ADJUSTING HOME AUTOMATION COMFORT BASED ON VEHICLE ASSOCIATED USER PROFILE DATA

Applicant: Flextronics AP, LLC, San Jose, CA (US)

Inventor: Christopher P. Ricci, Saratoga, CA (US)

Assignee: Flextronics AP, LLC, San Jose, CA (US)

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Abstract

Methods and systems for a complete vehicle ecosystem are provided. Specifically, systems that when taken alone, or together, provide an individual or group of individuals with an intuitive and comfortable vehicular environment. The present disclosure includes a system that provides various outputs based on a user profile and determined context. An output provided by the present disclosure can change a configuration of a vehicle, device, building, and/or a system associated with the user profile. The configurations can include comfort and interface settings that can be adjusted based on the user profile information. Further, the user profiles can track health data related to the user and make adjustments to the configuration to assist the health of the user.

Diagram of vehicle ecosystem with various components such as Operator Cluster, Storage, Master Blade, Comp Blade 1, Comp Blade N, Remote Display 1, Remote Display N, Console Display, IP Router, Communication Channel(s)/Ethernet Zones, Optionally connected with 224, Access Point e.g., WiFi, Bluetooth Access Point/USB, FemtoCell, Storage Controller, Firewall, Media Controller, Subsystem Switch 1, Subsystem Switch N, GPS, Media, Subsystem Media Switch.
Fig. 5B

Internal Vehicle Communications between Vehicle and one or more devices, or between
One or more of Bluetooth®, NFC, WiFi, Mobile Hotspot, Point-to-Point, Point-to-Multiple Other
Points, etc.
Tap

\[ \text{FIG. 11A} \]

Long Press

\[ \text{FIG. 11B} \]

Drag

\[ \text{FIG. 11C} \]

Flick

\[ \text{FIG. 11D} \]

Pinch

\[ \text{FIG. 11E} \]

Spread

\[ \text{FIG. 11F} \]
<table>
<thead>
<tr>
<th>User ID</th>
<th>Zone Settings</th>
<th>Health Data</th>
<th>Safety Parameters</th>
<th>Profile Information</th>
<th>Linked Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>User 1</td>
<td>1, 2, 3, 4</td>
<td>X, Y</td>
<td>1, 2, 3</td>
<td>X, Y</td>
<td>A, B, C</td>
</tr>
<tr>
<td>User 2</td>
<td>2, 3, 4, 5</td>
<td>X, Y</td>
<td>2, 3</td>
<td>X, Y</td>
<td>A, B, C</td>
</tr>
<tr>
<td>User 2</td>
<td>1, 2, 3, 4, 5</td>
<td>Z</td>
<td>8, 9, 7</td>
<td>X, Y</td>
<td>A, B, C</td>
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</tbody>
</table>

**Fig. 12A**
<table>
<thead>
<tr>
<th>Device 1</th>
<th>Device 2</th>
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<tbody>
<tr>
<td>User ID</td>
<td>User ID</td>
</tr>
<tr>
<td>XYZ101</td>
<td>ABC456</td>
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<tr>
<td>User Area Settings</td>
<td>User Area Settings</td>
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<tr>
<td>XYZ10, 1</td>
<td>X12, 2</td>
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<tr>
<td>Capabilities</td>
<td>Priority</td>
</tr>
<tr>
<td>X, Y, Z</td>
<td>X, Y, Z</td>
</tr>
<tr>
<td>Profile Information</td>
<td>Registration Data</td>
</tr>
<tr>
<td>A, B, C</td>
<td>A, B, C</td>
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</table>

**Fig. 12B**
<table>
<thead>
<tr>
<th>Component ID</th>
<th>Priority Type</th>
<th>Zone Settings</th>
<th>Health Status</th>
<th>Profile Information</th>
<th>Communication Type(s)</th>
<th>Linked Data</th>
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</thead>
<tbody>
<tr>
<td>Component 1</td>
<td>C</td>
<td>1</td>
<td>X, Y</td>
<td>Y</td>
<td>W1, W2, W3</td>
<td>A, B</td>
</tr>
<tr>
<td>Component 3</td>
<td>C</td>
<td>2</td>
<td>1, 2, 3, 4</td>
<td>X, Y, Z</td>
<td>W1, W2</td>
<td>A, B, C</td>
</tr>
<tr>
<td>Component 4</td>
<td>NC</td>
<td>3</td>
<td>1, 2, 3, 4</td>
<td>X, Y, Z, W</td>
<td>W1, W2, W3</td>
<td>A, B, C</td>
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<tr>
<td>Component 5</td>
<td>C</td>
<td>2</td>
<td>X, Y, Z</td>
<td>X, Y, Z</td>
<td>W1, W2</td>
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<td>A, B, C</td>
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<td>Component 7</td>
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<td>W1, W2, W3</td>
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<td>Component 8</td>
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<td>X, Y, Z</td>
<td>W1, W2, W3</td>
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Fig. 12C
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<tr>
<th>Vehicle ID</th>
<th>Area Zone Settings</th>
<th>Health Status</th>
<th>Profile Information</th>
<th>Linked Data</th>
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<tr>
<td>Vehicle 1</td>
<td>S1-1 1 1.2.3 X</td>
<td>T1</td>
<td>Y.Z</td>
<td>A.B.C</td>
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<tr>
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<td>S1-2 1 2.1.2 X</td>
<td>Y</td>
<td>Y</td>
<td>A.B.D</td>
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<tr>
<td></td>
<td>S5-1 2 1.2.3.4 X</td>
<td>Y.Z</td>
<td>X.Y.Z</td>
<td>A.C.E</td>
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<tr>
<td></td>
<td>S2-1 2 1,3,4 X</td>
<td>X</td>
<td>X.Y.Z</td>
<td>A.B.</td>
</tr>
<tr>
<td></td>
<td>S2-2 2 1,3,5 X</td>
<td>Z</td>
<td>X.Y.Z</td>
<td>A.B.C, A.B.D</td>
</tr>
<tr>
<td></td>
<td>S2-3 3 4,5,8,9 X</td>
<td>X</td>
<td>X.Y</td>
<td>A.B.D</td>
</tr>
</tbody>
</table>
START

Determine person in zone/area

Determine if person can be identified?

NO

Characterize person

YES

Identify person

Determine settings are to be stored

NO

Characterize person

YES

Identify person

Store settings for person

Store settings in cloud storage

END
1404 START

1408 Determine person in zone/area

1412 Identify person

1416 Determine settings associated with person

1420 Retrieve settings

1424 Configure/react to settings

1428 END

Fig. 14
1504 START

1508 Determine person in zone/area

1512 Determine characteristics

1516 Determine if person can be identified?

1524 Characterize person

1520 Identify person

1528 Determine if settings are to be stored?

1532 Retrieve settings

1536 Store settings in cloud storage

1540 END

Fig. 15
Determine person in zone/area

Determine characteristics

Determine if person can be identified?

Characterize person

Determine if gesture(s) are to be stored?

Store gesture(s) in cloud storage

Retrieve gesture(s)

Identify person

END
1700 START

1704 Determine person in zone/area

1712 Identify person

1716 Receive gesture from person

1720 Identify gesture

1724 Configure vehicle or react to gesture

1728 END

Fig. 17
START

Determine person in zone/area

Determine characteristics of person

Determine if person can be identified?

YES

Characterize person

Determine health/safety data is to be stored

Store health/safety data for person

Wait a period of time

NO

Identify person

Fig. 18
Receive health data from person

Compare health data to stored data

Determine if health data is within acceptable parameters?

React to health data

END
START

Receive User Input

Determine Context of User Input

Context Match Personality?

YES

NO

Alter/Generate Personality Based on User Context

Present Output in Personality Based on User Context

User Present?

YES

NO

END

Fig. 22
START

Store Area(s) of Building Associated with User in a User Profile

Collect Vehicle and/or Infotainment Settings Associated with User and Store in User Profile

Use Collected Information to Adjust Settings Based on Stored Information

END

Fig. 24
2504 START

2508 Detect Presence of Vehicle Setting Information in a User Profile

2512 Determine User Areas Associated with a Building

2516 User Present? NO

2520 Adjust Settings of the Building Based on Vehicle Setting Information

2524 Settings Changed from Adjusted? NO

2528 Record Change to Adjusted Settings in User Profile

2532 Use Change in Settings for Vehicle Setting Adjustment

2536 END

Fig. 25
Fig. 27

2704 START

2708 Record User Settings of Vehicle Controls in Profile

2712 Record Sensitivity of Controls in Profile

2716 Detect User Profile Control Settings Information

2720 Adjust Vehicle Controls to Match Profile Settings

2724 END
START

Record User Data

Establish Baseline Levels

Determine Deviation from Baseline Levels

Provide Output Based at Least Partially on Deviation

END

Fig. 28
Fig. 29

START

Detect Incident

Determine Health Statistics

Communicate with Third Party

Provide User Health Information to Third Party

END
START

3008 Collect Infotainment Settings and Store in User Profile

3012 Detect User Profile Infotainment Settings

3016 Detect Infotainment System

3020 Adjust Infotainment Based at Least Partially on Settings

3024 Infotainment Offline?

END

Fig. 30
ADJUSTING HOME AUTOMATION COMFORT BASED ON VEHICLE ASSOCIATED USER PROFILE DATA

CROSS REFERENCE TO RELATED APPLICATIONS


BACKGROUND

[0003] Whether using private, commercial, or public transport, the movement of people and/or cargo has become a major industry. In today’s interconnected world, daily travel is essential to engaging in commerce. Commuting to and from work can account for a significant portion of a traveler’s day. As a result, vehicle manufacturers have begun to focus on making this commute, and other journeys, more enjoyable.

[0004] Currently, vehicle manufacturers attempt to entice travelers to use a specific conveyance based on any number of features. Most of these features focus on vehicle safety or efficiency. From the addition of safety-restraints, air-bags,
and warning systems to more efficient engines, motors, and designs, the vehicle industry has worked to appease the supposed needs of the traveler. Recently, however, vehicle manufacturers have shifted their focus to user and passenger comfort as a primary concern. Making an individual more comfortable while traveling instills confidence and pleasure in using a given vehicle, increasing an individual’s preference for a given manufacturer and/or vehicle type.

[0005] One way to instill comfort in a vehicle is to create an environment within the vehicle similar to that of an individual’s home. Integrating features in a vehicle that are associated with comfort found in an individual’s home can ease a traveler’s transition from home to vehicle. Several manufacturers have added comfort features in vehicles such as the following: leather seats, adaptive and/or personal climate control systems, music and media players, ergonomic controls, and, in some cases, Internet connectivity. However, because these manufacturers have added features to a conveyance, they have built comfort around a vehicle and failed to build a vehicle around comfort.

SUMMARY

[0006] There is a need for a vehicle ecosystem, which can integrate both physical and mental comforts, while seamlessly communicating with current electronic devices to result in a totally intuitive and immersive user experience. These and other needs are addressed by the various aspects, embodiments, and/or configurations of the present disclosure. Also, while the disclosure is presented in terms of exemplary and optional embodiments, it should be appreciated that individual aspects of the disclosure can be separately claimed.

[0007] Embodiments include a method, comprising: determining a presence of a user inside a vehicle; determining an identity of the user; receiving input provided by the user, the input having a context associated therewith; and retrieving, based at least partially on the input provided by the user, a virtual personality for presentation to at least one device associated with the vehicle. Aspects of the above method include wherein determining the presence of the user inside the vehicle further comprises: detecting a person via at least one image sensor associated with the vehicle. Aspects of the above method include wherein determining the identity of the user further comprises: identifying facial features associated with the person detected via the at least one image sensor; and determining whether the identified facial features associated with the person match user characteristics stored in a memory. Aspects of the above method include wherein the identified facial features associated with the person do not match the user characteristics stored in the memory, and wherein determining the identity of the user further comprises: prompting the user for identification information; receiving identification information from the user; and storing the identification information received from the user in the memory. Aspects of the above method include wherein the identified facial features associated with the person match the user characteristics stored in the memory, and wherein the virtual personality is retrieved from a user profile associated with the user identified. Aspects of the above method include wherein receiving the input provided by the user further comprises: determining the context of the input, wherein the context corresponds to an emotional state of the user. Aspects of the above method include wherein retrieving the virtual personality for presentation to at least one device further comprises: determining, based at least partially on the context of the input, a content of the virtual personality to suit the emotional state of the user. Aspects of the above method further comprise comparing the determined content of the virtual personality with emotional information in a user profile virtual personality; and generating, when the determined content of the virtual personality differs from the emotional information in the user profile virtual personality, an adjusted user profile virtual personality for presentation, wherein the adjusted user profile includes the content to suit the emotional state of the user. Aspects of the above method further comprise presenting the virtual personality having the content to suit the emotional state of the user, wherein the content of the virtual personality includes an opposite emotional state to the emotional state of the user. Aspects of the above method include wherein the virtual personality includes at least one of an avatar, a voice output, a visual output, a tone, and a volume intensity.

[0008] Embodiments include a non-transitory computer readable medium having instructions stored thereon that, when executed by a processor, perform operations comprising the above methods. Embodiments include a device, means, and/or system configured to perform the above methods.

[0009] Embodiments include a vehicle control system, comprising a personality module contained in a memory and executed by a processor of the vehicle control system, the personality module configured to determine a presence of a user inside a vehicle, determine an identity of the user, receive input provided by the user, the input having a context associated therewith, and retrieve, based at least partially on the input provided by the user, a virtual personality for presentation to at least one device associated with the vehicle. Aspects of the above system include wherein receiving the input provided by the user further comprises determining the context of the input, wherein the context corresponds to an emotional state of the user, and wherein retrieving the virtual personality for presentation to at least one device further comprises determining, based at least partially on the context of the input, a content of the virtual personality to suit the emotional state of the user.

[0010] Embodiments include a method, comprising: referring to a user profile memory associated with a user for vehicle setting information; detecting an identification of at least one area of a building associated with the user; determining that the at least one area of the building includes a configurable comfort setting; and determining, based at least partially on the identification of the at least one area of the building and the vehicle setting information, to adjust the configurable comfort setting of the at least one area of the building. Aspects of the above method further comprise providing an adjustment output to a building comfort control system, wherein the building comfort control system is adapted to control the configurable comfort setting of the at least one area of the building. Aspects of the above method include wherein prior to providing the adjustment output, the method further comprises: determining a presence of the user inside the at least one area of the building, wherein the adjustment output is provided based at least partially on determining the user is present inside the at least one area of the building. Aspects of the above method include wherein prior to providing the adjustment output, the method further comprises: determining an expected time of arrival corresponding to an expected time the user is to be inside the at least one area...
of the building, wherein the expected time of arrival is based on one or more of user location data, historical data, and stored preferences, and wherein the adjustment output is provided based at least partially on the expected time of arrival such that the adjustment output is provided prior to or at the expected time of arrival. Aspects of the above method further comprise determining that the user made a change to the adjusted configurable comfort setting; and storing the change made to the adjusted configurable comfort setting in the user profile memory. Aspects of the above method further comprise determining a presence of the user inside a vehicle, and wherein the adjustment output is provided based at least partially on determining the user is present inside the vehicle. Aspects of the above method include wherein prior to referring to the user profile memory the method further comprises: storing, in the user profile memory, information corresponding to areas of a building occupied by the user; collecting vehicle setting data associated with the user, wherein the vehicle setting data includes at least one of vehicle comfort settings and infotainment settings made by the user; and storing the vehicle setting data in the user profile memory. Aspects of the above method include wherein the vehicle setting information includes an interior temperature of a vehicle, and wherein the configurable comfort setting of the at least one area of the building is a temperature associated with the at least one area. Aspects of the above method include wherein the configurable comfort setting of the at least one area of the building is adjusted to match the vehicle setting information in the user profile memory.

[0011] Embodiments include a non-transitory computer readable medium having instructions stored thereon that, when executed by a processor, perform operations comprising the above methods. Embodiments include a device, means, and/or system configured to perform the above methods.

[0012] Embodiments include a settings control system, comprising a building automation system configured to refer to a user profile memory associated with a user for vehicle setting information, detect an identification of at least one area of a building associated with the user, determine that the at least one area of the building includes a configurable comfort setting, and determine, based at least partially on the identification of the at least one area of the building and the vehicle setting information, to adjust the configurable comfort setting of the at least one area of the building. Aspects of the above system include wherein the building automation system is contained in a memory and executed by a processor of the settings control system, wherein the building automation system is further configured to provide an adjustment output to a building comfort control system, and wherein the building comfort control system is adapted to control the configurable comfort setting of the at least one area of the building.

[0013] Embodiments include a method, comprising: determining a location inside a vehicle associated with a user; determining at least one vehicle control associated with the location inside the vehicle; referring to a user profile memory associated with the user for vehicle control settings; and determining, based at least partially on the vehicle control settings, to adjust the at least one vehicle control associated with the location inside the vehicle. Aspects of the above method further comprise providing an adjustment output to a vehicle control system, wherein the vehicle control system is adapted to control the at least one vehicle control associated with the location inside the vehicle. Aspects of the above method include wherein prior to providing the adjustment output, the method further comprises: determining a presence of the user inside the vehicle, wherein the adjustment output is provided based at least partially on determining the user is present in the location of the vehicle. Aspects of the above method include wherein prior to determining the location inside the vehicle associated with the user the method further comprises: storing, in the user profile memory, information corresponding to locations inside the vehicle occupied by the user; collecting vehicle control setting data associated with the user, wherein the vehicle control setting data includes at least one vehicle control setting made by the user in at least one of the locations inside the vehicle; and storing the vehicle control setting data in the user profile memory. Aspects of the above method include wherein the at least one vehicle control includes one or more vehicle features such as a seat system, a steering control, a foot pedal control, a mirror position, and a display device. Aspects of the above method include wherein the vehicle control settings include at least one of a position, a sensitivity, an angle, and a movement, associated with the one or more vehicle features. Aspects of the above method include wherein determining the presence of the user inside the vehicle further comprises: detecting a person via at least one image sensor associated with the vehicle; identifying facial features associated with the person detected via the at least one image sensor; and determining whether the identified facial features associated with the person match user characteristics stored in a memory. Aspects of the above method include wherein determining the presence of the user inside the vehicle further comprises: detecting a device associated with the user in an area of the vehicle. Aspects of the above method further comprise determining that the user made a change to the adjusted at least one vehicle control; and storing the change made to the adjusted at least one vehicle control in the user profile memory. Aspects of the above method include wherein the at least one vehicle control is adjusted via the adjustment output to match the vehicle control settings in the user profile memory.

[0014] Embodiments include a non-transitory computer readable medium having instructions stored thereon that, when executed by a processor, perform operations comprising the above methods. Embodiments include a device, means, and/or system configured to perform the above methods.

[0015] Embodiments include a vehicle control system, comprising a profile identification module contained in a memory and executed by a processor of the vehicle control system, the profile identification module configured to determine a location inside a vehicle associated with a user, determine at least one vehicle control associated with the location inside the vehicle, refer to a user profile memory associated with the user for vehicle control settings, and determine, based at least partially on the vehicle control settings, to adjust the at least one vehicle control associated with the location inside the vehicle. Aspects of the above system include wherein the profile identification module is further configured to provide an adjustment output to the vehicle control system, wherein the vehicle control system is adapted to control the at least one vehicle control associated with the location inside the vehicle.

[0016] Embodiments include a method, comprising: detecting a presence of at least one user in a vehicle; determining an identity of the at least one user; receiving data
associated with the at least one user, wherein the data includes biometric information; detecting a deviation between the received data and an established baseline biometric profile associated with the at least one user; and determining, based at least partially on the detected deviation, to provide an output configured to address the deviation. Aspects of the above method include wherein prior to receiving data associated with the at least one user the method further comprises: determining the baseline biometric profile associated with the at least one user; and storing the determined baseline biometric profile in a user profile memory associated with the at least one user. Aspects of the above method include wherein determining the presence of the at least one user inside the vehicle further comprises: detecting a person via at least one image sensor associated with the vehicle. Aspects of the above method include wherein determining the identity of the at least one user further comprises: identifying facial features associated with the person detected via the at least one image sensor; and determining whether the identified facial features associated with the person match user characteristics stored in a memory. Aspects of the above method include wherein the data associated with the at least one user is provided by a sensor worn by the at least one user. Aspects of the above method include wherein the output configured to address the deviation is provided by the vehicle, and wherein addressing the deviation includes adjusting one or more settings associated with the vehicle. Aspects of the above method include wherein the one or more settings include at least one of a vehicle interior environment, temperature, air composition, oxygen level, sound level, window position, seat position, and lighting level. Aspects of the above method further comprise detecting a vehicle incident via one or more sensors associated with the vehicle; collecting, based at least partially on the detected vehicle incident, the data associated with the at least one user; and sending the established baseline biometric profile and collected data associated with the at least one user to a third party. Aspects of the above method include wherein the data associated with the at least one user is received at a first data rate in the absence of a detected vehicle incident and collected at a higher second data rate upon detecting the vehicle incident. Aspects of the above method include wherein the collected data associated with the at least one user is sent to the third party in real-time.

[0017] Embodiments include a non-transitory computer readable medium having instructions stored thereon that, when executed by a processor, perform operations comprising the above methods. Embodiments include a device, means, and/or system configured to perform the above methods.

[0018] Embodiments include a vehicle control system, comprising a profile identification module contained in a memory and executed by a processor of the vehicle control system, the profile identification module configured to detect the presence of at least one user in a vehicle, determine an identity of the at least one user, receive data associated with the at least one user, wherein the data includes biometric information, detect a deviation between the received data and an established baseline biometric profile associated with the at least one user, and determine, based at least partially on the detected deviation, to provide an output configured to address the deviation. Aspects of the above system include wherein prior to receiving data associated with the at least one user the profile identification module is further configured to determine the baseline biometric profile associated with the at least one user, and store the determined baseline biometric profile in a user profile memory associated with the at least one user. [0019] Embodiments include a method, comprising: detecting a user profile associated with a user, the user profile having infotainment information stored therein; detecting at least one infotainment system associated with the user; and determining to adjust a configuration of the at least one infotainment system based at least partially on the infotainment information in the user profile. Aspects of the above method include wherein the at least one infotainment system is a vehicle infotainment system, and wherein prior to detecting the user profile the method further comprises: identifying the user inside a vehicle via one or more sensors associated with the vehicle; and referring, in response to identifying the user, to a memory associated with the identified user, wherein the memory includes the user profile. Aspects of the above method include wherein identifying the user further comprises: receiving identifying characteristics associated with the user via an image sensor or via a signal provided by a device associated with the user; and determining whether the identifying characteristics associated with the user match unique user characteristics stored in a memory, wherein the unique user characteristics are configured to verify an identity of the user. Aspects of the above method include wherein detecting the at least one infotainment system associated with the user is based at least partially on one or more of a proximity of a user and a user device to the at least one infotainment system. Aspects of the above method include wherein determining to adjust the configuration of the at least one infotainment system further comprises: determining the configuration of the at least one infotainment system; and determining whether the infotainment information matches the determined configuration of the at least one infotainment system, wherein the infotainment information includes at least one infotainment setting, preference, content, and power state. Aspects of the above method further comprise providing, when the infotainment information does not match the determined configuration of the at least one infotainment system, an adjustment output configured to adjust the configuration of the at least one infotainment system. Aspects of the above method include wherein determining to adjust the configuration of the at least one infotainment system further comprises: determining an access priority of the user; and determining whether the access priority of the user allows for the adjustment to the configuration of the at least one infotainment system. Aspects of the above method include wherein determining whether the access priority of the user allows for the adjustment to the configuration of the at least one infotainment system further comprises: determining a second access priority of a second user associated with the infotainment system; and comparing the access priority of the user to the second access priority of the second user, wherein the adjustment is allowed when the access priority of the user is greater than the second access priority of the second user, and wherein the adjustment is prevented when the access priority of the user is less than the second access priority of the second user. Aspects of the above method further comprise receiving additional infotainment information via at least one device associated with the user; determining whether the additional infotainment information qualifies as user profile data; and storing, based at least partially on determining that the additional infotainment information qualifies as user profile data, the additional infotainment information in the user profile associated with the user. Aspects of the
above method further comprise adjusting the configuration of the at least one infotainment system, wherein adjusting the configuration includes at least one of tuning to a station, setting an infotainment input, selecting a content genre, and recording content for playback to the user.

[0020] Embodiments include a non-transitory computer readable medium having instructions stored thereon that, when executed by a processor, perform operations comprising the above methods. Embodiments include a device, means, and/or system configured to perform the above methods.

[0021] Embodiments include an infotainment control system, comprising a profile identification module contained in a memory and executed by a processor of the infotainment control system, the profile identification module configured to detect a user profile associated with a user, the user profile having infotainment information stored therein, detect at least one infotainment system associated with the user, and determine to adjust a configuration of the at least one infotainment system based at least partially on the infotainment information in the user profile. Aspects of the above system include wherein the at least one infotainment system is a vehicle infotainment system, and wherein prior to detecting the user profile the profile identification module is further configured to identify the user inside a vehicle via one or more sensors associated with the vehicle, and refer, in response to identifying the user, to a memory associated with the identified user, wherein the memory includes the user profile.

[0022] The present disclosure can provide a number of advantages depending on the particular aspect, embodiment, and/or configuration. One advantage includes providing user profiles that include one or more settings, configurations, and information, associated with a user. Among other things, the user profiles described herein may follow a user from vehicle-to-vehicle, from communication device-to-communication device, from building-to-vehicle, vehicle-to-building, and/or combinations thereof. The user profiles can act as a repository for user information. This user information can be used by any number of entities and/or devices in tracking a user, providing an output, manipulating controls of a vehicle, controlling features of a building, and/or adjusting infotainment systems. The user profiles can provide adjustment information for a vehicle features position, sensitivity, and/or operational range. These and other advantages will be apparent from the disclosure.

[0023] The phrases “at least one,” “one or more,” and “and/or” are open-ended expressions that are both conjunctive and disjunctive in operation. For example, each of the expressions “at least one of A, B and C,” “at least one of A, B, or C,” “one or more of A, B, and C,” “one or more of A, B, or C,” and “A, B, and/or C” means A alone, B alone, C alone, A and B together, A and C together, B and C together, or A, B and C together.

[0024] The term “a” or “an” entity refers to one or more of that entity. As such, the terms “a” (or “an”), “one or more,” and “at least one” can be used interchangeably herein. It is also to be noted that the terms “comprising,” “including,” and “having” can be used interchangeably.

[0025] The term “automatic” and variations thereof, as used herein, refer to any process or operation done without material human input when the process or operation is performed. However, a process or operation can be automatic, even though performance of the process or operation uses material or immaterial human input, if the input is received before the performance of the process or operation. Human input is deemed to be material if such input influences how the process or operation will be performed. Human input that consents to the performance of the process or operation is not deemed to be “material.”

[0026] The term “automotive navigation system” can refer to a satellite navigation system designed for use in vehicles. It typically uses a GPS navigation device to acquire position data to locate the user on a road in the unit’s map database. Using the road database, the unit can give directions to other locations along roads also in its database. Dead reckoning using distance data from sensors attached to the drivetrain, a gyroscope, and an accelerometer can be used for greater reliability, as GPS signal loss and/or multipath may occur due to urban canyons or tunnels.

[0027] The term “bus” and variations thereof, as used herein, can refer to a subsystem that transfers information and/or data between various components. A bus generally refers to the collection communication hardware interface, interconnects, bus architecture, standard, and/or protocol defining the communication scheme for a communication system and/or communication network. A bus may also refer to a part of a communication hardware that interfaces the communication hardware with the interconnects that connect to other components of the corresponding communication network. The bus may be for a wired network, such as a physical bus, or wireless network, such as part of an antenna or hardware that couples the communication hardware with the antenna. A bus architecture supports a defined format in which information and/or data is arranged when sent and received through a communication network. A protocol may define the format and rules of communication of a bus architecture.

[0028] The terms “communication device,” “smartphone,” and “mobile device,” and variations thereof, as used herein, can be used interchangeably and may include any type of device capable of communicating with one or more of another device and/or across a communications network, via a communications protocol, and the like. Exemplary communication devices may include but are not limited to smartphones, handheld computers, laptops, netbooks, notebooks, computers, subnotebooks, tablet computers, scanners, portable gaming devices, phones, pagers, GPS modules, portable music players, and other Internet-enabled and/or network-connected devices.

[0029] A “communication modality” can refer to any protocol or standard defined or specific communication session or interaction, such as Voice-Over-Internet-Protocol (“VoIP”), cellular communications (e.g., 1S-95, 1G, 2G, 3G, 3.5G, 4G, 4G/IMT-Advanced standards, 3GPP, WIMAX™, GSM, CDMA, CDMA2000, EDGE, iEVDO, iDEN, GPRS, HSPDA, TDMA, UMA, UMTS, ITU-R, and 5G), Bluetooth™, text or instant messaging (e.g., AIM, Blurrk, eBuddy, Gadu-Gadu, IBM Lotus Sametime, ICQ, iMessage, IMVU, Lynx, MXit, Paltalk, Skype, Tencent QQ, Windows Live Messenger™ or MSN Messenger™, Wirechuck, Xfire, and Yahoo! Messenger™), email, Twitter (e.g., tweeting), Digital Service Protocol (DSP), and the like.

[0030] The term “communication system” or “communication network” and variations thereof, as used herein, can refer to a collection of communication components capable of one or more of transmission, relay, interconnect, control, or otherwise manipulate information or data from at least one transmitter to at least one receiver. As such, the communic-
tion may include a range of systems supporting point-to-point or broadcasting of the information or data. A communication system may refer to the collection individual communication hardware as well as the interconnects associated with and connecting the individual communication hardware. Communication hardware may refer to dedicated communication hardware or may refer a processor coupled with a communication means (i.e., an antenna) and running software capable of using the communication means to send and/or receive a signal within the communication system. Interconnect refers to some type of wired or wireless communication link that connects various components, such as communication hardware, within a communication system. A communication network may refer to a specific setup of a communication system with the collection of individual communication hardware and interconnects having some definable network topography. A communication network may include wired and/or wireless network having a pre-set to an ad hoc network structure.

[0031] The term “computer-readable medium,” as used herein refers to any tangible storage and/or transmission medium that participates in providing instructions to a processor for execution. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media includes, for example, non-volatile random access memory (NVRAM), or magnetic or optical disks. Volatile media includes dynamic memory, such as main memory. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, or any other magnetic medium, magneto-optical medium, a compact disc read only memory (CD-ROM), any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, a random access memory (RAM), a programmable read only memory (PROM), and erasable programmable read only memory EPROM, a FLASH-EPROM, a solid state medium like a memory card, any other memory chip or cartridge, a carrier wave as described hereinabove, or any other medium from which a computer can read. A digital file attachment to an e-mail or other self-contained information archive or set of archives is considered a distribution medium equivalent to a tangible storage medium. When the computer-readable media is contained as a database, it is to be understood that the database may be any type of database, such as relational, hierarchical, object-oriented, and/or the like. Accordingly, the disclosure is considered to include a tangible storage medium or distribution medium and prior art-recognized equivalents and successor media, in which the software implementations of the present disclosure are stored. It should be noted that any computer readable medium that is not a signal transmission may be considered non-transitory.

[0032] The terms dash and dashboard and variations thereof, as used herein, may be used interchangeably and can be any panel and/or area of a vehicle disposed adjacent to an operator, user, and/or passenger. Dashboards may include, but are not limited to, one or more control panel(s), instrument housing(s), head unit(s), indicator(s), gauge(s), meter(s), light(s), audio equipment, computer(s), screen(s), display(s), HUD unit(s), and graphical user interface(s).

[0033] The term “module” as used herein refers to any known or later developed hardware, software, firmware, artificial intelligence, fuzzy logic, or combination of hardware and software that is capable of performing the functionality associated with that element.

[0034] The term “desktop” refers to a metaphor used to portray systems. A desktop is generally considered a “surface” that may include pictures, called icons, widgets, folders, etc. that can activate and/or show applications, windows, cabinets, files, folders, documents, and other graphical items. The icons are generally selectable to initiate a task through user interface interaction to allow a user to execute applications and/or conduct other operations.

[0035] The term “display” refers to a portion of a physical screen used to display the output of a computer to a user.

[0036] The term “displayed image” refers to an image produced on the display. A typical displayed image is a window or desktop. The displayed image may occupy all or a portion of the display.

[0037] The term “display orientation” refers to the way in which a rectangular display is oriented for viewing. The two most common types of display orientations are portrait and landscape. In landscape mode, the display is oriented such that the width of the display is greater than the height of the display (such as a 4:3 ratio, which is 4 units wide and 3 units tall, or a 16:9 ratio, which is 16 units wide and 9 units tall). Stated differently, the longer dimension of the display is oriented substantially horizontal in landscape mode while the shorter dimension of the display is oriented substantially vertical. In the portrait mode, by contrast, the display is oriented such that the width of the display is less than the height of the display. Stated differently, the shorter dimension of the display is oriented substantially horizontal in the portrait mode while the longer dimension of the display is oriented substantially vertical. A multi-screen display can have one composite display that encompasses all the screens. The composite display can have different display characteristics based on the various orientations of the device.

[0038] The term “electronic address” can refer to any contactable address, including a telephone number, instant message handle, e-mail address, Uniform Resource Locator (“URL”), Global Universal Identifier (“GUID”), Universal Resource Identifier (“URI”), Address of Record ("AOR"), electronic alias in a database, etc., combinations thereof.

