

DESCRIPTION

DATA TRANSMISSION AND RECEPTION SYSTEM, DATA TRANSMISSION AND
RECEPTION METHOD, INFORMATION PROCESSING DEVICE, PROGRAM, AND
5 RECORDING MEDIUM

TECHNICAL FIELD

[0001]

The present invention relates to a data transmission and reception system, a data
10 transmission and reception method, an information processing device, a program, and a
recording medium. Particularly, the present invention relates to a data transmission and
reception system in which an information processing device transmits and receives data,
a data transmission and reception method, an information processing device that
performs information processing, a program that causes a computer function as the
15 information processing device, and a recording medium that stores the program.

Priority is claimed on Japanese Patent Application No. 2011-283643, filed
December 26, 2011, the content of which is incorporated herein by reference.

BACKGROUND ART

20 [0002]

Automobiles are occasionally provided with in-vehicle devices for transmitting
and receiving data indicating various information concerning vehicles to and from
external devices (see, for example, Patent Document 1). In-vehicle devices transmit
data to external devices using wireless communication, such as DSRC (dedicated short
25 range communication).

CITATION LIST

[Patent Document]

[0003]

5 [Patent Document 1] Japanese Patent Publication No. 3353821

DISCLOSURE OF THE INVENTION

Problems to be Solved by the Invention

[0004]

10 In some cases, data to be transmitted from in-vehicle devices becomes necessary even when engines of automobiles are not started. However, in-vehicle devices generally operate using the power supplied from batteries of automobiles. Accordingly, in-vehicle devices cannot transmit data to external devices when the power is not supplied from the batteries of the automobiles, such as when the engines of the
15 automobiles are not started.

Means for Solving the Problems

[0005]

To solve the above problem, according to a first embodiment of the present
20 invention, a data transmission and reception system, in which an information processing device is configured to transmit and receive data, includes: an information processing device configured to perform information processing; and an IC tag configured to receive data from the information processing device and store the received data in a case that the IC tag is activated by receiving a power supplied from the information processing device,
25 and transmit the stored data to a reader in a case that the IC tag is activated by receiving

an electric wave transmitted from the reader. The information processing device includes a data transmitting unit configured to transmit to the IC tag, data indicating information to be referred to in a situation where the information processing device is not activated.

5 [0006]

The information processing device may further include a disconnection detecting unit configured to, in a case that a power supply to the information processing device is disconnected, detect disconnection of the power supply. The data transmitting unit may be configured to transmit data in a case that the disconnection detecting unit
10 detects the disconnection of the power supply to the information processing device.

[0007]

The information processing device may further include an information obtaining unit configured to obtain information to be referred to in a situation where the information processing device is not activated. The data transmitting unit may be
15 configured to transmit data indicating the information obtained by the information obtaining unit.

[0008]

The IC tag may be configured to, in a case that the IC tag is activated by receiving the electric wave transmitted from the reader and receives data transmitted
20 from the reader, store the received data. The information processing device may further include: a transmission requesting unit configured to, in a case that the information processing device is activated, request the IC tag to transmit data; a data receiving unit configured to receive data transmitted from the IC tag; and an information processing unit configured to perform information processing in accordance with contents of
25 information indicated by the data received by the data receiving unit.

[0009]

According to a second embodiment of the present invention, a data transmission and reception method for an information processing device to transmit and receive data, includes a data transmission step of the information processing device transmitting to an IC tag, data indicating information to be referred to in a situation where the information processing device is not activated.

[0010]

According to a third embodiment of the present invention, an information processing device configured to perform information processing, includes a data transmitting unit configured to transmit to an IC tag, data indicating information to be referred to in a situation where the information processing device is not activated.

[0011]

According to a fourth embodiment of the present invention, a program causes a computer to function as an information processing device configured to perform information processing. The program causes the computer to function as a data transmitting unit configured to transmit to an IC tag, data indicating information to be referred to in a situation where the information processing device is not activated.

