US 20070016342A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2007/0016342 A1**

Allen et al. (43) **Pub. Date: Jan. 18, 2007**

(54) **INTERFACE TO VEHICLE SECURITY AND CONVENIENCE SYSTEMS**

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(21) Appl. No.: **11/454,783**

(22) Filed: **June 19,**

Related U.S. Application Data

(60) Provisional application No. 60/691,250, filed on Jun. 17, 2005.

Publication Classification

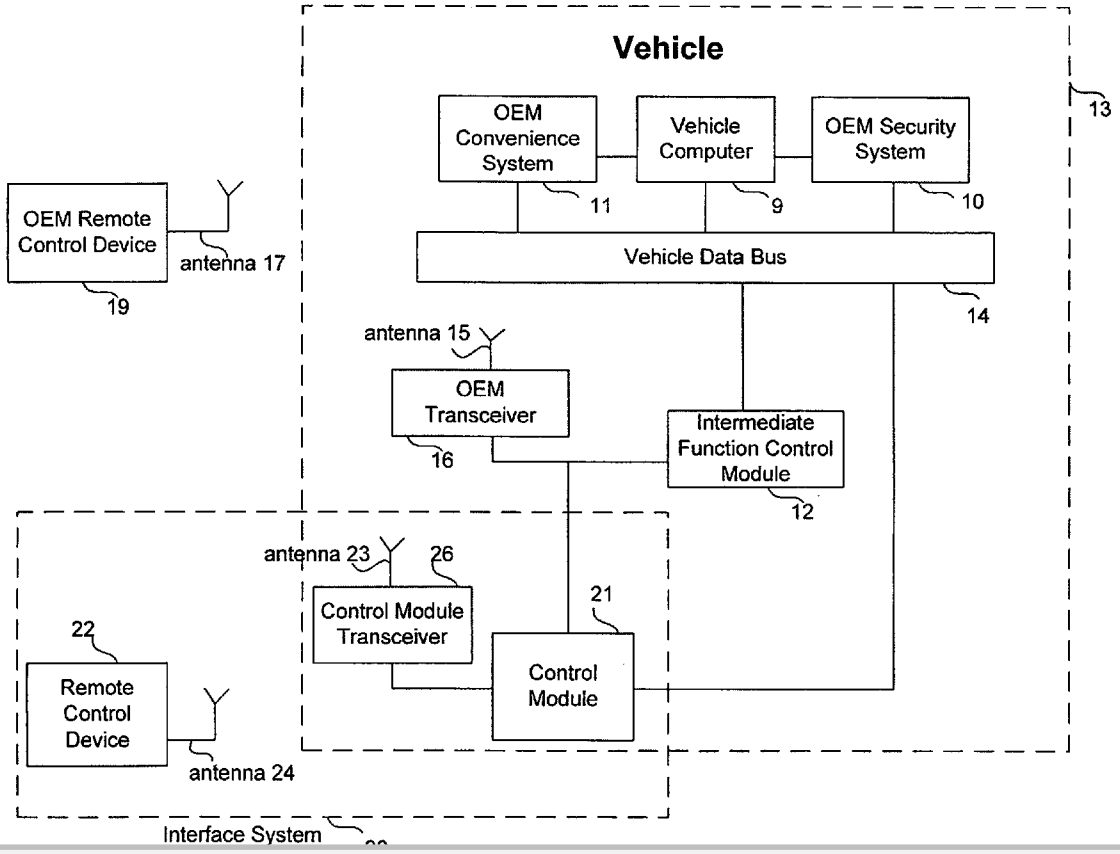
(51) **Int. Cl.**

G05D 1/00	(2006.01)
G05D 3/00	(2006.01)
G06F 17/00	(2006.01)
G06F 7/00	(2006.01)
G08C 19/12	(2006.01)
H04L 17/02	(2006.01)

(52) **U.S. Cl.** **701/2**; 341/176

(57) **ABSTRACT**

An interface system to a vehicle data bus having a communication range greater than a communication range between an Original Equipment Manufacturer (OEM) transceiver and an OEM remote control device already integrated in a vehicle. The interface system comprises a remote control device, a control module transceiver and a control module. The range-extension of the system is performed by either having receivers with higher detection sensitivity or transmitters emitting signals at higher powers, or a combination of both. The interface system has a control module that can communicate with either one of, or both, the data bus and the function control module of the vehicle. Finally, the interface system also permits a bi-directional communication scheme between the remote control device and the control module transceiver.



