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(54) **IN-VEHICLE INVENTORY AND RENTAL SYSTEM**

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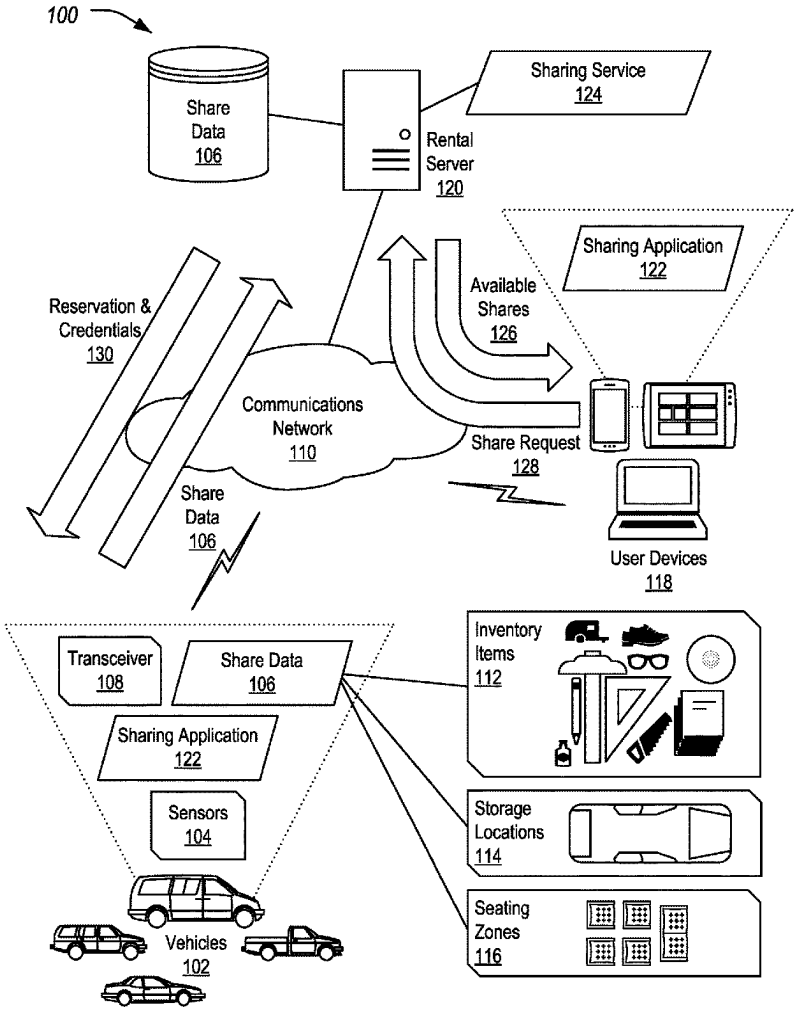
(57) **ABSTRACT**

Sharing seating zones of a vehicle as office space is provided. A share request is received from a user device of a user requesting a seating zone from a listing of available shares. A vehicle received from a rental server, a reservation of the seating zone of the vehicle. Access to the seating zone is provided in accordance with the reservation.



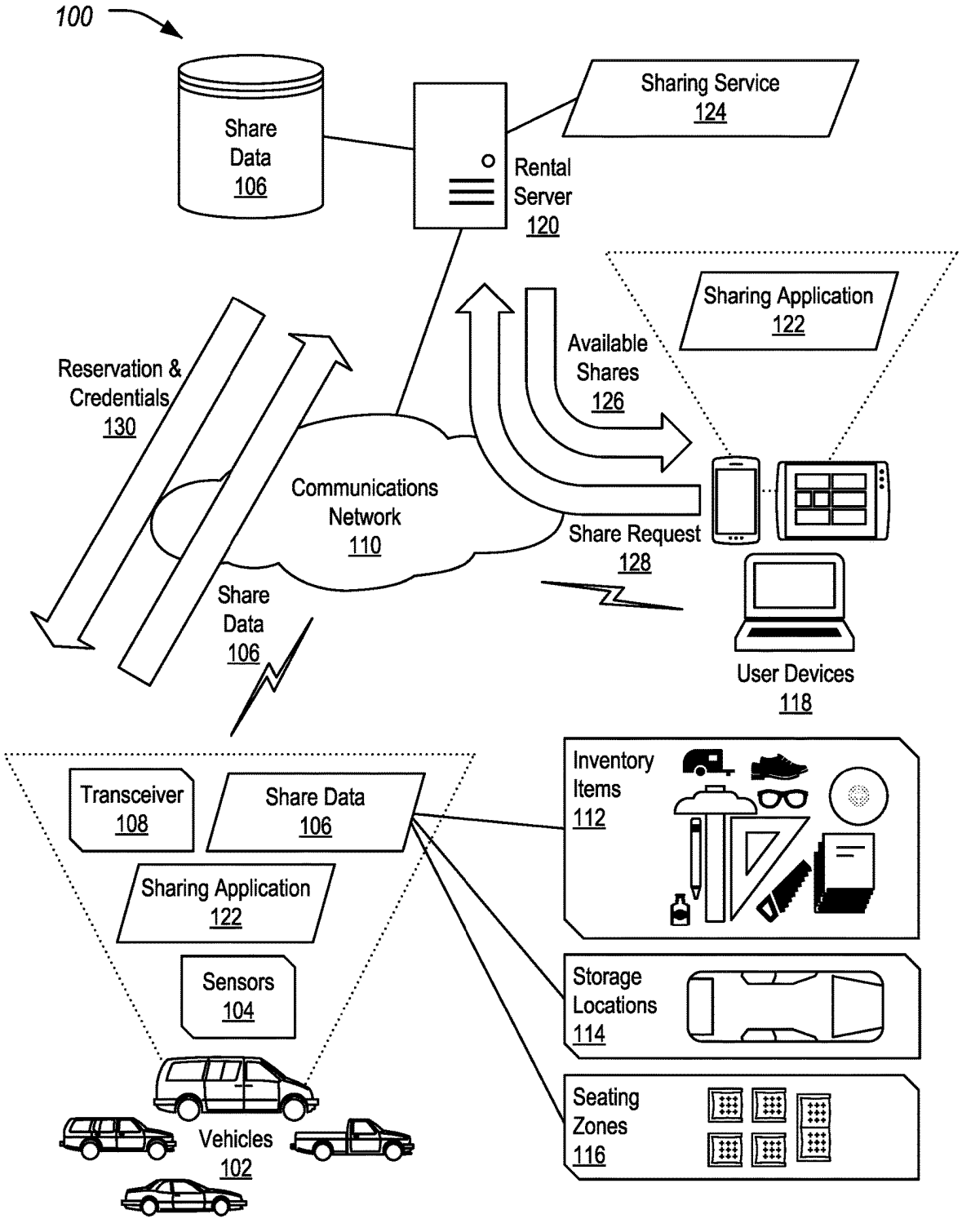

100
Share Data 106
Rental Server 120
Sharing Service 124
Sharing Application 122
Reservation & Credentials 130
Available Shares 126
Communications Network 110
Share Request 128
Share Data 106
User Devices 118
Transceiver 108
Share Data 106
Sharing Application 122
Sensors 104
Vehicles 102
Inventory Items 112
Storage Locations 114
Seating Zones 116

