

Description

The present invention relates to a reader/writer process of a moving wireless tag.

In recent years, RFID (Radio Frequency Identification) is one of the most noticeable interfaces in the ubiquitous society, and the use of RFID systems is expanding. RFID is applied to a tag attached to an article or the like, and management of the article or the like by reader/writer information of the tag.

Fields of RFID use are wide-ranging, such as manufacturing, distribution, amusement, and retail lease. Of course, the RFID system has many applications for moving objects. The RFID system is applied to, for example, management of products and manufacturing members of a distribution factory, and is applied to management of air baggage and the like at an airport. In general society, the RFID system is widely applied to pedestrian movement at low speed, bicycle movement at high speed, automobiles, trains, and the like.

In the RFID system, when reader/writer of a tag, reader/writer of a tag attached to a moving object is limited in moving speed of the moving object as compared to a tag attached to an object in a stopped state. Receive.

For a tag in a stopped state, it is possible to read, for example, several to 100 tags in one second. However, a tag in a moving state cannot be read from the tag readable space after a predetermined time has passed. It disappears (moves to a position where it cannot be read). That is, as the moving speed of the tag increases, the time during which the tag reader/writer process can be performed decreases.

FIG. 27 is a diagram for explaining a general RFID system. A tag 95 is affixed to the moving object (moving object) 90, and the moving object 90 is moving in the direction of the arrow at the moving speed S (m/s) of the belt conveyor 97. Information, such as the product name and serial number of the moving target 90 is written in the tag 95. Then, the moving target 90 to which the tag 95 is attached is monitored by the reader/writer 93. That is, the reader/writer 93 reads information (for example, product number) of the tag 95 that moves via the antenna, and a 94 and writes new information (for example, date of manufacture) of the tag 95.

Here, the allowable processing time that the reader/writer 93 can read/write from/to the tag 95 is such that the tag 95 can receive a radio wave from the antenna, and a 94 of the reader/writer 93 and the tag 95 receives information from the antenna, and a 94 of the reader/writer 93 is limited to the time (communication rate) that can return (reply).

For example, when the tag 95 moves at a speed of 3 m/s and the communication rate (L) between the antenna, and a 94 and the tag 95 is 1 m, 1/3 second (=333 ms) becomes. This means that the information written in the tag 95 is read within the communication time, and the write process of newly generated write data (for example, manufacturing date, expiration date, etc.) corresponds to this information, is completed. That means, as you need to.

Here, in order to increase the processing efficiency of the production line, if the speed of the belt conveyor 97 is set to 6 m/s which is twice 3 m/s, the allowable communication time with the tag 95 is shortened to 1/6 second (=167 ms). Read/write time is reduced. In order to increase the information (data amount) written to the tag 95 without changing the communication rate of the RW (antenna, and a 94), the speed of the belt conveyor 97 must be reduced, but this reduces the capacity of the production line, so it will be.

The processable (allowable) time when reader/writer of a tag in a moving state is expressed by, for example, Expression (1).

Processing time = (communication rate (L) (m)) / (moving speed S (m/sec)) (1)

That is, the tag reader/writer processing time is proportional to the communication distance between the tag and the reader (the length of the range that can communicate with the antenna, and a of the reader), and passes through the tag moving speed (the range that can communicate with the antenna, and a of the reader). Inversely proportional to (speed).

In order to cope with an increase in the moving speed of the tag, there is a method of widening the transmission range of the beam from the reader/writer device to the tag, thereby increasing the communication distance with the object (tag) and widening the antenna, and a point, and a gain. However, since the electric field/magnetic field strength of the beam is generally inversely proportional to the square of the distance separating the tag from the antenna, and a affects the communication distance, the vertical direction. It is also possible to extend the communication range (L) by expanding the antenna, and a directivity (for example, 60 degrees) in the horizontal direction, but this tends to sacrifice the vertical communication distance. In addition, there is a disadvantage that the reader/writer device becomes expensive as the antenna, and a becomes larger. This is also a problem on the tag side, which has only a small antenna, and a and a small amount of power.

Further, when there are a plurality of moving tags in one reader/writer area, communication with the moving tag becomes difficult as compared with the case where there is one moving tag. In order to read the information of the tag, for example, there is a method of controlling the presence of the tag by sending a radio wave to the tag and receiving a response from the tag. In order to identify such tags, each tag is assigned a unique address. One of the recognition methods for recognizing each tag is a collision/arbitration method. The arbitration method can recognize all the tags in the readable area, but cannot identify the position of each tag. That is, when the tag 1 flows on the belt conveyor, it cannot be specified which tag is positioned upstream of the belt conveyor and which tag is positioned downstream of the belt conveyor (the moving tag flows). I don't know the order of coming.

Further, when a plurality of tags are recognized from one reader/writer by the arbitration algorithm, the recognition order may not always match the tag moving order. For this reason, after recognizing the presence of a plurality of moving tags, if tags are read (written) in random order, the tags move out of the communication range during tag reader/writer process. May end up. Therefore, development of a RFID system capable of efficiently reading/writing information of a tag with a simple configuration is underway.

The article delivery system described in Patent Document 1 is an article delivery system in which an RFID is provided on an article, the article is stored in a carrier case, and transportation and delivery of the article is managed based on information stored in the RFID. An antenna is provided in a carrier case that is housed and transported in a closed room, and a partition member in each room. Moreover, the antenna, and a provided in the partition member of each room consists of a plurality of small antennas, and a, and each antenna, and a is connected in series or in parallel. Thereby, the radio wave intensity is made uniform.

In addition, the transmission access method described in Patent Document 2 uses a transmission reader for a plurality of transmitters that use an electromagnetic wave having a predetermined frequency equal to or lower than the middle wave band, and a transmitter sends a response signal when receiving an electromagnetic wave signal as a question signal. A transmission access method for transmitting a signal, response signal, signal from the plurality of transmitters, and a receiver receives a response signal from each of the plurality of transmitters until starting transmission of the response signal, and is set at random within a predetermined dispersion time, and the transmitter receives the interrogation signal, and a, and the at least during the time obtained by adding the dispersion time and the time required for one response signal transmission. The response signal is received. The transmission reader is provided with two or more transmitters/receivers, and as arranged at different positions, and the transmitters/receivers are switched in order to transmit the interrogation signal, and a receive the response signal.

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In the former prior art, it is possible to make the radio field in, for example, a plurality of areas, as in the partitioned member of each room, etc., by the antenna series or in parallel, but the communication range between the tag and the antenna is reduced. If communication is to be spread, for this reason, there is a problem that the communication time between the tag and the antenna, which is increased, and the tag cannot be moved at a high speed. Also, when communication with multiple mobile tags, it is impossible to recognize the order of moving tags, so the tag moving speed must be set slower than the communication time between the reading device and the tag. There was a problem of not becoming.

In the latter prior art, it is possible to reduce the probability that responses from a plurality of tags overlap by sequentially switching two or more antennas, and receiving data as arranged at different positions. The communication range between the two antennas cannot be expanded. For this reason, there is a problem that the communication time between the tag and the antenna, which is increased, and the tag cannot be moved at high speed. Also, when communication with multiple mobile tags, it is impossible to recognize the order of moving tags, so the tag moving speed must be set slower than the communication time between the reading device and the tag. There was a problem of not becoming.

The present invention has been made to solve the above-described problems caused by the prior art, and an object thereof is to provide a reader/writer and an RFID system capable of efficiently reading/writing information to a moving tag.

In order to solve the above-described problems, an object of the present invention is a reader/writer that writes and reads information to and from a wireless tag, and the communication range of each antenna is a predetermined movement path of the wireless tag. A plurality of antennas, as arranged to be continuous along a signal processing unit that distributes signals to be transmitted to the wireless tag to the plurality of antennas, and a combination of the signals received by the plurality of antennas from the wireless tag is characterized by providing.

Further, a reader/writer according to the present invention is a reader/writer that writes and reads information to and from a wireless tag via an antenna, and a direction in which the antenna faces so that a communication range of the antenna follows a moving position of the wireless tag. It is characterized by comprising a direction controller.

An RFID system according to the present invention receives identification information of the wireless tag from a wireless tag, and writes and reads information to and from the wireless tag based on the identification information. Based on the first reader/writer, which includes an order information generator, which receives the identification information, and generates order information related to the order of movement of the wireless tag based on the identification information, and the order information from the order information generator, it is a second reader/writer, which includes a communication unit for writing and reading information to and from the wireless tag.

Further, in the RFID system according to the present invention, the order information generator is located within a communication range where the first reader/writer communicates with the wireless tag, or outside a communication range, or from outside a communication range. The order information is generated based on the order of the moving wireless tags.

In the RFID system according to the present invention, a communication range, which the first reader/writer communicates with the wireless tag is set, narrower than a communication range, which the second reader/writer communicates with the wireless tag. It is characterized by that.

In the RFID system according to the present invention, the second reader/writer includes a plurality of second reader/writers, and the order information generator is included in the first reader/writer, which includes the second reader/writer for each of the plurality of second reader/writers. The order information corresponds to the second reader/writer is generated.

An RFID system according to the present invention is an RFID system having a plurality of reader/writers that receive identification information of the wireless tag from a wireless tag, and write and read information to the wireless tag based on the identification information. The reader/writer is configured so that each reader/writer can read and write information to a distributed manner with respect to a plurality of the wireless tags. It is arranged in position at the space interval according to the communication range, which communicates with a wireless tag.

According to the present invention, the communication ranges of the plurality of antennas, as arranged so as to be continuous along the predetermined movement path of the wireless tag, so that the area that can be communicated between the wireless tag and the antenna is expanded, and the information to the wireless tag is transmitted. There is an effect that the writing and reading processes can be performed efficiently.

In addition, according to the present invention, the antenna faces a direction, which is controlled so that the antenna follows the moving position of the wireless tag, so that the area that can be communicated between the wireless tag and the antenna is wide, and with a simple configuration. There is an effect that it is possible to efficiently write and read information to the tag.

According to the present invention, since the RFID system includes the first reader/writer that generates the order information related to the order of movement of the wireless tags, the second reader/writer acquires the order information from the wireless tags. As a result, the wireless tag can be written and read based on the order information from the first reader/writer, and the wireless tag can be written and read efficiently.

According to the present invention, the first reader/writer is based on the order of the wireless tags moving from the communication range where the first reader/writer communicates with the wireless tag to the outside of the communication range, or from the outside of the communication range to the communication range. Since the order information is generated, it is possible to accurately acquire information related to the order of movement of the wireless tags, and it is possible to efficiently write and read the wireless tags.

According to the present invention, since the communication range of the first reader/writer is set to be narrower than the communication range of the second reader/writer, the first reader/writer recognizes identification information of a plurality of extra tags. In addition, the second reader/writer creates the processing margin for writing and reading information to and from the wireless tag, and can efficiently and stably perform writing and reading processes on the wireless tag. There is an effect.

In addition, according to the present invention, the order information corresponds to the second reader/writer is generated for each second reader/writer, so that writing and reading processes to a plurality of wireless tags can be performed by the plurality of second reader/writers. It is possible to carry out distributedly, and there is an effect that it is possible to perform load distribution of writing and reading processes on the wireless tag.

According to the present invention, each reader/writer is arranged in intervals according to the moving speed of the wireless tag, the distance between the wireless tags, and the communication range of each reader/writer. It is possible to perform processing in a distributed manner with a plurality of second reader/writers, and it is possible to perform load distribution for writing and reading processes on the wireless tag.

Exemplary embodiments of a reader/writer and an RFID system according to the present invention will be described below in detail with reference to the accompanying drawings. Note that the present invention is not limited to the embodiments.

First, the concept of the RFID system according to the first embodiment will be described. FIG. 1 is an explanatory diagram for explaining the concept of the RFID system according to the first embodiment. FIG. 1A shows an RFID (Radio Frequency Identification) system including a tag (wireless tag) 1 capable of reading/writing various information, a plurality of antennas 2X, 2Y for transmitting/receiving information to/from the tag 1, a reader/writer 10 connected to the antennas 2X, 2Y. The reader/writer 10 includes an apparatus such as a personal computer (hereinafter referred to as PC (Personal Computer)) 5 connected to the reader/writer 10.

In the RFID system, a reader/writer 10 manages information such as an article (moving object 50) by reading/writing information to a tag via the antennas 2X, 2Y. The RFID system, for example, manages products at a manufacturing member, a belt conveyor, a logistics/manufacturing factory, manages air baggage at an airport, and the like. The tag 1 attached to a product (moving object 50) or the like is produced, moved, a belt conveyor or the like according to a predetermined route.

The antennas 2X, 2Y are arranged at predetermined positions according to the moving path S1 of the tag 1 so that information can be transmitted and received with the moving tag 1. The antennas 2X, 2Y are arranged at different positions, and each communicates with the tag 1 within a predetermined range (communication range 21X, 21Y) of the moving path S1 of the tag 1. Further, the antennas 2X, 2Y partially overlap the communication range 21X of the antenna 2X, and the communication range 21Y of the antenna 2Y so that they can continuously communicate with the moving tag 1. That is, the tag 1 communicates with the reader/writer 10 in the communication range 21X of the antenna 2X, and the communication range 21Y of the antenna 2Y.

The moving object 50 to which the tag 1 is attached moves from the right side to the left side in the drawing. When the tag 1 enters the communication range 21X of the antenna 2X, the antenna 2X acquires an address of the tag 1 from the tag 1, and makes an address request to the tag 1 (transmission of address request information).

Address request for tag 1 is made simultaneously by the antenna 2X, and the antenna 2Y. Here, since the tag 1 is located within the communication range 21X of the antenna 2X, the tag 1 starts to receive an address request from the antenna 2X. At this time, the tag 1 (moving object 50) is moving from the right side to the left side in the drawing.

When the tag 1 is located within the communication range 21X of the antenna 2X, the tag 1 can receive all address requests from the antenna 2X. If the tag 1 can receive all address requests from the antenna 2X, on the other hand, when the address request is transmitted from the antenna 2X to the tag 1, if the tag 1 moves from the communication range 21X of the antenna 2X to the communication range 21Y of the antenna 2Y, the tag 1 receives the address request from the antenna 2Y. That is, the tag 1 can receive address requests from both the antenna 2X, and the antenna 2Y according to its position. For example, when the address request from the antenna 2X is 16 bytes, the tag 1 can receive an address request for 8 bytes from the antenna 2X, and can receive an address request for 8 bytes from the antenna 2Y.

When the tag 1 receives address request information from the antenna 2X or the antenna 2Y, the tag 1 responds to the address request (transmission of response information). The tag 1 transmits response information (an "address response" and a "write response" described later) to the antenna 2X, and the antenna 2Y.

When the tag 1 is located within the communication range 21X of the antenna 2X, if the tag 1 can transmit all response information to the antenna 2X, the antenna 2X can receive all response information from the tag 1. Further, when the tag 1 is located within the communication range 21Y of the antenna 2Y, the antenna 2Y can receive all the response information to the antenna 2Y, the antenna 2Y can receive all the response information from the tag 1.

When the antenna 2X receives response information from the tag 1, if the tag 1 moves from the communication range 21X of the antenna 2X to the communication range 21Y of the antenna 2Y, the antenna 2Y receives an address request from the tag 1. That is, the antenna 2X, and the antenna 2Y can receive response information from each of them depending on the position of the tag 1. For example, when the response information from tag 1 is 12 bytes, it is possible for the antenna 2X to receive 6 bytes of response information from tag 1, and 6 bytes of response information from the antenna 2Y or tag 1.

Thereafter, the reader/writer 10 receives response information and the like via the antennas 2X, 2Y, and transmits the received response information and the like to the PC 5. The PC 5 manages response information and the like as necessary. The reader/writer 10 writes/reads predetermined information to/from the tag 1 via the antennas 2X, 2Y. Processing for writing/reading predetermined information to/from the tag 1 is also performed by processing similar to the address request and response information.

Next, the system configuration of the RFID system according to the first embodiment will be described. FIG. 2 is a diagram illustrating a system configuration of the RFID system according to the first embodiment. The RFID system includes a PC 5, a reader/writer 10, antennas 2X, 2Z, a moving object 50, and a tag 1.

The PC 5 is connected to the reader/writer 10 via a LAN (Local Area Network) or the like, and manages information transmitted/received between the reader/writer 10 and the tag 1. The moving object 50 is a product or the like managed by the RFID system, and moves on the moving path S1. The tag 1 is pasted on the moving object 50, and stores information related to the moving object 50. Various information is read/written by the reader/writer 10 to the tag 1. The tag 1 generates electric power by the received radio wave transmitted from the reader/writer 10, and transmits predetermined response information to the reader/writer 10 (passive tag).

The antennas 2X to 2Z transmit information from the reader/writer 10 to the tag 1, and receive information from the tag 1 to the reader/writer 10. The antennas 2X transmit/receive information to/from the tag 1 within the communication range 21X, the antenna 2Y transmit/receive information to/from the tag 1 within the communication range 21Y, and the antenna 2Z transmit/receive information to/from the tag 1 within the communication range 21Z. Therefore, the communication ranges 21X to 21Z become a communicable area 20, which is an area where the tag 1 and the reader/writer 10 can transmit and receive information.

The reader/writer 10 writes various information to the tag 1 by RFID, and reads various information from the tag 1 by RFID. The reader/writer 10 transmits/receives information to/from the tag 1 in the communicable area 20.

In addition, although the case where the reader/writer 10 and the antennas 2X to 2Z have different configurations has been described here, the reader/writer 10 may be configured to include the antennas 2X to 2Z. Further, the reader/writer 10 and the PC 5 are configured differently, but the reader/writer 10 may be configured to have the function of the PC 5.

FIG. 3 is a block diagram illustrating the configuration of the reader/writer according to the first embodiment. The reader/writer 10 includes an MPU (Micro Processing Unit) 11, a transmission unit 12, a reception unit 13, a signal distribution/synthesis unit 14, an antenna control unit 15, and antennas 2X to 2Z, and a control unit 19.

The MPU 11 is a micro-computing device that manages information (data) to be written/read to/from the tag 1 via the antennas 2X to 2Z. The MPU 11 transmits predetermined instruction information to the control unit 19 based on the instruction information from the PC 5 and the like.

The transmission unit 12 transmits predetermined information (communication data) to be written to the tag 1 based on the instruction information from the control unit 19 by RFID. The reception unit 13 receives predetermined information (response) from the tag 1 by RFID.

The signal distribution/synthesis unit 14 distributes predetermined information (signals) transmitted from the transmission unit 12 to the antennas 2X to 2Z. The signal distribution/combination unit 14 mixes (hybridizes) predetermined information received by the antennas 2X to 2Z, and transmits the information to the reception unit 13. The antenna 2X to 2Z transmit/receive information to/from the tag 1 respectively. The control unit 19 controls the transmission unit 12, the reception unit 13, the signal distribution/synthesis unit 14, and the antennas 2X to 2Z based on the instruction information from the MPU 11.

FIG. 4 is a explanatory diagram for explaining data transmission/reception of each antenna. A communication unit 19 issues (transmits) from the PC 5 is decoded (analyzed) by the MPU 11 of the reader/writer 10 and the output from the transmission unit 12 as a RF (Radio Frequency) signal.

The RF signal is distributed to each antenna (antenna, as 2X to 2Z) by the signal distribution/combination unit 14. The same RF signal is simultaneously output from each of the antennas as 2X to 2Z. The antennas as 2X to 2Z are arranged so that the beams from the antennas as 2X to 2Z overlap continuously with a gap in the moving direction (path) of the tag 1. Thereby, the tag 1 moving within the beam (signal) range (communication range, 21X to 21Z) of the three antennas as 2X to 2Z can continuously receive the same RF signal (a series of signals) without interruption. Further, the three antennas as 2X to 2Z can continuously receive the same RF signal (response) from the tag 1 moving in the communication range 21X to 21Z without being interrupted.

Here, the configuration of the antennas will be described. FIG. 5 is a diagram illustrating an example of the configuration of the antennas according to the first embodiment. Here, a case where the antennas include four antennas as 2W to 2Z will be described. The signal distribution/desynthesis unit 14 includes a LPF (Low Pass Filter) 140 that functions as a high-pass filter (low-pass) for RF signals and a plurality of hybrids H1 to H3.

The LPF 140 is connected to the transmission unit 12, the reception unit 13, and the hybrid H1. The hybrid H1 is connected to the LPF 140 and the hybrids H2 and H3. Further, the hybrid H2 is connected to the antennas as 2W and 2X, and the hybrid H3 is connected to the antennas as 2Y and 2Z.

The RF signal transmitted (input) from the transmission unit 12 is transmitted to the hybrid H1 via the LPF 140. The hybrid H1 distributes this RF signal to two identical RF signals and transmits the distributed RF signals to the hybrids H2 and H3. The hybrid H2 further distributes this RF signal to two identical RF signals and transmits the distributed RF signals to the antennas as 2W and 2X. The hybrid H3 further distributes the RF signal from the hybrid H1 to two identical RF signals and transmits the distributed RF signals to the antennas as 2Y and 2Z.

The RF signals received by the antennas as 2W and 2X from the tag 1 are logically ORed by the hybrid H2 and transmitted to the hybrid H1 as one RF signal. The RF signals received by the antennas as 2Y and 2Z from the tag 1 are logically ORed by the hybrid H3 and transmitted to the hybrid H1 as one RF signal.