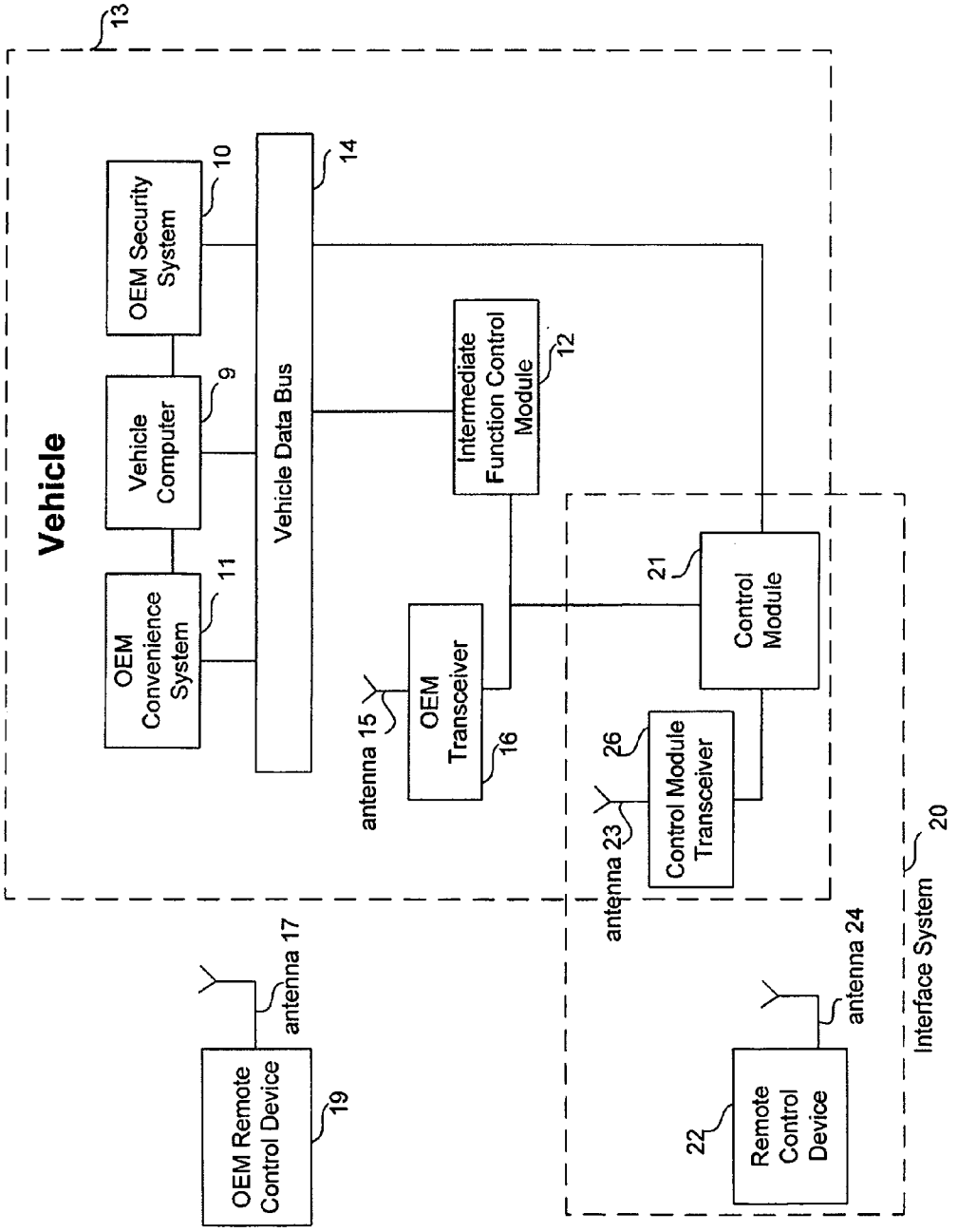


Fig. 1

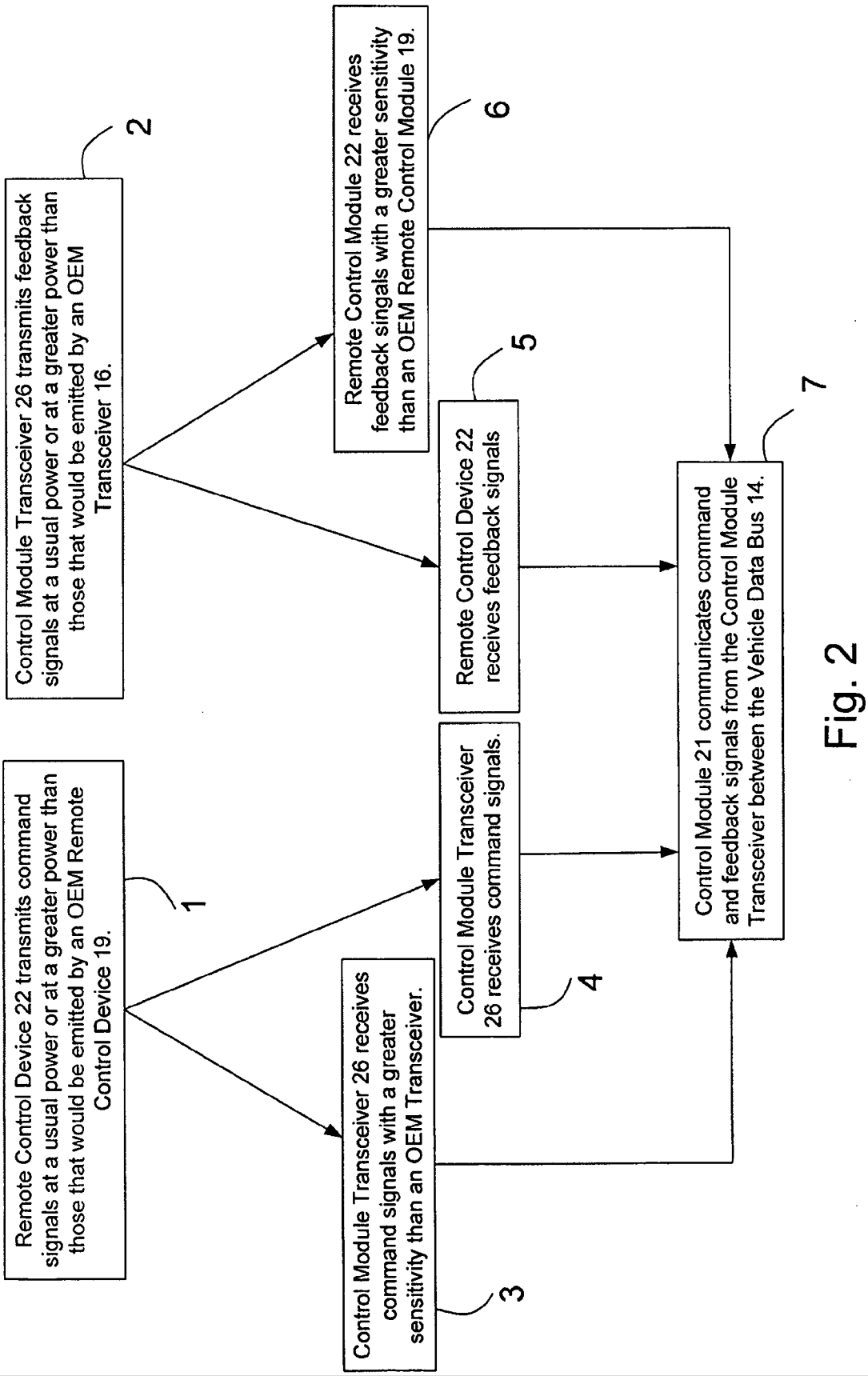


Fig. 2

INTERFACE TO VEHICLE SECURITY AND CONVENIENCE SYSTEMS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35USC§119(e) of U.S. provisional patent application 60/691,250, filed on Jun. 17, 2005 by Allen, the specification of which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1) Field of the Invention

[0003] The invention relates to the vehicle wireless convenience and security device industry.

[0004] 2) Description of the Prior Art

[0005] Up until recently, the wireless (RF) control of vehicle functions has been limited to aftermarket products that made this possible. The extent of vehicle functions has also escalated from simple actions such as door locking and unlocking functionalities to starting the engine, opening the trunk and controlling panic modes buttons. Gradually, vehicle manufacturers have chosen to integrate certain vehicle functions as standard wireless control features within their product lines. Also, vehicles have evolved in terms of their control and communications architecture.