[0012]

According to a fifth embodiment of the present invention, a recording medium stores a program to cause a computer to function as an information processing device configured to perform information processing. The program causes the computer to function as a data transmitting unit configured to transmit to an IC tag, data indicating information to be referred to in a situation where the information processing device is not activated.

[0013]

Here, the above summary of the invention does not include all the essential characteristics of the present invention. Additionally, any combination of the above characteristics can be within the scope of the present invention.

5 Effects of the Invention

[0014]

As is clear from the above descriptions, it is possible to read from an IC (integrated circuit) tag that is activated by receiving an electric wave transmitted from a reader, data indicating information to be referred to in a situation where the information
10 processing device is not activated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a diagram illustrating an example of use environments for a data
15 transmission and reception system 100 according to one embodiment.

FIG. 2 is a diagram illustrating an example of a block configuration of an in-vehicle device 110.

FIG. 3 is a diagram illustrating an example of a processing flow for the in-vehicle device 110.

20 FIG. 4 is a diagram illustrating an example of a processing flow for the in-vehicle device 110.

FIG. 5 is a diagram illustrating an example of a hardware configuration of a computer 800 constituting the in-vehicle device 110 according to the present embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0016]

Hereinafter, the present invention will be described using embodiments of the present invention. The embodiments below do not limit the claimed inventions, and all combinations of features described in the embodiments are not essential to means for solving the problems.

[0017]

FIG. 1 is a diagram illustrating an example of use environments for a data transmission and reception system 100 according to one embodiment. The data transmission and reception system 100 is a system in which an in-vehicle device 110 transmits and receives data. More specifically, the data transmission and reception system 100 includes an in-vehicle device 110 and an IC tag 130. Additionally, the in-vehicle device 110 and the IC tag 130 are connected by communication via a communication cable. Further, the in-vehicle device 110 may be one example of the “information processing device” of the present invention. Here, the information processing device means a device that performs information processing.

[0018]

The in-vehicle device 110 is a device that performs information processing concerning an electric automobile V. More specifically, the in-vehicle device 110 receives the power supplied from a battery B of the electric automobile V and thus operates using the received power. Additionally, the in-vehicle device 110 supplies the power to the IC tag 130 via the communication cable while the in-vehicle device 110 receives the power supplied from the battery B. Further, the in-vehicle device 110 transmits and receives data to and from the IC tag 130.

[0019]

The IC tag 130 is a wireless IC chip. More specifically, the IC tag 130 is activated by receiving the power supplied from the in-vehicle device 110 via the communication cable. In this case, the IC tag 130 transmits and receives data to and from the in-vehicle device 110. When the IC tag 130 receives data from the in-vehicle device 110, the IC tag 130 stores that data. Additionally, the IC tag 130 is activated by receiving an electric wave transmitted from a reader R. In this case, the IC tag 130 transmits and receives data to and from the reader R. When the IC tag 130 receives data from the reader R, the IC tag 130 stores that data. Here, the reader means a device that performs reading and writing of data from and to the IC tag 130.

10 [0020]

In order to avoid complicated descriptions, descriptions will be given in the present embodiment with respect to a configuration such that the data transmission and reception system 100 includes one in-vehicle device 110 and one IC tag 130 for one electric automobile V. However, the data transmission and reception system 100 may include multiple in-vehicle devices 110 and multiple IC tags 130 for one electric automobile V

[0021]

FIG. 2 is a diagram illustrating a block configuration of the in-vehicle device 110. The in-vehicle device 110 includes a disconnection detecting unit 111, an information obtaining unit 112, a data transmitting unit 113, a transmission requesting unit 114, a data receiving unit 115, and an information processing unit 116. Hereinafter, functions and processing of each constituent element will be described.

[0022]

The disconnection detecting unit 111, when a power supply to the in-vehicle device 110 is disconnected, detects that disconnection.