[0039] The term “gesture” refers to a user action that expresses an intended idea, action, meaning, result, and/or outcome. The user action can include manipulating a device (e.g., opening or closing a device, changing a device orientation, moving a trackball or wheel, etc.), movement of a body part in relation to the device, movement of an implement or tool in relation to the device, audio inputs, etc. A gesture may be made on a device (such as on the screen) or with the device to interact with the device.

[0040] The term “gesture capture” refers to a sense or otherwise a detection of an instance and/or type of user gesture. The gesture capture can be received by sensors in three-dimensional space. Further, the gesture capture can occur in one or more areas of a screen, for example, on a touch-sensitive display or a gesture capture region. A gesture region can be on the display, where it may be referred to as a touch sensitive display, or off the display, where it may be referred to as a gesture capture area.

[0041] The terms “infotainment” and “infotainment system” may be used interchangeably and can refer to the hardware/software products, data, content, information, and/or systems, which can be built into or added to vehicles to enhance driver and/or passenger experience. Infotainment may provide media and/or multimedia content. An example is
information-based media content or programming that also includes entertainment content.

[0042] A “multi-screen application” refers to an application that is capable of producing one or more windows that may simultaneously occupy one or more screens. A multi-screen application commonly can operate in single-screen mode in which one or more windows of the application are displayed only on one screen or in multi-screen mode in which one or more windows are displayed simultaneously on multiple screens.

[0043] A "single-screen application" refers to an application that is capable of producing one or more windows that may occupy only a single screen at a time.

[0044] The terms “online community,” “e-community,” or “virtual community” can mean a group of people that interact via a computer network, for social, professional, educational, and/or other purposes. The interaction can use a variety of media formats, including wikis, blogs, chat rooms, Internet forums, instant messaging, email, and other forms of electronic media. Many media formats may be used in social software separately and/or in combination, including text-based chat rooms and forums that use voice, video text or avatars.

[0045] The term “satellite positioning system receiver” can refer to a wireless receiver or transceiver to receive and/or send location signals from and/or to a satellite positioning system (SIPS), such as the Global Positioning System (“GPS”) (US), GLONASS (Russia), Galileo positioning system (EU), Compass navigation system (China), and Regional Navigational Satellite System (India).

[0046] The term “social network service” may include a service provider that builds online communities of people, who share interests and/or activities, or who are interested in exploring the interests and/or activities of others. Social network services can be network-based and may provide a variety of ways for users to interact, such as e-mail and instant messaging services.

[0047] The term “social network” can refer to a network-based social network.

[0048] The term “screen,” “touch screen,” “touchscreen,” or “touch-sensitive display” refers to a physical structure that enables the user to interact with the computer by touching areas on the screen and provides information to a user through a display. The touch screen may sense user contact in a number of different ways, such as by the change in an electrical parameter (e.g., resistance or capacitance), acoustic wave variations, infrared radiation proximity detection, light variation detection, and the like. In a resistive touch screen, for example, normally separated conductive and resistive metallic layers in the screen pass an electrical current. When a user touches the screen, the two layers make contact in the contacted location, whereby a change in electrical field is noted and the coordinates of the contacted location calculated. In a capacitive touch screen, a capacitive layer stores electrical charge, which is discharged to the user upon contact with the touch screen, causing a decrease in the charge of the capacitive layer. The decrease is measured, and the contacted location coordinates determined. In a surface acoustic wave touch screen, an acoustic wave is transmitted through the screen, and the acoustic wave is disturbed by user contact. A receiving transducer detects the user contact instance and determines the contacted location coordinates.

[0049] The term “window” refers to a, typically rectangular, displayed image on at least part of a display that contains or provides content different from the rest of the screen. The window may obscure the desktop. The dimensions and orientation of the window may be configurable either by another module or by a user. When the window is expanded, the window can occupy substantially all of the display space on a screen or screens.

[0050] The terms “determine,” “calculate,” and “compute,” and variations thereof, as used herein, are used interchangeably and include any type of methodology, process, mathematical operation, or technique.

[0051] It shall be understood that the term “means,” as used herein, shall be given its broadest possible interpretation in accordance with 35 U.S.C., Section 112, Paragraph 6 or other applicable law. Accordingly, a claim incorporating the term “means” shall cover all structures, materials, or acts set forth herein, and all of the equivalents thereof. Further, the structures, materials or acts and the equivalents thereof shall include all those described in the summary of the invention, brief description of the drawings, detailed description, abstract, and claims themselves.

[0052] The term “vehicle,” “car,” “automobile,” and variations thereof may be used interchangeably herein and can refer to a device or structure for transporting animate and/or inanimate or tangible objects (e.g., persons and/or things), such as a self-propelled conveyance. A vehicle as used herein can include any conveyance or model of a conveyance, where the conveyance was originally designed for the purpose of moving one or more tangible objects, such as people, animals, cargo, and the like. The term “vehicle” does not require that a conveyance moves or is capable of movement. Typical vehicles may include but are in no way limited to cars, trucks, motorcycles, buses, automobiles, trains, rail conveyances, boats, ships, marine conveyances, submarine conveyances, airplanes, space craft, flying machines, human-powered conveyances, and the like.

[0053] The term “profile,” as used herein, can refer to any data structure, data store, and/or database that includes one or more items of information associated with a vehicle, a vehicle system, a device (e.g., a mobile device, laptop, mobile phone, etc.), or a person.

[0054] The term “in communication with,” as used herein, refers to any coupling, connection, or interaction using electrical signals to exchange information or data, using any system, hardware, software, protocol, or format, regardless of whether the exchange occurs wirelessly or over a wired connection.

[0055] The preceding is a simplified summary of the disclosure to provide an understanding of some aspects of the disclosure. This summary is neither an extensive nor exhaustive overview of the disclosure and its various aspects, embodiments, and/or configurations. It is intended neither to identify key or critical elements of the disclosure nor to delineate the scope of the disclosure but to present selected concepts of the disclosure in a simplified form as an introduction to the more detailed description presented below. As will be appreciated, other aspects, embodiments, and/or configurations of the disclosure are possible utilizing, alone or in combination, one or more of the features set forth above or described in detail below.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0056] FIG. 1 depicts an embodiment of a vehicle operating environment;
FIG. 2 is a block diagram of an embodiment of a vehicle system;

FIG. 3 is a block diagram of an embodiment of a vehicle control system environment;

FIG. 4 is a block diagram of an embodiment of a vehicle communications subsystem;

FIG. 5A is a first block diagram of an embodiment of a vehicle interior environment separated into areas and/or zones;

FIG. 5B is a second block diagram of an embodiment of a vehicle interior environment separated into areas and/or zones;

FIG. 5C is a third block diagram of an embodiment of a vehicle interior environment separated into areas and/or zones;

FIG. 6A depicts an embodiment of a sensor configuration for a vehicle;

FIG. 6B depicts an embodiment of a sensor configuration for a zone of a vehicle;

FIG. 7A is a block diagram of an embodiment of interior sensors for a vehicle;

FIG. 7B is a block diagram of an embodiment of exterior sensors for a vehicle;

FIG. 8A is a block diagram of an embodiment of a media subsystem for a vehicle;

FIG. 8B is a block diagram of an embodiment of a user and device interaction subsystem for a vehicle;

FIG. 8C is a block diagram of an embodiment of a Navigation subsystem for a vehicle;

FIG. 9 is a block diagram of an embodiment of a communications subsystem for a vehicle;

FIG. 10 is a block diagram of an embodiment of a software architecture for the vehicle control system;

FIG. 11A is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11B is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11C is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11D is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11E is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11F is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11G is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11H is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11I is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11J is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 11K is a graphical representation of an embodiment of a gesture that a user may perform to provide input to a vehicle control system;

FIG. 12A is a diagram of an embodiment of a data structure for storing information about a user of a vehicle;

FIG. 12B is a diagram of an embodiment of a data structure for storing information about a device associated with or in a vehicle;

FIG. 12C is a diagram of an embodiment of a data structure for storing information about a system of a vehicle;

FIG. 12D is a diagram of an embodiment of a data structure for storing information about a vehicle;

FIG. 13 is a flow or process diagram of a method for storing one or more settings associated with a user;

FIG. 14 is a flow or process diagram of a method for establishing one or more settings associated with a user;

FIG. 15 is a flow or process diagram of a method for storing one or more settings associated with a user;

FIG. 16 is a flow or process diagram of a method for storing one or more gestures associated with a user;

FIG. 17 is a flow or process diagram of a method for reacting to a gesture performed by a user;

FIG. 18 is a flow or process diagram of a method for storing health data associated with a user;

FIG. 19 is a flow or process diagram of a method for reacting to a gesture performed by a user;

FIG. 20 is a block diagram of an embodiment of a personality subsystem for a vehicle;

FIG. 21 is a flow or process diagram of a method for presenting a virtual personality to a user of a vehicle;

FIG. 22 is a flow or process diagram of a method for matching a virtual personality to a context of a user;

FIG. 23 is a block diagram of an embodiment of an automation control system;

FIG. 24 is a flow or process diagram of a method for determining and adjusting settings of a building based on user profile information;

FIG. 25 is a flow or process diagram of a method for determining and adjusting settings of a system based on user profile information;

FIG. 26 is a block diagram of an embodiment of a vehicle control setup for a zone of a vehicle;

FIG. 27 is a flow or process diagram of a method for determining and adjusting a vehicle control based on user profile information;

FIG. 28 is a flow or process diagram of a method for providing an output based on health information associated with a user;

FIG. 29 is a flow or process diagram of a method for providing health information associated with a user to a third party; and

FIG. 30 is a flow or process diagram of a method for determining and adjusting infotainment settings associated with an infotainment system.

In the appended figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a letter that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference letter or label.
Presented herein are embodiments of systems, devices, processes, data structures, user interfaces, etc. The embodiments may relate to an automobile and/or an automobile environment. The automobile environment can include systems associated with the automobile and devices or other systems in communication with the automobile and/or automobile systems. Furthermore, the systems can relate to communications systems and/or devices and may be capable of communicating with other devices and/or to an individual or group of individuals. Further, the systems can receive user input in unique ways. The overall design and functionality of the systems provide for an enhanced user experience making the automobile more useful and more efficient. As described herein, the automobile systems may be electrical, mechanical, electro-mechanical, software-based, and/or combinations thereof.

A vehicle environment 100 that may contain a vehicle ecosystem is shown in FIG. 1. The vehicle environment 100 can contain areas associated with a vehicle or conveyance 104. The vehicle 104 is shown as a car but can be any type of conveyance. The environment 100 can include at least three zones. A first zone 108 may be inside a vehicle 104. The zone 108 includes any interior space, trunk space, engine compartment, or other associated space within or associated with the vehicle 104. The interior zone 108 can be defined by one or more techniques, for example, geo-fencing.

A second zone 112 may be delineated by line 120. The zone 112 is created by a range of one or more sensors associated with the vehicle 104. Thus, the area 112 is exemplary of the range of those sensors and what can be detected by those sensors associated with the vehicle 104. Although sensor range is shown as a fixed and continuous oval, the sensor range may be dynamic and/or discontinuous. For example, a ranging sensor (e.g., radar, lidar, lidar, etc.) may provide a range variable depending on output power, signal characteristics, or environmental conditions (e.g., min., fog, clear, etc.). The rest of the environment includes all space beyond the range of the sensors and is represented by space 116. Thus, the environment 100 may have an area 116 that includes all areas beyond the sensor range 112. The area 116 may include locations of travel that the vehicle 104 may proceed to in the future.

An embodiment of a vehicle system 200 is shown in FIG. 2. The vehicle system 200 can comprise hardware and/or software that conduct various operations for or with the vehicle 104. The operations can include, but are not limited to, providing information to the user 216, receiving input from the user 216, and controlling the functions or operation of the vehicle 104, etc. The vehicle system 200 can include a vehicle control system 204. The vehicle control system 204 can be any type of computing system operable to conduct the operations as described herein. An example of a vehicle control system may be as described in conjunction with FIG. 3.

The vehicle control system 204 may interact with a memory or storage system 208 that stores system data. System data 208 may be any type of data needed for the vehicle control system 204 to control effectively the vehicle 104. The system data 208 can represent any type of database or other storage system. Thus, the system data 208 can be a flat file data system, an object-oriented data system, or some other data system that may interface with the vehicle control system 204.

The vehicle control system 204 may communicate with a device or user interface 212, 248. The user interface 212, 248 may be operable to receive user input either through touch input, on one or more user interface buttons, via voice command, via one or more image sensors, or through a graphical user interface that may include a gesture capture region, as described in conjunction with the other figures provided herein. Further, the symbol 212, 248 can represent a device that is located or associated with the vehicle 104. The device 212, 248 can be a mobile device, including, but not limited to, a mobile telephone, a mobile computer, or other type of computing system or device that is either permanently located in or temporarily connected with, but not necessarily associated with, the vehicle 104. Thus, the vehicle control system 204 can interface with the device 212, 248 and leverage the device's computing capability to provide one or more of the features or functions as described herein.

The device or user interface 212, 248 can receive input or provide information to a user 216. The user 216 may thus interact with the vehicle control system 204 through the interface or device 212, 248. Further, the device 212, 248 may include or have access to device data 220 and/or profile data 252. The device data 220 can be any type of data that is used in conjunction with the device 212, 248 including, but not limited to, multimedia data, preferences data, device identification information, or other types of data. The profile data 252 can be any type of data associated with at least one user 216 including, but in no way limited to, bioinformatics, medical information, driving history, personal information (e.g., home physical address, business physical address, contact addresses, likes, dislikes, hobbies, size, weight, occupation, business contacts—including physical and/or electronic addresses, personal contacts—including physical and/or electronic addresses, family members, and personal information related thereto, etc.), other user characteristics, advertising information, user settings and feature preferences, travel information, associated vehicle preferences, communication preferences, historical information (e.g., including historical, current, and/or future travel destinations), Internet browsing history, or other types of data. In any event, the data may be stored as device data 220 and/or profile data 252 in a storage system similar to that described in conjunction with FIGS. 12A through 12D.

As an example, the profile data 252 may include one or more user profiles. User profiles may be generated based on data gathered from one or more of vehicle preferences (e.g., seat settings, HVAC settings, dash configurations, and the like), recorded settings, geographic location information (e.g., provided by a satellite positioning system (e.g., GPS), Wi-Fi hotspot, cell tower data, etc.), mobile device information (such as mobile device electronic addresses, Internet browsing history and content, application store selections, user settings and enabled and disabled features, and the like), secure data, biometric information, audio information from on board microphones, video information from on board cameras, Internet browsing history and browsed content using an on board computer and/or the local area network enabled by the vehicle 104, geographic location information (e.g., a vendor storefront, roadway name, city name, etc.), and the like.

The profile data 252 may include one or more user accounts. User accounts may include access and permissions...
to one or more settings and/or feature preferences associated with the vehicle 104. Communications, infotainment, content, etc. In one example, a user account may allow access to certain settings for a particular user, while another user account may deny access to the settings for another user, and vice versa. The access controlled by the user account may be based on at least one of a user account priority, role, permission, age, family status, a group priority (e.g., the user account priority of one or more users, etc.), a group age (e.g., the average age of the users in the group), a minimum age of the users in the group, a maximum age of the users in the group, and/or combinations thereof, etc.

[0115] For example, a user 216 may be allowed to purchase applications (e.g., software, etc.) for the vehicle 104 and/or a device associated with the vehicle 104 based on information associated with the user account. This user account information may include a preferred payment method, permissions, and/or other account information. As provided herein, the user account information may be part of the user profile and/or other data stored in the profile data 252.

[0116] As another example, an adult user (e.g., a user with an age of 18 years old and/or over, etc.) may be located in an area of a vehicle 104, such as a rear passenger area. Continuing this example a child user (e.g., a user with an age of 17 years old and/or less, etc.) may be located in the same, or close, area. In this example, the user account information in the profile data 252 associated with both the adult user and the child user may be used by the vehicle 104 in determining whether content is appropriate for the area given the age of the child user. For instance, a graphic movie containing violence (e.g., a movie associated with a mature rating, such as a Motion Picture Association of America (MPAA) rating of “R,” “NC-17,” etc.) may be suitable to present to a display device associated with the adult user but may not be acceptable to present to the display device if a 12-year-old child user may see and/or hear the content of the movie.

[0117] The vehicle control system 204 may also communicate with or through a communication network 224. The communication network 224 can represent any type of wireless and/or wired communication that may be included within the vehicle 104. Thus, the communication network 224 can include a local area communication capability and a wide area communication capability. For example, the communication network 224 can include a Bluetooth® wireless system, an 802.11x (e.g., 802.11g/802.11n/802.11ac, etc.) wireless system, a CAN bus, an Ethernet network within the vehicle 104, or other types of communication networks that may function with or be associated with the vehicle 104. Further, the communication network 224 can also include wide area communication capabilities, including one or more of: but not limited to, a cellular communication capability, satellite telephone communication capability, a wireless wide area network communication capability, or other types of communication capabilities that allow for the vehicle control system 204 to communicate outside the vehicle 104.

[0118] The vehicle control system 204 may communicate through the communication network 224 to a server 228 that may be located in a facility that is not within physical proximity to the vehicle 104. Thus, the server 228 may represent a cloud computing system or cloud storage that allows the vehicle control system 204 to either gain access to further computing capabilities or to storage at a location outside of the vehicle 104. The server 228 can include a computer processor and memory and be similar to any computing system as understood to one skilled in the art.

[0119] Further, the server 228 may be associated with stored data 232. The stored data 232 may be stored in any system or by any method, as described in conjunction with system data 208, device data 220, and/or profile data 252. The stored data 232 can include information that may be associated with one or more users 216 or associated with one or more vehicles 104. The stored data 232, being stored in a cloud or in a distant facility, may be exchanged among vehicles 104 or may be used by a user 216 in different locations or with different vehicles 104. Additionally or alternatively, the server may be associated with profile data 252 as provided herein. It is anticipated that the profile data 252 may be accessed across the communication network 224 by one or more components of the system 200. Similar to the stored data 232, the profile data 252, being stored in a cloud or in a distant facility, may be exchanged among vehicles 104 or may be used by a user 216 in different locations or with different vehicles 104.

[0120] The vehicle control system 204 may also communicate with one or more sensors 236, 242, which are either associated with the vehicle 104 or communicate with the vehicle 104. Vehicle sensors 242 may include one or more sensors for providing information to the vehicle control system 204 that determine or provide information about the environment 100 in which the vehicle 104 is operating. Embodiments of these sensors may be as described in conjunction with FIGS. 6A-7B. Non-vehicle sensor 236 can be any type of sensor that is not currently associated with the vehicle 104. For example, non-vehicle sensor 236 can be sensors in a traffic system operated by a third party that provides data to the vehicle control system 204. Further, the non-vehicle sensor(s) 236 can be other types of sensors which provide information about the distant environment 116 or other information about the vehicle 104 or the environment 100. These non-vehicle sensors 236 may be operated by third parties but provide information to the vehicle control system 204. Examples of information provided by the sensors 236 and that may be used by the vehicle control system 204 may include weather tracking data, traffic data, user health tracking data, vehicle maintenance data, or other types of data, which may provide environmental or other data to the vehicle control system 204. The vehicle control system 204 may also perform signal processing of signals received from one or more sensors 236, 242. Such signal processing may include estimation of a measured parameter from a single sensor, such as multiple measurements of a range state parameter from the vehicle 104 to an obstacle, and/or the estimation, blending, or fusion of a measured state parameter from multiple sensors such as multiple radar sensors or a combination of a lidar/ladar range sensor and a radar sensor. Signal processing of such sensor signal measurements may comprise stochastic signal processing, adaptive signal processing, and/or other signal processing techniques known to those skilled in the art.

[0121] The various sensors 236, 242 may include one or more sensor memory 244. Embodiments of the sensor memory 244 may be configured to store data collected by the sensors 236, 242. For example, a temperature sensor may collect temperature data associated with a vehicle 104, user 216, and/or environment, over time. The temperature data may be collected incrementally, in response to a condition, or at specific time periods. In this example, as the temperature
data is collected, it may be stored in the sensor memory 244. In some cases, the data may be stored along with an identification of the sensor and a collection time associated with the data. Among other things, this stored data may include multiple data points and may be used to track changes in sensor measurements over time. As can be appreciated, the sensor memory 244 can represent any type of database or other storage system.

[0122] The diagnostic communications module 256 may be configured to receive and transmit diagnostic signals and information associated with the vehicle 104. Examples of diagnostics signals and information may include, but is in no way limited to, vehicle system warnings, sensor data, vehicle component status, service information, component health, maintenance alerts, recall notifications, predictive analysis, and the like. Embodiments of the diagnostic communications module 256 may handle warning/error signals in a predetermined manner. The signals, for instance, can be presented to one or more of a third party, occupant, vehicle control system 204, and a service provider (e.g., manufacturer, repair facility, etc.).

[0123] Optionally, the diagnostic communications module 256 may be utilized by a third party (i.e., a party other than the user 216, etc.) in communicating vehicle diagnostic information. For instance, a manufacturer may send a signal to a vehicle 104 to determine a status associated with one or more components associated with the vehicle 104. In response to receiving the signal, the diagnostic communications module 256 may communicate with the vehicle control system 204 to initiate a diagnostic status check. Once the diagnostic status check is performed, the information may be sent via the diagnostic communications module 256 to the manufacturer. This example may be especially useful in determining whether a component recall should be issued based on the status check responses returned from a certain number of vehicles.

[0124] Wired/wireless transceiver/communications ports 260 may be included. The wired/wireless transceiver/communications ports 260 may be included to support communications over wired networks or links, for example with other communication devices, server devices, and/or peripheral devices. Examples of wired/wireless transceiver/communications ports 260 include Ethernet ports, Universal Serial Bus (USB) ports, Institute of Electrical and Electronics Engineers (IEEE) 1594, or other interface ports.

[0125] An embodiment of a vehicle control environment 300 including a vehicle control system 204 may be as shown in FIG. 3. Beyond the vehicle control system 204, the vehicle control environment 300 can include one or more of, but is not limited to, a power source and/or power control module 316, a data storage module 320, user interface(s)/input interface(s) 324, vehicle subsystems 328, user interaction subsystems 332, Global Positioning System (GPS)/Navigation subsystems 336, sensor(s) and/or sensor subsystems 340, communication subsystems 344, media subsystems 348, and/or device interaction subsystems 352. The subsystems, modules, components, etc. 316-352 may include hardware, software, firmware, computer readable media, displays, input devices, output devices, etc. or combinations thereof. The system, subsystems, modules, components, etc. 204, 316-352 may communicate over a network or bus 356. This communications bus 356 may be bidirectional and perform data communications using any known or future-developed standard or protocol. An example of the communication bus 356 may be as described in conjunction with FIG. 4.

[0126] The vehicle control system 204 can include a processor 304, memory 308, and/or an input/output (I/O) module 312. Thus, the vehicle control system 204 may be a computer system, which can comprise hardware elements that may be electrically coupled. The hardware elements may include one or more central processing units (CPUs) 304, one or more components of the I/O module 312 including input devices (e.g., a mouse, a keyboard, etc.) and/or one or more output devices (e.g., a display device, a printer, etc.).

[0127] The processor 304 may comprise a general purpose programmable processor or controller for executing application programming or instructions. The processor 304 may, optionally, include multiple processor cores, and/or implement multiple virtual processors. Additionally or alternatively, the processor 304 may include multiple physical processors. As a particular example, the processor 304 may comprise a specially configured application specific integrated circuit (ASIC) or other integrated circuit, a digital signal processor, a controller, a hardwired electronic or logic circuit, a programmable logic device or gate array, a special purpose computer, or the like. The processor 304 generally functions to run programming code or instructions implementing various functions of the vehicle control system 204.

[0128] The input/output module 312 and associated ports may be included to support communications over wired or wireless networks or links, for example with other communication devices, server devices, and/or peripheral devices. Examples of an input/output module 312 include an Ethernet port, a Universal Serial Bus (USB) port, Institute of Electrical and Electronics Engineers (IEEE) 1594, or other interface.

[0129] The vehicle control system 204 may also include one or more storage devices 308. By way of example, storage devices 308 may be disk drives, optical storage devices, solid-state storage devices such as a random access memory ("RAM") and/or a read-only memory ("ROM"), which can be programmable, flash-updateable and/or the like. The vehicle control system 204 may additionally include a computer-readable storage media reader; a communications system (e.g., a modem, a network card (wired or wireless), an infra-red communication device, etc.); and working memory 308, which may include RAM and ROM devices as described above. The vehicle control system 204 may also include a processing acceleration unit, which can include a digital signal processor (DSP), a special-purpose processor, and/or the like.

[0130] The computer-readable storage media reader can further be connected to a computer-readable storage medium, together (and, optionally, in combination with storage device(s)) comprehensively representing remote, local, fixed, and/or removable storage devices plus storage media for temporarily and/or more permanently containing computer-readable information. The communications system may permit data to be exchanged with an external or internal network and/or any other computer or device described herein. Moreover, as disclosed herein, the term "storage medium" may represent one or more devices for storing data, including read-only memory (ROM), random access memory (RAM), magnetic RAM, core memory, magnetic disk storage mediums, optical storage mediums, flash memory devices, and/or other machine readable mediums for storing information.
The vehicle control system 204 may also comprise software elements including an operating system and/or other code, as described in conjunction with FIG. 10. It should be appreciated that alternates to the vehicle control system 204 may have numerous variations from that described herein. For example, customized hardware might also be used and/or particular elements might be implemented in hardware, software (including portable software, such as applets), or both. Further, connection to other computing devices such as network input/output devices may be employed.

The power source and/or power control module 316 can include any type of power source, including, but not limited to, batteries, alternating current sources (from connections to a building power system or power line), solar cell arrays, etc. One or more components or modules may also be included to control the power source or change the characteristics of the provided power signal. Such modules can include one or more of, but is not limited to, power regulators, power filters, alternating current (AC) to direct current (DC) converters, DC to AC converters, receptacles, wiring, other converters, etc. The power source and/or power control module 316 functions to provide the vehicle control system 204 and any other system with power.

The data storage 320 can include any module for storing, retrieving, and/or managing data in one or more data stores and/or databases. The database or data stores may reside on a storage medium local to (and/or resident in) the vehicle control system 204 or in the vehicle 104. Alternatively, some of the data storage capability may be remote from the vehicle control system 204 or automobile, and in communication (e.g., via a network) to the vehicle control system 204. The database or data stores may reside in a storage area network ("SAN") familiar to those skilled in the art. Similarly, any necessary files for performing the functions attributed to the vehicle control system 204 may be stored locally on the respective vehicle control system 204 and/or remotely, as appropriate. The databases or data stores may be a relational database, and the data storage module 320 may be adapted to store, update, and retrieve data in response to specifically-formatted commands. The data storage module 320 may also perform data management functions for any flat file, object oriented, or other type of database or data store.

A first data store that may be part of the vehicle control environment 300 is a profile data store 252 for storing data about user profiles and data associated with the users. A system data store 208 can include data used by the vehicle control system 204 and/or one or more of the components 324-352 to facilitate the functionality described herein. The data stores 208 and/or 252 may be as described in conjunction with FIGS. 1 and/or 12A-12D.

The user interface/input interfaces 324 may be as described herein for providing information or data and/or for receiving input or data from a user. Vehicle systems 328 can include any of the mechanical, electrical, electromechanical, computer, or other systems associated with the function of the vehicle 100. For example, vehicle systems 328 can include one or more of, but is not limited to, the steering system, the braking system, the engine and engine control systems, the electrical system, the suspension, the drive train, the cruise control system, the radio, the heating, ventilation, air conditioning (HVAC) system, the windows and/or doors, etc. These systems are well known in the art and will not be described further.

Examples of the other systems and subsystems 324-352 may be as described further herein. For example, the user interface(s)/input interface(s) 324 may be as described in FIGS. 2 and 8B; the vehicle subsystems 328 may be as described in FIG. 6A et seq.; the user interaction subsystem 332 may be as described in conjunction with the user/device interaction subsystem 817 of FIG. 8B; the navigation subsystem 336 may be as described in FIGS. 6A and 8C; the sensor(s)/sensor subsystem 340 may be as described in FIGS. 7A and 7B; the communication subsystem 344 may be as described in FIGS. 2, 4, 5B, 5C, and 9; the media subsystem 348 may be as described in FIG. 8A; and, the device interaction subsystem 352 may be as described in FIG. 2 and in conjunction with the user/device interaction subsystem 817 of FIG. 8B.

FIG. 4 illustrates an optional communications channel architecture 400 and associated communications components. FIG. 4 illustrates some of the optional components that can be interconnected via the communication channels/zones 404. Communication channels/zones 404 can carry information on one or more of a wired and/or wireless communications link with, in the illustrated example, there being three communications channels/zones, 408, 412, and 416.

This optional environment 400 can also include an IP router 420, an operator cluster 424, one or more storage devices 428, one or more blades, such as master blade 432, and computational blades 436 and 440. Additionally, the communications channels/zones 404 can interconnect one or more displays, such as, remote display 144, remote display N 448, and console display 452. The communications channels/zones 404 also interconnect an access point 456, a Bluetooth® access point/USB hub 460, a Femtocell 464, a storage controller 468, that is connected to one or more of USB devices 472, DVDs 476, or other storage devices 480. To assist with managing communications within the communication channel, the environment 400 optionally includes a firewall 484 which will be discussed hereinafter in greater detail. Other components that could also share the communications channel/zones 404 include GPS 488, a media controller 492, which is connected to one or more media sources 496, and one or more subsystems, such as subsystem switches 498.

Optionally, the communications channels/zones 404 can be viewed as an I/O network or bus where the communications channels are carried on the same physical media. Optionally, the communication channels 404 can be split amongst one or more physical media and/or combined with one or more wireless communications protocols. Optionally, the communications channels 404 can be based on wireless protocols with no physical media interconnecting the various elements described herein.

The environment 400 shown in FIG. 4 can include a collection of blade processors that are housed in a “crate.” The crate can have a PC-style backplane connector 408 and a backplane Ethernet 408 that allows the various blades to communicate with one another using, for example, an Ethernet.

Various other functional elements illustrated in FIG. 4 can be integrated into this crate architecture with, as discussed hereinafter, various zones utilized for security. Optionally, as illustrated in FIG. 4, the backplane 404/408 can have two separate Ethernet zones that may or may not be on the same communications channel. Optionally, the zones exist on a single communications channel on the I/O network/bus 408. Optionally, the zones are actually on different com-
munications channels, e.g., 412, 416; however, the implementation is not restricted to any particular type of configuration. Rather, as illustrated in FIG. 4, there can be a red zone 417 and a green zone 413, and the I/O backbone on the network/bus 408 that enables standard I/O operations. This backbone or I/O network/bus 408 also optionally can provide power distribution to the various modules and blades illustrated in FIG. 4. The red and green Ethernet zones, 417 and 413 respectively, can be implemented as Ethernet switches, with one on each side of the firewall 484. Two Ethernet (untrusted and trusted) are not connected in accordance with an optional embodiment. Optionally, the connector geometry for the firewall can be different for the Ethernet zones than for the blades that are a part of the system.

0142 The red zone 417 only needs to go from the modular connector to the input side of the backbone connector of the firewall 484. While FIG. 4 indicates that there are five external red zone connectors to the firewall 484, provisions can be made for any number of ports with the connections being made at the access point 456, the Bluetooth® access point (combo controller) 460, Femtocell 464, storage controller 468, and/or firewall 484. Optionally, the external port connections can be made through a manufacturer configurable modular connector panel, and one or more of the red zone Ethernet ports could be available through a customer supplied crate which allows, for example, wired Ethernet connections from a bring-your-own-device (BYOD) to the firewall 484.

0143 The green zone 413 goes from the output side of the firewall 484 and generally defines the trusted Ethernet. The Ethernet on the backbone 408 essentially implements an Ethernet switch for the entire system, defining the Ethernet backbone of the vehicle 104. All other modules, e.g., blades, etc., can connect to a standard backbone bus and the trusted Ethernet. Some number of switch ports can be reserved to connect to an output modular connector panel to distribute the Ethernet throughout the vehicle 104, e.g., connecting such elements as the console display 452, remote displays 444, 448, GPS 488, etc. Optionally, only trusted components, either provided or approved by the manufacturer after testing, can be attached to the green zone 413, which is by definition in the trusted Ethernet environment.

0144 Optionally, the environment 400, shown in FIG. 4, utilizes IPv6 over Ethernet connections wherever possible. Using, for example, the Broadcom single-twisted pair Ethernet technology, wiring harnesses are simplified and data transmission speeds are maximized. However, while the Broadcom single-twisted pair Ethernet technology can be used, in general, systems and methods can work comparably well with any type of well-known Ethernet technology or other comparable communications technology.

0145 As illustrated in FIG. 4 the I/O network/bus 408 is a split-bus concept that contains three independent bus structures:

0146 The red zone 417—the untrusted Ethernet environment. This zone 417 may be used to connect network devices and customer provided devices to the vehicle information system with these devices being on the untrusted side of the firewall 484.

0147 The green zone 413—the trusted Ethernet environment, this zone 413 can be used to connect manufacturer certified devices such as GPS units, remote displays, subsystem switches, and the like, to the vehicle network 484. Manufacturer certified devices can be implemented by vendors that allow the vehicle software system to validate whether or not a device is certified to operate with the vehicle 100. Optionally, only certified devices are allowed to connect to the trusted side of the network.

0148 The I/O bus 409—the I/O bus may be used to provide power and data transmission to bus-based devices such as the vehicle solid state drive, the media controller blade 492, the computational blades 436, 440, and the like.

