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(54) **AUGMENTED REALITY BASED COMMUNITY REVIEW FOR AUTOMOBILE DRIVERS**

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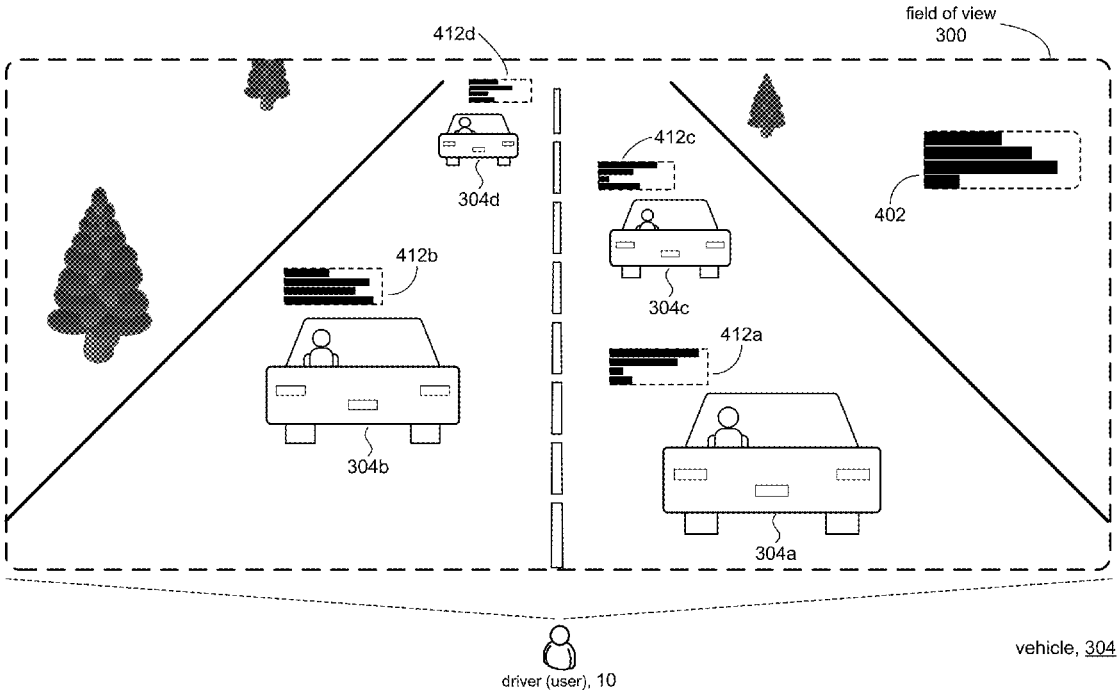
(57) **ABSTRACT**

Disclosed is an infrastructure to support an augmented reality (AR) based community for drivers. Each driver's view (e.g., using an AR device) of other vehicles on the road can be augmented with virtual information about other drivers in the community. Drivers in the community can express their opinions on the driving behavior of other drivers in the community. Drivers' opinions can be accumulated and tallied to produce a cumulative assessment of a particular behavior for a particular driver. A driver's view through their AR device and be further augmented with the community's assessment of that driver's driving behavior, which can influence the driver's future behavior.



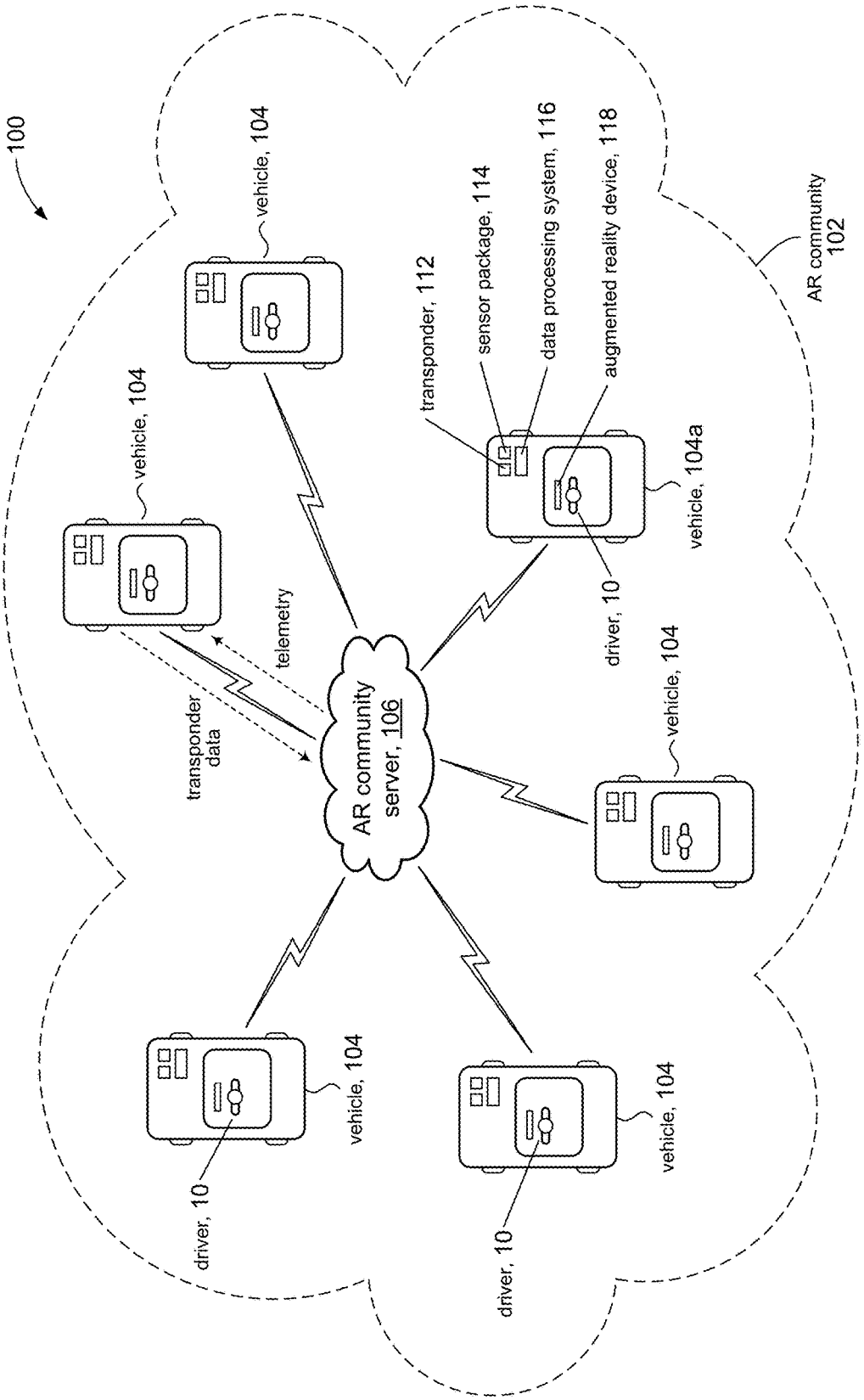

100
AR community 102
vehicle, 104
vehicle, 104
vehicle, 104
transponder, 112
sensor package, 114
data processing system, 116
augmented reality device, 118
vehicle, 104a
driver, 10
telemetry
transponder data
AR community server, 106
vehicle, 104
vehicle, 104
vehicle, 104
driver, 10
driver, 10

Fig. 1

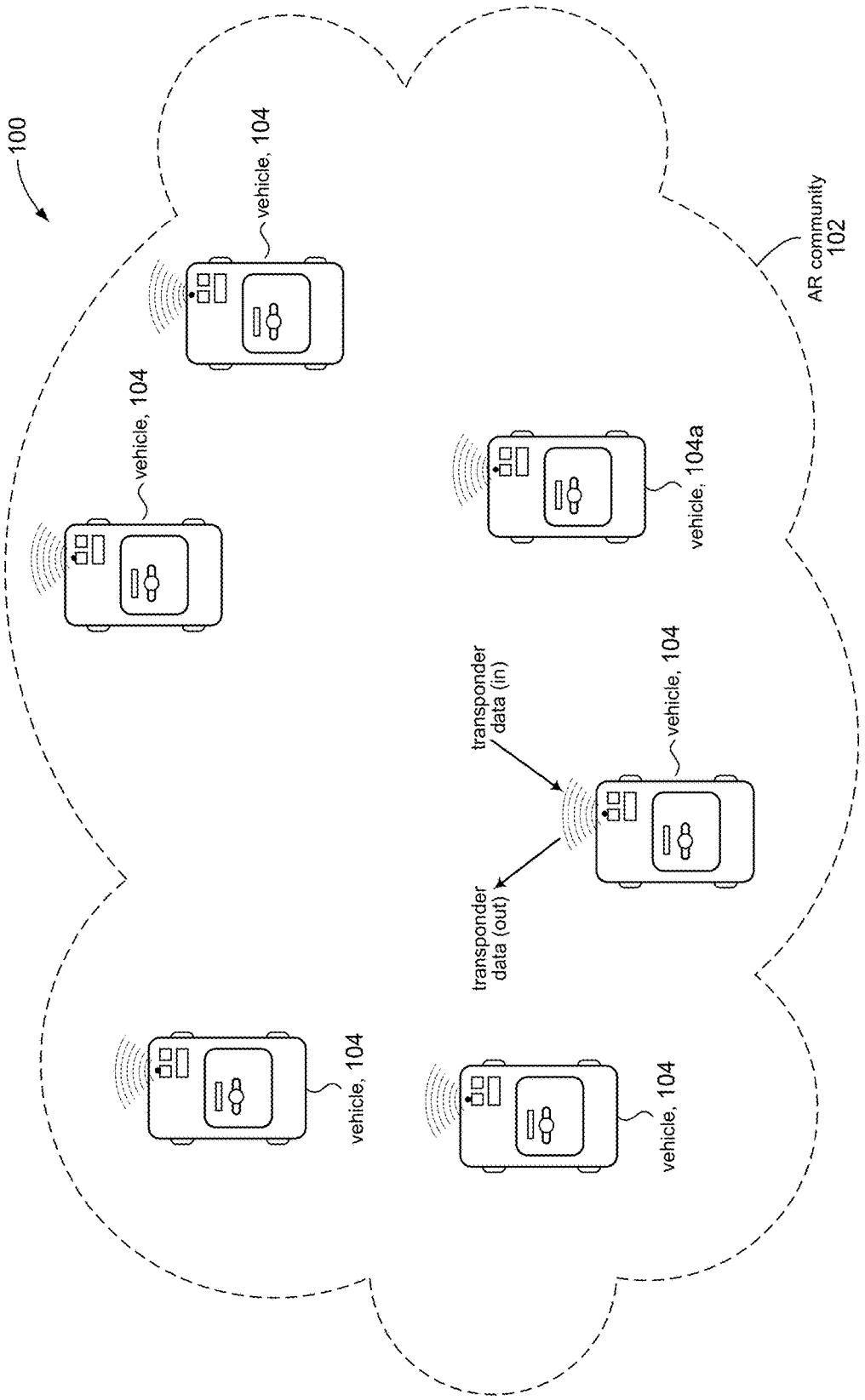

100
AR community
102
vehicle, 104
vehicle, 104
vehicle, 104a
transponder
data (in)
vehicle, 104
transponder
data (out)
vehicle, 104
vehicle, 104

Fig. 2

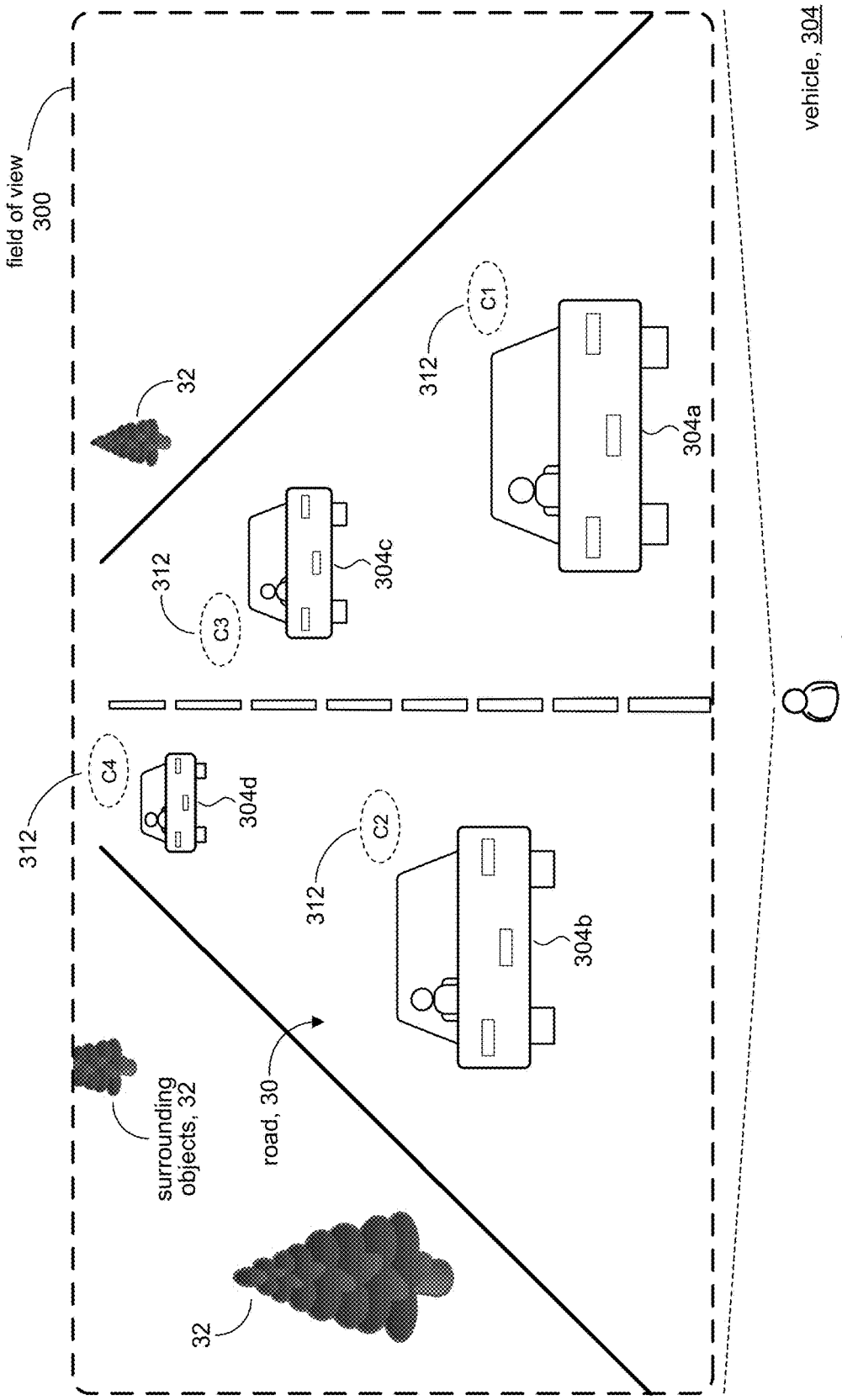

field of view
300
vehicle, 304
312
C1
304a
32
312
C3
304c
312
C4
304d
312
C2
304b
surrounding objects, 32
road, 30
32
driver (user), 10