[0023]

The information obtaining unit 112 obtains information to be referred to in a situation where the in-vehicle device 110 is not activated.

[0024]

5 The data transmitting unit 113 transmits to the IC tag 130, data indicating information to be referred to in a situation where the in-vehicle device 110 is not activated. More specifically, the data transmitting unit 113 transmits data when the disconnection detecting unit 111 detects disconnection of the power supply to the in-vehicle device 110. Additionally, the data transmitting unit 113 transmits data
10 indicating the information obtained by the information obtaining unit 112.

[0025]

The transmission requesting unit 114 requests the IC tag 130 to transmit data, when the in-vehicle device 110 is activated.

[0026]

15 The data receiving unit 115 receives data transmitted from the IC tag 130.

[0027]

The information processing unit 116 performs information processing in accordance with the contents of information indicated by the data received by the data receiving unit 115.

20 [0028]

FIG. 3 is a diagram illustrating an example of a processing flow for the in-vehicle device 110. Regarding the processing flow, descriptions are given with respect to processing of the in-vehicle device 110 when a power supply to the in-vehicle device 110 is terminated. Here, to describe the processing flow, FIGS. 1 and 2 are
25 referred to.

[0029]

The in-vehicle device 110 is operating using the power supplied from the battery B of the electric automobile V. In this case, the IC tag 130 has been activated by receiving the power supplied from the in-vehicle device 110 via the communication cable.

5 For some reasons, however, the power supplied to the in-vehicle device 110 is disconnected. In that case, the in-vehicle device 110 shuts down after performing processes of the processing flow shown in FIG. 3. Here, while performing the processes of the processing flow shown in FIG. 3, the in-vehicle device 110 temporarily uses the power, such as the power supplied from a supplemental battery of the in-vehicle device
10 110.

[0030]

When the power supply to the in-vehicle device 110 is disconnected, the disconnection detecting unit 111 detects that disconnection (S101). Here, examples of situations where the power supply to the in-vehicle device 110 is disconnected include a
15 case where an engine of the electric automobile V is stopped by an operation of a switch such as an ignition key or an engine starter, a case where the battery B of the electric automobile V is dead, a case where the electric automobile V is broken, and the like. Upon detecting the disconnection of the power supply to the in-vehicle device 110, the disconnection detecting unit 111 transmits data indicating the disconnection to the
20 information obtaining unit 112.

[0031]

Upon receiving the data transmitted from the disconnection detecting unit 111, the information obtaining unit 112 of the in-vehicle device 110 obtains information to be referred to in a situation where the in-vehicle device 110 is not activated (S102). More
25 specifically, the information obtaining unit 112 obtains from a computer of the electric

automobile V via a CAN (controller area network) for the electric automobile V or the like, data indicating conditions at the time the power supply to the in-vehicle device 110 become disconnected. Then, in accordance with the conditions indicated by the obtained data, the information obtaining unit 112 obtains from various devices connected to the CAN for the electric automobile V, information to be referred to in the situation where the in-vehicle device 110 is not activated. For example, in a case where the power supply to the in-vehicle device 110 is disconnected because the engine of the electric automobile V is stopped by an operation of a switch such as an ignition key or an engine starter, the information obtaining unit 112 obtains information concerning the remaining amount of charged power or a mileage, as the information to be referred to in the situation where the in-vehicle device 110 is not activated. Additionally, for example, in a case where the power supply to the in-vehicle device 110 is disconnected because the battery B of the electric automobile V is dead, the information obtaining unit 112 obtains information concerning the remaining amount of charged power, as the information to be referred to in the situation where the in-vehicle device 110 is not activated. Further, for example, in a case where the power supply to the in-vehicle device 110 is disconnected because the battery B of the electric automobile V is broken, the information obtaining unit 112 obtains fault diagnosis information, as the information to be referred to in the situation where the in-vehicle device 110 is not activated. Then, the information obtaining unit 112 gives the data indicating the obtained information to the data transmitting unit 113.