0149 As an example, the split-bus structure can have the following minimum configuration:

0150 Two slots for the red zone Ethernet;

0151 One slot for built-in LTE/WiMax access 420 from the car to other network resources such as the cloud/Internet;

0152 One slot for user devices or bring-your-own device access, this slot can implement, for example, WiFi, Bluetooth®, and/or USB connectivity 456, which can be provided in, for example, the customer crate;

0153 One slot for combined red zone and green zone Ethernet, this slot can be reserved for the firewall controller;

0154 Two slots for computational blades. Here the two computation blades are illustratively as shown the optional master blade and the multimedia blade or controller 492 which can be provided as standard equipment; and

0155 The expansion controller that allows the I/O bus to be extended and provides additional Ethernet switch ports for one or more of the red or green zones, which may require that the basic green zone Ethernet switch implementation will support additional ports beyond the initial three that are needed for the basic exemplary system.

0156 It should be possible to build 8 or 16 or more Ethernet switches that allow for the expansion with existing component(s) in a straight-forward manner.

0157 The red zone 417 can be implemented as an 8-port Ethernet switch that has three actual bus ports within the crate with the remaining five ports being available on the customer crate. The crate implements red zone slots for the firewall controller 484, the combo controller which includes WiFi, Bluetooth®, USB hub (456, 460) and the IP router 420.

0158 The firewall controller 484 can have a dedicated slot that bridges the red zone 417, green zone 413, and uses the I/O bus for power connections. In accordance with an optional low cost implementation, the firewall 484 can be implemented by a dummy module that simply bridges the red zone 417 and the green zone 413 without necessarily providing any firewall functionality. The combo controller 460 that includes the WiFi, Bluetooth®, and USB hub can be provided for consumer device connections. This controller can also implement the IPv6 (un-routable) protocol to insure that all information is packetized for transmission via IP over the Ethernet in the I/O network/bus 408.

0159 The combo controller 460 with the USB hub can have ports in the customer crate. The combo controller 460 can implement USB discovery functions and packetizes the information for transmission via IP over Ethernet. The combo controller 460 can also facilitate installation of the correct USB driver for the discovered device, such as a BYOD from the user. The combo controller 460 and USB hub can then map the USB address to a "local" IPv6 address for interaction.
with one or more of the computational blades which is generally going to be the media controller 492.

[0160] The IP router 420 can implement Internet access through a manufacturer provided service. This service can allow, for example, a manufacturer to offer value-added services to be integrated into the vehicle information systems. The existence of the manufacturer provided Internet access can also allow the “e-Call” function and other vehicle data recorder functions to be implemented. IP router 420 also allows, for example, WiMax, 4G LTE, and other connections to the Internet through a service provider that can be, for example, contracted by the manufacturer. Internally, the IP router 420 can allow cellular handset connections to the Internet through a Femtocell 464 that is part of the IP router implementation. The IP router 420, with the Femtocell 464, can also allow a cone of silence functionality to be implemented. The IP router 420 can be an optional component for a vehicle provided by, for example, the manufacturer, a dealer, or installed by a user. In the absence of the IP router 420, it is possible to connect a consumer handheld device to the I/O network/bus 408 using, for example, either WiFi or Bluetooth® 456, 460. While functionality may be somewhat reduced when using a handheld device instead of a built-in Ethernet connection, systems and methods of this invention can also work utilizing a consumer handheld device which then connects to the Internet via, for example, WiMax, 4G, 4G LTE, or the like.

[0161] FIGS. 5A-5C show configurations of a vehicle 104. In general, a vehicle 104 may provide functionality based at least partially on one or more areas, zones, and distances, associated with the vehicle 104. Non-limiting examples of this functionality are provided herein below.

[0162] An arrangement or configuration for sensors within a vehicle 104 is as shown in FIG. 5A. The sensor arrangement 500 can include one or more areas 508 within the vehicle. An area may be a larger part of the environment inside or outside of the vehicle 104. Thus, area one 508A may include the area within the trunk space or engine space of the vehicle 104 and/or the front passenger compartment. Area two 508B may include a portion of the interior space 108 (e.g., a passenger compartment, etc.) of the vehicle 104. The area N, 508N, may include the trunk space or rear compartment area, when included within the vehicle 104. The interior space 108 may also be divided into other areas. Thus, one area may be associated with the front passenger’s and driver’s seats, a second area may be associated with the middle passengers’ seats, and a third area may be associated with a rear passenger’s seat. Each area 508 may include one or more sensors that are positioned or operate to provide environmental information about that area 508.

[0163] Each area 508 may be further separated into one or more zones 512 within the area 508. For example, area 1 508A may be separated into zone A 512A, and zone B 512B. Each zone 512 may be associated with a particular portion of the interior occupied by a passenger. For example, zone A 512A may be associated with a driver. Zone B 512B, may be associated with a front passenger. Each zone 512 may include one or more sensors that are positioned or configured to collect information about the environment or ecosystem associated with that zone or person.

[0164] A passenger area 508B may include more than two zones as described in conjunction with area 508A. For example, area 508B may include three zones, 512C, 512D, and 512E. These three separate zones 512C, 512D, and 512E may be associated with three passenger seats typically found in the rear passenger area of a vehicle 104. An area 508N and may include a single zone 512N as there may be no separate passenger areas but may include a single trunk area within the vehicle 104. The number of zones 512 is unlimited within the areas as the areas are also unlimited inside the vehicle 104. Further, it should be noted that there may be one or areas 508 or zones 512 that may be located outside the vehicle 104 that may have a specific set of sensors associated therewith.

[0165] Optionally, each area/access point 508, 456, 516, 520, and/or zone 512, associated with a vehicle 104, may comprise one or more sensors to determine a presence of a user 216 and/or device 212, 248 in and/or adjacent to each area 508, 456, 516, 520, and/or zone 512. The sensors may include vehicle sensors 242 and/or non-vehicle sensors 236 as described herein. It is anticipated that the sensors may be configured to communicate with a vehicle control system 204 and/or the diagnostic communications module 256. Alternatively or in addition, the sensors may communicate with a device 212, 248. The communication of sensors with the vehicle 104 may initiate and/or terminate the control of device 212, 248 features. For example, a vehicle operator may be located in a second outside area 520 associated with a vehicle 104. As the operator approaches the first outside area 516, associated with the vehicle 104, the vehicle control system 204 may determine to control features associated with one or more device 212, 248 and diagnostic communications module 256.

[0166] Optionally, the location of the device 212, 248 relates to the vehicle 104 and may determine vehicle functionality and/or features to be provided and/or restricted to a user 216. By way of example, a device 212, 248 associated with a user 216 may be located at a second outside area 520 from the vehicle 104. In this case, and based at least partially on the distance of the device 212, 248 from the vehicle 104 (e.g., provided by detecting the device 212, 248 at or beyond the second outside area 520) the vehicle 104 may lock one or more features (e.g., ignition access, vehicle access, communications ability, etc.) associated with the vehicle 104. Optionally, the vehicle 104 may provide an alert based on the distance of the device 212, 248 from the vehicle 104. Continuing the example above, once the device 212, 248 reaches the first outside area 516 of the vehicle 104 at least one of the vehicle features may be unlocked. For instance, by reaching the first outside area 516, the vehicle 104 may unlock a door of the vehicle 104. In some cases, when the device is detected to be inside the vehicle 104, the various sensors 236, 242 may determine that the user 216 is in an area 508 and/or zone 512. As is further described herein, features of the vehicle 104, device 212, 248, and/or other components may be controlled based on rules stored in a memory.

[0167] FIG. 5B illustrates optional internal vehicle communications between one or more of the vehicle and one or more devices or between devices. Various communications can occur utilizing one or more Bluetooth®, NFC, WiFi, mobile hot spot, point-to-point communications, point-to-multipoint other point communications, an ad hoc network, or in general any known communications protocol over any known communications media or media-types.

[0168] Optionally, various types of internal vehicle communications can be facilitated using an access point 456 that utilizes one or more of Bluetooth®, NFC, WiFi, wireless Ethernet, mobile hot spot technology, or the like. Upon being connected with, and optionally authenticated to the access
point 456, the connected device is able to communicate with one or more of the vehicle and one or more other devices that are connected to the access point 456. The type of connection to the access point 456 can be based on, for example, the zone 512, in which the device is located.

[0169] The user may identify their zone 512 in conjunction with an authentication procedure to the access point 456. For example, a driver in zone A 512A, upon authenticating to the access point 456, can cause the access point 456 to send a query to the device asking the device user in which zone 512 they are located. As discussed hereinafter, the zone 512 the user device is located in may have an impact on the type of communications, available bandwidth, the types of other devices or vehicle systems or subsystems the device could communicate with, and the like. As a brief introduction, internal communications with zone A 512A may be given preferential treatment over those communications originating from area 2 508B, which could have in itself, preferential treatment over communications originating within area N 508N.

[0170] Moreover, the device in zone A 512A can include profile information that governs the other devices that are allowed to connect to the access point 456 and what those devices have access to, how they can communicate, how much bandwidth they are allocated, and the like. While, optionally, the device associated with zone A 512A will be considered the “master” controller of the profile that governs the internal vehicle communications, it should be appreciated that this was arbitrarily chosen since it is assumed that there will always be a driver in a car that is present in zone A 512A. However, it should be appreciated the driver in zone A 512A, for example, may not have a communications device in which case a device associated with one of the other areas or zones, such as zone B 512B, area 2 508B, or area N 508N could also be associated with or control this master profile.

[0171] Optionally, various devices located within the various zones 512 can connect using, for example, ports provided by access point 456 or Bluetooth® access point/USB hub 460 as illustrated in FIG. 4. Similarly, the device(s) could connect utilizing the Femtocell 464 and optionally be directly connected via, for example, a standard Ethernet port.

[0172] As discussed, each one of the areas, area 1 508A, area 2 508B, and area N 508N, can each have associated therewith a profile that governs, for example, how many and what types of devices can connect from that area 508, bandwidth allocated to that area 508, the types of media or content available to device(s) within that area 508, the interconnection of devices within that area 508 or between areas 508, or, in general, can control any aspect of communication of an associated device with any one or more other associated devices/vehicle systems within the vehicle 104.

[0173] Optionally, area 2 508B devices can be provided with full access to multimedia and infotainment available within the vehicle 104, however, devices in area 2 508B may be restricted from any access to vehicle functions. Only devices in area 1 508A may be able to access vehicle control functions such as when “parents” are located in area 1 508A and the children are located in area 2 508B. Optionally, devices found in zone E 512E of area 2 508B may be able to access limited vehicle control functionality such as climate control within area 2. Similarly, devices in area N 508N may be able to control climate features within zone N 512N.

[0174] As will be appreciated, profiles can be established that allow management of communications within each of the areas 508, and further optionally within each of the zones 512. The profile can be granular in nature controlling not only what type of devices can connect within each zone 512, but how those devices can communicate with other devices and/or the vehicle and types of information that can be communicated.

[0175] To assist with identifying a location of a device within a zone 512, a number of different techniques can be utilized. One optional technique involves one or more of the vehicle sensors detecting the presence of an individual within one of the zones 512. Upon detection of an individual in a zone 512, communications subsystems 344 and the access point 456 can cooperate to not only associate the device within the zone 512 with the access point 456 but to also determine the location of the device within an area, and optionally within a zone 512. Once the device is established within a zone 512, a profile associated with the vehicle 104 can store information identifying that device and/or a person and optionally associating it with a particular zone 512 as a default. As discussed, there can be a master profile optionally associated with the device in zone A 512A, this master profile can govern communications with the communications subsystems 340 and where communications within vehicle 104 are to occur.

[0176] Some optional profiles are illustrated below where the Master Profile governs other device connectivity:

<table>
<thead>
<tr>
<th>Area 1 508A</th>
<th>Area 2 508B</th>
<th>Area N 508N</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Communications</td>
<td>All communications</td>
<td>No Access to Infotainment</td>
<td>Master Profile acts as Firewall and Router</td>
</tr>
<tr>
<td>All Vehicle Controls</td>
<td>Allow Area 2</td>
<td>Climate Control</td>
<td></td>
</tr>
</tbody>
</table>

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<td></td>
</tr>
<tr>
<td>All Vehicle Controls</td>
<td>Allow Area 2</td>
<td>Climate Control</td>
<td></td>
</tr>
</tbody>
</table>

Secondary Profile: Area 2 508B Profile:

<table>
<thead>
<tr>
<th>Area 1 508A</th>
<th>Area 2 508B</th>
<th>Area N 508N</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Communication with Area 1 Devices</td>
<td>Allow Access to Infotainment</td>
<td>Allow Access to Other</td>
<td></td>
</tr>
</tbody>
</table>

Secondary Profile, Option 2
[0178] Optionally, a user’s device, such as a Smartphone, can store in, for example a profile, with which zone 512 the user’s device is associated. Then, assuming the user sits in the same zone 512 and area 508 as previously, the user’s device can re-establish the same communications protocols with the access point 456 as were previously established.

[0179] In addition or in the alternative, the areas 508 and zones 512 can have associated therewith restrictions as to which one or more other user’s devices with which users’ devices can connect. For example, a first user’s device may connect with any other user device in area 2 508B or area N 508N, however is restricted from connecting with a user device in area 1 508A, zone A 512A. However, the first user device may be able to communicate with another user’s device that is located in area 1 508A, zone B 512B. These communications can include any type of standard communications such as sharing content, exchanging messages, forwarding or sharing multimedia or infotainment, or in general can include any communications that would ordinarily be available between two devices and/or the vehicle and vehicle systems. As discussed, there may be restrictions on the type of communications that can be sent to the device in area 1 508A, zone A 512A. For example, the user’s device in area 1 508A, zone A 512A may be restricted from receiving one or more of text messages, multimedia, infotainment, or in general anything that can be envisioned as a potential distraction to the driver. Moreover, it should be appreciated that the communications between the various devices and the various zones 512 need not necessarily occur with the assistance of access point 456, but the communications could also occur directly between the device(s).

[0180] FIG. 5C outlines optional internal vehicle communications between one or more of the vehicle and one or more devices. More specifically, FIG. 5C illustrates an example of vehicle communications where the vehicle 104 is equipped with the necessary transceivers to provide a mobile hot spot functionality to any user device(s) therein, such as user devices 248A and 248N.

[0181] Optionally, and as discussed above, one or more user devices can connect to the access point 456. This access point 456 is equipped to handle communications routing to not only the communication network/buses 224 for intra-vehicle communications, but optionally can also communicate with, for example, the Internet or the cloud, in cooperation with transceiver 260. Optionally included is a firewall 484 that has the capability of not only blocking certain types of content, such as a malicious content, but can also operate to exclude certain types of communications from emanating from the vehicle 104 and transceiver 260. As will be appreciated, various profiles could be established in the firewall 484 that controls not only the type of communications that can be received at the vehicle 104, but the type of communications that can be sent from the vehicle 104.

[0182] The transceiver 260 can be any type of well-known wireless transceiver that communicates using a known communications protocol such as WiMax, 4G, 4G LTE, 3G, or the like. The user devices can communicate via, for example, WiFi link 248 with the access point 456, with the transceiver 260 providing Internet connectivity to the various user devices. As will be appreciated, there may need to be an account associated with transceiver 260 with a wireless carrier to provide data and/or voice connectivity to enable the user devices to communicate with the Internet. Typically, the account is established on a month-to-month basis with an associated fee but could also be performed based on the amount of data to be transmitted, received, or in any other manner.

[0183] Moreover, one or more of the user’s devices and access point 456 can maintain profile information that governs how the user’s devices are able to communicate with other devices, and optionally the Internet. Optionally, a profile can exist that only allows the user’s devices to communicate with other user’s devices and/or the vehicle, multimedia and/or the vehicle infotainment system, and may not be allowed access to the Internet via transceiver 260. The profile can stipulate that the user’s device could connect to the Internet via transceiver 260 for a specified period of time and/or up to a certain amount of data usage. The user’s device can have full access to the Internet via transceiver 260 with no limit on time or data usage which would reduce the data usage of the user’s device since it is connected via WiFi to the access point 456, but however, would increase the data usage by transceiver 260, and therefore, shift the billing for that data usage to the transceiver 260 instead of the user’s device. Still further, and as previously discussed, the various profiles may stipulate which user’s device has priority for use of the bandwidth provided by the transceiver 260. For example, a user’s device located area 1 508A, zone A 512A may be given preferential routing treatment of data above that of a user’s device in zone N 512N. In this manner, for example, a driver would be given priority for Internet access above that of the passengers. This could become important, for example, when the driver is trying to obtain traffic or direction information or, for example, when the vehicle is performing a download to update various software features.

[0184] As will be appreciated, the optional firewall 484 can cooperate with the access point 456 and the various profiles that area 508 associated with the various devices within the vehicle 104 and can fully implement communications restrictions, control bandwidth limits, Internet accessibility, malicious software blocking, and the like. Moreover, the optional firewall 484 can be accessed by an administrator with one or
more of these configuration settings edited through an administrator’s control panel. For example, in a scenario where parents are always in area 1508A, it may be appropriate to give all of the user’s devices in area 1508A full access to the Internet utilizing transceiver 260, however, while restricting access and/or bandwidth to any other user devices within the vehicle 104. As the user’s device and profile would be known by the firewall 484, upon the user’s device being associated with the access point 450, the firewall 484 and transceiver 260 can be configured to allow communications in accordance with the stored profile.

[0185] A set of sensors or vehicle components 600 associated with the vehicle 104 may be as shown in FIG. 6A. The vehicle 104 can include, among many other components common to vehicles, wheels 607, a power source 609 (such as an engine, motor, or energy storage system (e.g., battery or capacitive energy storage system)), a manual or automatic transmission 612, a manual or automatic transmission gear controller 616, a power controller 620 (such as a throttle), a vehicle control system 204, the display device 212, a braking system 636, a steering wheel 640, a power source activation/deactivation switch 644 (e.g., an ignition), an occupant sensing system 648, a wireless signal receiver 653 to receive wireless signals from signal sources such as roadside beacons and other electronic roadside devices, and a satellite positioning system receiver 657 (e.g., a Global Positioning System (“GPS”) (US), GLONASS (Russia), Galileo positioning system (EU), Compass navigation system (China), and Regional Navigational Satellite System (India) (receiver), driverless systems (e.g., cruise control systems, automatic steering systems, automatic braking systems, etc.).

[0186] The vehicle 104 can include a number of sensors in wireless or wired communication with the vehicle control system 204 and/or display device 212, 248 to collect sensed information regarding the vehicle state, configuration, and/or operation. Exemplary sensors may include one or more of, but are not limited to, wheel state sensor 660 to sense one or more of vehicle speed, acceleration, deceleration, wheel rotation, wheel speed (e.g., wheel revolutions-per-minute), wheel slip, and the like, a power source energy output sensor 664 to sense a power output of the power source 609 by measuring one or more of current engine speed (e.g., revolutions-per-minute), energy input and/or output (e.g., voltage, current, fuel consumption, and torque) (e.g., turbine speed sensor, input speed sensor, crankshaft position sensor, manifold absolute pressure sensor, mass flow sensor, and the like), and the like, a switch state sensor 668 to determine a current activation/deactivation state of the power source activation/deactivation switch 644, a transmission setting sensor 670 to determine a current setting of the transmission (e.g., gear selection or setting), a gear controller sensor 672 to determine a current setting of the gear controller 616, a power controller sensor 674 to determine a current setting of the power controller 620, a brake sensor 676 to determine a current state (braking or non-braking) of the braking system 636, a seating system sensor 678 to determine a seat setting and current weight of seated occupant, if any) in a selected seat of the seating system 648, exterior and interior sound receivers 690 and 692 (e.g., a microphone, sonar, and other type of acoustic-to-electric transducer or sensor) to receive and convert sound waves into an equivalent analog or digital signal. Examples of other sensors (not shown) that may be employed include safety system state sensors to determine a current state of a vehicular safety system (e.g., air bag setting (deployed or undeployed) and/or seat belt setting (engaged or not engaged)), light setting sensor (e.g., current headlight, emergency light, brake light, parking light, fog light, interior or passenger compartment light, and/or tail light state (on or off)), brake control (e.g., pedal) setting sensor, accelerator pedal setting or angle sensor, clutch pedal setting sensor, emergency brake pedal setting sensor, door setting (e.g., open, closed, locked or unlocked) sensor, engine temperature sensor, passenger compartment or cabin temperature sensor, window setting (open or closed) sensor, one or more interior-facing or exterior-facing cameras or other imaging sensors (which commonly convert an optical image into an electronic signal but may include other devices for detection objects such as an electromagnetic radiation emitter/receiver that emits electromagnetic radiation and receives electromagnetic waves reflected by the object) to sense objects, such as other vehicles and pedestrians and optionally determine the distance, trajectory and speed of such objects, in the vicinity or path of the vehicle, odometer reading sensor, trip mileage reading sensor, wind speed sensor, radar transmitter/receiver output, brake wear sensor, steering/torque sensor, oxygen sensor, ambient lighting sensor, vision system sensor, ranging sensor, parking sensor, heating, venting, and air conditioning (HVAC) sensor, water sensor, air-fuel ratio meter, blind spot monitor, hall effect sensor, microphone, radio frequency (RF) sensor, infrared (IR) sensor, vehicle control system sensors, wireless network sensor (e.g., Wi-Fi and/or Bluetooth® sensor), cellular data sensor, and other sensors either future-developed or known to those of skill in the vehicle art.

[0187] In the depicted vehicle embodiment, the various sensors can be in communication with the display device 212, 248 and vehicle control system 204 via signal carrier network 224. As noted, the signal carrier network 224 can be a network of signal conductors, a wireless network (e.g., a radio frequency, microwave, or infrared communication system using a communications protocol, such as Wi-Fi), or a combination thereof. The vehicle control system 204 may also provide signal processing of one or more sensors, sensor fusion of similar and/or dissimilar sensors, signal smoothing in the case of erroneous “wild point” signals, and/or sensor fault detection. For example, ranging measurements provided by one or more RF sensors may be combined with ranging measurements from one or more IR sensors to determine one fused estimate of vehicle range to an obstacle target.

[0188] The control system 204 may receive and read sensor signals, such as wheel and engine speed signals, as a digital input comprising, for example, a pulse width modulated (PWM) signal. The processor 304 can be configured, for example, to read each of the signals into a port configured as a counter or configured to generate an interrupt on receipt of a pulse, such that the processor 304 can determine, for example, the engine speed in revolutions per minute (RPM) and the speed of the vehicle in miles per hour (MPH) and/or kilometers per hour (KPH). One skilled in the art will recognize that the two signals can be received from existing sensors in a vehicle comprising a tachometer and a speedometer, respectively. Alternatively, the current engine speed and vehicle speed can be received in a communication packet as numeric values from a conventional dashboard subsystem comprising a tachometer and a speedometer. The transmission speed sensor signal can be similarly received as a digital input comprising a signal coupled to a counter or interrupt signal of the processor 304 or received as a value in a communication packet on a network or port interface from an
existing subsystem of the vehicle 104. The ignition sensor signal can be configured as a digital input, wherein a HIGH value represents that the ignition is on and a LOW value represents that the ignition is OFF. Three bits of the port interface can be configured as a digital input to receive the gear shift position signal, representing eight possible gear shift positions. Alternatively, the gear shift position signal can be received in a communication packet as a numeric value on the port interface. The throttle position signal can be received as an analog input value, typically in the range 0-5 volts. Alternatively, the throttle position signal can be received in a communication packet as a numeric value on the port interface. The output of other sensors can be processed in a similar fashion.

[0189] Other sensors may be included and positioned in the interior space 108 of the vehicle 104. Generally, these interior sensors obtain data about the health of the driver and/or passenger(s), data about the safety of the driver and/or passenger(s), and/or data about the comfort of the driver and/or passenger(s). The health data sensors can include sensors in the steering wheel that can measure various health telemetry for the person (e.g., heart rate, temperature, blood pressure, blood presence, blood composition, etc.). Sensors in the seats may also provide for health telemetry (e.g., presence of liquid, weight, weight shifts, etc.). Infrared sensors could detect a person's temperature; optical sensors can determine a person's position and whether the person has become unconscious. Other health sensors are possible and included herein.

[0190] Safety sensors can measure whether the person is acting safely. Optical sensors can determine a person's position and focus. If the person stops looking at the road ahead, the optical sensor can detect the lack of focus. Sensors in the seats may detect if a person is leaning forward or may be injured by a seat belt in a collision. Other sensors can detect that the driver has at least one hand on a steering wheel. Other safety sensors are possible and contemplated as if included herein.

[0191] Comfort sensors can collect information about a person's comfort. Temperature sensors may detect a temperature of the interior cabin. Moisture sensors can determine a relative humidity. Audio sensors can detect loud sounds or other distractions. Audio sensors may also receive input from a person through voice data. Other comfort sensors are possible and contemplated as if included herein.

[0192] FIG. 63 shows an interior sensor configuration for one or more zones 512 of a vehicle 104. Optionally, the areas 508 and/or zone 512 of a vehicle 104 may include sensors that are configured to collect information associated with the interior 108 of a vehicle 104. In particular, the various sensors may collect environmental information, user information, and safety information, to name a few. Embodiments of these sensors may be as described in conjunction with FIGS. 7A-83.

[0193] Optionally, the sensors may include one or more of optical, or image, sensors 622A-B (e.g., cameras, etc.), motion sensors 624A-B (e.g., utilizing RF, IR, and/or other sound/image sensing, etc.), steering wheel user sensors 642 (e.g., heat rate, temperature, blood pressure, sweat, health, etc.), seat sensors 677 (e.g., weight, load cell, moisture, electrical, force transducer, etc.), safety restraint sensors 679 (e.g., seatbelt, airbag, load cell, force transducer, etc.), interior sound receivers 692A-B, and environmental sensors 694 (e.g., temperature, humidity, air, oxygen, etc.), and the like.

[0194] The image sensors 622A-B may be used alone or in combination to identify objects, users 216, and/or other features, inside the vehicle 104. Optionally, a first image sensor 622A may be located in a different position within a vehicle 104 from a second image sensor 622B. When used in combination, the image sensors 622A-B may combine captured images to form, among other things, stereo and/or three-dimensional (3D) images. The stereo images can be recorded and/or used to determine depth associated with objects and/or users 216 in a vehicle 104. Optionally, the image sensors 622A-B used in combination may determine the complex geometry associated with identifying characteristics of a user 216. For instance, the image sensors 622A-B may be used to determine dimensions between various features of a user's face (e.g., the depth/distance from a user's nose to a user's cheeks, a linear distance between the center of a user's eyes, and more). These dimensions may be used to verify, record, and even modify characteristics that serve to identify a user 216. As can be appreciated, utilizing stereo images can allow for a user 216 to provide complex gestures in a 3D space of the vehicle 104. These gestures may be interpreted via one or more of the subsystems as disclosed herein. Optionally, the image sensors 622A-B may be used to determine movement associated with objects and/or users 216 within the vehicle 104. It should be appreciated that the number of image sensors used in a vehicle 104 may be increased to provide greater dimensional accuracy and/or views of a detected image in the vehicle 104.

[0195] The vehicle 104 may include one or more motion sensors 624A-B. These motion sensors 624A-B may detect motion and/or movement of objects inside the vehicle 104. Optionally, the motion sensors 624A-B may be used alone or in combination to detect movement. For example, a user 216 may be operating a vehicle 104 (e.g., while driving, etc.) when a passenger in the rear of the vehicle 104 unfastens a safety belt and proceeds to move about the vehicle 104. In this example, the movement of the passenger could be detected by the motion sensors 624A-B. Optionally, the user 216 could be alerted of this movement by one or more of the devices 212, 248 in the vehicle 104. In another example, a passenger may attempt to reach for one of the vehicle control features (e.g., the steering wheel 640, the console, icons displayed on the head unit and/or device 212, 248, etc.). In this case, the movement (i.e., reaching) of the passenger may be detected by the motion sensors 624A-B. Optionally, the path, trajectory, anticipated path, and/or some other direction of movement/motion may be determined using the motion sensors 624A-B. In response to detecting the movement and/or the direction associated with the movement, the passenger may be prevented from interfacing with and/or accessing at least some of the vehicle control features (e.g., the features represented by icons may be hidden from a user interface, the features may be locked from use by the passenger, combinations thereof, etc.). As can be appreciated, the user 216 may be alerted of the movement/motion such that the user 216 can act to prevent the passenger from interfering with the vehicle 104 controls. Optionally, the number of motion sensors in a vehicle 104, or areas of a vehicle 104, may be increased to increase an accuracy associated with motion detected in the vehicle 104.

[0196] The interior sound receivers 692A-B may include, but are not limited to, microphones and other types of acoustic-to-electric transducers or sensors. Optionally, the interior sound receivers 692A-B may be configured to receive and
convert sound waves into an equivalent analog or digital signal. The interior sound receivers 692A-B may serve to determine one or more locations associated with various sounds in the vehicle 104. The location of the sounds may be determined based on a comparison of volume levels, intensity, and the like, between sounds detected by two or more interior sound receivers 692A-B. For instance, a first interior sound receiver 692A may be located in a first area of the vehicle 104 and a second interior sound receiver 692B may be located in a second area of the vehicle 104. If a sound is detected at a first volume level by the first interior sound receiver 692A and a second, higher, volume level by the second interior sound receiver 692B in the second area of the vehicle 104, the sound may be determined to be closer to the second area of the vehicle 104. As can be appreciated, the number of sound receivers used in a vehicle 104 may be increased (e.g., more than two, etc.) to increase measurement accuracy surrounding sound detection and location, or source, of the sound (e.g., via triangulation, etc.).

[0197] Seat sensors 677 may be included in the vehicle 104. The seat sensors 677 may be associated with each seat and/or zone 512 in the vehicle 104. Optionally, the seat sensors 677 may provide health telemetry and/or identification via one or more load cells, force transducers, weight sensors, moisture detection sensor, electrical conductivity/resistance sensor, and the like. For example, the seat sensors 677 may determine that a user 216 weighs 180 lbs. This value may be compared to user data stored in memory to determine whether a match exists between the detected weight and a user 216 associated with the vehicle 104. In another example, if the seat sensors 677 detect that a user 216 is fidgeting, or moving, in a seemingly uncontrollable manner, the system may determine that the user 216 has suffered a nervous and/or muscular system issue (e.g., seizure, etc.). The vehicle control system 204 may then cause the vehicle 104 to slow down and in addition or alternatively the automobile controller 8104 (described below) can safely take control of the vehicle 104 and bring the vehicle 104 to a stop in a safe location (e.g., out of traffic, off a freeway, etc.).

[0198] Health telemetry and other data may be collected via the steering wheel user sensors 642. Optionally, the steering wheel user sensors 642 may collect heart rate, temperature, blood pressure, and the like, associated with a user 216 via at least one contact disposed on or about the steering wheel 640.

[0199] The safety restraint sensors 679 may be employed to determine a state associated with one or more safety restraint devices in a vehicle 104. The state associated with one or more safety restraint devices may serve to indicate a force observed at the safety restraint device, a state of activity (e.g., retracted, extended, various ranges of extension and/or retraction, deployment, buckled, unbuckled, etc.), damage to the safety restraint device, and more.

[0200] Environmental sensors 694, including one or more of temperature, humidity, air, oxygen, carbon monoxide, smoke, and other environmental condition sensors may be used in a vehicle 104. These environmental sensors 694 may be used to collect data relating to the safety, comfort, and/or condition of the interior space 108 of the vehicle 104. Among other things, the data collected by the environmental sensors 694 may be used by the vehicle control system 204 to alter functions of a vehicle. The environment may correspond to an interior space 108 of a vehicle 104 and/or specific areas 508 and/or zones 512 of the vehicle 104. It should be appreciated that an environment may correspond to a user 216. For example, a low oxygen environment may be detected by the environmental sensors 694 and associated with a user 216 who is operating the vehicle 104 in a particular zone 512. In response to detecting the low oxygen environment, at least one of the subsystems of the vehicle 104, as provided herein, may alter the environment, especially in the particular zone 512, to increase the amount of oxygen in the zone 512. Additionally or alternatively, the environmental sensors 694 may be used to report conditions associated with a vehicle (e.g., fire detected, low oxygen, low humidity, high carbon monoxide, etc.). The conditions may be reported to a user 216 and/or a third party via at least one communications module as provided herein.

[0201] Among other things, the sensors as disclosed herein may communicate with each other, with devices 212, 248, and/or with the vehicle control system 204 via the signal carrier network 224. Additionally or alternatively, the sensors disclosed herein may serve to provide data relevant to more than one category of sensor information including, but not limited to, combinations of environmental information, user information, and safety information to name a few.

[0202] FIGS. 7A-7B show block diagrams of various sensors that may be associated with a vehicle 104. Although depicted as interior and exterior sensors, it should be appreciated that any of the one or more of the sensors shown may be used in both the interior space 108 and the exterior space of the vehicle 104. Moreover, sensors having the same symbol or name may include the same, or substantially the same, functionality as those sensors described elsewhere in the present disclosure. Further, although the various sensors are depicted in conjunction with specific groups (e.g., environmental 708, 708E, user interface 712, safety 716, 716E, etc.) the sensors should not be limited to the groups in which they appear. In other words, the sensors may be associated with other groups or combinations of groups and/or disassociated from one or more of the groups shown. The sensors as disclosed herein may communicate with each other, the devices 212, 248, and/or the vehicle control system 204 via one or more communications channel(s) 356.