FIG. 1

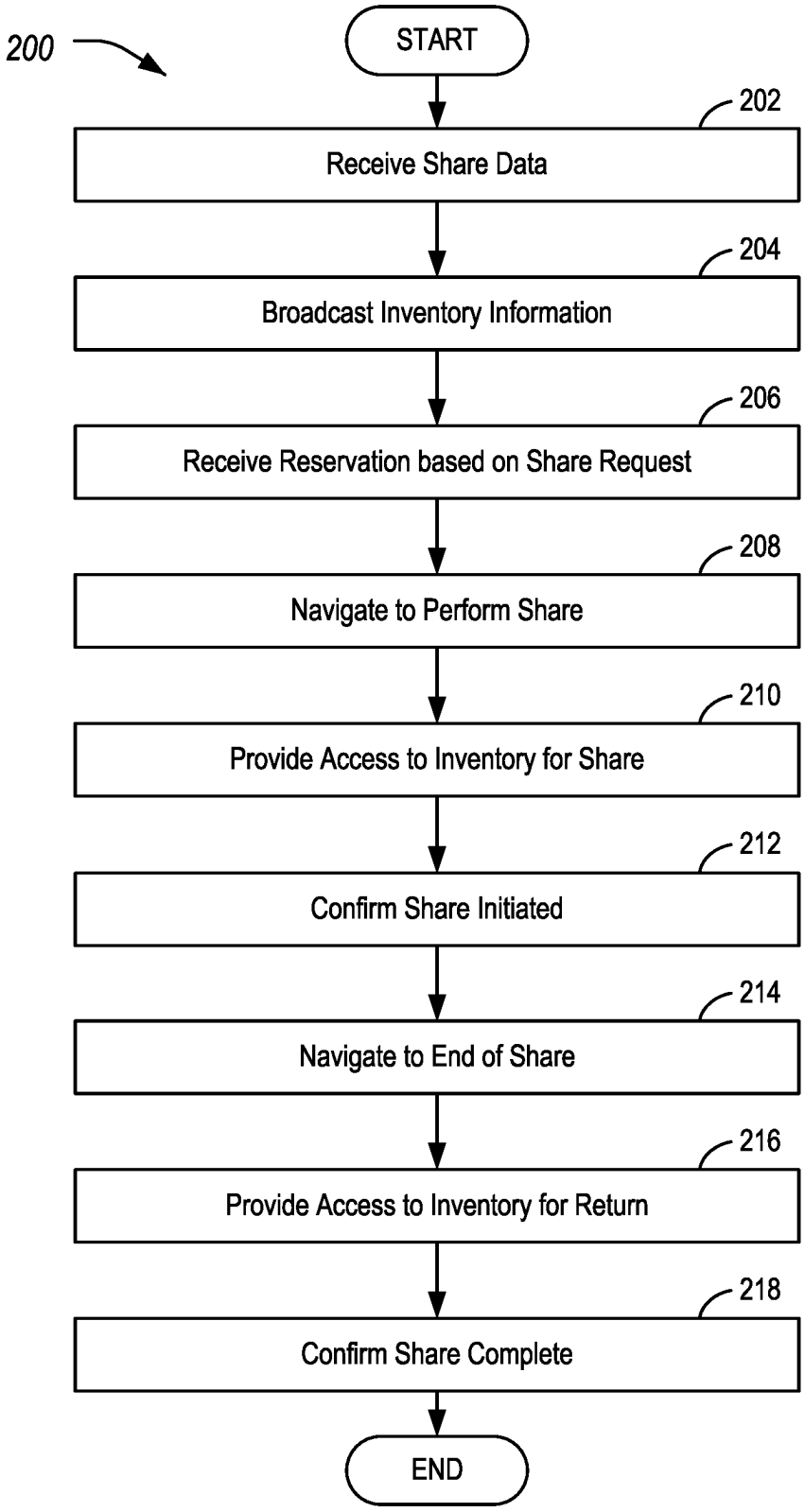

200
START
202
Receive Share Data
204
Broadcast Inventory Information
206
Receive Reservation based on Share Request
208
Navigate to Perform Share
210
Provide Access to Inventory for Share
212
Confirm Share Initiated
214
Navigate to End of Share
216
Provide Access to Inventory for Return
218
Confirm Share Complete
END

FIG. 2

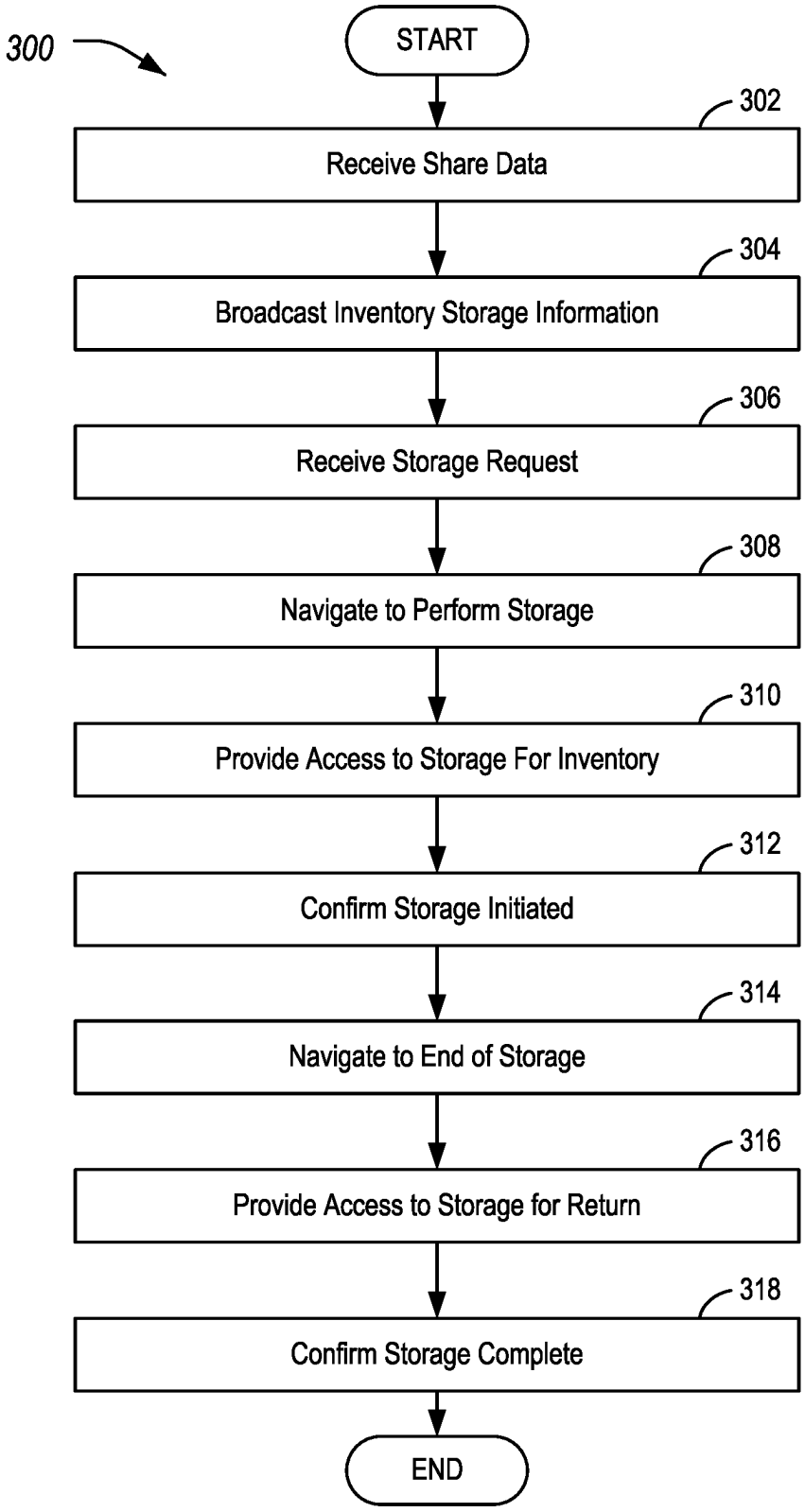

300
START
302
Receive Share Data
304
Broadcast Inventory Storage Information
306
Receive Storage Request
308
Navigate to Perform Storage
310
Provide Access to Storage For Inventory
312
Confirm Storage Initiated
314
Navigate to End of Storage
316
Provide Access to Storage for Return
318
Confirm Storage Complete
END