[0032]

The data transmitting unit 113 of the in-vehicle device 110, upon receiving the data received from the information obtaining unit 112, transmits that data to the IC tag 130 (S103). The IC tag 130, upon receiving the data transmitted from the in-vehicle

device 110, stores that data. Thereafter, the in-vehicle device 110 is shut down.

[0033]

Thus, the IC tag 130 stores the information to be referred to in the situation where the in-vehicle device 110 is not activated. Accordingly, for example, a user of the electric automobile V can, using the reader R, without starting the engine of the electric automobile V, refer to information supposed to become referable after the in-vehicle device 110 is activated. Additionally, as described above, even in the cases where the battery B of the electric automobile V is dead and where the electric automobile V is broken, the IC tag 130 stores information to be referred to in the situation where the in-vehicle device 110 is not activated. Accordingly, for example, a user of the electric automobile V can refer to useful information even in such a situation where the engine of the electric automobile V cannot be started.

[0034]

FIG. 4 is an example of a processing flow for the in-vehicle device 110.

Regarding the processing flow, descriptions are given here with respect to processing of the in-vehicle device 110 when the power supply to the in-vehicle device 110 is initiated. Here, to describe the processing flow, FIGS. 1 to 3 are referred to.

[0035]

For example, information to be input to the in-vehicle device 110 while the in-vehicle device 110 is not activated, such as while the engine of the electric automobile V is stopped, is stored in the IC tag 130 with use of the reader R. Here, examples of the information to be input to the in-vehicle device 110 while the in-vehicle device 110 is not activated include a parking fee, a charging fee, and the like.

[0036]

When a switch, such as an ignition key or an engine starter, is operated, the

in-vehicle device 110 is activated by receiving the power supplied from the battery B of the electric automobile V. Once the in-vehicle device 110 is activated, the IC tag 130 is activated by receiving the power supplied from the in-vehicle device 110 via the communication cable.

5 [0037]

Once the in-vehicle device 110 is activated, the transmission requesting unit 114 of the in-vehicle device 110 requests the IC tag 130 to transmit data (S201). Upon receiving the request for transmission of data from the in-vehicle device 110, the IC tag 130 transmits to the in-vehicle device 110, data stored in the IC tag 130 with use of the

10 reader R while the in-vehicle device 110 is not activated.

[0038]

Upon receiving the data transmitted from the IC tag 130 (S202), the data receiving unit 115 of the in-vehicle device 110 gives that data to the information processing unit 116.

15 [0039]

Upon receiving the data transmitted from the data receiving unit 115, the information processing unit 116 of the in-vehicle device 110 performs information processing in accordance with the contents of the information indicated by that data (S203). For example, when data indicating information concerning a parking fee or a

20 charging fee is received, the information processing unit 116 communicates with an external server and thereby performs an electric payment process with respect to that parking fee or the charging fee.

[0040]

Thus, the in-vehicle device 110, once activated, reads the data stored in the IC

25 tag 130 and performs information processing in accordance with the contents of the

information indicated by that data. Accordingly, for example, organizations of parking lots or charging stations can charge a parking fee or a charging fee without having the user start the engine of the electric automobile V.

[0041]

5 As described above, the in-vehicle device 110 transmits to the IC tag 130, data indicating information to be referred to in a situation where the in-vehicle device 110 is not activated. Thus, the data transmission and reception system 100 makes it possible to read from the IC tag 130 that is activated by receiving an electric wave transmitted from the reader, data indicating the information to be referred to in the situation where
10 the in-vehicle device 110 is not activated.

[0042]

 Additionally, as described above, when the power supply to the in-vehicle device 110 is disconnected, the in-vehicle device 110 detects the disconnection. Thus, the data transmission and reception system 100 makes it possible to store data in the IC
15 tag 130 when the in-vehicle device 110 shuts down.