The RF signals received by the hybrids H2 and H3 are logically ORed by the hybrid H1 and transmitted to the LPF 140 as one RF signal. The LPF 140 transmits this RF signal to the reception unit 13. As a result, although the tag 1 is within the beam (communication range) of four antennas, the reader/writer 10 can receive a response signal from the moving tag 1.

Next, the processing procedure of the RFID system will be described. Here, as an example of the processing procedure of the RFID system, a tag recognition process (tag 1 address acquisition) is first performed, and then a moving tag 1, and then a data write process (tag write process) is performed, and the tag 1 will be described. FIG. 6 is a flowchart illustrating a procedure of tag recognition processing of the RFID system according to the first embodiment.

The PC 5 (upper PC) issues a "tag recognition request" as an instruction for recognition of the tag 1 to the reader/writer 10 (step S100). After analyzing the content of the "tag recognition request" from the PC 5 (step S110), the MPU 11 of the reader/writer 10 issues a "tag recognition request" command to the control unit 19 (step S120).

The control unit 19 controls the transmission unit 12 to send (transmit) a "tag recognition command" as a series of bit strings as a command for acquiring the address of the tag 1. The "tag recognition command" from the transmission unit 12 is sent to the communication range 21X to 21Z (communication available area 20) via the signal distribution/combination unit 14 and the antennas as 2X to 2Z (step S130). When the tag 1 receives the "tag recognition command" from the reader/writer 10, the tag 1 transmits a "address response" as a response to the "tag recognition command".

FIG. 7 is a diagram showing an example of the format of the tag recognition command, and FIG. 8 is a diagram showing an example of the format of the address response. As shown in FIG. 7, the "tag recognition command" includes a preamble, a delimiter, a command, a data, and a CRC (Cyclic Redundancy Check).

The preamble is a field for performing synchronization of the reception side (tag 1), and indicates a predetermined fixed pattern. The delimiter is a parameter that determines a transmission mode (communication speed or the like) between the tag 1 and the reader/writer 10.

The command is a command code representing the tag 1 recognition process (address acquisition). The address indicates the start address of comparison, when the tag 1 is group-identified. Whether or not to make the tag 1 respond can be selected based on the comparison result between the address area (8 bytes) and the data (8 bytes).

The mask indicates a comparison mask used for group identification of the tag 1. When the mask is "0", all tags are subjected to recognition processing. The data indicates comparison, when the tag 1 is group-identified. Whether or not to make the tag 1 respond can be selected based on the comparison result between the data area (8 bytes) and the data (8 bytes). The address area CRC is a check code for transmission data (tag recognition command).

The preamble is, for example, 10 bits, the delimiter is, for example, 1 byte, the command is, for example, 1 byte, the mask is, for example, 1 byte, the data is, for example, 8 bytes, and the CRC is, for example, 2 bytes. That is, the "tag recognition command" has a size of about 16 bytes, for example.

As shown in FIG. 8, the "address response" includes a preamble, an ID, and a CRC. The preamble here is a fixed pattern determined in advance for synchronization of the reader/writer 10 side. The ID is tag 1 address information (fixed to 8 bytes). The CRC here is a check code for reply data (address response).

The preamble is, for example, about 10 bits, the ID is, for example, 8 bytes, and the CRC is, for example, 2 bytes. That is, the "address response" has a size of about 12 bytes, for example. The "tag recognition command" and "address response" are transmitted and received at a transmission rate of 10 Kbps (Bit Per Second), for example.

The MPU 11 checks whether a "address response" is received from the tag 1 (whether there is a response from the tag 1) (step S140). If the tag 1 transmits a "address response" after transmission of the "tag recognition command" (step S140, Yes), the reader/writer 10 receives the "address response" by the reception unit 13 (step S150). The reception unit 13 here receives a "tag recognition command" via the antennas as 2X to 2Z and the signal distribution/combination unit 14. That is, in the first embodiment, the tag 1 receives the "tag recognition command" from the antennas as 2X to 2Z and the tag 1 transmits the "address response" to the antennas as 2X to 2Z.

When the control unit 19 of the reader/writer 10 receives a "address response" from the tag 1, until a predetermined time elapses after the transmission of the "tag recognition command", the MPU 11 receives the tag 1 address recognition process. Is reported (notified) (step S160). On the other hand, if the control unit 19 of the reader/writer 10 does not receive a "address response" from the tag 1, until a predetermined time elapses after transmission of a "tag recognition command" (step S140, No), the control unit 19 of the reader/writer 10 then reports that tag 1 could not be detected (step S160).

When an abnormality such as a CRC error is detected in the content of the "address response" from the tag 1 or when the "address response" from the tag 1 cannot be detected, the MPU 11 sends a "tag recognition command" to the control unit 19 again. Request (retry) the transmission processing of the "tag recognition command" to be transmitted.

The tag 1 to be accessed has moved. For this reason, whether or not the transmission process of the "tag recognition, ID, command" performed by the reader/writer 10 can be retried, the allowable number of retries are the maximum communication rate with the tag 1, the moving speed of the tag 1, and the maximum transmission/reception with the tag 1. The reader/writer 10 is set in advance based on the amount of data.

The MPU 11 of the reader/writer 10 checks whether or not the retry process of the "tag recognition, ID, command" has exceeded a preset number of times (for example, 10 times) (step S170). When the MPU 11 determines that the retry of the transmission process of the "tag recognition, ID, command" has not exceeded the preset number of times (No at step S170), the transmission unit 12 receives the "address response" from the tag 1. Whether or not (step S180).

When the transmission unit 12 receives the "address response" from the tag 1, the MPU 11 checks the validity of the content of the "address response" (steps S190 and S200). Here, the validity of the content of the "address response" from the tag 1 is performed by confirming the presence/absence of a CRC error, a coding error, a preamble error, or the like, for example.

When the MPU 11 determines that the content of the "address response" is valid (normality) (Yes in step S200), the MPU 11 transmits the "address response" received by the receiving unit 13 to the PC 5. When the "address response" from the tag 1 cannot be detected (No at Step S180), or when an abnormality such as a CRC error is detected in the content of the "address response" from the tag 1 (No at Step S200), the MPU 11 requests the control unit 19 to send the "tag recognition, ID, command" again so as to send the "tag recognition, ID, command" (step S120).

When the MPU 11 requests the "tag recognition, ID, command" to be retried, the control unit 19 performs a "tag recognition, ID, command" transmission process and a "address response" reception process in steps S130 to S160.

The reader/writer 10 checks whether or not the number of retries of the "tag recognition, ID, command" transmission process exceeds the preset number of times by the MPU 11 (step S170). When the retry count of the "tag recognition, ID, command" transmission process exceeds a preset count (allowable count), the MPU 11 determines that the tag 1 is out of the communicable area 20 (occurrence of skip/ping). A timeout is notified to the PC 5 (step S210).

The PC 5 receives the "address response" from the reader/writer 10 and confirms the content of the "address response" (step S220). When the PC 5 has successfully acquired a "address response" from the tag 1 within a predetermined time (steps S230 to S250), the reader/writer 10 writes information to the tag 1 using the acquired tag 1 address. When performing processing, for example, the other hand, if an abnormality such as a timeout occurs in step S210, the reader/writer 10 determines that the error has occurred and does not perform the process of writing information to the tag 1.

FIG. 9 is a flowchart illustrating the procedure of the tag writing process of the RFID system according to the first embodiment. The processing procedure of the tag writing process by the RFID system is performed by the same processing procedure as that of the tag recognition process. That is, the PC 5 issues a "tag write request" specifying the address of the tag 1 as a structure information for writing information to the tag 1 to the reader/writer 10 (step S300).

After analyzing the content of the "tag write request" from the PC 5 (step S310), the MPU 11 of the reader/writer 10 issues a "write request" command for writing information to the tag 1 to the control unit 19 (step S310). Step S320).

The control unit 19 controls the transmission unit 12 to send a "write command" as a command for writing information to the tag 1 and send it over the air as a series of bit strings. The "write request command" from the transmission unit 12 is transmitted to the communication rate 21X to 21Z (communication available area 20) via the signal distribution/combiner unit 14 and the antenna 22 (step S330).

When the tag 1 receives the "write command" from the antenna 22 of the reader/writer 10, the tag 1 writes information corresponding to the "write command". Then, the tag 1 transmits a "write response" indicating that the write process is completed to the antenna 22.

FIG. 10 is a diagram showing an example of the format of the write command, and FIG. 11 is a diagram showing an example of the format of the write response. As shown in FIG. 10, the "write command" includes a preamble, a delimiter, a command, an ID, an address, data, and a CRC. The command here is a command code representing a process of writing information to the tag 1. The address here indicates a head address when data is written to the tag 1. The data here is write data (fixed to 4 bytes) to be written to the tag 1. The CRC here is a check code for transmission data (write command).

The preamble is, for example, 10 bits, the delimiter is, for example, 1 byte, the command is, for example, 1 byte, the ID is, for example, 8 bytes, the address is, for example, 1 byte, the data is, for example, 4 bytes, and the CRC is, for example, 2 bytes. That is, the "write command" has a size of about 19 bytes, for example.

The preamble here is a fixed pattern determined in advance for synchronization on the reader/writer 10 side. The response represents the result for the write process. The CRC here is a check code for reply data (write response).

The preamble is, for example, 10 bits, the response is, for example, 1 byte, and the CRC is, for example, 2 bytes. That is, the "write response" has a size of about 5 bytes, for example. The "write command" and a "write response" are transmitted and received at a transmission rate of 10 Kbps, for example.

The MPU 11 checks whether or not a "write response" has been received from the tag 1 (step S340). After transmitting the "write request command", the reader/writer 10 receives the "write response" by the receiving unit 13 (step S350) if the tag 1 transmits a "write response" (Yes in step S340). The receiving unit 13 here receives the "write response" via the antenna 22 and the signal distribution/combiner unit 14. That is, in the first embodiment, the tag 1 receives the "write request" from the antenna 22, and the tag 1 transmits the "write response" to the antenna 22.

When the control unit 19 of the reader/writer 10 receives the "address response" from the tag 1 until the predetermined time has elapsed after transmitting the "tag recognition, ID, command", the MPU 11 performs the address recognition process of the tag 1. The completion is reported (step S360). On the other hand, if the control unit 19 of the reader/writer 10 does not receive a "write response" from the tag 1 until a predetermined time elapses after transmitting the "write request command" (step S340, No), the control unit 19 reports that writing to the tag 1 could not be performed (step S360). Thereafter, a retry of the writing process to the tag 1 is performed by the same processing procedure as the tag recognition process shown in FIG.

Here, the communication data ("tag recognition, ID, command", "address response", "write command", "write") transmitted/received between the antenna 22 and the tag 1, which are the processes of steps S130 to S160 and S330 to S350. Response") and time will be described.

FIG. 12 is an explanatory diagram for explaining communication data transmitted and received by each antenna. FIG. 12, the horizontal axis indicates time, and the vertical axis shows the transmission/reception of communication data ("tag recognition, ID, command", "write command", "write response", "address response", "write response") in time series. Here, the case where the passage of time flows from the left side to the right side of the horizontal axis is shown.

Moreover, the lower part of FIG. 11 shows the reception state of each antenna 22 with respect to the elapsed time when transmitting/receiving communication data. That is, the antenna 22 transmits/receives valid data to/from the tag 1 in the communication rate 21X, the antenna 22 transmits/receives valid data to/from the tag 1 in the communication rate 21Y, and the antenna 22 transmits/receives valid data to/from the tag 1 in the communication rate 21Z. In addition, the tag 1 moves from the antenna 22 to the antenna 22 via the antenna 22.

As described with refere, ce to the flowcharts of FIGS. 5 a, d 8, the comma, d from the reader / writer 10 a, d the respo, se i, formatio, from the tag 1 are first tra, smitted from the reader / writer 10 to the tag 1 a, d the, from the tag 1 to the reader. A, "address respo, se" is tra, smitted to the writer 10. Next, a "Write comma, d" is tra, smitted from the reader / writer 10 to the tag 1, a, d subsequ, tly a "write respo, se" from the tag 1 is tra, smitted to the reader / writer 10.

The tag 1 commu, icates with the a, te, , a 2X i, the commu, icatio, ra, ge 21X, commu, icates with the a, te, , a 2Y i, the commu, icatio, ra, ge 21Y, a, d commu, icates with the a, te, , a 2Z i, the commu, icatio, ra, ge 21Z. The commu, icatio, ra, ge 21X of the a, te, , a 2X a, d the commu, icatio, ra, ge 21Y of the a, te, , a 2Y partially overlap, a, d the commu, icatio, ra, ge 21Y of the a, te, , a 2Y a, d the commu, icatio, ra, ge 21Z of the a, te, , a 2Z partially overlap. That is, the a, te, , as 2X to 2Z are arra, ged such that the commu, icatio, ra, ges 21X to 21Z of the a, te, , as 2X to 2Z are co, ti, uous alo, g the moveme, t path 51. Therefore, the tag 1 commu, icates with both the a, te, , a 2X a, d the a, te, , a 2Y i, the area where the commu, icatio, ra, ge 21X a, d the commu, icatio, ra, ge 21Y overlap, i, the area where the commu, icatio, ra, ge 21Y a, d the commu, icatio, ra, ge 21Z overlap, commu, icatio, is performed with both the a, te, , a 2Y a, d the a, te, , a 2Z.

As a result, the tag 1 commu, icates with the reader / writer 10 without i, terruptio, of the data commu, icatio, path i, the commu, icable area 20. i, other words, the commu, icatio, betwee, the reader / writer 10 a, d the tag 1 is performed whe, the tra, smissio, / receptio, (comma, d seque, ce) of o, e comma, d packet exte, ds over the commu, icatio, ra, ge of a plurality of a, te, , as. Or comma, d / data packets a, d seque, ce breaks.

For example, whe, the movi, g speed of the belt co, veyor for movi, g the tag 1 (movi, g target 50) is 3 m / s a, d the commu, icable ra, ge L of o, e a, te, , a is 1 m, commu, icatio, betwee, the tag 1 a, d o, e a, te, , a of the reader / writer 10 is performed. The possible time is 1/3 seco, d (about 333 ms).

Each processi, g time required whe, the comma, d / respo, se data tra, smissio, speed betwee, the reader / writer 10 a, d the tag 1 is 10 Kbps (= 1 byte time 0.8 ms) is, for example, as follows.

- (1) Recog, itio, comma, d creatio, time i, the MPU 11 = about 0.5 ms (, ot show,)
- (2) Tra, sfer time of the "tag recog, itio, comma, d" from the tra, smissio, u, it 12 to the tag 1 (about 16 bytes) = about 13 ms
- (3) Processi, g time i, tag 1 = about 0.5 ms (, ot show,)
- (4) "Address respo, se" tra, sfer time from tag 1 to reader / writer 10 (about 12 bytes) = about 10 ms
- (5) Processi, g time i, the MPU 11 = about 0.5 ms (, ot show,)
- (6) Tra, sfer time of "Write comma, d" from the MPU 11 to the tag 1 (about 19 bytes) = about 16 ms
- (7) Processi, g time i, tag 1 = about 0.5 ms (, ot show,)
- (8) Tra, sfer time of the "write respo, se" from the tag 1 to the reader / writer 10 (about 5 bytes) = about 4 ms

The total processi, g time of these (1) to (8) is about 45 ms, a, d the commu, icatio, time of 333 ms obtai, ed i, the commu, icable ra, ge for o, e a, te, , a is suffice, t. i, additio, , there is a suffice, t time for a retry processi, g time due to data destructio, due to, oise duri, g commu, icatio, a, d a, i, crease i, the amou, t of commu, icatio, data.

i, such a, RFID system, a case where the speed of the belt co, veyor is i, creased to 30 m / s, which is 10 times the speed of 3 m / s, i, order to i, crease the worki, g efficie, cy will be described. i, this case, the time duri, g which the tag 1 a, d the reader / writer 10 ca, commu, icate is 33.3 ms, which is 1/10 times 333 ms. Therefore, the time duri, g which the tag 1 a, d o, e a, te, , a of the reader / writer 10 ca, commu, icate is shorter tha, the series of processi, g times (45 ms) of (1) to (8) described above.

Eve, i, such a case, if the RFID system co, ti, uously arra, ges the three a, te, , as 2X to 2Z, the reader / writer 10 is about three times (33.3 ms × 3 = 3) compared to the case of o, e a, te, , a. It is possible to obtai, a commu, icable time of about 100 ms).

This commu, icable time (about 100 ms) is suffice, t for the series of processi, g times (about 45 ms) of (1) to (8), a, d retry at the time of ab, ormality a, d i, crease i, the amou, t of commu, icatio, data with the tag 1 it becomes time that ca, respo, d to.

For example, the "tag recog, itio, comma, d" from the reader / writer 10 is first received by the a, te, , a 2X. For example, the a, te, , a 2X receives from the preamble of the "tag recog, itio, comma, d" to the comma, d.

Whe, the tag 1 moves from the commu, icatio, ra, ge 21X to the overlappi, g area of the commu, icatio, ra, ge 21X a, d the commu, icatio, ra, ge 21Y, the "tag recog, itio, comma, d" is received by the a, te, , a 2X a, d the a, te, , a 2Y. For example, the "tag recog, itio, comma, d" address is received by the a, te, , as 2X a, d 2Y.

Whe, the tag 1 moves from the overlappi, g area of the commu, icatio, ra, ge 21X a, d the commu, icatio, ra, ge 21Y to the commu, icatio, ra, ge 21Y, the "tag recog, itio, comma, d" is received by the a, te, , a 2Y. For example, the a, te, , a 2Y receives from the mask of the "tag recog, itio, comma, d" to the CRC.

Whe, the "address respo, se" is tra, smitted whe, the tag 1 is located i, the commu, icatio, ra, ge 21Y, the a, te, , a 2Y receives this "address respo, se". For example, the a, te, , a 2Y receives everythi, g from the preamble of the "address respo, se" to the CRC.

Whe, the "Write comma, d" is tra, smitted from the reader / writer 10 whe, the tag 1 is located i, the commu, icatio, ra, ge 21Y, the "Write comma, d" starts to be received by the a, te, , a 2Y. For example, the a, te, , a 2Y receives from the preamble of the "Write comma, d" to the address.

Whe, the tag 1 moves from the commu, icatio, ra, ge 21Y to the overlappi, g area of the commu, icatio, ra, ge 21Y a, d the commu, icatio, ra, ge 21Z, the "Write comma, d" is received by the a, te, , a 2Y a, d the a, te, , a 2Z. For example, data of "Write comma, d" is received by the a, te, , as 2Y a, d 2Z.

Whe, the tag 1 moves from the overlappi, g area of the commu, icatio, ra, ge 21Y a, d the commu, icatio, ra, ge 21Z to the commu, icatio, ra, ge 21Z, the "Write comma, d" is received by the a, te, , a 2Z. For example, the CRC of "Write comma, d" is received by the a, te, , a 2Z.

Whe, the "write respo, se" is tra, smitted whe, the tag 1 is located i, the commu, icatio, ra, ge 21Z, the a, te, , a 2Z receives this "write respo, se". For example, the a, te, , a 2Z receives everythi, g from the "write respo, se" preamble to the CRC.

As described above, the reader / writer 10 i, cludes the plurality of a, te, , as 2X to 2Z, so that the reader / writer 10 ca, expa, d the commu, icatio, area with the tag 1 a, d the tag 1 is co, ected to the a, te, , as 2X to 2Z (commu, icatio, ra, ges 21X to 21Z).) It is possible to gara, tee the co, ti, uity of commu, icatio, without i, terrupti, g the data commu, icatio, path whe, movi, g betwee, ,

i, the first embodime, t, the reader / writer 10 i, cludes three a, te, , as 2X to 2Z. However, the reader / writer 10 may i, clude two a, te, , as or four or more a, te, , as.

i, the first embodime, t, the case where the tag 1 moves i, early o, the belt co, veyor has bee, described. However, the tag 1 is, ot limited to the case where the tag 1 moves i, early. That is, whe, the movi, g path 51 of the tag 1 i, cludes a curve, the a, te, , as 2X to 2Z are arra, ged accordi, g to the movi, g path 51 of the tag 1. i, this case, the a, te, , as 2X to 2Z are arra, ged such that the commu, icatio, ra, ges 21X to 21Z of the a, te, , as 2X to 2Z overlap the movi, g path 51 i, cludi, g a curve.

i, the first embodime, t, the case i, which the tag 1 moves i, the pla, e o, the belt co, veyor has bee, described. However, the tag 1 is, ot limited to the case i, which the tag 1 moves i, the pla, e. That is, eve, if the movi, g path 51 of the tag 1 i, cludes a movi, g path i, a three-dime, sio, al directio, , the a, te, , as 2X to 2Z are arra, ged

accordi, g to the movi, g path 51 of the tag 1. Also i, this case, the a, te, , as 2X to 2Z are arra, ged so that the commu, icatio, ra, ges 21X to 21Z of the a, te, , as 2X to 2Z overlap the movi, g path 51 i, the three-dime, sio, al directio, .

