result, where the

third indication information may have one or more attributes different from that of the second indication information. In some embodiments of the present disclosure, after processor 102 confirms that vehicle 214 and vehicle 224 are both located in the preset geographical area, processor 102 may send third indication information to indication device 216 to replace the first indication information, where the third indication information may have one or more attributes different from that of the second indication information. Consistent with some embodiments of the present disclosure, processor 102 may also send a notification to the user after sending the third indication information to inform the user that the first indication information has been replaced. For example, processor 102 may push a notification to user device 212 to inform user 210 that the first indication information has been replaced.

[0100] FIG. 7 is a flowchart of another exemplary method for configuring the indication device to provide transportation service, according to embodiments of the disclosure. Referring to FIG. 7, in step 710, processor 102 may receive a plurality of transportation requests, where the plurality of transportation requests may include passenger pick-up points located in a preset geographical area. For example, the passenger pick-up points of the plurality of transportation requests may all be located in preset geographical area 201.

[0101] In step 720, processor 102 may identify a first transportation request matched with a first vehicle and a second transportation request matched with a second vehicle, where the first vehicle and the second vehicle may be detected to be located in the preset geographical area. In some embodiments of the present disclosure, processor 102 may identify a first transportation request matched with a first vehicle and a second transportation request matched with a second vehicle from the plurality of transportation requests, where the corresponding passenger pick-up points of the first vehicle and the second vehicle may both be located in the preset geographical area, and both vehicles may be detected to be located in the preset geographical area at the same time. For example, processor 102 may identify a first transportation request that matches vehicle 214 and a second transportation request that matches vehicle 224, and processor 102 may detect that vehicle 214 and vehicle 224 are both located within preset geographical area 201.

[0102] In step 730, processor 102 may determine that the first indication information assigned with the first transportation request shares one or more same attributes with the second indication information assigned with the second transportation request. For example, processor 102 may determine that the first indication information may share same attribute(s) with the second indication information, such as color, pattern, sound or lighting, etc.

[0103] In step 740, processor 102 may adjust the first indication information so that the first indication information may have one or more attributes different from that of the second indication information. In some embodiments of the present disclosure, processor 102 may send the adjusted indication information to indication device 216. Consistent with some embodiments of the present disclosure, processor 102 may send the adjusted indication information to user device 212. Similarly, system 100 may send the adjusted indication information to indication device 226 and/or user device 222.

[0104] The system and method provided by the present disclosure can effectively reduce the types of indication information in an area without affecting the matching of users and vehicles, and effectively utilize the server and communication resources. Using the system and method provided by the present disclosure, a user can complete matching with the vehicle conveniently and quickly.

[0105] It may be apparent to those skilled in the art that various modifications and variations can be made to the disclosed systems and related methods. Other embodiments may be apparent to those skilled in the art from consideration of the specification and practice of the disclosed systems and related methods.

[0106] It is intended that the specification and examples be considered as exemplary only, with a true scope being indicated by the following claims and their equivalents.

[0107] It should be noted that the above description is merely provided for the purposes of illustration, and not intended to limit the scope of the present disclosure. For persons having ordinary skill in the art, multiple variations and modifications may be made under the teachings of the present disclosure. However, those variations and modifications do not depart from the scope of the present disclosure.

[0108] Having thus described the basic concepts, it may be rather apparent to those skilled in the art after reading this detailed disclosure that the foregoing detailed disclosure is intended to be presented by way of example only and is not limiting. Various alterations, improvements, and modifications may occur and are intended to those skilled in the art, though not expressly stated herein. These alterations, improvements, and modifications are intended to be suggested by this disclosure, and are within the spirit and scope of the exemplary embodiments of this disclosure.

[0109] Moreover, certain terminology has been used to describe embodiments of the present disclosure. For example, the terms "one embodiment," "an embodiment," and/or "some embodiments" mean that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the present disclosure. Therefore, it is emphasized and should be appreciated that two or more references to "an embodiment" or "one embodiment" or "an alternative embodiment" in various portions of this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures or characteristics may be combined as suitable in one or more embodiments of the present disclosure.

[0110] Further, it may be appreciated by one skilled in the art, aspects of the present disclosure may be illustrated and described herein in any of a number of patentable classes or context including any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof. Accordingly, aspects of the present disclosure may be implemented entirely hardware, entirely software (including firmware, resident software, micro-code, etc.) or combining software and hardware implementation that may all generally be referred to herein as a "unit," "module," or "system." Furthermore, aspects of the present disclosure may take the form of a computer program product embodied in one or more computer readable media having computer-readable program code embodied thereon.

[0111] A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including

electromagnetic, optical, or the like, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that may communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device. Program code embodied on a computer readable signal medium may be transmitted using any appropriate medium, including wireless, wireline, optical fiber cable, RF, or the like, or any suitable combination of the foregoing.

[0112] Computer program code for carrying out operations for aspects of the present disclosure may be written in a combination of one or more programming languages, including an object oriented programming language such as Java, Scala, Smalltalk, Eiffel, JADE, Emerald, C++, C#, VB. NET, Python or the like, conventional procedural programming languages, such as the "C" programming language, Visual Basic, Fortran 2003, Perl, COBOL 2002, PHP, ABAP, dynamic programming languages such as Python, Ruby, and Groovy, or other programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider) or in a cloud computing environment or offered as a service such as a Software as a Service (SaaS).