Fig. 3

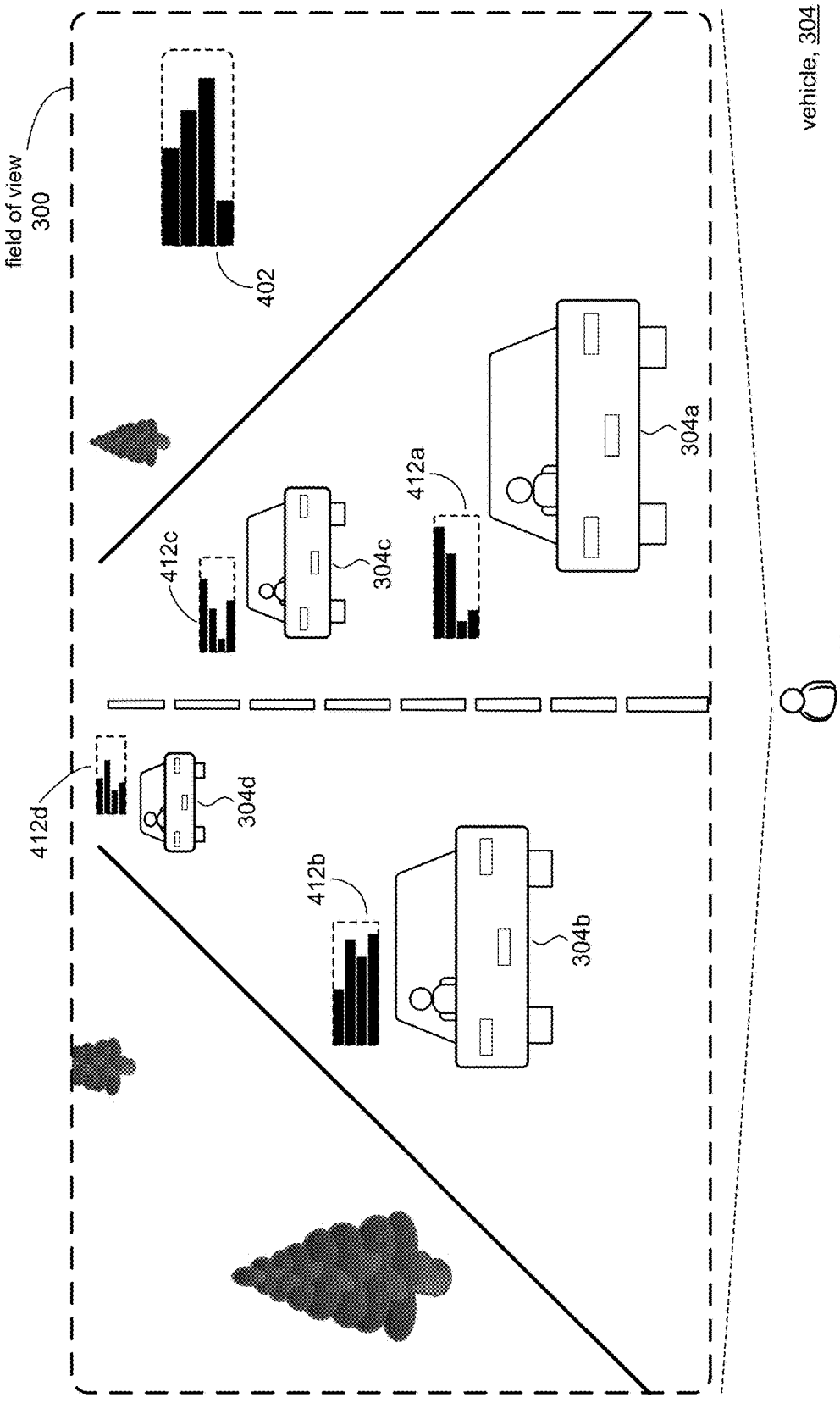

field of view
300
402
412a
304a
412c
304c
412b
304b
412d
304d
vehicle, 304
driver (user), 10

Fig. 4

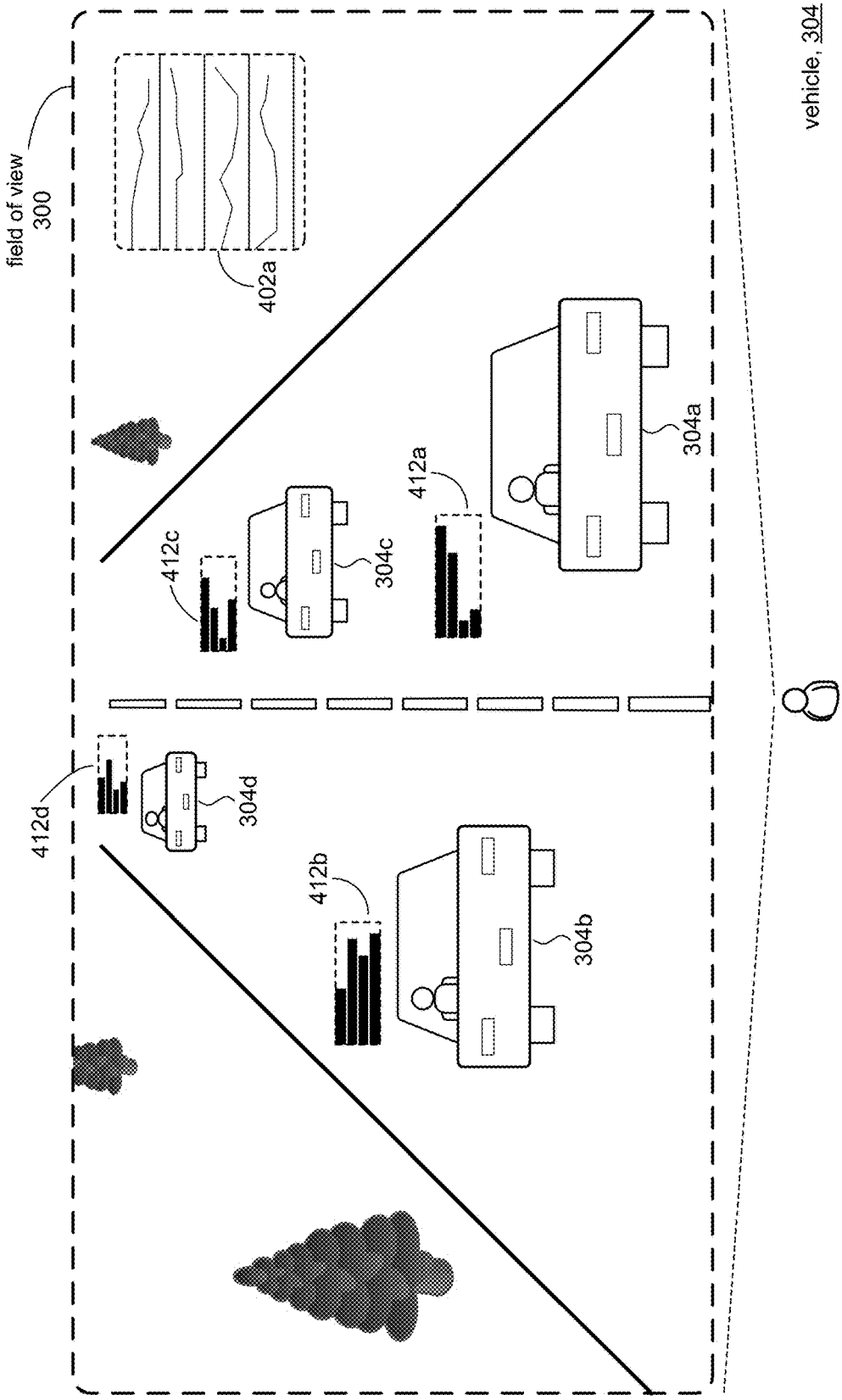

field of view
300
402a
vehicle, 304
304a
412a
304c
412c
304d
412d
304b
412b
driver (user), 10

Fig. 4A

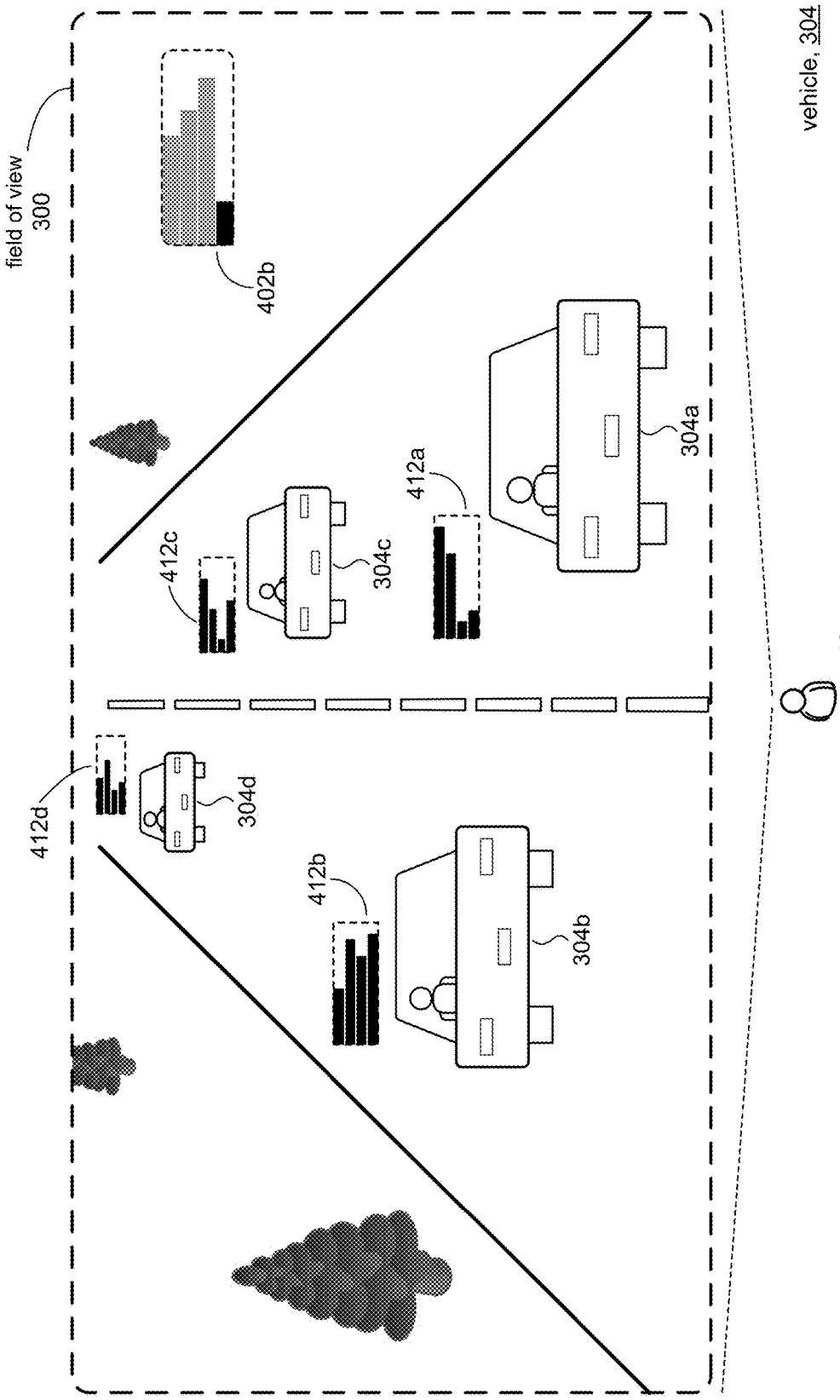

field of view
300
402b
412c
304c
412a
304a
vehicle, 304
412d
304d
412b
304b
driver (user), 10

Fig. 4B

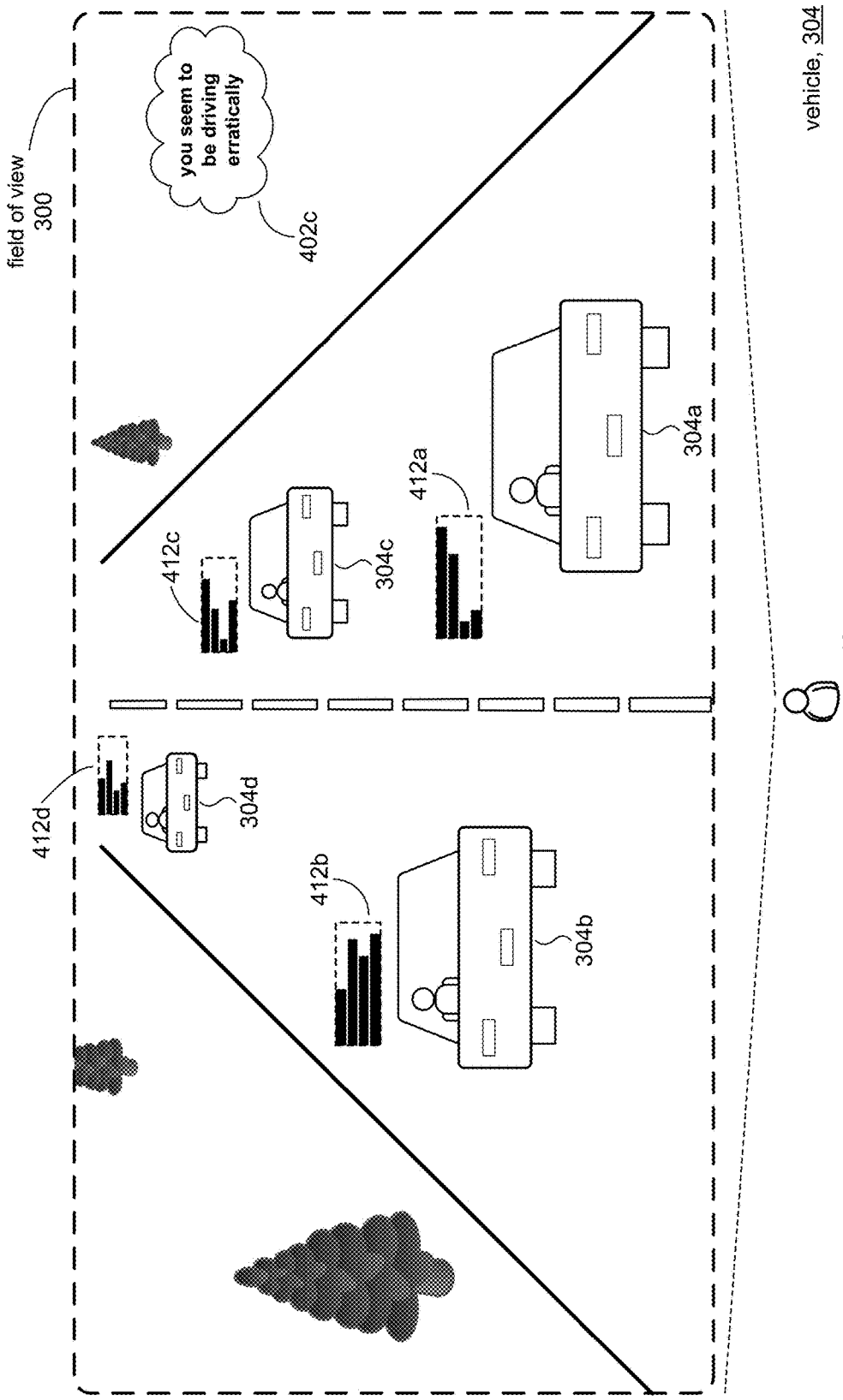

field of view
300
you seem to be driving erratically
402c
vehicle, 304
412d
304d
412b
304b
412c
304c
412a
304a
driver (user), 10