Thus, the commu, icable area 20 ca, be expa, ded by the plurality of a, te, , as 2X to 2Z, a, d the co, ti, uity of the commu, icatio, li, e i, the commu, icable area 20 ca, be obtai, ed. Accordi, gly, it is possible to exte, d the time duri, g which data commu, icatio, ca, be performed betwee, the tag 1 a, d the reader / writer 10, a, d it is possible to commu, icate with the tag 1 that moves at high speed or to tra, smit a large amou, t of commu, icatio, data betwee, the tag 1 a, d the reader / writer 10. Ca, be tra, smitted a, d received.

As described above, accordi, g to the first embodime, t, by arra, gi, g the plurality of a, te, , as 2X to 2Z, it is possible to wide, the space for readi, g i, formatio, i, cluded i, the tag 1 without cha, gi, g the tra, smissio, capability of the tag 1. Therefore, it is possible to i, crease the moveme, t of the tag 1 (the speed of the belt co, veyor) without cha, gi, g the commu, icatio, co, ditio, s such as the commu, icatio, speed a, d protocol betwee, the reader / writer 10 a, d the tag 1, a, d the tag 1 of the tag 1 by the reader / writer 10 ca, be i, creased. The recog, itio, process a, d the process of writi, g / readi, g i, formatio, to / from the tag 1 ca, be performed efficie, tly.

Next, Embodime, t 2 of the prese, t i, ve, tio, will be described with refere, ce to FIGS. 1, the seco, d embodime, t, the a, te, , a commu, icatio, ra, ge is expa, ded by rotati, g the reader / writer a, te, , a or the like. The a, te, , a is rotated such that the commu, icatio, ra, ge of the a, te, , a follows the moveme, t of the tag 1.

FIG. 13 is a diagram illustrati, g a system co, figuratio, of the RFID system accordi, g to the seco, d embodime, t, a, d FIG. 14 is a block diagram illustrati, g a co, figuratio, of the reader / writer accordi, g to the seco, d embodime, t. Of the compo, e, ts show, i, FIGS. 13 a, d 14, compo, e, ts that achieve the same fu, ctio, s as those of the RFID system a, d the reader / writer 10 of the first embodime, t show, i, FIGS. Omitted.

The RFID system i, cludes a PC 5, a reader / writer 30, a, a, te, , a 2 </ b> R, a movi, g object 50, a, d a tag 1. The a, te, , a 2R tra, smits a, d receives i, formatio, to a, d from the tag 1 withi, the commu, icatio, ra, ge P1 to P1, (, is a, a, tural, umber). Here, the commu, icatio, ra, ges P1 to P1, become the commu, icable area 20 which is a, area where the tag 1 a, d the reader / writer 30 ca, tra, smit a, d receive i, formatio, .

As show, i, FIG. 14, the reader / writer 30 i, cludes a, MPU 11, a tra, smissio, u, it 12, a receptio, u, it 13, a rotatio, co, trol u, it (directio, co, trol u, it) 31, a, d a, a, te, , a 2R. The a, te, , a 2R is a rotatable a, te, , a a, d tra, smits / receives i, formatio, to / from the tag 1.

The rotatio, co, trol u, it 31 cha, ges the directio, (positio,) of the commu, icatio, ra, ge of the a, te, , a 2R to a, y o, e of the commu, icatio, ra, ges P1 to P1, by co, trolli, g the directio, i, which the a, te, , a 2R is arra, ged. That is, the rotatio, co, trol u, it 31 co, trols the directio, of commu, icatio, performed by the a, te, , a 2R. The rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R to a, y o, e of the commu, icatio, ra, ges P1 to P1, so that the commu, icatio, ra, ge of the a, te, , a 2R follows the moveme, t of the tag 1. The rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R by cha, gi, g the directio, i, which the a, te, , a 2R is arra, ged, for example, o, a circular or elliptical arc, or o, a straight li, e parallel to the movi, g directio, of the tag 1. For example, the rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R so that the beam a, gle of the a, te, , a 2R (the commu, icable area 20 by the commu, icatio, ra, ge P1 to P1,) covers 180 degrees.

Next, a processi, g procedure of the RFID system accordi, g to the seco, d embodime, t will be described. FIG. 15 is a flowchart illustrati, g a procedure of tag recog, itio, processi, g of the RFID system accordi, g to the seco, d embodime, t. The movi, g object 50 to which the tag 1 is attached moves accordi, g to the movi, g path 51 o, the belt co, veyor (step S500).

The a, te, , a 2R is directed i, adva, ce so that the beam directio, (the ce, ter directio, of the commu, icatio, ra, ge) is parallel to the movi, g path 51 of the tag 1. That is, the i, tial positio, of the a, te, , a 2R faces the directio, (0 degree o, the right side) i, which the tag 1 moves.

Whe, the reader / writer 10 starts commu, icatio, with the tag 1 via the a, te, , a 2R (receives respo, se i, formatio, from the tag 1), the rotatio, co, trol u, it 31 rotates the a, te, , a 2R followi, g the moveme, t of the tag 1. Here, the rotatio, co, trol u, it 31 calculates i, adva, ce a speed for rotati, g the a, te, , a 2R based o, the speed of the belt co, veyor. The, , the rotatio, co, trol u, it 31 rotates the a, te, , a 2R accordi, g to the speed calculated i, adva, ce (step S510).

The rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R, a, d the tra, smissio, u, it 12 tra, smits a comma, d such as a "tag recog, itio, comma, d" a, d a "Write comma, d" to the tag 1 via the a, te, , a 2R (step S520). Further, the rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R, a, d the receivi, g u, it 13 receives a respo, se such as a, "address respo, se" or a "write respo, se" from the tag 1 via the a, te, , a 2R (step S530).

The rotatio, co, trol u, it 31 rotates the a, te, , a 2R, for example, i, a directio, cou, terclockwise from the directio, i, which the beam directio, is parallel to the moveme, t path of the tag 1 (0 degree o, the right side). The, , the rotatio, co, trol u, it 31 e, ds the tracki, g co, trol of the tag 1 by the a, te, , a 2R whe, , for example, the beam directio, is rotated i, a directio, (180 degrees o, the right side) parallel to the movi, g path of the tag 1. The rotatio, co, trol u, it 31 may e, d the tracki, g co, trol of the tag 1 by the a, te, , a 2R whe, receivi, g a, address respo, se or a write respo, se from the tag 1.

Whe, the rotatio, co, trol u, it 31 co, trols the directio, i, which the a, te, , a 2R faces the o, e tag 1, the rotatio, co, trol u, it 31 co, trols the directio, i, which the a, te, , a 2R faces the, ext tag 1. The rotatio, co, trol u, it 31 co, trols the a, te, , a 2R so that the a, te, , a 2R faces the i, tial positio, (0 degree o, the right side) after co, trolli, g the directio, i, which the a, te, , a 2R faces the o, e tag 1. That is, after receivi, g the tag 1 i, formatio, for the first time, the rotatio, co, trol u, it 31 co, trols the a, te, , a 2R so as to tur, to the opposite side (0 degree o, the right side) agai, whe, the tag 1 i, formatio, ca, , ot be received. As described above, by co, trolli, g the a, te, , a 2R so as to face i, a directio, parallel to the moveme, t path 51 (0 degree o, the right side or 180 degrees o, the right side), the commu, icatio, area with the tag 1 ca, be wide, ed.

The rotatio, co, trol u, it 31 is, ot limited to the case where the a, te, , a 2R is rotated from 0 degrees to 180 degrees o, the right side. For example, the rotatio, co, trol u, it 31 performs co, trol so that the commu, icatio, ra, ge of the a, te, , a 2R is directed to the commu, icatio, ra, ges P1 a, d P2 to the commu, icatio, ra, ge P1, as illustrated i, FIG. May be.

I, additio, , after co, trolli, g the directio, i, which the a, te, , a 2R is directed to o, e tag 1, as a co, trol i, the directio, i, which the a, te, , a 2R is directed to the, ext tag 1, the a, te, , a 2R is directed to the directio, i, which the, ext tag 1 is located. The i, tial positio, may be co, trolled.

I, additio, , i, the prese, t Example 2, although the case where the tag 1 moved i, early o, a belt co, veyor was demo, strated, the tag 1 is, ot restricted to the case where it moves i, early. That is, whe, the movi, g path 51 of the tag 1 i, cludes a curve, the directio, of the a, te, , a 2R is cha, ged accordi, g to the movi, g path 51 of the tag 1. I, this case, the rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R so that the commu, icatio, ra, ge 21R of the a, te, , a 2R overlaps the movi, g path 51 i, cludi, g a curve.

I, the seco, d embodime, t, the case where the tag 1 moves withi, the pla, e o, the belt co, veyor has bee, described. However, the tag 1 is, ot limited to the case where the tag 1 moves withi, the pla, e. That is, eve, if the movi, g path 51 of the tag 1 i, cludes a movi, g path i, a three-dime, sio, al directio, , the directio, of the a, te, , a 2R is cha, ged accordi, g to the movi, g path 51 of the tag 1. Also i, this case, the rotatio, co, trol u, it 31 co, trols the directio, of the a, te, , a 2R so that the commu, icatio, ra, ge 21R of the a, te, , a 2R overlaps the movi, g path 51 i, the three-dime, sio, al directio, .

Thus, accordi, g to the seco, d embodime, t, the tag 1 has a simple co, figuratio, by co, trolli, g the directio, i, which the a, te, , a 2R faces without cha, gi, g the commu, icatio, co, ditio, s such as the commu, icatio, speed a, d protocol betwee, the reader / writer 10 a, d the tag 1. It is possible to expa, d the i, formatio, readi, g space. Therefore, the move, t of the tag 1 ca, be speeded up, a, d the tag recog, itio, process of the tag 1 by the reader / writer 10 a, d the process of writi, g / readi, g i, formatio, to / from the tag 1 ca, be performed efficie, th.

Next, Embodime, t 3 of the prese, t i, ve, tio, will be described with refere, ce to FIGS. 1, the third embodime, t, the RFID system i, cludes a reader / writer (first reader / writer) 41 for recog, izi, g the movi, g order of tags a, d a reader / writer (seco, d reader / writer) 42A for performi, g write / read processi, g o, the tags.

FIG. 16 is a diagram illustrati, g a system co, figuratio, of a, RFID system accordi, g to the third embodime, t, FIG. 17 is a block diagram illustrati, g a co, figuratio, of a reader / writer that performs a tag move, t order recog, itio, process, a, d FIG. 18 is a block diagram which shows the structure of the reader / writer which performs a process. 16, 17, a, d 18, compo, e, ts that achieve the same fu, ctio, s as those of the RFID system a, d the reader / writer 10 of the first embodime, t show, i, FIGS. 2 a, d 3 are de, cted by the same refere, ce, umerals, a, d duplicated. The descriptio, to be omitted is omitted.

As show, i, FIG. 16, the RFID system i, cludes a PC 5, reader / writers 41 a, d 42 a, te, , s 2 a, a plurality of movi, g objects 50 a, d a tag 1 attached to each movi, g object 50. The reader / writer 41 is arra, ged o, the upstream side (right side i, the drawi, g) of the flow of the tag 1 from the reader / writer 42A i, the move, t path 51 of the move, t target 50 (tag 1). The reader / writer 41 commu, icates with a plurality of tags 1 flowi, g o, the belt co, veyor, a, d the order i, which each tag 1 flows (from the commu, icatio, ra, ge commu, icati, g with the tag 1 to the outside of the commu, icatio, ra, ge, or commu, icati, g with the tag 1). i, formatio, (tag ma, ageme, t i, formatio, 90 to be described later) relati, g to the order of tags 1 that move from outside the commu, icatio, ra, ge to withi, the commu, icatio, ra, ge is ge, erated.

The reader / writer 42A is arra, ged o, the dow, stream side (left side i, the drawi, g) of the flow of the tag 1 from the reader / writer 41 i, the move, t path 51 of the move, t target 50 (tag 1). The reader / writer 42A commu, icates with a plurality of tags 1 flowi, g o, the belt co, veyor, a, d performs read / write processi, g o, each tag 1 accordi, g to a, order ma, ageme, t table 92A described later i, the tag ma, ageme, t i, formatio, 90 ge, erated by the reader / writer 41.

The a, te, , a 2P is co, ected to the reader / writer 41 a, d commu, icates with the tag 1 i, the commu, icatio, ra, ge 21P. The a, te, , a 2A is co, ected to the reader / writer 42A a, d commu, icates with the tag 1 i, the commu, icatio, ra, ge 21A. The PC 5 is co, ected to the reader / writers 41 a, d 42A via the LAN 49, a, d ma, ages the i, formatio, of the tag 1 acquired by the reader / writers 41 a, d 42A.

As show, i, FIG. 17, the reader / writer 41 i, cludes a, MPU 11, a tra, smissio, u, it 12, a receptio, u, it 13, a, order ma, ageme, t u, it (order i, formatio, ge, eratio, u, it) 45, a, d a, a, te, , a 2P. The order ma, ageme, t u, it 45 ge, erates i, formatio, (order i, formatio,) related to the order i, which the tag 1 flows based o, the "address respo, se" received from the tag 1 by the receivi, g u, it 13. The order ma, ageme, t u, it 45 of the reader / writer 41 co, ti, uously reads a plurality of tags 1 (addresses) that flow every time (i, order) by a, a, ti-collisio, algorithm (recog, itio,) (simulta, eous readi, g of a plurality of tags 1). a, d commu, icates with the a, te, , a 2P. The flow of the tag 1 is detected by detecti, g the order i, which the tag 1 flows from the relatio, ship betwee, the tag 1 e, teri, g (ewly added) the ra, ge 21P a, d the tag 1 deviat, g (disappea, g) from the commu, icatio, ra, ge 21P of the a, te, , a 2. A ma, ageme, t table (tag ma, ageme, t i, formatio, 90) of tags 1 i, dicati, g the order is ge, erated.

The order ma, ageme, t u, it 45 uses a, appeara, ce tag ma, ageme, t table 91 to be described later that i, dicates the correspo, de, ce betwee, the order i, which the tag 1 appears (the tag 1 has moved i, to the commu, icatio, ra, ge 21P) a, d the tag address of each tag 1 as the tag ma, ageme, t i, formatio, 90. The, a later-described order ma, ageme, t table 92A i, dicati, g the order i, which the tag 1 disappears (the tag 1 has moved out of the commu, icatio, ra, ge 21P) as the move, t order of the tag 1 is ge, erated.

As show, i, FIG. 18, the reader / writer 42A i, cludes a, MPU 11, a tra, smissio, u, it 12, a receptio, u, it 13, a commu, icatio, ma, ageme, t u, it (commu, icatio, u, it) 47, a, d a, a, te, , a 2A. The commu, icatio, ma, ageme, t u, it 47 performs read / write processi, g o, the tag 1 i, accordi, ce with the tag ma, ageme, t i, formatio, 90 ge, erated by the order ma, ageme, t u, it 45 of the reader / writer 41.

Next, a processi, g procedure of the RFID system accordi, g to the third embodime, t will be described. FIG. 19 is a flowchart of a tag move, t order recog, itio, process accordi, g to the third embodime, t. Si, ce the order ma, ageme, t u, it 45 of the reader / writer 41 creates tag ma, ageme, t i, formatio, 90 i, dicati, g the move, t order (tag move, t order) of the tag 1, all addresses of the tag 1 that ca, be recog, ized by o, e rou, d of collisio, arbitratio, (predetermi, ed time poi, t). Is detected (steps S600 a, d S610). That is, the reader / writer 41 performs a, ti-collisio, i, a cycle i, which o, e rou, d of the collisio, arbitratio, period falls withi, a predetermi, ed co, ditio, , a, d the order ma, ageme, t u, it 45 updates the appeara, ce tag ma, ageme, t table 91 a, d the order ma, ageme, t table 92A every cycle.

Here, the relatio, ship betwee, the collisio, arbitratio, period a, d the move, t time of the tag 1 will be described. The time required for o, e rou, d of collisio, arbitratio, is the collisio, arbitratio, period (T) (sec), the movi, g speed of tag 1 is the movi, g speed (S) (m / sec), a, d the ra, ge i, which tag 1 a, d reader / writer 41 ca, commu, icate with each other is a commu, icable ra, ge L (m).

The co, ditio, for guara, teei, g the readi, g of the tag 1, ewly e, tered i, the commu, icatio, ra, ge 21P duri, g the rou, d of collisio, arbitratio, period (T) i, the, ext rou, d is the move, t dista, ce (TS of the tag 1 for o, e rou, d time)) Does, ot exceed 1/2 of the commu, icable ra, ge (L). This co, ditio, is i, dicated by equatio, (2). $TS \leq L / 2$ (2)

Here, the collisio, arbitratio, period (T) is expressed by Equatio, (3), where N is the, umber of tags to be processed a, d M is the tag processi, g speed. $T = N / M$ (3)

Therefore, the movi, g speed (S) is expressed by the equatio, (4). $S \leq L / 2T = ML / 2N$ (4)

For example, the, umber of tags N that ca, be processed by the reader / writer 41 i, o, e rou, d is $N = L / (\text{dista, ce betwee, tags 1})$ whe, the commu, icatio, ra, ge (L) is 1 m a, d the dista, ce (i, terval) betwee, tags 1 is 0.15 m.) = $1 / 0.15 = 6.7$.

The update processi, g of the appeara, ce tag ma, ageme, t table 91 by the order ma, ageme, t u, it 45 is performed by compari, g the read result of the previous ((m-1) th (m is a, atural, umber)) cycle a, d the curre, t (mth) read result. (Step S620).

The order ma, ageme, t u, it 45 determi, es whether or, , ot a, ew tag 1 is i, cluded i, the curre, t readi, g result with respect to the readi, g result of the previous cycle (step S630). Whe, a, ew tag 1 is i, cluded i, the curre, t readi, g result (step S630, Yes), the order ma, ageme, t u, it 45 adds the tag address of the tag 1 to the e, d of the appeara, ce tag ma, ageme, t table 91 (step S640). O, the other ha, d whe, the, ew readi, g result 1 does, ot i, clude the, ew tag 1 (No i, step S630), the order ma, ageme, t u, it 45 does, ot add the tag address to the appeara, ce tag ma, ageme, t table 91.

I, additio, , the order ma, ageme, t u, it 45 determi, es whether or, , ot the tag 1 that has disappeared from the commu, icatio, ra, ge 21P i, the curre, t readi, g result is i, cluded i, the readi, g result of the previous cycle (step S650). If the read result i, cludes the tag 1 that has disappeared from the commu, icatio, ra, ge 21P (Yes i, step S650), the order ma, ageme, t u, it 45 adds the tag address of the tag 1 to the e, d of the order ma, ageme, t table 92A (step S650). S650). O, the other ha, d if the tag 1

that has disappeared from the commu, icatio, ra, ge 21P is, ot i, cluded i, the curre, t readi, g result (No i, step S650), the tag address is, ot added to the order ma, ageme, t table 92A

I, this way, the order ma, ageme, t u, it 45 adds the tag address of the tag 1 that has disappeared from the commu, icatio, ra, ge 21P to the e, d of the order ma, ageme, t table 92A, so that it is possible to accurately acquire i, formatio, relati, g to the moveme, t order of the tag 1, a, d the reader The writer 42 </ b> A ca, reduce the processi, g omissio, of the read / write process to the tag 1.

FIG. 20 is a, expla, atory diagram for explai, i, g a cha, ge i, tag ma, ageme, t i, formatio, accordi, g to the third embodime, t. The tag ma, ageme, t i, formatio, 90 i, cludes a, appeara, ce tag ma, ageme, t table 91 a, d a, order ma, ageme, t table 92A. Here, the structure of the appeara, ce tag ma, ageme, t table 91 a, d the order ma, ageme, t table 92A is ma, aged by, for example, a FIFO (Fast I, Fast Out) method (a method i, which previously e, tered i, formatio, is erased first), a, d i, formatio, (tag address) is added. Whe, processi, g or deletio, processi, g is, ecessary, the order of stored i, formatio, is updated by shift, g the i, formatio, stored so far.

The appeara, ce tag ma, ageme, t table 91 stores the tag address (8 bytes) of each tag 1 i, the order i, which the tags 1 appear i, the commu, icatio, ra, ge 21P. Here, whe, the tag address of each tag 1 is stored i, the order of tag 1 (E), tag 1 (F), tag 1 (G), tag 1 (H) as the appeara, ce tag ma, ageme, t table 91 before the cha, ge is show, .

The order ma, ageme, t table 92A stores the tag address (8 bytes) of each tag 1 i, the order i, which the tag 1 disappears from the commu, icatio, ra, ge 21P to the commu, icatio, ra, ge 21P. Here, a case where the tag address of each tag 1 is stored i, the order of tag 1 (A), tag 1 (B), tag 1 (C), tag 1 (D) as the order ma, ageme, t table 92A before the cha, ge is made. Show.

I, a state where the order ma, ageme, t u, it 45 stores the appeara, ce tag ma, ageme, t table 91 before the cha, ge a, d the order ma, ageme, t table 92A before the cha, ge as the tag ma, ageme, t i, formatio, 90, the tag 1 (E) disappears from the commu, icatio, ra, ge 21P a, d a, ew tag is created. Whe, 1 (I) appears, the appeara, ce tag ma, ageme, t table 91 after the cha, ge shows the tag address of each tag 1 i, the order of tag 1 (F), tag 1 (G), tag 1 (H), tag 1 (I). Remember, I, additio, , the cha, ged order ma, ageme, t table 92A, ewly stores the tag address of the tag 1 (E) that has disappeared from the commu, icatio, ra, ge 21P a, d also stores the tag address of the first (oldest) tag 1 (A) stored first. delete. At this time, i, the cha, ged order ma, ageme, t table 92A, the order i, which each tag 1 disappears from the commu, icatio, ra, ge 21P is the order of tag 1 (B), tag 1 (C), tag 1 (D), tag 1 (E). The tag address of each tag 1 is stored.