FIG. 3

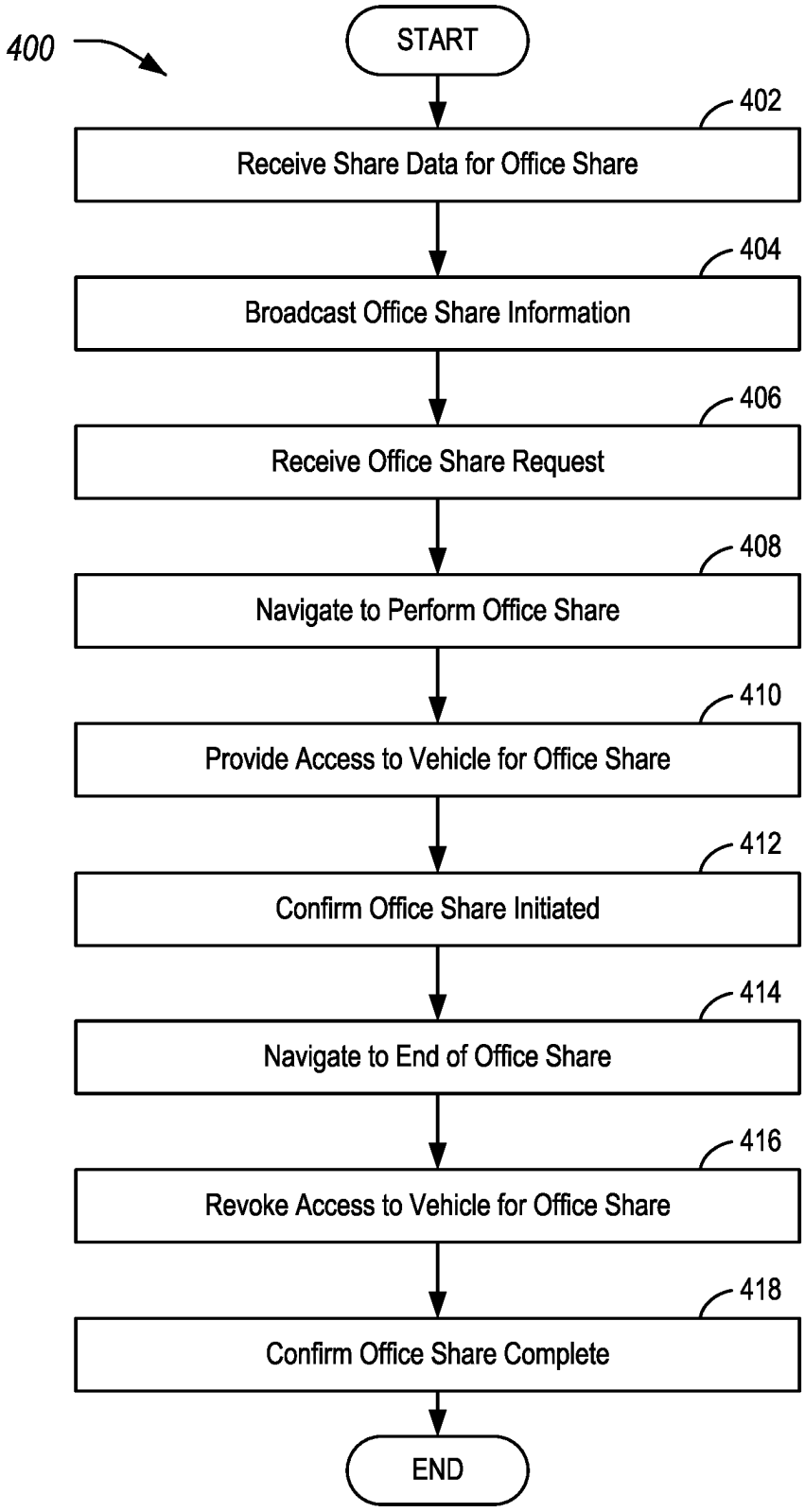

400
START
402
Receive Share Data for Office Share
404
Broadcast Office Share Information
406
Receive Office Share Request
408
Navigate to Perform Office Share
410
Provide Access to Vehicle for Office Share
412
Confirm Office Share Initiated
414
Navigate to End of Office Share
416
Revoke Access to Vehicle for Office Share
418
Confirm Office Share Complete
END

FIG. 4

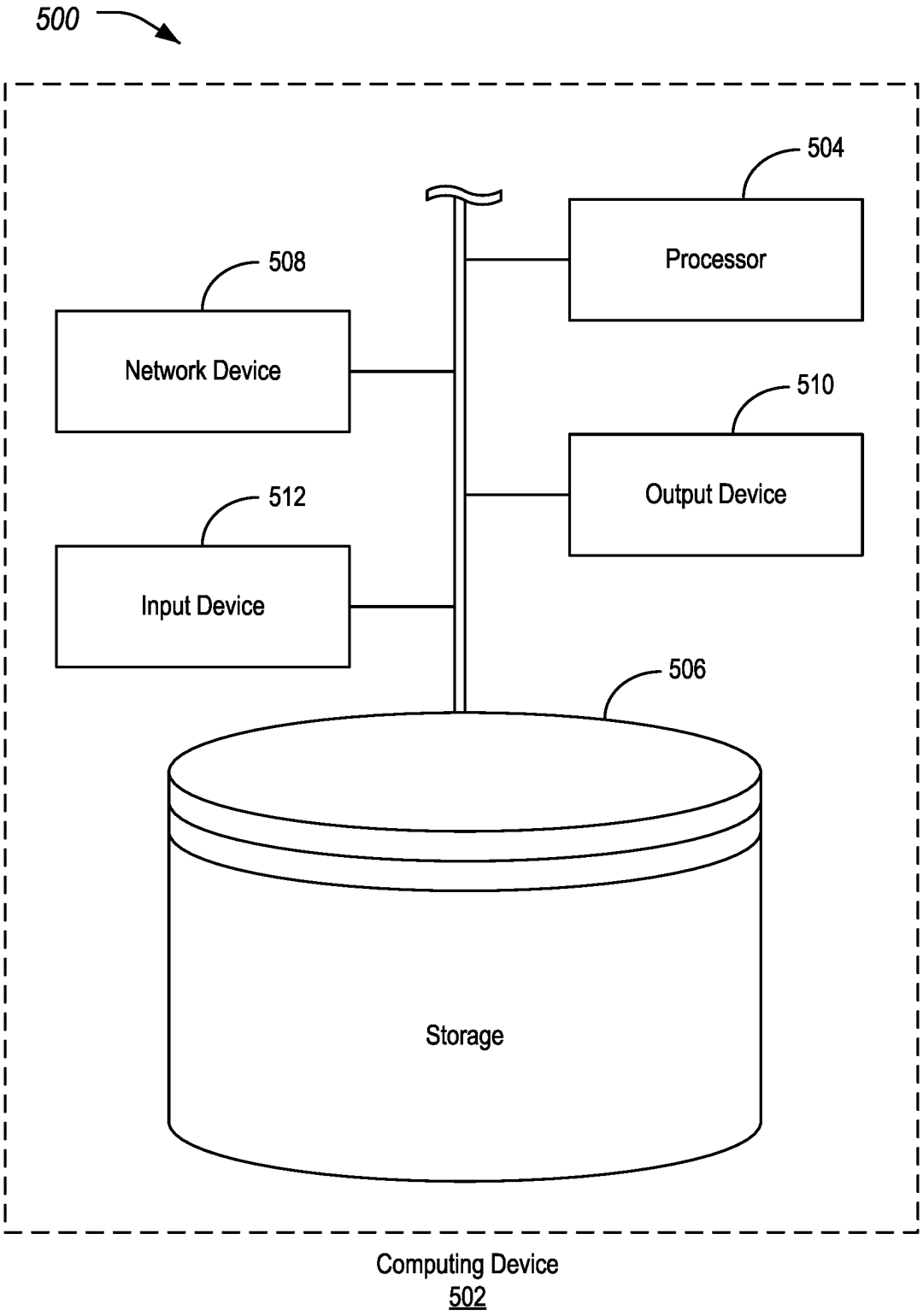

500
504
Processor
508
Network Device
510
Output Device
512
Input Device
506
Storage
Computing Device
502

FIG. 5

IN-VEHICLE INVENTORY AND RENTAL SYSTEM

TECHNICAL FIELD

[0001] Aspects of the disclosure generally relate to an in-vehicle inventory and rental system.

BACKGROUND

[0002] A vehicle user may have many items in their vehicle which are not being used and not expected to be used. These items may be utilized by other individuals if the vehicle user is willing for the item to be rented and the item is not in use.

SUMMARY

[0003] In one or more illustrative examples, a method for sharing seating zones of a vehicle as office space includes receiving, to a vehicle from a rental server, a reservation of a seating zone of the vehicle, responsive to a share request requesting the seating zone being received from a user device of a user from a listing of available shares; and providing access to the seating zone in accordance with the reservation.