Fig. 4C

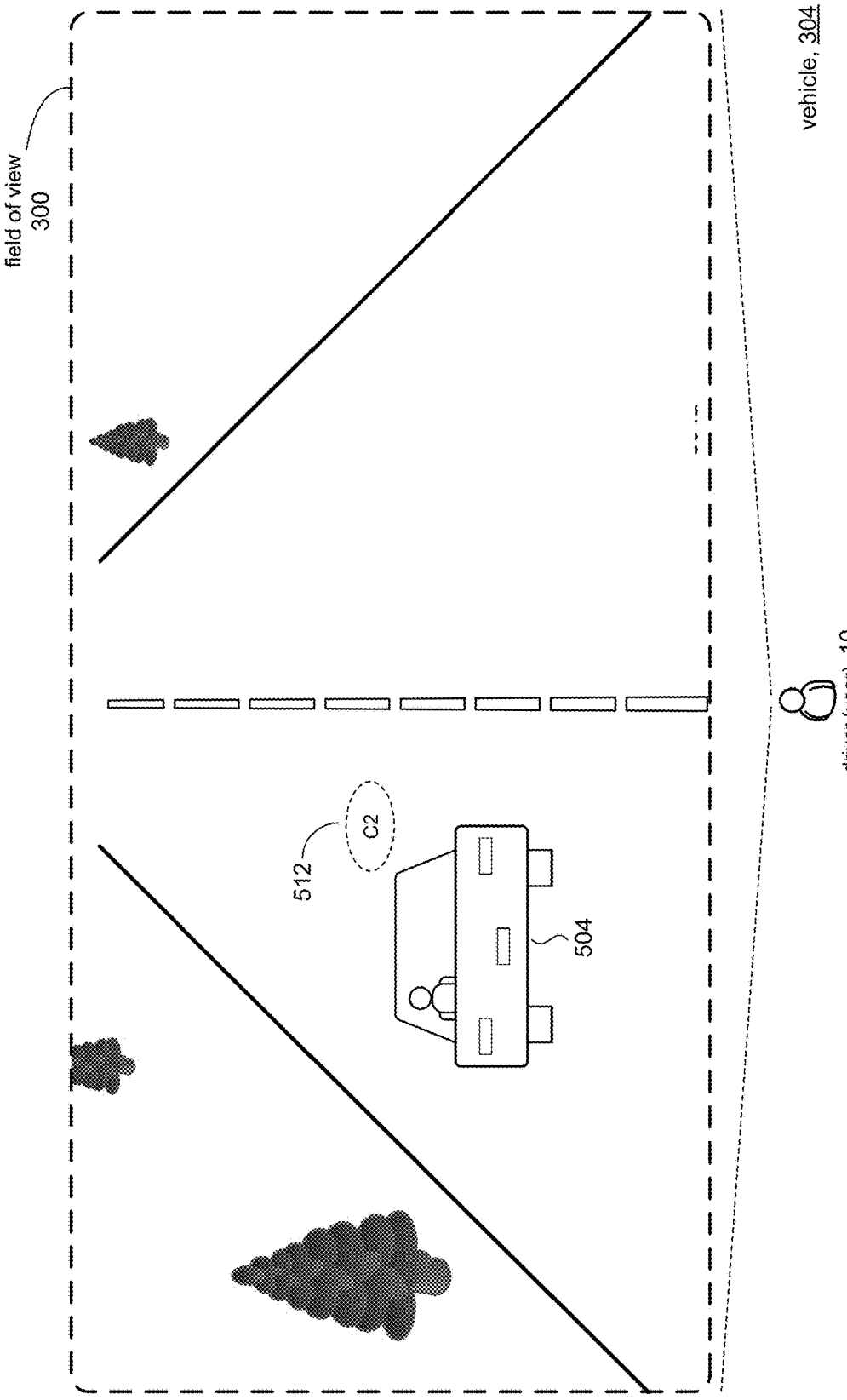


Fig. 5A

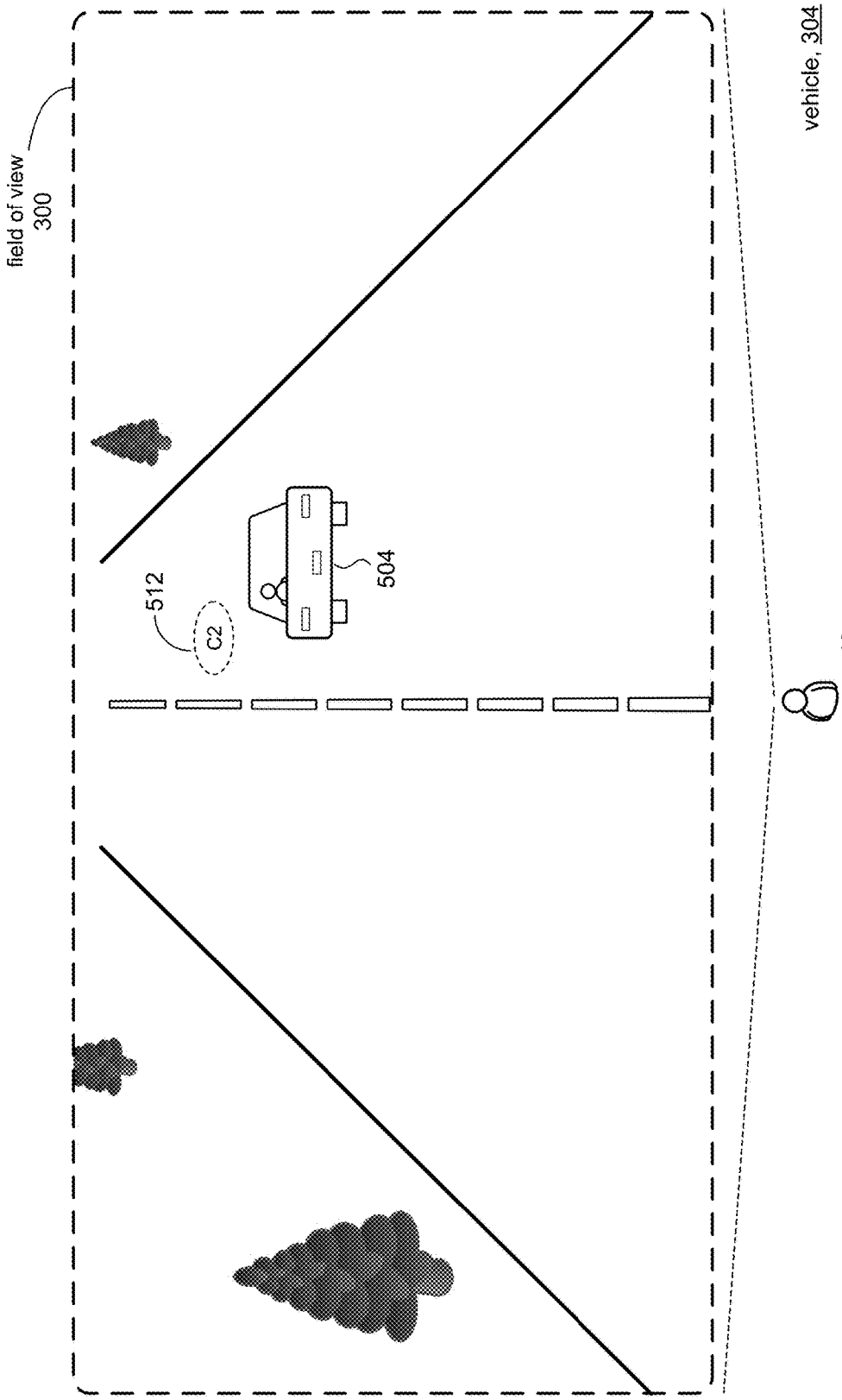


Fig. 5B

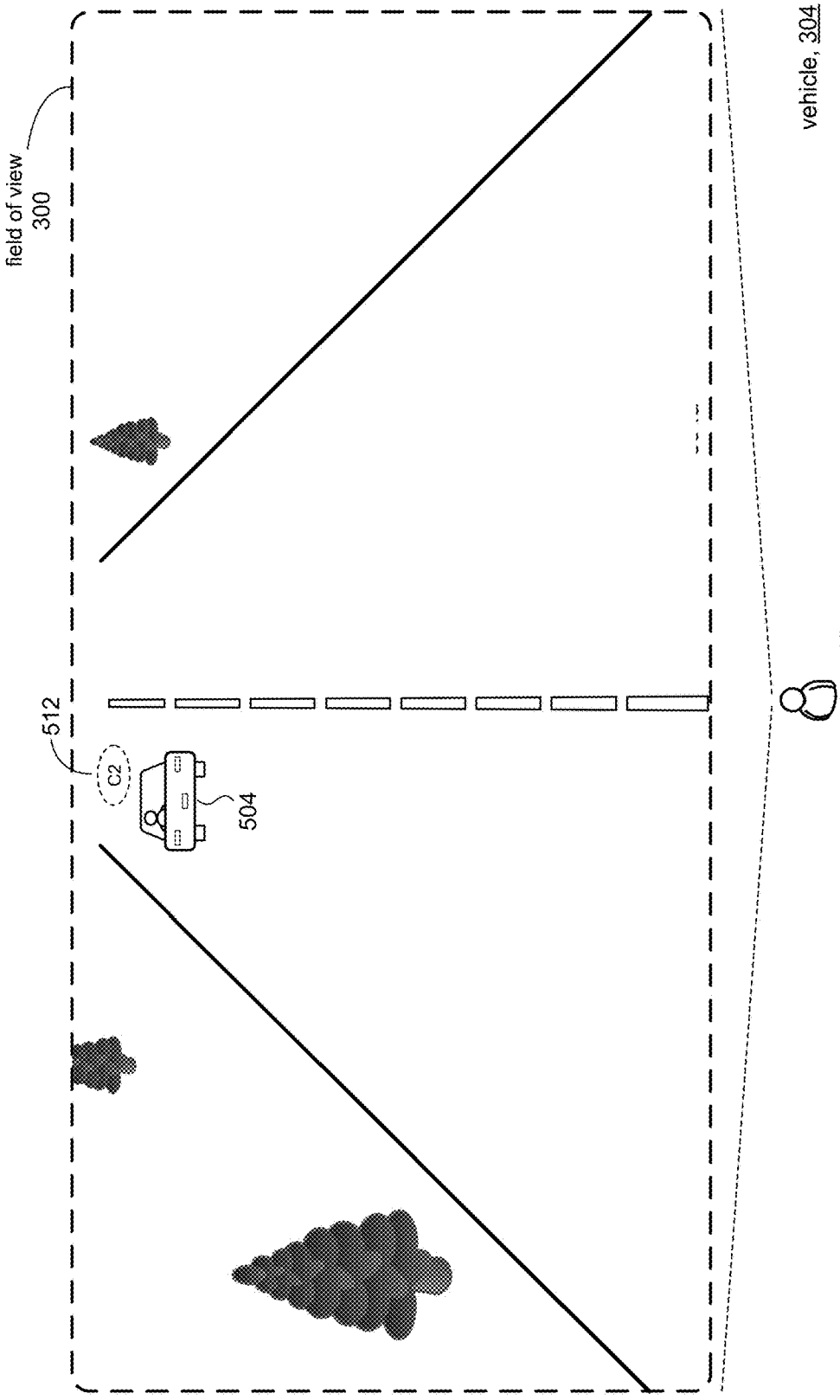


Fig. 5C

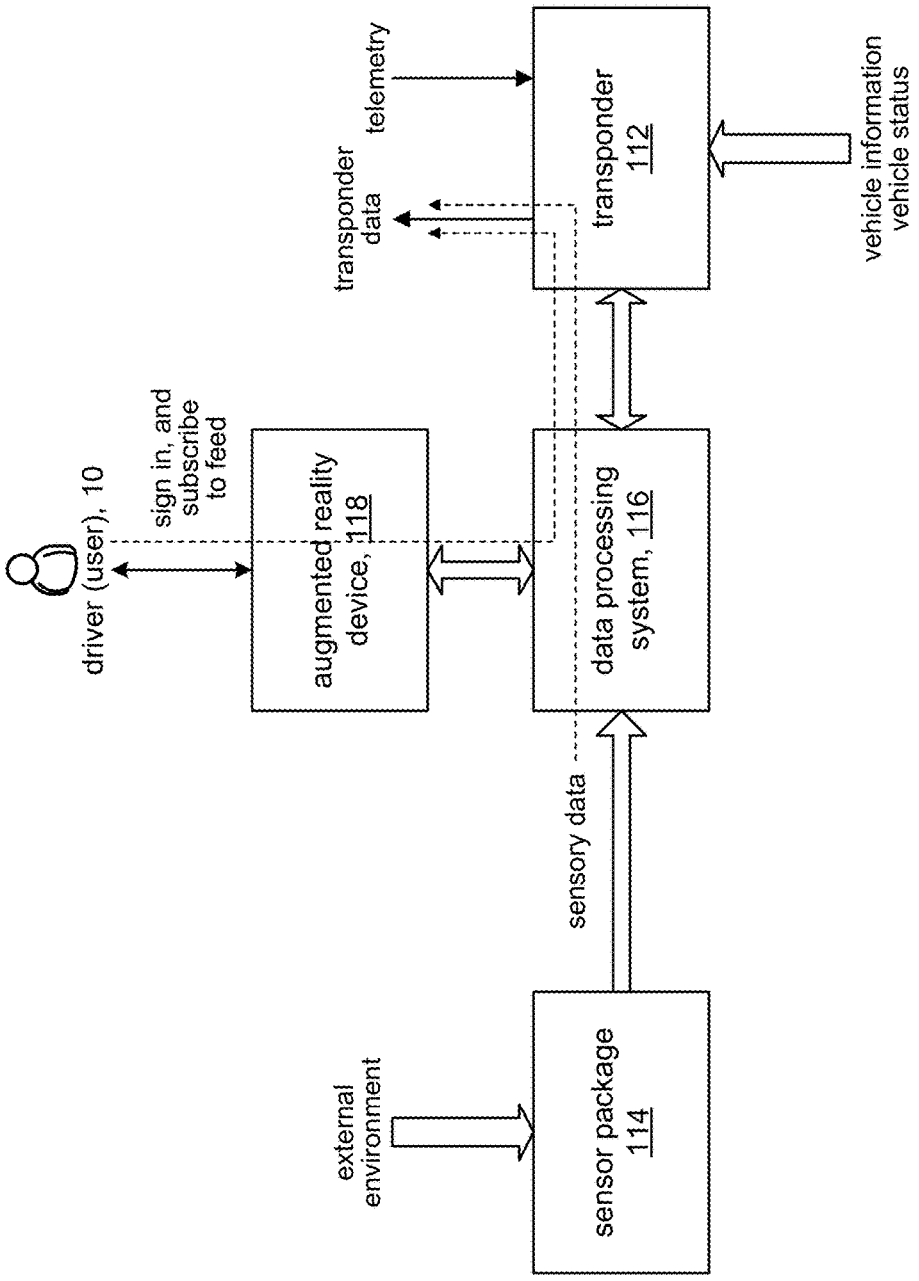

telemetry
transponder data
transponder 112
vehicle information vehicle status
sign in, and subscribe to feed
driver (user), 10
augmented reality device, 118
data processing system, 116
sensory data
external environment
sensor package 114