[0203] FIG. 7A is a block diagram of an embodiment of interior sensors 340 for a vehicle 104 is provided. The interior sensors 340 may be arranged into one or more groups, based at least partially on the function of the interior sensors 340. The interior space 108 of a vehicle 104 may include an environmental group 708, a user interface group 712, and a safety group 716. Additionally or alternatively, there may be sensors associated with various devices inside the vehicle (e.g., devices 212, 248, smart phones, tablets, mobile computers, etc.)

[0204] The environmental group 708 may comprise sensors configured to collect data relating to the internal environment of a vehicle 104. It is anticipated that the environment of the vehicle 104 may be subdivided into areas 508 and zones 512 in an interior space 108 of a vehicle 104. In this case, each area 508 and/or zone 512 may include one or more of the environmental sensors. Examples of environmental sensors associated with the environmental group 708 may include, but are not limited to, oxygen/air sensors 724, temperature sensors 728, humidity sensors 732, light/photo sensors 736, and more. The oxygen/air sensors 724 may be configured to detect a quality of the air in the interior space 108 of the vehicle 104 (e.g., ratios and/or types of gasses comprising the air inside the vehicle 104, dangerous gas levels, safe gas levels, etc.). Temperature sensors 728 may be
configured to detect temperature readings of one or more objects, users 216, and/or areas 508 of a vehicle 104. Humidity sensors 732 may detect an amount of water vapor present in the air inside the vehicle 104. The light/photo sensors 736 can detect an amount of light present in the vehicle 104. Further, the light/photo sensors 736 may be configured to detect various levels of light intensity associated with light in the vehicle 104.

[0205] The user interface group 712 may comprise sensors configured to collect data relating to one or more users 216 in a vehicle 104. As can be appreciated, the user interface group 712 may include sensors that are configured to collect data from users 216 in one or more areas 508 and zones 512 of the vehicle 104. For example, each area 508 and/or zone 512 of the vehicle 104 may include one or more of the sensors in the user interface group 712. Examples of user interface sensors associated with the user interface group 712 may include, but are not limited to, infrared sensors 740, motion sensors 744, weight sensors 748, wireless network sensors 752, biometric sensors 756, camera (or image) sensors 760, audio sensors 764, and more.

[0206] Infrared sensors 740 may be used to measure IR light irradiating from at least one surface, user 216, or other object in the vehicle 104. Among other things, the infrared sensors 740 may be used to measure temperatures, form images (especially in low light conditions), identify users 216, and even detect motion in the vehicle 104.

[0207] The motion sensors 744 may be similar to the motion detectors 624-A-B, as described in conjunction with FIG. 63. Weight sensors 748 may be employed to collect data relating to objects and/or users 216 in various areas 508 of the vehicle 104. In some cases, the weight sensors 748 may be included in the seats and/or floor of a vehicle 104.

[0208] Optionally, the vehicle 104 may include a wireless network sensor 752. This sensor 752 may be configured to detect one or more wireless network(s) inside the vehicle 104. Examples of wireless networks may include, but are not limited to, wireless communications utilizing Bluetooth®, Wi-Fi®, ZigBee, IEEE 802.11, and other wireless technology standards. For example, a mobile hotspot may be detected inside the vehicle 104 via the wireless network sensor 752. In this case, the vehicle 104 may determine to utilize and/or share the mobile hotspot detected via one or more other devices 212, 248 and/or components associated with the vehicle 104.

[0209] Biometric sensors 756 may be employed to identify and/or record characteristics associated with a user 216. It is anticipated that biometric sensors 756 can include at least one of image sensors, IR sensors, fingerprint readers, weight sensors, load cells, force transducers, heart rate monitors, blood pressure monitors, and the like as provided herein.

[0210] The camera sensors 760 may be similar to image sensors 622-A-B, as described in conjunction with FIG. 63. Optionally, the camera sensors may record still images, video, and/or combinations thereof. The audio sensors 764 may be similar to the interior sound receivers 692-A-B, as described in conjunction with FIGS. 6A-6B. The audio sensors may be configured to receive audio input from a user 216 of the vehicle 104. The audio input from a user 216 may correspond to voice commands, conversations detected in the vehicle 104, phone calls made in the vehicle 104, and/or other audible expressions made in the vehicle 104.

[0211] The safety group 716 may comprise sensors configured to collect data relating to the safety of a user 216 and/or one or more components of a vehicle 104. The vehicle 104 may be subdivided into areas 508 and/or zones 512 in an interior space 108 of a vehicle 104 where each area 508 and/or zone 512 may include one or more of the safety sensors provided herein. Examples of safety sensors associated with the safety group 716 may include, but are not limited to, force sensors 768, mechanical motion sensors 772, orientation sensors 776, restraint sensors 780, and more.

[0212] The force sensors 768 may include one or more sensors inside the vehicle 104 configured to detect a force observed in the vehicle 104. One example of a force sensor 768 may include a force transducer that converts measured forces (e.g., force, weight, pressure, etc.) into output signals.

[0213] Mechanical motion sensors 772 may correspond to encoders, accelerometers, damped masses, and the like. Optionally, the mechanical motion sensors 772 may be adapted to measure the force of gravity (i.e., G-force) as observed inside the vehicle 104. Measuring the G-force observed inside a vehicle 104 can provide valuable information related to a vehicle’s acceleration, deceleration, collisions, and/or forces that may have been suffered by one or more users 216 in the vehicle 104. As can be appreciated, the mechanical motion sensors 772 can be located in an interior space 108 or an exterior of the vehicle 104.

[0214] Orientation sensors 776 can include accelerometers, gyroscopes, magnetic sensors, and the like that are configured to detect an orientation associated with the vehicle 104. Similar to the mechanical motion sensors 772, the orientation sensors 776 can be located in an interior space 108 or an exterior of the vehicle 104.

[0215] The restraint sensors 780 may be similar to the safety restraint sensors 679 as described in conjunction with FIGS. 6A-6B. The sensors 780 may correspond to sensors associated with one or more restraint devices and/or systems in a vehicle 104. Seatbelts and airbags are examples of restraint devices and/or systems. As can be appreciated, the restraint devices and/or systems may be associated with one or more sensors that are configured to detect a state of the device/system. The state may include extension, engagement, retraction, disengagement, deployment, and/or other electrical or mechanical conditions associated with the device/system.

[0216] The associated device sensors 720 can include any sensors that are associated with a device 212, 248 in the vehicle 104. As previously stated, typical devices 212, 248 may include smartphones, tablets, laptops, mobile computers, and the like. It is anticipated that the various sensors associated with these devices 212, 248 can be employed by the vehicle control system 204. For example, a typical smartphone can include an image sensor, an image sensor, an IR sensor, audio sensor, gyroscope, accelerometer, wireless network sensor, fingerprint reader, and more. It is an aspect of the present disclosure that one or more of these associated device sensors 720 may be used by one or more subsystems of the vehicle system 200.

[0217] In FIG. 7B, a block diagram of an embodiment of exterior sensors 340 for a vehicle 104 is shown. The exterior sensors may include sensors that are identical, or substantially similar, to those previously disclosed in conjunction with the interior sensors of FIG. 7A. Optionally, the exterior sensors 340 may be configured to collect data relating to one or more conditions, objects, users 216, and other events that are external to the interior space 108 of the vehicle 104. For instance, the oxygen/air sensors 724 may measure a quality...
and/or composition of the air outside of a vehicle 104. As another example, the motion sensors 744 may detect motion outside of a vehicle 104.

[0218] The external environmental group 708E may comprise sensors configured to collect data relating to the external environment of a vehicle 104. In addition to including one or more of the sensors previously described, the external environmental group 708E may include additional sensors, such as, vehicle sensors 750, biological sensors, and wireless signal sensors 758. Vehicle sensors 750 can detect objects that are in an environment surrounding the vehicle 104. For example, the vehicle sensors 750 may detect objects in a first outside area 516, a second outside area 520, and/or combinations of the first and second outside areas 516, 520. Optionally, the vehicle sensors 750 may include one or more of RF sensors, IR sensors, image sensors, and the like to detect vehicles, people, hazards, etc. that are in an environment exterior to the vehicle 104. Additionally or alternatively, the vehicle sensors 750 can provide distance/directional information relating to a distance (e.g., distance from the vehicle 104 to a detected object) and/or a direction (e.g., direction of travel, etc.) associated with the detected object.

[0219] The biological sensors 754 may determine whether one or more biological entities (e.g., an animal, a person, a user 216, etc.) is in an external environment of the vehicle 104. Additionally or alternatively, the biological sensors 754 may provide distance information relating to a distance of the biological entity from the vehicle 104. Biological sensors 754 may include at least one of RF sensors, IR sensors, image sensors and the like that are configured to detect biological objects. For example, an IR sensor may be used to determine that an object, or biological entity, has a specific temperature, temperature pattern, or heat signature. Continuing this example, a comparison of the determined heat signature may be compared to known heat signatures associated with recognized biological entities (e.g., based on shape, location of temperature, and combinations thereof, etc.) to determine whether the heat signature is associated with a biological entity or an inanimate, or non-biological, object.

[0220] The wireless signal sensors 758 may include one or more sensors configured to receive wireless signals from signal sources such as Wi-Fi® hotspots, cell towers, roadside beacons, other electronic roadside devices, and satellite positioning systems. Optionally, the wireless signal sensors 758 may detect wireless signals from one or more of a mobile phone, mobile computer, keyless entry device, RFID device, near field communications (NFC) device, and the like.

[0221] The external safety group 716E may comprise sensors configured to collect data relating to the safety of a user 216 and/or one or more components of a vehicle 104. Examples of safety sensors associated with the external safety group 716E may include, but are not limited to, force sensors 768, mechanical motion sensors 772, orientation sensors 776, vehicle body sensors 782, and more. Optionally, the exterior safety sensors 716E may be configured to collect data relating to one or more conditions, objects, vehicle components, and other events that are external to the vehicle 104. For instance, the force sensors 768 in the safety group 716E may detect and/or record force information associated with the outside of a vehicle 104. For instance, if an object strikes the exterior of the vehicle 104, the force sensors 768 from the exterior safety group 716E may determine a magnitude, location, and/or time associated with the strike.

[0222] The vehicle 104 may include a number of vehicle body sensors 782. The vehicle body sensors 782 may be configured to measure characteristics associated with the body (e.g., body panels, components, chassis, windows, etc.) of a vehicle 104. For example, two vehicle body sensors 782, including a first body sensor and a second body sensor, may be located at some distance apart. Continuing this example, the first body sensor may be configured to send an electrical signal across the body of the vehicle 104 to the second body sensor, or vice versa. Upon receiving the electrical signal from the first body sensor, the second body sensor may record a detected current, voltage, resistance, and/or combinations thereof associated with the received electrical signal. Values (e.g., current, voltage, resistance, etc.) for the sent and received electrical signal may be stored in a memory. These values can be compared to determine whether subsequent electrical signals sent and received between vehicle body sensors 782 deviate from the stored values. When the subsequent signal values deviate from the stored values, the difference may serve to indicate damage and/or loss of a body component. Additionally or alternatively, the deviation may indicate a problem with the vehicle body sensors 782. The vehicle body sensors 782 may communicate with each other, a vehicle control system 204, and/or systems of the vehicle system 200 via a communications channel 356. Although described using electrical signals, it should be appreciated that alternative embodiments of the vehicle body sensors 782 may use sound waves and/or light to perform a similar function.

[0223] FIG. 8A is a block diagram of an embodiment of a media controller subsystem 348 for a vehicle 104. The media controller subsystem 348 may include, but is not limited to, a media controller 804, a media processor 808, a match engine 812, an audio processor 816, a speech synthesis module 820, a network transceiver 824, a signal processing module 828, memory 832, and a language database 836. Optionally, the media controller subsystem 348 may be configured as a dedicated blade that implements the media-related functionality of the system 200. Additionally or alternatively, the media controller subsystem 348 can provide voice input, voice output, library functions for multimedia, and display control for various areas 508 and/or zones 512 of the vehicle 104.

[0224] Optionally, the media controller subsystem 348 may include a local IP address (e.g., IPv4, IPv6, combinations thereof, and even a routable, global unicast address). The routable, global unicast address may allow for direct addressing of the media controller subsystem 348 for streaming data from Internet resources (e.g., cloud storage, user accounts, etc.). It is anticipated, that the media controller subsystem 348 can provide multimedia via at least one Internet connection, or wireless network communications module, associated with the vehicle 104. Moreover, the media controller subsystem 348 may be configured to service multiple independent clients simultaneously.

[0225] The media processor 808 may comprise a general purpose programmable processor or controller for executing application programming or instructions related to the media subsystem 348. The media processor 808 may include multiple processor cores, and/or implement multiple virtual processors. Optionally, the media processor 808 may include multiple physical processors. By way of example, the media processor 808 may comprise a specially configured application specific integrated circuit (ASIC) or other integrated circuit, a digital signal processor, a controller, a hardwired
electronic or logic circuit, a programmable logic device or gate array, a special purpose computer, or the like. The media processor 808 generally functions to run programming code or instructions implementing various functions of the media controller 804.

[0226] The match engine 812 can receive input from one or more components of the vehicle system 800 and perform matching functions. Optionally, the match engine 812 may receive audio input provided via a microphone 886 of the system 800. The audio input may be provided to the media controller subsystem 348 where the audio input can be decoded and matched, via the match engine 812, to one or more functions available to the vehicle 104. Similar matching operations may be performed by the match engine 812 relating to video input received via one or more image sensors, cameras 878, and the like.

[0227] The media controller subsystem 348 may include a speech synthesis module 820 configured to provide audio output to one or more speakers 880, or audio output devices, associated with the vehicle 104. Optionally, the speech synthesis module 820 may be configured to provide audio output based at least partially on the matching functions performed by the match engine 812.

[0228] As can be appreciated, the coding/decoding, the analysis of audio input/output, and/or other operations associated with the match engine 812 and speech synthesis module 820, may be performed by the media processor 808 and/or a dedicated audio processor 816. The audio processor 816 may comprise a general purpose programmable processor or controller for executing application programming or instructions related to audio processing. Further, the audio processor 816 may be similar to the media processor 808 described herein.

[0229] The network transceiver 824 can include any device configured to transmit and receive analog and/or digital signals. Optionally, the media controller subsystem 348 may utilize a network transceiver 824 in one or more communication networks associated with the vehicle 104 to receive and transmit signals via the communications channel 356. Additionally or alternatively, the network transceiver 824 may accept requests from one or more devices 212, 248 to access the media controller subsystem 348. One example of the communication network is a local area network (LAN). As can be appreciated, the functionality associated with the network transceiver 824 may be built into at least one other component of the vehicle 104 (e.g., a network interface card, communications module, etc.).

[0230] The signal processing module 828 may be configured to alter audio/multimedia signals received from one or more input sources (e.g., microphones 886, etc.) via the communications channel 356. Among other things, the signal processing module 828 may alter the signals received electrically, mathematically, combinations thereof, and the like.

[0231] The media controller 804 may also include memory 832 for use in connection with the execution of application programming or instructions by the media processor 808, and for the temporary or long term storage of program instructions and/or data. As examples, the memory 832 may comprise RAM, DRAM, SDRAM, or other solid state memory.

[0232] The language database 836 may include the data and/or libraries for one or more languages, as are used to provide the language functionality as provided herein. In one case, the language database 836 may be loaded on the media controller 804 at the point of manufacture. Optionally, the language database 836 can be modified, updated, and/or otherwise changed to alter the data stored therein. For instance, additional languages may be supported by adding the language data to the language database 836. In some cases, this addition of languages can be performed via accessing administrative functions on the media controller 804 and loading the new language modules via wired (e.g., USB, etc.) or wireless communication. In some cases, the administrative functions may be available via a vehicle console device 248, a user device 212, 248, and/or other mobile computing device that is authorized to access administrative functions (e.g., based at least partially on the device’s address, identification, etc.).

[0233] One or more video controllers 840 may be provided for controlling the video operation of the devices 212, 248, 882 associated with the vehicle. Optionally, the video controller 840 may include a display controller for controlling the operation of touch sensitive screens, including input (touch sensing) and output (display) functions. Video data may include data received in a stream and unpacked by a processor and loaded into a display buffer. In this example, the processor and video controller 840 can optimize the display based on the characteristics of a screen of a display device 212, 248, 882. The functions of one touch screen controller may be incorporated into other components, such as a media processor 808 or display subsystem.

[0234] The audio controller 844 can provide control of the audio entertainment system (e.g., radio, subscription music service, multimedia entertainment, etc.), and other audio associated with the vehicle 104 (e.g., navigation systems, vehicle comfort systems, convenience systems, etc.). Optionally, the audio controller 844 may be configured to translate digital signals to analog signals and vice versa. As can be appreciated, the audio controller 844 may include device drivers that allow the audio controller 844 to communicate with other components of the system 800 (e.g., processors 816, 808, audio I/O 874, and the like).

[0235] The system 800 may include a profile identification module 848 to determine whether a user profile is associated with the vehicle 104. Among other things, the profile identification module 848 may receive requests from a user 216, or device 212, 228, 248, to access a profile stored in a profile database 856 or profile data 252. Additionally or alternatively, the profile identification module 848 may request profile information from a user 216 and/or a device 212, 228, 248, to access a profile stored in a profile database 856 or profile data 252. In any event, the profile identification module 848 may be configured to create, modify, retrieve, and/or store user profiles in the profile database 856 and/or profile data 252. The profile identification module 848 may include rules for profile identification, profile information retrieval, creation, modification, and/or control of components in the system 800.

[0236] By way of example, a user 216 may enter the vehicle 104 with a smart phone or other device 212. In response to determining that a user 216 is inside the vehicle 104, the profile identification module 848 may determine that a user profile is associated with the user’s smart phone 212. As another example, the system 800 may receive information about a user 216 (e.g., from a camera 878, microphone 886, etc.), and, in response to receiving the user information, the profile identification module 848 may refer to the profile database 856 to determine whether the user information matches a user profile stored in the database 856. It is anticipated that the profile identification module 848 may commu-
nicate with the other components of the system to load one or more preferences, settings, and/or conditions based on the user profile. Further, the profile identification module 848 may be configured to control components of the system 800 based on user profile information.

[0237] Optionally, data storage 852 may be provided. Like the memory 832, the data storage 852 may comprise a solid state memory device or devices. Alternatively or in addition, the data storage 852 may comprise a hard disk drive or other random access memory. Similar to the data storage 852, the profile database 856 may comprise a solid state memory device or devices.

[0238] An input/output module 860 and associated ports may be included to support communications over wired networks or links, for example with other communication devices, server devices, and/or peripheral devices. Examples of an input/output module 860 include an Ethernet port, a Universal Serial Bus (USB) port, CAN Bus, Institute of Electrical and Electronics Engineers (IEEE) 1594, or other interface. Users may bring their own devices (e.g., Bring Your Own Device (BYOD), device 212, etc.) into the vehicle 104 for use with the various systems disclosed. Although most BYOD devices can connect to the vehicle systems (e.g., the media controller subsystem 348, etc.) via wireless communications protocols (e.g., Wi-Fi®, Bluetooth®, etc.) many devices may require a direct connection via USB, or similar. In any event, the input/output module 860 can provide the necessary connection of one or more devices to the vehicle systems described herein.

[0239] A video input/output interface 864 can be included to receive and transmit video signals between the various components in the system 800. Optionally, the video input/output interface 864 can operate with compressed and uncompressed video signals. The video input/output interface 864 can support high data rates associated with image capture devices. Additionally or alternatively, the video input/output interface 864 may convert analog video signals to digital signals.

[0240] The infotainment system 870 may include information media content and/or entertainment content, informational devices, entertainment devices, and the associated programming therefor. Optionally, the infotainment system 870 may be configured to handle the control of one or more components of the system 800 including, but in no way limited to, audio, streaming audio/video devices, audio devices 880, 882, 886, video devices 878, 882, travel devices (e.g., GPS, navigational systems, etc.), wireless communication devices, network devices, and the like. Further, the infotainment system 870 can provide the functionality associated with other infotainment features as provided herein.

[0241] An audio input/output interface 874 can be included to provide analog audio to an interconnected speaker 880 or other device, and to receive analog audio input from a connected microphone 886 or other device. As an example, the audio input/output interface 874 may comprise an associated amplifier and analog to digital converter. Alternatively or in addition, the devices 212, 248 can include integrated audio input/output devices 880, 886 and/or an audio jack for interconnecting an external speaker 880 or microphone 886. For example, an integrated speaker 880 and an integrated microphone 886 can be provided, to support near talk, voice commands, spoken information exchange, and/or speaker phone operations.

[0242] Among other things, the system 800 may include devices that are part of the vehicle 104 and/or part of a device 212, 248 that is associated with the vehicle 104. For instance, these devices may be configured to capture images, display images, capture sound, and present sound. Optionally, the system 800 may include at least one image sensors/cameras 878, display devices 882, audio input devices/microphones 886, and audio output devices/speakers 880. The cameras 878 can be included for capturing still and/or video images. Alternatively or in addition, image sensors 878 can include a scanner or code reader. An image sensor/camera 878 can include or be associated with additional elements, such as a flash or other light source. In some cases, the display device 882 may include an audio input device and/or an audio output device in addition to providing video functions. For instance, the display device 882 may be a console monitor, a tablet computing device, and/or some other mobile computing device.

[0243] FIG. 813 is a block diagram of an embodiment of a user/device interaction subsystem 817 in a vehicle system 800. The user/device interaction subsystem 817 may comprise hardware and/or software that conduct various operations for or with the vehicle 104. For instance, the user/device interaction subsystem 817 may include at least one user interaction subsystem 332 and device interaction subsystem 352 as previously described. These operations may include, but are not limited to, providing information to the user 216, receiving input from the user 216, and controlling the functions or operation of the vehicle 104, etc. Among other things, the user/device interaction subsystem 817 may include a computing system operable to conduct the operations as described herein.

[0244] Optionally, the user/device interaction subsystem 817 can include one or more of the components and modules provided herein. For instance, the user/device interaction subsystem 817 can include one or more of a video input/output interface 864, an audio input/output interface 874, a sensor module 814, a device interaction module 818, a user identification module 822, a vehicle control module 826, an environmental control module 830, and a gesture control module 834. The user/device interaction subsystem 817 may be in communication with other devices, modules, and components of the system 800 via the communications channel 356.

[0245] The user/device interaction subsystem 817 may be configured to receive input from a user 216 and/or device via one or more components of the system. By way of example, a user 216 may provide input to the user/device interaction subsystem 817 via wearable devices 802, 806, 810, video input (e.g., via at least one image sensor/camera 878, etc.), audio input (e.g., via the microphone, audio input source, etc.), gestures (e.g., via at least one image sensor 878, motion sensor 888, etc.), device input (e.g., via a device 212, 248 associated with the user, etc.), combinations thereof, and the like.

[0246] The wearable devices 802, 806, 810 can include heart rate monitors, blood pressure monitors, glucose monitors, pedometers, movement sensors, wearable computers, and the like. Examples of wearable computers may be worn by a user 216 and configured to measure user activity, determine energy spent based on the measured activity, track user sleep habits, determine user oxygen levels, monitor heart rate, provide alarm functions, and more. It is anticipated that the wearable devices 802, 806, 810 can communicate with the user/device interaction subsystem 817 via wireless commu-
communications channels or direct connection (e.g., where the device docks, or connects, with a USB port or similar interface of the vehicle 104).

[0247] A sensor module 814 may be configured to receive and/or interpret input provided by one or more sensors in the vehicle 104. In some cases, the sensors may be associated with one or more user devices (e.g., wearable devices 802, 806, 810, smart phones 212, mobile computing devices 212, 248, and the like). Optionally, the sensors may be associated with the vehicle 104, as described in conjunction with FIGS. 6A-7B.

[0248] The device interaction module 818 may communicate with the various devices as provided herein. Optionally, the device interaction module 818 can provide content, information, data, and/or media associated with the various subsystems of the vehicle system 800 to one or more devices 212, 248, 802, 806, 810, 882, etc. Additionally or alternatively, the device interaction module 818 may receive content, information, data, and/or media associated with the various devices provided herein.

[0249] The user identification module 822 may be configured to identify a user 216 associated with the vehicle 104. The identification may be based on user profile information that is stored in profile data 252. For instance, the user identification module 822 may receive characteristic information about a user 216 via a device, a camera, and/or some other input. The received characteristics may be compared to data stored in the profile data 252. Where the characteristics match, the user 216 is identified. As can be appreciated, where the characteristics do not match a user profile, the user identification module 822 may communicate with other subsystems in the vehicle 104 to obtain and/or record profile information about the user 216. This information may be stored in a memory and/or the profile data storage 252.

[0250] The vehicle control module 826 may be configured to control settings, features, and/or the functionality of a vehicle 104. In some cases, the vehicle control module 826 can communicate with the vehicle control system 204 to control critical functions (e.g., driving system controls, braking, accelerating, etc.) and/or noncritical functions (e.g., driving signals, indicator/hazard lights, mirror controls, window actuation, etc.) based at least partially on user/device input received by the user/device interaction subsystem 817.

[0251] The environmental control module 830 may be configured to control settings, features, and/or other conditions associated with the environment, especially the interior environment, of a vehicle 104. Optionally, the environmental control module 830 may communicate with the climate control system (e.g., changing cabin temperatures, fan speeds, air direction, etc.), oxygen and/or air quality control system (e.g., increase/decrease oxygen in the environment, etc.), interior lighting (e.g., changing intensity of lighting, color of lighting, etc.), an occupant seating system 648 (e.g., adjusting seat position, firmness, height, etc.), steering wheel 640 (e.g., position adjustment, etc.), infotainment/entertainment system (e.g., adjust volume levels, display intensity adjustment, change content, etc.), and/or other systems associated with the vehicle environment. Additionally or alternatively, these systems can provide input, setpoints, and/or responses, to the environmental control module 830. As can be appreciated, the environmental control module 830 may control the environment based at least partially on user/device input received by the user/device interaction subsystem 817.

[0252] The gesture control module 834 is configured to interpret gestures provided by a user 216 in the vehicle 104. Optionally, the gesture control module 834 may provide control signals to one or more of the vehicle systems 300 disclosed herein. For example, a user 216 may provide gestures to control the environment, critical and/or noncritical vehicle functions, the infotainment system, communications, networking, and more. Optionally, gestures may be provided by a user 216 and detected via one or more of the sensors as described in conjunction with FIGS. 6D-7A. As another example, one or more motion sensors 888 may receive gesture input from a user 216 and provide the gesture input to the gesture control module 834. Continuing this example, the gesture input is interpreted by the gesture control module 834. This interpretation may include comparing the gesture input to gestures stored in a memory. The gestures stored in memory may include one or more functions and/or controls mapped to specific gestures. When a match is determined between the detected gesture input and the stored gesture information, the gesture control module 834 can provide a control signal to any of the systems/subsystems as disclosed herein.

[0253] FIG. 8C illustrates a GPS/Navigation subsystem(s) 336. The Navigation subsystem(s) 336 can be any present or future-built navigation system that may use location data, for example, from the Global Positioning System (GPS), to provide navigation information or control the vehicle 104. The Navigation subsystem(s) 336 can include several components or modules, such as, one or more of, but not limited to, a GPS Antenna/receiver 892, a location module 896, a maps database 8100, an automobile controller 8104, a vehicle systems transceiver 8108, a traffic controller 8112, a network traffic transceiver 8116, a vehicle-to-vehicle transceiver 8120, a traffic information database 8124, etc. Generally, the several components or modules 892-8124 may be hardware, software, firmware, computer readable media, or combinations thereof.

[0254] A GPS Antenna/receiver 892 can be any antenna, GPS puck, and/or receiver capable of receiving signals from a GPS satellite or other navigation system, as mentioned hereinbefore. The signals may be demodulated, converted, interpreted, etc. by the GPS Antenna/receiver 892 and provided to the location module 896. Thus, the GPS Antenna/receiver 892 may convert the time signals from the GPS system and provide a location (e.g., coordinates on a map) to the location module 896. Alternatively, the location module 896 can interpret the time signals into coordinates or other location information.

[0255] The location module 896 can be the controller of the satellite navigation system designed for use in automobiles. The location module 896 can acquire position data, as from the GPS Antenna/receiver 892, to locate the user or vehicle 104 on a road or a road map database 8100. Using the road database 8100, the location module 896 can give directions to other locations along roads also in the database 8100. When a GPS signal is not available, the location module 896 may apply dead reckoning to estimate distance data from sensors 242 including one or more of, but not limited to, a speed sensor attached to the drive train of the vehicle 104, a gyroscope, an accelerometer, etc. GPS signal loss and/or multipath can occur due to urban canyons, tunnels, and other obstructions. Additionally or alternatively, the location module 896 may use known locations of Wi-Fi hotspots, cell tower data, etc. to determine the position of the vehicle 104,
such as by using time difference of arrival (TDOA) and/or frequency difference of arrival (FDOA) techniques.

[0256] The maps database 8100 can include any hardware and/or software to store information about maps, geographical information system information, location information, etc. The maps database 8100 can include any data definition or other structure to store the information. Generally, the maps database 8100 can include a road database that may include one or more vector maps of areas of interest. Street names, street numbers, house numbers, and other information can be encoded as geographic coordinates so that the user can find some desired destination by street address. Points of interest (waypoints) can also be stored with their geographic coordinates. For example, a point of interest may include speed cameras, fuel stations, public parking, and “parked here” or “you parked here”) information. The map database contents can be produced or updated by a server connected through a wireless system in communication with the Internet, even as the vehicle 104 is driven along existing streets, yielding an up-to-date map.

[0257] An automobile controller 8104 can be any hardware and/or software that can receive instructions from the location module 896 or the traffic controller 8112 and operate the vehicle 104. The automobile controller 8104 receives this information and data from the sensors 242 to operate the vehicle 104 without driver input. Thus, the automobile controller 8104 can drive the vehicle 104 along a route provided by the location module 896. The route may be adjusted by information sent from the traffic controller 8112. Discrete and real-time driving can occur with data from the sensors 242. To operate the vehicle 104, the automobile controller 8104 can communicate with a vehicle system transceiver 8108.

[0258] The vehicle systems transceiver 8108 can be any present or future-developed device that can comprise a transmitter and/or a receiver, which may be combined and can share common circuitry or a single housing. The vehicle systems transceiver 8108 may communicate or instruct one or more of the vehicle control subsystems 328. For example, the vehicle systems transceiver 8108 may send steering commands, as received from the automobile controller 8104, to an electronic steering system, to adjust the steering of the vehicle 100 in real time. The automobile controller 8104 can determine the effect of the commands based on received sensor data 242 and can adjust the commands as needed. The vehicle systems transceiver 8108 can also communicate with the braking system, the engine and drive train to speed or slow the car, the signals (e.g., turn signals and brake lights), the headlights, the windshield wipers, etc. Any of these communications may occur over the components or functions as described in conjunction with FIG. 4.

[0259] A traffic controller 8112 can be any hardware and/or software that can communicate with an automated traffic system and adjust the function of the vehicle 104 based on instructions from the automated traffic system. An automated traffic system is a system that manages the traffic in a given area. This automated traffic system can instruct cars to drive in certain lanes, instruct cars to raise or lower their speed, instruct a car to change their route of travel, instruct cars to communicate with other cars, etc. To perform these functions, the traffic controller 8112 may register the vehicle 104 with the automated traffic system and then provide other information including the route of travel. The automated traffic system can return registration information and any required instructions. The communications between the automated traffic system and the traffic controller 8112 may be received and sent through a network traffic transceiver 8116.

[0260] The network traffic transceiver 8116 can be any present or future-developed device that can comprise a transmitter and/or a receiver, which may be combined and can share common circuitry or a single housing. The network traffic transceiver 8116 may communicate with the automated traffic system using any known or future-developed, protocol, standard, frequency, bandwidth range, etc. The network traffic transceiver 8116 enables the sending of information between the traffic controller 8112 and the automated traffic system.

[0261] The traffic controller 8112 can also communicate with another vehicle, which may be in physical proximity (i.e., within range of a wireless signal), using the vehicle-to-vehicle transceiver 8120. As with the network traffic transceiver 8116, the vehicle-to-vehicle transceiver 8120 can be any present or future-developed device that can comprise a transmitter and/or a receiver, which may be combined and can share common circuitry or a single housing. Generally, the vehicle-to-vehicle transceiver 8120 can communicate with the other vehicles using any known or future-developed, protocol standard, frequency, bandwidth range, etc.

[0262] The traffic controller 8112 can control functions of the automobile controller 8104 and communicate with the location module 896. The location module 896 can provide current location information and route information that the traffic controller 8112 may then provide to the automated traffic system. The traffic controller 8112 may receive route adjustments from the automated traffic system that are then sent to the location module 896 to change the route. Further, the traffic controller 8112 can also send driving instructions to the automobile controller 8104 to change the driving characteristics of the vehicle 104. For example, the traffic controller 8112 can instruct the automobile controller 8104 to accelerate or decelerate to a different speed, change lanes, or perform another driving maneuver. The traffic controller 8112 can also manage vehicle-to-vehicle communications and store information about the communications or other information in the traffic information database 8124.

[0263] The traffic information database 8124 can be any type of database, such as relational, hierarchical, object-oriented, and/or the like. The traffic information database 8124 may reside on a storage medium local to (and/or resident in) the vehicle control system 204 or in the vehicle 104. The traffic information database 8124 may be adapted to store, update, and retrieve information about communications with other vehicles or any active instructions from the automated traffic system. This information may be used by the traffic controller 8112 to instruct or adjust the performance of driving maneuvers.

