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Car Assistant

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Car Assistant

Abstract:

Smart devices continue to proliferate as the Internet-of-Things expands. Advances in both automotive and computing device technology now allow smart device functionality to be integrated into automobiles. In some circumstances, smart device functionality can be incorporated into the computing system of the automobile itself. In other circumstances, smart device functionality can be present in an automobile via a secondary electronic device, such as a dongle coupled to an automobile's on-board diagnostic port or a twelve-volt electric port. In either circumstance, smart device functionality can be integrated into the automobile without the need of, or compromising the performance of, a driver's or passenger's mobile device.

Keywords:

Smart device, WiFi, Bluetooth, Internet-of-Things, automobile, assistant, hands-free, voice activated, on-board diagnostic port, dongle, fob, VIN number, SIM card, GPS.

Background:

As the Internet-of-Things expands, smart devices continue to proliferate. Internet-connected thermostats, appliances, vehicles, lights, cameras, robots, and machines are found in all areas of life, including home, work, business, recreation, school, and transportation. In particular, many smart devices leverage machine learning algorithms, models, and processes to sense the environments in which they are located and respond to changes in or conditions of those environments. In addition, many smart devices can receive direct instruction from users via a user interface or a user-input device, including microphones capable of receiving voice or other audio commands. Automobiles represent an under-utilized place for the use or implementation of smart devices.

Description:

Smart devices continue to proliferate as the Internet-of-Things expands. Advances in both automotive and computing device technology now allow smart device functionality to be integrated into automobiles. In some circumstances, smart device functionality can be incorporated into the computing system of the automobile itself. In other circumstances, smart device functionality can be present in an automobile via a secondary electronic device, such as a dongle coupled to an automobile's on-board diagnostic port. In either circumstance, smart device functionality can be integrated into the automobile without the need of, or compromising the performance of, a driver's or passenger's mobile device.

Smart computing devices include things like thermostats, home assistants, ovens, refrigerators, cameras, lights, switches, security systems, monitors, robots, appliances, mobile phones, tablets, or home theater components. A smart device can be directly connected to the Internet or indirectly connected to the Internet via a communication hub. The smart devices can be accessed and manipulated using a web browser, an application on a mobile device, a local remote, or programing system (*e.g.*, voice commands, home automation systems). The smart devices can also connect and interact with one another. For example, a home theater system that is turning on could send a signal that instructs the lights in the room to dim after a certain amount of time, a security camera could recognize an authorized individual and automatically open a door lock, or an automobile audio system could automatically select a radio station based on a vocal profile associated with a driver.

Automobiles represent an interesting challenge and opportunity in the implementation of smart devices, primarily because many smart devices either depend on or are improved by an internet connection. As noted above, many smart devices like cameras or home assistants operate

in a single location and are stationary. Such stationary locations can be selected, or designed, to feature reliable wired or wireless internet connections. However, by their very nature, automobiles (or other transportation vehicles) move from one location to another, which makes reliable internet connections more difficult to maintain.

Some techniques rely on a separate device to provide a reliable internet connection to an automobile, such as a mobile phone. However, most such techniques simply pass through or mirror the signal or operations of the mobile phone via an existing computing system of the automobile. Thus, the mobile phone is the actual smart device and the automobile merely broadcasts the smart functionality of the mobile phone. Although many advances have been made to mobile phone communication networks and technology, some challenges remain. For example, a forgotten mobile phone or a mobile phone with a depleted battery renders the automobile unable to participate in any smart device operations. Additionally, as the number of mobile phones continues to rise, the automobile computing system could have difficulty selecting or interfacing with a particular mobile phone or device among multiple mobile phones or devices (e.g., each passenger in an automobile may have any number of mobile phones, tablets, or computing watches, any of which could provide the "smart" internet connectivity or smart functionality for the automobile).

Consider instead the environment of Figure 1. Figure 1 shows an interior space of an automobile, such as a car or truck. Although the environment of Figure 1 most closely resembles the dashboard and steering wheel of a car or truck, the car assistant discussed herein could be integrated into any given vehicle, such as a motorcycle, train, plane, all-terrain vehicle, or the like. In Figure 1, a central console features a touchscreen user interface (although any other type of user input device would suffice). The vehicle of Figure 1 features a built-in or integrated car assistant.