[0043]

 Further, as described above, the in-vehicle device 110 obtains information to be referred to in the situation where the in-vehicle device 110 is not activated. Thus, the data transmission and reception system 100 makes it possible to obtain the information to
20 be referred to in the situation where the in-vehicle device 110 is not activated, if a type of such information is set to the in-vehicle device 110.

[0044]

 Moreover, as described above, the in-vehicle device 110 requests the IC tag 130 to transmit data when the in-vehicle device 110 is activated. Then, the in-vehicle device
25 110 receives data transmitted from the IC tag 130. Then, the in-vehicle device 110

performs information processing in accordance with the contents of the information indicated by that data. Thus, the data transmission and reception system 100 makes it possible to transmit data to be transmitted to the in-vehicle device 110, even when the in-vehicle device 110 is not activated.

5 [0045]

FIG. 5 is a diagram illustrating a hardware configuration of a computer 800 constituting the in-vehicle device 110 according to the present embodiment. The computer 800 according to the present embodiment includes: a CPU peripheral unit including a CPU (central processing unit) 802 mutually connected to the host controller 10 801, a RAM (random access memory) 803, a graphic controller 804, and a display 805; an input/output unit including a communication interface 807 mutually connected to the input/output controller 806, a hard disk drive 808, and a CD-ROM (compact disk read only memory) drive 809; and a legacy input/output unit including a ROM (read only memory) 810 connected to the input/output controller 806, a flexible disk drive 811, and 15 an input/output chip 812.

[0046]

The host controller 801 connects the RAM 803, the CPU 802 that accesses the RAM 803 at the high transfer rate, and the graphic controller 804. The CPU 802 operates based on programs stored in the ROM 810 and the RAM 803 and controls each 20 unit. The graphic controller 804 obtains image data that the CPU 802 or the like generates on a frame buffer provided in the RAM 803, and has the display 805 display the image data. Alternatively, the graphic controller 804 may include a frame buffer that stores image data generated by the CPU 802 or the like.

[0047]

25 The input/output controller 806 connects the host controller 801, the

communication interface 807 that is a relatively-high-speed input/output device, a hard disk drive 808, and a CD-ROM drive 809. The hard disk drive 808 stores programs and data to be used by the CPU 802 included in the computer 800. The CD-ROM drive 809 read programs or data from the CD-ROM 892 and gives the read programs or data to the
5 hard disk drive 808 via the RAM 803.

[0048]

Additionally, the input/output controller 806 is connected to the ROM 810 and a relatively-low-speed input/output device such as the flexible disk drive 811 and the input/output chip 812. The ROM 810 stores a boot program executed at the start of the
10 computer 800, and/or a program dependent on hardware of the computer 800. The flexible disk drive 811 reads a program or data from the flexible disk 891 and gives the program or data to the hard disk drive 808 via the RAM 803. The input/output chip 812 connects the flexible disk drive 811 to the input/output controller 806. Additionally, the input/output chip 812 connects various input/output devices to the input/output controller
15 806 via a parallel port, a serial port, a keyboard port, a mouse port, or the like.

[0049]

The program to be given to the hard disk drive 808 via the RAM 803 is stored in a recording medium, such as the flexible disk 891, the CD-ROM 892, or an IC (integrated circuit) card, and thus the recording medium is provided by a user. The
20 program is read from the recording medium, is installed via the RAM 803 in the hard disk drive 808 included in the computer 800, and is executed by the CPU 802.

[0050]

The program, which is to be installed in the computer 800 and to cause the computer 800 to function as the in-vehicle device 110, causes the computer 800 to
25 function as the data transmitting unit 113 that, in step S103, transmits to the IC tag 130,

data indicating information to be referred to in a situation where the computer 800 is not activated.