[0006] Whereas every function or feedback in a vehicle required a physical connection, common or parallel applications required parallel sets of harnesses in order to achieve their functional objectives. This practice was inefficient, expensive and difficult to troubleshoot. Modern methods now permit the concept of communications data buses to be integrated inside vehicles. Commands can thus be initially launched onto the data bus and then collected by the appropriate device for execution of a particular function. Certain types of vehicles are also equipped with functional control modules dedicated to controlling specific vehicle functions. A factory installed, or Original Equipment Manufacturer (OEM) remote control device can therefore be used to transmit commands to the OEM receiver/antenna, or transceiver, which sends them to the FCM for input onto the data bus and execution by the appropriate vehicle functional device.

[0007] One shortcoming of such OEM vehicle integrated systems is that the effective RF distance range of these factory systems is rather short under the best of circumstances. Another important drawback is the limited number of functions addressable by the OEM remote control device, while a much wider range of functions may be executable by the vehicle itself.

[0008] There is hence a growing consumer demand for systems that are capable of providing an interface with the factory installed vehicle devices (e.g., security and others). Furthermore, these interface systems nowadays usually require a rather complex installation process such that all the electrical connections must be considered; themselves often depending on the type of vehicle available in the marketplace. A need therefore exists for providing enhanced interface systems to vehicle security and convenience systems.

SUMMARY OF THE INVENTION

[0009] ... installation in a vehicle having a data bus, the interface system operating over a greater communication distance than a communication distance between an Original Equipment Manufacturer (OEM) transceiver and an OEM remote control device; the OEM transceiver being integrated in the vehicle and the interface system comprising: (1) a remote control device comprising at least one of: a transmitter for transmitting command signals, the transmitter emitting command signals at a greater power and hence having a capability of transmitting command signals over a greater distance than a transmission and distance capability of an OEM remote control device, and a receiver for receiving feedback signals, the receiver having a greater sensitivity and hence having a capability of receiving feedback signals over a greater distance than a reception and distance capability of an OEM remote control device; (2) a control module transceiver comprising at least one of: a transmitter for transmitting feedback signals and a receiver for receiving command signals; and finally, (3) a control module for communicating at least one of command and feedback signals between the control module transceiver and the vehicle data bus.

[0010] According to another embodiment of the invention, there is provided an interface system for at least partial installation in a vehicle having a data bus, the interface system operating over a greater communication distance than a communication distance between an Original Equipment Manufacturer (OEM) transceiver and an OEM remote control device, the OEM transceiver being integrated in the vehicle and the interface system comprising: (1) a remote control device comprising at least one of: a transmitter for transmitting command signals and a receiver for receiving feedback signals; (2) a control module transceiver comprising at least one of: a transmitter for transmitting feedback signals, the transmitter emitting the feedback signals at a greater power and hence having a capability of transmitting the feedback signals over a greater distance than a transmission and distance capability of an OEM transceiver; and a receiver for receiving command signals, the receiver having a greater sensitivity and hence having a capability of receiving the command signals over a greater distance than a reception and distance capability of an OEM transceiver; and finally, (3) a control module for communicating at least one of command signals and feedback signals between the control module transceiver and the data bus.

[0011] According to yet another embodiment of the invention, there is provided a method for interfacing to a data bus installed in a vehicle, the interfacing method enabling a communication over a greater distance than a communication distance between an Original Equipment Manufacturer (OEM) transceiver and an OEM remote control device, the OEM transceiver being integrated in said vehicle and the interfacing method comprising (1) providing a remote control device comprising for performing at least one of: transmitting command signals at a greater power and hence transmitting the command signals over a greater distance than a transmission and distance capability of an OEM remote control device; and receiving feedback signals with a greater sensitivity and hence receiving these feedback signals over a greater distance than a reception and distance capability of an OEM remote control device; (2) providing a control module transceiver comprising for performing at ...

ule for communicating at least one of command signals and feedback signals between the control module transceiver and the data bus.

[0012] According to yet another embodiment of the invention, there is provided a method for interfacing to a data bus installed in a vehicle, the interfacing method enabling a communication over a greater distance than a communication distance between an Original Equipment Manufacturer (OEM) transceiver and an OEM remote control device, the OEM transceiver being integrated in said vehicle and the interfacing method comprising: (1) providing a remote control device comprising for performing at least one of: transmitting command signals and receiving feedback signals; (2) providing a control module transceiver comprising for performing at least one of: transmitting feedback signals at a greater power and hence transmitting said feedback signals over a greater distance than a transmission and distance capability of said OEM transceiver; and receiving command signals with a greater sensitivity and hence receiving said command signals over a greater distance than a reception and distance capability of said OEM transceiver; and finally (3), providing a control module for communicating at least one of said command signals and said feedback signals between said control module transceiver and said data bus.