The car assistant operates as part of the computing systems of the vehicle. In this manner, the car assistant can be designed to function seamlessly with other systems of the vehicle, such as a global positioning system, a map system, an audio system, vehicle diagnostic systems, climate controls, lights, and other systems. In this mode, the car assistant may not need an internet connection because its operation and function can be confined to the systems already present in the automobile itself.

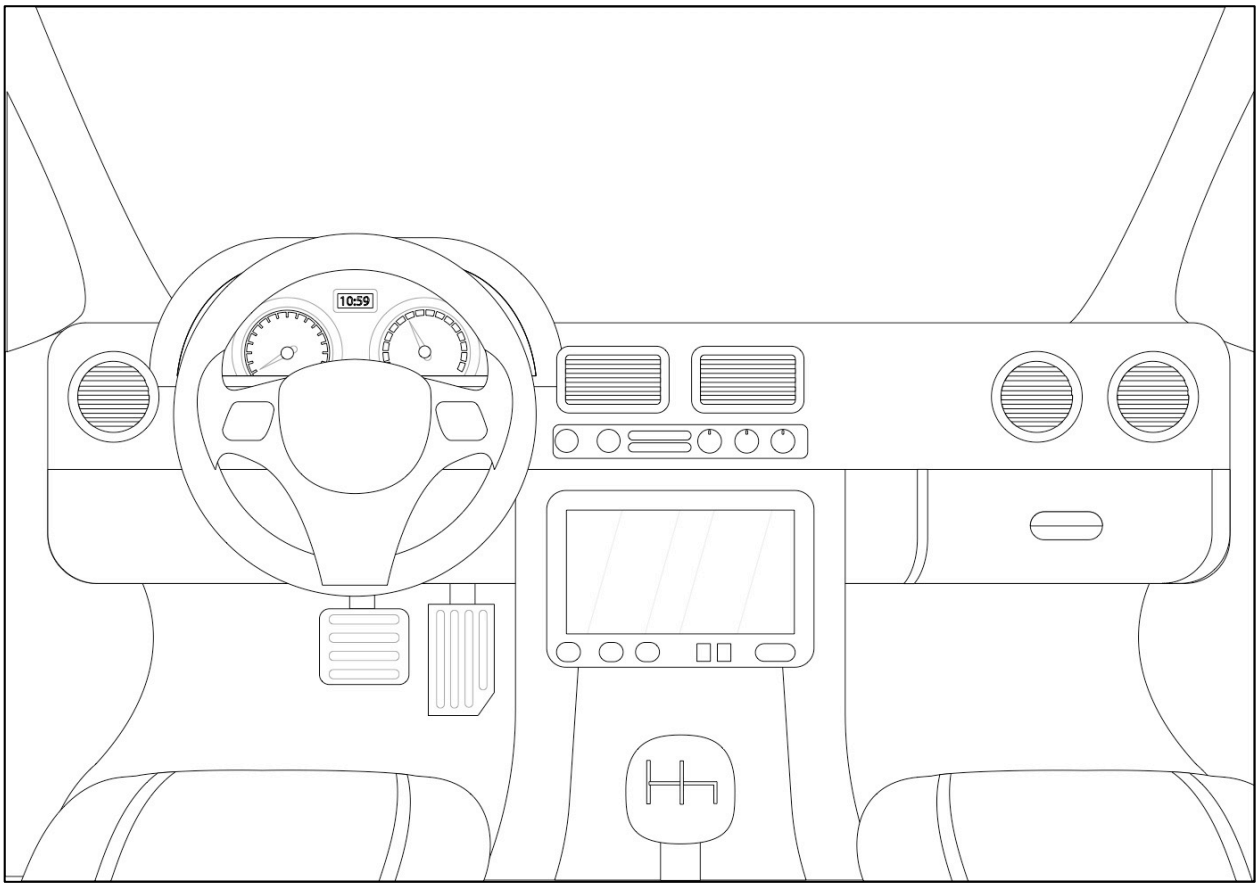

Figure 1

The integrated car assistant can also provide additional operation and functionality by leveraging an internet connection. The car assistant could access the internet via a built in wireless connection of the automobile or through other wireless connectivity means, including sharing a cellular connection with a mobile device as noted above.