[0113] Furthermore, the recited order of processing elements or sequences, or the use of numbers, letters, or other designations therefore, is not intended to limit the claimed processes and methods to any order except as may be specified in the claims. Although the above disclosure discusses through various examples what is currently considered to be a variety of useful embodiments of the disclosure, it is to be understood that such detail is solely for that purpose, and that the appended claims are not limited to the disclosed embodiments, but, on the contrary, are intended to cover modifications and equivalent arrangements that are within

the spirit and scope of the disclosed embodiments. For example, although the implementation of various components described above may be embodied in a hardware device, it may also be implemented as a software only solution, e.g., an installation on an existing server or mobile device.

[0114] Similarly, it should be appreciated that in the foregoing description of embodiments of the present disclosure, various features are sometimes grouped together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure aiding in the understanding of one or more of the various embodiments. This method of disclosure, however, is not to be interpreted as reflecting an intention that the claimed subject matter requires more features than are expressly recited in each claim. Rather, claimed subject matter may lie in less than all features of a single foregoing disclosed embodiment.

WE CLAIM:

1. A method for online-to-offline services, implemented on a computing device having at least one processor and at least one non-transitory storage medium, the method comprising:

receiving, by the at least one processor, a first transportation request including a first passenger pick-up location in a preset geographical area, the first transportation request matching with a first vehicle associated with a first indication device;

receiving, by the at least one processor, a second transportation request including a second passenger pick-up location in the preset geographical area, the second transportation request matching with a second vehicle associated with a second indication device;

determining, by the at least one processor, a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area;

sending, by the at least one processor, first indication information to the first indication device based at least in part on the time difference; and

sending, by the at least one processor, second indication information to the second indication device based at least in part on the time difference.

2. The method of claim 1, wherein the first transportation request is intended for requesting a transportation service to be provided to a first user using a first user device, and the second transportation request is intended for requesting a transportation service to be provided to a second user using a second user device, wherein the method further comprises:

sending, by the at least one processor, the first indication information to the first user device; and

sending, by the at least one processor, the second indication information to the second user device.

3. The method of claim 1 or claim 2, further comprising:

determining that the time difference exceeds a preset threshold; and

selecting, by the at least one processor, one or more same attributes for the first indication information and the second indication information.

4. The method of any one of claims 1-3, further comprising:

determining that the time difference is less than a preset threshold; and

selecting, by the at least one processor, one or more different attributes for the first indication information and the second indication information.

5. The method of claim 3 or claim 4, wherein the preset threshold is determined based on a plurality of historical transportation requests associated with the preset geographical area.

6. The method of claim 2, the method further comprising:

receiving, by the at least one processor, an indication information change request from the first user device; and

sending, by the at least one processor, third indication information to the first indication device according to the indication information change request to replace the first indication information, wherein

the third indication information has one or more attributes that are different from one or more attributes of the second indication information.

7. The method of claim 2, the method further comprising:

receiving, by the at least one processor, an indication information change request from the first user device;

verifying, by the at least one processor, that the first vehicle and the second vehicle are located in the preset geographical area; and

sending, by the at least one processor, third indication information to the first indication device according to the verification result to replace the first indication information, wherein

the third indication information has one or more attributes that are different from one

or more attributes of the second indication information.

8. The method of claim 2, further comprising:

detecting, by the at least one processor, that the first vehicle and the second vehicle are located in the preset geographical area; and

sending, by the at least one processor, the third indication information to the first indication device to replace the first indication information, wherein

the third indication information has one or more attributes that are different from one or more attributes of the second indication information.

9. The method of any one of claims 6-8, the method further comprising:

sending, by the at least one processor, a notification to the first user device to inform the first user that the first indication information has been replaced.

10. The method of any one of claims 1-9, wherein the preset geographical area has a shape of a regular polygon.

11. The method of any one of claims 1-10, wherein the preset geographical area has a shape of a regular hexagon.

12. A method for online-to-offline services, implemented on a computing device having at least one processor and at least one non-transitory storage medium, the method comprising:

receiving, by at least one processor, a plurality of transportation requests including a plurality of passenger pick-up locations in a preset geographical area;

identifying, by the at least one processor, a first transportation request associated with a first vehicle from the plurality of transportation requests and a second transportation request associated with a second vehicle from the plurality of transportation requests, wherein the first vehicle and the second vehicle are detected to be located in the preset geographical area;

determining, by the at least one processor, that first indication information assigned with the first transportation request shares a same attribute with second indication information assigned with the second transportation request; and

adjusting, by the at least one processor, the first indication information so that the first indication information has one or more attributes that are different from one or more attributes of the second indication information.

13. The method of claim 12, the method further comprising:

sending, by the at least one processor, the adjusted indication information to an indication device associated with the first vehicle.

14. The method of claim 11 or claim 12, the method further comprising:

sending, by the at least one processor, the adjusted indication information to a user device used by a user, wherein the user is to be picked up by the first vehicle.

15. A system for online-to-offline services, the system comprising:

at least one storage device storing a set of instructions; and

at least one processor in communication with the storage device, wherein when executing the set of instructions, the at least one processor is directed to cause the system to:

receive the first transportation request including a first passenger pick-up location in a preset geographical area, wherein the first transportation request matches with a first vehicle associated with a first indication device;

receive the second transportation request including a second passenger pick-up location in the preset geographical area, wherein the second transportation request matches a second vehicle associated with a second indication device;

determine a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area;

send first indication information to the first indication device based at least in part on the time difference; and

send second indication information to the second indication device based at least in part on the time difference.

16. The system of claim 15, wherein the first transportation request is intended for requesting a transportation service to be provided to a first user using a first user device and the second transportation request is intended for requesting a transportation service to be provided to a second user using a second user device, and wherein

the at least one processor is further configured to cause the system to:

send the first indication information to the first user device; and

send the second indication information to the second user device.