[0051]

Additionally, the program may cause the computer 800 to function as the
5 disconnection detecting unit 111 that, when the power supply to the computer 800 is disconnected, detects that disconnection in step S101, and as the data transmitting unit 113 that transmits data in step S103 when the disconnection detecting unit 111 detects that the power supply to the computer 800 is disconnected.

[0052]

10 Further, the program may cause the computer 800 to function as the information obtaining unit 112 that, in step S102, obtains information to be referred to in a situation where the computer 800 is not activated, and as the data transmitting unit 113 that, in step S103, transmits data indicating the information obtained by the information obtaining unit 112.

15 [0053]

Moreover, the program may cause the computer 800 to function as the transmission requesting unit 114 that, in step S201, requests the IC tag 130 to transmit data when the computer 800 is activated, and as the data receiving unit 115 that, in step S202, receives data transmitted from the IC tag 130, and as the information processing
20 unit 116 that, in step S203, performs information processing in accordance with the contents of the information indicated by the data received by the data receiving unit 115.

[0054]

The computer 800 reads the information processing described in those programs, thus functioning as specific means implemented by cooperation of software and the
25 aforementioned various hardware resources, which are the disconnection detecting unit

111, the information obtaining unit 112, the data transmitting unit 113, the transmission requesting unit 114, the data receiving unit 115, and the information processing unit 116. Additionally, those specific means implement computation or processing of information in accordance with a purpose of use of the computer 800 of the present embodiment, thereby configuring a unique in-vehicle device 110 in accordance with the purpose of use.

[0055]

As an example, when communication is performed between the computer 800 and an external device or the like, the CPU 802 executes the communication program loaded on the RAM 803. Based on the contents of processing described in the communication program, the CPU 802 instructs the communication interface 807 to perform communication processing. Under the control of the CPU 802, the communication interface 807 reads transmission data stored in a transmission buffer region or the like provided in a storage device, such as the RAM 803, the hard disk drive 808, the flexible disk 891, or the CD-ROM 892, and transmits the read transmission data to a network. Alternatively, the communication interface 807 writes reception data received from the network in a reception buffer region provided in the storage device. Thus, the communication interface 807 may transfer, by the direct memory access method, transmission and reception data between the communication interface 807 and the storage device. Alternatively, the CPU 802 may read data from the storage device or the communication interface 807, which is the transferring source, and write the data in the communication interface 807 or the storage device, which is the transferring destination, thereby transferring transmission and reception data.

[0056]

Additionally, the CPU 802 has the RAM 803 read, by the direct memory access

transfer or the like, all or a necessary part of information stored in a database or the like, or all or a necessary part of information stored in a file stored in an external storage device, such as the hard disk drive 808, the flexible disk drive 891, or the CD-ROM 892. Then, the CPU 802 performs various processing on the data read on the RAM 803.

- 5 Then, the CPU 802 writes, by the direct memory access transfer or the like, the processed data in the external storage device.

[0057]

- In such processing, the RAM 803 is considered to be a memory that temporarily stores the information stored in the external storage device. For this reason, in the
- 10 present embodiment, the RAM 803 and the external storage device or the like are collectively referred to as a storing unit, a storage device, or the like. Various information of the present embodiment, such as various programs, data, tables, or databases, is stored in such a storage device and is subject to information processing. Additionally, the CPU 802 may be configured to store part of information stored in the
- 15 RAM 803 in a cache memory so as to perform reading and writing of data on the cache memory. In such an embodiment, the cache memory serves part of the functions of the RAM 803. For this reason, in the present embodiment, the cache memory is assumed to be included in the RAM 803, a memory, and/or the storage device, unless described distinctively.