An integrated car assistant can provide many benefits to a driver or a passenger of a vehicle. A car assistant connected to a shopping service could be used to order supplies for the vehicle itself at the time someone in the vehicle recognizes a need for the supplies. For example, a driver could recognize the need for new windshield wipers or additional windshield washer fluid while driving and order the wipers or the fluid at that time, which can help a driver avoid forgetting to order the wipers or the fluid when returning home or arriving at a workplace. Additionally, a car assistant could enable a driver or a passenger to determine or evaluate a condition of the vehicle itself, such as a need for an oil change, tire pressures, maintenance needs, details of a check engine light, or any number of other conditions of the vehicle. Similar to an at-home, stationary, or other virtual assistant, the car assistant could also allow a driver or passenger to get weather information, query a search engine, make phone calls, find particular music or other audio content, play trivia games, or any other of the nearly limitless activities possible through a virtual assistant.

Not all vehicles will feature a built-in or integrated car assistant. However, a secondary electronic device can provide a car assistant to such vehicles. Consider the environment of Figure 2. Although similar to the dashboard and steering wheel of Figure 1, Figure 2 also includes a car assistant dongle or device plugged into the on-board diagnostic port just to the left and below the steering wheel. The car assistant dongle can not only connect to systems of the automobile but can also draw power from the automobile itself. In other arrangements, the car assistant dongle could plug into a twelve-volt electric port such as a cigarette lighter. In this arrangement, a wireless connection (such as a Bluetooth connection through an audio system) could allow the car assistant to interface with other systems and components of the vehicle. Here, the car assistant dongle could include its own internet or other connectivity (e.g., a standalone SIM card for connecting to a

cellular network) or make use of the connectivity of another device (e.g., the wireless capabilities of the vehicle itself).