[0004] In one or more illustrative examples, a system for sharing seating zones of a vehicle as office space, comprising a rental server including one or more hardware computing devices, the rental server being configured to execute a sharing service to perform operations including to receive share data from a plurality of vehicles, the share data indicating office features of the seating zones; compile a listing of available shares based on the share data; receive a share request requesting a seating zone from a user device of a user from a listing of available shares, the share request indicating one or more requirements for office features to be available in the seating zone, the office features being independent of location of the vehicle; filter the listing of available shares based on the requirements; receive an indication of a selected vehicle of the plurality of vehicles from the user device; send, to the selected vehicle, a reservation of the seating zone of the vehicle and a credential for access to the seating zone, and send, to the user device, the credential for access to the seating zone, the credential to be provided from the user device to the vehicle to grant access to the seating zone, wherein the vehicle is configured to provide access to the seating zone in accordance with the reservation responsive to validating the credential received to the vehicle from the user device.

[0005] In one or more illustrative examples, a non-transitory computer-readable medium comprising instructions that, when executed by one or more hardware computing devices, cause the one or more hardware computing devices to perform operations including to receive share data from a plurality of vehicles, the share data indicating office features of seating zones of the respective vehicles; compile a listing of available shares based on the share data; receive a share request requesting a seating zone from a user device of a user, the share request including a listing of one or more requirements for the office features to be available in the seating zone; filter the listing of available shares based on the requirements; receive an indication of a selected vehicle of the plurality of vehicles from the user device; send, to the selected vehicle, a reservation of the seating zone of the vehicle and a credential for access to the seating zone, and send, to the user device, the credential for access to the seating zone, the credential to be provided from the user device to the vehicle to grant access to the seating zone.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. **1** illustrates an example system for using vehicles for the sharing of inventory items, storage locations, and seating locations for mobile office rental space;

[0007] FIG. **2** illustrates an example process for the use of the system for the sharing of inventory items of a vehicle;

[0008] FIG. **3** illustrates an example process for the use of the system for the sharing of storage locations of a vehicle;

[0009] FIG. **4** illustrates an example process for the use of the system for the sharing of seating locations of a vehicle as office space; and

[0010] FIG. **5** illustrates an example computing device for performing aspects of the sharing of inventory items, storage locations, and seating locations.

DETAILED DESCRIPTION

[0011] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale; some features may be exaggerated or minimized to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a representative basis for teaching one skilled in the art to variously employ the present invention.

[0012] It may be desirable for a vehicle to act as an item rental depot. Additionally, people cities are always on the move and often walk from place to place due to lack of ownership of a vehicle or to avoid traffic. Finding a place to work between destinations may be difficult. Coffee shops and other public work hubs may become crowded and/or noisy. Moreover, such locations may expose valuable company information while the user is in a meeting or working on a project. A vehicle inventory, charge, and mobile office rental system may utilize user input, the interior and/or exterior sensor suite, and items that are available in the vehicle that are not being used to facilitate the rental of items and vehicle space. Further aspects of the disclosure are discussed in detail herein.

[0013] FIG. **1** illustrates an example system **100** for using vehicles **102** for the sharing of inventory items **112**, storage locations **114**, and seating zones **116** for mobile office rental space. The vehicles **102** may include sensors **104** configured to monitor the operation of the vehicles **102** for use in generating share data **106**. The vehicles **102** may also include transceivers **108** for communication over the communications network **110**. The share data **106** may be indicative of the status of inventory items **112**, storage locations **114**, and/or seating zones **116** of the vehicle **102**. The system **100** may also include user devices **118** and a rental server **120**, each configured for communication over the communications network **110**. A sharing application **122** may be installed to the vehicles **102** and/or to the user devices **118**. A sharing service **124** may be installed to the rental server **120**. The rental server **120** may be configured to receive share data **106** from the vehicles **102**, indicate available shares **126** to the user devices **118**, receive share

requests **128** from the user devices **118**, and provide reservations and/or credentials **130** to the vehicles **102** to perform the sharing. It should be noted that the illustrated system **100** is only an example, and systems **100** having more, fewer, or different components may be used.

[0014] The vehicle **102** may include various types of automobile, crossover utility vehicle (CUV), sport utility vehicle (SUV), truck, recreational vehicle (RV), boat, plane or other mobile machine for transporting people or goods. In many cases, the vehicle **102** may be a battery electric vehicle (BEV) powered by a traction battery and one or more electric motors. As a further possibility, the vehicle **102** may be a hybrid electric vehicle powered by both an internal combustion engine, a traction battery, and one or more electric motors. Hybrid vehicles **102** may come in various forms, such as a series hybrid electric vehicle, a parallel hybrid electrical vehicle, or a parallel/series hybrid electric vehicle. Vehicles **102** may be associated with unique identifiers, such as vehicle identification numbers (VINs), globally unique identifiers (GUIDs), customer or fleet accounts, etc.

[0015] The sensors **104** may include devices of the vehicle **102** configured to measure quantities relevant to operation of the vehicle **102**, as well as to provide a data signal to the vehicle **102** to inform the vehicle **102** regarding the measured quantities. The sensors **104** may include, as some non-limiting examples, speed sensors, pedal position sensors, temperature sensors, seat pressure sensors, global navigation satellite system (GNSS) sensors, infrared image sensors, visible light image sensors, light detection and ranging (LIDAR) sensors, radio detection and ranging (RADAR) sensors, door lock sensors, etc.

[0016] The share data **106** may include static information about the capacities and capabilities of the vehicle **102**. As the type and configuration of vehicle **102** may vary, the capabilities of the vehicle **102** may correspondingly vary. As some possibilities, vehicles **102** may have different capabilities with respect to passenger capacity, towing ability and capacity, and storage. This information may be stored to the vehicles **102** as share data **106**. The share data **106** may indicate, for example, how many seating locations available, etc.

[0017] The share data **106** may also include dynamic information about the vehicle **102** determined using the sensors **104**. For example, the share data **106** may indicate, based on the sensors **104**, which seating locations are occupied, where the vehicle **102** is located, the current heading and/or speed of the vehicle **102**, whether the doors of the vehicle **102** are locked, images of the interior and/or exterior of the vehicle **102**, etc.

[0018] The vehicle **102** may include a transceiver **108** to send data from the vehicle **102** as well as to receive data to the vehicle **102**. The transceiver **108** may a wireless transceiver for communication over the communications network **110**. The communications network **110** may include one or more interconnected communication networks such as the Internet, a cable television distribution network, a satellite link network, a local area network, and a telephone network, as some non-limiting examples. In another example, the transceiver **108** may additionally or alternatively utilize other communications protocols such as a BLUETOOTH or BLUETOOTH Low Energy (BLE) transceivers, ultrawide band (UWB), Wi-Fi, etc., for communications with various devices.

[0019] The vehicle **102** may contain or be connected to various inventory items **112**. These inventory items **112** may include: tools, extension cords, golf clubs, baseball bats, tennis rackets, sunglasses, umbrellas, water tubes, ice skates, roller blades, spare tires, wheels, compressor kits, bikes, kayaks, canoes, trailers, etc. The inventory items **112** may remain in the vehicle **102** when it is not being used and not expected to be used. Yet, the inventory items **112** may be utilized by other individuals if the user of the vehicle **102** is willing for the item to be rented and the item is not in use.

[0020] The sensors **104** may be used by the vehicle **102** to determine the presence of the inventory items **112**. In an example, the sensors **104** may capture images from which image recognition techniques may be performed to determine the presence of various items of the inventory items **112** in the vehicle **102**. Additionally or alternatively, tow sensors **104** or electrical wiring of the vehicle **102** may be used to sense the presence of various items of inventory items **112**.

[0021] The vehicle **102** may also include one or more vehicle storage locations **114**. These storage locations **114** may include, as some non-limiting examples, the trunk of the vehicle **102**, the frunk of the vehicle **102**, seating zones **116** of the vehicle **102**, lockers installed to the vehicle **102**, a trailer of the vehicle **102**, etc. The sensors **104** may also be used by the vehicle **102** to determine the presence of inventory items **112** or other items within the storage locations **114**.

[0022] The vehicle **102** may also include one or more seating zones **116**. These seating zones **116** may include, as some non-limiting examples, front row seats, second row seats, third row seats, the truck bed, a trailer, etc. The sensors **104** may also be used by the vehicle **102** to determine the presence of occupants, inventory items **112**, or other items within the seating zones **116**.

[0023] The users of the system **100** may carry or otherwise be associated with user devices **118**. The user devices **118** may include various brought-in devices that may be carried into the vehicle **102** interior by a user. Examples of such user devices **118** may include laptop computers, tablet devices, smartphones, smart rings or other wearables, personal digital assistants (PDAs), virtual reality (VR) headsets, smart speaker devices, as some non-limiting possibilities.