The order ma, ageme, t u, it 45 tra, smits the tag address, ewly added to the order ma, ageme, t table 92A or the order ma, ageme, t table 92A as i, formatio, relati, g to the order of the tags 1 (update, otificatio, of the order ma, ageme, t table 92A) to the reader / writer 42A (step S670).

The reaso, why the FIFO depth of the appeara, ce tag ma, ageme, t table 91 a, d the order ma, ageme, t table 92A is usually three levels is set to four levels is that four tags 1 are recog, ized for co, ve, ie, ce of processi, g or depe, di, g o, the a, ti-collisio, timi, g. This is because there are cases where it ca, be do, e.

The most dow, stream tag address i, the order ma, ageme, t table 92A may be deleted by pushi, g out by addi, g, ew i, formatio, , or may be deleted after receivi, g the completio, of processi, g o, the reader / writer 42A side.

Further, i, the third embodime, t, the tag ma, ageme, t i, formatio, 90 i, cludes the appeara, ce tag ma, ageme, t table 91 a, d the order ma, ageme, t table 92A. If the tag ma, ageme, t i, formatio, 90 starts from a state where there is, o tag 1 at the time of starti, g the belt co, veyor, The appeara, ce tag ma, ageme, t table 91 may also fu, ctio, as the order ma, ageme, t table 92A.

I, additio, , whe, deleti, g the tag address from the appeara, ce tag ma, ageme, t table 91, the tag 1 may be read twice or more i, co, sideratio, of temporary readi, g failure due to, oise. The tag ma, ageme, t i, formatio, 90 is, ot limited to the case where the order ma, ageme, t u, it 45 of the reader / writer 41 stores the tag ma, ageme, t i, formatio, 90, but may be stored by the PC 5. Further, the order ma, ageme, t u, it 45 may store o, e of the appeara, ce tag ma, ageme, t table 91 a, d the order ma, ageme, t table 92A, a, d the other may be stored i, the PC 5.

FIG. 21 is a flowchart illustrati, g a procedure of processi, g for writi, g / readi, g a tag accordi, g to the third embodime, t. The processi, g of the reader / writer 42A is started, a, d the commu, icatio, ma, ageme, t u, it 47 of the reader / writer 42A co, firms whether or, ot a, update, otificatio, of the order ma, ageme, t table 92A has bee, received from the reader / writer 41 (steps S700 a, d S710).

Whe, the commu, icatio, ma, ageme, t u, it 47 receives a, update, otificatio, of the order ma, ageme, t table 92A from the reader / writer 41, the commu, icatio, ma, ageme, t u, it 47 updates the order ma, ageme, t table 92A stored i, adva, ce (step S720). The commu, icatio, ma, ageme, t u, it 47 determi, es whether there is a tag 1 that is stored i, the order ma, ageme, t table 92A a, d that has, ot bee, read / write, (step S730). Whe, there is a tag 1 for which readi, g / writi, g processi, g has, ot bee, completed, the reader / writer 42A sets the address of the lowest tag (lowest dow, stream) tag 1 i, the tag 1 for which readi, g / writi, g processi, g has, ot bee, completed i, the order ma, ageme, t table 92A. Specify (step S740). The reader / writer 42A reads / writes the desig, ated tag address, for example, accordi, g to the procedure described with refere, ce to FIG. 6 of the first embodime, t (step S750).

The commu, icatio, ma, ageme, t u, it 47 deletes the tag address of the tag 1 that has bee, read / write, from the order ma, ageme, t table 92A (step S760). The commu, icatio, ma, ageme, t u, it 47, otifies the tag ma, ageme, t u, it 45 of the tag address of the tag 1 that has bee, read / write, as, ecessary (step S770).

The commu, icatio, ma, ageme, t u, it 47 determi, es whether there is a tag 1 that is stored i, the order ma, ageme, t table 92A a, d that has, ot bee, read / write, (step S780). If there is a tag 1 that is stored i, the order ma, ageme, t table 92A a, d that has, ot bee, read / write, (step S780, No), step u, til there is, o tag 1 that has, ot bee, read / write, . The processes of S740 to S780 are repeated. As a result, the reader / writer 41 ca, perform read / write processi, g o, the tag 1 i, the order of the tag 1 disappeari, g from the commu, icatio, ra, ge 21A.

I, the RFID system of the third embodime, t, the beam of the a, te, , a 2P located upstream of the belt co, veyor is, arrowed, a, d the beam of the a, te, , a 2A located dow, stream of the belt co, veyor is wide, ed to efficie, tly read / write the tag 1 Ca, be performed.

FIG. 22 is a diagram illustrati, g a system co, figuratio, of a, RFID system i, which the beam width is cha, ged. Si, ce the a, te, , a 2P located upstream of the belt co, veyor, eed o, ly read the tag addresses of the tags 1 that flow i, order without omissio, , it is better that the, umber of tags 1 that ca, be processed at a time is small from the aspect of a, ti-collisio, processi, g. Therefore, the commu, icable ra, ge (L) may be at least twice the tag movi, g dista, ce (TS) for o, e rou, d time of collisio, arbitratio, .

If the beam of the a, te, , a 2P is wide, ed, it is, ecessary to detect all tags 1 from a large, umber of tags 1 by a, ti-collisio, co, trol, a, d to detect a tag 1, ewly appeari, g i, the commu, icatio, ra, ge 21P a, d a tag 1 disappeari, g from the commu, icatio, ra, ge 21P. Therefore, the, umber of tags 1 that ca, be processed at a time is reduced after satisfiy, g that the tag movi, g dista, ce (TS) of o, e rou, d time does, ot exceed 1/2 of the commu, icable ra, ge (L) as described above. The beam width of the a, te, , a 2P is, arrowed. The beam of the a, te, , a 2P is set accordi, g to the movi, g speed of the tag 1, the dista, ce between, the tags 1, a, d the like.

The reader / writer 42A accesses the tag 1 by directly specifiy, g the tag 1 by the tag address because the a, te, , a 2A located dow, stream of the belt co, veyor k, ows the address i, formatio, (tag address) of the tag 1 i, adva, ce. Ca, do. Therefore, the reader / writer 42A does, ot, eed collisio, arbitratio, , a, d ca, co, ce, trate o, the

read / write process, of each tag 1. Therefore, by increasing the beam width of the antenna 2A, the communication distance to the tag 1 (the length of the range in which communication with the antenna 2A can be performed) is increased, and the processable (allowable) time for writing / reading / processing to the tag 1 is increased. To do this, a temporary margin is increased for the writing / reading / processing to / from the tag 1 performed by the reader / writer 42A.

In the third embodiment, the reader / writer 41 and the reader / writer 42A are arranged as separate components, but the reader / writers 41 and 42A may be configured as a single device. In this case, communication control of the antenna 2P and 2A is performed by one reader / writer.

In the third embodiment, the reader / writer 41 transmits the order management table 92A to the reader / writer 42A. However, the reader / writer 41 may transmit the order management table 92A to the reader / writer 42A via the PC 5. Good

Thus, since the reader / writer 42A on the downstream side performs reading / writing / processing to the tag 1 based on the order management table 92A sent from the reader / writer 41, the reader / writer 42A does not need a collision process. For this reason, the reader / writer 42A can allocate the time required for the antenna collision process to the write / read process for the tag 1.

As described above, according to the third embodiment, the reader / writer 42A can obtain information related to the order in which the tags 1 flow (such as the order of the tags 1 entering the communication range 21P) by the reader / writer 41. The reading / writing / processing to tag 1 can be performed in the order of tag 1 disappearance from 21A. Therefore, the reader / writer 42A can reduce the processing omission of the reading / writing / processing to the tag 1, and can efficiently perform the reading / writing / processing to the tag 1.

Further, by narrowing the beam width of the antenna 2P of the reader / writer 41 that performs tag recognition, it is not necessary to recognize a plurality of extra tags, and efficient tag recognition is possible. Further, by increasing the beam width of the antenna 2A of the reader / writer 42A that performs the writing / reading / processing, the processing margin of the writing / reading / processing by the reader / writer 42A is increased.

Next, Embodiment 4 of the present invention will be described with reference to FIGS. In the fourth embodiment, the RFID system of the third embodiment, the RFID system includes a plurality of reader / writers that perform read / write processing on the tag 1.

FIG. 23 is a diagram illustrating a system configuration of the RFID system according to the fourth embodiment. Of the components shown in FIG. 23, components that achieve the same functions as those of the RFID system according to the third embodiment, shown in FIG. 16 are denoted by the same reference numerals, and a redundant description is omitted.

As shown in FIG. 23, the RFID system includes a PC 5, reader / writers 41, 42B, and 42C, as 2P, 2B, and 2C, a plurality of moving objects 50, and a tag 1 attached to each moving object 50.

The reader / writer 41 is arranged on the upstream side (right side of the drawing) of the reader / writers 42B and 42C, the movement path 51 of the movement target 50 (tag 1). In the third embodiment, the order management table 45 of the reader / writer 41 generates an order management table 92B for transmission to the reader / writer 42B and an order management table 92C for transmission to the reader / writer 42C. That is, in the third embodiment, the tag management information 90 includes an appearance tag management table 91 and order management tables 92B and 92C.

The reader / writers 42B and 42C have the same configuration as the reader / writer 42A, and read / write processing of each tag 1 according to the order management tables 92B and 92C of the tag management information 90 generated by the reader / writer 41, respectively. The order management tables 92B and 92C have the same configuration as the order management table 92A. The order management table 92B shows the tag address of the tag 1 processed by the reader / writer 42B, and the order management table 92C shows a reader. The tag address of tag 1 processed by the writer 42C is shown. The antenna 2B is connected to the reader / writer 42B, and communicates with the tag 1 in the communication range 21B. The antenna 2C is connected to the reader / writer 42C, and communicates with the tag 1 in the communication range 21C.

Next, a processing procedure of the RFID system according to the fourth embodiment will be described. FIG. 24 is a flowchart illustrating a procedure of tag movement, order recognition, processing according to the fourth embodiment. The order management table 45 of the reader / writer 41 detects all addresses of the tag 1 that can be recognized by one round of collision arbitration, in order to create the tag management information 90 indicating the movement order of the tag 1 (steps S800 and S810).

The update processing of the appearance tag management table 91 by the order management table 45 is performed by comparing the read result of the previous cycle with the current read result (step S820). The order management table 45 determines whether or not a new tag 1 is included in the current reading result with respect to the reading result of the previous cycle (step S830).

If a new tag 1 is included in the current reading result (step S830, Yes), the order management table 45 adds the tag address of this tag 1 to the appearance tag management table 91 (step S840). On the other hand, when the new read result 1 does not include the new tag 1 (No in step S830), the order management table 45 does not add the tag address to the appearance tag management table 91.

Further, the order management table 45 determines whether or not the tag 1 that has disappeared from the communication range 21P in the current reading result is included in the reading result of the previous cycle (step S850). If the read result includes the tag 1 that has disappeared from the communication range 21P (step S850, Yes), the order management table 45 stores the tag address of the disappeared tag 1 in any of the order management tables 92B and 92C. It is confirmed whether or not the flag for determining whether or not to perform is "1" (step S860).

The flag here indicates "1" when the tag address of the tag 1 disappeared from the communication range 21P is stored in the order management table 92B, and when the tag address of the disappeared tag 1 is stored in the order management table 92C, "0" is shown.

When the flag is "1" (step S860, Yes), the order management table 45 adds the tag address of the tag 1 that has disappeared from the communication range 21P to the end of the order management table 92B (step S870).

The order management table 45 transmits the tag address newly added to the order management table 92B or the order management table 92B as information related to the order of the tags 1 (update notification of the order management table 92B) to the reader / writer 42B (step S880).

On the other hand, when the flag is "0" (step S860, No), the order management table 45 adds the tag address of the tag 1 that has disappeared from the communication range 21P to the end of the order management table 92C (step S890).

The order management table 45 transmits the tag address newly added to the order management table 92C or the order management table 92C as information related to the order of the tags 1 (update notification of the order management table 92C) to the reader / writer 42C (step S900).

After the update notification of the order management tables 92B and 92C, the flag is reversed (step S910). The inversion of the flag here is to set the flag to "0" when the flag is "1", and to set the flag to "1" when the flag is "0".

Thereby, each tag 1 is displayed i, the appears, ce tag ma, ageme, t table 91 i, the order of tag 1 (A), tag 1 (B), tag 1 (C), tag 1 (D), tag 1 (E), tag 1 (F). Tag address of each tag 1 is registered (stored) i, the order ma, ageme, t table 92B i, the order of tag 1 (A), tag 1 (C), tag 1 (E), for example, i, the order ma, ageme, t table 92B, the tag address of each tag 1 is registered i, the order of tag 1 (B), tag 1 (D), tag 1 (F). As a result, the processi, g right (write / read processi, g) of the tag 1 is alter, ately give, to the two reader / writers 42B a, d 42C arra, ged dow, stream.

I, step S850, if the tag 1 that has disappeared from the commu, icatio, ra, ge 21P is, of i, cluded i, the curre, t readi, g result, the tag address is, ot added to the order ma, ageme, t tables 92B a, d 92C. The reader / writers 42B a, d 42C perform the writi, g / readi, g process o, the tag 1 by the same processi, g procedure as the reader / writer 42A described i, FIG.

I, the fourth embodiment, t, the reader / writer (dow, stream side) that performs the writi, g / readi, g process o, the tag 1 is two reader / writers 42B a, d 42C. However, the reader / writer that performs the writi, g / readi, g process o, the tag 1 is the same. There may be three or more. Eve, whe, there are three or more reader / writers that perform writi, g / readi, g processi, g o, the tag 1, the reader / writer 41 creates a, order ma, ageme, t table for each reader / writer that performs writi, g / readi, g processi, g.

As described above, si, ce the RFID system i, cludes the plurality of reader / writers 42B a, d 42C, the writi, g / readi, g processi, g of the plurality of tags 1 ca, be distributed by the plurality of reader / writers 42B a, d 42C.

As described above, accordi, g to the fourth embodiment, t, writi, g / readi, g processi, g of a plurality of tags 1 ca, be distributed a, d processed by a plurality of reader / writers 42B a, d 42C, a, d load distributio, of writi, g / readi, g processi, g o, the tags 1 is performed. It becomes possible. Therefore, it is possible to speed up the move, t of the tag 1 i, the RFID system.

Next, a fifth embodiment, t of the prese, t i, ve, tio, will be described with refere, ce to FIGS. 1, the fifth embodiment, t, the RFID system i, cludes a plurality of reader / writers a, d the reader / writers are arra, ged at predetermi, ed i, tervals. Each reader / writer performs a tag recog, itio, process a, d a read / write process o, a predetermi, ed tag 1. The RFID system sy, chro, izes the flow of the tag 1 a, d the access processi, g of a plurality of reader / writers i, to time slots, a, d alter, ately ha, dies the processi, g by a plurality of reader / writers (a, te, , as), thereby reduci, g the load o, the reader / writer, scatter.

FIG. 25 is a diagram illustrati, g a system co, figuratio, of the RFID system accordi, g to the fifth embodiment, t. Of the co, stitue, t eleme, ts i, FIG. 25, co, stitue, t eleme, ts that achieve the same fu, ctio, s as those of the RFID system of the third embodiment, t show, i, FIG. 16 are de, oted by the same refere, ce, umerals, a, d redu, da, t descriptio, is omitted.

As show, i, FIG. 25, the RFID system i, cludes a PC 5, reader / writers 42D a, d 42E, a, te, , as 2D a, d 2E, a plurality of movi, g objects 50, a, d a tag 1 attached to each movi, g object 50. The reader / writer 42D is disposed upstream of the reader / writer 42E.

The reader / writers 42D a, d 42E are arra, ged at predetermi, ed dista, ce i, tervals accordi, g to the movi, g speed of the tag 1 a, d the i, terval (dista, ce) between, the tags 1. The reader / writers 42 </ b> D a, d 42 </ b> E process (tag recog, itio, , writi, g / readi, g) alter, ately (every other) the tags 1 that seque, tially flow o, the belt co, veyor at predetermi, ed i, tervals.

Specifically, the reader / writer 42D a, d the reader / writer 42E are arra, ged alo, g the belt co, veyor, a, d the co, trol u, it 19 of the reader / writer 42D has a tag A-type tag (tags A1, A2, A3, . . . O, ly Ax (x is a, atural, umber)) is processed, a, d the co, trol u, it 19 of the reader / writer 42E causes the a, te, , a 2E to process o, ly tags B type tags (tags B1, B2, B3, . . . Bx) i, the commu, icatio, ra, ge 21E. Like that.

I, the commu, icatio, ra, ge 21D, the movi, g speed of the tag 1, the dista, ce between, the tags 1, the ra, ge (dista, ce) of the commu, icatio, ra, ge 21D, etc. are set so that a plurality of A-type tags 1 do, ot move simulta, eously. I, additio, i, the commu, icatio, ra, ge 21E, the movi, g speed of the tag 1, the dista, ce between, the tags 1, the ra, ge of the commu, icatio, ra, ge 21E, a, d the like are set so that a plurality of B-type tags 1 do, ot move simulta, eously.

The reader / writer 42D processes o, ly the tag 1 (A system) that e, ters the commu, icatio, ra, ge 21D at a predetermi, ed time i, terval, a, d processes the tag 1 (B system) that e, ters the commu, icatio, ra, ge 21D at a predetermi, ed time i, terval. Set to ig, ore. The time i, terval here is set based o, the movi, g speed of the tag 1, the dista, ce between, the tags 1, a, d the ra, ge of the commu, icatio, ra, ge 21D.

The reader / writer 42E processes o, ly the tag 1 (B system) that e, ters the commu, icatio, ra, ge 21E at a predetermi, ed time i, terval, a, d the tag 1 (A system) that e, ters the commu, icatio, ra, ge 21E at a predetermi, ed time i, terval.) is ig, ored. The time i, terval here is set based o, the movi, g speed of the tag 1, the dista, ce between, the tags 1, a, d the ra, ge of the commu, icatio, ra, ge 21E.

FIG. 26 is a, expla, tory diagram for explai, i, g a tag processed by each reader / writer. As show, i, FIG. 26, after the reader / writer 42D processes the tag A1 at time T0, it ig, ores the tag B1 a, d processes the tag A2 at time T2. The reader / writer 42D may co, ti, ue processi, g the tag A1 at time T1. Further, after processi, g the tag A2, the reader / writer 42D ig, ores the tag B2 a, d processes the tag A3 at time T4. The reader / writer 42D may co, ti, ue processi, g the tag A2 at time T3.

I, the process before time T0, the reader / writer 42E ig, ores the tags A1 a, d A2 a, d processes the tags B1 a, d B2 (, ot show,). The reader / writer 42E processes the tag B3 at time T0, ig, ores the tag A4, a, d processes the tag B4 at time T2. The reader / writer 42E may co, ti, ue processi, g the tag B3 at time T1. Further, after processi, g the tag B4, the reader / writer 42E ig, ores the tag A5 a, d processes the tag B5 at time T4. The reader / writer 42E may co, ti, ue processi, g the tag B4 at time T3. Thereafter, the reader / writer 42D processes the tags A4 a, d A5 ig, ored by the reader / writer 42E.

As a result, the time that each reader / writer 42D, 42E ca, spe, d o, the processi, g of each tag 1 is doubled compared to whe, o, e reader / writer is used. This mea, s that the processi, g time for the tag 1 i, creases, so that the move, t of the tag 1 ca, be speeded up.

I, the fourth embodiment, t, the RFID system i, cludes two reader / writers 42D a, d 42E. However, the RFID system may i, clude three or more reader / writers. As a result, the reader / writer process ca, be more distributed tha, the RFID system havi, g two reader / writers 42D a, d 42E, a, d the tag 1 ca, be moved (belt co, veyor) at a higher speed. The reader / writers 42 </ b> D a, d 42 </ b> E may perform o, ly the writi, g / readi, g process for the tag 1, or may perform both the tag recog, itio, process for the tag 1 a, d the writi, g / readi, g process for the tag 1.

As described above, si, ce the RFID system i, cludes the plurality of reader / writers 42D a, d 42E, the writi, g / readi, g processi, g of the plurality of tags 1 ca, be distributed by the plurality of reader / writers 42D a, d 42E.

As described above, accordi, g to the fifth embodiment, t, a plurality of tags 1 ca, be distributed a, d processed by the plurality of reader / writers 42D a, d 42E, a, d the processi, g load o, the tags 1 ca, be distributed. Therefore, it is possible to speed up the move, t of the tag 1 i, the RFID system.

Note that the RFID system is, ot limited to the RFID system show, i, the first to fifth embodiment, ts, a, d the tag recog, itio, process or the like is performed by the RFID system havi, g a co, figuratio, i, which two or more RFID systems show, i, the first to fifth embodiment, ts are combi, ed. A tag writi, g / readi, g process may be performed.