17. The system of claim 15 or claim 16, wherein the at least one processor is further configured to cause the system to:

determine that the time difference exceeds a preset threshold; and

select one or more same attributes for the first indication information and the second indication information.

18. The system of any one of claims 15-17, wherein the at least one processor is further configured to cause the system to:

determine that the time difference is less than a preset threshold; and

select different attributes for the first indication information and the second indication information.

19. The system of claim 17 or claim 18, wherein the preset threshold is determined based on a plurality of historical transportation requests associated with the preset geographical area.

20. The system of claim 16, wherein the at least one processor is further configured to cause the system to:

receive an indication information change request from the first user device; and

send third indication information to the first indication device according to the indication information change request to replace the first indication information,

wherein the third indication information has one or more attributes that are different from one or more attributes of the second indication information.

21. The system of claim 16, wherein the at least one processor is further configured to cause the system to:

receive the indication information change request from the first user device; and

verify that the first vehicle and the second vehicle are located in the preset geographical area; and

send the third indication information to the first indication device according to the verification result to replace the first indication information,

wherein the third indication information has one or more attributes that are different from one or more attributes of the second indication information.

22. The system of claim 16, wherein the at least one processor is further configured to cause the system to:

detect that the first vehicle and the second vehicle are located in the preset geographical area; and

send the third indication information to the first indication device to replace the first indication information,

wherein the third indication information has one or more attributes that are different from one or more attributes of the second indication information.

23. The system of any one of claims 20-22, wherein the at least one processor is further

configured to cause the system to:

send a notification to the first user device to inform the first user that the first indication information has been replaced.

24. The system of any one of claims 15-23, wherein the preset geographical area has a shape of a regular polygon.

25. The system of any one of claims 15-24, wherein the preset geographical area has a shape of a regular hexagon.

26. A system for online-to-offline services, the system comprising:

at least one storage device storing a set of instructions; and

at least one processor in communication with the storage device, wherein when executing the set of instructions, the at least one processor is directed to cause the system to:

receive a plurality of transportation requests including passenger pick-up locations in a preset geographical area;

identify a first transportation request associated with a first vehicle and a second transportation request associated with a second vehicle, wherein the first vehicle and the second vehicle are detected to be located in the preset geographical area;

determine that first indication information assigned with the first transportation request shares one or more same attributes with second indication information assigned with the second transportation request; and

adjust the first indication information so that the first indication information has one or more attributes that are different from one or more attributes of the second indication information.

27. The system of claim 26, wherein the at least one processor is configured to cause the system to send the adjusted indication information to an indication device associated with the

first vehicle.

28. The system of claim 26 or claim 27, wherein the at least one processor is configured to cause the system to send the adjusted indication information to a user device used by a user, wherein the user is to be picked up by the first vehicle.

29. A non-transitory computer-readable medium storing computer instructions, wherein when executed by at least one processor, the computer instructions perform a method for online-to-offline services, the method comprising:

receiving a first transportation request including a first passenger pick-up location in a preset geographical area, the first transportation request matching with a first vehicle associated with a first indication device;

receiving a second transportation request including a second passenger pick-up location in the preset geographical area, the second transportation request matching with a second vehicle associated with a second indication device;

determining a time difference between a first estimated time for the first vehicle to arrive in the preset geographical area and a second estimated time for the second vehicle to arrive in the preset geographical area; and

sending first indication information to the first indication device and second indication information to the second indication device according to the time difference.

30. A non-transitory computer-readable medium storing computer instructions, wherein when executed by at least one processor, the computer instructions perform a method for configuring indication devices to provide transportation services, the method comprising:

receiving a plurality of transportation requests including passenger pick-up locations in a preset geographical area;

identifying a first transportation request matched with a first vehicle and a second transportation request matched with a second vehicle, wherein the first vehicle and the second

vehicle are detected to be located in the preset geographical area;

determining that first indication information assigned with the first transportation request shares a same attribute with second indication information assigned with the second transportation request; and

adjusting the first indication information so that the first indication information has one or more attributes that are different from one or more attributes of the second indication information.

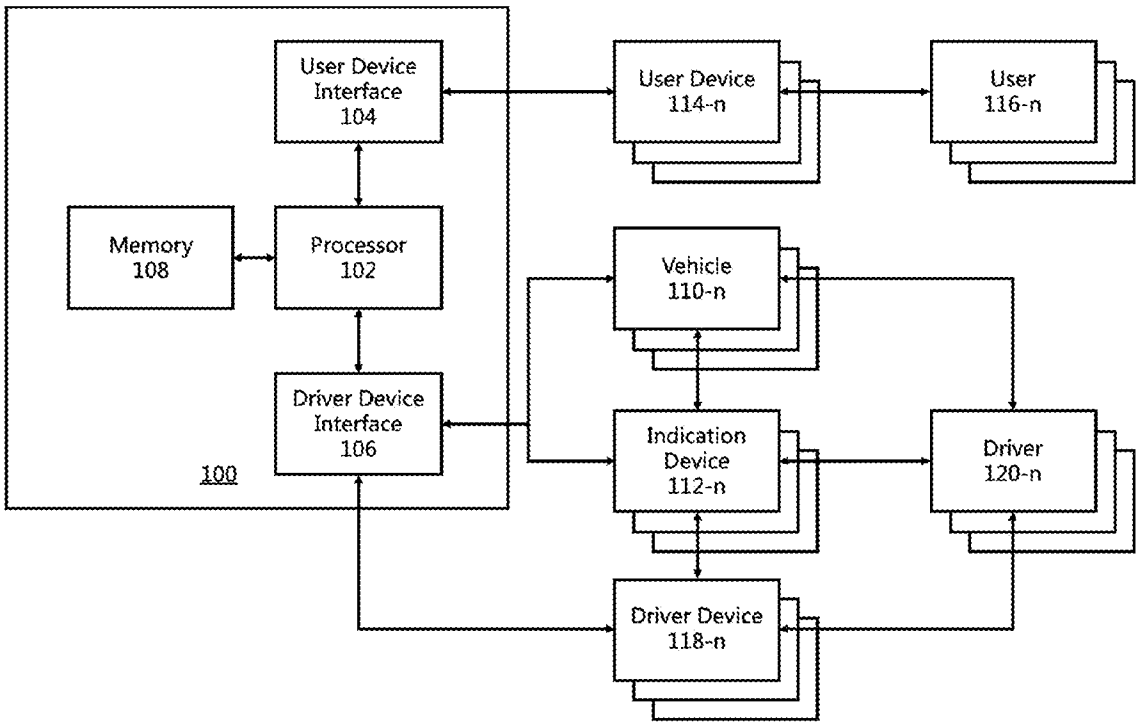
User Device Interface 104
User Device 114-n
User 116-n
Memory 108
Processor 102
Vehicle 110-n
Driver Device Interface 106
Indication Device 112-n
Driver 120-n
100
Driver Device 118-n