[0024] The rental server **120** may be an example of a networked computing device that is accessible to the vehicles **102**, inventory items **112**, and/or user devices **118** over the communications network **110**. The rental server **120** may be configured to send and receive various data elements from and to the other elements of the system **100**. A sharing application **122** may be an example of an application that is executed by one or more computing devices of the vehicle **102** and/or the user devices **118**. A sharing service **124** may be an example of an application executed by the rental server **120**.

[0025] The sharing application **122** of the vehicle **102** and/or user devices **118** operating in combination with the sharing service **124** of the rental server **120** may include instructions that, when executed by the respective devices, perform the operations discussed in detail herein. For instance, a user may utilize the user device **118** to receive a listing of available shares **126**. The available shares **126** may indicate inventory items **112**, storage locations **114**, and/or seating zones **116** that are compiled by the sharing service **124** based on the share data **106** and available for sharing via

the rental server **120**. Based on the available shares **126**, the user device **118** may send a share request **128** to the rental server **120**. The rental server **120** may accordingly provide a reservation and/or credentials **130** to the vehicle **102** to perform the share. As some specific examples, these operations may include, for example, for the sharing of inventory items **112** as discussed with respect to FIG. **2**, the sharing of storage locations **114** as discussed with respect to FIG. **3**, and/or the sharing of seating zones **116** as discussed with respect to FIG. **4**.

[0026] FIG. **2** illustrates an example process **200** for the use of the system **100** for the sharing of inventory items **112** of a vehicle **102**. The process **200** may allow the user of the vehicle **102** to share inventory items **112** that are available in the vehicle **102** and not being used.

[0027] At operation **202**, the vehicle **102** determines which inventory items **112** in the vehicle **102** can be rented out and/or purchased. In an example the sensors **104** of the vehicle **102** may be used for identifying which inventory items **112** are present in or connected to the vehicle **102**. For instance, internal sensors **104** and image recognition may be used to identify inventory items **112** within the cabin, trunk, and./or frunk of the vehicle **102**, while external sensors **104** may be used to determine whether a trailer or other inventory items **112** area attached to the exterior of the vehicle **102**.

[0028] In another example, the vehicle **102** may receive user input from an owner or other operator of the vehicle **102** indicating the inventory items **112** that is available for rental and/or sale. In yet another example the vehicle **102** may receive user input with respect to which of the detected inventory items **112** are available.

[0029] For each item, the vehicle **102** may also receive share data **106** indicating parameters of the sharing of the inventory items **112**. The share data **106** may indicate aspects of how the system **100** should allow the rental and/or sale of the inventory items **112**. In one example, the share data **106** may include a rental fee. The rental fee may be a flat rate fee, based on a periodic basis such as hourly, based on a value of the item (e.g., if broken or not returned), etc.

[0030] The share data **106** may also define a return policy regarding if the inventory items **112** is to be borrowed but is not returned back to the vehicle **102** within a specified time duration. The return policy may specify, for example, that the borrowing user may have to pay the value of the item to the owner if the inventory items **112** is not returned.

[0031] The share data **106** may also specify whether the inventory items **112** is to be returned to the vehicle **102** by a specific time range and/or specific location (e.g., if the vehicle **102** is routed to move, to be returned to another vehicle **102**, to be returned to a locker, building or other fixed location, to be pass along to a next user, etc.).

[0032] Based on the detected and/or entered items, at operation **204** the vehicle **102** may indicate which inventory items **112** are available for rent. Share data **106** with respect to the inventory items **112** may be sent to the rental server **120** and/or broadcast locally, to inform other users of the available items. For instance, the information about available inventory items **112** may be displayed as alerts to the user device **118**. Or a browse interface may be displayed by the user device **118** to allow the user to search and locate available inventory items **112**. In another example, the vehicle **102** may utilize external displays on the vehicle **102** to visually inform passersby of the inventory items **112**. In yet another example, the vehicle **102** may use exterior speakers to audibly inform passersby of the inventory items **112**.

[0033] At operation **206**, the vehicle **102** receives a share request **128**. In an example, the user device **118** may receive available shares **126** from the rental server **120**. The renting user may choose to rent an inventory item **112** and may use the user device **118** to select the inventory item **112** from the available shares **126**. This selection may include accepting any associated fees, agreement, policies, etc. for the rental.

[0034] At operation **208**, the vehicle **102** navigates to perform the share. In an example, the vehicle **102** may receive the reservation and/or credential **130** from the rental server **120**. Based on the reservation, the vehicle **102** may use autonomous driving functionality to relocate itself closer to areas or specific regions where the inventory items **112** may be required. In another example, the rental server **120** may send a location of the vehicle **102** to the user device **118** to allow the renting user to locate the inventory item **112**. This may allow the vehicle **102** and/or the renting user to meet to allow for the retrieval of the inventory item **112**.

[0035] At operation **210**, the vehicle **102** provides access to the inventory item **112** to be shared. In an example, the vehicle **102** may use the sensors **104** to confirm the identity of the renting user. For instance, the vehicle **102** may perform facial recognition to confirm the identity of the renting user. In such a case, prior to providing entry into vehicle **102**, the vehicle **102** may use its sensors **104** in combination with additional devices in the system **100** to confirm specific aspects of the renting user. In an example, camera sensors **104** of the vehicle **102** embedded in the B-pillar (or other vehicle camera) may be used to capture an image of the user, which may be sent to the rental server **120** for the performance of image recognition to verify the identify of the user. Additionally or alternatively, face print data to allow the vehicle **102** to recognize the user may be provided to the vehicle **102**, to allow the vehicle **102** (or a mobile edge computing (MEC) device in communication with the vehicle **102**) to perform the identity validation.

[0036] In another example, the vehicle **102** may receive a pin, fingerprint, voice print, or other biometric data from the rental server **120** and may compare the entered pin or biometric to ensure the identity of the user. In yet another example, the rental server **120** may provide the vehicle **102** and the user device **118** with a temporary phone-as-a-key (PAAK) credential **130**, and communication between the vehicle **102** and the user device **118** of the credential **130** may be used to authorize access to the inventory item **112** of the vehicle **102**.

[0037] Responsive to granting the access, the vehicle **102** may unlock and/or open a closure, lock box, item rental box, etc., to allow the renting user to retrieve the inventory item **112**. The closure may be a location of the vehicle **102**, such as the bed, a frunk, a trunk, a separate lock box where only a specific set of inventory items **112** are available, etc.

[0038] At operation **212**, the vehicle **102** confirms that the share is initiated. In an example, the vehicle **102** uses the sensors **104** to monitor the renting user to ensure that the renting user is only retrieving the inventory item **112** for the share. If the shared item is not taken, then the vehicle **102** may indicate to the rental server **120** that the share is canceled. If other items are taken instead of or in addition to the inventory item **112** for the share, the vehicle **102** may alert the user device **118** and/or the rental server **120** of the

discrepancy. This may allow the renting user to correct the issue, as perhaps the renting user retrieved the wrong inventory item **112** or inventory items **112**. Or, this may also allow the system **100** to raise an alert if unauthorized inventory items **112** are taken intentionally.

[0039] A similar process may be performed for return of the inventory item **112**. At operation **214**, the vehicle **102** navigates to perform the return. This may include autonomous movement of the vehicle **102** and/or providing directions to the vehicle **102** to the user device **118** of the renting user. It should be noted that, in some examples, the vehicle **102** to which the inventory item **112** is to be returned may be a different vehicle **102** as compared to the vehicle from which the inventory item **112** is rented.

[0040] At operation **216**, the vehicle **102** provides access for the inventory item **112** to be returned. In an example, the access may be granted similar to as discussed above with respect to operation **210**. For instance, the same pin PAAK credential **130**, etc. may be used to grant the access. Or in other examples, new pins or other credentials **130** may be supplied from the rental server **120** to the user device **118** to facilitate the return.

[0041] Responsive to granting the access, the vehicle **102** may unlock and/or open a closure, lock box, item rental box, etc., to allow the renting user to return the inventory item **112**. The closure may be a location of the vehicle **102**, such as the bed, a frunk, a trunk, a separate lock box where only a specific set of inventory items **112** are available, etc.

[0042] At operation **218**, the vehicle **102** confirms the share is complete. In an example, the vehicle **102** may use the sensors **104** to confirm that the correct inventory item **112** was returned. This also allow the system **100** to raise an alert if unauthorized inventory items **112** are takin intentionally.