[0013] According to yet another embodiment of the invention, there is provided an interface system for at least partial installation in a vehicle having a data bus, the interface system operating over a greater communication distance than a communication distance between an Original Equipment Manufacturer (OEM) transceiver and an OEM remote control device, the OEM transceiver being integrated in the vehicle, the interface system comprising: a remote control device comprising at least one of: a transmitter for transmitting command signals; and a receiver for receiving feedback signals; a control module transceiver comprising at least one of: a transmitter for transmitting feedback signals; a processor for providing control module transceiver signals which emulate the OEM transceiver signals corresponding to known vehicle functions or commands to be decoded by the IFCM and a receiver for receiving command signals; and a control module for communicating at least one of the command signals and the feedback signals between the control module transceiver and the data bus; wherein said greater communication distance being the result of at least one of: transmitting signals at a power level on a communication link between said remote control device and said control module transceiver that is greater than a power level between said OEM transceiver and said OEM remote control device; receiving signals with a sensitivity level of at least one of remote control device receiver and control module transceiver receiver that is greater that a sensitivity level of at least one of said OEM transceiver and said OEM remote control device; transmitting signals on said communication link with a data rate on link between remote control device and control module transceiver that is lower than a data rate between said OEM transceiver and said OEM remote control device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further features and advantages of the present invention will become apparent from the following detailed

[0015] FIG. **1** is a block diagram showing an interface system and its environment according to an embodiment of the invention.

[0016] FIG. **2** is a block diagram showing the interfacing method used by the interface system in its environment according to another embodiment of the invention.

[0017] It will be noted that throughout the appended drawings, like features are identified by like reference numerals.

DETAILED DESCRIPTION OF THE INVENTION

[0018] Referring to FIG. **1**, vehicle **8** is shown, equipped with factory installed security systems such as OEM Security System **10**, OEM Convenience System **11**, and Vehicle Computer **9**). Many vehicles are now also equipped with a functional control module (FCM), referred to herein as an Intermediate Function Control Module (IFCM) **12**, which is connected to the Vehicle Data Bus **14**. The IFCM **12** may also be interpreted as a Body Control Module (BCM). Finally, vehicles are also often equipped with a factory installed OEM transceiver **16**, equipped with an OEM receiver and transmitter (not shown) and an antenna referred to herein as antenna **15**. OEM Transceiver **16** can communicate with an IFCM **12** and with an OEM keyless or Remote Control Device **19** (also equipped with a transmitter and receiver (not shown) and with an illustrated antenna **17**). The IFCM **12** generally exercises the control over vehicle functions such as door locks, sliding doors, factory installed alarms and the like via the Vehicle Data Bus **14**.

[0019] The Interface System **20** thus provides vehicles equipped with an FCM, now referred to as an IFCM **12**, the capability of interfacing with such an IFCM **12** and/or a Vehicle Data Bus **14**. More specifically, the Interface System **20** is meant to provide this capability by using a Remote Control Device **22**, a Control Module **21** with a Control Module Transceiver **26**, this transceiver comprising its own receiver, transmitter (not shown), and antenna **23**. Similarly, the Remote Control Device **22** is also equipped with a receiver and transmitter (not shown), as well as an antenna **24**. Both the Remote Control Device **22** and the Control Module Transceiver **26** are designed such that their receiver offers greater reception sensitivity and their transmitter emits signals with a greater power, thereby providing the Interface System **20** with for a much greater communication distance than the distance offered by OEM systems. For example, for one embodiment of the invention where the environment is an open field, and in which a communication between the Remote Control Device **22** and the Control Module Transceiver **26** is performed in the Radio-Frequency (RF) range, at either 372.5 MHz or 433.92 MHz, the communication distance is between 1000 to 2000 feet. Communication distance is usually determined by the receiver sensitivity, itself dependent on the intrinsic receiver sensitivity, the type of antenna used, the data rate, the location of the antenna within the Vehicle **8**, and the physical environment enclosed within the communication range (trees, buildings and RF interferences for example). Again as an example, and in one embodiment of the invention, it is measured that the Remote Control Device **22** has a receiver

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