Fig. 6

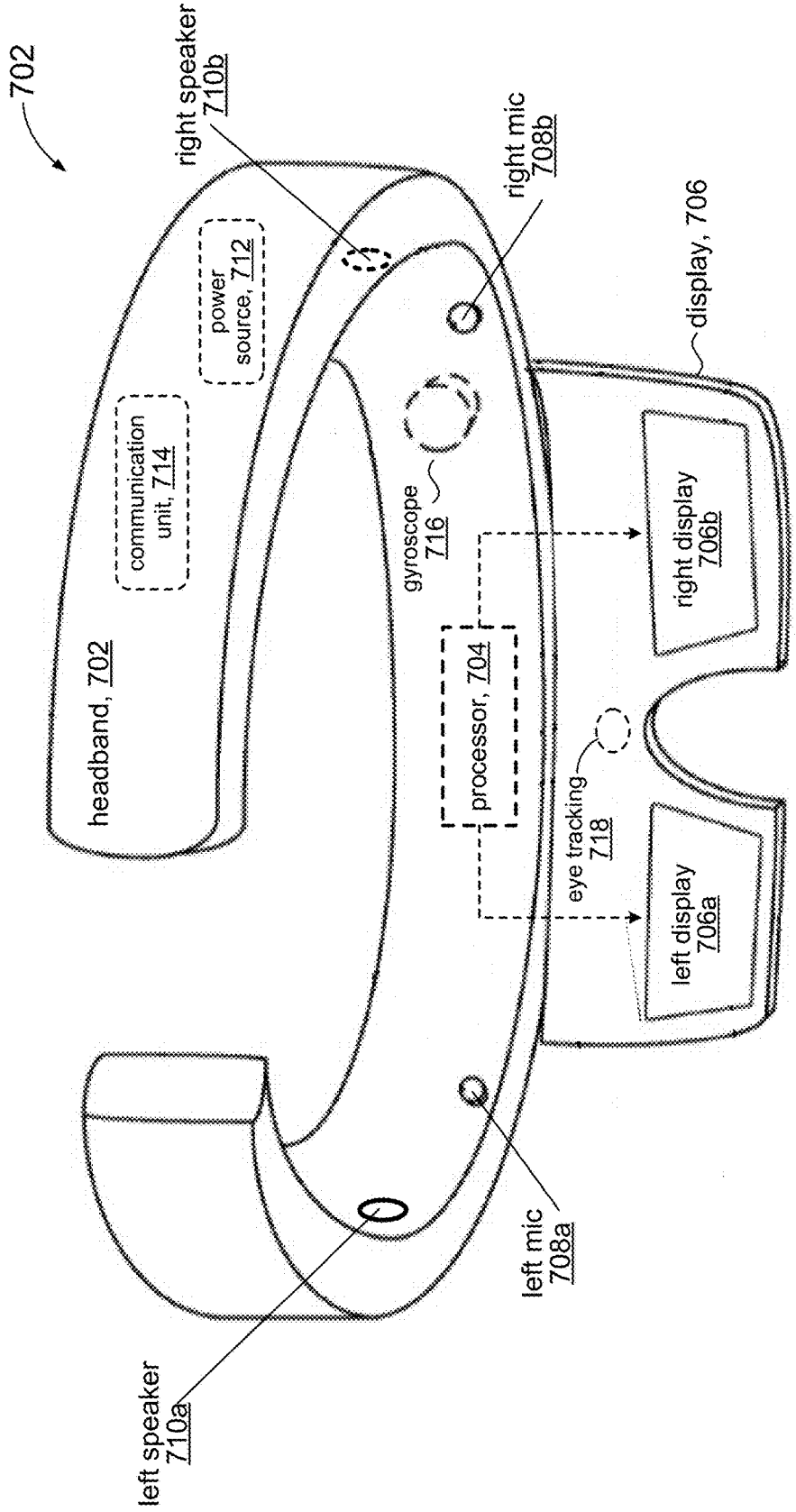

702
right speaker 710b
right mic 708b
display, 706
power source, 712
communication unit, 714
gyroscope 716
headband, 702
processor, 704
right display 706b
eye tracking 718
left display 706a
left mic 708a
left speaker 710a

Fig. 7

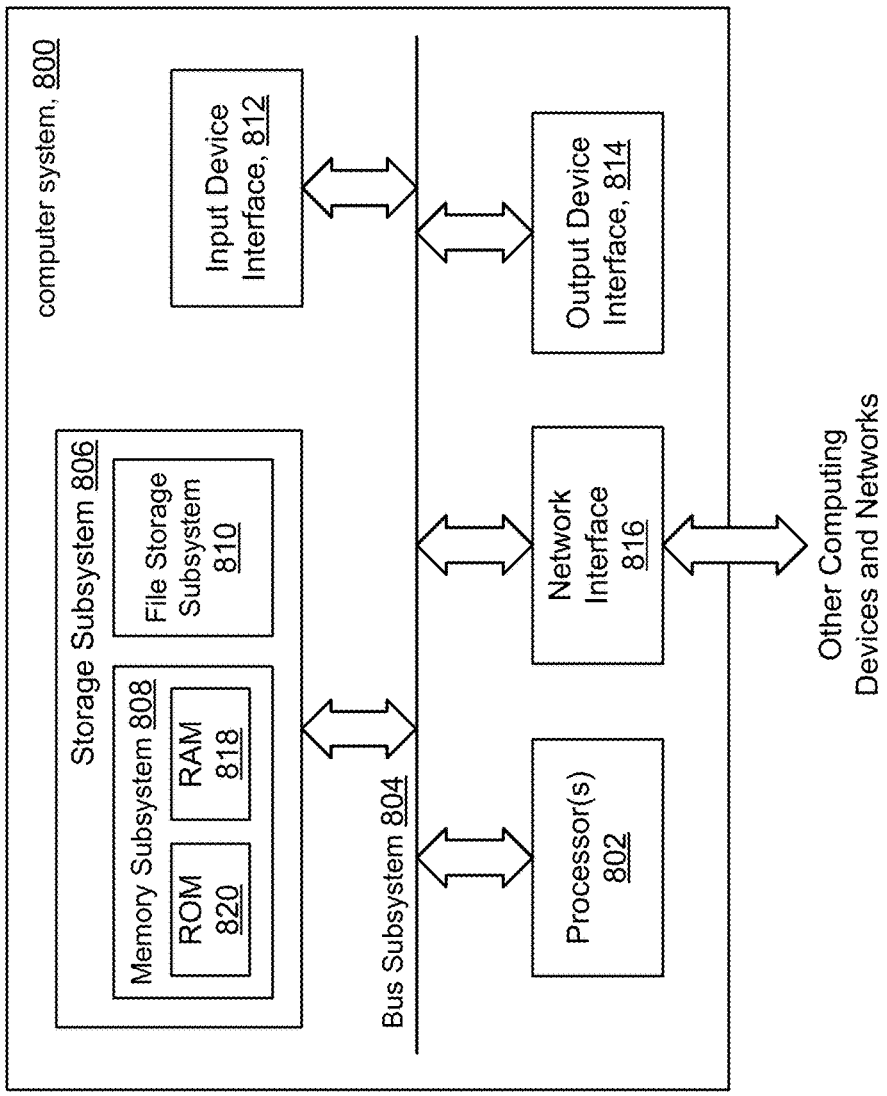

computer system, 800
Input Device Interface, 812
Output Device Interface, 814
Storage Subsystem 806
File Storage Subsystem 810
Memory Subsystem 808
RAM 818
ROM 820
Bus Subsystem 804
Network Interface 816
Processor(s) 802
Other Computing Devices and Networks

Fig. 8

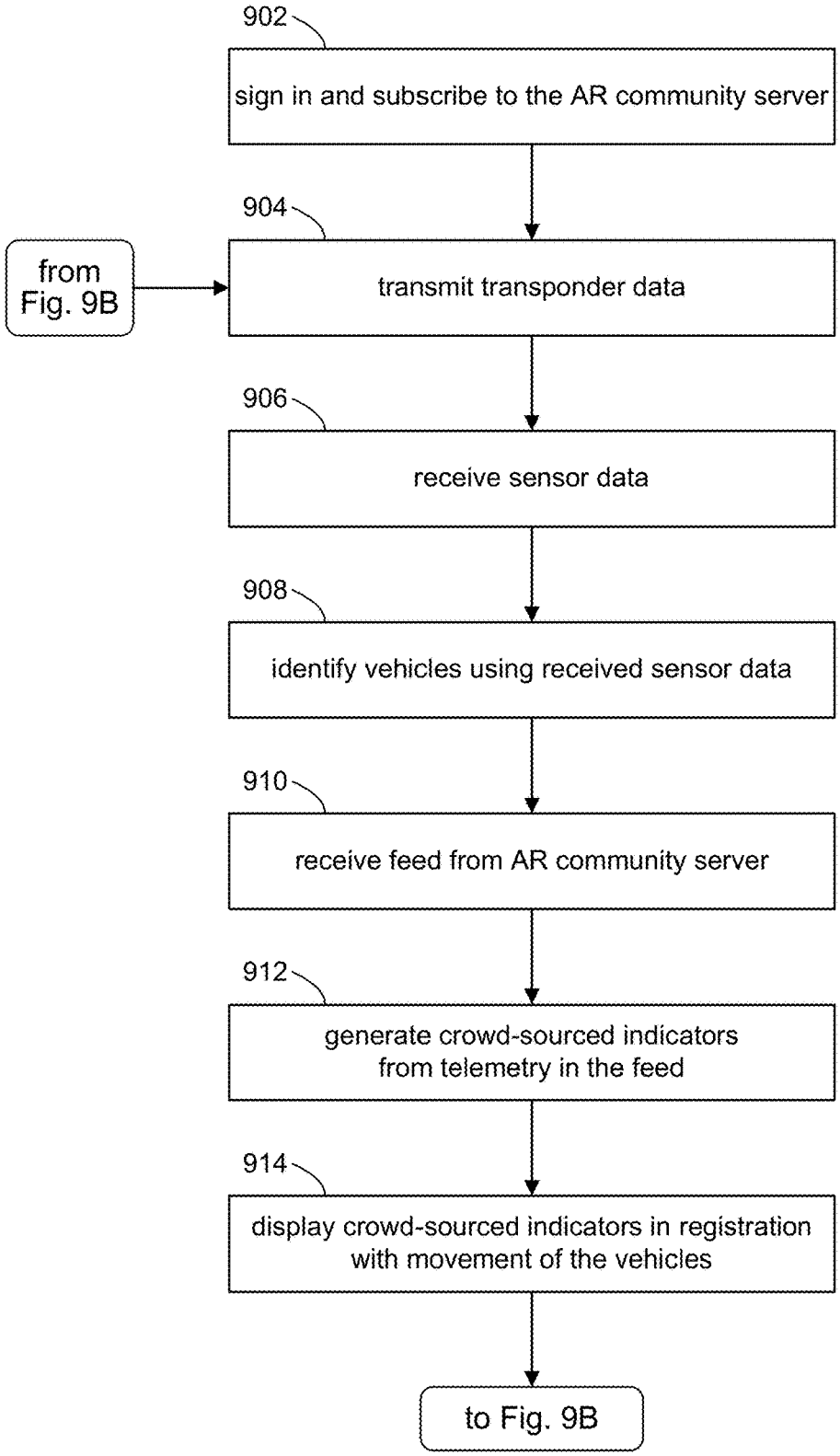

902
sign in and subscribe to the AR community server
904
from Fig. 9B
transmit transponder data
906
receive sensor data
908
identify vehicles using received sensor data
910
receive feed from AR community server
912
generate crowd-sourced indicators from telemetry in the feed
914
display crowd-sourced indicators in registration with movement of the vehicles
to Fig. 9B