[0043] Variations on the process **200** are possible. It should be noted that if the share transaction is a purchase transaction and not a borrow transaction, then the item may not be required to be returned. If so, then operations **214-218** may not be performed. Such an example may include, for example where a refrigerated frunk storage of the vehicle **102** is used to offer cold items such as beverages for sale. In such an example, external displays of the vehicle **102** may be used to advertise the inventory items **112** for sale.

[0044] In some examples, one or more theft prevention features may be implemented to ensure the smooth operation of the vehicle **102** in dispensing and receiving the inventory items **112**. For instance, prior to being given the location of the vehicle **102**, the user device **118** of the borrowing user may be required to provide a confirmed image identification of the borrowing user. For example, the rental server **120** may indicate a gesture to be performed by the user in an image for verification purposes. The borrowing user may be required to provide an image using the user device **118** that matches the requested gesture. Responsive to the rental server **120** receiving an image of the requested gesture, the rental server **120** may then send the location of the vehicle **102** to the user device **118**.

[0045] In some examples, the share and/or return may be conditional on the renting user being the only detected user. For instance, if the vehicle **102** identifies, using the sensors **104**, that more than one person is in the vicinity of the vehicle **102**, then further operations may be performed to ensure the security of the inventory item **112**. As one possibility, a user device **118** approach may be used to allow the renting user picking up the inventory items **112** to either take responsibility for the other people in the vicinity (and anything they might do or take), verify the other person in the vicinity, or wait until those other persons depart.

[0046] In some examples, the return of the inventory item **112** may include image recognition and/or a two-way camera sharing using the sensors **104** to allow the renting user to verify the condition of the inventory items **112** being returned. This may allow the owner to confirm that the inventory items **112** that were borrowed are returned in a clean, undamaged, functioning, etc. state. As one possibility, the rental server **120** may broker an approval process via the user device **118** by which the inventory items **112** to be returned are confirmed or rejected by the owner.

[0047] In some examples, rather than return of the inventory item **112** to the owner, the inventory item **112** may be passed along to a third party, such as a second renting user or a new owner. In such an example, similar image recognition or confirmation procedures between the giving and receiving users may be used to facilitate the transaction. In yet another possibility, the borrower may simply deliver the inventory item **112** between vehicles **102** without using the inventory item **112**. In such a case, the borrower may be a simple delivery person, and may in some examples be compensated for performing the delivery, e.g., as specified in the share data **106**.

[0048] FIG. **3** illustrates an example process **300** for the use of the system **100** for the sharing of storage locations **114** of a vehicle **102**. The process **300** may be similar to the process **200** discussed in detail above. However, instead of inventory items **112**, it is available storage locations **114** for inventory items **112** that is mediated by the system **100**. Thus, the techniques discussed above may be used, in an example, for temporary storage of inventory items **112**.

[0049] At operation **302** and similar to operation **202**, the vehicle **102** determines which storage locations **114** of the vehicle **102** can be rented out for storage of inventory items **112**. In an example, the sensors **104** of the vehicle **102** may be used for identifying which storage locations **114** are available in the vehicle **102**. For instance, internal sensors **104** and/or image recognition may be used to identify empty seating, available trunk space, available frunk space, available trailer space in trailers attached to the vehicle **102**, etc. In another example, the vehicle **102** may receive user input from an owner or other operator of the vehicle **102** indicating the storage locations **114** that are available for rental. In yet another example the vehicle **102** may receive user input with respect to which of the detected storage locations **114** are available.

[0050] At operation **304** and similar to operation **204**, the vehicle **102** may indicate which storage locations **114** are available for rent for inventory items **112**. For instance, share data **106** with respect to the inventory items **112** may be sent to the rental server **120** and/or broadcast locally, to inform other users of the available storage locations **114**.

[0051] At operation **306** and similar to operation **206**, the vehicle **102** receives a storage share request **128**. In an example, the user device **118** may send the storage share request **128** to the rental server **120**. A storing user may choose to rent a storage location **114** of a vehicle **102** and may use the user device **118** to select the vehicle **102** and accept any associated fees, agreement, policies, etc. for the rental.

[0052] At operation **308** and similar to operation **208**, the vehicle **102** navigates to perform the storage. In an example, the vehicle **102** may use autonomous driving functionality to relocate itself closer to areas or specific regions where the storage locations **114** may be required. In another example, the rental server **120** may send a location of the vehicle **102** to the user device **118** to allow the storing user to locate the vehicle **102** into which the inventory item **112** can be placed. This may allow the vehicle **102** and/or the renting user to meet to allow for the storing of the inventory item **112**.

[0053] At operation **310** and similar to operation **210**, the vehicle **102** provides access to the storage locations **114** to store inventory items **112**. In an example, the vehicle **102** may receive a pin, fingerprint, voice print, or other biometric data from the rental server **120** and may compare the entered pin or biometric to ensure the identity of the user. Responsive to granting the access, the vehicle **102** may unlock and/or open a closure, lock box, item rental box, etc., to allow the renting user to store the inventory item **112**.

[0054] At operation **312** and similar to operation **212**, the vehicle **102** confirms that the storage operation is initiated. In an example, the vehicle **102** uses the sensors **104** to monitor the storing user to ensure that the storing user is placing the inventory item **112** into the storage location **114** that is authorized for the storing.

[0055] A similar process may be performed for retrieval of the inventory item **112** from the storage. At operation **314** and similar to operation **214**, the vehicle **102** navigates to perform the retrieval from the storage location **114**. This may include autonomous movement of the vehicle **102** and/or providing directions to the vehicle **102** to the user device **118** of the storing user. It should be noted that, in some examples, the user to which the inventory item **112** is to be retrieved may be a different user as compared to the user who stored the inventory item **112** to the vehicle **102**.

[0056] At operation **316** and similar to operation **216**, the vehicle **102** provides access to the storage location **114** for the inventory item **112** to be removed. In an example, the access may be granted similar to as discussed above with respect to operations **210** and **310**.

[0057] At operation **318** and similar to operation **218**, the vehicle **102** confirms the storage is complete. In an example, the vehicle **102** may use the sensors **104** to confirm that the correct inventory item **112** was removed from the correct storage location **114**.

[0058] In an example, if a user is at the beach and wants to store their valuables in a vehicle **102**, a verification and/or identification of the inventory items **112** may be used to catalog the inventory items **112** and their condition. Once identified, the inventory items **112** may be stored in a vehicle **102** while that person is enjoying the beach. Once the storage is complete, access can be granted to the user's inventory items **112** using access techniques discussed above, such as facial image recognition, fingerprint detection, voice print detection, pin entry, PAAK credentials **130**, etc. to identify the returning user.

[0059] Dedicated storage locations **114** can be offered where a frunk or trunk can be dedicated to a person's belongings. A live camera feed may can be offered from the sensors **104** for piece-of-mind to the person renting the storage location **114**. The inventory items **112** in the storage location **114** may be listed for sale. Agreements may be made to place an inventory item **112** in the storage for pick up at a different location.

[0060] In another variation, the system **100** may be used for scheduling vehicle-to-vehicle charging. Vehicle-based charging may be offered, for example, at tailgating venues or at a beach or park where a user of a vehicle **102** wants to charge a user device **118** or another vehicle **102**. A charger integrated within the vehicle **102**, such as in a trunk or frunk, may be used to facilitate the charging. The trunk or frunk may be secured and may be opened similar to providing access to storage and/or to inventory items **112** as discussed in detail above. In addition, the credentials **130** aspects may be used to ensure that only authorized devices may be charged. For instance, similar to as noted above, the vehicle **102**, may require biometrics, a pin, a PAAK certificate, etc. to allow the charging to be activated.

[0061] Further variations may be performed to ensure schedule coordination. For example, the vehicle **102** may be agreed to be maintained in a parked location for a prescribed period of time, e.g., for pickup, drop off, or storage of inventory items **112**. However, in some cases, the vehicle **102** may be required to be moved, such as to make way for a priority vehicle **102** (such as an ambulance) that is giving aid. In such a situation, the rental server **120** may manage changing the vehicle **102** location, and to arrange an updated return of borrowed inventory items **112** or withdrawal from the storage location **114**.