[0264] FIG. 9 illustrates an optional communications architecture where the host device 908 may include one more routing profiles, permission modules, and rules that control how communications within the vehicle 104 are to occur. This communications architecture can be used in conjunction with the routing tables, rules and permissions associated with
access point 456 and optional firewall 484, or can be in lieu thereof. For example, the host device 908 acts as a mobile hot spot to one or more other devices within vehicle 104, such as, other device 1912, other device 2916, other device 3920, and other device N 924. Optionally, one or more of the other devices 912 can communicate directly with the host device 908 which then provides Internet access to those devices 912 via the device 908. The host device 908 can act as a mobile hot spot for any one or more of the other devices 912, which may not need to communicate over the network/communications buses 224/404, but could instead connect directly to the host device 908 via, for example, NFC, Bluetooth®, WiFi, or the like. When the device 908 is acting as the host device, the device 908 can include one or more routing profiles, permissions, rules modules, and can also act as a firewall for the various inter and intra vehicle communications.

[0265] As will be appreciated, there could be alternative host devices, such as, host 904 which could also act as, for example, a co-host in association with device 908. Optionally, one or more of the routing profile, permission information, and rules could be shared between the co-host devices 904, 908, both of those devices being usable for Internet access for one or more of the other devices, 912-924. As will be appreciated, the other devices 912-924 need not necessarily connect to one or more host device 908 and the other device 904 via a direct communications link, but could also interface with those devices 904, 908 utilizing the network/communications buses 224/404 associated with the vehicle 100. As previously discussed, one or more of the other devices can connect to the network/communications buses 224/404 utilizing the various networks and/or buses discussed herein which would therefore enable, for example, regulation of the various communications based on the Ethernet zone that the other device 912 is associated with.

[0266] An embodiment of one or more modules that may be associated with the vehicle control system 204 may be as shown in FIG. 10. The modules can include a communication subsystem interface 1008 in communication with an operating system 1004. The communications may pass through a firewall 1044. The firewall 1044 can be any software that can control the incoming and outgoing communications by analyzing the data packets and determining whether the packets should be allowed through the firewall, based on applied ruleset. A firewall 1044 can establish a “barrier” between a trusted, secure internal network and another network (e.g., the Internet) that is not assumed to be secure and trusted.

[0267] In some situations, the firewall 1044 may establish security zones that are implemented by running system services and/or applications in restricted user groups and accounts. A set of configuration files and call backs may then be linked to an IP table firewall. The IP table firewall can be configured to notify a custom filter application at any of the layers of the Ethernet packet. The different users/group rights to access the system may include: system users, which may have exclusive right over all device firewall rules and running software; a big-brother user, which may have access to on board device (OBD) control data and may be able to communicate with the vehicle subsystem 328 and may be able to alter the parameters in the vehicle control system 204; a dealer user, which can have rights to read OBD data for diagnostics and repairs; a dashboard user, which can have rights to launch dashboard applications and/or authenticate guest users and change their permissions to trusted/friend/family, and can read but cannot write into OBD diagnostic data; a world wide web (WWW) data user, which can have HTTP rights to respond to HTTP requests (the HTTP requests also can target different user data, but may be filtered by default user accounts); a guest user, which may have no rights; a family/ friend user, which may have rights to play media from the media subsystem 348 and/or to stream media to the media subsystem 348.

[0268] The operating system 1004 can be a collection of software that manages computer hardware resources and provides common services for applications and other programs. The operating system 1004 may schedule time-sharing for efficient use of the system. For hardware functions, such as input, output, and memory allocation, the operating system 1004 can act as an intermediary between applications or programs and the computer hardware. Examples of operating systems that may be deployed as operating system 1004 include Android, BSD, iOS, Linux, OS X, QNX, Microsoft Windows, Windows Phone, IBM z/OS, etc.

[0269] The operating system 1004 can include one or more sub-modules. For example, a desktop manager 1012 can manage one or more graphical user interfaces (GUI) in a desktop environment. Desktop GUIs can help the user to easily access and edit files. A command-line interface (CLI) may be used if full control over the operating system (OS) 1004 is required. The desktop manager 1012 is described further herein.

[0270] A kernel 1028 can be a computer program that manages input/output requests from software and translates them into data processing instructions for the processor 304 and other components of the vehicle control system 204. The kernel 1028 is the fundamental component of the operating system 1004 that can execute many of the functions associated with the OS 1004.

[0271] The kernel 1028 can include other software functions, including, but not limited to, driver(s) 1056, communication software 1052, and/or Internet Protocol software 1048. A driver 1056 can be any computer program that operates or controls a particular type of device that is attached to a vehicle control system 204. A driver 1056 can communicate with the device through the bus 356 or communications subsystem 1008 to which the hardware connects. When a calling program invokes a routine in the driver 1056, the driver 1056 may issue one or more commands to the device. Once the device sends data back to the driver 1056, the driver 1056 may invoke routines in the original calling program. Drivers can be hardware-dependent and operating-system-specific. Driver(s) 1056 can provide the interrupt handling required for any necessary asynchronous time-dependent hardware interface.

[0272] The IP module 1048 can conduct any IP addressing, which may include the assignment of IP addresses and associated parameters to host interfaces. The address space may include networks and sub-networks. The IP module 1048 can perform the designation of network or routing prefixes and may conduct IP routing, which transports packets across network boundaries. Thus, the IP module 1048 may perform all functions required for IP multicast operations.

[0273] The communications module 1052 may conduct all functions for communicating over other systems or using other protocols not serviced by the IP module 1048. Thus, the communications module 1052 can manage multicast operations over other buses or networks not serviced by the IP module 1048. Further, the communications module 1052 may perform or manage communications to one or more devices, systems, data stores, services, etc. that are in communication with the vehicle control system 204 or other sub-
systems through the firewall 1044. Thus, the communications module 1052 can conduct communications through the communication subsystem interface 1008.

[0274] A file system 1016 may be any data handling software that can control how data is stored and retrieved. The file system 1016 can separate the stored data into individual pieces, and giving each piece a name, can easily separate and identify the pieces of data. Each piece of data may be considered a “file”. The file system 1016 can construct data structure and logic rules used to manage the information and the identifiers for the information. The structure and logic rules can be considered a “file system.”

[0275] A device discovery daemon 1020 may be a computer program that runs as a background process that can discover new devices that connect with the network 356 or communication subsystem 1008 or devices that disconnect from the network 356 or communication subsystem 1008. The device discovery daemon 1020 can ping the network 356 (the local subnet) when the vehicle 104 starts, when a vehicle door opens or closes, or upon the occurrence of other events. Additionally or alternatively, the device discovery daemon 1020 may force Bluetooth®, USB, and/or wireless detection. For each device that responds to the ping, the device discovery daemon 1020 can populate the system data 208 with device information and capabilities, using any of one or more protocols, including one or more of, but not limited to, IPv6 Hop-by-Hop Option (HOPOPT), Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP), Gateway-to-Gateway Protocol (GGP), Internet Protocol (IP), Internet Stream Protocol (ST), Transmission Control Protocol (TCP), Exterior Gateway Protocol (EGP), CHAOS, User Datagram Protocol (UDP), etc.

[0276] For example, the device discovery daemon 1020 can determine device capabilities based on the opened ports the device exposes. If a camera exposes port 80, then the device discovery daemon 1020 can determine that the camera is using a Hypertext Transfer Protocol (HTTP). Alternatively, if a device is supporting Universal Plug and Play (UPnP), the system data 208 can include more information, for example, a camera control universal resource locator (URL), a camera zoom URL, etc. When a scan stops, the device discovery daemon 1020 can trigger a dashboard refresh to ensure the user interface reflects the new devices on the desktop.

[0277] A desktop manager 1012 may be a computer program that manages the user interface of the vehicle control system 204. The desktop environment may be designed to be customizable and allow the definition of the desktop configuration look-and-feel for a wide range of appliances or devices from computer desktops, mobile devices, computer tablets, etc. Launcher(s), panels, desktop areas, the desktop background, notifications, panes, etc., can be configured from a dashboard configuration file managed by the desktop manager 1012. The graphical elements in which the desktop manager 1012 controls can include launchers, the desktop, notification bars, etc.

[0278] The desktop may be an area of the display where the applications are running. The desktop can have a custom background. Further, the desktop may be divided into two or more areas. For example, the desktop may be divided into an upper half of the display and a lower half of the display. Each application can be configured to run in a portion of the desktop. Extended settings can be added to the desktop configuration file, such that, some objects may be displayed over the whole desktop or in custom size out of the context of the divided areas.

[0279] The notification bar may be a part of a bar display system, which may provide notifications by displaying, for example, icons and/or pop-up windows that may be associated with sound notifications. The notification mechanism can be designed for separate plug-ins, which run in separate processes and may subscribe to a system intelligent input Bus (IBUS)/D-BUS event service. The icons on the notifications bar can be accompanied with application short-cuts to associated applications, for example, a Bluetooth® manager, a USB manager, radio volume and or tone control, a security firewall, etc.

[0280] The desktop manager 1012 may include a windows manager 1032, an application launcher 1036, and/or a panel launcher 1040. Each of these components can control a different aspect of the user interface. The desktop manager 1012 can use a root window to create panels that can include functionality for one or more of, but not limited to: launching applications, managing applications, providing notifications, etc.

[0281] The windows manager 1032 may be software that controls the placement and appearance of windows within a graphical user interface presented to the user. Generally, the windows manager 1032 can provide the desktop environment used by the vehicle control system 204. The windows manager 1032 can communicate with the kernel 1028 to interface with the graphical system that provides the user interface(s) and supports the graphics hardware, pointing devices, keyboard, touch-sensitive screens, etc. The windows manager 1032 may be a tiling window manager (i.e., a window manager with an organization of the screen into mutually non-overlapping frames, as opposed to a coordinate-based stacking of overlapping objects (windows) that attempts to fully emulate the desktop metaphor). The windows manager 1032 may read and store configuration files, in the system data 208, which can control the position of the application windows at precise positions.

[0282] An application manager 1036 can control the function of any application over the lifetime of the process. The process or application can be launched from a panel launcher 1040 or from a remote console. The application manager 1036 can intercept the process name and may take appropriate action to manage that process. If the process is not running, the application manager 1036 can load the process and may bring the process to a foreground in a display. The application manager 1036 may also notify the windows manager 1032 to bring the associated window(s) to a top of a window stack for the display. When a process starts from a shell or a notification out of the context of the desktop, the application manager 1036 can scan files to match the process name with the entry name provided. When a match is found, the application manager 1036 can configure the process according to a settings file.

[0283] In some situations, the application manager 1036 may restrict an application as singleton (i.e., restricts the instantiation of a class to one object). If an application is already running and the application manager 1036 is asked to run the application again, the application manager 1036 can bring the running process to a foreground on a display. There can be a notification event exchange between the windows manager 1032 and the application manager 1036 for activating the appropriate window for the foreground process. Once
an application is launched, the application may not be terminated or killed. The application can be sent to the background, except, possibly, for some applications (e.g., media player, Bluetooth®, notifications, etc.), which may be given a lowest process priority.

[0284] The panel launcher 1040 can be a widget configured to be placed along a portion of the display. The panel launcher 1040 may be built from desktop files from a desktop folder. The desktop folder location can be configured by a configuration file stored in system data 208. The panel launcher 1040 can allow for the launching or executing of applications or processes by receiving inputs from a user interface to launch programs.

[0285] A desktop plugin 1024 may be a software component that allows for customization of the desktop or software interface through the initiation of plug-in applications.

[0286] One or more gestures used to interface with the vehicle control system 204 may be as described in conjunction with FIG. 11A through 11K. FIGS. 11A through 11H depict various graphical representations of gesture inputs that may be recognized by the devices 212, 248. The gestures may be performed not only by a user’s body part, such as a digit, but also by other devices, such as a stylus, that may be sensed by the contact sensing portion(s) of a screen associated with the device 212, 248. In general, gestures are interpreted differently, based on where the gestures are performed (either directly on a display or in a gesture capture region). For example, gestures in a display may be directed to a desktop or application, and gestures in a gesture capture region may be interpreted as for the system.

[0287] With reference to FIGS. 11A-11H, a first type of gesture, a touch gesture 1120, is substantially stationary on a portion (e.g., a screen, a display, etc.) of a device 212, 248 for a selected length of time. A circle 1128 represents a touch or other contact type received at particular location of a contact sensing portion of the screen. The circle 1128 may include a border 1132, the thickness of which indicates a length of time that the contact is held substantially stationary at the contact location. For instance, a tap 1120 (or short press) has a thinner border 1132A than the border 1132B for a long press 1124 (or for a normal press). The long press 1124 may involve a contact that remains substantially stationary on the screen for longer time period than that of a tap 1120. As will be appreciated, differently defined gestures may be registered depending upon the length of time that the touch remains stationary prior to contact cessation or movement on the screen.

[0288] With reference to FIG. 11C, a drag gesture 1100 on the screen is an initial contact (represented by circle 1128) with contact movement 1136 in a selected direction. The initial contact 1128 may remain stationary on the screen for a certain amount of time represented by the border 1132. The drag gesture typically requires the user to contact an icon, window, or other displayed image at a first location followed by movement of the contact in a drag direction to a new second location desired for the selected displayed image. The contact movement need not be in a straight line but have any path of movement so long as the contact is substantially continuous from the first to the second locations.

[0289] With reference to FIG. 11D, a flick gesture 1104 on the screen is an initial contact (represented by circle 1128) with truncated contact movement 1136 (relative to a drag gesture) in a selected direction. A flick may have a higher exit velocity for the last movement in the gesture compared to the drag gesture. The flick gesture can, for instance, be a finger snap following initial contact. Compared to a drag gesture, a flick gesture generally does not require continual contact with the screen from the first location of a displayed image to a predetermined second location. The contacted displayed image is moved by the flick gesture in the direction of the flick gesture to the predetermined second location. Although both gestures commonly can move a displayed image from a first location to a second location, the temporal duration and distance of travel of the contact on the screen is generally less for a flick than for a drag gesture.

[0290] With reference to FIG. 11E, a pinch gesture 1108 on the screen is depicted. The pinch gesture 1108 may be initiated by a first contact 1128A to the screen by, for example, a first digit and a second contact 1128B to the screen by, for example, a second digit. The first and second contacts 1128A, 1128B may be detected by a common contact sensing portion of a common screen, by different contact sensing portions of a common screen, or by different contact sensing portions of different screens. The first contact 1128A is held for a first amount of time, as represented by the border 1132A, and the second contact 1128B is held for a second amount of time, as represented by the border 1132B. The first and second amounts of time are generally substantially the same, and the first and second contacts 1128A, 1128B generally occur substantially simultaneously. The first and second contacts 1128A, 1128B generally also include corresponding first and second contact movements 1136A, 1136B, respectively. The first and second contact movements 1136A, 1136B are generally in opposing directions. Stated another way, the first contact movement 1136A is towards the second contact 1136B, and the second contact movement 1136B is towards the first contact 1136A. More simply stated, the pinch gesture 1108 may be accomplished by a user’s digits touching the screen in a pinching motion.

[0291] With reference to FIG. 11F, a spread gesture 1110 on the screen is depicted. The spread gesture 1110 may be initiated by a first contact 1128A to the screen by, for example, a first digit, and a second contact 1128B to the screen by, for example, a second digit. The first and second contacts 1128A, 1128B may be detected by a common contact sensing portion of a common screen, by different contact sensing portions of a common screen, or by different contact sensing portions of different screens. The first contact 1128A is held for a first amount of time, as represented by the border 1132A, and the second contact 1128B is held for a second amount of time, as represented by the border 1132B. The first and second amounts of time are generally substantially the same, and the first and second contacts 1128A, 1128B generally occur substantially simultaneously. The first and second contacts 1128A, 1128B generally also include corresponding first and second contact movements 1136A, 1136B, respectively. The first and second contact movements 1136A, 1136B are generally in opposing directions. Stated another way, the first contact movement 1136A is towards the second contact 1136B, and the second contact movement 1136B is towards the first contact 1136A. More simply stated, the spread gesture 1110 may be accomplished by a user’s digits touching the screen in a spreading motion.

[0292] The above gestures may be combined in any manner, such as those shown by FIGS. 11G and 11H, to produce a determined functional result. For example, in FIG. 11G a tap gesture 1120 is combined with a drag or flick gesture 1112 in a direction away from the tap gesture 1120. In FIG. 11H, a tap gesture 1120 is combined with a drag or flick gesture 1116 in a direction towards the tap gesture 1120.
The functional result of receiving a gesture can vary depending on a number of factors, including a state of the vehicle 104, display, or screen of a device, a context associated with the gesture, or sensed location of the gesture, etc. The state of the vehicle 104 commonly refers to one or more of a configuration of the vehicle 104, a display orientation, and user and other inputs received by the vehicle 104. Context commonly refers to one or more of the particular application (s) selected by the gesture and the portion(s) of the application currently executing, whether the application is a single- or multi-screen application, and whether the application is a multi-screen application displaying one or more windows. A sensed location of the gesture commonly refers to whether the sensed set(s) of gesture location coordinates are on a touch sensitive display or a gesture capture region of a device 212, 248, whether the sensed set(s) of gesture location coordinates are associated with a common or different display, or screen, or device 212, 248, and/or what portion of the gesture capture region contains the sensed set(s) of gesture location coordinates.

A tap, when received by a touch sensitive display of a device 212, 248, can be used, for instance, to select an icon to initiate or terminate execution of a corresponding application, to maximize or minimize a window, to reorder windows in a stack, and/or to provide user input such as by keyboard display or other displayed image. A drag, when received by a touch sensitive display of a device 212, 248, can be used, for instance, to relocate an icon or window to a desired location within a display, to reorder a stack on a display, or to span both displays (such that the selected window occupies a portion of each display simultaneously). A flick, when received by a touch sensitive display of a device 212, 248 or a gesture capture region, can be used to relocate a window from a first display to a second display or to span both displays (such that the selected window occupies a portion of each display simultaneously). Unlike the drag gesture, however, the flick gesture is generally not used to move the displayed image to a specific user-selected location but to a default location that is not configurable by the user.

The pinch gesture, when received by a touch sensitive display or a gesture capture region of a device 212, 248, can be used to minimize or otherwise increase the displayed area or size of a window (typically when received entirely by a common display), to switch windows displayed at the top of the stack on each display to the top of the stack of the other display (typically when received by different displays or screens), or to display an application manager (a "pop-up window" that displays the windows in the stack). The spread gesture, when received by a touch sensitive display or a gesture capture region of a device 212, 248, can be used to maximize or otherwise decrease the displayed area or size of a window, to switch windows displayed at the top of the stack on each display to the top of the stack of the other display (typically when received by different displays or screens), or to display an application manager (typically when received by an off-screen gesture capture region on the same or different screens).

The combined gestures of FIG. 11G, when received by a common display capture region in a common display or screen of a device 212, 248, can be used to hold a first window location constant for a display receiving the gesture while reordering a second window location to include a window in the display receiving the gesture. The combined gestures of FIG. 11H, when received by different display capture regions in a common display or screen of a device 212, 248 or in different displays or screens of one more devices 212, 248, can be used to hold a first window location for a display receiving the tap part of the gesture while reordering a second window location to include a window in the display receiving the flick or drag gesture. Although specific gestures and gesture capture regions in the preceding examples have been associated with corresponding sets of functional results, it is to be appreciated that these associations can be redefined in any manner to produce differing associations between gestures and/or gesture capture regions and/or functional results.

Gestures that may be completed in three-dimensional space and not on a touch sensitive screen or gesture capture region of a device 212, 248 may be as shown in FIGS. 11I-11K. The gestures may be completed in an area where a sensor, such as an optical sensor, infrared sensor, or other type of sensor, may detect the gesture. For example, the gesture 1140 in FIG. 11I may be executed by a person when the person opens their hand 1164 and moves their hand in a back and forth direction 1148 as a gesture 1140 to complete some function with the vehicle 104. For example gesture 1140 may change the station of the radio in the vehicle 104. The sensors 242 may both determine the configuration of the hand 1164 and the vector of the movement. The vector and hand configuration can be interpreted to mean certain things to the vehicle control system 204 and produce different results.

In another example of a gesture 1152 in FIG. 11J, a user may configure their hand 1164 to extend two fingers and move the hand 1164 in an up and down operation 1156. This gesture 1152 may control the volume of the radio or some other function. For instance, this gesture 1152 may be configured to place the vehicle in a "valet" mode, among other things, restrict access to certain features associated with the vehicle. Again, the sensors 242 may determine how the person has configured their hand 1164, and the vector of the movement. In another example of a gesture 1160 shown in FIG. 11K, a user may extend their middle three fingers at an angle that is substantially 45° for vertical from straight vertical and circle the hand in a counter-clockwise motion 1166. This gesture 1160 may cause the automobile to change the heat setting or do some other function. As can be understood by one skilled in the art, the configurations of the hand and the types of movement are variable. Thus, the user may configure the hand 1164 in any way imaginable and may also move that hand 1164 in any direction with any vector in three-dimensional space.

The gestures 1140, 1152, 1160, as shown in FIGS. 11I-11K, may occur in a predetermined volume of space within the vehicle 104. For example, a sensor may be configured to identify such gestures 1140, 1152, 1160 between the front passenger's and front driver's seats over a console area within the passenger compartment of the vehicle 104. The gestures 1140, 1152, 1160 may be made within area 1 508A between zones A 512A and B 512B. However, there may be other areas 508 where a user may use certain gestures, where sensors 242 may be able to determine a certain function is desired. Gestures that may be similar but used in different areas within the vehicle 104 may cause different functions to be performed. For example, the gesture 1140 in FIG. 11I, if used in zone E 512E, may change the heat provided in zone E 512E, but may change the station of a radio if used in zone A 512A and/or zone B 512B. Further, the gestures may be made with other body parts or, for example, different expressions of a person's face and may be used to control functions in the
vehicle 104. Also, the user may use two hands in some circumstances or do other types of physical movements that can cause different reactions in the vehicle 104.

[0300] FIGS. 12A-12D show various embodiments of a data structure 1200 to store different settings. The data structure 1200 may include one or more of data files or data objects 1204, 1250, 1270, 1280. Thus, the data structure 1200 may represent different types of databases or data storage, for example, object-oriented databases, flat file data structures, relational database, or other types of data storage arrangements. Embodiments of the data structure 1200 disclosed herein may be separate, combined, and/or distributed. As indicated in FIGS. 12A-12D), there may be more or fewer portions in the data structure 1200, as represented by ellipses 1244. Further, there may be more or fewer files in the data structure 1200, as represented by ellipses 1248.

[0301] Referring to FIG. 12A, a first data structure is shown. The data file 1204 may include several portions 1208-1242 representing different types of data. Each of these types of data may be associated with a user, as shown in portion 1208.

[0302] There may be one or more user records 1240 and associated data stored within the data file 1204. As provided herein, the user can be any person that uses or rides within the vehicle or conveyance 104. The user may be identified in portion 1212. For the vehicle 104, the user may include a set of one or more features that may identify the user. These features may be the physical characteristics of the person that may be identified by facial recognition or some other type of system. In other situations, the user may provide a unique code to the vehicle control system 204 or provide some other type of data that allows the vehicle control system 204 to identify the user. The features or characteristics of the user are then stored in portion 1212.

[0303] Each user, identified in portion 1208, may have a different set of settings for each area 508 and/or each zone 512 within the vehicle 104. Thus, each set of settings may also be associated with a predetermined zone 512 or area 508. The zone 512 is stored in portion 1220, and the area 508 is stored in portion 1216.

[0304] One or more settings may be stored in portion 1224. These settings 1224 may be the configurations of different functions within the vehicle 104 that are specified by or for that user. For example, the settings 1224 may be the position of a seat, the position of a steering wheel, the position of an accelerator or brake pedals, positions of mirrors, a heating/cooling setting, a radio setting, a cruise control setting, or some other type of setting associated with the vehicle 104. Further, in vehicles adapted to have a configurable console or a configurable dash or heads-up display, the settings 1224 may also provide for how that heads-up display, dash, or console are configured for this particular user.

[0305] Each setting 1224 may be associated with a different area 508 or zone 512. Thus, there may be more settings 1224 for when the user is the driver and in zone A 512A. 512A, of area 1, 508A. However, there may be similar settings 1224 among the different zones 512 or areas 508 as shown in portion 1224. For example, the heating or radio settings for the user may be similar in every zone 512.

[0306] The sensors 242 within the vehicle 104 may be able to either obtain or track health data in portion 1228. Health data 1228 may include any type of physical characteristic associated with the user. For example, a heart rate, a blood pressure, a temperature, or other types of health data may be obtained and stored in portion 1228. The user may have this health data tracked over a period of time to allow for statistical analysis of the user’s health while operating the vehicle 104. In this way, if some function of the user’s health deviates from a norm (e.g., a baseline measurement, average measurements taken over time, and the like), the vehicle 104 may be able to determine there is a problem with the person and react to that data.

[0307] One or more gestures may be stored in portion 1232. Thus, the gestures used and described in conjunction FIG. 11A through 11K may be configurable. These gestures may be determined or created by the user and stored in portion 1132. A user may have different gestures for each zone 512 or area 508 within the vehicle. The gestures that do certain things while driving may do other things while in a different area 508 of the vehicle 104. Thus, the user may use a first set of gestures while driving and a second set while a passenger. Further, one or more users may share gestures as shown in portion 1232. Each driver may have a common set of gestures that they use in zone A 512A, 512A. Each of these gestures may be determined or captured and then stored with their characteristics (e.g., vector, position of gesture, etc.) in portion 1232.

[0308] One or more sets of safety parameters may be stored in portion 1236. Safety parameters 1236 may be common operating characteristics for this driver/passenger or for all drivers/passengers that if deviated from may determine there is a problem with the driver/passenger or the vehicle 104. For example, a certain route may be taken repeatedly and an average speed or mean speed may be determined. If the mean speed deviates by some number of standard deviations, a problem with the vehicle 104 or the user may be determined. In another example, the health characteristics or driving experience of the user may be determined. If the user drives in a certain position where their head occupies a certain portion of three-dimensional space within the vehicle 104, the vehicle control system 204 may determine that the safety parameter includes the users face or head being within this certain portion of the vehicle interior space. If the user’s head deviates from that interior space for some amount of time, the vehicle control system 204 can determine that something is wrong with the driver and change the function or operation of the vehicle 104 to assist the driver. This may happen, for example, when a user falls asleep at the wheel. If the user’s head droops and no longer occupies a certain three-dimensional space, the vehicle control system 204 can determine that the driver has fallen asleep and may take control of the operation of the vehicle 204 and the automobile controller 8104 may steer the vehicle 204 to the side of the road. In other examples, if the user’s reaction time is too slow or some other safety parameter is not nominal, the vehicle control system 204 may determine that the user is inebriated or having some other medical problem. The vehicle control system 204 may then assume control of the vehicle to ensure that the driver is safe.

[0309] Information corresponding to a user and/or a user profile may be stored in the profile information portion 1238. For example, the profile information 1238 may include data relating to at least one of current data, historical data, a user preference, user habit, user routine, observation, location data (e.g., programmed and/or requested destinations, locations of parking, routes traveled, average driving time, etc.), social media connections, contacts, brand recognition (e.g., determined via one or more sensors associated with the vehicle 104, a device 212, 248, etc.), audible recording data, text data,
email data, political affiliation, preferred retail locations/sites (e.g., physical locations, web-based locations, etc.), recent purchases, behavior associated with the aforementioned data, and the like. The data in the profile information portion 1238 may be stored in one or more of the data structures 1200 provided herein. As can be appreciated, these one or more data structures may be stored in one or more memory locations. Examples of various memory locations are described in conjunction with FIG. 2.

[0310] One or more additional data fields may be stored in the linked data portion 1242 as data and/or locations of data. The linked data 1242 may include at least one of pointers, addresses, location identification, data source information, and other information corresponding to additional data associated with the data structure 1200. Optionally, the linked data portion 1242 may refer to data stored outside of a particular data structure 1200. For example, the linked data portion 1242 may include a link/locator to the external data. Continuing this example, the link/locator may be resolved (e.g., via one or more of the methods and/or systems provided herein, etc.) to access the data stored outside of the data structure 1200. Additionally or alternatively, the linked data portion 1242 may include information configured to link the data objects 1204 to other data files or data objects 1250, 1270, 1280. For instance, the data object 1204 relating to a user may be linked to at least one of a device data object 1250, a vehicle system data object 1270, and a vehicle data object 1280, to name a few.

[0311] An embodiment of a data structure 1200 to store information associated with one or more devices is shown in FIG. 12B. The data file 1250 may include several portions 1216-1262 representing different types of data. Each of these types of data may be associated with a device, as shown in portion 1252.

[0312] There may be one or more device records 1250 and associated data stored within the data file 1250. As provided herein, the device may be any device that is associated with the vehicle 104. For example, a device may be associated with a vehicle 104 when that device is physically located within the interior space 108 of the vehicle 104. As another example, a device may be associated with a vehicle 104 when the device registers with the vehicle 104. Registration may include pairing the device with the vehicle 104 and/or one or more of the vehicle systems (e.g., as provided in FIG. 3). In some cases, the registration of a device with a vehicle 104 may be performed manually and/or automatically. An example of automatic registration may include detecting, via one or more of the vehicle systems, that a device is inside the vehicle 104. Upon detecting that the device is inside the vehicle 104, the vehicle system may identify the device and determine whether the device is or should be registered. Registration may be performed outside of a vehicle 104 via providing a unique code to the vehicle 104 and/or at least one of the vehicle systems.

[0313] The device may be identified in portion 1256. Among other things, the device identification may be based on the hardware associated with the device (e.g., Media Access Control (MAC) address, Burned-In Address (BIA), Ethernet Hardware Address (EHA), physical address, hardware address, and the like).

[0314] Optionally, a device may be associated with one or more users. For example, a tablet and/or graphical user interface (GUI) associated with the vehicle 104 may be used by multiple members of a family. For instance, the GUI may be located in a particular area 508 and/or zone 512 of the vehicle 104. Continuing this example, when a family member is located in the particular area 508 and/or zone 512, the device may include various settings, features, priorities, capabilities, and the like, based on an identification of the family member. The user may be identified in portion 1254. For the device, the user identification portion 1254 may include a set of one or more features that may identify a particular user. These features may be the physical characteristics of the person that may be identified by facial recognition, or some other type of system, associated with the device and/or the vehicle 104. Optionally, the user may provide a unique code to the device, or provide some other type of data, that allows the device to identify the user. The features or characteristics of the user are then stored in portion 1254.

[0315] Each device identified in the device identification portion 1256 may have a different set of settings for each area 508 and/or each zone 512, and/or each user of the device. Thus, each set of settings may also be associated with a predetermined zone 512, area 508, and/or user. The zone 512 is stored in portion 1220 and the area 508 is stored in portion 1216.

[0316] One or more settings may be stored in portion 1224. These settings 1224 may be similar and/or identical to those previously described. Further, the settings 1224 may also provide for how a device is configured for a particular user. Each setting 1224 may be associated with a different area 508 or zone 512. Thus, there may be more restrictive settings 1224 (e.g., restricted multimedia, texting, limited access to device functions, and the like) for the device when the user is the driver and in zone A 512A, 512A, of area 1, 508A. However, when the user is in another zone 512 or area 508, for example, where the user is not operating a vehicle 104, the settings 1224 may provide unrestricted access to one or more features of the device (e.g., allowing texting, multimedia, etc.).

[0317] Optionally, the capabilities of a device may be stored in portion 1258. Examples of device capabilities may include, but are not limited to, a communications ability (e.g., via wireless network, EDGE, 3G, 4G, LTE, wired, Bluetooth®, Near Field Communications (NFC), Infrared (IR), etc.), hardware associated with the device (e.g., cameras, gyroscopes, accelerometers, touch interface, processor, memory, display, etc.), software (e.g., installed, available, revision, release date, etc.), firmware (e.g., type, revision, etc.), operating system, system status, and the like. Optionally, the various capabilities associated with a device may be controlled by one or more of the vehicle systems provided herein. Among other things, this control allows the vehicle 104 to leverage the power and features of various devices to collect, transmit, and/or receive data.

[0318] One or more priorities may be stored in portion 1260. The priority may correspond to a value, or combination of values, configured to determine how a device interacts with the vehicle 104 and/or its various systems. The priority may be based on a location of the device (e.g., as stored in portions 1216, 1220). A default priority can be associated with each area 508 and/or zone 512 of a vehicle 104. For example, the default priority associated with a device found in zone 1 512A of area 1 508A (e.g., a vehicle operator position) may be set higher than an (or the highest of any) alternative zone 512 or area 508 of the vehicle 104. Continuing this example, the vehicle 104 may determine that, although other devices are found in the vehicle, the device, having the highest priority, controls features associated with the vehicle 104. These fea-
tures may include vehicle control features, critical and/or non-critical systems, communications, and the like. Additionally or alternatively, the priority may be based on a particular user associated with the device. Optionally, the priority may be used to determine which device will control a particular signal in the event of a conflict.

[0319] Registration data may be stored in portion 1262. As described above, when a particular device registers with a vehicle 104, data related to the registration may be stored in the registration data portion 1262. Such data may include, but is not limited to, registration information, registration codes, initial registration time, expiration of registration, registration timers, and the like. Optionally, one or more systems of the vehicle 104 may refer to the registration data portion 1262 to determine whether a device has been previously registered with the vehicle 104. As shown in FIG. 12B, User 4 of Device 2 has not been registered. In this case, the registration data field 1262, for this user, may be empty, contain a null value, or other information/indication that there is no current registration information associated with the user.