20 [0058]

- Additionally, the CPU 802 performs on the data read from the RAM 803, various processes described in the present embodiment which include various computations, processing of information, determination of conditions, search and replacement of information, and the like, which are specified by a command string of the
- 25 program. Then, the CPU 802 writes the processed data to the RAM 803. For example,

when determination of conditions is performed, the CPU 802 determines whether or not various parameters described in the present embodiment meet conditions such as whether or not one parameter is larger, smaller, larger than or equal to, smaller than or equal to, or equal to, another parameter or a fixed value. If the condition is met, or if the condition
5 is not met, the CPU 802 proceeds to another branch of a different command string or calls a subroutine.

[0059]

Further, the CPU 802 can search the information stored in the files included in the storage device, the database, or the like. For example, when the storage device
10 stores multiple entries each storing an attribute value of a first attribute and an attribute value of a second attribute in association with each other, the CPU 802 searches from among multiple entries stored in the storage device, an entry storing an attribute value of the first attribute matching a specified condition, and reads the attribute value of the second attribute stored in that entry, thereby obtaining the attribute value of the second
15 attribute associated with the first attribute meeting a predetermined condition.

[0060]

The above programs or modules may be stored in an external recording medium. Examples of the recording medium include, in addition to the flexible disk 891 and the CD-ROM 892, optical recording mediums such as a DVD (digital versatile disk) and a
20 CD (compact disk), magneto optical recording mediums such as an MO (magneto-optical disk), a tape medium, a semiconductor memory such as an IC card, and the like. Additionally, a storage medium, such as a hard disk provided for a server system connected to a dedicated communication network or the Internet, or a RAM, may be used as a recording medium, so that the programs are provided to the computer 800 via the
25 network.

[0061]

Although embodiments of the present invention have been described above, the technical scope of the present invention is not limited to the scopes of the above embodiments. Those skilled in the art will recognize that various modifications or improvements can be made to the above embodiments. It can be clearly understood from the descriptions of the claimed inventions that embodiments resulting from those modifications or improvements can be covered by the technical scope of the present invention.

[0062]

- 10 It should be noted that processing, procedure, steps, and phases, which are performed by the system, the method, the device, the program, and the recording medium described in the claims, the specification, and the drawings may be performed in arbitrary order, unless a particular language such as “before” or “prior to” is expressly used therein and an output from a previous process is used in a subsequent process.
- 15 Even if a description is made using a language such as “first” or “next” for convenience, it does not necessarily mean that processing must be performed in that order.

INDUSTRIAL APPLICABILITY

[0063]

- 20 The present invention is applicable to, for example, an in-vehicle device that transmits and receives data to and from an external device.

DESCRIPTION OF REFERENCE SYMBOLS

[0064]

- 25 100: data transmission and reception system

	110: in-vehicle device
	111: disconnection detecting unit
	112: information obtaining unit
	113: data transmitting unit
5	114: transmission requesting unit
	115: data receiving unit
	116: information processing unit
	130: IC tag
	800: computer
10	801: host controller
	802: CPU
	803: RAM
	804: graphic controller
	805: display
15	806: input/output controller
	807: communication interface
	808: hard disk drive
	809: CD-ROM drive
	810: ROM
20	811: flexible disk drive
	812: input/output chip
	891: flexible disk
	892: CD-ROM
	B: battery
25	R: reader

V: automobile

CLAIMS

1. A data transmission and reception system in which an in-vehicle device is configured to transmit and receive data, the data transmission and reception system
5 comprising:

an in-vehicle device configured to perform information processing about a vehicle; and

an IC tag configured to receive data from the in-vehicle device and store the received data in a case that the IC tag is activated by receiving a power supplied from the
10 in-vehicle device, and transmit the stored data to a reader in a case that the IC tag is activated by receiving an electric wave transmitted from the reader,

wherein the in-vehicle device comprises:

a disconnection detecting unit configured to, in a case that a power supply to the in-vehicle device is disconnected, detect disconnection of the power supply,

15 an information obtaining unit configured to, in a case that the disconnection detecting unit detects disconnection of the power supply to the in-vehicle device, obtain from a vehicle computer of the vehicle, a condition data indicating conditions at the time the power supply to the in-vehicle device become disconnected, and obtain from a device provided in the vehicle, information to be referred to in a situation where the in-vehicle
20 device is not activated, in accordance with the conditions indicated by the condition data, and

a data transmitting unit configured to transmit the data indicating information obtained by the information obtaining unit to the IC tag.