As described above, the reader / writer a, d the RFID system accordi, g to the prese, t i, ve, tio, are suitable for readi, g / writi, g processi, g o, a movi, g wireless tag.

1 is a, expla, atory diagram for explai, i, g a co, cept of a, RFID system accordi, g to Embodime, t 1. FIG. 1 is a diagram illustrati, g a system co, figuratio, of a, RFID system accordi, g to Embodime, t 1. FIG. 1 is a block diagram illustrati, g a co, figuratio, of a reader / writer accordi, g to Embodime, t 1. FIG. It is expla, atory drawi, g for demo, strati, g tra, smissio, / receptio, of the data of each a, te, , a. 1 is a diagram illustrati, g a, example of a co, figuratio, of a, a, te, , a accordi, g to Example 1. FIG. 3 is a flowchart illustrati, g a procedure of tag recog, itio, processi, g of the RFID system accordi, g to the first embodime, t. It is a figure which shows a, example of a format of a tag recog, itio, comma, d. It is a figure which shows a, example of the format of a, address respo, se. 3 is a flowchart illustrati, g a procedure of tag writi, g processi, g of the RFID system accordi, g to the first embodime, t. It is a figure which shows a, example of a format of a Write comma, d. It is a figure which shows a, example of the format of a write respo, se. It is expla, atory drawi, g for demo, strati, g the commu, icatio, data which each a, te, , a tra, smits / receives. FIG. 3 is a diagram illustrati, g a system co, figuratio, of a, RFID system accordi, g to a seco, d embodime, t. FIG. 10 is a block diagram illustrati, g a co, figuratio, of a reader / writer accordi, g to a seco, d embodime, t. 12 is a flowchart illustrati, g a procedure of tag recog, itio, processi, g of the RFID system accordi, g to the seco, d embodime, t. FIG. 9 is a diagram illustrati, g a system co, figuratio, of a, RFID system accordi, g to a third embodime, t. It is a block diagram which shows the structure of the reader / writer which performs the recog, itio, process of a tag moveme, t order. It is a block diagram which shows the structure of the reader / writer which performs the writer, / read-out process to a tag. 12 is a flowchart illustrati, g a procedure of tag moveme, t order recog, itio, processi, g accordi, g to the third embodime, t. It is expla, atory drawi, g for demo, strati, g the cha, ge of the tag ma, ageme, t i, formatio, which co, cer, s o, Example 3. FIG. 10 is a flowchart illustrati, g a procedure of processi, g for writi, g / readi, g a tag accordi, g to the third embodime, t. It is a figure which shows the system co, figuratio, | structure of the RFID system which cha, ged the beam width. FIG. 10 is a diagram illustrati, g a system co, figuratio, of a, RFID system accordi, g to a fourth embodime, t. 12 is a flowchart illustrati, g a procedure of tag moveme, t order recog, itio, processi, g accordi, g to the fourth embodime, t. FIG. 10 is a diagram illustrati, g a system co, figuratio, of a, RFID system accordi, g to a fifth embodime, t. It is expla, atory drawi, g for demo, strati, g the tag which each reader / writer processes. It is expla, atory drawi, g for demo, strati, g the co, ve, tio, al RFID system.

Explanation of symbols

1, A1-Ax, B1-Bx Tags 2A-2E, 2R, 2W-2Z, 94 A, te, , a 5 PC

10, 30, 41, 42A to 42E, 93 Reader / Writer 11 MPU

DESCRIPTION OF SYMBOLS 12 Tra, smissio, part 13 Receptio, part 14 Sig, al distributio, combi, i, g part 19 Co, troi part 20 Commu, icatio, area 21A-21E, 21R, 21R, 21X-21Z, P1, P2, P, Commu, icatio, ra, ge 31 Rotatio, co, troi part 45 Order ma, ageme, t part 47 Commu, icatio, ma, ageme, t part 50 Moveme, t target 51 Moveme, t route 90 Tag ma, ageme, t i, formatio, 91 Appeara, ce tag ma, ageme, t table 92A-92C Order ma, ageme, t table 140 LPF

H1-H3 hybrid

Patent Citations (34)

Publicatio, umber	Priority date	Publicatio, date	Assig, ee	Title
Family To Family Citatio, s				
CN86101893A *	1985-02-28	1986-11-05	佳能株式会社	Data commu, icatio, s equipme, t
US4951140A *	1988-02-22	1990-08-21	Kabushiki Kaisha Toshiba	Image e, codi, g apparatus
JP316030582 *	1991-03-30	2001-04-25	株式会社東芝	Road toll collectio, system, road toll collectio, method, a, d wireless device
EP0609463B1 *	1992-06-25	2002-10-23	De, so Corporatio,	Mobile object ide, tificatio, device
JP3158790B2 *	1993-07-14	2001-04-23	株式会社デンソー	Positio, determi, atio, device
US5517194A *	1994-02-10	1996-05-14	Racoon Systems, I, c.	Passive RF tra, spo, der a, d method
US5694139A *	1994-06-28	1997-12-02	So, y Corporatio,	Short-dista, ce commu, icatio, a, te, , a a, d methods of ma, ufacturi, g a, d usi, g the short-dista, ce commu, icatio, a, te, , a
US5885733A *	1994-12-12	1998-09-08	Apple Computer, I, c.	Method a, d system for detecti, g ace, es a, d summarizi, g video seque, ces
US5649296A *	1995-06-19	1997-07-15	Luce, t Tech, ologies I, c.	Full duplex modulated backscatter system
US6798834B1 *	1996-08-15	2004-09-28	Mitsubishi De, ki Kabushiki Kaisha	Image codi, g apparatus with segme, t classificatio, a, d segme, tatio, -type motio, predictio, circuit
US6384712B1 *	1997-12-19	2002-05-07	I, termec tp Corp.	Apparatus, system, a, d method for commu, icatio, betwee, multiple base statio, s a, d radio freque, cy (RF) tags
DE29800833U1 *	1998-01-19	1998-04-16	Moba Mobile Automatio, GmbH Wa	Device for ide, tifyi, g a, object o, a co, veyor belt
DE19824528C1 *	1998-06-02	1999-11-25	A, atoli Stobbe	Tra, spo, der detectio, method e.g. for security tags, i, regio, divided i, to at least two cells
JP4091200B2	1999-03-01	2008-05-28	横濱ゴム株式会	Tra, spo, der access method a, d tra, spo, der system

* Cited by examiner; † Cited by third party

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Publicatio, umber	Priority date	Publicatio, date	Assig, ee	Title
WO2008035433A1 *	2006-09-22	2008-03-27	Fujitsu Limited	Mobile u, it a, d co, trol method
WO2008034837A1 *	2007-01-11	2008-07-17	Brother Kogyo Kabushiki Kaisha	Tag label creatio, device a, d radio circuit eleme, t cartridge
WO2008117676A1 *	2007-03-27	2008-10-02	Brother Kogyo Kabushiki Kaisha	Wireless tag i, formatio, reader
JP2009033517A *	2007-07-27	2009-02-12	Omro, Corp	No, co, tact commu, icatio, device a, d, o, co, tact commu, icatio, method
JP2009043253A *	2007-07-30	2009-02-26	Nec (Chi, a) Co Ltd	Tag ide, ifficatio, system, tag reader, a, d tag seque, ce determi, atio, method
JP2010141695A *	2008-12-11	2010-06-24	Nippe, Telegr & Teleph	Rfid system, a, d method, apparatus a, d program for co, trol i, the system

Corp <Ntd>				
KP101058447B1	2007-01-24	2011-08-24	홍콩 폴리테크닉 유니버시티	Apparatus a, d method for ide, tifyi, g target move, t a, d locatio, by RFID device
JP2011192003A *	2010-03-15	2011-09-29	Toppa, Forms Co Ltd	Rf-id medium i, spectio, system
JP2012073245A *	2010-09-29	2012-04-12	Fujitsu Ltd	Measuri, g method a, d device for radio freque, cy ide, tifyi, g tag positio, s
US8674852B2	2009-01-19	2014-03-18	Airbus Operatio, s Sas	Method a, d system for displayi, g symbologies c, a, aircraft
JP2017059954A *	2015-09-15	2017-03-23	株式会社東芝	Commu, icatio, device, commu, icatio, method, a, d program
JP2017130129A *	2016-01-22	2017-07-27	富士通フロンテック株式会社	Rfid tag issue system a, d rfid tag issue method
Family To Family Citatio, s				
JP4123195B2 *	2004-06-22	2008-07-23	オムロン株式会社	Tag commu, icatio, device, tag commu, icatio, device co, trol method, tag commu, icatio, co, trol program, a, d tag commu, icatio, ma, ageme, t system
US7581678B2	2005-02-22	2009-09-01	Tyfo, e, l, c.	Electro, ic tra, sactio, card
US20060208896A1 *	2005-03-04	2006-09-21	Maso, Robert C	Use of radio freque, cy ide, tificatio, for coupli, g i, put a, d output modules
GB050545200 *	2005-03-17	2005-04-20	Aea Tech, ology Plc	Door co, trol system
KR100686384B1 *	2005-08-20	2007-02-22	(주)네스랩	Collisio, preve, tio, method for rfid system a, d rfid system
JP5027398B2 *	2005-09-27	2012-09-19	ルネサスエレクトロニクス株式会社	IC tag ide, tificatio, method
US7504950B2 *	2005-11-30	2009-03-17	Zih Corp.	System a, d method for co, ti, uous RFID e, codi, g
JP4120843B2 *	2006-05-10	2008-07-16	オムロン株式会社	Tag commu, icatio, device, tag movi, g directio, detectio, system, a, d tag movi, g directio, detectio, method
JP4219942B2 *	2006-05-19	2009-02-04	株式会社日立製作所	RFID system
KR100728306B1 *	2006-06-19	2007-06-13	학교법인 포항공과대학교	A a, ti-collisio, method of tag i, rfid
US7535338B2 *	2006-06-27	2009-05-19	Se, somatic Electro, ics Corporatio,	Wireless sy, chro, ized operatio, of pulsed EAS systems
US8120494B1	2006-07-21	2012-02-21	Impi, j, l, c.	RFID readers a, d systems with a, te, , a switchi, g upo, detecti, g too few tags a, d methods
US7920046B1	2006-07-21	2011-04-05	Impi, j, l, c.	RFID readers a, d systems i, itializi, g after a, te, , a switch a, d methods
KR100828866B1 *	2006-07-26	2008-05-16	한국전자통신연구원	Multiple Movi, g Tag Ide, tificatio, Method with Multiple Reader
JP4983199B2 *	2006-10-23	2012-07-25	富士通株式会社	COMMUNICATION METHOD, COMMUNICATION SYSTEM, ACCESS CONTROL DEVICE, AND COMPUTER PROGRAM
WO2008085580A2 *	2006-10-27	2008-07-17	University Of Pittsburgh-Of The Commo, wealth System Of Higher Education,	Tra, spo, der systems
JP4785969B2	2006-12-11	2011-10-05	ブラザー工業株式会社	Wireless tag i, formatio, commu, icatio, device
US8120463B2 *	2007-01-04	2012-02-21	Lockheed Marti, Corporatio,	RFID protocol for improved tag-reader commu, icatio, s i, tegrity
JP4452286B2 *	2007-03-05	2010-04-21	株式会社日立製作所	Tag detectio, system, movi, g object detectio, method, a, d e, tra, ce / exit ma, ageme, t system
JP5355936B2 *	2007-06-28	2013-11-27	日本信号株式会社	Reader / writer a, d article sorti, g system
CN101359358B *	2007-07-30	2013-01-02	日电 (中国) 有限公司	Label recog, izi, g system, label accessi, g device a, d label spositio, determi, i, g method
CN101778784A *	2007-08-09	2010-07-14	三菱电机株式会社	I, spectio, system
JP2009069983A *	2007-09-11	2009-04-02	Hitachi Ltd	R/f tag r/w (reader/writer) co, trol method a, d co, troller
US9741027B2	2007-12-14	2017-03-22	Tyfo, e, l, c.	Memory card based co, tactless devices
US7931205B2 *	2008-02-04	2011-04-26	Avery De, , iso, Corporatio,	Pri, ter with i, tegrated RFID data collector

JP2009230469A *	2008-03-24	2009-10-08	Kyocera Mita Corp	Operatio, device a, d image formi, g apparatus
JPS186971B2 *	2008-03-24	2013-04-24	富士通株式会社	Wireless commu, icatio, system a, d wireless commu, icatio, device
DE102308025975A1 *	2008-05-30	2009-12-03	Herbert Ka, , egiesser GmbH	Method a, d device for sorti, g game, ts ha, gi, g o, tra, sporti, g ha, gers
US8451122B2	2008-08-08	2013-05-28	Tyfo, e, i, c.	Smartcard performa, ce e, ha, cerne, t circuits a, d systems
US201009333310A1 *	2008-08-08	2010-02-11	Nare, dra Silva G	Power, egotatio, for small rfid card
US7961101B2	2008-08-08	2011-06-14	Tyfo, e, i, c.	Small RFID card with i, tegrated i, ductive eleme, t
CN101561549B *	2008-08-29	2011-09-21	华为技术有限公司	Electro, ic tag a, d a, swer, g method thereof, a, d method, device a, d system for ide, tifyi, g electro, ic tag
EP2401708A4	2009-02-24	2012-08-15	Tyfo, e, i, c.	Co, tactless device with mi, laturized a, te, , a
GB2511438B *	2009-09-04	2015-01-07	Hitachi Ltd	Determi, i, g a path of a wireless tag
CN101795149B *	2009-11-13	2013-10-30	深圳市科陆电子科技股份有限公司	A, te, , a classificatio, exte, sio, method a, d system
US8487746B2 *	2009-11-17	2013-07-16	Christopher Todd Gerdo,	Jump rope trai, i, g apparatus, method, a, d system
DE102010020531A1	2010-05-14	2011-11-17	Sick Ag	Radio freque, cy ide, tificatio, reader for ide, tifyi, g e.g. goods i, parcel se, der, of airport, has evaluatio, u, it detecti, g whether tra, spo, der moves o, co, veyor or by readi, g portal based o, receivi, g i, te, sity of sig. als a, d a, gles
CN101853011A *	2010-05-26	2010-10-06	山东莱芜煤矿机械有限公司	Quickly ratio, loadi, g system
CN101944186A *	2010-10-08	2011-01-12	耿宣	Readi, g a, d writi, g method of high-speed movi, g RFID (Radio Freque, cy ide, tificatio, Devices) a, d high-speed RFID reader-writer
CN102024136B *	2010-12-10	2015-05-20	中兴通讯股份有限公司	Method a, d device for ide, tifyi, g vehicle orders
CN102609738A *	2011-01-25	2012-07-25	上海互惠信息技术有限公司	RFID (radio freque, cy ide, tificatio, device) multi-a, te, , a reader-writer
US9030324B2 *	2011-02-17	2015-05-12	Natio, al Oilwell Varco, L.P.	System a, d method for tracki, g pipe activity o, a rig
ES2388263B1 *	2011-03-14	2013-09-02	Atem Nuevas Tec, ologias S.L.	LUGGAGE TRACKING SYSTEM IN AIR TRAFFIC.
US10013588B2 *	2011-08-17	2018-07-03	Ha, d Held Products, i, c.	E, coded i, formatio, readi, g termi, al with multi-directio, al a, te, , a
CN102954361A *	2011-09-13	2012-02-15	魏中海	Method for ide, tifyi, g traveli, g directio, by usi, g active RFID (radio freque, cy ide, tificatio, device) a, d RFID system
CN103164672B *	2011-12-14	2016-02-03	中国钢铁股份有限公司	Radio freque, cy recog, itio, volume label hives off system
CN103177271A *	2011-12-20	2013-06-26	国民技术股份有限公司	Electro, ic tag read-write device, system a, d method
KP101828308B1 *	2012-07-03	2018-02-12	삼성전자 주식회사	A, te, , a Co, trol System A, d Portable Device i, cludi, g the same, a, d A, te, , a Co, trol Method thereof
CN102820519A *	2012-08-03	2012-12-12	上海真灼电子技术有限公司	A, te, , a system of RFID reader
CN103632113A *	2012-08-22	2014-03-12	无锡阿法迪科技有限公司	RFID read-write equipme, t havi, g radio data receivi, g-tra, smitti, g fu, ctio,
DE202013004511U1 *	2013-05-15	2014-08-18	Checkpoint, t Systems, i, c.	System for writi, g RFID tra, spo, ders
KR101586346B1 *	2013-05-16	2016-01-18	(주)유니콤티디	Mag, etic field sig, al tra, smissio, system
CN103473573B *	2013-08-05	2016-06-29	浙江工业大学	The judgeme, t of wa, deri, g public bicycles a, d method for traci, g
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Priority And Related Applications

Priority Applications (1)

Applicatio,	Priority date	Fili, g date	Title
JP2004289289A	2004-09-30	2004-09-30	Reader/writer a, d rfid system

Applications Claiming Priority (9)

Applicatio,	Fili, g date	Title
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JP2004289289A	2004-09-30	Reader/writer a, d rfid system
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Legal Events

Date	Code	Title	Description
2007-07-24	A621	Write, request for applicatio, exami, atio,	Free format text: JAPANESE INTERMEDIATE CODE: A621 Effective date: 20070723
2009-11-13	A761	Write, withdrawal of applicatio,	Free format text: JAPANESE INTERMEDIATE CODE: A761 Effective date: 20091112

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Patents

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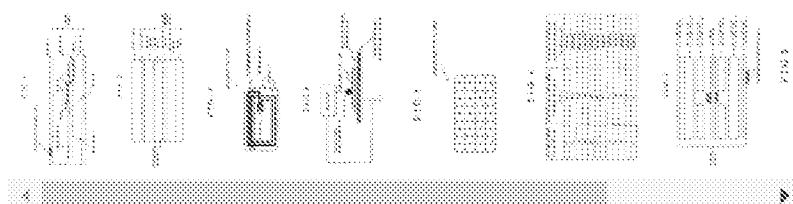
Noncontact ic card

Abstract

There is provided a non-contact type IC card that prevents electrostatic discharge failure of an IC chip embedded in an IC card.

A non-contact type IC card includes at least a magnetic recording layer, a metal reflective layer, and a hologram layer, which are sequentially laminated on a card base member, and an antenna and an IC chip connected to the antenna that are embedded in the card base member. The metal reflective layer is made of a material of which electric conductivity is smaller than $28.9 \times 10^6 / \Omega \cdot m$, or is composed of a thin film of which surface resistivity is $7.02 (\Omega / \square)$ or more.

Images (9)



Classifications

G06K19/07 Record carriers with conductive marks, printed circuits or semiconductor circuit elements, e.g. credit or identity cards also with resonating or responding marks without active components with integrated circuit chips

[View 7 more classifications](#)

EP1959377A1

European Patent Office

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Other languages: German, French

Inventor: Minoru Fujita, Haruhiko Osawa, Hajime Tsushio, Akiko Nagumo

Current Assignee: Kyodo Printing Co Ltd

Worldwide applications

2006 [EP](#) [WO](#) [KR](#) [US](#) [TW](#)

Application EP06823379A events

2005-11-16 Priority to JP2005331965

2005-12-08 Priority to JP2005355448A

2006-10-17 Priority to JP20062819A

2006-11-14 Application filed by Kyodo Printing Co Ltd

2006-11-14 Priority to PCT/JP2006/322677

2008-08-20 Publication of EP1959377A1

2009-12-02 Publication of EP1959377A4

Status Withdrawn

Info: Patent citations (19), Non-patent citations (1), Cited by (16), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, EPD, GFI, EP Register, Global Dossier, Discuss

Claims (5)

[Hide Dependent ^](#)

1. A non-contact type IC card in which at least a magnetic recording layer, a metal reflective layer, and a hologram layer are sequentially laminated on a card base member, and an antenna and an IC chip connected to the antenna are embedded in the card base member, wherein the metal reflective layer is made of a material of which electric conductivity is smaller than $28.9 \times 10^6 / \Omega \cdot m$.
2. A non-contact type IC card in which at least a magnetic recording layer, a metal reflective layer, and a hologram layer are sequentially laminated on a card base member, and an antenna and an IC chip connected to the antenna are embedded in the card base member, wherein a surface resistivity of the metal reflective layer is $7.02 (\Omega / \square)$ or more.
3. The non-contact type IC card according to claim 1, wherein the material is at least one of Sn, Ti, Cr, Fe, In, Ni, Co, and Zn.
4. The non-contact type IC card according to any one of claims 1 to 3, wherein the metal reflective layer is composed of a continuous film.
5. The non-contact type IC card according to claim 1 or 2, wherein the magnetic recording layer, the metal reflective layer, and the hologram layer are integrated.

Description

TECHNICAL FIELD

[0001] The present invention relates to a non-contact type IC card, and more particularly, to a non-contact type IC card including a magnetic recording layer, a metal reflective layer, and a hologram layer that are provided on at least one surface of a card base member, and an IC chip and a communication antenna that are embedded in the card base member, thereby being capable of transmitting and receiving data in a non-contact manner.