[0320] Additionally or alternatively, the data structure 1200 may include a profile information portion 1238 and/or a linked data portion 1242. Although the profile information portion 1238 and/or the linked data portion 1242 may include different information from that described above, it should be appreciated that the portions 1238, 1242 may be similar, or identical, to those as previously disclosed.

[0321] An embodiment of a data structure 1200 to store information associated with one or more vehicle systems is shown in FIG. 12C. The data file 1270 may include several portions 1216-1279 representing different types of data. Each of these types of data may be associated with a vehicle system, as shown in portion 1272.

[0322] There may be one or more system records 1270 and associated data stored within the data file 1270. As provided herein, the vehicle systems may be any system and/or subsystem that is associated with the vehicle 104. Examples of various systems are described in conjunction with FIG. 3 and other related figures (e.g., systems 324-352, etc.). One example of a system associated with the vehicle 104 is the vehicle control system 204. Other systems may include communications subsystems 344, vehicle subsystems 328, and media subsystems 348, to name a few. It should be appreciated that the various systems may be associated with the interior space 108 and/or the exterior of the vehicle 104.

[0323] Each system may include one or more components. The components may be identified in portion 1274. Identification of the one or more components may be based on hardware associated with the component. This identification may include hardware addresses similar to those described in conjunction with the devices of FIG. 12B. Additionally or alternatively, a component can be identified by one or more signals sent via the component. Such signals may include an Internet Protocol (IP), or similar, address as part of the signal. Optionally, the signal may identify the component sending the signal via one or more of a header, a footer, a payload, and/or an identifier associated with the signal (e.g., a packet of a signal, etc.).

[0324] Each system and/or component may include priority type information in portion 1276. Among other things, the priority type information stored in portion 1276 may be used by the various methods and systems provided herein to differentiate between critical and non-critical systems. Non-limiting examples of critical systems may correspond to those systems used to control the vehicle 104, such as, steering control, engine control, throttle control, braking control, and/or navigation informational control (e.g., speed measurement, fuel measurement, etc.). Non-critical systems may include other systems that are not directly related to the control of the vehicle 104. By way of example, non-critical systems may include media presentation, wireless communications, comfort settings systems (e.g., climate control, seat position, seat warmers, etc.), and the like. Although examples of critical and/or non-critical systems are provided above, it should be appreciated that the priority type of a system may change (e.g., from critical to non-critical, from non-critical to critical, etc.) depending on the scenario. For instance, although the interior climate control system may be classified as a non-critical system at a first point in time, it may be subsequently classified as a critical system when a temperature inside/outside of the vehicle 104 is measured at a dangerous level (e.g., sub-zero Fahrenheit, greater than 90-degrees Fahrenheit, etc.). As such, the priority type may be associated with temperature conditions, air quality, times of the day, condition of the vehicle 104, and the like.

[0325] Each system may be associated with a particular area 508 and/or zone 512 of a vehicle 104. Among other things, the location of a system may be used to assess a state of the system and/or provide how the system interacts with one or more users of the vehicle 104. As can be appreciated each system may have a different set of settings for each area 508 and/or each zone 512 and/or each user of the system. Thus, each set of settings may also be associated with a predetermined zone 512, area 508, system, and/or user. The zone 512 is stored in portion 1220 and the area 508 is stored in portion 1216.

[0326] One or more settings may be stored in portion 1224. These settings 1224 may be similar and/or identical to those previously described. Further, the settings 1224 may also provide for how a system is configured for a particular user. Each setting 1224 may be associated with a different area 508 or zone 512. For instance, a climate control system may be associated with more than one area 508 and/or zone 512. As such, a first user seated in zone 1 512A of area 1 508A may store settings related to the climate control of that zone 512A that are different from other users and/or zones 512 of the vehicle 104. Optionally, the settings may not be dependent on a user. For instance, specific areas 508 and/or zones 512 of a vehicle 104 may include different, default, or the same settings based on the information stored in portion 1224.

[0327] The various systems and/or components may be able to obtain or track health status data of the systems and/or components in portion 1278. The health status 1278 may include any type of information related to a state of the system. For instance, an operational condition, manufacturing date, update status, revision information, time in operation, fault status, state of damage detected, inaccurate data reporting, and other types of component/system health status data may be obtained and stored in portion 1278.

[0328] Each component and/or system may be configured to communicate with users, systems, servers, vehicles, third parties, and/or other endpoints via one or more communication type. At least one communication ability and/or type associated with a system may be stored in the communication type portion 1279. Optionally, the communication types contained in this portion 1279 may be ordered in a preferential order of communication types. For instance, a system may be configured to preferably communicate via a wired communi-
cation protocol over one or more wired communication channels (e.g., due to information transfer speeds, reliability, and the like). However, in this instance, if the one or more wired communication channels fail, the system may transfer information via an alternative communication protocol and channel (e.g., a wireless communication protocol and wireless communication channel, etc.). Among other things, the methods and systems provided herein may take advantage of the information stored in the communication type portion 1279 to open available communication channels in the event of a communication channel failure, listen on other ports for information transmitted from the systems, provide a reliability rating based on the number of redundant communication types for each component, and more. Optionally, a component or system may be restricted from communicating via a particular communication type (e.g., based on rules, traffic, critical/non-critical priority type, and the like). In this example, the component or system may be forced by the vehicle control system 204 to use an alternate communication type where available, cease communications, or store communications for later transfer.

[0329] Alternatively or alternatively, the data structure 1200 may include a profile information portion 1238 and/or a linked data portion 1242. Although the profile information portion 1238 and/or the linked data portion 1242 may include different information from that described above, it should be appreciated that the portions 1238, 1242 may be similar, or identical, to those as previously disclosed.

[0330] Referring now to FIG. 12D, a data structure 1200 is shown optionally. The data file 1280 may include several portions 1216-1286 representing different types of data. Each of these types of data may be associated with a vehicle, as shown in portion 1282.

[0331] There may be one or more vehicle records 1280 and associated data stored within the data file 1282. As provided herein, the vehicle 104 can be any vehicle or conveyance 104 as provided herein. The vehicle 104 may be identified in portion 1282. Additionally or alternatively, the vehicle 104 may be identified by one or more systems and/or subsystems. The various systems of a vehicle 104 may be identified in portion 1284. For example, various features or characteristics of the vehicle 104 and/or its systems may be stored in portion 1284. Optionally, the vehicle 104 may be identified via a unique code or some other type of data that allows the vehicle 104 to be identified.

[0332] Each system may be associated with a particular area 508 and/or zone 512 of a vehicle 104. Among other things, the location of a system may be used to assess a state of the system and/or provide how the system interacts with one or more users of the vehicle 104. As can be appreciated each system may have a different set of settings for each area 508 and/or each zone 512, and/or each user of the system. Thus, each set of settings may also be associated with a predetermined zone 512, area 508, system, and/or user. The zone 512 is stored in portion 1220 and the area 508 is stored in portion 1216.

[0333] One or more settings may be stored in portion 1224. These settings 1224 may be similar and/or identical to those previously described. Further, the settings 1224 may also provide for how a vehicle and/or its systems are configured for one or more users. Each setting 1224 may be associated with a different area 508 or zone 512. Optionally, the settings may not be dependent on a particular user. For instance, specific areas 508 and/or zones 512 of a vehicle 104 may include different, default, or the same settings based on the information stored in portion 1224.

[0334] The various systems and/or components may be able to obtain or track health status data of the systems and/or components in portion 1278. The health status 1278 may include any type of information related to a state of the systems. For instance, if an operational condition, manufacturing date, update status, revision information, time in operation, fault status, state of damage detected, inaccurate data reporting, and other types of component/system health status data may be obtained and stored in portion 1278.

[0335] One or more warnings may be stored in portion 1286. The warnings data 1286 may include warning generated by the vehicle 104, systems of the vehicle 104, manufacturer of the vehicle, federal agency, third party, and/or a user associated with the vehicle. For example, several components of the vehicle may provide health status information (e.g., stored in portion 1278) that, when considered together, may suggest that the vehicle 104 has suffered some type of damage and/or failure. Recognition of this damage and/or failure may be stored in the warnings data portion 1286. The data in portion 1286 may be communicated to one or more parties (e.g., a manufacturer, maintenance facility, user, etc.). In another example, a manufacturer may issue a recall notice for a specific vehicle 104, system of a vehicle 104, and/or a component of a vehicle 104. It is anticipated that the recall notification may be stored in the warning data field 1286. Continuing this example, the recall notification may then be communicated to the user of the vehicle 104 notifying the user of the recall issued by the manufacturer.

[0336] Alternatively or alternatively, the data structure 1200 may include a profile information portion 1238 and/or a linked data portion 1242. Although the profile information portion 1238 and/or the linked data portion 1242 may include different information from that described above, it should be appreciated that the portions 1238, 1242 may be similar, or identical, to those as previously disclosed.

[0337] An embodiment of a method 1300 for storing settings for a user 216 associated with vehicle 104 is shown in FIG. 13. While a general order for the steps of the method 1300 is shown in FIG. 13, the method 1300 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 13. Generally, the method 1300 starts with a start operation 1304 and ends with an end operation 1336. The method 1300 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer-readable medium. Hereinafter, the method 1300 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-12.

[0338] A person may enter the vehicle space 108. One or more sensors 242 may then identify that a person is sitting within the vehicle 104, in step 1308. For example, sensors 242 in a seat, may determine that some new amount of weight has been registered. The amount of weight may fall within predetermined parameters (e.g., over a threshold, in a specific range, etc.). This weight may then be determined to be a person by one or more optical or other sensors 242. The vehicle control system 204 may then determine that a person is in a certain zone 512 or area 508. For example, the sensors 242 may send signals to the vehicle control system 204 that an event has occurred. This information may be sent to the vehicle control system processor 204 to determine the zone
and area 508 where the event occurred. Further, the vehicle control system 204 may then identify the person, in step 1312.

[0339] The vehicle control system 204 can receive the information from the sensors 242 and use that information to search the database 1200 that may be stored within the system data 208. The sensor data may be compared to ID characteristics 1212 to determine if the person has already been identified. The vehicle control system 204 may also send the characteristic data from the sensors to the communication network 224 to a server 228 to compare the sensor data to stored data 232 that may be stored in a cloud system. The person’s features can be compared to stored features 1212 to determine if the person in the vehicle 104 can be identified.

[0340] If the person has been identified previously and their characteristics stored in portion 1212, the method 1300 proceeds YES to step 1316 where that person may be identified. In identifying a person, the information associated with that person 1240 may be retrieved and provided to the vehicle control system 204 for further action. If a person cannot be identified by finding their sensor characteristics in portion 1212, the method 1300 proceeds NO to step 1320. In step 1320, the vehicle control system 204, using an application, may create a new record in table 1200 for the user. This new record may store a user identifier and their characteristics 1212. It may also store the area 508 and zone 512 in data portions 1216 and 1220. The new record may then be capable of receiving new settings data for this particular user. In this way, the vehicle 104 can automatically identify or characterize a person so that settings may be established for the person in the vehicle 104.

[0341] The input module 312 may then determine if settings are to be stored, in step 1324. Settings might be any configuration of the vehicle 104 that may be associated with the user. The determination may be made after receiving a user input from the user. For example, the user may make a selection on a touch sensitive display indicating that settings currently made are to be stored. In other situations, a period of time may elapse after the user has made a configuration. After determining that the user is finished making changes to the settings, based on the length of the period of time since the settings were established, the vehicle control system 204 can save the setting. Thus, the vehicle control system 204 can make settings automatically based on reaching a steady state for settings for user.

[0342] The vehicle control system 204 may then store the settings for the person, in step 1328. The user interaction subsystem 332 can make a new entry for the user 1208 in data structure 1204. The new entry may be either a new user or a new settings listed in 1224. The settings may be stored based on the area 508 and zone 512. As explained previously, the settings can be any kind of configuration of the vehicle 104 that may be associated with the user in that area 508 and the zone 512.

[0343] The settings may also be stored in cloud storage, in step 1332. Thus, the vehicle control system 204 can send the new settings to the server 228 to be stored in storage 232. In this way, these new settings may be ported to other vehicles for the user. Further, the settings in storage system 232 may be retrieved, if local storage does not include the settings in storage system 208.

[0344] Additionally or alternatively, the settings may be stored in profile data 252. As provided herein, the profile data 252 may be associated with one or more devices 212, 248, servers 228, vehicle control systems 204, and the like. Optionally, the settings in profile data 252 may be retrieved in response to conditions. For instance, the settings may be retrieved from at least one source having the profile data if local storage does not include the settings in storage system 208. As another example, a user 216 may wish to transfer settings stored in profile data 252 to the system data 208. In any event, the retrieval and transfer of settings may be performed automatically via one or more devices 204, 212, 248, associated with the vehicle 104.

[0345] An embodiment of a method 1400 to configure the vehicle 104 based on stored settings is shown in FIG. 14. A general order for the steps of the method 1400 is shown in FIG. 14. Generally, the method 1400 starts with a start operation 1404 and ends with an end operation 1428. The method 1400 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 14. The method 1400 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 1400 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-13.

[0346] The vehicle control system 204 can determine if a person is in a zone 512 or area 508, in step 1408. This determination may be made by receiving data from one or more sensors 242. The vehicle 104 can use facial recognition, weight sensors, heat sensors, or other sensors to determine whether a person is occupying a certain zone 512.

[0347] Using the information from the sensors 242, the vehicle control system 204 can identify the person, in step 1412. The vehicle control system 204 can obtain characteristics for the user currently occupying the zone 512 and compare those characteristics to the identifying features in portion 1212 of data structure 1204. Thus, the settings in portion 1224 may be retrieved by identifying the correct zone 512, area 508, and characteristics for the user.

[0348] The vehicle control system 204 can first determine if there are settings associated with the identified person for that zone 512 and/or area 508, in step 1416. After identifying the user by matching characteristics with the features in portion 1212, the vehicle control system 204 can determine if there are settings for the user for the area 1216 and zone 1220 the user currently occupies. If there are settings, then the vehicle control system 204 can make the determination that there are settings in portion 1224, and the vehicle control system 204 may then read and retrieve those settings, in step 1420. The settings may be then used to configure or react to the presence of the user, in step 1424. Thus, these settings may be obtained to change the configuration of the vehicle 104, for example, how the position of the seats or mirrors are set, how the dash, console, or heads up display is configured, how the heat or cooling is configured, how the radio is configured, or how other different configurations are made.

[0349] Embodiments of a method 1500 for storing settings in cloud storage are shown in FIG. 15. A general order for the steps of the method 1500 is shown in FIG. 15. Generally, the method 1500 starts with a start operation 1504 and ends with an end operation 1540. The method 1500 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 15. The method 1500 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 1500
shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-14.

[0350] The vehicle control system 204 can determine if a person is in a zone 512 or area 508, in step 1508. As explained previously, the vehicle control system 204 can receive vehicle sensor data from vehicle sensors 242 that show a person has occupied a zone 512 or an area 508 of the vehicle 104. Using the vehicle sensor data, the vehicle control system 204 can determine characteristics of the person, in step 1512. These characteristics are compared to the features in portion 1212 of the data structure 1204. From this comparison, the vehicle control system 204 can determine if the person is identified within the data structure 1204, in step 1516. If there is a comparison and the person can be identified, the method 1500 proceeds YES to step 1520. However, if the person cannot be identified, the method 1500 proceeds NO, to step 1524.

[0351] In step 1520, the person is identified in portion 1208 by the successful comparison of the characteristics and the features. It should be noted that there may be a degree of variability between the characteristics and the features in portion 1212. Thus, the comparison may not be an exact comparison but may use methods known in the art to make a statistically significant comparison between the characteristics received from the sensors 242 and the features stored in portion 1212. In step 1524, the characteristics received from sensors 242 are used to characterize the person. In this way, the received characteristics may be used as an ID, in portion 1212, for a new entry for a new user in portion 1208.

[0352] The user may make one or more settings for the vehicle 104. The vehicle control system 204 may determine if the settings are to be stored, in step 1528. If the settings are to be stored, the method 1500 proceeds YES to step 1536. If the settings are not to be stored or if there are no settings to be stored, the method 1500 proceeds NO to step 1532. In step 1532, the vehicle control system 204 can retrieve the settings in the portion 1224 of the data structure 1204. Retrieval of the settings may be as described in conjunction with FIG. 14. If settings are to be stored, the vehicle control system 204 can send those settings to server 228 to be stored in data storage 232, in step 1536. Data storage 232 acts as cloud storage that can be used to retrieve information on the settings from other vehicles or from other sources. Thus, the cloud storage 232 allows for persistent and more robust storage of user preferences for the settings of the vehicle 104.

[0353] An embodiment of a method 1600 for storing gestures associated with the user is shown in FIG. 16. A general order for the steps of the method 1600 is shown in FIG. 16. Generally, the method 1600 starts with a start operation 1604 and ends with an end operation 1640. The method 1600 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 16. The method 1600 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 1600 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-15.

[0354] Vehicle control system 204 may receive sensor data from sensors 242 to determine a person is occupying a zone 512 in an area 508 of the vehicle 104, in step 1608. The sensor data may provide characteristics for the person, in step 1612. The vehicle control system 204 may then use the characteristics to determine if the person can be identified, in step 1616.

The vehicle control system 204 may compare the characteristics to the features in portion 1212 for the people having been recognized and having data associated therewith. If a comparison is made between the characteristics and the features in portion 1212, the person can be identified, and the method 1600 proceeds YES to step 1620. If there is no comparison, the method 1600 may proceed NO to step 1624. In step 1620, the person may be identified by the vehicle control system 204. Thus, the person's features and associated data record 1240 may be determined and the user identified in portion 1208. If the person is not identified, the vehicle control system 204 can characterize the person in step 1624 by establishing a new record in data structure 1204 using the characteristics, received from the sensors 242, for the features in portion 1212.

[0355] Thereinafter, the vehicle control system 204 may determine if gestures are to be stored and associated with the user, in step 1628. The vehicle control system 204 may receive user input on a touch sensitive display or some other type of gesture capture region which acknowledges that the user wishes to store one or more gestures. Thus, the user may create their own gestures such as those described in conjunction with FIGS. 11A-11K. These gestures may then be characterized and stored in data structure 1204. If there are gestures to be stored, the method 1600 proceeds YES to step 1636. If gestures are not to be stored the method 1600 may proceed NO to step 1632.

[0356] In step 1632, the vehicle control system 204 can retrieve current gestures from portion 1232, which are associated with user 1240. These gestures may be used then to configure how the vehicle 104 will react if a gesture is received. If gestures are to be stored, the vehicle control system 204 may store characteristics, in step 1636, as received from sensor 242 or from one more user interface inputs. These characteristics may then be used to create the stored gestures 1232, in data structure 1204. The characteristics may include what the gesture looks like or appears and also what affect the gesture should have. This information may then be used to change the configuration or operation of the vehicle 104 based on the gesture if it is received at a later time.

[0357] An embodiment of a method 1700 for receiving a gesture and configuring the vehicle 104 based on the gesture may be as provided in FIG. 17. A general order for the steps of the method 1700 is shown in FIG. 17. Generally, the method 1700 starts with a start operation 1704 and ends with an end operation 1728. The method 1700 may include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 17. The method 1700 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 1700 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-16.

[0358] A vehicle control system 204 can receive sensor data from vehicle sensors 242. The vehicle sensor data can be used by the vehicle control system 204 to determine that a person is in a zone 512 or area 508, in step 1708. The vehicle sensor data may then be used to compare against feature characteristics 1212 to identify a person, in step 1712. The vehicle control system 204 thereinafter may receive a gesture, in step 1716. The gesture may be perceived by vehicle sensors 242 or received in a gesture capture region. The gesture may
be as described in conjunction with FIGS. 11A-11K. Upon receiving the gesture, the vehicle control system 204 can compare the gesture to gesture characteristics in portion 1232, in step 1720. The comparison may be made so that a statistically significant correlation between the sensor data or gesture data and the gesture characteristic 1232 is made. Upon identifying the gesture, the vehicle control system 204 can configure the vehicle 104 and/or react to the gesture, in step 1724. The configuration or reaction to the gesture may be as prescribed in the gesture characteristic 1232.

[0359] An embodiment of a method 1800 for storing health data may be as shown in FIG. 18. A general order for the steps of the method 1800 is shown in FIG. 18. Generally, the method 1800 starts with a start operation 1804 and ends with an end operation 1844. The method 1800 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 18. The method 1800 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 1800 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-17.

[0360] Vehicle control system 204 can receive sensor data from sensors 242. The sensor data may be used to determine that a person is in a zone 512 or area 508, in step 1808. The sensor data may then be used to determine characteristics of the person, in step 1812. From the characteristics, the vehicle control system 204 can determine if a person may be identified in data structure 1204, in step 1816. If it is determined that the person can be identified in step 1816, the method 1800 proceeds YES to step 1820. If the person cannot be identified, the method 1800 proceeds NO to step 1824. A person may be identified by matching the characteristics of a person from the sensor data to the features shown in portion 1212. If these comparisons are statistically significant, the person may be identified in portion 1208, in step 1820. However, if the person is not identified in portion 1208, the vehicle control system 204 can characterize the person using the vehicle sensor data, in step 1824. In this way, the vehicle control system 204 can create a new record for a new user in data structure 1204.

[0361] Hereinafter, the vehicle control system 204 may receive health and/or safety data from the vehicle sensors 242, in step 1828. The vehicle control system 204 can determine if the health or safety data is to be stored, in step 1832. The determination is made as to whether or not there is sufficient health data or safety parameters, in portion 1228 and 1236, to provide a reasonable baseline data pattern for the user 1240. If there is data to be received and stored, the vehicle control system 204 can store the data for the person in portions 1228 and 1236 of the data structure 1204, in step 1832.

[0362] The vehicle control system 204 may then wait a period of time, in step 1836. The period of time may be any amount of time from seconds to minutes to days. Thereinafter, the vehicle control system 204 can receive new data from vehicle sensors 242, in step 1828. Thus, the vehicle control system 204 can receive data periodically and update or continue to refine the health data and safety parameters in data structure 1204. Hereinafter, the vehicle control system 204 may optionally store the health and safety data in cloud storage 232 by sending it through the communication network 224 to the server 228, in step 1840.

[0363] An embodiment of a method 1900 for monitoring the health of a user may be as shown in FIG. 19. A general order for the steps of the method 1900 is shown in FIG. 19. Generally, the method 1900 starts with a start operation 1904 and ends with an end operation 1928. The method 1900 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 19. The method 1900 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 1900 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-18.

[0364] The vehicle control system 204 can receive health data from sensors 242. The health data may be received in step 1908. The vehicle control system 204 may then compare the received health data to stored health parameters in portion 1228 or portion 1236, in step 1912. The comparison may check if there is statistically significant separation or disagreement between the received health data and the stored health data. Thus, the vehicle control system 204 can make a health comparison of the user based on a baseline of health data previously stored. A statistically significant comparison may include determining if there are any parameters more than three standard deviations from the average or norm, any parameter that is increasing or decreasing over a period of eight different measurements, a measurement that is more than two standard deviations from the norm more than three measurements consecutively, or other types of statistical comparisons.

[0365] If the vehicle control system 204 determines that measured health parameter does deviate from the norm, the vehicle control system 204 can determine whether the health data is within acceptable limits, in step 1916. If the health data is within acceptable limits, the method 1900 proceeds YES back to receiving new health data, in step 1908. In this way, the health data is periodically or continually monitored to ensure that the driver is in a healthy state and able to operate the vehicle. If the health data is not within acceptable parameters, the method 1900 may proceed NO to step 1924 where the vehicle control system 204 may react to the change in the health data. The reaction may include any measure to provide for the safety of the user, such as stopping the vehicle, beginning to drive the vehicle, driving the vehicle to a new location, such as a hospital, waking the driver with an alarm or other noise, or performing some other function that may help maintain the health or safety of the user.

[0366] The health data received may be a reaction from the driver. For example, the driver may call for help or ask the vehicle for assistance. For example, the driver or passenger may say that they are having a medical emergency and ask the car to perform some function to help. The function to help may include driving the person to a hospital or stopping the car and calling for emergency assistance.

[0367] FIG. 20 is a block diagram of an embodiment of a personality subsystem 2000 for a vehicle 104. The personality subsystem 2000 may include a personality module 2004, a personality matching module 2008, a personality data memory 2028, and a memory 2032. The subsystems, modules, components, etc. 2004-2028 may communicate over a network or bus 356. This communication bus 356 may be bidirectional and perform data communications using any known or future-developed standard or protocol. An example of the communication bus 356 may be as described in con-
juncture with FIG. 4. As one example of the communication, the personality module 2004 and/or the personality matching module 2008, aside from communicating with each other, may communicate with profile data 252, vehicle sensors 242, and/or non-vehicle sensors via the communication bus 356.

[0368] The personality module 2004 may be configured to present a virtual personality to a user 216 associated with a vehicle 104 via one or more displays, screens, speakers, and/or devices, associated with the vehicle 104. As can be appreciated, the virtual personality may be presented to a user 216 in at least one of an audible, visual, and tactile form. The personality module 2004 may be configured to interact with one or more users 216 of a vehicle 104. In some cases, input may be received and interpreted by the personality module 2004. Input corresponding to personality information may be stored in the personality data memory 2028 and/or memory 2032. Additionally or alternatively, virtual personalities created by the personality module 2004 may be stored in the personality data memory 2028. As can be appreciated, the stored virtual personalities may be retrieved from at least one personality module 2004 for presentation to a user 216.

[0369] The personality matching module 2008 may include a matching engine 2012 and rules 2016 for matching a virtual personality with a personality of a user 216. The rules can include behavior rules 2020 and preferences 2024. Among other things, behavior rules 2020 may be used by the matching engine 2012 to interpret a user’s 216 behavior observed via the vehicle and/or non-vehicle sensors 242, 236. Behavior rules 2020 may include instructions on detecting a context associated with a behavior of the user 216. For instance, the context may correspond to an emotional state of the user 216. Preferences 2024 can be associated with a user 216 and may include data relating to one or more of preferred virtual personalities, the presentation of a virtual personality, timing associated with the presentation of a virtual personality, permissions and access to information, and the like.

[0370] The personality matching module 2008 may communicate with a user profile stored in profile data memory 252. The user profile may have a corresponding user interface or personality defined or configured by the user 216. In some embodiments, the virtual personality can be an animated character that follows the user from vehicle-to-vehicle and/or from communication device-to-communication device. In other words, the virtual personality may include at least one of artificial intelligence, virtual traits, voice, tone, behavior, and predictive behavior based on a defined personality. In some embodiments, this virtual personality may be refined and/or modified over time to match a personality of a user 216. Suiting the personality of the user 216 may include matching a personality to the user 216 based on a context associated with the personality of the user 216. This matching may include providing a personality that mirrors and/or tempers the personality of the user 216. For example, in the case where a user 216 is determined to have an impulsive personality, the virtual personality may be configured to present a more rational virtual personality (e.g., providing more non-impulsive, or rational, responses, etc.). As can be appreciated, if the user 216 is determined to have an analytical personality, the virtual personality may be configured to provide impulsive responses and behavioral output. Additionally or alternatively, the virtual personality may be configured to match a personality to what a user 216 desires by monitoring input made by a user 216 (e.g., voice commands, content, context, etc.). In some cases, a user 216 may wish to interface with a virtual personality that is identical to the personality of the user 216. This desire may be determined by the one or more vehicle sensors recording user responses, interactions with a virtual personality, spoken tone, and/or context to refine the virtual personality to meet the preferences of the user 216. Additionally or alternatively, the profile matching module 2008 may refer to preferences 2024 to determine the virtual personality desired by the user 216. The profile matching module 2008 may refer to a personality data memory 2028 for stored virtual personalities (e.g., standard virtual personalities, user-defined virtual personalities, etc.). In some cases, the profile matching module 2008 may refer to a user profile associated with a user 216 (e.g., stored in a profile data memory 252, etc.).

[0371] As provided herein, a user profile may be created, modified, stored, copied, transferred, and/or transported. Additionally, the user profile can be accessed by one or more devices. In some cases, the user profile may be copied from one user to another user, transferred from one memory to another memory, and/or transported from one vehicle to another vehicle, to name a few. A user profile can be stored in a memory associated with a user and may include one or more data records. For example, the user profile may be stored in at least one data file or data object of a data structure 1200 as previously described in conjunction with FIGS. 12A-12D.

[0372] User profiles can be compiled and/or modified based on a number of factors and/or input received by one or more sensors (e.g., vehicle sensors 242, non-vehicle sensors 236, etc.). In some embodiments, these sensors can be associated with a user 216, a user device 212, and/or a vehicle 104. The sensors may include at least one of environmental sensors 708, user interface sensors 712, associated device sensors 720, and the like. In one example, the associated device sensors 720 can include any sensors of a mobile device (e.g., a smart phone, tablet, mobile computer, etc.) that is connected, either wired or wirelessly, to a vehicle 104 and/or vehicle control system 204.

[0373] Information received by the one or more sensors may include inquiries made and/or input provided by a user (e.g., web browsing history, stored data cookies, voice commands, gesture input, intelligent personal assistant history, knowledge navigator, etc.), geographic location data (e.g., satellite positioning system, Wi-Fi hotspot, cell tower data, indoor positioning system, etc.) associated with a user 216 and/or a vehicle 104, and the like. In some cases, the information may be evaluated to determine whether the received information qualifies as user profile data. This evaluation may include referring to rules stored in a memory and/or comparing terms in the received information to a list of key terms associated with user profile data.

[0374] An embodiment of a method 2100 for presenting a virtual personality to a user 216 of a vehicle 104 is shown in FIG. 21. A general order for the steps of the method 2100 is shown in FIG. 21. Generally, the method 2100 starts with a start operation 2104 and ends with an end operation 2132. The method 2100 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 21. The method 2100 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. One example of the computer readable medium may include, but is not limited to, the memory 2032 described in conjunction with the personality subsystem 2000 of FIG. 20. Hereinafter, the method 2100 shall be explained with reference to the
systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-20.

[0375] The method 2100 begins at step 2104 and proceeds when a user 216 is detected (step 2108). This detection and/or identification may be based on information received from the user 216. For example, a user 216 may be recognized based on information detected by at least one image sensor, such as the camera sensors 760 of a vehicle 104. Where a user 216 is recognized, a user profile associated with the user 216 can be accessed and/or modified.

[0376] In some embodiments, the detection step of the method 2100 may include an identification of the user 216. This identification may be based on a facial recognition of the user 216. For instance, the user identification module 822 may collect facial recognition information from a user 216 associated with the vehicle 104. Facial recognition information may be collected from one or more of sites, sources, cameras 878, user profile data 252, vehicle user 216 data, vehicle passenger data, and/or other sensors. The collection of facial recognition information may include recording information via one or more sensors (e.g., vehicle sensors 242, non-vehicle sensors 236, etc.). These one or more sensors may be associated with a vehicle 104. In one example, the one or more sensors may include at least one image sensor, such as a camera 878. Continuing this example, the cameras 878 may be positioned inside and/or outside of a vehicle 104. As can be appreciated, facial recognition information can be collected from one or more users 216 inside the vehicle 104 and/or from one or more users 216 outside the vehicle 104.

[0377] Facial recognition information may include facial features, and information about facial features, that can identify a user 216. For instance, the facial features can include measurement information that defines a position and/or arrangement of the facial features. In some cases, one or more sensors may be used to determine a measurement between at least one of the facial features of a user 216. Typical facial features can include, but are not limited to, at least one eye, eyebrow, nose, nostril, cavity, socket, tooth, bone, mouth, lip, chin, ear, hairline, forehead, facial hair, mole, birthmark, scar, and/or other distinguishing mark associated with the face of a user 216. The collected facial recognition information can be stored in a memory and may include pointers to a memory. These pointers can be stored in one or more other memory locations.

[0378] The recognition of facial features may include comparing identified facial features associated with a user 216 with one or more identification characteristics stored in a memory. The one or more identification characteristics can be stored in a memory of a social networking site, facial recognition data memory, profile data memory 252 and/or other memory location. When the at least some of the identified facial features match at least one identification characteristic stored in the memory, a successful match, or facial recognition, may be determined. The more identified facial features that match the identification characteristics, the more successful the facial recognition. In other words, the facial recognition may be associated with a confidence level, or accuracy rating. This rating may be based on the number of features that are determined to match.

[0379] In the event that a user 216 is detected, the method 2100 continues by determining whether a user profile associated with the detected user 216 is available and/or accessible (step 2112). This determination may be based on a positive (e.g., matching) facial recognition of the user 216 during the detection step. Where a user 216 is identified, the personality module 2004 may communicate with the profile data memory 252 to access a user profile associated with the identified user 216. In some cases, a user 216 may not be identified, and as such, the user profile associated with that user 216 cannot be retrieved or accessed from memory.

[0380] Next, the method 2100 may continue by determining whether any virtual personality information is stored in the accessed user profile (step 2116). The virtual personality information may include, but is not limited to, at least one of a virtual personality, a personality type of the user, personality preferences, and virtual personality presentation information. The virtual personality may include one or more of an avatar, a voice output, a visual output, a tone, and a volume intensity. If the user profile includes a virtual personality, the personality module 2004 may retrieve and/or access the virtual personality from the user profile for use in the vehicle 104.