Fig. 9A

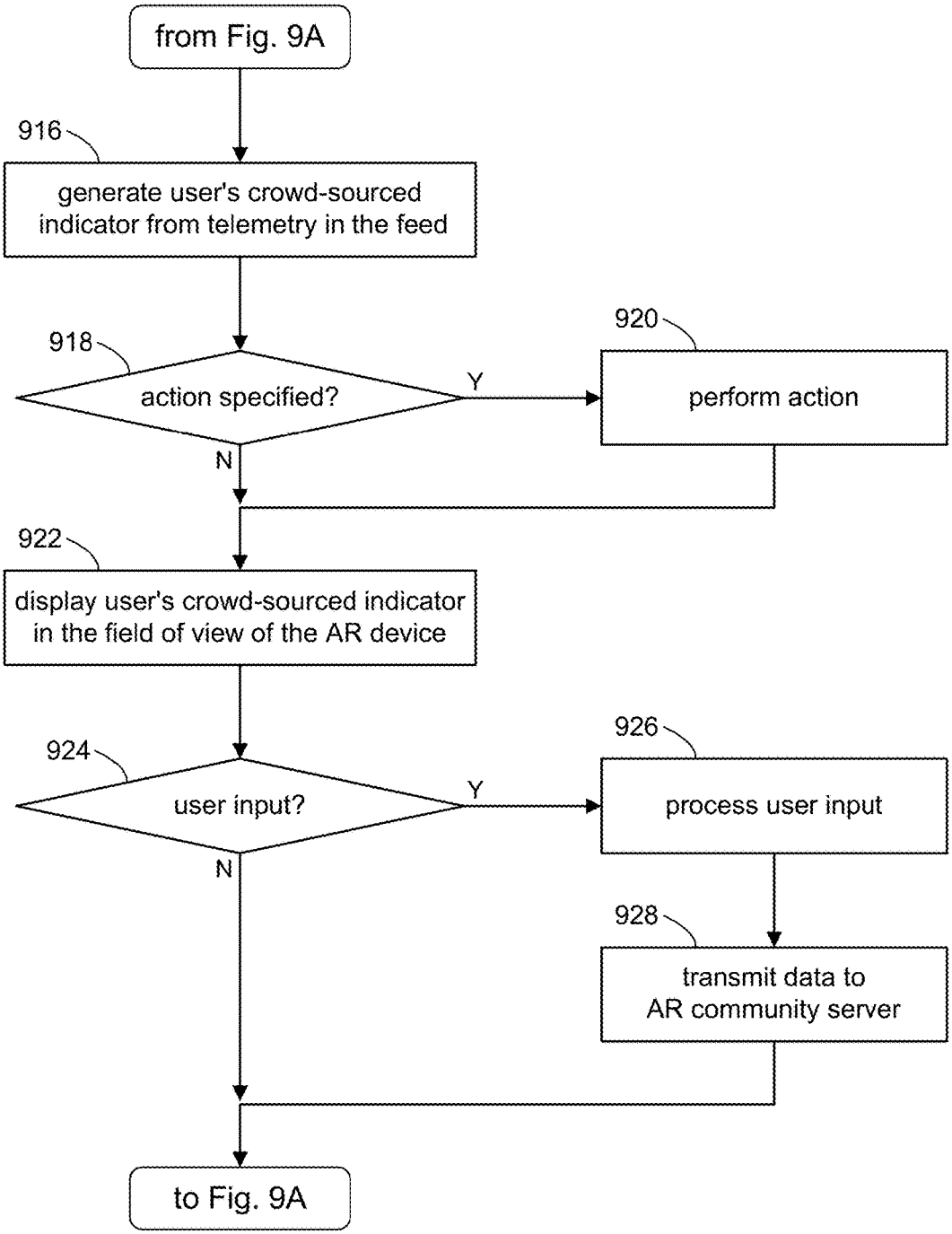

from Fig. 9A
916
generate user's crowd-sourced indicator from telemetry in the feed
918
action specified?
Y
920
perform action
N
922
display user's crowd-sourced indicator in the field of view of the AR device
924
user input?
Y
926
process user input
N
928
transmit data to AR community server
to Fig. 9A

Fig. 9B

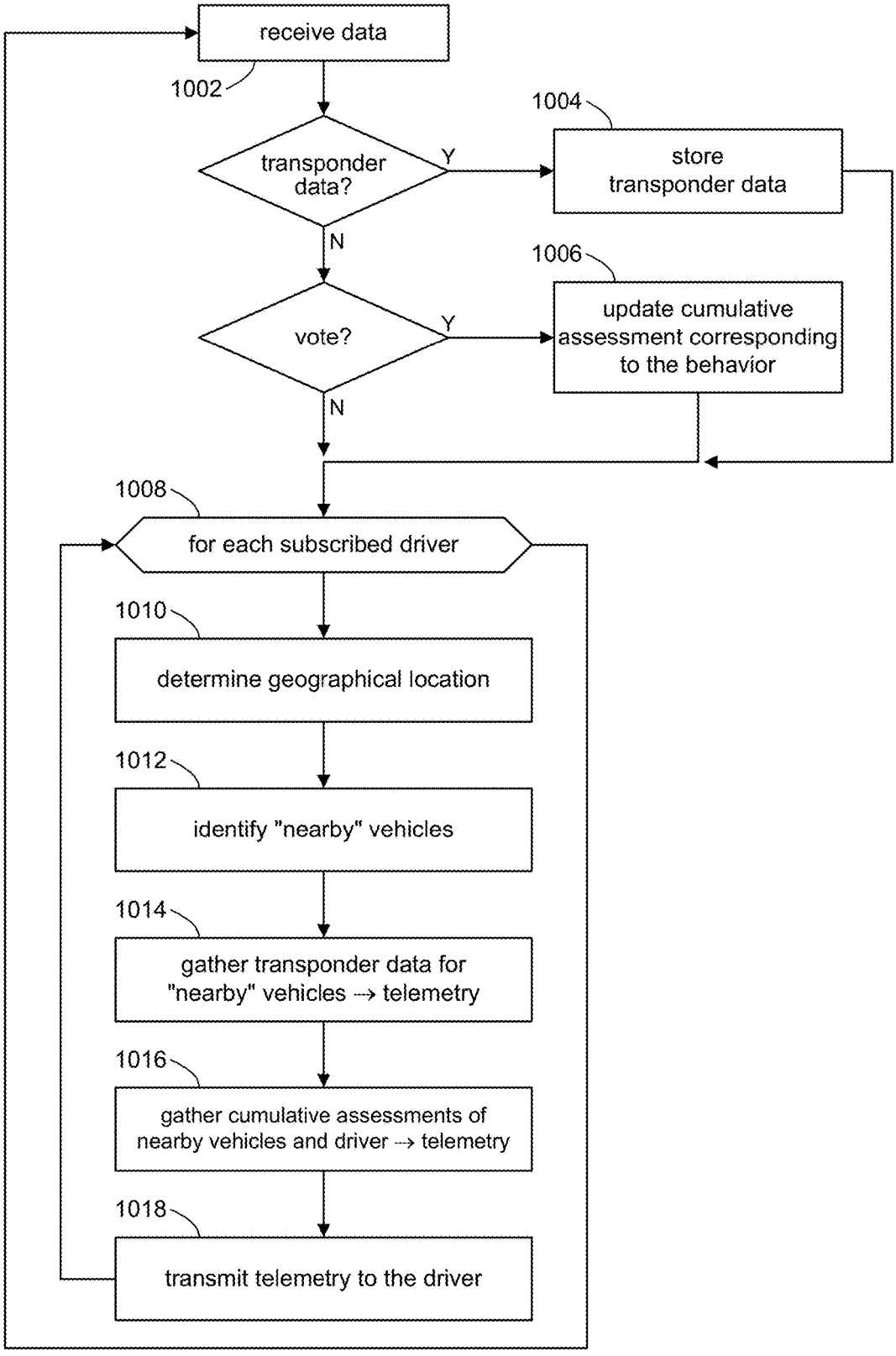

receive data
1002
1004
transponder data?
Y
store transponder data
N
1006
vote?
Y
update cumulative assessment corresponding to the behavior
N
1008
for each subscribed driver
1010
determine geographical location
1012
identify "nearby" vehicles
1014
gather transponder data for "nearby" vehicles → telemetry
1016
gather cumulative assessments of nearby vehicles and driver → telemetry
1018
transmit telemetry to the driver

Fig. 10

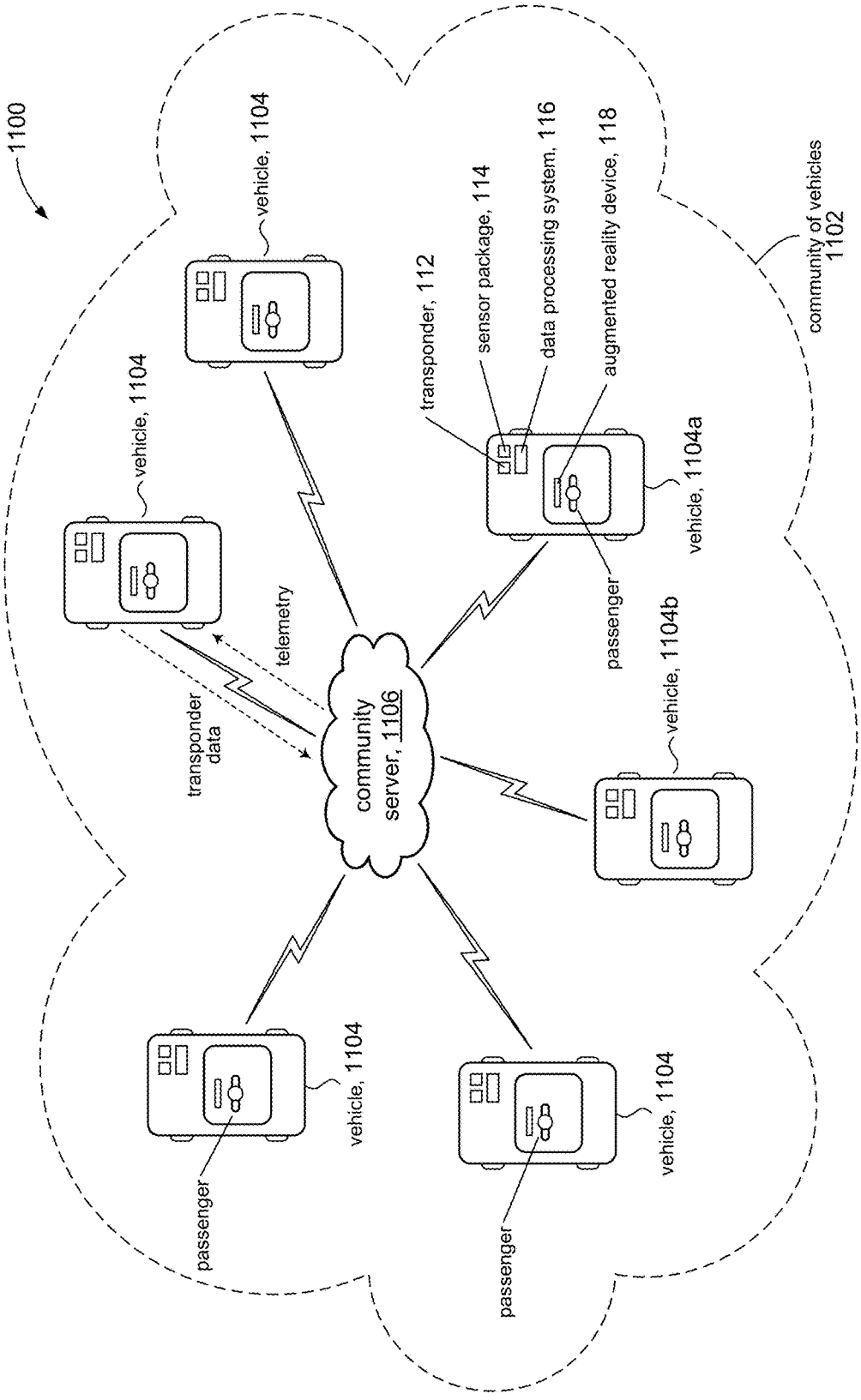

1100
community of vehicles
1102
vehicle, 1104
vehicle, 1104
transponder, 112
sensor package, 114
data processing system, 116
augmented reality device, 118
vehicle, 1104a
passenger
vehicle, 1104b
telemetry
transponder data
community server, 1106
vehicle, 1104
vehicle, 1104
passenger
passenger

Fig. 11

AUGMENTED REALITY BASED COMMUNITY REVIEW FOR AUTOMOBILE DRIVERS

BACKGROUND

[0001] Augmented reality is a technology that superimposes a computer-generated image on a user's view of the real-world, thus providing a composite (augmented) view of their real-world surroundings. The augmentation is usually done by adding extra data (e.g., holograms) to the real-world objects around the user. Consider, for example, a user who is traveling abroad. Suppose the user is interested in the history of the nearby buildings. The user can launch a history app enhanced with augmented reality capability on their smartphone and connect to the Internet. The app looks through the smartphone's camera and shows the real-world surroundings to the user. The user can point the smartphone at a building and in response the app can show a graphical callout (e.g., hologram) that provides some historical information next to the building, thus augmenting the real-world object (i.e., the building) with virtually generated information.

[0002] Augmented reality (AR) devices can come in a wearable form factor. The wearable AR device can be Internet enabled. The AR device can include a semi-transparent display that allows the user to view their real-world surroundings. The user can provide input (e.g., spoken commands) to the AR device to call up information about their real-world surroundings. In response, the AR device can display virtual information on the display, thus superimposing the information over the user's view of their real-world surroundings.

SUMMARY

[0003] The present disclosure describes a system for an augmented reality (AR) based social community for drivers. In various embodiments, a driver's vehicle can be configured to provide an AR experience while driving. The system can provide the driver's vehicle telemetry that provides information about nearby community members and their vehicles on the road. The system can augment the driver's view of their real-world surrounding, as seen through a wearable augmented device for example, with virtual objects that represent information obtained from the received telemetry. In some embodiments, for example, the information can include assessments of those drivers (e.g., their driving behavior) as voted on or otherwise rated by members of the driving community. In some embodiments, the system can provide the AR experience using a heads up display configured with an AR display system.

[0004] In accordance with the present disclosure, the received telemetry can include information that represents the community's assessment of the driver's own driving behavior. The system can further augment the driver's view of their real-world surrounding with virtual objects that represent such information.

[0005] In accordance with the present disclosure, the system can allow a driver to assess another driver's behavior on the road, for example, by describing that other driver's vehicle and speaking words or phrases that indicate a particular behavior and a positive or negative assessment of the behavior. The system can tally up these "votes" for all behaviors of all drivers, and present the resulting cumulative assessments to drivers in the community.

[0006] The following detailed description and accompanying drawings provide further understanding of the nature and advantages of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] With respect to the discussion to follow and in particular to the drawings, it is stressed that the particulars shown represent examples for purposes of illustrative discussion, and are presented in the cause of providing a description of principles and conceptual aspects of the present disclosure. In this regard, no attempt is made to show implementation details beyond what is needed for a fundamental understanding of the present disclosure. The discussion to follow, in conjunction with the drawings, makes apparent to those of skill in the art how embodiments in accordance with the present disclosure may be practiced. Similar or same reference numbers may be used to identify or otherwise refer to similar or same elements in the various drawings and supporting descriptions. In the accompanying drawings:

[0008] FIG. **1** depicts a simplified diagram of an augmented reality (AR) system according to certain embodiments.

[0009] FIG. **2** depicts a simplified diagram of an alternate configuration of an AR system according to certain embodiments.

[0010] FIG. **3** is an illustrative example of an augmented reality scene.

[0011] FIG. **4** is an illustrative example of an augmented reality scene in accordance with the present disclosure.

[0012] FIGS. **4**A, **4**B, and **4**C illustrate further aspects of an augmented reality scene in accordance with the present disclosure.

[0013] FIGS. **5**A, **5**B, **5**C illustrate registration of vehicle indicia in accordance with the present disclosure.

[0014] FIG. **6** shows details of an instrumentation package in an AR system according to certain embodiments.

[0015] FIG. **7** shows an example of a wearable AR device.

[0016] FIG. **8** depicts a simplified block diagram of an example computer system according to certain embodiments.

[0017] FIGS. **9**A and **9**B show operations and processing in an AR system according to certain embodiments.