FIG. 1

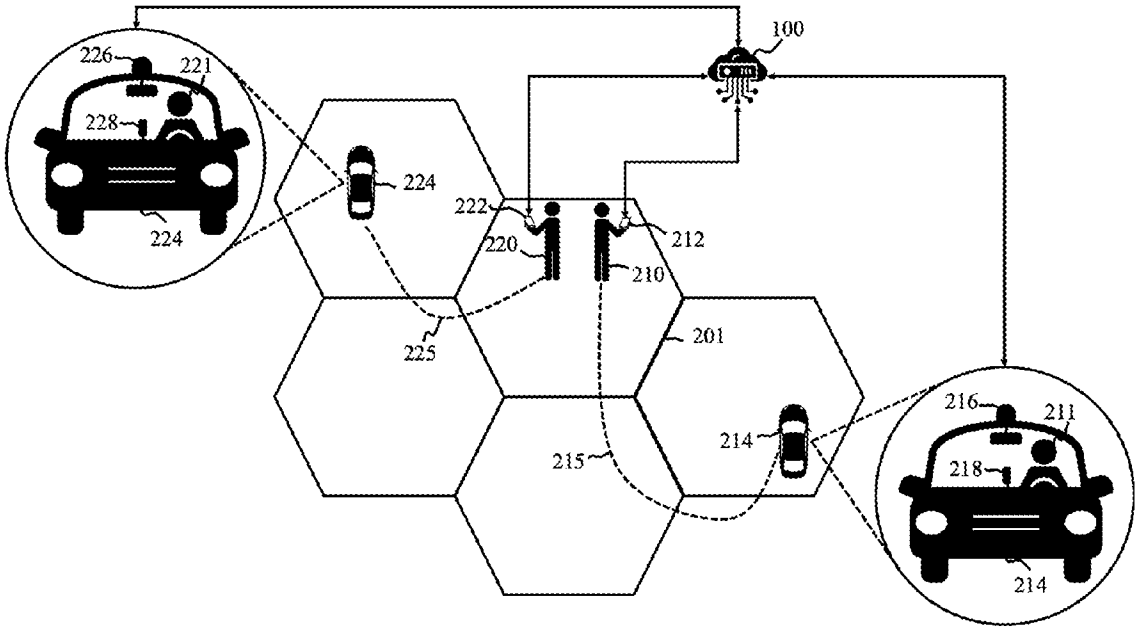
100
226
221
228
224
224
222
220
212
210
225
201
216
211
214
215
218
214

FIG. 2

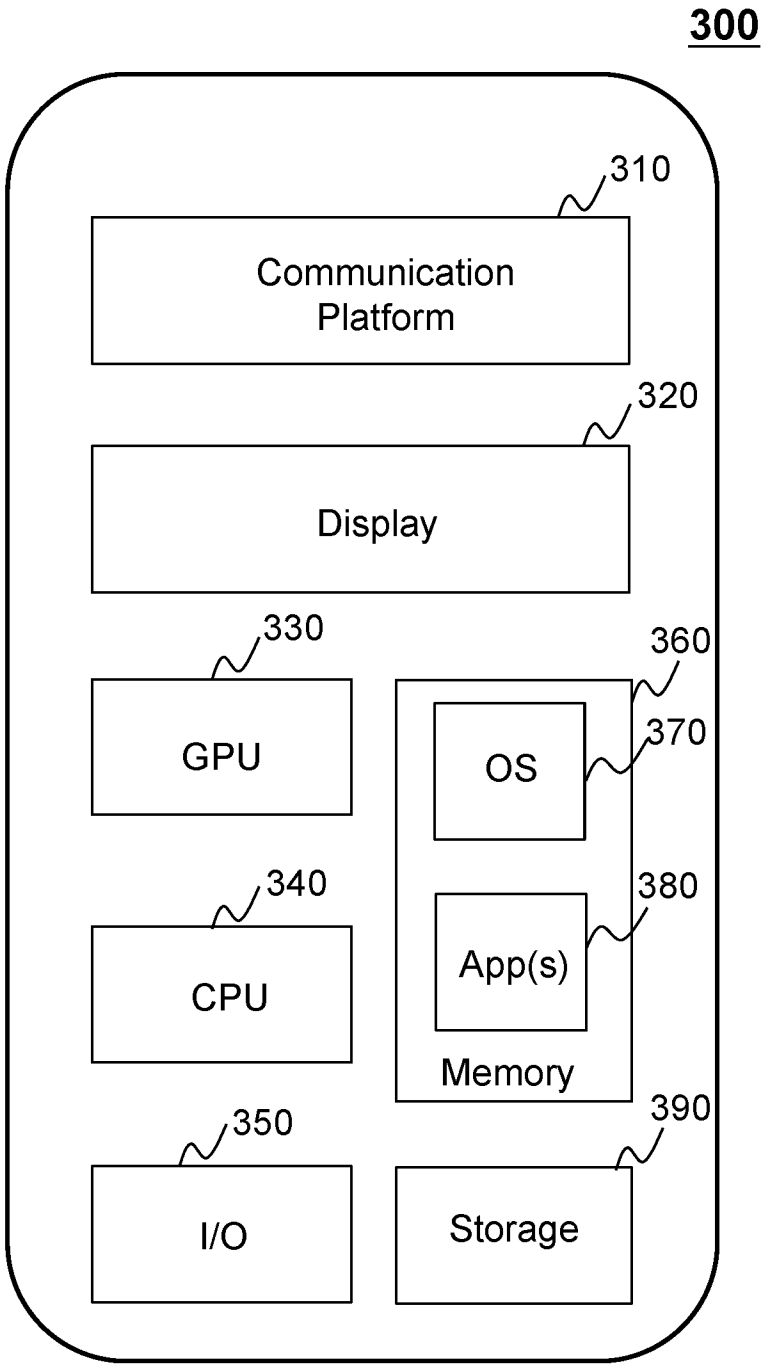
300
310
Communication Platform
320
Display
330
GPU
340
CPU
350
I/O
360
370
OS
380
App(s)
Memory
390
Storage