[0381] Once the virtual personality is retrieved, and/or accessed, the virtual personality may be presented to the user 216. In some cases, presenting the virtual personality to a user 216 may include altering one or more features of the vehicle 104. For instance, one or more features of the vehicle 104 may be altered to change a mood associated with the virtual personality. Continuing this example, the personality module 2004 may communicate with the vehicle control system 204 to change an internal lighting, an infotainment setting, a temperature, an oxygen level, an air composition, a comfort setting, a seat position, a transmission setting (e.g., automatic to manual, paddle shifting, and more), a navigation output, etc., and/or combinations thereof. In presenting the virtual personality the method 2100 may include interacting with the user 216. One example of interaction may include asking the user 216 questions. Another example may include providing comments to the user 216. The user 216 may respond to the questions and/or comments by providing visual, audible, and/or touch input responses. The personality module 2004 can respond to the user 216 based on a tone, context, and/or volume associated with the user 216 responses.

[0382] In the event that no virtual personality is associated with the user profile in step 2116, the method 2100 may continue by generating a virtual personality to suit the user 216 (step 2136). The virtual personality may be generated by the personality module 2004 in conjunction with the personality matching module 2008. For example, the personality matching module 2008 may receive user input via a user profile associated with the user 216, voice input, visual input, tactile input, manual input, etc., and/or combinations thereof. Continuing this example, the matching engine 2012 may determine a virtual personality that suits the user input received. In some cases, suit the virtual personality to a user 216 may be based at least partially on rules 2016. If it is determined from the user input that the user 216 is agitated (e.g., angry, frustrated, annoyed, has little patience, is shouting, making fast sharp gestures, frowning, etc.), the matching engine 2012 may determine that a virtual personality should be generated to reduce the user's 216 agitation (e.g., the virtual personality may be generated as an opposite personality to that determined with the user 216). Additionally or alternatively, if it is determined (e.g., via the personality matching module 2008, etc.) from the user input that the user 216 is happy (e.g., whistle, singing, smiling, waving, is talking softly, etc.), the matching engine 2012 may determine
that the virtual personality should be generated to match the user’s happiness. In any event, the virtual personality is generated by the personality module 2004 in communication with the personality matching module 2008. The method 2100 can then present the generated virtual personality in step 2124, as previously described.

[0383] If no user profile is associated with the user 216 in step 2112, or if the user profile cannot be accessed, the method 2100 may continue by providing a standard virtual personality to the user (step 2140). In some embodiments, while the standard virtual personality is provided to a user 216, and as profile data is collected, the standard virtual personality may be refined to suit the user 216. The standard virtual personality may include a virtual personality stored in a memory (e.g., personality data memory 2028, memory 2032, etc.). This standard virtual personality can be created by at least one of a user 216, company, group, institution, personality module 2004, etc. The method 2100 may continue to present the personality at step 2124 or proceed at step 2144.

[0384] The method 2100 continues by collecting profile data associated with the user 216 (step 2144). In some embodiments, collecting profile data may include determining whether any of the information received qualifies as user profile data. In one embodiment, this determination may be made by the profile identification module 848. For instance, the profile identification module 848 may refer to rules stored in a memory to determine whether a match exists between at least some of the received information and matching information corresponding to user profile and/or virtual personality data. Matching information may include keywords, key terms, input types, context-sensitive data, match indicators, etc., and combinations thereof.

[0385] Next, the method 2100 may proceed by refining the virtual personality (step 2148). Refining the virtual personality may include using data to custom suit the virtual personality to a user 216 (e.g., based at least partially on rules 2016). This custom suiting operation may be similar, if not identical, to suiting the virtual personality to the user 216 as described in conjunction with step 2136. For instance, the data collected in step 2144 may be used by the personality matching module 2004 in altering the virtual personality to suit the user 216. Continuing this example, as the user 216 continues to provide more information and/or input, the virtual personality may be refined to best suit the user 216. In some embodiments, the virtual personality may be refined while the virtual personality is being presented to a user 216. The virtual personality may be refined in real-time (e.g., as the input is happening, is provided, etc.) and/or near-real-time (e.g., as the input is happening including any system and/or communication delays, etc.). Additionally or alternatively, as the virtual personality is altered, the altered personality may be presented to the user in real-time and/or near-real-time. Additionally or alternatively, the virtual personality may be refined (e.g., altered) when the user 216 is not being presented the virtual personality. In other words, the virtual personality may be refined in non-real-time (e.g., when the virtual personality is not being used, etc.). As provided herein, a standard personality and/or a virtual personality associated with a user 216 can be refined. The method 2100 continues at step 2124 by presenting the virtual personality and/or refined virtual personality.

[0386] The method 2100 continues by determining whether the user 216 is still present (step 2128). In some embodiments, the presence of a user 216 may include an existing association of the user 216 with a vehicle 104. For instance, the user 216 may be associated with the vehicle 104, although the user 216 may not be physically located inside the vehicle 104. An example of this association may include when the user steps outside of the vehicle 104, e.g., to maintain the vehicle 104, refuel, temporarily visit a location outside of the vehicle 104, etc.). The detection and/or determination of whether a user 216 is present may include one or more of the detection steps described in conjunction with step 2108. Additionally or alternatively, determining whether a user 216 is present may include determining whether the user 216 is physically inside the vehicle 104. For example, a user 216 may be determined to be present inside a vehicle 104 based on information detected by at least one image sensor, such as the camera sensors 760 of the vehicle 104. In any event, when a user 216 can no longer be detected by at least one sensor (e.g., vehicle sensors 242, non-vehicle sensors 236, etc.) associated with the vehicle 104, the user 216 may be determined as not being present. If the user 216 is determined to still be present, the method 2100 may continue by collecting more profile data (step 2144). If the user is determined not to be present, the method 2100 ends at step 2132.

[0387] In one example, a virtual personality may be represented by an avatar. The avatar may be an intelligent assistant, a virtual assistant, and/or an intelligent virtual assistant as described in application PCT/US14/028488, filed on Apr. 15, 2014, entitled “Vehicle-Based Multimode Discovery” (Attorney Docket No. 6583-585-PC1) which is hereby incorporated herein by reference, in its entirety, for all that it teaches and for all purposes. The avatar may be presented as a theme, color, specific sound output, other user preference, etc., and/or combinations thereof. For instance, the avatar may be configured as one or more icons, figures, colors, and/or themes that are configured to represent the virtual personality.

[0388] In some embodiments the avatar may be configured to follow a user 216 from vehicle-to-vehicle and/or from communication device-to-communication device. The avatar may be stored in the user profile associated with a user 216. The user profile may be accessed, as provided herein, via one or more vehicle 104 and/or device 212, 248. Avatars may be synchronized, or synced, between vehicles 104 and/or communication devices 212, 248. The synchronization can include a communication of the avatar from one vehicle to another vehicle. The synchronization can include a communication of the avatar from one device to another device 248. Additionally or alternatively, the avatar may be stored in profile data 252 (e.g., in the user profile) accessible across a communication network 224. One example of profile data 252 located across a network 224 may include a cloud-based system (e.g., a server 228 and profile data memory 252). In yet another example, a vehicle 104 may include an avatar associated with a user 216. In this example, the vehicle 104 may synchronize with another vehicle, a device 212, 248, and/or a building automation system 2304. As part of the synchronization communication, the vehicle 104 may transfer the avatar associated with the user 216. As can be appreciated, this operation may be performed in reverse (e.g., the other vehicle, device 212, 248, and/or building automation system 2304 may transfer the avatar associated with the user 216 to the vehicle 104 as part of the synchronization communication).

[0389] An embodiment of a method 2200 for matching a virtual personality to a context of a user 216 of a vehicle 104
is shown in FIG. 22. A general order for the steps of the method 2200 is shown in FIG. 22. Generally, the method 2200 starts with a start operation 2204 and ends with an end operation 2232. The method 2200 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 22. The method 2200 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. One example of the computer readable medium may include, but is not limited to, the memory 2032 described in conjunction with the personality subsystem 2000 of FIG. 20. Hereinafter, the method 2200 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-21.

[0390] The method 2200 begins at step 2204 and proceeds when user input is received from a user 216 (step 2208). User input can be received by the one or more sensors (e.g., vehicle sensors 242, non-vehicle sensors 236, etc.) associated with the vehicle, as previously described. Additionally or alternatively, the user input may be received by the personality module 2004 and/or the personality matching module 2008. User input may include input provided from one or more users 216. In one embodiment, where two or more users 216 provide input, a group user input may be received by the modules 2004/2008.

[0391] The method 2200 continues by determining a context of the user input received (step 2212). As previously described in conjunction with FIG. 20, a context may include an emotional state of the user 216. Context may be determined via the personality matching module 2008 based at least partially on rules 2016 stored in memory. In some embodiments, determining the context of the user input may correspond to determining at least one other user-related consideration. For example, the personality matching module 2008 may refer to at least one of a schedule, email, text message, phone call, search engine result, etc., and other content related to the user 216. In some embodiments, determining the context of the user input may correspond to determining at least one non-user consideration. Non-user considerations may include, but are not limited to at least one of, environment (e.g., temperature, humidity, air composition, oxygen level, etc.), weather (e.g., rain, sun, snow, etc.), calendar, traffic, unemployment rate, stock market value, economic index, social unrest, and the like. For instance, a user 216 may be quiet, with a neutral, or sad, expression inside a vehicle 104. In this example, an image sensor (e.g., camera 878, etc.) may detect the facial expressions of the user 216, while an audio sensor (e.g., microphone 886, etc.) may detect audio output, or lack thereof, from the user 216. The personality matching module 2008 may communicate with other systems (e.g., a device 212, 248, etc.) associated with the vehicle 104 to check the user’s 216 email, messages, calls, and/or schedule. Continuing this example, the personality matching module 2008 may communicate across a network 224 to determine at least one non-user consideration, such as a low employment rate and/or a severe drop in stock market value. Along, or together, this input and information may define the context of the user input.

[0392] In some cases, determining a context associated with the user input may include determining a context of a group user input (e.g., two or more users 216, etc.). Determining group user context may include detecting whether any of the users in the group of users have an avatar in user profile data 252. In some cases, two or more users 216 may have avatars that have been created based on profile information associated with the two or more users 216. In other words, each user 216 may have an avatar in user profile data 252, corresponding to that individual user 216.

[0393] Next, the method 2200 proceeds by determining whether the determined context matches a virtual personality of the user 216 (step 2216). This match can be based on rules 2016 stored in memory. As provided herein, a context of user input may match a virtual personality when the virtual personality is suited to the user 216 based at least partially on the context of the user input provided by the user 216. In some cases, matching a context of the user input may include providing a virtual personality having an opposite context. For instance, a user 216 may provide input having a context determined to be “sad,” and a virtual personality identified as “happy” (e.g., having a “happy” or opposite context) may match the “sad” user input context. Additionally or alternatively, a user 216 may provide input having a context determined to be “happy,” and a virtual personality identified as “happy” may match the “happy” user input context. In any event, the match is similar to the matching the virtual personality as described in conjunction with FIG. 21 (e.g., steps 2136 and 2148). In the event that a match is determined, the method 2200 continues by presenting the matching virtual personality to the user 216 (step 2224).

[0394] In embodiments where two or more users 216 have avatars in profile data 252, the context matching may determine whether the avatar of at least one of the two or more users 216 matches an avatar of another user 216 of the two or more users 216. The context matching operation may include determining whether at least one theme, color, specific sound output, other user preference, etc., and/or combinations thereof, of the avatars match. In the event that a match is determined, the method 2200 may continue by presenting the matching avatar to the user 216 (step 2224).

[0395] If a virtual personality does not match the context of the user input, the method 2200 may continue by altering and/or generating a virtual personality to match the context (step 2220). Altering and/or generating a virtual personality to match the context is similar, if not identical, to the refining of and/or generating the virtual personality as described in conjunction with FIG. 21 (e.g., step 2148 and step 2136, respectively). Once a matching virtual personality has been refined and/or generated, the method 2200 continues by presenting the matching virtual personality to the user 216 (step 2224). As can be appreciated, presenting the matching virtual personality in step 2228 may be similar, if not identical to, the presentation of the virtual personality as described in conjunction with FIG. 21. Additionally or alternatively, the output provided by the matching virtual personality may be in the form of at least one avatar, voice output, visual output, tone, and volume intensity, and configured to suit the user 216.

[0396] In another embodiment, if no direct or exact match is determined to exist between the avatars from the group user input, the method 2200 may continue by generating a group avatar that represents two or more users 216 in the group of two or more users (step 2220). This group avatar may include at least one common setting and/or preference shared between the avatars of the group of users 216. For example, a brother and sister may be seated in a passenger area (e.g., area 2 5083) of a vehicle 104. The brother may like rock music and dark colors (e.g., stored in the brother’s user profile), while the sister may like pop music and pastel colors (e.g., stored in
the sister’s user profile). As provided above, a group avatar may be created to appeal to both users (e.g., without alienating at least one user 216). The group avatar may include secondary and/or tertiary settings and/or preferences associated with the brother and sister’s user profiles to find common themes, preferences, settings, etc. In this example, both the brother and sister may like country music (but not necessarily prefer it over other kinds of music). Moreover, the brother and sister may like grayscale color schemes (but they may not prefer them). In this example, the group avatar generated for the group of users 216 (e.g., the brother and sister) for presentation to the passenger area of the vehicle 104 can include grayscale color schemes and may even suggest and/or present country music to the passenger area. When a group avatar is generated, the method 2200 continues by presenting the group avatar to the group of users 216 (step 2224).

[0397] The method 2200 continues by determining whether the user 216 is still present (step 2228). In some embodiments, the presence of a user 216 may include an existing association of the user 216 with a vehicle 104. For instance, the user 216 may be associated with the vehicle 104, although the user 216 may not be physically located inside the vehicle 104. An example of this association may include when the user steps outside of the vehicle 104 (e.g., to maintain the vehicle 104, refuel, temporarily visit a location outside of the vehicle, etc.). The detection and/or determination of whether a user 216 is present may include one or more of the detection steps described in conjunction with step 2108 of FIG. 21. Additionally or alternatively, determining whether a user 216 is present may include determining whether the user 216 is physically inside the vehicle 104. For example, a user 216 may be determined to be present inside a vehicle 104 based on information detected by at least one image sensor, such as the camera sensors 760 of the vehicle 104. In any event, when a user 216 can no longer be detected by at least one sensor (e.g., vehicle sensors 242, non-vehicle sensors 236, etc.) associated with the vehicle 104, the user 216 may be determined as not being present. If the user 216 is determined to still be present, the method 2200 may continue to receive user input at step 2208. If the user 216 is determined not to be present, the method 2200 ends at step 2232.

[0398] FIG. 23 is a block diagram of an embodiment of an automation control system 2300. The automation control system 2300 may include a building automation system 2304 having at least one of an HVAC module 2308, an energy module 2312, a security module 2316, an information module 2320, a utilities module 2324, and more. The subsystems, modules, components, etc. 212, 216, 252, 2304 may communicate over a network or bus 356 and/or a communication network 224. The communication bus 356 may be bidirectional and perform data communications using any known or future-developed standard or protocol. An example of the communication bus 356 may be as described in conjunction with FIG. 4. As one example of the communication, the building automation system 2304 may communicate with vehicles 104, devices 212, 248, profile data 252, vehicle sensors 242, and/or non-vehicle sensors 235 via the communication bus 356 and/or the communication network 224. Additionally or alternatively, the building automation system 2304 may communicate across a communication network 224 with at least one of an emergency agency 2320, energy provider 2332, security provider 2336, group 2340, and company 2344.

[0399] For example, building automation systems 2304 may communicate with a user profile to predictively adjust climate and other settings based on user 216 settings associated with a vehicle 104. The user profile may be stored in at least one profile data memory 252. A user 216 may set the inside cabin temperature of a vehicle 104 to a specific value (e.g., 72 degrees Fahrenheit, etc.). Based on this temperature setting, the building automation system 2304 may share the temperatures setting for one or more areas of a home, office, and/or other environmentally controlled space. The building automation system 2304 may be configured to analyze the behavior of a user 216 associated with a vehicle 104. The behavioral analysis of a user’s preferred temperature settings may include a consideration of ambient temperature, environmental factors, and/or solar radiation in determining shared settings.

[0400] As provided above, the building automation system 2304 may determine preferred building (e.g., rooms, areas, spaces, etc., associated with the building) temperatures of a user 216 based on information stored in a user profile. For example, the building automation system 2304 may refer to vehicle temperatures set by a user 216 and stored in the user profile. Based on the vehicle temperatures stored in the user profile, the building automation system 2304 may adjust certain areas of a home to match the vehicle temperatures. In some embodiments, the building automation system 2304 may determine that areas of the building may be adjusted based on a combination of the vehicle temperatures, time of day, recorded images and/or sounds from the vehicle, and mood of the user, as provided herein.

[0401] The HVAC module 2308 may be configured to control HVAC settings associated with one or more areas of a building. The one or more areas described herein may include, but are not limited to, rooms, floors, cubicles, an entire building space, subdivisions thereof, and/or the like. Among other things, the HVAC module 2308 can monitor at least one HVAC system and control an operation of the HVAC system based on at least one input, such as, setpoints, timers, schedules, building area temperatures, building area humidity, user profile information, and more. In any event, the HVAC module 2308 may determine an actual state (e.g., an actual temperature, humidity, pressure, etc.) of one or more areas of a building, compare the actual state with a target state (e.g., a desired or goal temperature, humidity, pressure, etc.) of the one or more areas of the building, and regulate the HVAC system at least partially in response to the comparison.

[0402] The energy module 2312 can be configured to control and/or monitor at least one energy feature and/or setting associated with one or more areas of a building. Energy features and/or settings can include, but is in no way limited to, lighting, powered circuits, ionization devices, communication equipment, and/or the like. In some cases, power to the energy features and/or a power setting of the energy features may be controlled by the energy module 2312. For example, when a user 216 is not present in one or more areas of a building, the energy of the one or more areas may be “turned off,” disabled, and/or at least partially limited. Continuing this example, when a user 216 is no longer present in a room of a home, the lighting may be turned off in that room. Presence of the user 216 can be detected in a number of ways. For instance, one or more motion sensors, image sensors, signal detectors, etc. may be used in the building to detect the presence of a user 216. The presence of the user 216 can
include an identification of a particular user 216. This identification may include referring to a user profile associated with the detected user 216.

[0403] The security module 2316 may be configured to control and/or monitor at least one security system, security component, and/or state thereof. Security systems may include any type of security service equipment associated with one or more areas of a building. Security systems may range from one or more surveillance components, locking elements, alarm features, and communication features. In some cases, a security event may be detected by the security system and reported (e.g., via a communication feature such as a phone line, wireless signal, etc.) to a security provider 2326 and/or an emergency agency 2328 (e.g., police, fire, emergency medical service (EMS), and/or governmental agency, etc.). Additionally or alternatively, the security module can activate, deactivate, monitor, and/or otherwise control the security system of a building.

[0404] The infotainment module 2320 can be configured to communicate with one or more infotainment devices associated with one or more areas of a building. Infotainment systems associated with the one or more areas of a building may include, but are not limited to, radios (e.g., analog, digital, and/or satellite, etc.), home entertainment systems, streaming content players, intercom systems, cable boxes, satellite boxes, set-top boxes (STB), digital video recorders, background music systems, emergency alert system (EAS) devices, over-the-air receiver, speakers, etc. Among other things, the infotainment module 2320 may control a state of the infotainment systems, such as power state (e.g., on, off, standby, etc.), recording content (e.g., content selection, tuning, etc.), playing content (e.g., speed of playback, volume output, etc.), receiving content, presenting content, scheduling the receiving and/or presentation of content, and the like. Additionally or alternatively, the infotainment module 2320 may monitor the state of the infotainment systems.

[0405] Similar to the energy module 2312, the utilities module 2324 can be configured to control and/or monitor at least one utility feature and/or setting associated with one or more areas of a building. Utility features and/or settings can include, but is in no way limited to, electricity, water, gas, telephone, Internet access, etc. In some cases, the utility features may be “turned off,” disabled, and/or at least partially disabled. For example, when a user 216 is not present in one or more areas of a building, the utilities of the one or more areas may be controlled as provided above. Continuing this example, when a user 216 is no longer present in a room of a home, the Internet access may be turned off, or limited, in that room. In some cases, the utilities module 2324 may turn off, and/or limit, utilities, in response to detecting an emergency condition and/or security event. For instance, a criminal may have forcefully entered a home at night with the intent to commit a felony therein. In this case, the utilities module 2324 may limit, or turn off, one or more utilities associated with the home to prevent the unlawful use by the criminal. As another example, a gas leak may be detected in the home. In this instance, the utilities module 2324 may shut off the gas supplied to the home.

[0406] In any of the aforementioned modules 2308-2324, a presence of the user 216 may be used by the modules 2308-2324 to control and/or monitor their respective features and/or settings. The presence of the user 216 can be detected in a number of ways. For instance, one or more motion sensors, image sensors, signal detectors, etc. may be used in the building to detect the presence of a user 216. The presence of the user 216 can include an identification of a particular user 216. This identification may include referring to a user profile associated with the detected user 216.

[0407] In some embodiments, the building automation system 2304 may be controlled and/or monitored by one or more of the user 216, an emergency agency 2328, an energy provider 2332, a security provider 2336, a group 2340, and a company 2344. For example, an emergency agency 2328 may need access to the one or more areas of the building. In this case, the emergency agency 2328 (e.g., police) may communicate with the building automation system 2304 and deactivate, and/or override, a security system (e.g., via the security module 2316). Similarly, in the event of a fire, the emergency agency 2328 (e.g., fire department, etc.) may shut off one or more utilities, such as gas, via the utilities module 2324. As another example, an owner of one or more areas of a building may have a contract with an energy provider 2332 to limit HVAC output during peak energy usage periods. In this example, the energy provider 2332 may communicate with the building automation system 2304 and turn off, or limit, an HVAC output via the HVAC module 2308. Additionally or alternatively, the energy provider 2332 may throttle an energy usage of the owner by communicating with the energy module 2312, and directing the energy module 2312 to limit, or turn off, power in the one or more areas of the building. The group can represent any other entity not represented by one or more of the other agencies 2328, providers 2332, 2336, or company 2344. The company 2344 can include an owner (or group of owners) of the one or more areas of the building, a business, and/or an entity recognized by a locality to serve others and/or conduct business.

[0408] An embodiment of a method 2400 for determining and adjusting settings of one or more areas of a building based at least partially on user profile information may be as shown in FIG. 24. A general order for the steps of the method 2400 is shown in FIG. 24. Generally, the method 2400 starts with a start operation 2404 and ends with an end operation 2420. The method 2400 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 24. The method 2400 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Herein, the method 2400 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-23.

[0409] The method 2400 begins at step 2404 and continues by storing one or more areas of a building associated with a user 216 in a user profile (2408). The user profile may be associated with the user 216. In some of the many embodiments described herein the user profile may be specific to only one user 216. As a user 216 moves about a building, information corresponding to the movement of the user 216 may be collected. This information may be provided by location information associated with a device 212 of user 216. For instance, the device 212 may determine a physical location of the device using one or more of an SPS, Wi-Fi hotspot, cell tower data, indoor positioning system, and the like. Additionally or alternatively, the location of a user 216 may be determined from position information collected by one or more sensors associated with the building. These sensors may
include at least one of image sensors, motion sensors, signal
detectors (e.g., key card readers, electronic key station, wire-
less communication signal detector, etc.) and the like. In one
embodiment, a user 216 can be associated with one or more
areas of a building via data entered into the user profile
corresponding to associated areas. This data may be entered
by a user 216, an administrator, a manager, a building owner,
and/or some other entity.

[0410] It is anticipated that the one or more areas of the
building associated with the user 216 can be stored (in user
profile associated with the user) in the profile data memory
252. The profile data memory 252 can be found on a device
212, a vehicle 104, attached to a communication network 224,
and/or some other location.

[0411] Next, the method 2400 continues by collecting com-
fort and/or infotainment information associated with the user
216 (step 2412). In some cases, the infotainment information
may correspond to the infotainment settings of a vehicle 104
and/or one or more areas of a building, that are associated
with a user 216. Infotainment settings may include, but are
not limited to, preferred radio stations, content applications,
listening content, viewing content, content playback settings
(e.g., volume, speed, quality, etc.), genres, content consump-
tion habits (e.g., including listening times, associated content,
trends, etc.), recording preferences, and/or the like. The com-
fort information may correspond to one or more comfort
settings of the user 216. Comfort settings can include, but are
in no way limited to, at least one preference such as lighting,
temperature, air composition, humidity, oxygen levels, back-
ground music/noise, etc.

[0412] Similar to the building area information, this col-
clected comfort and/or infotainment information may be
stored in the user profile associated with the user 216. The
comfort and/or infotainment information can be stored (in
user profile associated with the user) in the profile data memory
252. The profile data memory 252 can be found on a device
212, a vehicle 104, attached to a communication network 224,
and/or some other location (e.g., associated with a
building, etc.).

[0413] The method 2400 proceeds by using the collected
and/or stored information to adjust settings based on the
stored information (step 2416). For instance, the building
automation system 2304 can alter at least one setting of one
or more areas of the building to match information stored in
the user profile associated with a user 216. In other words,
the settings of a building may be adjusted to match the settings
of a vehicle 104 associated with a user 216. Additionally or
alternatively, a vehicle 104 may adjust the settings of the
vehicle 104 based on information stored in the user profile
associated with the user 216. In other words, the settings of a
vehicle 104 may be adjusted to match the settings of one or
more areas of a building associated with a user 216. The
method 2400 ends at step 2420.

[0414] An embodiment of a method 2500 for determining
and adjusting settings of a system based on user profile infor-
mation is shown in FIG. 25. A general order for the steps
of the method 2500 is shown in FIG. 25. Generally, the method
2500 starts with a start operation 2504 and ends with an end
operation 2536. The method 2500 can include more or fewer
steps or can arrange the order of the steps differently than
those shown in FIG. 25. The method 2500 can be executed as
a set of computer-executable instructions executed by a com-
puter system and encoded or stored on a computer readable
medium. Hereinafter, the method 2500 shall be explained
with reference to the systems, components, modules, soft-
ware, data structures, user interfaces, etc. described in con-
junction with FIGS. 1-24.

[0415] The method 2500 begins at step 2504 and proceeds
by detecting the presence of setting information in a user
profile associated with a user 216 (step 2508). The presence
of setting information may be provided via the user profile
reporting the setting information to at least one of the vehicle
104 and/or the building automation system 2304. In some
embodiments, the detection of the setting information may be
made by the building automation system 2304 detecting a
user profile and reading at least one data record of the user
profile, the data record containing the setting information.
The user profile may be detected in response to identifying a
user 216. For example, a user 216 may register with a building
automation system 2304. As part of the registration, the user
216 may provide access to at least a portion of the user profile
associated with the user 216 via the building automation
system 2304. The building automation system 2304 may be
configured to retrieve the setting information from the user
profile on a periodic basis. Additionally or alternatively, the
building automation system 2304 may be configured to retrieve
the setting information from the user profile based on
detecting the presence of a user 216 (e.g., in one or more areas
of a building and/or a vehicle 104).

[0416] The method 2500 may continue by determining user
areas associated with the building (step 2512). This determi-
nation may be made by referring to a data location of the user
profile stored in the profile data memory 252. In one embo-
diment, the user areas may correspond to the one or more areas
of a building associated with the user 216 as described in
conjunction with FIG. 24. For example, the user areas may be
a space where a user 216 works, lives, and/or plays. User
areas can be determined from location information associated
with the user 216 and a time the user 216 spends in the user
area. As can be appreciated, various thresholds may be set for
an area/space to qualify as a user area. For instance, a user 216
may be required to spend a minimum amount of time in a
space or area for that space or area to qualify as a user area.
Additionally or alternatively, a frequency associated with the
time a user 216 spends in a space or area can qualify the space
or area as a user area. By way of example, a user 216 may visit
a space every day for a week, this frequency may qualify the
space as a user area associated with that user 216. In some
cases, the user areas may be associated with a work person-
ality, home personality, and/or other rating/rank.

[0417] Next, the method 2500 continues by determining
whether a user 216 is present in the user area (step 2516).
Presence of a user 216 may include actual physical presence,
anticipated presence (e.g., expected time of arrival, based on
historical data, planned presence, etc.), and/or a programmed
presence (e.g., set by one or more administrative preferences,
user-configured, and/or the like) in at least one area of the
building. The presence of the user 216 may be determined by
one or more sensors of the building, a device 212, etc., as
described above. If the user 216 is not determined to be
present, the method 2500 ends at step 2536.

[0418] In the event that the user is determined to be present
in the user area, the method 2500 proceeds by adjusting at
least one setting of the building based on the settings infor-
mation in the user profile (step 2520). The adjustment may be
caused by the building automation system 2304 providing an
adjustment output to one or more components (e.g., building
comfort control systems, modules, etc.) associated with the
one or more areas of the building. Adjusting settings may correspond to changing at least one setting of comfort and/or infotainment settings. For instance, a radio may be tuned to a specific station, the lighting may be adjusted to a certain level, the temperature in a home, or area of the home, may be changed, and/or the like. The settings may be adjusted to match the settings stored in the user profile. In some cases, the adjustments may include a scaling factor to compensate for differences between vehicle settings and building settings. 

The method 2500 may continue by determining whether a user 216 changes settings after the settings have been adjusted via the building automation system 2304 (step 2524). For example, a user 216 may change a temperature after the temperature is adjusted via the building automation system 2304. This change may occur where vehicle settings may differ slightly from building settings. Continuing this example, the user 216 may have the inside cabin temperature of a vehicle 104 set to 74 degrees Fahrenheit. When the user 216 is present in the user area of the building, the building automation system 2304 may adjust the user area to match the 74 degrees Fahrenheit. In this example, the user may reduce the user area temperature to 72 degrees after it has been set at 74 degrees Fahrenheit by the building automation system 2304. This user 216 change may indicate that there is a comfort difference in the settings. The comfort difference may be stored in the user profile of the user 216 and used in subsequent matching operations performed by the building automation system 2304 (step 2528). Among other things, the comfort difference may be used to fine-tune, or refine, the matching of settings adjustments provided herein. If no settings have been adjusted, the method 2500 ends at step 2536.

In the event that the settings have been adjusted by the user 216, and the user 216 change, or comfort difference, is stored in the user profile associated with the user 216, the method 2500 may continue by adjusting the vehicle settings to match the settings of the building automation system 2304. Similar to refining the adjustment matching provided in conjunction with the description of steps 2524 and 2528, the method 2500 may determine whether the user 216 makes any changes to the vehicle settings in response to the settings being adjusted by the vehicle 104 based on the building automation system 2304 settings stored in the user profile associated with the user. The method ends at step 2536.

Referring to FIG. 26, a block diagram of an embodiment of a vehicle control setup for at least one zone 512 of a vehicle 104 is shown. In some embodiments, the sensitivity, dimension, and even location of typical vehicle controls may be adjusted according to a preference and/or ability of a user 216. It is anticipated that vehicle control functionality (e.g., including sensitivity, and/or placement, etc.) may be adjusted and stored with a user profile. As can be appreciated, this vehicle control functionality can follow a user 216 from one vehicle 104 to another vehicle 104.

As shown in FIG. 26, the interior space 108 of a vehicle 104 is shown having one or more controls, actuators, systems, and components, etc. For example, the vehicle 104 may include at least one feature of vehicle 104 including, but not limited to, a speed control pedal 2608, steering wheel 640, occupant seating system 648, and other features 2604, to name a few. These features may each have a feature origin 2628 connecting a positional reference datum 2632 with a feature positional reference 2636. In other words, the position of at least one of the features may be adjusted in reference to the reference datum 2632 and feature origin 2628 associated with the at least one feature. Additionally or alternatively, the feature origin 2628 of each feature may be adjusted according to one or more feature ranges 2612, 2616, 2624. The feature origin may be moved relative to a base origin 2620. At least one feature may be moved, and/or positioned, in one or more directions including, but not limited to, a forward direction 2606 (e.g., away from a user 216 in some cases), a backward direction 2610 (e.g., toward a user 216 in some cases), an upward direction 2614 (e.g., away from the base origin 2620), and/or a downward direction 2618 (e.g., toward the base origin 2620). The directions may include side-to-side positioning (e.g., leftward direction and rightward direction, with reference to a user 216 and/or the base origin 2620).

In some embodiments, at least one feature may be adjusted according to angular measurements. These angular adjustments can include an angle 2640, 2644, 2648, 2652 between at least one reference datum 2632 and the feature positional reference 2636 of the at least one feature. For example, a user 216 may have configured a vehicle 104 to include control settings having a position of a steering wheel 640 in a steering positional range 2616 and at a steering wheel angle 2648. The origin 2628 of the steering wheel 640 may be adjusted in an upward direction 2614 or downward direction 2618 to adjust a height of the steering wheel 640 in the interior space 108 of the vehicle 104. As another example, the occupant seating system 648 may be adjusted for various positions. These various positions can include a height of the occupant seating system 648 (e.g., as measured from the base origin 2620 across a seating positional range 2624), a forward/backward position, and a seating angle 2640, to name a few. As can be appreciated, the occupant seating system may include lumbar support adjustments, side-to-side settings, seat base angles, and more. As yet another example, the position of one or more control pedals 2608 may be adjusted according to orientation and/or angle. For instance, a user 216 may have configured a vehicle 104 to include control settings having a position of the control pedal 2608 in a pedal positional range 2612 and at a pedal angle 2644. The origin 2628 of the control pedal 2608 may be adjusted in an upward direction 2614 or downward direction 2618 to adjust a height of the control pedal 2608 in the interior space 108 of the vehicle 104. Additionally or alternatively, a side-to-side position of the control pedal 2608 may be adjusted.