[0062] As noted above, people in larger cities are always on the move and often walk from place to place due to lack of ownership of a vehicle **102** or to avoid traffic. Or people may be traveling and be located in another city where they do not have a vehicle **102** to drive or office to attend. Finding a place to work in such a location may be difficult. Coffee shops and other public work hubs may become crowded or noisy or may expose valuable company information while in a meeting or working on a project.

[0063] FIG. **4** illustrates an example process **400** for the use of the system **100** for the sharing of seating zones **116** of a vehicle **102** as office space. In such an example, users may be able to rent vehicles **102** to use as a temporary office location. In many examples, the office rental vehicles **102** may be parked, but in some instances it is possible that the rented vehicles **102** may be in transit.

[0064] In the vehicle **102** office, in-vehicle work surfaces such as tables may provide a work surface. In another example, mobile hot spots may allow users to connect to the Internet. In another example, heating, ventilation, and air conditioning (HVAC) and other vehicle controls may be used to set to comfort settings. In another example, charging features and/or electrical outlets may be offered to ensure that the user devices **118** are powered. In yet another example, the vehicle **102** may carry office supplies such as pens, paper, etc. Additionally, the infotainment system of the vehicle may offer white noise and/or noise cancelation to allow for improved concentration and/or secured access to classified information. In some examples, microphones, cameras, speakers, touchscreens, keypads, etc. located within the cabin of the vehicle **102** may be available for being plugged into or paired with or otherwise being made available for use in connection with the user's electronics.

[0065] In some examples, the vehicle **102** interior may have various features that may be useful as an office environment. For example, the vehicle **102** may have seats that are maneuverable to recline, move forwards or backwards, swivel to face towards or away from one another, or otherwise be configurable to be positioned into orientations and

positions useful for meetings, working in front of a desk, facilitating a video call, or other office tasks.

[0066] In some examples, the vehicle **102** may have windows with an electro-chromatic tint feature, allowing the windows to darken the vehicle interior to a defined brightness. Additionally, or alternately, the vehicle **102** may include light sensors within the vehicle cabin, such that the window tint can be altered and/or the vehicle **102** can be instructed to be moved to a location with reduced sun load exposure.

[0067] In some examples, the vehicle **102** may have specific approved uses and rules to be monitored and enforced using the sensors **106** of the vehicle **102**. If a non-approved usage is identified, then warnings may be provided and/or cancelation of the rental may result. In an example, approved usage may include use of a computer or drawing, while a non-approved use may include preparing or drinking beverages, smoking, sound above a predefined dB level, etc.

[0068] At operation **402** and similar to operations **202** and **302**, the vehicle **102** determines which seating zones **116** of the vehicle **102** can be rented out for use as office space. For instance, internal sensors **104** and/or image recognition may be used to identify empty seating zones **116** of the vehicle **102**, etc. In another example, the vehicle **102** may receive user input from an owner or other operator of the vehicle **102** indicating the seating zones **116** that are available for rental. In yet another example the vehicle **102** may receive user input with respect to which of the detected seating zones **116** are available.

[0069] At operation **404** and similar to operations **204** and **304**, the vehicle **102** indicates which seating zones **116** are available for rent. For instance, share data **106** with respect to the seating zones **116** may be sent to the rental server **120** and/or broadcast locally, to inform other users of the available seating zones **116**.

[0070] At operation **406** and similar to operations **206** and **306**, the vehicle **102** receives an office space share request **128**. In an example, the user device **118** may send the office space share request **128** to the rental server **120**. The share request **128** may include requirements of the user for the office features to be available in the seating zone **116**. These requirements may generally be independent of the location of the vehicle **102**. As some non-limiting examples, the requirements may include one or more of availability of Wi-Fi, availability of a table, availability of a conference call speaker device, and/or availability of a privacy sound zone. As some further examples, the requirements may include swiveling chairs for a conference, presence of built in web conference equipment (such as cameras, microphones and speakers), maximum light level inside the vehicle, maximum sound level inside the vehicle, etc. An office worker user may choose to rent a seating zone **116** of a vehicle **102** and may use the user device **118** to select the vehicle **102** and accept any associated fees, agreement, policies, etc. for the rental.

[0071] At operation **408** and similar to operations **208** and **308**, the vehicle **102** navigates to perform the office share of the seating zone **116**. In an example, the vehicle **102** may use autonomous driving functionality to relocate itself closer to areas or specific regions where the seating zones **116** may be required. In another example, the rental server **120** may send a location of the vehicle **102** to the user device **118** to allow the office space requesting user to locate the vehicle **102** to use as a temporary office. This may allow the vehicle **102** and/or the office space user to meet to allow for the use of the seating zone **116**.

[0072] At operation **410** and similar to operations **210** and **310**, the vehicle **102** provides access to the seating zone **116** to be shared. In an example, the vehicle **102** may use the sensors **104** to confirm the identity of the office space user. For instance, the vehicle **102** may receive a pin, fingerprint, voice print, or other biometric data from the rental server **120** and may compare the entered pin or biometric to ensure the identity of the user. Responsive to granting the access, the vehicle **102** may unlock and/or otherwise provide access to the seating zone **116**.

[0073] At operation **412** and similar to operations **212** and **312**, the vehicle **102** confirms that the office share of the seating zone **116** is initiated. In an example, the vehicle **102** uses the sensors **104** to monitor the office space user to confirm that the office space user is using the correct seating zone **116** that is authorized for use. If the user is in the wrong seat, then the vehicle **102** may inform the user. In some examples, the selected seating zone **116** for the office space user may be indicating using features of the vehicle **102**, such as cabin lighting or speakers, to provide an indication to the user of the correct seating zone **116**.

[0074] At operation **414** and similar to operations **214** and **314**, the vehicle **102** navigates (if necessary) to perform the end of the office share. In many examples, the office share may be performed by the vehicle **102** at a fixed location. However, in some examples, the vehicle **102** may also combine a travel task with the office space task, and may allow the user to travel to a destination while also offering office services.

[0075] At operation **416** and similar to operations **216** and **316**, the vehicle **102** revokes access to the seating zones **116** for the office share to be completed. At operation **418** and similar to operations **218** and **318**, the vehicle **102** confirms the office share is complete. In an example, the vehicle **102** may use the sensors **104** to confirm that the user has left the seating zone **116** and has not left inventory items **112** behind.

[0076] FIG. **5** illustrates an example computing device **502** for performing aspects of the sharing of inventory items **112**, storage locations **114**, and seating zones **116**. Referring to FIG. **5**, and with reference to FIGS. **1-4**, the vehicles **102**, sensors **104**, transceivers **108**, inventory items **112**, user devices **118**, and rental server **120** may include examples of such computing devices **502**. Computing devices **502** generally include computer-executable instructions, such as those of the sharing application **122** and sharing service **124**, where the instructions may be executable by one or more computing devices **502**. Computer-executable instructions may be compiled or interpreted from computer programs created using a variety of programming languages and/or technologies, including, without limitation, and either alone or in combination, Java™, C, C++, C#, Visual Basic, JavaScript, Python, JavaScript, Perl, etc. In general, a processor (e.g., a microprocessor) receives instructions, e.g., from a memory, a computer-readable medium, etc., and executes these instructions, thereby performing one or more processes, including one or more of the processes described herein. Such instructions and other data, such as the share data **106**, may be stored and transmitted using a variety of computer-readable media.

[0077] As shown, the computing device **502** may include a processor **504** that is operatively connected to a storage

506, a network device **508**, an output device **510**, and an input device **512**. It should be noted that this is merely an example, and computing devices **502** with more, fewer, or different components may be used.

[0078] The processor **504** may include one or more integrated circuits that implement the functionality of a central processing unit (CPU) and/or graphics processing unit (GPU). In some examples, the processors **504** are a system on a chip (SoC) that integrates the functionality of the CPU and GPU. The SoC may optionally include other components such as, for example, the storage **506** and the network device **508** into a single integrated device. In other examples, the CPU and GPU are connected to each other via a peripheral connection device such as Peripheral Component Interconnect (PCI) express or another suitable peripheral data connection. In one example, the CPU is a commercially available central processing device that implements an instruction set such as one of the x86, ARM, Power, or Microprocessor without Interlocked Pipeline Stages (MIPS) instruction set families.

[0079] Regardless of the specifics, during operation the processor **504** executes stored program instructions that are retrieved from the storage **506**. The stored program instructions, accordingly, include software that controls the operation of the processors **504** to perform the operations described herein. The storage **506** may include both non-volatile memory and volatile memory devices. The non-volatile memory includes solid-state memories, such as Not AND (NAND) flash memory, magnetic and optical storage media, or any other suitable data storage device that retains data when the system is deactivated or loses electrical power. The volatile memory includes static and dynamic random access memory (RAM) that stores program instructions and data during operation of the system **100**.