25 2. A data transmission and reception method for an in-vehicle device performing

information processing about a vehicle to transmit and receive data, the data transmission and reception method comprising:

a disconnection detecting step of the in-vehicle device; in a case that a power supply to the in-vehicle device is disconnected, detecting disconnection of the power supply,

an information obtaining step of the in-vehicle device, in a case that disconnection of the power supply to the in-vehicle device is detected in the disconnection detecting step, obtaining from a vehicle computer of the vehicle, a condition data indicating conditions at the time the power supply to the in-vehicle device become disconnected, and obtaining from a device provided in the vehicle, information to be referred to in a situation where the in-vehicle device is not activated, in accordance with the conditions indicated by the condition data, and

a data transmitting step of the in-vehicle device transmitting the data indicating information obtained in the information obtaining step to an IC tag configured to receive data from the in-vehicle device and store the received data in a case that the IC tag is activated by receiving a power supplied from the in-vehicle device.

3. An in-vehicle device configured to perform information processing about a vehicle, the in-vehicle device comprising:

a disconnection detecting unit configured to, in a case that a power supply to the in-vehicle device is disconnected, detect disconnection of the power supply,

an information obtaining unit configured to, in a case that the disconnection detecting unit detects disconnection of the power supply to the in-vehicle device, obtain from a vehicle computer of the vehicle, a condition data indicating conditions at the time the power supply to the in-vehicle device become disconnected, and obtain from a device

provided in the vehicle, information to be referred to in a situation where the in-vehicle device is not activated, in accordance with the conditions indicated by the condition data, and

5 a data transmitting unit configured to transmit the data indicating information obtained by the information obtaining unit to an IC tag configured to receive data from the in-vehicle device and store the received data in a case that the IC tag is activated by receiving a power supplied from the in-vehicle device.

4. A program to cause a computer to function as an in-vehicle device configured to
10 perform information processing about a vehicle, the program causing the computer to function as:

a disconnection detecting unit configured to, in a case that a power supply to the in-vehicle device is disconnected, detect disconnection of the power supply,

an information obtaining unit configured to, in a case that the disconnection
15 detecting unit detects disconnection of the power supply to the in-vehicle device, obtain from a vehicle computer of the vehicle, a condition data indicating conditions at the time the power supply to the in-vehicle device become disconnected, and obtain from a device provided in the vehicle, information to be referred to in a situation where the in-vehicle device is not activated, in accordance with the conditions indicated by the condition data,
20 and

a data transmitting unit configured to transmit the data indicating information obtained by the information obtaining unit to the IC tag configured to receive data from the in-vehicle device and store the received data in a case that the IC tag is activated by receiving a power supplied from the in-vehicle device.

5. A recording medium storing a program to cause a computer to function as an in-vehicle device configured to perform information processing about a vehicle, the program causing the computer to function as:

5 a disconnection detecting unit configured to, in a case that a power supply to the in-vehicle device is disconnected, detect disconnection of the power supply,

an information obtaining unit configured to, in a case that the disconnection detecting unit detects disconnection of the power supply to the in-vehicle device, obtain from a vehicle computer of the vehicle, a condition data indicating conditions at the time the power supply to the in-vehicle device become disconnected, and obtain from a device
10 provided in the vehicle, information to be referred to in a situation where the in-vehicle device is not activated, in accordance with the conditions indicated by the condition data, and

a data transmitting unit configured to transmit the data indicating information obtained by the information obtaining unit to the IC tag configured to receive data from
15 the in-vehicle device and store the received data in a case that the IC tag is activated by receiving a power supplied from the in-vehicle device.