In some embodiments, the feature ranges 2612, 2616, may include an operational range. For instance, the steering wheel 640 may have an angular operational range corresponding to the rotation of a steering wheel 640 about an axis. Additionally or alternatively, the control pedal 2608 may include an operational range within the control pedal range 2612. The operational range may correspond to an amount of movement of the feature 640, 2608 within the range 2612, 2616. In some embodiments, the operational range can include a sensitivity associated with the movement in the range. The sensitivity may be set to limit and/or restrict movement of the feature 640, 2608 within the operational range. It is anticipated that this restriction may be adjusted between various levels to provide greater or lesser operational force as required from a user 216.

For instance a user 216 may wish to have sensitive controls in a vehicle 104. In this example, the restriction associated with the sensitivity may be reduced from a default, or mid-level, value to allow less restrictive movement of the feature. Continuing this example, a default value of sensitivity associated with the control pedal 2608 may require 3-4
pounds of force to overcome the restriction and move the control pedal 2608 in the operational range of the feature 2608. Increasing the sensitivity may include reducing the restriction to require less than 3-4 pounds of force (e.g., 4 ounces of force, 1 pound of force, 2 pounds of force, and/or values in between these forces, etc.). In some cases (e.g., where the user 216 may have a "heavy" foot), the sensitivity of the features may be decreased from the default value (e.g., by increasing the restrictive force required to move the feature 2608). This restriction and sensitivity may apply to the steering wheel 640 and/or other features of the vehicle 104.

[0426] Other features 2604, including, but not limited to, mirrors, cameras, sensors, microphones, speakers, and/or controls/instruments may be adjustable/set in a similar, if not identical, manner to that described above.

[0427] An embodiment of a method 2700 for determining and adjusting a vehicle feature control based on user profile information is shown in FIG. 27. Generally, the method 2700 begins at step 2704 and proceeds by recording settings of vehicle controls, or features, in a user profile associated with the user 216 (step 2708). Recording settings may include at least one of collecting settings information and storing settings information associated with the features of a vehicle 104. In some cases, these settings may have been preset and/or configured by a user 216. In one embodiment, the settings may be predefined, or default, settings configured by a manufacturer of the vehicle 104. In some embodiments, the profile identification module 848 may be configured to perform one or more of the steps as provided herein. When recording the settings, the profile identification module 848 may communicate with one or more components of the vehicle 104 to determine a position, angle, and/or other measurement of the features of the vehicle 104 as described above in conjunction with FIG. 26.

[0429] The profile identification module 848 may communicate with the various features of the vehicle 104, including vehicle sensors 242, to determine a sensitivity associated with at least one feature (e.g., vehicle controls, etc.) of the vehicle 104 (step 2712). Sensitivity can include at least one of movement restriction, movement range, operational range, and other control related aspects of the features, as described above.

[0430] The method 2700 continues by detecting vehicle feature information stored in a user profile associated with a user 216 of the vehicle 104 (step 2716). In some embodiments, the detection of the vehicle feature setting information may be made by the profile identification module 848 detecting a user profile and reading at least one data record of the user profile, the data record containing the vehicle feature setting information. The user profile may be detected in response to identifying a user 216 as provided herein. For example, a user 216 may register with a vehicle 104. As part of the registration, the user 216 may provide access to at least a portion of the user profile associated with the user 216 via the one or more components of the vehicle 104. The one or more components of the vehicle 104 may be configured to retrieve the vehicle feature setting information from the user profile on a periodic basis. Additionally or alternatively, the one or more components of the vehicle 104 (e.g., the profile identification module 848, etc.) may be configured to retrieve the setting information from the user profile based on detecting the presence of a user 216 (e.g., in one or more areas of a vehicle 104). The detection and/or determination of whether a user 216 is present may include one or more of the detection steps described in conjunction with step 2108. Additionally or alternatively, determining whether a user 216 is present may include determining whether the user 216 is physically inside the vehicle 104. For example, a user 216 may be determined to be present inside a vehicle 140 based on information detected by at least one image sensor, such as the camera sensors 760 of the vehicle 104.

[0431] Next, the method 2700 may proceed by adjusting the vehicle features (e.g., controls, settings, etc.) to match the settings stored in the user profile associated with the user 216 (step 2720). In some cases, the adjustments may include a scaling factor to compensate for differences between vehicle settings stored for a particular vehicle 104 and the settings of another vehicle. The vehicle features may be adjusted based on the presence of a user 216 in a vehicle 104. Presence of a user 216 may include actual physical presence, anticipated presence (e.g., expected time of arrival, based on historical data, planned presence, etc.), and/or a programmed presence (e.g., set by one or more administrative preferences, user-configured, and/or the like) in the vehicle 104. The presence of the user 216 may be determined by one or more sensors of the vehicle 104, a device 212, etc., as described above. If the user 216 is not determined to be present, or if the adjustments have been made to the features of the vehicle 104, the method 2700 ends at step 2724.

[0432] Referring now to FIGS. 28 and 29, methods concerning the health of a user 216 and various outputs are provided. The methods 2800, 2900 may utilize one or more sensors to measure heart rate, weight, vital signs, etc. The measurements collected by these sensors may be used to detect heart attack, seizures, and the like associated with a user 216, and in certain situations provide action to the vehicle 104. For example, the various sensors (e.g., user interface 712, non-vehicle sensors 236, vehicle sensors 242, and/or other sensors, etc.) may communicate with the vehicle control system to stop the vehicle 104, pull over to the shoulder, notify hospitals nearby (e.g., EMS, police, fire departments, etc.). Examples of these sensors may include, but are not limited to, vehicle sensors 242, non-vehicle sensors 236, associated device sensors 720, sensors associated with a user’s device 212, 248 (e.g., cell phone, tablet, smart-phone, etc.), wearable sensors and/or devices (e.g., heart rate monitors, health monitors, Fitbit® health and/or activity sensors, oxygen level sensors, diabetes sensors, etc.), and the like.

[0433] The sensors may at least one of detect, record, and track resting heart rate, maximum heart rate, aerobic heart rate. For example, if a user’s heart rate moves into a resting heart rate, the vehicle 104 may respond by altering oxygen levels, providing haptic feedback, etc. In one embodiment, health statistics, vitals, and/or other user 216 information may be sent to a third party (e.g., police, emergency responders, doctors, etc.). This example may be especially useful in the event of an accident where vital statistics are of the utmost
importance in providing healthcare assistance and/or emergency aid to those involved in an accident.

[0434] An embodiment of a method 2800 for providing an output based on health information associated with a user 216 is shown in FIG. 28. A general order for the steps of the method 2800 is shown in FIG. 28. Generally, the method 2800 starts with a start operation 2804 and ends with an end operation 2824. The method 2800 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 28. The method 2800 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 2800 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-27.

[0435] The method 2800 begins at step 2804 and proceeds by recording data about a user 216 (step 2808). The data may include, but is not limited to, one or more health data, such as heart rate, oxygen levels, glucose levels, blood composition, weight, movement, eye dilatation, eye movement, gaze direction, speech pattern, temperature, breathing rate, voluntary body movements (e.g., coughing, spitting, vomiting, etc.), involuntary bodily movements (e.g., sneezing, seizures, twitching, ticks, etc.), skin color changes (e.g., due to lack of blood, lack of oxygen, abundance of blood, sickness, etc.). In some embodiments, the health data may be stored in a user profile associated with a user 216.

[0436] Next, the method 2800 may continue by establishing baseline health levels of a user 216 associated with a vehicle 104 (step 2812). The baseline health levels may be established using the health data recorded in step 2808. Additionally or alternatively, the baseline health levels may be established by monitoring the recorded health data of a user 216 over a period of time. As can be appreciated, this recorded health data may be averaged and/or analyzed to remove statistical health outliers. In other words, if at least some of the measured data does not generally fit with previous and/or subsequent health measurements, that data may be discarded as an outlier. In one embodiment, the baseline health levels may be established by prompting a user 216 to provide baseline health levels. The vehicle 104 may present one or more prompts to a user 216 to collect the health data, while the user 216 may provide one or more self-reported health data. The baseline health levels may be used by the profile identification module 848 to create a baseline biometric profile of the user 216. This baseline biometric profile may be stored in a user profile associated with the user 216.

[0437] The method 2800 may proceed by determining whether there is any deviation between the established baseline health levels of a user 216 and a current state of health associated with the user 216 (step 2816). In some embodiments, the sensors may collect health data of user 216 periodically or continually. This health data may be used to detect a state of health associated with the user 216 at any given point in time. Additionally or alternatively, the health data associated with a user 216 may be tracked during travel and/or for a length of time that the user 216 is associated with a vehicle 104.

[0438] The method 2800 continues by providing an output based at least partially on any deviation in health data determined in step 2816 (step 2820). In some cases, a graphical output of a user’s health during travel may be output via the profile identification module 848. For example, a user 216 may have multiple routes to a specific location, but it may be determined that one of the routes provides a greater level of stress (e.g., based on the tracked health data) than other routes. In some embodiments, multiple routes may be provided to a user 216 (e.g., via a GPS device, navigation system, etc.) for comparison and/or selection, based on tracked health data (e.g., user stress, emotion, etc.).

[0439] In some embodiments, the output provided may adjust one or more settings of a vehicle 104. For example, the output may be configured to adjust at least one of the vehicle interior environment, temperature, air composition, oxygen level, sound level, window position, seat position, and lighting level. As another example, the output may be configured to adjust a position and/or sensitivity of features of the vehicle 104. This example may be especially useful when a user 216 has lost the ability to accurately control a portion of the user’s body (e.g., due to a stroke and/or seizure). For instance, the sensitivity associated with a feature of the vehicle 104 may be decreased, and as such small movements from the user 216 would not translate into large movements of the vehicle 104.

[0440] In another example, the method 2800 may provide an output that directs the vehicle control system 204 to control at least one aspect of the vehicle 104. For instance, the vehicle control system 204 may maneuver a vehicle 104 into a safe area from a potentially harmful area. In some cases, the vehicle control system 204 can shut off power to the vehicle 104, activate emergency lights, notify others, and more. The method 2800 ends at step 2824.

[0441] An embodiment of a method 2900 for providing health information associated with a user 216 to a third party is shown in FIG. 29. A general order for the steps of the method 2900 is shown in FIG. 29. Generally, the method 2900 starts with a start operation 2904 and ends with an end operation 2924. The method 2900 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 29. The method 2900 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 2900 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc. described in conjunction with FIGS. 1-28.

[0442] The method 2900 begins at step 2904 and proceeds by detecting an incident (step 2908). In some cases, the incident may act as a trigger to collect and/or determine health data and/or statistics associated with one or more user 216 of a vehicle 104. An incident may correspond to one or more conditions detected by the vehicle and/or non-vehicle sensors 242, 236. For instance, an impact, or collision, may be detected by the vehicle body sensors 762, orientation sensors 776, mechanical motion sensors 772, force sensors 768, and/or other safety sensors 716, 716F associated with the interior and/or exterior of the vehicle 104. Additionally or alternatively, an incident may correspond to a health condition associated with a user 216. For example, a user 216 may suffer from a heart attack in which case, the user’s heart rate would deviate from established baseline levels. This deviation may qualify as an incident that can be detected by the various sensors of the vehicle 104.

[0443] Next, the method 2900 may proceed by determining the health data and/or statistics of one or more users 216 associated with the vehicle 104 (step 2912). This determination may be made in response to detecting the incident from
Similar to the health data collection described above, the health data and/or statistics may be made by the various sensors provided herein. In some embodiments, the health data may be collected at a greater rate of speed, or sampling rate (e.g., samples per minute, samples per second, etc.), in response to detecting the incident. Additionally or alternatively, the health data may be collected from the users 216 of a vehicle 104, and if no health issues are detected (e.g., over a predetermined period of measurement time) then the health data collection may return to a normal sampling rate.

The method 2900 continues by communicating with at least one third party (step 2916). The communication may include a message, text message, email, phone call, emergency signal, etc., and/or combinations thereof. In some cases, the communication may be made by the transceiver 260 of the vehicle 104. In one embodiment, the communication may be made by at least one device 212, 248 associated with a user 216 and/or a vehicle 104. For instance, the communication may be made by a mobile phone of a user 216. The third party can be a loved one, a friend, a company, a group, an emergency service (e.g., police, fire, EMS, etc.), or other entity.

The communication may include the collected health data associated with one or more users 216 of the vehicle 104 and/or an identification of the one or more users 216 (step 2920). The identification may be provided based, on device 212 identification, user 216 identification via facial recognition (e.g., as described above), and/or user 216 registration with a vehicle 104. In some embodiments, the communication may provide health data in real-time (e.g., as the health data is collected, etc.), near-real-time (e.g., as the health data is collected including any system and/or communication delays, etc.), and/or in non-real-time (e.g., after the data is collected, etc.). The method 2900 ends at step 2924.

FIG. 30 provides adjusting an infotainment system 870 based on infotainment information stored in memory. In some embodiments, the infotainment system 870 of a vehicle 104 can record and/or track infotainment information, such as a user's 216 music preferences, favorite morning show, content, genres, and/or the like. The infotainment system 870 can automatically record one or more shows based at least partially on this infotainment information. For example, the user 216 may select and consume content recorded by the infotainment system 870 at any time. The infotainment information and/or any preferences associated therewith may be stored in a user profile associated with the user 216, as disclosed herein. In another example, the infotainment system 870 may know what the user 216 has been watching in the home. In this example, if the user leaves the home to go shopping (e.g., during a football game, etc.), the infotainment system 870 may already be tuned to a station playing the football game. In some embodiments, the infotainment system 870 may communicate with, or receive communications from, a cable provider, STB, satellite provider, or other content consumption service provider.

Continuing the example provided above, a user 216 may be watching a game, television show, listening to a radio, or consuming some other content while at home. At least one device (e.g., TV, set-top box, smart-phone, tablet, computer, etc.) associated with the user 216 may record this information to memory (e.g., locally or remotely on the cloud). In some cases this memory may be associated with a user profile of the user 216. When the user 216 moves from home to a vehicle 104, or vice versa, the infotainment system 870 may access the user profile to determine recent entertainment consumption (e.g., consumed by the user 216, etc.). The infotainment system 870 may then tune at least one infotainment component to present a source of entertainment that at least partially matches the entertainment consumption recorded in the user profile.

An embodiment of a method 3000 for determining and adjusting infotainment settings associated with an infotainment system is shown in FIG. 30. A general order for the steps of the method 3000 is shown in FIG. 30. Generally, the method 3000 starts with a start operation 3004 and ends with an end operation 3028. The method 3000 can include more or fewer steps or can arrange the order of the steps differently than those shown in FIG. 30. The method 3000 can be executed as a set of computer-executable instructions executed by a computer system and encoded or stored on a computer readable medium. Hereinafter, the method 3000 shall be explained with reference to the systems, components, modules, software, data structures, user interfaces, etc., described in conjunction with FIGS. 1-29.

The method 3000 begins at step 3004 and proceeds by collecting infotainment information (step 3008). In some embodiments, the infotainment information may include infotainment settings. As provided above, the infotainment settings may include, but are not limited to, preferred radio stations, content applications, listening content, viewing content, content playback settings (e.g., volume, speed, quality, etc.), genres, content consumption habits (e.g., including listening times, associated content, trends, etc.), recording preferences, and/or the like. This infotainment information may be stored in a user profile associated with a user 216. In one embodiment, the user profile may be stored in a profile data memory 252 that can be found on a device 212, in a vehicle 104, attached to a communication network 224, on the cloud (e.g., a server 228, etc.) and/or some other location.

Next, the method 3000 may continue when user profile infotainment settings are detected (step 3012). Detecting the presence of infotainment information may be provided via the user profile reporting the infotainment information to at least one of the vehicle 104 and/or the infotainment system 870. In some embodiments, the detection of the infotainment information may be made by the infotainment system 870 detecting a user profile and reading at least one data record of the user profile, the data record containing the infotainment information. The user profile may be detected in response to identifying a user 216. For example, a user 216 may register with an infotainment system 870. As part of the registration, the user 216 may provide access to at least a portion of the user profile associated with the user 216 via the infotainment system 870. The infotainment system 870 may be configured to retrieve the setting information from the user profile on a periodic basis. Additionally or alternatively, the infotainment system 870 may be configured to retrieve the setting information from the user profile based on detecting the presence of a user 216 (e.g., in one or more areas of a building and/or a vehicle 104).

The method 3000 may continue by detecting an available infotainment system 870 (step 3016). In some embodiments the infotainment system 870 may be associated with a vehicle 104, a home, a building, or other location. For example, a profile identification module can detect one or more infotainment systems 870 that have been registered with a device 212 and/or user 216. The vehicle 104 may detect an available infotainment system 870 based on a communication
with across a bus 356 or communication network 224. The detection of an available infotainment system 870 may be provided via device discovery on a network (e.g., wired and/or wireless). Additionally or alternatively, the detection may include determining a configuration of the infotainment system 870. Configurations may include settings, preferences, content, tuners, power state, associated users 216 and/or devices 212, 248, access priorities, and/or the like.

[0452] The method 3000 proceeds by using the collected and/or stored infotainment information to adjust settings based on the infotainment information (step 3020). For instance, the infotainment system 870 can alter at least one setting of one or more components of the infotainment system 870 to match information stored in the user profile associated with a user 216. In other words, the settings of an infotainment system 870 may be adjusted to match the settings of an infotainment system of a building, another vehicle 104, or other device 212 associated with a user 216.

[0453] In some cases, the adjustment of one or more settings associated with the infotainment system 870 may be allowed, denied, and/or limited based on one or more access priorities. Users 216 may have an access priority assigned by the infotainment system 870. High access priorities have precedence to access of the infotainment system 870 over lower access priorities. For example, a parent may have a high access priority (e.g., AP1), and a child may have a lower access priority (e.g., AP3) when compared to the parent's access priority. In the event that access conflicts arise (e.g., where the child wishes to play music via the infotainment system 870 while the parent is currently playing content via the infotainment system 870), the access priority serves to deny access to the child (e.g., because the parent's access priority is greater than, or a higher priority, than the child's access priority). In determining the ability to adjust infotainment settings, the access priorities may be compared by the infotainment system 870.

[0454] The method 3000 continues by determining whether the infotainment system 870 is online or offline (step 3000). An infotainment system 870 may be turned off, or may have no communications ability in which case, the infotainment system 870 would be determined to be offline. The determination may be made by the vehicle control system 204, media subsystems 346, a device 212, 248, and/or other systems or the infotainment system 870 is online, or not offline, the method 3000 may continue at step 3008 by continuing to collect infotainment information for the user profile associated with a user 216. In the event that the infotainment system 870 is determined to be offline, the method 3000 ends at step 3028.

[0455] It should be appreciated that the user profiles as described herein can be associated with a single user 216. In some embodiments, each user profile may be unique to the user 216 with whom the user profile is associated. Additionally or alternatively, one or more user profiles associated with one or more users 216 may be stored in a profile data memory 252. In some cases, the one or more user profiles may be stored in the profile data memory separately from one another. In other words, the one or more user profiles may be stored according to an identification of a unique user 216 associated with each user profile.

[0456] The exemplary systems and methods of this disclosure have been described in relation to configurable vehicle consoles and associated devices. However, to avoid unnecessarily obscuring the present disclosure, the preceding description omits a number of known structures and devices. This omission is not to be construed as a limitation of the scopes of the claims. Specific details are set forth to provide an understanding of the present disclosure. It should however be appreciated that the present disclosure may be practiced in a variety of ways beyond the specific detail set forth herein.

[0457] Furthermore, while the exemplary aspects, embodiments, options, and/or configurations illustrated herein show the various components of the system collocated, certain components of the system can be located remotely, at distant portions of a distributed network, such as a LAN and/or the Internet, or within a dedicated system. Thus, it should be appreciated, that the components of the system can be combined in to one or more devices, such as a Personal Computer (PC), laptop, netbook, smart phone, Personal Digital Assistant (PDA), tablet, etc., or collocated on a particular node of a distributed network, such as an analog and/or digital telecommunications network, a packet-switch network, or a circuit-switched network. It will be appreciated from the preceding description, and for reasons of computational efficiency, that the components of the system can be arranged at any location within a distributed network of components without affecting the operation of the system. For example, the various components can be located in a switch such as a PBX and media server; gateway, in one or more communications devices, at one or more users' premises, or some combination thereof. Similarly, one or more functional portions of the system could be distributed between a telecommunications device(s) and an associated computing device.

[0458] Furthermore, it should be appreciated that the various links connecting the elements can be wired or wireless links, or any combination thereof, or any other known or later developed element(s) that is capable of supplying and/or communicating data to and from the connected elements. These wired or wireless links can also be secure links and may be capable of communicating encrypted information. Transmission media used as links, for example, can be any suitable carrier for electrical signals, including coaxial cables, copper wire and fiber optics, and may take the form of acoustic or light waves, such as those generated during radio-wave and infra-red data communications.

[0459] Also, while the flowcharts have been discussed and illustrated in relation to a particular sequence of events, it should be appreciated that changes, additions, and omissions to this sequence can occur without materially affecting the operation of the disclosed embodiments, configuration, and aspects.

[0460] A number of variations and modifications of the disclosure can be used. It would be possible to provide for some features of the disclosure without providing others.

[0461] It should be appreciated that the various processing modules (e.g., processors, vehicle systems, vehicle sub-systems, modules, etc.), for example, can perform, monitor, and/or control critical and non-critical tasks, functions, and operations, such as interaction with and/or monitoring and/or control of critical and non-critical on board sensors and vehicle operations (e.g., engine, transmission, throttle, brake power assist/brake lock-up, electronic suspension, traction and stability control, parallel parking assistance, occupant protection systems, power steering assistance, self-diagnostics, event data recorders, steer-by-wire and/or brake-by-wire operations, vehicle-to-vehicle interactions, vehicle-to-infrastructure interactions, partial and/or full automation, telematics, navigation/SPS, multimedia systems, audio systems, rear
seat entertainment systems, game consoles, tuners (SDR),
heads-up display, night vision, lane departure warning, adapt-
tive cruise control, adaptive headlights, collision warning,
blind spot sensors, park/reverse assistance, tire pressure
monitoring, traffic signal recognition, vehicle tracking (e.g.,
LoJack®), dashboard/instrument cluster, lights, seats, cli-
mate control, voice recognition, remote keyless entry, secu-
rrity alarm systems, and wiper/window control). Processing
modules can be enclosed in an advanced EMI-shielded enclo-
sure containing multiple expansion modules. Processing
modules can have a "black box" or flight data recorder tech-
nology, containing an event (or driving history) recorder
(containing operational information collected from vehicle
on board sensors and provided by nearby or roadside signal
transmitters), a crash survivable memory unit, an integrated
controller and circuitry board, and network interfaces.

Critical system controller(s) can control, monitor,
and/or operate critical systems. Critical systems may include
one or more of (depending on the particular vehicle) moni-
toring, controlling, operating the ECU, TCU, door settings,
window settings, blind spot monitor, monitoring, controlling,
operating the safety equipment (e.g., airbag deployment con-
trol unit, collision sensor, nearby object sensing system, seat
belt control unit, sensors for setting the seat belt, etc.), moni-
toring and/or controlling certain critical sensors such as the
power source controller and energy output sensor, engine
temperature, oil pressure sensing, hydraulic pressure sensors,
sensors for headlight and other lights (e.g., emergency light,
bright headlight, parking light, fog light, interior or passenger
compartment light, and/or tail light state (on or off)), vehicle
control system sensors, wireless network sensor (e.g., Wi-Fi
and/or Bluetooth sensors, etc.), cellular data sensor, and/or
steering/torque sensor, controlling the operation of the engine
(e.g., ignition, etc.), head light control unit, power steering,
display panel, switch state control unit, power control unit,
and/or brake control unit, and/or issuing alerts to a user and/or
remote monitoring entity of potential problems with a vehicle
operation.

Non-critical system controller(s) can control, moni-
tor, and/or operate non-critical systems. Non-critical systems
may include one or more of (depending on the particular
vehicle) monitoring, controlling, operating a non-critical sys-

tem, emissions control, seating system controller and sensor,
inflatable/entertainment system, monitoring certain non-
critical sensors such as ambient (outdoor) weather readings
(e.g., temperature, precipitation, wind speed, and the like),
odometer reading sensor, trip mileage reading sensor, road
condition sensors (e.g., wet, icy, etc.), radar transmitter/re-
ceiver output, brake wear sensor, oxygen sensor, ambient
lighting sensor, vision system sensor, ranging sensor, parking
sensor, heating, venting, and air conditioning (HVAC) system
and sensor, water sensor, air-fuel ratio meter, hall effect sen-
or, microphone, radio frequency (RF) sensor, and/or infrared
(IR) sensor.

It is an aspect of the present disclosure that one or
more of the non-critical components and/or systems provided
herein may become critical components and/or systems, and/
or vice versa, depending on a context associated with the
vehicle.

Optionally, the systems and methods of this disclo-
sure can be implemented in conjunction with a special pur-
pose computer, a programmed microprocessor or microcon-
troller and peripheral integrated circuit element(s), an ASIC
or other integrated circuit, a digital signal processor, a hard-
wired electronic or logic circuit such as discrete element
circuit, a programmable logic device or gate array such as
PLD, PLA, FPGA, PAL, a special purpose computer, any com-
parable means, or the like. In general, any device(s) or means
capable of implementing the methodology illustrated herein
can be used to implement the various aspects of this disclo-
sure. Exemplary hardware that can be used for the disclosed
embodiments, configurations and aspects includes comput-
ers, handheld devices, telephones (e.g., cellular, Internet
enabled, digital, analog, hybrids, and others), and other hard-
ware known in the art. Some of these devices include proces-
sors (e.g., a single or multiple microprocessors), memory,
nonvolatile storage, input devices, and output devices. Fur-
thermore, alternative software implementations including,
but not limited to, distributed processing or component/object
distributed processing, parallel processing, or virtual
machine processing can also be constructed to implement the
methods described herein.

In yet another embodiment, the disclosed methods
may be readily implemented in conjunction with software
using object or object-oriented software development envi-
ronments that provide portable source code that can be used
on a variety of computer or workstation platforms. Alterna-
tively, the disclosed system may be implemented partially or
fully in hardware using standard logic circuits or VLSI
design. Whether software or hardware is used to implement
the systems in accordance with this disclosure is dependent
on the speed and/or efficiency requirements of the system,
the particular function, and the particular software or hardware
systems or microprocessor or microcomputer systems being
utilized.

In yet another embodiment, the disclosed methods
may be partially implemented in software that can be stored
on a storage medium, executed on programmed general-pur-
pose computer with the cooperation of a controller and
memory, a special purpose computer, a microprocessor, or the
like. In these instances, the systems and methods of this
disclosure can be implemented as program embedded on
personal computer such as an applet, JAVA® or CGI script, as
a resource residing on a server or computer workstation, as a
route embedded in a dedicated measurement system, sys-
tem component, or the like. The system can also be imple-
mented by physically incorporating the system and/or
method into a software and/or hardware system.

Although the present disclosure describes compon-
ents and functions implemented in the aspects, embodi-
ments, and/or configurations with reference to particular
standards and protocols, the aspects, embodiments, and/or
configurations are not limited to such standards and proto-
ocols. Other similar standards and protocols not mentioned
herein are in existence and are considered to be included in
the present disclosure. Moreover, the standards and protocols
mentioned herein and other similar standards and protocols
not mentioned herein are periodically superseded by faster or
more effective equivalents having essentially the same func-
tions. Such replacement standards and protocols having
the same functions are considered equivalents included in the
present disclosure.

The present disclosure, in various aspects, embodi-
ments, and/or configurations, includes components, methods,
processes, systems and/or apparatus substantially as depicted
described herein, including various aspects, embodiments,
configurations embodiments, subcombinations, and/or
subsets thereof. Those of skill in the art will understand
how to make and use the disclosed aspects, embodiments, and/or configurations after understanding the present disclosure. The present disclosure, in various aspects, embodiments, and/or configurations, includes providing devices and processes in the absence of items not depicted and/or described herein in or in various aspects, embodiments, and/or configurations thereof, including in the absence of such items as may have been used in previous devices or processes, e.g., for improving performance, achieving ease and/or reducing cost of implementation.

The foregoing discussion has been presented for purposes of illustration and description. The foregoing is not intended to limit the disclosure to the form or forms disclosed herein. In the foregoing Detailed Description for example, various features of the disclosure are grouped together in one or more aspects, embodiments, and/or configurations for the purpose of streamlining the disclosure. The features of the aspect, embodiments, and/or configurations of the disclosure may be combined in alternate aspects, embodiments, and/or configurations other than those discussed above. This method of disclosure is not to be interpreted as reflecting an intention that the claims require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed aspect, embodiment, and/or configuration. Thus, the following claims are hereby incorporated into this Detailed Description, with each claim standing on its own as a separate preferred embodiment of the disclosure.

Moreover, though the description has included description of one or more aspects, embodiments, and/or configurations and certain variations and modifications, other variations, combinations, and modifications are within the scope of the disclosure, e.g., as may be within the skill and knowledge of those in the art, after understanding the present disclosure. It is intended to obtain rights which include alternative aspects, embodiments, and/or configurations to the extent permitted, including alternate, interchangeable and/or equivalent structures, functions, ranges or steps to those claimed, whether or not such alternate, interchangeable and/or equivalent structures, functions, ranges or steps are disclosed herein, and without intending to publicly dedicate any patentable subject matter.


Examples of the processors as described herein may include, but are not limited to, at least one of Qualcomm Snapdragon® 800 and 801, Qualcomm Snapdragon® 610 and 615 with 4G LTE Integration and 64-bit computing, Apple® A7 processor with 64-bit architecture, Apple® M7 motion coprocessors, Samsung® Exynos® series, the Intel® Core™ family of processors, the Intel® Xeon® family of processors, the Intel® Atom™ family of processors, the Intel® Itanium® family of processors, Intel® Core® i5-4670K and i7-4770K 22 nm Haswell, Intel® Core® i5-3570K 22 nm Ivy Bridge, the AMD® FX® family of processors, AMD® FX-4300, FX-6300, and FX-8350 32 nm Vishera, AMD®, Kaveri processors, Texas Instruments® Jacinto C6000™ automotive infotainment processors, Texas Instruments® OMAP™ automotive-grade mobile processors, ARM® Cortex™-M processors, ARM® Cortex-A and ARM® Cortex-M processors, other industry-equivalent processors, and may perform computational functions using any known or future-developed standard, instruction set, libraries, and/or architecture.

What is claimed is:

1. A method, comprising:
   referring to a user profile memory associated with a user for vehicle setting information;
   detecting an identification of at least one area of a building associated with the user;
   determining that the at least one area of the building includes a configurable comfort setting; and
   determining, based at least partially on the identification of the at least one area of the building and the vehicle setting information, to adjust the configurable comfort setting of the at least one area of the building.

2. The method of claim 1, further comprising:
   providing an adjustment output to a building comfort control system, wherein the building comfort control system is adapted to control the configurable comfort setting of the at least one area of the building.

3. The method of claim 2, wherein prior to providing the adjustment output, the method further comprises:
   determining a presence of the user inside the at least one area of the building, wherein the adjustment output is provided based at least partially on determining the user is present inside the at least one area of the building.

4. The method of claim 2, wherein prior to providing the adjustment output, the method further comprises:
   determining an expected time of arrival corresponding to an expected time the user is to be inside the at least one
area of the building, wherein the expected time of arrival is based on one or more of user location data, historical data, and stored preferences, and wherein the adjustment output is provided based at least partially on the expected time of arrival such that the adjustment output is provided prior to or at the expected time of arrival.

5. The method of claim 2, further comprising: determining that the user made a change to the adjusted configurable comfort setting; and storing the change made to the adjusted configurable comfort setting in the user profile memory.

6. The method of claim 5, further comprising: determining a presence of the user inside a vehicle, and wherein the adjustment output is provided based at least partially on determining the user is present inside the vehicle.

7. The method of claim 1, wherein prior to referring to the user profile memory the method further comprises: storing, in the user profile memory, information corresponding to areas of a building occupied by the user; collecting vehicle setting data associated with the user, wherein the vehicle setting data includes at least one of vehicle comfort settings and infotainment settings made by the user; and storing the vehicle setting data in the user profile memory.

8. The method of claim 1, wherein the vehicle setting information includes an interior temperature of a vehicle, and wherein the configurable comfort setting of the at least one area of the building is a temperature associated with the at least one area.

9. The method of claim 8, wherein the configurable comfort setting of the at least one area of the building is adjusted to match the vehicle setting information in the user profile memory.

10. A non-transitory computer readable medium having instructions stored thereon that, when executed by a processor, perform a method comprising: referring to a user profile memory associated with a user for vehicle setting information; detecting an identification of at least one area of a building associated with the user; determining that the at least one area of the building includes a configurable comfort setting; and determining, based at least partially on the identification of the at least one area of the building and the vehicle setting information, to adjust the configurable comfort setting of the at least one area of the building.

11. The non-transitory computer readable medium of claim 10, wherein the method further comprises: providing an adjustment output to a building comfort control system, wherein the building comfort control system is adapted to control the configurable comfort setting of the at least one area of the building.

12. The non-transitory computer readable medium of claim 11, wherein prior to providing the adjustment output, the method further comprises: determining a presence of the user inside the at least one area of the building, wherein the adjustment output is provided based at least partially on determining the user is present inside the at least one area of the building.