[0018] FIG. **10** shows operations and processing in a community server for an AR system according to certain embodiments.

[0019] FIG. **11** depicts a community in accordance with further aspects of the present disclosure.

DETAILED DESCRIPTION

[0020] The present disclosure describes using augmented reality (AR) technology to support a social network or community of automobile drivers. The present disclosure enables and facilitates an AR technology based system to provide a driver with information about other drivers. In various embodiments, each participating driver's view of other vehicles on the road can be augmented to display information about the other vehicles and drivers on the road. This augmentation can be facilitated via augmented reality (AR) eyewear or via projection on a vehicle's windshield (e.g., as in a heads-up display). From the perspective of the

driver, information about other vehicles and drivers appear "attached" to those vehicles as they move around on the road.

[0021] The system can provide the ability for each participant to express opinions regarding other drivers, such as offering a positive or negative assessment of each interaction with another driver. The cumulative results of these assessments (for example, a "plus-minus rating" that measures total positive assessments less total negative assessments) can be part of the information displayed about each driver. This enables drivers to be wary of those on the road with strongly negative community assessments, and also encourages better behavior on the roads due to the natural inclination for drivers to want to be perceived positively by peers.

[0022] In the following description, for purposes of explanation, numerous examples and specific details are set forth in order to provide a thorough understanding of the present disclosure. It will be evident, however, to one skilled in the art that the present disclosure as expressed in the claims may include some or all of the features in these examples, alone or in combination with other features described below, and may further include modifications and equivalents of the features and concepts described herein.

[0023] FIG. **1** shows an AR based system **100** in accordance with embodiments of the present disclosure. The system **100** enables and supports an AR-based social community **102** of drivers **10**. Drivers' vehicles **104** include, but are not limited to passenger vehicles (cars, trucks, motorcycles), recreational vehicles, commercial vehicles, public transportation vehicles (e.g., buses, cabs), and so on.

[0024] Vehicles **104** in accordance with the present disclosure can be equipped with various instrumentation. In some embodiments, for example, the instrumentation package in a given vehicle **104***a* can include a transponder **112** to provide information about the vehicle **104***a* and its status. A sensor package **114** can include a radar and/or lidar (light detection and ranging) system to detect the presence of nearby vehicles **104**. The sensor package **114** can include a system of cameras to provide a 360° perception of the vehicle's physical surroundings and correlate with the driver's own visual observations and inputs. A data processing system **116** can provide data processing of information provided by the transponder **112** and sensor package **114**. An AR device **118** can operate in conjunction with the data processing system **116** to provide the driver **10** with an augmented reality experience in accordance with the present disclosure.

[0025] The system **100** can include an AR community server **106** to support interaction among drivers **10** in the community **102**. The server **106** can receive transponder data from each of the transponders **112**; for example, the transponder **112** can include a transceiver unit (not shown) to communicate with the server **106**. In some embodiments, the transponders **112** can always be active; e.g., each transponder **112** can periodically transmit (ping) their data to the server **106** whenever the vehicle **104** is running. This allows the server **106** to have the most up to date information of vehicles **104** in the community **102**. The transponder data received from the vehicles **104** can be collected and processed by the server **106**. The server **106** can repackage the received and processed transponder data and transmit it to a given vehicle (e.g., **104***a*) as telemetry that describes the state of the other vehicles **104** nearby the given vehicle **104***a*.

[0026] Vehicles **104** providing transponder data to the server **106** can be anywhere in a given geographic region. Telemetry for vehicles **104** in one part of town, therefore, may not be relevant to drivers at the other side of town. In accordance with the present disclosure, the server **106** can implement a subscribe/publish service. Drivers can subscribe to a particular feed, for example, based on their local geographical location. The server **106** can then provide telemetry only for those vehicles **104** in the immediate vicinity of the driver.

[0027] The AR community server **106** shown in FIG. **1** provides a data infrastructure for the exchange of data (e.g., transponder data, telemetry) among vehicles **104** in the community **102**. FIG. **2** shows, for some embodiments, that the data exchange can occur directly among the vehicles **104** themselves, without a server. In some embodiments, for example, each transponder **112** can use a radio frequency to broadcast its transponder data to other transponders in its immediate area, and conversely can receive broadcasts from other transponders. In some embodiments, for example, communication can be based on a packet switched radio network. It will be appreciated that the data processing functionality provided by the AR community server **106** can be distributed among the vehicles **104**. The remaining discussion will assume, without loss of generality, a configuration that includes the AR community server **106**.

[0028] Referring to FIG. **3**, the discussion will now turn to a description of various aspects of an augmented reality experience in accordance with the present disclosure. FIG. **3** diagramatically represents a field of view **300** as seen through the AR device **118** by a driver/user **10** of the AR device **118** in vehicle **304**. The term "user" will be used to distinguish between other drivers on the road and the user **10** (who is also a driver) wearing the AR device **118**. The user's field of view **300** includes the real-world objects of the user's surroundings. For example, this can include the real-world vehicles **304***a*, **304***b*, **304***c*, **304***d* that are nearby the user's vehicle **304**. The real-world objects in the user's field of view **300** can also include the road **30** and other objects **32** (e.g., trees, buildings, etc.) in the user's real-world surroundings.

[0029] In accordance with the present disclosure, vehicles **304***a*, **304***b*, **304***c*, **304***d* as seen in the user's field of view **300** can be augmented with virtual objects that are displayed by the AR device **118** and superimposed on the vehicles **304***a*, **304***b*, **304***c*, **304***d*. Virtual objects are depicted in the figures using dashed or broken lines to distinguish from real-world objects which are shown using solid lines. FIG. **3**, for example, shows the vehicles **304***a*, **304***b*, **304***c*, **304***d* are augmented with corresponding crowd-source indicators (vehicle indicia) **312**.

[0030] In accordance with the present disclosure, crowd-sourced indicators **312** represent information that is generated from the collective inputs of other drivers in the community **102**. FIG. **4** illustrates an example of virtual crowd-sourced indicators **412***a*, **412***b*, **412***c*, **412***d* (collectively **412**), respectively associated with each vehicle **304***a*, **304***b*, **304***c*, **304***d* and displayed in the user's field of view **300**. Crowd-sourced indicators **412** can represent driving behaviors. Driving behavior can refer to any aspect of driving as perceived by other drivers on the road. Merely to

illustrate, and by no means exhaustive, examples of driving behaviors can include driver aggressiveness, driver politeness, driver risk-taking, quality of driving, and so on.

[0031] Crowd-sourced indicators **412** can be used to rate driving behaviors of a driver based on individual assessments made by other drivers in the community **102**. The crowd-sourced indicators **412** can represent a cumulative assessment of a driver's behavior. For example, the cumulative assessment can represent a driver's level of aggression, how polite the driver is to other drivers on the road, how risky the driver is, how well the driver is driving, and so on. In some embodiments, for example, individual drivers can assess various behavior by casting votes based on what they see a particular driver doing. For example, a driver may cast an "up" vote if they feel that the target driver is behaving well with respect to a given behavior. Conversely, a driver can cast a "down" vote if they feel the target driver is behaving badly. The individual votes or ratings can be collected and used to generate an overall cumulative assessment for a given behavior.

[0032] The illustrative example of crowd-sourced indicators **412** shown in FIG. **4** uses bar charts to rate various driving behaviors. Each bar in a bar chart (e.g., crowd-sourced indicators **412***a*), for example, can correspond to a certain behavior. As drivers vote or otherwise submit their assessments on a driver's behavior, the corresponding bar of that driver's bar chart can lengthen or shorten to reflect changes in the community's cumulative assessment of the behavior. It will be appreciated that the crowd-sourced indicators **412** can represent any one behavior or set of behaviors. It will be appreciated that the crowd-sourced indicators **412** can be presented in any suitable manner; e.g., using different chart types (e.g., pie chart), using text, using sound (in addition to or instead of visual objects), and so on.

[0033] Since the cumulative assessments (ratings) are based on the cumulative votes of many drivers, an individual driver is not likely to be able to skew the ratings with a strong negative or strong positive vote. For example, a single strong vote can be averaged out by the other votes. Also, since the cumulative assessments are based on the community **102** of drivers, the voting can be reflective of different perceptions among drivers of what is considered good behavior and bad behavior, and so the ratings can be an accurate reflection of how well a driver is doing. These cumulative assessments allow drivers to be wary of those on the road with strongly negative community assessments, and can encourage better behavior on the roads due to the natural inclination for people to want to be perceived positively by peers.

[0034] FIG. **4** further illustrates that, in accordance with the present disclosure, an individualized virtual crowd-sourced indicator **402** for the user **10** can be presented via the user's AR device **118**. Like the vehicle crowd-sourced indicators **412**, the user's crowd-sourced indicator **402** can represent the cumulative assessments of the user's driving behaviors as assessed by other drivers in the community **102**.

[0035] The user's crowd-sourced indicator **402** can be presented in a suitable position in the user's field of view **300**. The user's crowd-sourced indicator **402** can include more and/or different information than crowd-sourced indicators **412**. More detailed information can be presented if there is sufficient space in the user's field of view **300** to display the additional information without obstructing the user's view of the road or otherwise impacting driving safety. The user **10** may benefit from the additional and/or different information. Referring to FIG. **4**A merely as an example to illustrate the point, instead of displaying the current cumulative assessment for a given behavior, for example, the user's crowd-sourced indicator **402** can comprise a graph **402***a* or some other suitable representation of previous ratings to indicate improvement in driving behavior (which can serve as positive reinforcement of the behavior) or deterioration in driving behavior (which can trigger a change in the behavior).

[0036] In accordance with some embodiments, the visual presentation of the user's crowd-sourced indicator **402** can vary depending the voting pattern by the other drivers. For example, attributes such as font, size, color, flashing, and so on of the text and/or graphical elements comprising the user's crowd-sourced indicator **402** can be varied. Altering the attributes of the graphic can serve to capture the user's attention. For example, if a threshold number of other drivers give the driver a negative assessment, that fact can be conveyed to the user **10**. FIG. **4**B illustrates an example. Here, one of the bars in the user's crowd-sourced indicator **402***b* is highlighted to show that the user **10** has reached a strong a negative assessment by the other drivers. This can alert the user **10** to that fact, which may encourage the user **10** alter their driving behavior.

[0037] In some embodiments, an entirely different graphic can be presented, rather than simply altering an attribute of the graphic, to alert the misbehaving user **10**. Referring to FIG. **4**C, for example, suppose a large number of drivers voted that the user **10** is driving erratically, the user's crowd-sourced indicator **402** can change from the bar chart format shown in FIG. **4** to an explicit warning **402***c* as shown in FIG. **4**C. Generally, the user's crowd-sourced indicator **402** can be presented in any manner to indicate a certain voting pattern.

[0038] Referring to the sequence in FIGS. **5**A, **5**B, and **5**C, in accordance with the present disclosure, the crowd-sourced indicator **512** can be displayed in registration with the corresponding vehicle **504** as the vehicle's position in the user's field of view **300** changes while traveling on the road. This allows the crowd-sourced indicator **512** (virtual object) to track with the vehicle **504** (real-world object) in the user's field of view **300**. As can be seen in the sequence, the position of the crowd-sourced indicator **512** can change as the vehicle's position changes. Also, as the distance between the user **10** and the vehicle **504** changes, the size of the crowd-sourced indicator **512** can change accordingly; e.g., size increases as the distance decreases and size decreases as the distance increases.

[0039] FIG. **6** shows additional detail of the instrumentation package shown in FIG. **1** that can be provided in each vehicle **104** in accordance with the present disclosure. For example, in a given vehicle **104***a*, transponder **112** can generally provide information about the vehicle itself. In some embodiments, for example, the transponder **112** can store information that identifies the vehicle **104***a*; e.g., the make and model of the vehicle, license number, and so on. The transponder **112** can be integrated with the vehicle's systems to provide information about the status of the vehicle **104***a*. Status information can include attributes of the engine (e.g., engine temp., oil level, fuel level, etc.), speed of the vehicle **104***a*, the vehicle's acceleration (gas pedal)/deceleration (brake pedal) state, and the like. The

transponder **112** can include a GPS component to provide information about the vehicle's location. Information from the transponder **112**, collectively referred to as "transponder data," can be transmitted to the AR community server **106**. In addition, the transponder data can be provided to the data processing system **116** and processed locally to support functionality in the AR device **118**. The transponder **112** can be used to allow the user to sign-in to the AR community server **106** and to subscribe to feeds for information on other drivers on the road.

[0040] In accordance with the present disclosure, the sensor package **114** in a given vehicle **104***a* can provide sensory data about the vehicle's external environment. In some embodiments, for example, the sensor package **114** can include a radar and/or lidar system to detect the presence of nearby vehicles **104**, and generate radar and/or lidar data that represents other vehicles' positions relative to each other and to the given vehicle **104***a*. The radar and/or lidar data can include information about other vehicles' speeds relative to each other and to the given vehicle **104***a*, and the like. The sensor package **114** can include a system of cameras to record a 360° view around the vehicle **104***a* to provide a source of visual information (e.g., video feeds) of the vehicle's surroundings, including other vehicles **104** (e.g., their color, make and model, etc.), nearby structures, road conditions, etc. The radar and/or lidar data, video feeds, and any other data collected by the sensor package **114** can be provided to the data processing system **116** and processed locally to support the AR device **118**. In some embodiments, some of the sensory data can be incorporated with the transponder data and provided to the AR community server **106**.

[0041] The data processing system **116** can serve as the central data processing unit in the vehicle **104***a* to process transponder data from the transponder **112** and sensory data from the sensor package **114**. The data processing system **116** can also provide the human-machine interaction with the AR device **118** to provide the driver **10** with an augmented reality experience in accordance with the present disclosure.

[0042] FIG. **7** illustrates an AR device **118** in accordance with the present disclosure. In some embodiments, for example, the AR device **118** can take the form of a wearable device. Different wearable form factors include goggles, glasses, and the like. In other embodiments (not shown), the AR device can be a heads up display system (HUDS) that is integrated with the vehicle's windshield to project virtual objects onto the vehicle's windshield. A HUDS AR device can additionally project virtual objects onto the user's passenger-side window. A HUDS AR device can include a head position sensor and eye tracking sensor to provide information about the user's head position and eye movements to provide registration of virtual objects with vehicles in the user's field of view (e.g., **300**, FIG. **3**). The present disclosure will assume, without loss of generality, a wearable AR device **118**.

[0043] The AR device **118** can include a headband **702** that allows the user **10** to wear the device. The headband **702** can be adjustable to provide a suitable fit for the user **10**. The headband **702** can house various components comprising the AR device **118**, including a power source **712** and a communication unit **714**; e.g., to provide wireless communication with data processing system **116**.