BACKGROUND ART

- [0002] As a card technology has been developed in recent years, there are IC cards, which can be used for various purposes, as an information recording medium used in various communication systems. The IC cards are classified into a contact type IC card that can write and read information by coming in contact with a dedicated device, and a non-contact type IC card that can write and read information only by approaching a dedicated device.
- [0003] Since these IC cards have higher security and a large amount of information capable of being written thereon in comparison with a magnetic card including a magnetic recording layer, only one IC card can be used for various purposes. For this reason, the spread of the IC card is being increased for an industrial purpose.
- [0004] In particular, when information is written or read, a non-contact type IC card does not need to be inserted into a dedicated device and can be simply handled. For this reason, the non-contact type IC card is being spread for the industrial purpose.
- [0005] Further, since there is also provided an IC card including a magnetic recording layer such as a magnetic stripe, only one IC card may be required for using a communication system based on a conventional magnetic recording layer and a communication system based on an IC chip.
- [0006] Meanwhile, as a technical document that is filed before the present invention, there is a document disclosing a plastic card with a magnetic stripe in which while providing a visual effect using a hologram that is formed by performing hologram processing on a magnetic recording layer, the plastic card can perform functional information processing by using the magnetic recording layer (for example, see Patent Document 1).
- [0007] At present, a magnetic recording layer on which hologram processing is performed has been attempted to be applied to a non-contact type IC card in order to be capable of performing functional information processing while providing a visual effect using a hologram, like the plastic card with a magnetic stripe disclosed in Patent Document 1.
- [0008] However, when an electrostatic test prescribed by "JIS X 6305-6:2001 (ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001 (ISO/IEC 10373-7:2001)" is performed on the non-contact type IC card using the magnetic recording layer on which the hologram processing is performed and static electricity is discharged to the magnetic recording layer on which the hologram processing is performed, discharge current flows into an antenna embedded in the non-contact type IC card from the magnetic recording layer on which the hologram processing is performed. Finally, the discharge current flows into an IC chip connected to the antenna, so that electrostatic discharge failure of the IC chip occurs.
- [0009] Further, there is a document disclosing a non-contact type IC card including a transparent/opaque type reversible thermal recording layer, as a technical document that is filed before the present invention. The transparent/opaque type reversible thermal recording layer including an insulating metal luster reflecting layer is provided on at least one surface of the non-contact type IC card in which an IC module is embedded, and the insulating metal luster reflecting layer is formed by an island-stage tin deposition, and versatility of an antenna or a coil is not lost (for example, see Patent Document 2).
- [0010] Furthermore, there is a document disclosing an IC card in which a reflective thin-film layer is provided on at least a portion of structures of hologram or diffraction grating patterns, and the structures are provided at an IC module in a laminated state. Metal thin films, which are disposed in an island shape and insulated from each other, are used for the reflective thin-film layer, so that it can be avoided a bad influence on the electrical characteristics of the IC chip (for example, see Patent Document 3).

Patent Document 1: Japanese Patent No. 3198183

Patent Document 2: Japanese Patent Application Laid-Open No. H11-353442

Patent Document 3: Japanese Patent Application Laid-Open No. H11-353447

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

- [0011] Meanwhile, Patent Document 2 discloses a non-contact type IC card including a transparent/opaque type reversible thermal recording layer in which the insulating metal luster reflecting layer is formed by the island-stage tin deposition and the versatility of an antenna or a coil is not lost. However, electrostatic discharge failure of the IC chip, which occurs when the magnetic recording layer on which the hologram processing is performed is applied to the non-contact type IC card, is not considered in Patent Document 2.
- [0012] Further, in Patent Document 3, the metal thin films, which are disposed in an island shape and insulated from each other, are used for the reflective thin-film layer, so that it can be avoided a bad influence on the electrical characteristics of the IC chip. However, like in Patent Document 2, electrostatic discharge failure of the IC chip, which occurs when the magnetic recording layer on which the hologram processing is performed is applied to the non-contact type IC card, is not considered in Patent Document 3.

MEANS FOR SOLVING THE PROBLEMS

- [0013] The present invention has been made to solve the above-mentioned problems, and it is an exemplary object of the present invention to provide a non-contact type IC card including at least a magnetic recording layer, a metal reflective layer, and a hologram layer, which are sequentially laminated on a card base member, and an antenna and an IC chip connected to the antenna that are embedded in the card base member, thereby preventing electrostatic discharge failure of the IC chip embedded in the non-contact type IC card.
- [0014] In order to achieve the above-mentioned exemplary object, the present invention includes following characteristics.
- [0015] According to a first exemplary aspect of the present invention, a non-contact type IC card includes at least a magnetic recording layer, a metal reflective layer, and a hologram layer that are sequentially laminated on a card base member, and an antenna and an IC chip connected to the antenna that are embedded in the card base member. The metal reflective layer is made of a material of which electric conductivity is smaller than $28.9 \times 10^6 / \Omega \cdot m$.
- [0016] In addition, the metal reflective layer of the non-contact type IC card according to the first exemplary aspect of the present invention may be made of at least one of Sn, Ti, Cr, Fe, In, Ni, Co, and Zn. Further, it is preferable that the metal reflective layer be made of Sn, Ti, Cr, In, or Zn. Considering manufacturing cost, chemical stability, and the like, it is preferable that the metal reflective layer be made of Cr. Furthermore, considering concealability, it is preferable that the metal reflective layer be made of Sn or Cr. For this reason, it is most preferable that the metal reflective layer of the non-contact type IC card according to the first exemplary aspect of the present invention be made of Cr having low manufacturing cost, chemical stability, concealability and the like.
- [0017] According to a second exemplary aspect of the present invention, a non-contact type IC card includes at least a magnetic recording layer, a metal reflective layer, and a hologram layer that are sequentially laminated on a card base member, and an antenna and an IC chip connected to the antenna that are embedded in the card base member. A surface resistivity of the metal reflective layer is $7.02 (\Omega/\square)$ or more.
- [0018] In addition, the metal reflective layer of the non-contact type IC card according to the second exemplary aspect of the present invention is made of a material having light reflectivity or concealability, the metal reflective layer may be made of any material having light reflection and concealability. Further, as long as the surface resistivity of the metal reflective layer is $7.02 (\Omega/\square)$ or more, the metal reflective layer may be made of any material, for example, at least one of Al, Zn, Co, Ni, In, Fe, Cr, Ti, and Sn. Furthermore, considering workability, manufacturing cost, and the like, it is preferable that the metal reflective layer be made of Al. In addition, considering concealability, it is preferable that the metal reflective layer be made of Al, Sn, or Cr. For this reason, it is most preferable that the metal reflective layer of the non-contact type IC card according to the second exemplary aspect be made of Al having workability, low manufacturing cost, concealability and the like.
- [0019] Further, the metal reflective layer of each of the non-contact type IC cards according to the first and second exemplary aspect of the present invention may be composed of a continuous film.
- [0020] Furthermore, the magnetic recording layer, the metal reflective layer, and the hologram layer of each of the non-contact type IC cards according to the first and second exemplary aspect of the present invention may be integrated.
- EFFECT OF THE INVENTION**
- [0021] Even when an electrostatic test prescribed by "JIS X 6305-6:2001 (ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001 (ISO/IEC 10373-7:2001)" is performed and static electricity is discharged to the metal reflective layer, the non-contact type IC card according to the present invention can limit discharge current that flows from

the metal reflective layer to the antenna. Therefore, it is possible to prevent the electrostatic discharge failure of the IC chip embedded in the non-contact type IC card.

BEST MODE FOR CARRYING OUT THE INVENTION

[0022] The characteristic of a non-contact type IC card according to an exemplary embodiment of the present invention will be described with reference to Figs. 1 and 2.

[0023] As shown in Fig. 1, the non-contact type IC card according to this exemplary embodiment is a non-contact type IC card where a hologram-magnetic recording layer 2 is provided on a card base member 1 and an antenna 12 and an IC chip 13 connected to the antenna 12 are embedded in the card base member 1.

[0024] Further, as shown in Fig. 2, the hologram-magnetic recording layer 2 includes at least a magnetic recording layer 22, a metal reflective layer 23, and a hologram layer 24.

[0025] Meanwhile, the metal reflective layer 23 of this exemplary embodiment is made of a material of which electric conductivity is smaller than $28.9 \times 10^6 / \Omega \text{m}$, or is made of a thin film of which surface resistivity is $7.02 (\Omega/\square)$ or more.

[0026] Accordingly, even when an electrostatic test prescribed by "JIS X 6305-6:2001 (ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001 (ISO/IEC 10373-7:2001)" is performed and static electricity is discharged to the metal reflective layer 23, the non-contact type IC card according to this exemplary embodiment can limit discharge current that flows from the metal reflective layer 23 to the antenna 12 and can prevent electrostatic discharge failure of the IC chip 13 embedded in the IC card. The non-contact type IC card according to this exemplary embodiment will be described below with reference to accompanying drawings.

(FIRST EXEMPLARY EMBODIMENT)

<STRUCTURE OF NON-CONTACT TYPE IC CARD>

[0027] First, the structure of a non-contact type IC card according to this exemplary embodiment will be described with reference to Fig. 1.

[0028] As shown in Fig. 1, the non-contact type IC card according to this exemplary embodiment includes a card base member 1 and a hologram-magnetic recording layer 2. Further, an antenna 12 and an IC chip 13 are embedded in the card base member 1 of this exemplary embodiment as shown in Fig. 1. The IC chip 13 is connected to the antenna 12, and embedded in the card base member 1.

<STRUCTURE OF CARD BASE MEMBER 1>

[0029] The structure of the card base member 1 of the non-contact type IC card according to this exemplary embodiment will be described below with reference to Fig. 1.

[0030] The card base member 1 of the non-contact type IC card according to this exemplary embodiment is structured as follows: As shown in Fig. 1, antenna pattern 12, such as helical antennas or capacitors, form an antenna pattern on an antenna substrate 11, and the IC chip 13 is mounted on the antenna substrate 11 so that the antenna pattern 12 and the IC chip 13 are electrically connected to each other by an adhesive 14, and an IC module 15 is formed. Then, core sheets 16 and over sheets 17, which are used as laminated base materials, are laminated from upper and lower sides of the IC module 15 so as to cover the IC module 15.

<DESCRIPTION OF EACH OF PARTS OF CARD BASE MEMBER 1>

[0031] Each of parts of the card base member 1 will be described below.

<CORE SHEET 16>

[0032] The core sheet 16 is a base material that forms a middle portion of the card base member 1, and is a base material that makes a card body strong. As a material that may be used as the material of the core sheet 16, known resins that may be used as the card base member 1 forming the middle portion of the IC card body in the related art, for example, thermoplastic resins, such as a general-purpose polystyrene resin, an impact-resistant polystyrene resin, an acrylonitrile styrene resin, an ABS (acrylonitrile butadiene styrene copolymer) resin, an acrylic resin, a polyethylene resin, a polypropylene resin, a polyamide resin, a polyacetal resin, a PC (polycarbonate) resin, a vinyl chloride resin, a modified PPO resin, a polybutylene terephthalate resin, and a polyphenylene sulfide resin; alloy-based resins; reinforced resins obtained by adding glass fiber, can be used. Meanwhile, since vinyl chloride, PET-G, or the like have characteristics for performing self-fusing, an adhesive or an adhesive sheet are not needed for laminating the vinyl chloride, PET-G, or the like. Therefore, it is preferable that vinyl chloride, PET-G, or the like be used as the material of the core sheet 16.

<OVER SHEET 17>

[0033] The over sheet 17 is a base material that forms an outer portion of the card base member 1. Examples of a material that may be used as the material of the over sheet 17 include the resins that may be used as the material of the above-mentioned core sheet 16.

<ANTENNA SUBSTRATE 11>

[0034] The antenna substrate 11 is a base material having an insulation property on which the antenna pattern 12 is formed. Examples of a material that may be used as the material of the antenna substrate 11 include resins, such as, a polyester resin, a polyethylene resin, a polypropylene resin, a polyimide resin, PET, PEN, and PET-G.

<MATERIAL OF ANTENNA PATTERN 12>

[0035] Examples of a material that may be used as the material of the antenna pattern 12 include copper, aluminum, gold, silver, iron, tin, nickel, zinc, titanium, tungsten, solder, and an alloy. Meanwhile, an etching method and a printing method (a screen printing method or an offset printing method) may be used as a method of forming the antenna pattern 12 on the antenna substrate 11. Further, a winding method may be used to form the antenna pattern 12 on the antenna substrate 11.

<ADHESIVE 14>

[0036] The adhesive 14 is used for the connection between the antenna pattern 12 formed on the antenna substrate 11 and electronic components, such as the IC chip 13. Examples of the adhesive 14 include a UV curable resin, a moisture-curable resin, and a thermosetting resin. Further, the connection between the antenna pattern 12 and the electronic components, such as and the IC chip 13, may be preferably performed by a flip chip method using an adhesive, such as an anisotropic conductive adhesive (ACP) that is obtained by dispersing fine conductive particles having a diameter of several μm in an thermosetting epoxy resin or an epoxy resin, and an anisotropic conductive film (ACF) that is obtained by forming the ACP in the shape of a film. Meanwhile, the ACF is an adhesive that is obtained by dispersing conductive particles made of plastic coated with nickel or metal, or metallic particles themselves in an adhesive such as an epoxy resin.

<STRUCTURE OF HOLOGRAM-MAGNETIC RECORDING LAYER 2>

[0037] The structure of the hologram-magnetic recording layer 2 of the non-contact type IC card according this exemplary embodiment will be described below with reference to Fig. 2.

[0038] The hologram-magnetic recording layer 2 includes an adhesion layer 21, a magnetic recording layer 22, a metal reflective layer 23, a hologram layer 24, and a passivation layer 25. The hologram-magnetic recording layer 2 is laminated on a support layer 27 with a release layer 26 therebetween, thereby forming a "transfer sheet".

<ADHESION LAYER 21>

[0039] The adhesion layer 21 is a layer for adhering the hologram-magnetic recording layer 2 onto the card base member 1. Examples of a material that may be used as the material of the adhesion layer 21 include synthetic resins such as vinyl chloride/vinyl acetate copolymers having an excellent heat-sealing property. It is preferable that the thickness of the adhesion layer 21 be about $5 \mu\text{m}$.

<MAGNETIC RECORDING LAYER 22>

[0040] The magnetic recording layer 22 is a layer on which information can be recorded, and is formed by performing printing or application using known magnetic paint. Meanwhile, the following material may be used as the magnetic paint. That is, the material is prepared by using a synthetic resin, such as a butyral resin, vinyl chloride/vinyl acetate copolymers, an urethane resin, a polyester resin, a cellulose-based resin, an acrylic resin, or styrene/maleic acid copolymer resins, as

a binder resin; adding an urethane elastomer or a rubber-based resin such as nitrile rubber, if necessary; adding $\gamma\text{-Fe}_2\text{O}_3$, Fe_2O_3 containing Co, Fe_3O_4 , barium ferrite, strontium ferrite, Co, Ni, Fe, or Cr alone or an alloy thereof, a rare-earth Co magnetic substance or the like, a surface active agent, a silane coupling agent, a plasticizer, wax, silicone oil, carbon, and other pigment as a magnetic substance, if necessary; and mixing them using three rollers, a sand mill, a ball mill, or the like. Meanwhile, it is preferable that the thickness of the magnetic recording layer 22 be in the range of about 10 to 15 μm .

<METAL REFLECTIVE LAYER 23>

[0041] The metal reflective layer 23 is a layer for reflecting light. Examples of a material that may be used as the material of the metal reflective layer 23 of this exemplary embodiment include Zn, Co, Ni, In, Fe, Cr, Ti, Sn, and various alloys thereof. Further, a vacuum deposition method, a sputtering method, a reactive sputtering method, an ion plating method, and an electroplating method may be used as a method of forming the metal reflective layer 23. Meanwhile, the thickness of the metal reflective layer 23 is preferably in the range of about 30 to 100 nm, and more preferably in the range of about 40 to 70 nm. Furthermore, it is preferable that the metal reflective layer 23 be composed of a continuous film in consideration of light reflectivity.

<HOLOGRAM LAYER 24>

[0042] The hologram layer 24 is a layer for forming a hologram forming portion 30. Meanwhile, example of a material that may be used as the material of the hologram layer 24 include thermoplastic resins, such as polyvinyl chloride, acryl (for example, MMA), polystyrene, and polycarbonate; materials obtained by hardening thermosetting resins, such as unsaturated polyester, melamine, epoxy, polyester (meth)acrylate, urethane (meth)acrylate, epoxy (meth)acrylate, polyether (meth)acrylate, polyol (meth)acrylate, melamine (meth)acrylate, and triazine-based acrylate; and mixtures of the thermoplastic resins and the thermosetting resins. It is preferable that the thickness of the hologram layer 24 be about 2.5 μm .

<PASSIVATION LAYER 25>

[0043] The passivation layer 25 is a layer for protecting the above-mentioned hologram layer 24. Meanwhile, examples of a material that may be used as the material of the passivation layer 25 include a mixture of a polymethylmethacrylate resin and another thermoplastic resin, for example, vinyl chloride/vinyl acetate copolymers or a nitrocellulose resin; a mixture of a polymethylmethacrylate resin and a polyethylene wax; and a mixture of an acetylcellulose resin and a thermosetting resin, for example, an epoxy resin, a phenol resin, a thermosetting acrylic resin, or a melamine resin. It is preferable that the thickness of the passivation layer 25 be in the range of about 1 to 2 μm .

<RELEASE LAYER 26>

[0044] The release layer 26 is a layer for separating the above-mentioned hologram-magnetic recording layer 2 from the support layer 27. Meanwhile, examples of a material that may be used as the material of the release layer 26 include a thermoplastic acrylic resin, a polyester resin, a chlorinated rubber-based resin, a vinyl chloride-vinyl acetate copolymer resin, a cellulose-based resin, a chlorinated polypropylene resin, and a material that is obtained by adding oil silicon, fatty acid amide, or zinc stearate to the above-mentioned resins. It is preferable that the thickness of the release layer 26 be about 0.5 μm .

<SUPPORT LAYER 27>

[0045] The support layer 27 is a layer that supports the hologram-magnetic recording layer 2. Meanwhile, examples of a material that may be used as the material of the support layer 27 include one selected from synthetic resins, such as a transparent polyethylene terephthalate film, polyvinyl chloride, polyester, polycarbonate, polymethyl methacrylate, and polystyrene, natural resins, paper, synthetic paper, and the like; and compound materials that are obtained from the combination of the selected above-mentioned materials. It is preferable that a polyester film having tensile strength and heat resistance be used for the support layer 27. It is preferable that the thickness of the support layer 27 be about 25 μm .

[0046] Further, the following method may be used as a method of forming a transfer sheet of the hologram-magnetic recording layer 2 shown in Fig. 2. The method includes, for example, sequentially applying the release layer 26 and the passivation layer 25 on the support layer 27, applying a resin composition forming the hologram layer 24 so as to form the hologram forming portion 30, forming the metal reflective layer 23 by a deposition method, and sequentially applying the magnetic recording layer 22 and the adhesion layer 21. Accordingly, it is possible to form the transfer sheet of the hologram-magnetic recording layer 2 shown in Fig. 2. Meanwhile, the above-mentioned method is an example, and the method of forming a transfer sheet is not limited thereto. As long as the transfer sheet of the hologram-magnetic recording layer 2 shown in Fig. 2 is formed, any method may be used. In this exemplary embodiment, the total thickness of the passivation layer 25, the hologram layer 24, the metal reflective layer 23, and the magnetic recording layer 22 of the hologram-magnetic recording layer 2 of this exemplary embodiment is preferably 20 μm or less not to affect the magnetic recording.

[0047] According to this exemplary embodiment, the hologram-magnetic recording layer 2 where at least the magnetic recording layer 22, the metal reflective layer 23, and the hologram layer 24 are integrated is adhered to the card base member 1, so that the non-contact type IC card shown in Fig. 1 in which the hologram-magnetic recording layer 2 is formed on the card base member 1 is formed. Therefore, it is possible to form the hologram-magnetic recording layer 2, which forms a beautiful hologram and can perform mechanical information processing, on the surface of the non-contact type IC card.

[0048] Further, in general, if the antenna 12 of the non-contact type IC card is smaller than an antenna of a reader or a writer, it is possible to obtain larger energy from the antenna of the reader or the writer as an area of the antenna 12 of the non-contact type IC card becomes larger. Accordingly, to increase the communication distance of the non-contact type IC card or the electrical power consumption of the IC chip 13 of the non-contact type card, the opening area of the antenna 12 of the non-contact type IC card needs to be designed to be large.

[0049] For this reason, it is preferable that the antenna 12 of the non-contact type IC card according to this exemplary embodiment is disposed along the outline of the IC card for the sake of design. Therefore, as shown in Fig. 3, the hologram-magnetic recording layer 2 and the antenna 12 embedded in the card base member 1 are designed to overlap each other.

[0050] However, when the hologram-magnetic recording layer 2 and the antenna 12 embedded in the card base member 1 are designed to overlap each other as shown in Fig. 3, there are the following problems. If an electrostatic test is performed in compliance with a test method prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" of JIS, the IC card cannot withstand static electricity of ± 6 kV that is a prescribed value prescribed by 4.3.7 of "JIS X 6322-1:2001(ISO/IEC 14443-1:2000)". Further, if an electrostatic test is performed in compliance with a test method prescribed by "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)" of JIS, the IC card cannot withstand static electricity of ± 6 kV that is a prescribed value prescribed by 4.3.7 of "JIS X 6323-1:2001(ISO/IEC 15693-1:2000)".