FIG. 3

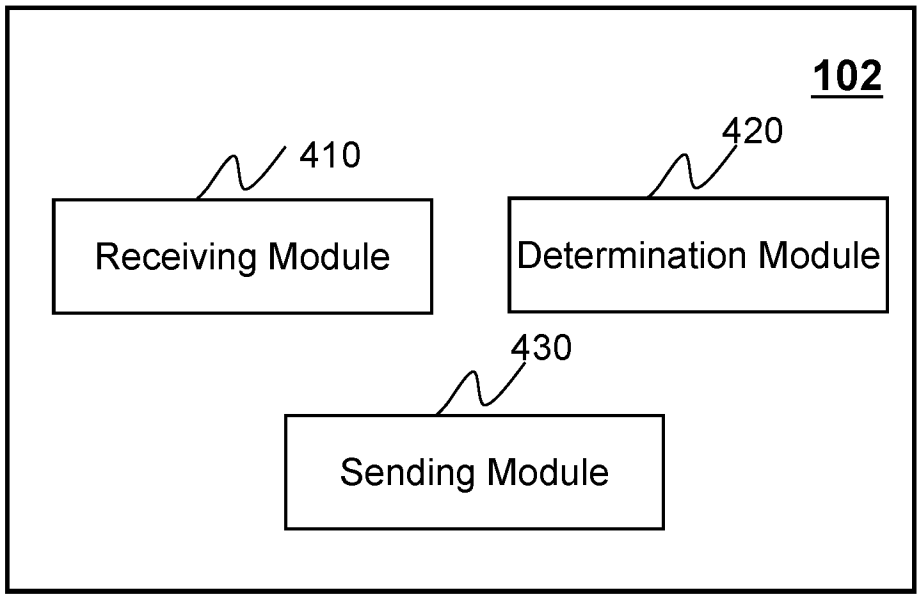
102
410
Receiving Module
420
Determination Module
430
Sending Module