[0080] The GPU may include hardware and software for display of at least two-dimensional (2D) and optionally three-dimensional (3D) graphics to the output device **510**. The output device **510** may include a graphical or visual display device, such as an electronic display screen, projector, printer, or any other suitable device that reproduces a graphical display. As another example, the output device **510** may include an audio device, such as a loudspeaker or headphone. As yet a further example, the output device **510** may include a tactile device, such as a mechanically raisable device that may, in an example, be configured to display braille or another physical output that may be touched to provide information to a user.

[0081] The input device **512** may include any of various devices that enable the computing device **502** to receive control input from users. Examples of suitable input devices **512** that receive human interface inputs may include keyboards, mice, trackballs, touchscreens, microphones, graphics tablets, and the like.

[0082] The network devices **508** may each include any of various devices that enable the described components to send and/or receive data from external devices over networks. Examples of suitable network devices **508** include an Ethernet interface, a Wi-Fi transceiver, a cellular transceiver, or a BLUETOOTH or BLE transceiver, or other network adapter or peripheral interconnection device that receives data from another computer or external data storage device, which can be useful for receiving large sets of data in an efficient manner.

[0083] With regard to the processes, systems, methods, heuristics, etc. described herein, it should be understood that, although the steps of such processes, etc. have been described as occurring according to a certain ordered sequence, such processes could be practiced with the described steps performed in an order other than the order described herein. It further should be understood that certain steps could be performed simultaneously, that other steps could be added, or that certain steps described herein could be omitted. In other words, the descriptions of processes herein are provided for the purpose of illustrating certain embodiments, and should in no way be construed so as to limit the claims.

[0084] Accordingly, it is to be understood that the above description is intended to be illustrative and not restrictive. Many embodiments and applications other than the examples provided would be apparent upon reading the above description. The scope should be determined, not with reference to the above description, but should instead be determined with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. It is anticipated and intended that future developments will occur in the technologies discussed herein, and that the disclosed systems and methods will be incorporated into such future embodiments. In sum, it should be understood that the application is capable of modification and variation.

[0085] All terms used in the claims are intended to be given their broadest reasonable constructions and their ordinary meanings as understood by those knowledgeable in the technologies described herein unless an explicit indication to the contrary in made herein. In particular, use of the singular articles such as "a," "the," "said," etc. should be read to recite one or more of the indicated elements unless a claim recites an explicit limitation to the contrary.

[0086] The abstract of the disclosure is provided to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in various embodiments for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter lies in less than all features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separately claimed subject matter.

[0087] While exemplary embodiments are described above, it is not intended that these embodiments describe all possible forms of the disclosure. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the disclosure. Additionally, the features of various implementing embodiments may be combined to form further embodiments of the disclosure.

What is claimed is:

1. A method for sharing seating zones of a vehicle as office space, comprising:

receiving, to a vehicle from a rental server, a reservation of a seating zone of the vehicle, responsive to a share request requesting the seating zone being received from a user device of a user from a listing of available shares; and

providing access to the seating zone in accordance with the reservation.

2. The method of claim **1**, further comprising:

receiving a credential to the vehicle from the rental server for providing the access to the vehicle;

validating the credential by the vehicle as entered by the user of the user device, the credential being provided to the user via the user device; and

granting the access to the seating zone responsive to the credential being validated.

3. The method of claim **1**, further comprising indicating the seating zone using cabin lights or speakers the vehicle.

4. The method of claim **1**, further comprising:

verifying that the user is in the seating zone using sensors of the vehicle; and

responsive to the user being in an incorrect seating zone, indicating the seating zone that is correct for the user using cabin lights or speakers the vehicle.

5. The method of claim **1**, further comprising:

receiving, from each of a plurality of vehicles, share data indicative of seating zones of the respective vehicles that are available, the share data indicating office features of the seating zones; and

compiling the listing of available shares based on the share data.

6. The method of claim **5**, further comprising:

receiving from the user device, a listing of one or more requirements for the office features to be available in the seating zone, the office features being independent of location of the vehicle; and

filtering the listing of available shares based on the requirements.

7. The method of claim **6**, wherein the requirements include one or more of availability of Wi-Fi, availability of a table, availability of a conference call speaker device, availability of a conference call microphone device, availability of a conference call camera device, and/or availability of charging features or electrical outlets.

8. The method of claim **6**, wherein the requirements include availability of a privacy sound zone.

9. The method of claim **6**, wherein the requirements include availability of swiveling seats to allow for a face-to-face conference.

10. The method of claim **6**, wherein the requirements include a defined brightness, and further comprising one or more of:

utilizing an electro-chromatic tint feature of windows of the vehicle to darken the vehicle interior to the defined brightness; or

autonomously moving the vehicle moved to a location with reduced sun load exposure to meet the defined brightness.

11. The method of claim **1**, wherein the share request indicates a location for the vehicle, and further comprising one or more of navigating the vehicle to the location or navigating the user to the location.

12. The method of claim **1**, wherein the share request indicates a pickup location and a dropoff location, and further comprising responsive to detecting the user as having entered the vehicle, navigating the vehicle from the pickup location to the dropoff location.

13. A system for sharing seating zones of a vehicle as office space, comprising:

a rental server including one or more hardware computing devices, the rental server being configured to execute a sharing service to perform operations including to:

receive share data from a plurality of vehicles, the share data indicating office features of the seating zones;

compile a listing of available shares based on the share data;

receive a share request requesting a seating zone from a user device of a user from a listing of available shares, the share request indicating one or more requirements for the office features to be available in the seating zone, the office features being independent of location of the vehicle;

filter the listing of available shares based on the requirements;

receive an indication of a selected vehicle of the plurality of vehicles from the user device;

send, to the selected vehicle, a reservation of the seating zone of the vehicle and a credential for access to the seating zone, and

send, to the user device, the credential for access to the seating zone, the credential to be provided from the user device to the vehicle to grant access to the seating zone,

wherein the vehicle is configured to provide access to the seating zone in accordance with the reservation responsive to validating the credential received to the vehicle from the user device.

14. The system of claim **13**, wherein the vehicle is further configured to indicate the seating zone using cabin lights or speakers the vehicle.

15. The system of claim **13**, wherein the vehicle is further configured to:

verify that the user is in the seating zone using sensors of the vehicle; and

responsive to the user being in an incorrect seating zone, indicate the seating zone that is correct for the user using cabin lights or speakers the vehicle.

16. The system of claim **13**, wherein the requirements include one or more of availability of Wi-Fi, availability of a table, availability of a conference call speaker device, availability of a conference call microphone device, availability of a conference call camera device, availability of charging features or electrical outlets, availability of a privacy sound zone, and/or availability of swiveling seats to allow for a face-to-face conference.

17. The system of claim **13**, wherein the requirements include a defined brightness, and further comprising one or more of:

utilizing an electro-chromatic tint feature of windows of the vehicle to darken the vehicle interior to the defined brightness; or

autonomously moving the vehicle moved to a location with reduced sun load exposure to meet the defined brightness.

18. The system of claim **13**, wherein the share request indicates a location for the vehicle, and wherein one or more of: the vehicle is configured to navigate to the location or the user device is configured to navigate the user to the location.

19. The system of claim **13**, wherein the share request indicates a pickup location and a dropoff location, and the vehicle is configured to, responsive to detecting the user as having entered the vehicle, navigate the vehicle from the pickup location to the dropoff location.

20. A non-transitory computer-readable medium comprising instructions that, when executed by one or more hardware computing devices, cause the one or more hardware computing devices to perform operations including to:

receive share data from a plurality of vehicles, the share data indicating office features of seating zones of the respective vehicles;

compile a listing of available shares based on the share data;

receive a share request requesting a seating zone from a user device of a user, the share request including a listing of one or more requirements for the office features to be available in the seating zone;

filter the listing of available shares based on the requirements;

receive an indication of a selected vehicle of the plurality of vehicles from the user device;

send, to the selected vehicle, a reservation of the seating zone of the vehicle and a credential for access to the seating zone, and

send, to the user device, the credential for access to the seating zone, the credential to be provided from the user device to the vehicle to grant access to the seating zone.

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