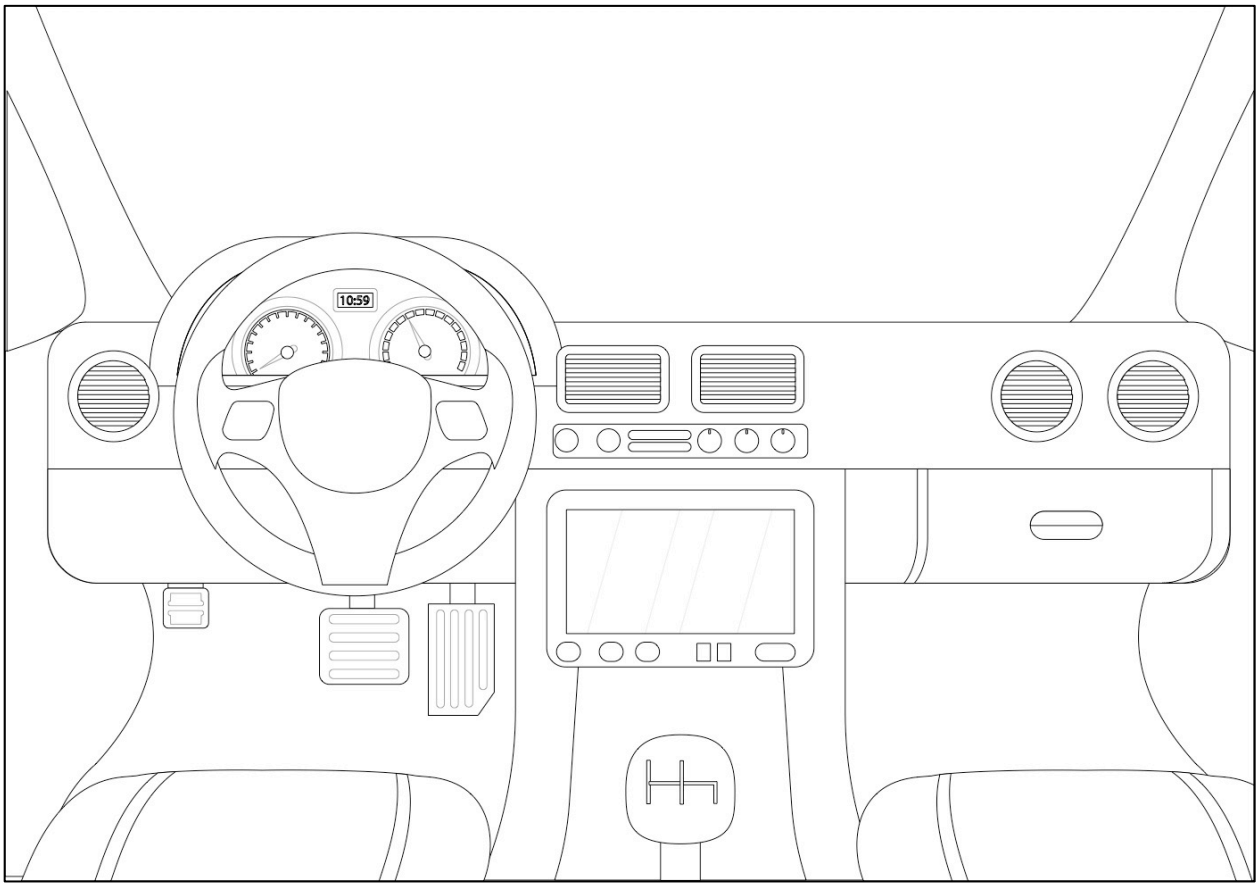

Figure 2

A separate device or portable car assistant can offer several advantages. For example, a traveling sales representative could take a car assistant to use in a rental vehicle. The car assistant could log traveled miles automatically or automatically connect to a toll-road payment service. The car assistant could sync a prepared travel itinerary with a map system of the vehicle. In some embodiments, the separate or portable car assistant could include its own cellular or other internet connection, which could be very useful in vehicles without internet connectivity or where sharing internet connectivity with another device (such as a mobile phone) could be cost prohibitive or

technologically unfeasible (such as in a foreign country where a mobile phone does not possess compatible hardware).

A separate device or portable car assistant could be designed to work only with certain vehicles. For example, each individual vehicle has its own unique vehicle identification number. In programming or calibrating the car assistant, a list of approved vehicles can be established. In this manner, the car assistant cannot be activated in a non-approved vehicle or in the event of a lost, forgotten, or stolen car assistant.

A separate device could also include global positioning system capabilities or a standalone SIM card port (e.g., to connect with a cellular network or a global internet provider). Although many cellular or mobile phones can provide location services, the locations are often derived from the cellular tower signals themselves. Thus, outside of the cellular network, many mobile phones can no longer provide map guidance, direction, or other services. A portable car or vehicle assistant with built-in global positioning capabilities could be very useful in out-of-network locations, such as wilderness areas. For example, a search team could engage with the car assistant to obtain additional information (such as search vehicle diagnostics, data from other sensors associated with the search, or data regarding the search vehicle's location) while in a remote area without diverting attention away from the terrain, driving the vehicle, or the search. A standalone SIM card port could allow a user to quickly and easily transfer his or her settings, configurations, or preferences among various car assistants or among various vehicles with car assistants.

Additionally, any number of methods could be invoked by a driver or a passenger of the vehicle to interact with the car assistant, such as a button or switch. In a useful embodiment, a microphone (not shown in Figure 1 or Figure 2) could be placed on a steering wheel, near a rear-view mirror, or at any other strategic location within the vehicle. The microphone can be

configured to receive audio commands from a user, which would allow the user to operate the car assistant without taking his or her hands from the steering wheel or looking away from the road conditions. The car assistant could initially require a key word, phrase, or sound to commence active interaction with a driver or passenger of the vehicle.

The car assistant could be configured or calibrated to respond to a limited number of individuals or to respond only to approved individuals. For example, a car assistant configured to adjust the volume on an audio system or make a purchase could respond only to an approved adult or parent instead of responding to a child. The car assistant could also be configured to connect to different individual profiles. For example, a husband and wife that share a car or employees sharing a common company vehicle could also have separate and unique accounts associated with a same car assistant. In such circumstances, the car assistant can be configured to respond uniquely to different individuals. In some configurations, a button or switch could be used to prevent the car assistant from monitoring audio or other conditions in the vehicle.

Smart devices continue to proliferate as the Internet-of-Things expands. Advances in both automotive and computing device technology now allow smart device functionality to be integrated into automobiles. In some circumstances, smart device functionality can be incorporated into the computing system of the automobile itself. In other circumstances, smart device functionality can be present in an automobile via a secondary electronic device, such as a dongle coupled to an automobile's on-board diagnostic port. In either circumstance, smart device functionality can be integrated into the automobile without the need of, or compromising the performance of, a driver's or passenger's mobile device.