[0044] The AR device **118** can include a processor **704**, which among other things, can generate and display virtual objects (e.g., crowd-source indicators **402**, **412**) to the user **10** on a display **706**. In some embodiments, the display **706** can be partially transparent so that the user **10** can view their real-world surrounding through the display **706**. The display **706** can comprise a left display panel **706***a* and a right display panel **706***b*. The left and right display panels **706***a*, **706***b* can be implemented using any suitable technology; e.g., using transparent organic light emitting diodes (OLED), edge-mounted light modulators, and so on.

[0045] Virtual objects displayed or presented on the display **706** are visually superimposed onto the user's field of view **300** such that the virtual objects appear with the real-world objects as shown, for example, in FIGS. **3** and **4**. The left and right display panels **706***a*, **706***b* can provide a stereoscopic effect for 3-dimensional virtual objects so as to visually place the virtual objects at a desired depth by presenting separate images of the virtual objects in the left and right display panels **706***a*, **706***b*.

[0046] The AR device **118** can include left and right microphones **708***a*, **708***b* for receiving spoken input from the user **10**; e.g., for voice commands. In some embodiments, it may be sufficient to have only a single microphone. The AR device **118** can include left and right speakers **710***a*, **710***b* to provide stereo audio to the user **10**, although in some embodiments, only a single speaker may be sufficient.

[0047] In accordance with the present disclosure, the AR device **118** can include sensors such as a gyroscope **716** to provide information about the user's head position, such as lateral position, tilt, rotation and so on. Another sensor can include an eye tracking sensor **718** to track the user's eye movements. As will be discussed below, these position sensors **716**, **718** can be used to provide registration of virtual objects with vehicles as the vehicles move in the user's field of view **300**.

[0048] FIG. **8** depicts a simplified block diagram of an example computer system **800** according to certain embodiments. Computer system **800** can be used to implement any of the computing devices, systems, or servers described in the present disclosure, including for example the AR community server **106**, data processing system **116**, and processor **704** in the AR device **118**.

[0049] As shown in FIG. **8**, computer system **800** includes one or more processors **802** that communicate with a number of peripheral devices via a bus subsystem **804**. These peripheral devices include a storage subsystem **806** (comprising a memory subsystem **808** and a file storage subsystem **810**, an interface **812** for input devices, an interface **814** for output devices, and a network interface subsystem **816**.

[0050] Bus subsystem **804** can provide a mechanism for letting the various components and subsystems of computer system **800** communicate with each other as intended. Although bus subsystem **804** is shown schematically as a single bus, alternative embodiments of the bus subsystem **804** can utilize multiple busses.

[0051] Network interface subsystem **816** can serve as an interface for communicating data between computer system **800** and other computer systems or networks. Embodiments of network interface subsystem **816** can include for example, a WiFi transceiver, cellular adapter, wireless modem (satellite, packet-switched radio, etc.), and/or the like. The network interface subsystem **816** in both the data processing system **116** and the processor **704** of the AR

device **118**, for example, can use wireless communication technology to communicate with each other.

[0052] The interface **812** can connect to audio input devices such as the microphones **708***a*, **708***b* in the case of AR device **118**. The interface **814** can connect to output devices such as the display **706** in AR device **118**.

[0053] Storage subsystem **806** includes a memory subsystem **808** and a file/disk storage subsystem **810**. Subsystems **808** and **810** represent non-transitory computer-readable storage media that can store program code and/or data that provide the functionality of embodiments of the present disclosure.

[0054] Memory subsystem **808** includes a number of memories including a main random access memory (RAM) **818** for storage of instructions and data during program execution and a read-only memory (ROM) **820** in which fixed instructions are stored. File storage subsystem **810** can provide persistent (i.e., non-volatile) storage for program and data files, and can include a magnetic or solid-state hard disk drive, an optical drive along with associated removable media (e.g., CD-ROM, DVD, Blu-Ray, etc.), a removable flash memory-based drive or card, and/or other types of storage media known in the art.

[0055] It should be appreciated that computer system **800** is illustrative and many other configurations having more or fewer components than system **800** are possible.

[0056] Referring to FIGS. **9**A and **9**B and other figures, the discussion will now turn to a high level description of operations and processing by the instrumentation package in a vehicle **104**, including the computer system **116** and AR device **118**, to provide an augmented reality experience in accordance with the present disclosure. In some embodiments, for example, the computer system **116** and AR device **118** can include computer executable program code, which when executed by their respective processors (e.g., **802**, FIG. **8**), can cause the computer system **116** and AR device **118** to perform processing in accordance with FIGS. **9**A and **9**B. The operation and processing blocks described below are not necessarily executed in the order shown, and can be allocated for execution among one ore more concurrently executing processes and/or threads.

[0057] At block **902**, a user **10** can sign-in to the AR community server **106** so that the user can be identified. In some embodiments, the sign-in process can ensure anonymity, for example, by using anonymous ID. This allows the AR community server **106** to announce the user's presence to the community **102** without revealing who they are. The sign-in can include a password or other authentication sequence so to ensure the ID, although anonymous, is used by the same user **10**.

[0058] Once signed in, the user **10** can subscribe to a feed to receive local telemetry from the AR community server **106**. The telemetry is "local" in the sense that the telemetry is for vehicles near the user's location. The AR device **118** can receive spoken commands from the user **10** to request a feed from the AR community server **106**, including identifying information that can be used to identify the user **10**. In some embodiments, the AR device **118** can perform voice recognition processing to convert the speech to equivalent text. The generated text can be sent in a subscribe-to-feed request (e.g., via computer system **116**) to the AR community server **106**. In other embodiments, the AR device **118** can transmit the spoken speech to the computer system **116**, which can then perform the conversion. In some embodiments, the computer system **116** can transmit the spoken speech to the AR community server **106** to process the spoken speech. The request can be sent to the AR community server **106** along with the transponder data, as depicted in FIG. **6** for example.

[0059] At block **904**, the transponder **112** in the user's vehicle can continuously (e.g., periodically) transmit transponder data to the AR community server **106**. The transponder data includes status information and location information (e.g., GPS coordinates) for the user's vehicle. The transponder **112** can provide some of the transponder data (e.g., GPS coordinates of the user's vehicle) to the computer system **116** for local processing.

[0060] At block **906**, the computer system **116** can receive sensor data from the sensor package **114**. As explained above, the sensor data can provide information about the external surroundings of the user's vehicle, including radar and/or lidar data and video feeds, that can provide information about vehicle near the user's vehicle.

[0061] At block **908**, the computer system **116** can use the sensor data to identify vehicles in the user's vicinity. For example, the computer system **116** can include a computer vision system and image processing capability to recognize the presence of vehicles in the video feeds contained the sensor data. The computer system **116** can include recognition software to identify vehicles by make and model, their color, and so on. The positions of identified vehicles relative to the user's vehicle can also be determined; e.g., in front of, to the right, to the left, behind, etc.

[0062] At block **910**, the computer system **116** can receive a feed from the AR community server **106** (block **902**). The feed can include telemetry for the vehicles near the user **10**. For example, the telemetry can include the location information (e.g., GPS coordinates) of each vehicle, information that identifies the drivers of the vehicles, and so on. In accordance with the present disclosure, the telemetry can include cumulative assessments data, described above in connection with FIG. **4**, associated with the drivers in each vehicle. The telemetry can further include cumulative assessment data associated with the user **10**.

[0063] At block **912**, the computer system **116** can generate crowd-sourced indicators (e.g., **412**) for vehicles identified in the received telemetry. The telemetry can include the cumulative assessments of one or more driving behaviors for each vehicle. In some embodiments, the received telemetry can include graphical data for generating the indicators themselves. In other embodiments, the computer system **116** may include predefined graphics in its memory (e.g., **810**, FIG. **8**) that it can use to generate the indicators. The computer system **116** can use the cumulative assessments as parameters to control the generation of the indicators; e.g., the length of bars in a bar chart can be determined by the magnitude of its associated cumulative assessment.

[0064] At block **914**, the computer system **116** can display the crowd-sourced indicators in registration with their respective vehicles. For example, the computer system **116** can identify the positions of the vehicles using the location information provided in the received telemetry (block **910**) and the position of the user's vehicle using location information provided by the vehicle's transponder **112** (e.g., transponder data) to determine the location of each vehicle to a first approximation. The computer system **116** can use the video feeds provided by the cameras comprising the

sensor package **114** to determine the specific location the vehicles in the user's field of view **300**. The computer system **116** can then determine specific placement locations of the crowd-sourced indicators for each vehicle to be displayed on the AR device **118**. The computer system **116** can provide this information to the AR device **118** to superimpose the crowd-sourced indicators onto the user's field of view **300**. In some embodiments, the indicators can be made semitransparent so the user **10** can see the real-world objects behind indicator.

[0065] The feed continuously received from the AR community server **106** (block **910**) provides up to date location information of the vehicles. Likewise, the transponder **112** provides up to date location information of the user's vehicle. In order to maintain registration of the crowd-sourced indicators with the movement of their respective vehicles, the computer system **116** can recompute updated placement locations of the crowd-sourced indicators using the up to date information to account for movement of both the user's vehicle and vehicles on the road.

[0066] The position of the user **10** within their vehicle can also factor into the computation of the placement locations of the vehicles' crowd-sourced indicators. For example, when the user **10** turns their head, the position of the crowd-sourced indicators presented on the display **706** of the AR device **118** may no longer register with the position of their corresponding vehicles; likewise, if the user's eye position varies. In accordance with the present disclosure, the computer system **116** can incorporate head position information provided by the gyroscope **716** and eye position provided by the eye tracking sensor **718** into its computation of placement locations for displaying the vehicles' crowd-sourced indicators on the AR device **118**.

[0067] Continuing with FIG. **9**B, at block **916**, the computer system **116** can generate the user's crowd-sourced indicators (e.g., **402**). In some embodiments, for example, the telemetry received from the AR community server **106** can include cumulative assessment data for the user **10**, which can be used to generate the user's crowd-sourced indicators in the same manner as describe above in block **912** for vehicle indicators. In accordance with some embodiments, the computer system **116** can vary the visual appearance of the user's crowd-sourced indicators based on the cumulative assessment data. Merely as an example to illustrate this point, suppose the user's crowd-sourced indicators is represented by a bar chart. If the user's rating for a particular behavior is very low (e.g., <5 on a scale of 0-100), that can represent an extreme condition of the behavior. In response, the bar chart can be enhanced to call attention to this condition. For example, the user's crowd-source indicator **402***b* in FIG. **4**B. can highlight the bar associated with the particular behavior. In some situations, it may be appropriate to display a completely different graphic. FIG. **4**C illustrates an example in which the bar chart is replaced with a warning **402***c*.

[0068] Other examples of changing the visual appearance of the user's crowd-sourced indicators include using different graphics for different values or ranges of values of a given cumulative assessment. The color of the text may be set according to ranges of values of the given cumulative assessment; e.g., changing from blue to red in rainbow order. Indicators may include an audio component (e.g., a beep) that can change in tone, volume, and so on according to ranges of values of the given cumulative assessment, and so on.

[0069] At block **918**, the computer system **116** can detect whether the telemetry received from the AR community server **106** includes any actions associated with the user's cumulative assessments. Processing can continue with block **920** in response to detecting the presence of one or more actions. Processing can continue with block **922** in response to detecting that there are no actions.

[0070] At block **920**, the computer system **116** can perform an action associated with a user's cumulative assessment. Merely as an example to illustrate this point, suppose a vehicle was being driven in an unsafe manner indicative of an impaired driver, the computer system could take a number of actions, including warning the driver, alerting law enforcement, or—in the case of vehicles with some autonomous driving capability—pull the vehicle off the road.

[0071] At block **922**, the computer system **116** can display the user's crowd-sourced indicator in the user's field of view **300**. The computer system **116** can place the indicator in the user's field view **300** so as to avoid obscuring the user's view of real-world objects such as other vehicles on the road, portions of the road, and the like. In some embodiments, for example, the computer system **116** can use the sensor data (e.g., radar and/or lidar data, video feeds) to determine specific locations of the vehicles near the user and hence their location on the user's field of view **300**. In some embodiments, the indicator can be made semitransparent so the user **10** can see the real-world objects behind indicator.

[0072] At block **924**, the computer system **116** can receive input from the user **10** via the AR device **118**. Processing can continue with block **926** in response to receiving input from the user **10**. Processing can continue with block **904** (FIG. **9**A) in the case where there is no input from the user **10**.

[0073] At block **926**, the computer system **116** can process the user's input. In a typical usage scenario, the user **10** can speak their input, which can be picked up by the microphones **708***a*, **708***b* of the AR device **118** and provided to the computer system **116**. The computer system **116** can provide a human-machine interface with language processing capability so that the user **10** can interact with the system using spoken commands or word phrases.

[0074] In accordance with the present disclosure, the user **10** can express their assessment of a driver by speaking a description of the vehicle. The description can include the make, model, color, and other physical attributes of the vehicle. The description can also include the vehicle's position relative to the user's vehicle. For example, the user **10** can speak "green toyota" or "blue car on my right" and so on to identify the vehicle. The computer system **116** can process the spoken input to extract vehicle identification information and correlate that information with telemetry received from the AR community server **106** to identify the current driver of the vehicle. For example, if the user **10** says "green toyota," the computer system **116** can search the telemetry for a green Toyota and thus identify the driver. Where vehicle description may be ambiguous, the computer system **116** can also respond with questions necessary to disambiguate, such as "do you mean the green toyota on the left or the green toyota on the right?"

[0075] The computer system **116** can process the spoken input to identify words or phrases that relate to driving behavior. In some embodiments, predefined phrases can be

used to identify various driving behavior. For example, predefined phrases that the user can speak can include "driver is polite," "driver is not polite," "driver is aggressive," "driver is not aggressive," "driver is swerving," and so on. The computer system **116** can recognize these phrases and generate a request to cast a vote for that behavior. Thus, for example, if the user **10** speaks "blue car on the right . . . driver is aggressive," can generate a request to cast a plus vote of the driver of the blue car in the behavior category of aggressive driving. Each driver in the community **102** can cast their individual ratings in this way, thus contributing to the community's assessment of that driver.

[0076] In some embodiments, the computer system **116** can include machine learning capability and/or artificial intelligence (AI) capability so that the user **10** can speak more naturally without having to speak predefined phrases. The AI, for example, can determine the driving behavior from the context of the spoken speech. Thus, for example, if the user **10** says "that's nice, I just saw a red convertible slowing down to let someone in from the on-ramp" can be interpreted as the driver being a polite driver, and a request to cast a plus vote for that driver in the behavior category of polite driving can be generated.

[0077] At block **928**, the computer system **116** can transmit any requests for votes generated in block **926** to the AR community server **106**. Processing can continue by returning to block **904** (FIG. **9**A).

[0078] Referring to FIG. **10** and other figures, the discussion will now turn to a high level description of operations and processing in the AR community server **106**, to provide an augmented reality experience in accordance with the present disclosure. In some embodiments, for example, the AR community server **106** can include computer executable program code, which when executed by a processor (e.g., **802**, FIG. **8**), can cause the AR community server **106** to perform processing in accordance with FIG. **10**. The operation and processing blocks described below are not necessarily executed in the order shown, and can be allocated for execution among one ore more concurrently executing processes and/or threads.