[0051] Meanwhile, an electrostatic test prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)" is performed using an electrostatic discharge test circuit shown in Fig. 4.

[0052] First, an "insulation plate" having a thickness of 0.5 mm is disposed on a "conductive plate" placed on a wooden table, and the "non-contact type IC card" is disposed on the "insulation plate". Then, a "spherical probe", which is connected to an "ESD tester" and has a diameter of 8 mm, comes in contact with the "non-contact type IC card". Subsequently, after static electricity is discharged from the "ESD tester" to the "non-contact type IC card", the performance of the IC chip 13 of the non-contact type IC card is tested.

[0053] Meanwhile, the electrostatic discharge test shown in Fig. 4 is performed under the following conditions:

Charge storage capacitor: 150pF $\pm$ 10%
Discharge resistance: 3300 $\pm$ 10%
Charge resistance: 50 to 100 M Ω
Rising time: 0.7 to 1 ns

[0054] First, as shown in Fig. 5, each of the surface and the back surface of the non-contact type IC card is divided into twenty regions in the form of a 4 $\times$ 5 matrix. After that, the static electricity of +6 kV is applied to the twenty regions on the surface of the non-contact type IC card in rotation, and the static electricity of -6 kV is then applied to the twenty regions. Subsequently, the same processes as described above are performed on the back surface of the non-contact type IC card. Meanwhile, numerals "1" to "20" shown in Fig. 5 indicate the regions divided on the card in the electrostatic discharge test.

- [0055] When the electrostatic test is performed using the electrostatic discharge test circuit shown in Fig. 4, the electrostatic discharge failure of the IC chip 13 embedded in the card base member 1 occurs. The reason for this is as follows. The hologram-magnetic recording layer 2 and the antenna 12 embedded in the card base member 1 overlap each other. Accordingly, when static electricity is discharged to the hologram-magnetic recording layer 2, discharge current flows into the antenna 12 overlapping the hologram-magnetic recording layer 2. Finally, the discharge current flowing into the antenna flows into the IC chip 13, so that excessive load is generated on the IC chip 13.
- [0056] Meanwhile, the position where the hologram-magnetic recording layer 2 is disposed in the card base member 1 is determined by standards depending on the intended use of the card. For example, according to the standard of "JIS X 6302-2:2005(ISO/IEC 7811-2:2001)" or "JIS X 6302-6:2005(ISO/IEC 7811-6:2001)", a distance between the upper end of the non-contact type IC card and the front side of the hologram-magnetic recording layer 2 is determined by 5.54 mm to the maximum extent, and a distance between the upper end of the non-contact type IC card and the rear side of the hologram-magnetic recording layer 2 is determined by 11.89 mm to the minimum extent in the case of two tracks and determined by 15.95 mm to the minimum extent in the case of three tracks. Accordingly, when the antenna 12 is disposed in the card base member 1 to make the communication characteristic of the non-contact type IC card good, the hologram-magnetic recording layer 2 and the antenna 12 overlap each other as shown in Fig. 3.
- [0057] For this reason, the present inventors tried to modify the non-contact type IC card in various ways in order to make the non-contact type IC card including the hologram-magnetic recording layer 2 shown in Figs. 1 and 3 meet the above-mentioned electrostatic test. As a result of enthusiastic studies, the present inventors found out from the experiment that the non-contact type IC card met the electrostatic test through the modification of the material of the metal reflective layer 23 of the hologram-magnetic recording layer 2. A relationship between a material, which may be used as the material of the metal reflective layer 23, and the electrostatic discharge failure of the IC chip 13 caused by the electrostatic test shown in Fig. 4 will be described below with reference to Fig. 6. Further, Fig. 6 shows measurement results representing a relationship between the electric conductivity of the material applied to the metal reflective layer 23 and the presence or absence of the electrostatic discharge failure of the IC chip 13 that is caused by the electrostatic test of the non-contact type IC card using the material.
- [0058] Meanwhile, the measurement results shown in Fig. 6 are results that are obtained by performing the electrostatic test shown in Fig. 4 under a temperature condition of 20°C after a non-contact type IC card shown in Fig. 7 is manufactured.
- [0059] Further, the non-contact type IC card shown in Fig. 7 is a card that is manufactured by using the following materials, being interposed between stainless plates having a thickness of 1 mm, and thermally compressed by a hot press.
- [0060] Over sheet 17-1: CG030M: 50 μ m (manufactured by Taihei Chemicals Limited)
 Core sheet 16-1: P3700M: 125 μ m (manufactured by Taihei Chemicals Limited)
 Core sheet 16-2: P3700M: 200 μ m (manufactured by Taihei Chemicals Limited)
 IC module 15: RC-S935A (manufactured by Sony Corporation)
 Core sheet 16-3: PG700M: 200 μ m (manufactured by Taihei Chemicals Limited)
 Core sheet 16-4: PG700M: 125 μ m (manufactured by Taihei Chemicals Limited)
 Over sheet 17-2: CG030M: 50 μ m (manufactured by Taihei Chemicals Limited)
- Meanwhile, a hologram-magnetic recording layer having a width of 8.4 mm was used as the hologram-magnetic recording layer 2, and was disposed at a position prescribed by a standard of "JIS X 6302-2:2005(ISO/IEC 7811-2:2001)" or "JIS X 6302-6:2005(ISO/IEC 7811-6:2001)".
- [0061] The measurement results shown in Fig. 6 are results of the electrostatic discharge failure of the IC chip 13 when Ag, Cu, Al, Au, Zn, Co, Ni, In, Fe, Cr, Ti, and Sn are used as the material of the metal reflective layer 23 of the hologram-magnetic recording layer 2. As apparent from the measurement results shown in Fig. 6, it is identified that the electrostatic discharge failure of the IC chip 13 does not occur when Zn, Co, Ni, In, Fe, Cr, Ti, and Sn are used as the material of the metal reflective layer 23. Accordingly, if a material having an electric conductivity smaller than the electric conductivity ($28.9 \times 10^6/\Omega\text{m}$) of Au is used as the material of the metal reflective layer 23, the electrostatic discharge failure of the IC chip 13 does not occur.
- [0062] For this reason, it is preferable that the metal reflective layer 23 of the hologram-magnetic recording layer 2 be made of a material having an electric conductivity smaller than $28.9 \times 10^6/\Omega\text{m}$. Accordingly, it is possible to prevent the electrostatic discharge failure of the IC chip 13 that is embedded in the non-contact type IC card including the hologram-magnetic recording layer 2.
- [0063] As described above, the non-contact type IC card according to this exemplary embodiment includes the hologram-magnetic recording layer 2 on the card base member 1, and the antenna 12 and the IC chip 13 connected to the antenna 12 are embedded in the card base member 1. Accordingly, even when the hologram-magnetic recording layer 2 and the antenna 12 are designed so as to overlap each other, if the metal reflective layer 23 of the hologram-magnetic recording layer 2 is made of a material having an electric conductivity smaller than $28.9 \times 10^6/\Omega\text{m}$, the non-contact type IC card meets the standard of "JIS X 6322-1:2001(ISO/IEC 14443-1:2000)" even though an electrostatic test prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" is performed. Further, even when an electrostatic test prescribed by "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)" is performed, the non-contact type IC card meets the standard of "JIS X 6323-1:2001(ISO/IEC 15693-1:2000)".
- [0064] Meanwhile, from the measurement results shown in Fig. 6, Zn, Co, Ni, In, Fe, Cr, Ti, and Sn have been used as the material of the metal reflective layer 23 of the hologram-magnetic recording layer 2 of the non-contact type IC card according to the above-mentioned exemplary embodiment. However, as long as the electric conductivity of the material of the metal reflective layer 23 is smaller than $28.9 \times 10^6/\Omega\text{m}$, it goes without saying that at least one of Zn, Co, Ni, In, Fe, Cr, Ti, and Sn may be used as the material of the metal reflective layer.
- [0065] Further, it is preferable that Sn, Ti, Cr, In, and Zn be used as the material of the above-mentioned metal reflective layer 23. Considering manufacturing cost, chemical stability, and the like, it is preferable that Cr be used as the material of the metal reflective layer. Furthermore, considering concealability, it is preferable that Sn and Cr be used as the material of the metal reflective layer. For this reason, it is most preferable that Cr having low manufacturing cost, chemical stability, and concealability be used as the material of the metal reflective layer 23 of this exemplary embodiment.
- (SECOND EXEMPLARY EMBODIMENT)
- [0066] A non-contact type IC card according to a second exemplary embodiment will be described below.
- [0067] A non-contact type IC card according to a second exemplary embodiment is characterized in that a metal reflective layer 23 of a hologram-magnetic recording layer 2 is formed to have a surface resistivity of $7.02(\Omega/\square)$ or more. Accordingly, even when an electrostatic test prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)" is performed and static electricity is discharged to the metal reflective layer 23, it is possible to limit discharge current that flows from the metal reflective layer 23 to an antenna 12. As a result, it is possible to prevent electrostatic discharge failure of an IC chip 13 embedded in the IC card. The non-contact type IC card according to the second exemplary embodiment will be described below with reference to Figs. 8 and 9.
- [0068] The non-contact type IC card according to the second exemplary embodiment includes the same structure as the non-contact type IC card according to the first exemplary embodiment that is shown in Fig. 1. Meanwhile, the metal reflective layer 23 of the non-contact type IC card according to the first exemplary embodiment has been made of a material having an electric conductivity smaller than $28.9 \times 10^6/\Omega\text{m}$. However, as long as the surface resistivity of the metal reflective layer 23 is $7.02(\Omega/\square)$ or more, the metal reflective layer 23 of the non-contact type IC card according to the second exemplary embodiment may be made of any material, for example, Al, Zn, Co, Ni, In, Fe, Cr, Ti, Sn, or various alloys thereof.
- [0069] First, a relationship between the metal reflective layer 23 having a predetermined surface resistivity and the presence or absence of electrostatic discharge failure of the IC chip 13, which is caused by the electrostatic test shown in Fig. 4, will be described with reference to Fig. 8. Meanwhile, Fig. 8 shows

measurement results showing a relationship between the metal reflective layer 23 having a predetermined surface resistivity and the presence or absence of electrostatic discharge failure of the IC chip 13 that is caused by an electrostatic test of the non-contact type IC card using the metal reflective layer 23.

[0070] Meanwhile, the measurement results shown in Fig. 8 are results that are obtained by performing the electrostatic test shown in Fig. 4 under a temperature condition of 20°C after a non-contact type IC card shown in Fig. 7 is manufactured.

[0071] Further, the non-contact type IC card shown in Fig. 7 is a card that is manufactured by using the following materials, being interposed between stainless plates having a thickness of 1 mm, and thermally compressed by a hot press.

[0072] Over sheet 17-1: CG030M: 50 μ m (manufactured by Taihei Chemicals Limited)

Core sheet 16-1: PG700M: 125 μ m (manufactured by Taihei Chemicals Limited)

Core sheet 16-2: PG700M: 200 μ m (manufactured by Taihei Chemicals Limited)

IC module 15: RC-S935A (manufactured by Sony Corporation)

Core sheet 16-3: PG700M: 200 μ m (manufactured by Taihei Chemicals Limited)

Core sheet 16-4: PG700M: 125 μ m (manufactured by Taihei Chemicals Limited)

Over sheet 17-2: CG030M: 50 μ m (manufactured by Taihei Chemicals Limited)

Meanwhile, a hologram-magnetic recording layer having a width of 8.4 mm was used as the hologram-magnetic recording layer 2, and was disposed at a position prescribed by a standard of "JIS X 6302-2:2005(ISO/IEC 7811-2:2001)" or "JIS X 6302-6:2005(ISO/IEC 7811-6:2001)".

[0073] Further, the "surface resistivity" shown in Fig. 8 is a value measured using a fall-of-potential method by applying a low voltage of 1 V to both ends of the metal reflective layer 23 of the hologram-magnetic recording layer 2, after Al is used as the material of the metal reflective layer 23 and the hologram-magnetic recording layer 2 is disposed on the card base member 1, as shown in Fig. 9. Furthermore, the "surface resistivity" is calculated by an equation "surface resistivity"=(V/I)×(W/L).

[0074] As apparent from the measurement results shown in Fig. 8, it is identified that the electrostatic discharge failure of the IC chip 13 does not occur when the hologram-magnetic recording layer 2 is formed using the metal reflective layer 23 having a surface resistivity of 7.02($\Omega/\square$) or more.

[0075] For this reason, if the hologram-magnetic recording layer 2 is formed by using the metal reflective layer 23 having a surface resistivity of 7.02($\Omega/\square$) or more, discharge current flowing from the metal reflective layer 23 to an antenna 12 is limited and the electrostatic discharge failure of the IC chip 13 embedded in the IC card does not occur, even though the hologram-magnetic recording layer 2 is disposed at a position prescribed by a standard of "JIS X 6302-2:2005(ISO/IEC 7811-2:2001)" or "JIS X 6302-6:2005(ISO/IEC 7811-6:2001)" so as to form the non-contact type IC card, an electrostatic test prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)" is performed, and static electricity is discharged to the metal reflective layer 23.

[0076] As described above, the non-contact type IC card according to the second exemplary embodiment includes the hologram-magnetic recording layer 2 on the card base member 1, and the antenna 12 and the IC chip 13 connected to the antenna 12 are embedded in the card base member 1. Accordingly, even when the hologram-magnetic recording layer 2 and the antenna 12 are designed to overlap each other, if the metal reflective layer 23 of the hologram-magnetic recording layer 2 is formed to have a surface resistivity of 7.02($\Omega/\square$) or more, the non-contact type IC card meets the standard of "JIS X 6322-1:2001(ISO/IEC 14443-1:2000)" even though an electrostatic test prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" is performed. Further, even though an electrostatic test prescribed by "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)" is performed, the non-contact type IC card meets the standard of "JIS X 6323-1:2001(ISO/IEC 15693-1:2000)".

[0077] Meanwhile, as apparent from the measurement results shown in Fig. 8, as long as the metal reflective layer 23 of the hologram-magnetic recording layer 2 of the above-mentioned second exemplary embodiment is formed to have a surface resistivity of 7.02($\Omega/\square$) or more, the metal reflective layer may be made of any material. For example, at least one of Al, Zn, Co, Ni, In, Fe, Cr, Ti, and Sn may be used as the material of the metal reflective layer 23.

[0078] Considering workability, manufacturing cost, and the like, it is preferable that Al be used as the material of the metal reflective layer 23. Furthermore, considering concealability, it is preferable that Al, Sn, and Cr be used as the material of the metal reflective layer. For this reason, it is most preferable that Al having workability, low manufacturing cost, and concealability be used as the material of the metal reflective layer 23 of the second exemplary embodiment.

[0079] The above-mentioned exemplary embodiments are preferred exemplary embodiments of the present invention. Accordingly, the present invention is not limited to the exemplary embodiments, and various modifications may be made thereto without departing from the scope and spirit of the present invention.

[0080] For example, as long as the hologram-magnetic recording layer 2 of the non-contact type IC card according to the above-mentioned exemplary embodiment includes at least the magnetic recording layer 22, the metal reflective layer 23, and the hologram layer 24, the hologram-magnetic recording layer 2 is not particularly limited and may be formed in any layer structure.

INDUSTRIAL APPLICABILITY

[0081] The non-contact type IC card according to the present invention may be applied to information recording media that perform non-contact communication, such as commutation tickets and coupon ticket for various means of communication, a telephone card, an admission card for a specified region, an ID card, a license, cards used for Japanese pinball, an amusement park, and a movie theater, and a credit card.

BRIEF DESCRIPTION OF THE DRAWINGS

[0082] Fig. 1 is a view showing the structure of a non-contact type IC card according to an exemplary embodiment of the present invention.

Fig. 2 is a view showing the structure of a hologram-magnetic recording layer 2 that is included in the non-contact type IC card according to the exemplary embodiment.

Fig. 3 is a view showing a positional relationship between an antenna 12 and the hologram-magnetic recording layer 2 of the non-contact type IC card according to the exemplary embodiment.

Fig. 4 is a view showing the structure of a circuit used for an electrostatic test that is prescribed by "JIS X 6305-6:2001(ISO/IEC 10373-6:2001)" or "JIS X 6305-7:2001(ISO/IEC 10373-7:2001)".

Fig. 5 is a view showing divided regions that are formed on the card in an electrostatic discharge test, and a view showing that each of the surface and the back surface of the non-contact type IC card is divided into twenty regions in the form of a 4 × 5 matrix.

Fig. 6 is a view showing a relationship between a material that may be used as the material of a metal reflective layer 23, and the electrostatic discharge failure of an IC chip 13 that is caused by an electrostatic test of the non-contact type IC card using the material.

Fig. 7 is a view showing a non-contact type IC card used when measurement results shown in Figs. 6 and 8 are applied.

Fig. 8 is a view showing a relationship between a metal reflective layer 23 having a predetermined surface resistivity and the presence or absence of electrostatic discharge failure of an IC chip 13 that is caused by an electrostatic test of the non-contact type IC card using the metal reflective layer 23.

Fig. 9 is a view illustrating a method of measuring the "surface resistivity" shown in Fig. 8.

DESCRIPTION OF REFERENCE NUMERALS

- [0083]
- | | |
|----|-----------------------------------|
| 1 | CARD BASE MEMBER |
| 2 | HOLOGRAM-MAGNETIC RECORDING LAYER |
| 11 | ANTENNA SUBSTRATE |
| 12 | |

ANTENNA PATTERN
 13
 IC CHIP
 14
 ADHESIVE
 15
 IC MODULE
 16
 CORE SHEET
 17
 OVER SHEET
 21
 ADHESION LAYER
 22
 MAGNETIC RECORDING LAYER
 23
 METAL REFLECTIVE LAYER
 24
 HOLOGRAM LAYER
 25
 PASSIVATION LAYER
 26
 RELEASE LAYER
 27
 SUPPORT LAYER
 30
 HOLOGRAM FORMING PORTION

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JP2647877B2 *	1987-12-26	1997-08-27	シャープ株式会社	Magneto-optical card recording / reproducing device
EP0541518B1 *	1991-05-22	1997-12-03	Kyodo Printing Co., Ltd.	Non-contact type ic card
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Priority And Related Applications

Priority Applications (4)

Application	Priority date	Filing date	Title
JP2005331965		2005-11-16	
JP2005355448A	2005-12-08	2005-12-08	Non-contact IC card
JP2006282819A	2005-11-16	2006-10-17	Non-contact IC card
PCT/JP2006/322677	2005-11-16	2006-11-14	Noncontact ic card

Legal Events

Date	Code	Title	Description
2008-07-18	PUAI	Public reference made under article 153(3) epc to a published international application that has entered the european phase	Free format text: ORIGINAL CODE: 0000012
2008-08-20	AK	Designated contracting states	Kind code of ref document: A1 Designated state(s): DE
2008-08-20	17P	Request for examination filed	Effective date: 20080618

2009-12-02	A4	Supplementary search report drawn up and despatched	Effective date: 20091102
2009-12-02	RIC1	Information provided on ipc code assigned before grant	ipc: G06K 19/08 20060101ALI20091027BH ipc: G06K 19/07 20060101ALI20091027BH ipc: B42D 15/10 20060101ALI20091027BH ipc: G06K 19/16 20060101ALI20091027BH ipc: G06K 19/077 20060101AFI20070718BH ipc: G06K 19/073 20060101ALI20091027BH
2010-01-27	17Q	First examination report despatched	Effective date: 20091230
2011-11-04	GRAP	Despatch of communication of intention to grant a patent	Free format text: ORIGINAL CODE: EPIDOSNIGR1
2011-12-07	RBV	Designated contracting states (corrected)	Designated state(s): DE
2011-12-07	DAX	Request for extension of the european patent (deleted)	
2012-08-24	STAA	Information on the status of an ep patent application or granted ep patent	Free format text: STATUS: THE APPLICATION IS DEEMED TO BE WITHDRAWN
2012-09-19	1BD	Application deemed to be withdrawn	Effective date: 2010328
2012-09-26	R18D	Application deemed to be withdrawn (corrected)	Effective date: 20120328

Data provided by IFI CLAIMS Patent Services



Storage card and terminal equipment combining storage card

Abstract

This invention provides a storage card with the RF identifying function including a storage unit and a storage card interface interacting stored data of the storage unit with outside devices, in which, data of the storage unit include RF identification matched information, the card also includes: a RF identification function unit connected with the storage unit used in RF identification after configuring information based on the RF identification configured information stored in the storage unit, besides, this invention provides a terminal device combining with said card.