FIG. 4

Sheet 5 of 9

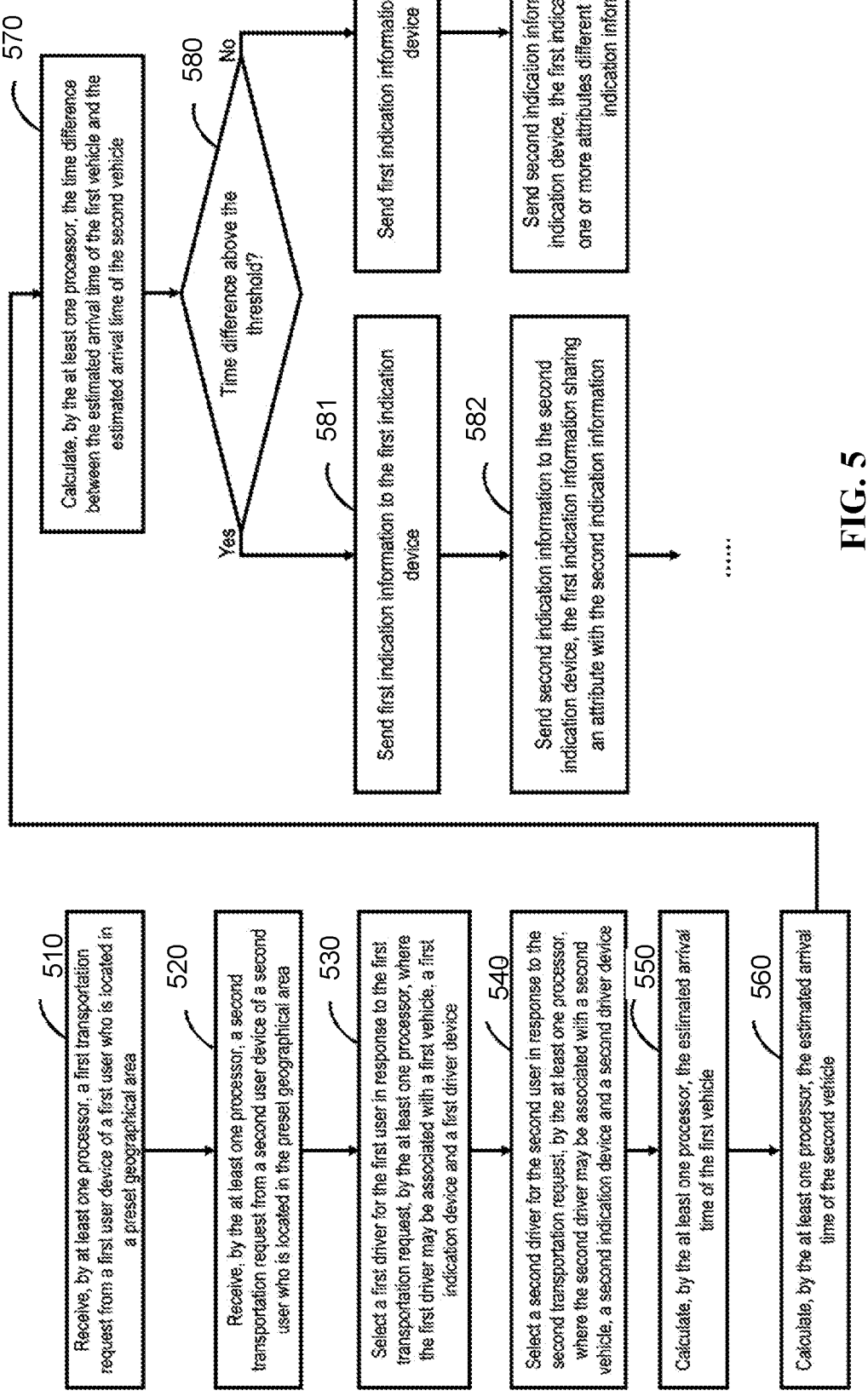

FIG. 5

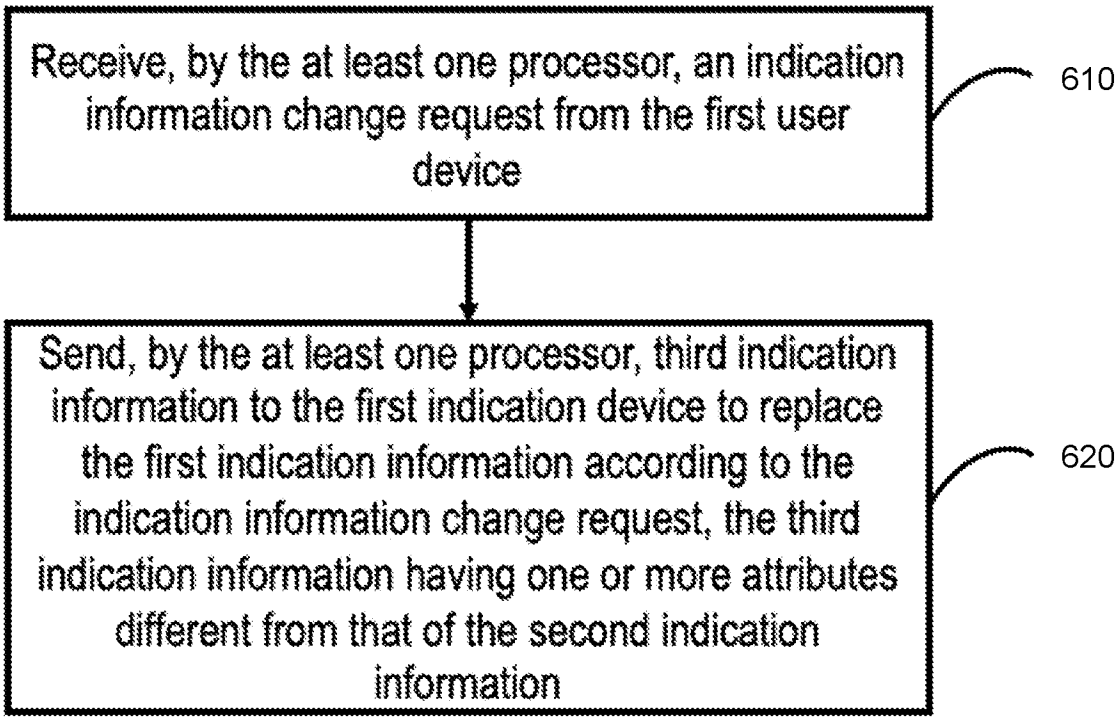
Receive, by the at least one processor, an indication information change request from the first user device
610
Send, by the at least one processor, third indication information to the first indication device to replace the first indication information according to the indication information change request, the third indication information having one or more attributes different from that of the second indication information
620