[0079] At block **1002**, the server **106** can continuously receive data from each of the transponders **112** in the vehicles **104** of the community **102**. The server **106** can process the received data as follows:

[0080] At block **1004**, in response to the received data being transponder data, the server **106** can store the transponder data. In some embodiments, for example, the transponder data can include information that identifies the vehicle so that the data (e.g., the current location of the vehicle, it's current speed, and so on) can be stored for that vehicle. In some embodiments, when a driver subscribes to the server **106** (block **902**, FIG. **9**A) for a feed, the computer system **116** can incorporate a request for the feed into the transponder data (see FIG. **6**). This allows the server **106** to make the association between the driver and the vehicle, thus tying the driver to that vehicle. Processing can then proceed to block **1008**.

[0081] At block **1006**, in response to the received data comprising a vote from a driver, the server **106** can update the cumulative assessment corresponding to the specific behavior identified in the received vote, for the driver identified in the received vote. A given cumulative assessment can be expressed as a percentage; for example, the number of positive votes as a percentage of the total number votes. The cumulative assessment can be a number that is incremented once with each positive vote and decremented once with each negative vote, and so on. In some embodiments, a particular cumulative assessment can be periodically reset to avoid including old votes that may no longer be relevant. Processing can then proceed to block **1008**.

[0082] At block **1008**, the server **106** can generate telemetry data for each subscribed driver as follows:

[0083] At block **1010**, the server **106** can determine the subscribed driver's geographic location. As explained above, received transponder data (block **1004**) can include vehicle location data (e.g., GPS coordinates). When a driver subscribes to a feed, the driver is associated with the vehicle they are driving as explained in block **1004**. Therefore, the subscribed driver's geographic location can be determined from the location data contained in the transponder of the vehicle associated with that driver.

[0084] At block **1012**, the server **106** can identify vehicles that are near the subscribed driver. For example, using vehicle location data, the server **106** can identify nearby vehicles. This can include vehicles that are within some distance (e.g., 100 feet) of the subscribed driver as determined based on GPS coordinates.

[0085] At block **1014**, the server **106** can gather transponder data for the nearby vehicles. This can include vehicle identification information, GPS data, and so on. This information constitutes the telemetry that the server **106** sends down to the vehicles (blocks **910**, **912**, FIG. **9**A).

[0086] At block **1016**, the server **106** can gather cumulative assessments associated with the drivers of the nearby vehicles, and cumulative assessments associated with the subscribed driver. This information can be packaged with the telemetry that the server **106** sends down to the vehicles.

[0087] At block **1018**, the server **106** can transmit the telemetry (feed) to the subscribed driver. The foregoing processing is repeated by returning to block **1002**, in order to update the positions of each vehicle and their respective drivers and to provide updated telemetry (block **1014**) and updated assessments (block **1016**) in near real time for the community **102** of drivers.

[0088] Referring to FIG. **11**, a system **1100** in accordance with further aspects of the present disclosure can include a community **1102** comprising a "social" network of vehicles **1104** that autonomously communicate with each other. In some embodiments, for example, vehicles **1104** in the community **1102** can be driverless, autonomous vehicles, carrying passengers to their destinations. The system **1100** can include a community server **1106** to support autonomous interaction among vehicles **1104** in the community **1102**.

[0089] Each vehicle **1104** can include instrumentation such as a transponder **112**, sensor package **114**, and a data processing system **116** as described above. An AR device **118** can operate in conjunction with the data processing system **116** to provide passengers with an augmented reality experience as there are carried by their respective vehicles **1104** to their destinations.

[0090] In some embodiments, vehicles **1104** in the community **1102** can assess each other in a manner similar to the techniques disclosed above. For example, each vehicle **1104** can "observe" other vehicles on the road via their respective instrumentation. However, instead of assessing the driving behavior of drivers (humans), the vehicles **1104** can assess driving behaviors of the actual vehicles themselves to deter-

mine if a vehicle is operating in some state of deficiency (e.g., cracked windshield, flat tire, and so on).

[0091] Processing in each of the vehicles **1104** can proceed generally as described above in connection with FIGS. **9**A and **9**B. For example, a given vehicle (e.g., **1104***a*) can "sign in" to identify itself (e.g., anonymously) to the community server **1106**. The given vehicle can transmit data about its own condition to the community server **1106**. The vehicle's instrumentation can sense the activity and condition of its surrounding vehicles, and the collected telemetric data (e.g., transponder data, sensor data, etc.) can be transmitted to the community server **1106**. Telemetric data on a subject vehicle (e.g., **1104***b*) collected by the given vehicle can be viewed as an assessment of that subject vehicle.

[0092] In some embodiments, a vehicle can enhance the AR experience of a passenger wearing an AR device **118**, generally in the manner as described above. Instead of displaying virtual information relating to the driving behavior of other drivers, the passenger's AR experience can be enhanced with information relating to the behavior of other vehicles on the road. The virtual information can be based on a compilation of assessments made by vehicles in the vicinity of the passenger, and can include an assessment of the passenger's vehicle in addition to other vehicles on the road.

[0093] The community server **1106** can process the individual assessments received from vehicles **1104** in the community **1102** made on a subject vehicle (e.g., **1104***b*), and take appropriate actions. For example, if the number of individual assessments that report on a given situation (e.g., low tire pressure has been observed for a subject vehicle) passes a certain threshold, the community server **1106** can take action (either automatically or with human intervention) to remediate the situation. In some embodiments, for example, the community server **1106** can send messages to the data processing system **116** of the subject vehicle with instructions to take action.

[0094] In some embodiments, for example, if the community server **1106** determines, based on other vehicles' assessments, that the subject vehicle should schedule itself for maintenance, the community server **1106** can send a message to that effect to the subject vehicle. In response, the data processing system **116** on the subject vehicle can take action autonomously and schedule itself for maintenance. Alternatively, the subject vehicle can inform the owner that the community of vehicles **1102** had made a determination that maintenance activity is appropriate. The "voice" of the community **1102** may be able to overcome the owner's propensity to procrastinate and encourage the owner to take action.

[0095] In some embodiments, the community server **1106** may even initiate physical action to be taken by the subject vehicle. For example, if the community server **1106** determines that a sufficiently dire situation (e.g., imminent danger to the passenger(s) or damage to the vehicle) exists, the community server **1106** can send a message to the subject vehicle to pull over onto a shoulder on the road. In response, data processing system **116** on the subject vehicle can autonomously take action (e.g., control the vehicle to pull over) or inform the passenger of the situation.

[0096] The community of vehicles **1102** in accordance with this aspect of the present disclosure can enable a self-healing or self-policing vehicle network, whereby autonomous vehicles have the capacity to "observe" other vehicles on the road and—similar to humans—make a judgment as to whether the other vehicles are exhibiting unsafe driving behaviors or operating in some other state of deficiency. This contributes to a defense-in-depth approach for autonomous road safety, where local, on-vehicle safety measures may fail or be insufficient to detect problems.

[0097] Accordingly, in some embodiments in accordance with the present disclosure, an AR system can include one or more computer processors in a subject vehicle on a road carrying a user of the AR system and a computer-readable storage medium comprising instructions for controlling the one or more computer processors to be operable to receive telemetry associated with a plurality of vehicles proximate the subject vehicle and augment a real-world view of the plurality of vehicles as seen by the user via the AR system.

[0098] The one or more computer processors can generate from the received telemetry vehicle indicia corresponding to the plurality of vehicles and display the vehicle indicia in registration with the real-world view of the plurality of vehicles using position information contained in the received telemetry so that the vehicle indicia move in registration with movement of their corresponding vehicles.

[0099] The one or more computer processors can display in a field of view of the AR system at least one crowd-sourced indicator, generated from the received telemetry, that represents a community assessment of the subject vehicle, the at least one crowd-sourced indicator comprising a compilation of individual assessments of the subject vehicle submitted by the plurality of vehicles.

[0100] In some embodiments, each individual assessment from each of the plurality of vehicles can be based on telemetry associated with the subject vehicle collected by said each of the plurality of vehicles.

[0101] In some embodiments, the computer-readable storage medium can further comprise instructions for controlling the one or more computer processors to perform an action on the subject vehicle based on the compilation of individual assessments of the subject vehicle submitted by the plurality of vehicles. The action can include preventing operation of the subject vehicle. The action can include forcing the subject vehicle to steer itself onto a shoulder of the road. The action includes scheduling the subject vehicle for maintenance.

[0102] The above description illustrates various embodiments of the present disclosure along with examples of how aspects of these embodiments may be implemented. The above examples and embodiments should not be deemed to be the only embodiments, and are presented to illustrate the flexibility and advantages of the present disclosure as defined by the following claims. For example, although certain embodiments have been described with respect to particular process flows and steps, it should be apparent to those skilled in the art that the scope of the present disclosure is not strictly limited to the described flows and steps. Steps described as sequential may be executed in parallel, order of steps may be varied, and steps may be modified, combined, added, or omitted. As another example, although certain embodiments have been described using a particular combination of hardware and software, it should be recognized that other combinations of hardware and software are possible, and that specific operations described as being implemented in software can also be implemented in hardware and vice versa.

[0103] The specification and drawings are, accordingly, to be regarded in an illustrative rather than restrictive sense. Other arrangements, embodiments, implementations and equivalents will be evident to those skilled in the art and may be employed without departing from the spirit and scope of the present disclosure as set forth in the following claims.

1. An augmented reality (AR) system comprising:

one or more computer processors; and

a computer-readable storage medium comprising instructions for controlling the one or more computer processors to be operable to:

receive telemetry associated with first vehicles proximate a second vehicle that is driven by a user of the AR system;

augment a real-world view of the first vehicles as seen by the user via the AR system, wherein the one or more computer processors:

generate from the received telemetry vehicle indicia corresponding to the first vehicles; and

display the vehicle indicia in registration with the real-world view of the first vehicles using position information of the first vehicles from the received telemetry so that the vehicle indicia move in registration with movement of their corresponding first vehicles; and

display in a field of view of the AR system at least one crowd-sourced indicator, generated from the received telemetry, that represents a community assessment of the user of the AR system, the at least one crowd-sourced indicator comprising a compilation of individual assessments of the user of the AR system submitted by drivers among the first vehicles.

2. The AR system of claim 1, wherein the at least one crowd-sourced indicator is a rating of driving behavior of the user of the AR system and the individual assessments are individual ratings of the user's driving behavior submitted by the drivers among the first vehicles.

3. The AR system of claim 1, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to generate crowd-sourced indicators associated with the first vehicles and display the crowd-sourced indicators in registration with movement of their corresponding first vehicles.

4. The AR system of claim 1, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to receive spoken input from the user of the AR system that constitutes an assessment of a driver of one of the first vehicles.

5. The AR system of claim 4, wherein the assessment received from the user of the AR system is a rating of the driver's driving behavior.

6. The AR system of claim 4, wherein the user of the AR system identifies the driver of one of the first vehicles by describing the driver's vehicle.

7. The AR system of claim 1, wherein the at least one crowd-sourced indicator further comprises a compilation of previously submitted individual assessments of the user of the AR system.

8. The AR system of claim 1, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to vary a visual appearance of the at least one crowd-source indicator according to a number of drivers among the first vehicles who have contributed to its compilation.

9. The AR system of claim 1, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to track head position of the user of the AR system and display the corresponding vehicle indicia in registration with the real-world view of the vehicles based on the user's head position.

10. The AR system of claim 9, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to track eye movement of the user, wherein displaying the corresponding vehicle indicia in registration with the real-world view of the vehicles is further based on the user's eye movements.

11. The AR system of claim 1, wherein the telemetry associated with the first vehicles are sent to a server, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to receive the telemetry from the server.

12. The AR system of claim 1, wherein the computer-readable storage medium further comprises instructions for controlling the one or more computer processors to receive the telemetry associated with the first vehicles directly from each of the first vehicles, respectively.

13. A method in an augmented reality (AR) system, the method comprising:

receiving telemetry associated with first vehicles proximate a second vehicle that is driven by a user of the AR system;

augmenting a real-world view of the first vehicles as seen by the user via the AR system, including:

generating from the received telemetry vehicle indicia corresponding to the first vehicles; and

displaying the vehicle indicia in registration with the real-world view of the first vehicles using position information of the first vehicles from the received telemetry so that the vehicle indicia move in registration with movement of their corresponding first vehicles; and

displaying in a field of view of the AR system at least one crowd-sourced indicator, generated from the received telemetry, that represents a community assessment of the user of the AR system, the at least one crowd-sourced indicator comprising a compilation of individual assessments of the user of the AR system submitted by drivers among the first vehicles.

14. The method of claim 13, wherein the at least one crowd-sourced indicator is a rating of driving behavior of the user of the AR system and the individual assessments are individual ratings of the user's driving behavior submitted by the drivers among the first vehicles.

15. The method of claim 13, further comprising generating crowd-sourced indicators associated with the first vehicles and displaying the crowd-sourced indicators in registration with movement of their corresponding first vehicles.

16. The method of claim 13, further comprising receiving spoken input from the user of the AR system that constitutes an assessment of a driver of one of the first vehicles, wherein the user of the AR system identifies the driver of one of the first vehicles by describing the driver's vehicle.

17. The method of claim 13, further comprising varying a visual appearance of the at least one crowd-source indicator according to a number of drivers among the first vehicles who have contributed to its compilation.

18. A non-transitory computer-readable storage medium having stored thereon computer executable instructions, which when executed by a computer device in an augmented reality (AR) system, cause the computer device to:

receive telemetry associated with first vehicles proximate a second vehicle that is driven by a user of the AR system;

augment a real-world view of the first vehicles as seen by the user via the AR system, wherein the one or more computer processors:

generate from the received telemetry vehicle indicia corresponding to the first vehicles; and

display the vehicle indicia in registration with the real-world view of the first vehicles using position information of the first vehicles from the received telemetry so that the vehicle indicia move in registration with movement of their corresponding first vehicles; and

display in a field of view of the AR system at least one crowd-sourced indicator, generated from the received telemetry, that represents a community assessment of the user of the AR system, the at least one crowd-sourced indicator comprising a compilation of individual assessments of the user of the AR system submitted by drivers among the first vehicles.

19. The non-transitory computer-readable storage medium of claim **18**, wherein the at least one crowd-sourced indicator is a rating of driving behavior of the user of the AR system and the individual assessments are individual ratings of the user's driving behavior submitted by the drivers among the first vehicles.

20. The non-transitory computer-readable storage medium of claim **18**, wherein the computer executable instructions, which when executed by the computer device, further cause the computer device to vary a visual appearance of the at least one crowd-source indicator according to a number of drivers among the first vehicles who have contributed to its compilation.

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