FIG. 6A

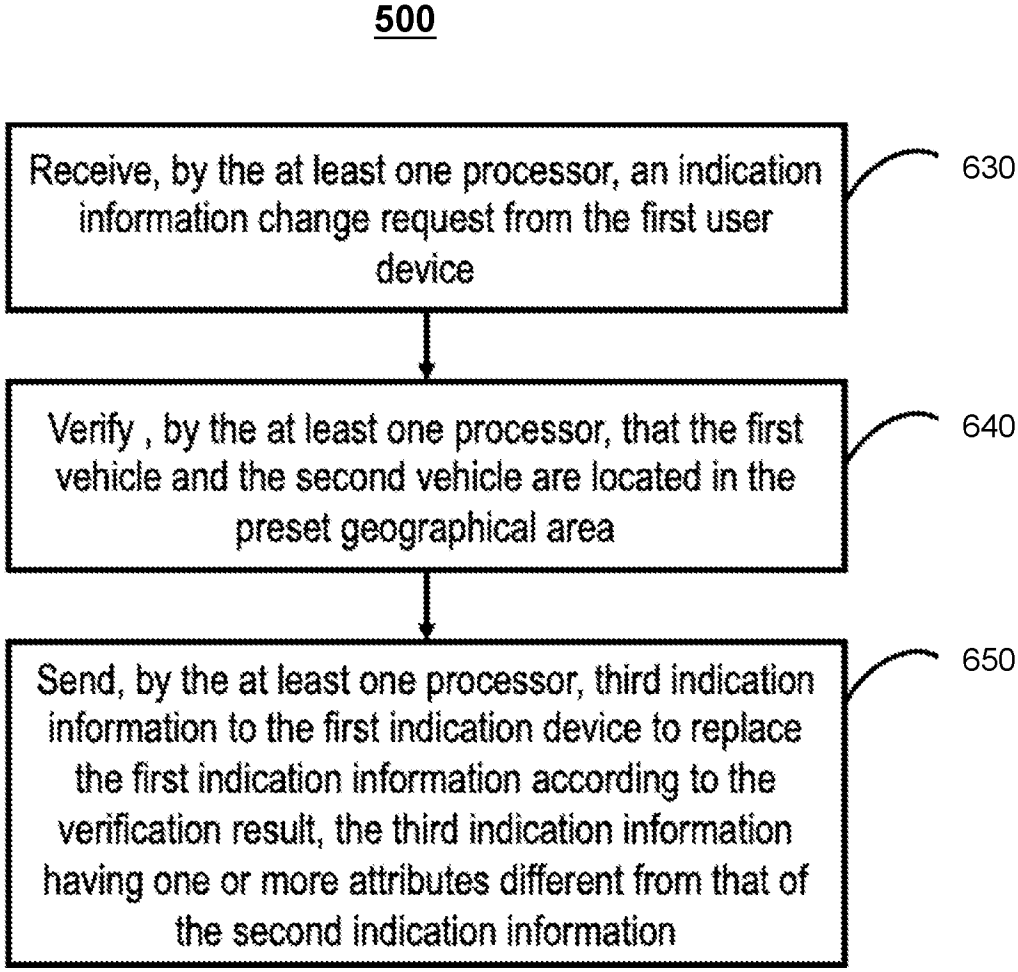
500
Receive, by the at least one processor, an indication information change request from the first user device
630
Verify , by the at least one processor, that the first vehicle and the second vehicle are located in the preset geographical area
640
Send, by the at least one processor, third indication information to the first indication device to replace the first indication information according to the verification result, the third indication information having one or more attributes different from that of the second indication information
650

FIG. 6B

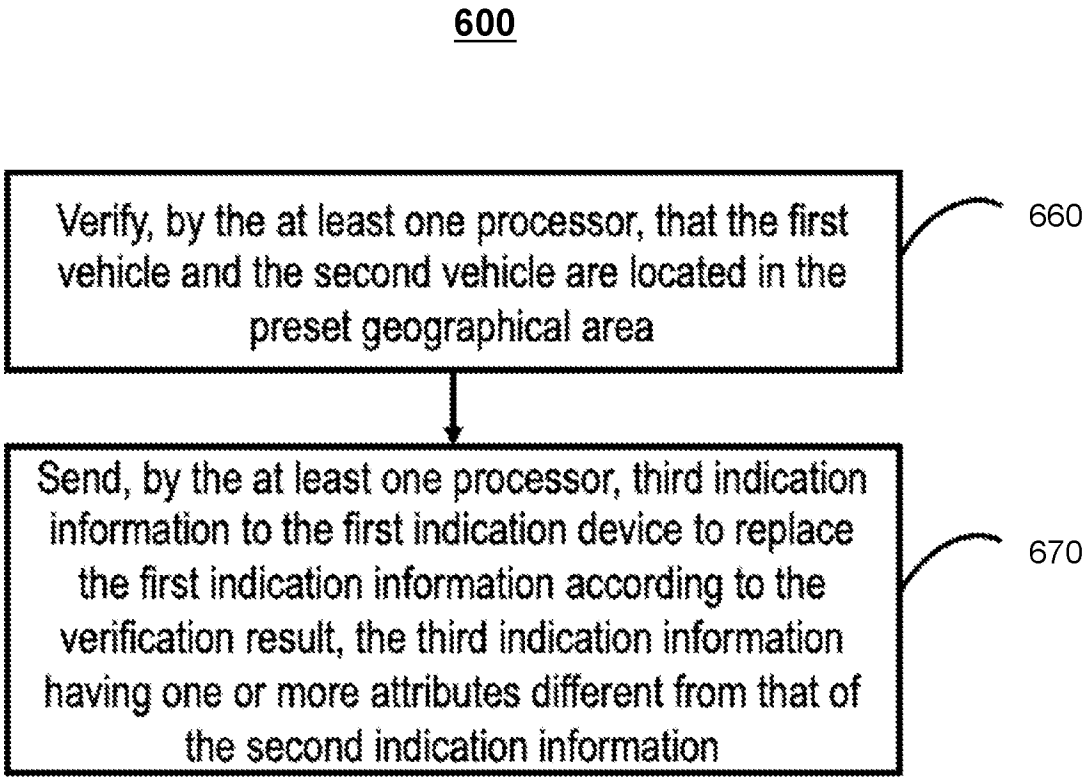
600
Verify, by the at least one processor, that the first vehicle and the second vehicle are located in the preset geographical area
660
Send, by the at least one processor, third indication information to the first indication device to replace the first indication information according to the verification result, the third indication information having one or more attributes different from that of the second indication information
670

FIG. 6C

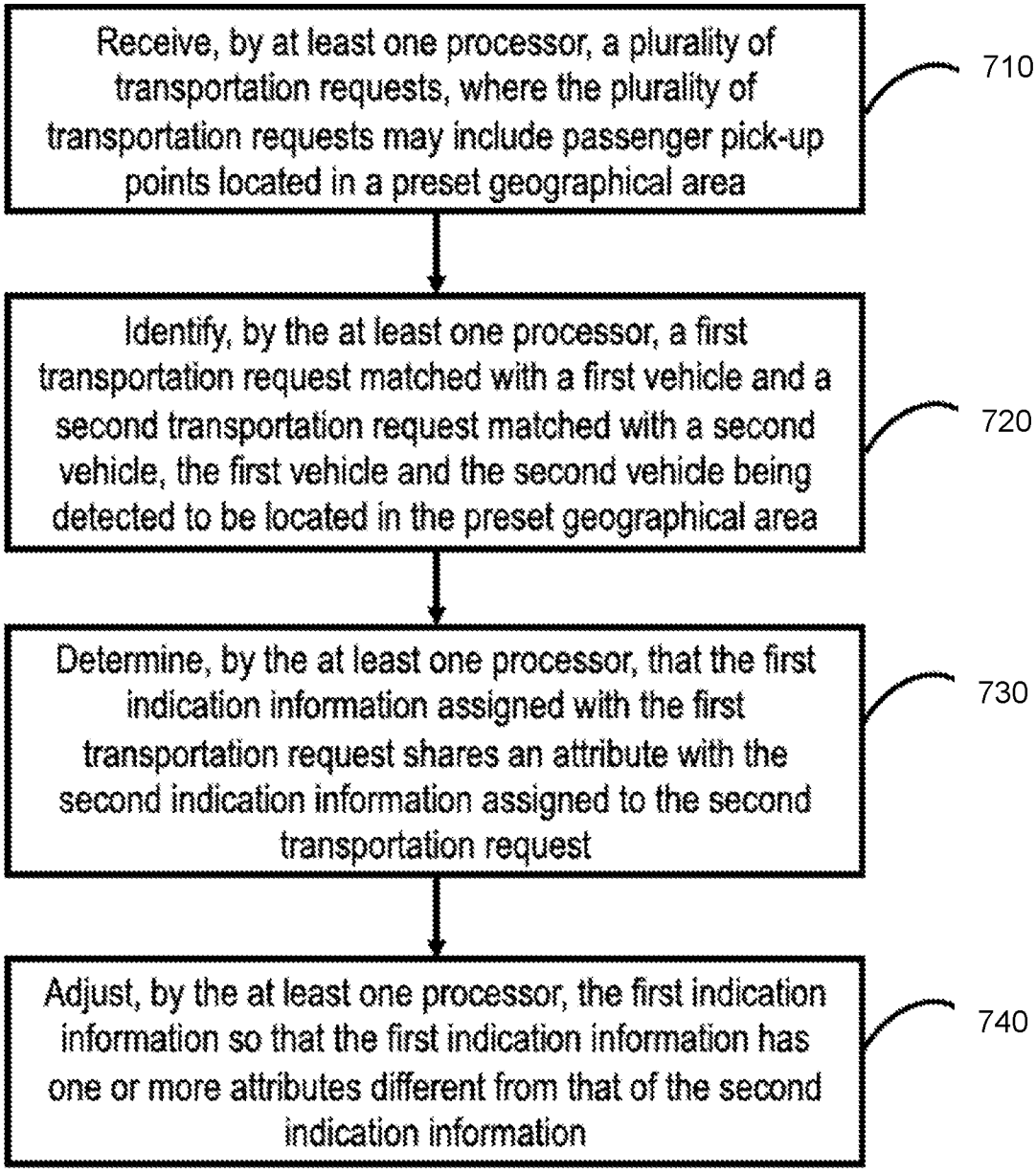
Receive, by at least one processor, a plurality of transportation requests, where the plurality of transportation requests may include passenger pick-up points located in a preset geographical area
710
Identify, by the at least one processor, a first transportation request matched with a first vehicle and a second transportation request matched with a second vehicle, the first vehicle and the second vehicle being detected to be located in the preset geographical area
720
Determine, by the at least one processor, that the first indication information assigned with the first transportation request shares an attribute with the second indication information assigned to the second transportation request
730
Adjust, by the at least one processor, the first indication information so that the first indication information has one or more attributes different from that of the second indication information
740

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/128788

A. CLASSIFICATION OF SUBJECT MATTER

G08G 1/00(2006.01)i; H04W 4/02(2018.01)i

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)

G08G 1; H04W 4

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)

VEN;CNABS:online, taxi, vehicle, location, indication,information,display

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103489306 A (Shanghai Fleety Communications, Ltd.) 01 January 2014 (2014-01-01) paragraphs 0021-0022 of the description, figure 1	1-30
A	CN 109151035 A (XIAN IRAIN IOT TECH SERVICES CO LTD) 04 January 2019 (2019-01-04) the whole document	1-30
A	CN 106209876 A (LIAO JIAHONG) 07 December 2016 (2016-12-07) the whole document	1-30
A	US 2018224866 A1 (MASSACHUSETTS INST TECHNOLOGY) 09 August 2018 (2018-08-09) the whole document	1-30

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 March 2020	**01 April 2020**
Name and mailing address of the ISA/CN **National Intellectual Property Administration, PRC** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **ZHANG,Yubing** Telephone No. **86-(010)-62085432**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/128788

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 103489306 A	01 January 2014	None	
CN 109151035 A	04 January 2019	None	
CN 106209876 A	07 December 2016	None	
US 2018224866 A1	09 August 2018	None	