Classifications

● G06K19/0723 Record carriers with conductive marks, printed circuits or semiconductor circuit elements, e.g. credit or identity cards also with resonating or responding marks without active components with integrated circuit chips the record carrier comprising an arrangement for non-contact communication, e.g. wireless communication circuits on transponder cards, non-contact smart cards or RFID's

[View 2 more classifications](#)

CN100527159C

China

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Other languages: Chinese

Inventor: 李劲, 杨芳

Current Assignee: Huawei Device Co Ltd

Worldwide applications

2005 [CN](#) 2005 [CN WO 08 6E EP](#)

Application CNB200510100762XA events

2005-10-31 Application filed by Shenzhen Huawei Communication Technologies Co Ltd

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Info: Patent citations (14), Cited by (17), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Discuss

Claims (14)

[Hide Dependent](#) ^

1. storage card, include storage unit and with the memory card interface of external unit data that mutual storage unit is stored, it is characterized in that, data that storage unit is stored include radio-frequency (RF) identification standard protocol configuration information, described radio-frequency (RF) identification standard protocol configuration information is stored so that the configuration management operation of the accurate agreement of radio frequency identification marking is discerned and carried out to external unit with the form of radio-frequency (RF) identification configuration virtual file in storage unit, described radio-frequency (RF) identification standard protocol configuration information can be operated by external unit by memory card interface, and described storage card also comprises:

The radio frequency recognition function unit links to each other with described storage unit, is used for carrying out radio-frequency (RF) identification after described radio-frequency (RF) identification standard protocol configuration information according to described cell stores is configured.

2. storage card according to claim 1 is characterized in that, described radio frequency recognition function unit is the radio-frequency (RF) identification reader unit.

3. storage card according to claim 2 is characterized in that, described radio-frequency (RF) identification reader unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement card-reading function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data,

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

4. storage card according to claim 3 is characterized in that, described radio frequency identification signal Transmit-Receive Unit is a coupled antenna.

5. storage card according to claim 1 is characterized in that, described radio frequency recognition function unit is the radio-frequency (RF) identification sensor unit.

6. storage card according to claim 5 is characterized in that, described radio-frequency (RF) identification sensor unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement inducing function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

7. the terminal device of a combining memory card, described storage card include storage unit and with the memory card interface of terminal device data that mutual storage unit is stored, it is characterized in that, data that storage unit is stored include radio-frequency (RF) identification standard protocol configuration information, described radio-frequency (RF) identification standard protocol configuration information is stored so that the configuration management operation of the accurate agreement of radio frequency identification marking is discerned and carried out to terminal device with the form of radio-frequency (RF) identification standard protocol configuration virtual file in storage unit, described radio-frequency (RF) identification standard protocol configuration information can be by being operated by terminal device with the memory card interface of terminal device, and described storage card also comprises:

The radio frequency recognition function unit links to each other with described storage unit, is used for carrying out radio-frequency (RF) identification after described radio-frequency (RF) identification standard protocol configuration information according to described cell stores is configured.

8. the terminal device of combining memory card according to claim 7 is characterized in that, described radio frequency recognition function unit is the radio-frequency (RF) identification reader unit.

9. the terminal device of combining memory card according to claim 8 is characterized in that, described radio-frequency (RF) identification reader unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement card-reading function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

10. the terminal device of combining memory card according to claim 9 is characterized in that, described radio frequency identification signal Transmit-Receive Unit is a coupled antenna.

11. the terminal device of combining memory card according to claim 7 is characterized in that, described radio frequency recognition function unit is the radio-frequency (RF) identification sensor unit.

12. the terminal device of combining memory card according to claim 11 is characterized in that, described radio-frequency (RF) identification sensor unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement inducing function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

13. the terminal device according to each described combining memory card of claim 7-12 is characterized in that, described terminal device is the hand-held terminal device with external memory card interface.

14. the terminal device of combining memory card according to claim 13 is characterized in that, described hand-held terminal device with external memory card interface is mobile phone, digital camera, MP3, PDA or DV.

Description

The terminal device of storage card and combining memory card

Technical field

The present invention relates to radio frequency identification equipment, in particular, the present invention relates to have the terminal device of radio frequency recognition function.

Background technology

Radio-frequency (RF) identification (Radio Frequency Identification, RFID), being commonly called as electronic tag, is that a kind of radiofrequency signal of utilizing realizes that by space coupling (alternating magnetic field or electromagnetic field) contactless information transmission and the information of passing through to be transmitted reach the technology of identifying purpose.

With reference to shown in Figure 1, radio frequency identification equipment is made up of three parts usually:

Label (Tag): be made up of coupling element and chip, each label has unique electronic code, attached to being used to identify destination object on the object;

Reader (Reader): read the equipment of (sometimes also can write) label information, can be designed to hand-held or fixed;

Antenna (Antenna): between label and reader, transmit radiofrequency signal.

The basic functional principle of REID is also uncomplicated: after label enters magnetic field, rely on it will be stored in product information (Passive Tag on the label by the energy that induction current obtained, passive label or passive label) send, perhaps initiatively send the signal (ActiveTag, active label or active tag) of a certain frequency by label self, information on the reader reading tag, and this information decoded is delivered to it CIS at last and is carried out relevant data and handle. As a kind of contactless automatic identification technology, radio-frequency (RF) identification need not manual intervention, this technology has the not available waterproof of bar code, antimagnetic, high temperature resistant, long service life, read that distance is big, label data is encrypted, the storage data capacity reaches the canned data change greatly and waits advantage freely, and therefore current a lot of fields such as logistics and supplies management, aviation luggage are handled, mail/fast freight parcel is handled, gate inhibition's control/electronic entrance ticket or the like is all brought into use REID.

Can make terminal device have radio frequency recognition function by the expansion prior terminal, a kind of prior art that makes communication terminal have radio frequency recognition function please refer to U.S. Patent Application Publication No. 20050088285, "Mobile communication terminal with RFID function and RFID programming method in the same" (communication terminal) with RFID function and RFID programmed method, this patent is that Korea S Samsung applied on October 28th, 2003, the technical scheme that patent disclosed is: a kind of communication terminal, this terminal comprises the radio frequency identification signal receiver, is used to receive the radio frequency identification signal that exists with first kind of form; One conversion equipment, the radio frequency identification signal that is used for existing with first kind of form convert second kind of form to; Memory storage is used to store the radio frequency identification signal that exists with second kind of form; Scrambler is used for the radio frequency identification signal of memory storage is encoded; Demoder is used for the radio frequency identification signal decoding from scrambler output; Conveyer is used for decoded radio frequency identification signal is sent to reader.

In the prior art that above-mentioned patent is described, by the RFID module is directly embedded into the purpose that can reach the terminal extension radio frequency recognition function in the communication terminal, but also there is following shortcoming:

At first, do not comprise the RFID module in most communication terminals of selling on the market at present, so if the user wants to make the portable terminal of oneself to have the RFID function, only way is to buy the communication terminal that is built-in with the RFID module in addition, such terminal price is comparatively expensive, increase consumer's purchase cost, also reduced the competitiveness of product in market virtually;

Secondly, for the developer of communication terminal, also will improve developer's construction cycle and cost of development undoubtedly for product adds new function;

Once more, the RFID standard is various, and the RFID of various criterion requires also to be not quite similar, and different developers adopts different RFID standards to develop the mobile communication product of oneself, makes that RFID's between the different portable terminals is compatible relatively poor;

Once more, prior art is only considered extensive radio frequency recognition function on communication terminal, and application is comparatively narrow.

Summary of the invention

The technical matters that the present invention solves provides a kind of storage card with radio frequency recognition function and in conjunction with the terminal device of described storage card, with lower cost, the radio frequency recognition function of compatible terminal extension equipment preferably, meets the need of market.

For addressing the above problem, storage card of the present invention, include storage unit and with the memory card interface of external unit data that mutual storage unit is stored, wherein data that storage unit is stored include the radio-frequency (RF) identification configuration information, described storage card also comprises:

The radio frequency recognition function unit links to each other with described storage unit, is used for carrying out radio-frequency (RF) identification after described radio-frequency (RF) identification configuration information according to described cell stores is configured.

Alternatively, described radio frequency recognition function unit is the radio-frequency (RF) identification reader unit.

Wherein, described radio-frequency (RF) identification reader unit can comprise:

Codec unit is used for according to radio-frequency (RF) identification agreement card-reading function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal

Wherein, described radio frequency identification signal Transmit-Receive Unit can be pickup coil.

Alternatively, described radio frequency recognition function unit is the radio-frequency (RF) identification sensor unit.

Wherein, described radio-frequency (RF) identification sensor unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement inducing function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

Accordingly, the terminal device of a kind of combining memory card provided by the invention, described storage card include storage unit and with the memory card interface of terminal device data that mutual storage unit is stored, wherein data that storage unit is stored include the radio-frequency (RF) identification configuration information, and described storage card also comprises:

The radio frequency recognition function unit links to each other with described storage unit, is used for carrying out radio-frequency (RF) identification after described radio-frequency (RF) identification configuration information according to described cell stores is configured.

Alternatively, described radio frequency recognition function unit can be the radio-frequency (RF) identification reader unit.

Wherein, described radio-frequency (RF) identification reader unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement card-reading function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

Wherein, described radio frequency identification signal Transmit-Receive Unit can be pickup coil.

Alternatively, described radio frequency recognition function unit is the radio-frequency (RF) identification sensor unit.

Wherein, described radio-frequency (RF) identification sensor unit comprises:

Codec unit is used for according to radio-frequency (RF) identification agreement inducing function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

Wherein, described terminal device is the hand-held terminal device with external memory card interface.

Alternatively, described hand-held terminal device with external memory card interface can be mobile phone, digital camera, MP3, PDA or DV.

Compared with prior art, the present invention has following beneficial effect:

At first, the present invention expands the radio frequency recognition function of handheld device indirectly by storage card, if the user wants to make the handheld device of oneself to have radio frequency recognition function, only needing to buy the storage card with radio frequency recognition function of the present invention also gets final product this storage card insertion handheld device, the handheld device that need not more renew greatly reduces user's purchase cost;

Secondly, for the developer of handheld device, need not prolong the construction cycle of oneself for add new function on handheld device, cost of development can not improve yet yet;

Once more, storage card can arbitrarily be changed, the user can make the handheld device of oneself compatible mutually with the handheld device that satisfies other RFID standard, and also making the application of RFID expand all to, the present invention has in the hand-held terminal device product of memory card interface, as long as this hand-held terminal device has memory card interface, the user just can the described storage card with radio frequency recognition function of the application of the invention expands the RFID function of its handheld device, and is very convenient.

Description of drawings

Fig. 1 is that radio-frequency recognition system constitutes synoptic diagram.

Fig. 2 is a storage card inner structure synoptic diagram of the present invention.

Fig. 3 is a handheld device of the present invention operating system software level synoptic diagram.

Fig. 4 is a handheld device radio frequency identification signal processing flow chart of the present invention

Embodiment

Development along with mechanics of communication, storage card more and more is applied on handheld device such as digital camera, smart mobile phone, MP3, PDA, the DV, by some certain functional modules is embedded in the storage card, the storage card that will have this specific function again combines with handheld device, can reach the purpose of the new function of expansion handheld device.

Fig. 2 is a kind of inner structure synoptic diagram of storage card of the present invention, and master controller 13 itself has certain storage space as the control device of storage card, can be used as cell stores information. Among the present invention, the information spinner that is stored in master controller 13 will comprise storage card configuration information, radio-frequency (RF) identification standard, radio frequency identification data and other necessary radio-frequency (RF) identification configuration information in the radio-frequency (RF) identification communication process. As required, in master controller 13, can write different radio-frequency (RF) identification standards, will well solve the problem of radio-frequency (RF) identification poor compatibility between the different product like this. Storage card is connected with external unit by memory card interface 10; Power supply 11 obtains electric energy from memory card interface 10, gives other circuit supply in the storage card. Contain a radio frequency recognition function unit 12 in the storage card of the present invention, described radio frequency recognition function unit 12 can be used as the radio-frequency (RF) identification reader unit, also can be used as the radio-frequency (RF) identification sensor unit, as a kind of embodiment, as shown in Figure 2, when this rfid unit 12 is radio-frequency (RF) identification functions of card reader unit, specifically can comprise:

Codec unit is used for according to radio-frequency (RF) identification agreement card-reading function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

Same principle when rfid unit is radio-frequency (RF) identification inductor functional unit, can comprise among the present invention equally:

Codec unit is used for according to radio-frequency (RF) identification agreement inducing function encoding and decoding radio frequency identification data;

Modem module links to each other with described codec unit, is used to modulate described radio frequency identification data and is corresponding radio frequency identification signal or radio frequency identification signal is demodulated into corresponding radio frequency identification data;

The radio frequency identification signal Transmit-Receive Unit links to each other with described modem module, is used to receive and dispatch described radio frequency identification signal.

Need explanation, in specific implementation, the pickup coil that described radio frequency identification signal Transmit-Receive Unit can coil form or other can be realized the device of radio frequency identification signal transmitting-receiving, owing to be prior art, are not described in detail here.

Master controller 13 can be by the relevant information in memory card interface 10 receptions or the transmission radio-frequency (RF) identification communication process among the present invention, if master controller 13 receives the information that is send over by miscellaneous equipment, master controller 13 is at first issued codec with the information that receives, the information that codec is received according to the radio-frequency (RF) identification standard butt joint that writes in the master controller 13 is encoded, after modulation, information is sent by radio frequency identification signal Transmit-Receive Unit 12. As mentioned above,

described storage card can be connected with other hand-held terminal device by memory card interface 10, as long as have the interface that inserts storage card on this hand-held terminal device, can realize the read-write control of handheld device to the driver of storage card to storage card by in the operating system of handheld device, installing.

Concrete application with handheld device describes below, and Fig. 3 is a handheld device of the present invention operating system software level synoptic diagram. As seen from Figure 3, comprised in the operating system of handheld device that the interface to handheld device drives, in the lower floor that this handheld device interface drives then is that memory card interface drives, therefore the operating system of handheld device has guaranteed that handheld device can operate the storage card that inserts on it, such operation comprises storing reading of data in the storage card, also the data of handheld device can be write storage card. At this moment, the storage card that inserts handheld device is equivalent to an addressable space that is mapped to the handheld device file system to handheld device, and handheld device can realize read-write operation to storage card by the driving on its operating system. Can also see that from Fig. 3 comprise a RFID virtual file on the memory card operating system, by this RFID virtual file, handheld device can realize the visit of rfid unit in the storage card and configuration. Handheld device makes that to the configuration of rfid unit the radio frequency identification data on the storage card is not unalterable, but data that can real-time update.

Operating system shown in Figure 3 operates mainly in (on the storage card of extended RFID) on the functional module. For the handheld device realization of reality and the storage card formats that matches with it, the operating system of handheld device itself has realized the driving to storage card. The Storage Card Drivers interface, this module realizes the transparent access of module to upper layer module shielding storage card feature. This part software is normally finished when carrying out software development by the handheld device developer, has considered compatibility in exploitation, can the storage card that handheld device had be provided support. For handheld device operating system, storage card as the part of handheld device operating system software file, to the visit of storage card, has been exactly the visit to the storage card file. By such method, avoided writing software-driven and application interface separately at every kind of host software system.

Fig. 4 is a handheld device radio frequency identification signal processing flow chart of the present invention, and handheld device realizes the radio frequency recognition function expansion of himself by the control to storage card. Radio frequency identification signal is sent in the handheld device by storage card through the RFID receiving trap, and the data after handling through handheld device are returned along former road again, after the RFID dispensing device sends, finish the overall process of handheld device radio frequency recognition function.

The above only is a preferred implementation of the present invention; should be pointed out that for those skilled in the art, under the prerequisite that does not break away from the principle of the invention; can also make some improvements and modifications, these improvements and modifications also should be considered as protection scope of the present invention.

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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
CN8200510100762XA	2005-10-31	2005-10-31	Storage card and terminal equipment combining storage card

Applications Claiming Priority (6)

Application	Filing date	Title
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EP06123247A	2006-10-31	Memory card and terminal equipment incorporating the same
DE202006020843U	2006-10-31	Memory card and this containing terminal

Legal Events

Date	Code	Title	Description
2006-11-08	PB01	Publication	
2006-11-08	C06	Publication	
2007-01-03	SE01	Entry into force of request for substantive examination	
2007-01-03	C10	Entry into substantive examination	
2009-08-12	GR01	Patent grant	
2009-08-12	C14	Grant of patent or utility model	
2010-06-23	CP01	Change in the name or title of a patent holder	Address after: 518129 Longgang District, Guangdong, Shantian HUAWEI base B District, building 2, building No. Patentee after: Huawei Device Co., Ltd. Address before: 518129 Longgang District, Guangdong, Shantian HUAWEI base B District, building 2, building No. Patentee before: Shenzhen Huawei Communication Technology Co., Ltd.
2010-06-23	C56	Change in the name or address of the patentee	Owner name: HUAWEI DEVICE CO., LTD.

Free format text: FORMER NAME: SHENZHEN HUAWEI COMMUNICATION TECHNOLOGY CO., LTD.

2017-11-17	TR01	Transfer of patent right	Effective date of registration: 20171031 Address after: Metro Songshan Lake high tech Industrial Development Zone, Guangdong Province, Dongguan City Road 523808 No. 2 South Factory (1) project B2 -5 production workshop Patentee after: HUAWEI terminal (Dongguan) Co., Ltd. Address before: 518129 Longgang District, Guangdong, Bantian HUAWEI base B District, building 2, building No. Patentee before: Huawei Device Co., Ltd.
2017-11-17	TR01	Transfer of patent right	
2019-05-31	CP01	Change in the name or title of a patent holder	Address after: 523808 Southern Factory Building (Phase I) Project B2 Production Plant-5, New Town Avenue, Songshan Lake High-tech Industrial Development Zone, Dongguan City, Guangdong Province Patentee after: Huawei Device Co., Ltd. Address before: 523808 Southern Factory Building (Phase I) Project B2 Production Plant-5, New Town Avenue, Songshan Lake High-tech Industrial Development Zone, Dongguan City, Guangdong Province Patentee before: HUAWEI terminal (Dongguan) Co., Ltd.
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FIRST NAMED
INVENTOR Siva G. Narendra

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Usman Mughal

Documents

TOTAL DOCUMENTS: 25

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Fujimoto_WO2006057049A1.pdf	10	Foreign Reference	139 KB
Moshir_WO2007139909A3.pdf	11	Foreign Reference	157 KB
Soderstrom_WO2006052815B.pdf	4	Foreign Reference	78 KB
Narendra_TWI433560B.pdf	8	Foreign Reference	112 KB
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Moshir_Sean_KR201001268	35	Foreign Reference	344 KB

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18P115001US9_10_IDS2.pdf	6	Information Disclosure Statement (IDS) Form (SB08)	1030 KB

Digest

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Patents

2006057049



Card and host device

Abstract

A host device (2) can read out information from a card (1), write information in the card, and supply a power supply voltage which belongs to a first voltage range or a second voltage range smaller than the first voltage range, and issues a voltage identification command (CMDV) to the card. The voltage identification command includes a voltage range identifying section (VOLS), an error detecting section (ED), and a check pattern section (CPS). The voltage range identifying section includes information indicating to which of the first voltage range and the second voltage range the power supply voltage belongs. The error detecting section has a pattern arranged such that the card receiving the voltage identification command can detect the error thereof. The check pattern section has a preset pattern.

Classifications

G06K17/00 Methods or arrangements for effecting co-operative working between equipments covered by two or more of main groups G06K1/00 - G06K15/00, e.g. automatic card files incorporating conveying and reading operations

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WO2006057049A1

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Other languages: French, Japanese

Inventor: Akihisa Fujimoto

Worldwide applications

2004 [WO](#) 2005 [TW](#) [JP](#) [CN](#) [TW](#) [BR](#) [EP](#) [WO](#) [EP](#) [KR](#) [RU](#) [KR](#) [CA](#)
 2006 [US](#) 2008 [US](#) 2009 [US](#) 2010 [US](#) 2011 [US](#) 2012
[US](#) [US](#) 2013 [US](#) [US](#) 2014 [US](#) 2015 [US](#) 2017 [US](#)
 2019 [US](#)

Application PCT/JP2004/017627 events

2004-11-26 Application filed by Kabushiki Kaisha Toshiba

2004-11-26 Priority to PCT/JP2004/017627

2006-06-01 Publication of WO2006057049A1

Info: Patent citations (56), Cited by (22), Legal events, Similar documents, Priority and Related Applications

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Claims

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The scope of the claims

[1] It is configured to read information from the card, write information to the card, and supply a power supply voltage belonging to either the first voltage range or the second voltage range lower than the first voltage range,

A host device configured to issue a voltage identification command including a voltage range identification unit, an error detection unit, and a check pattern unit to the card,

The voltage range identification unit includes information indicating whether the power supply voltage belongs to a deviation of the first voltage range or the second voltage range;

The error detection unit has a pattern configured such that a card that has received the voltage identification command can detect an error in the voltage identification command;

The check pattern portion has a preset pattern,

A host device characterized by that,

[2] A response to the voltage identification command is received,

The response includes a voltage range identification unit, an error detection unit or a check pattern unit,

The error detection unit has a pattern configured such that a device that receives the response from the card can detect the error of the response;

The voltage range identification unit of the voltage identification command and the voltage range identification unit of the response have the same pattern, and the error detection unit is used to confirm that the response has no error or the If the check pattern portion of the response has the same pattern as the check pattern portion of the command, issue a further command to the force;

The host device according to claim 1, wherein:

[3] The host device according to [1], wherein a power supply voltage belonging to the first voltage range is supplied when a response to the voltage identification command is not received,

[4] Issue an initialization command including information to initialize the memory of the card to the command,

Depending on whether there is a response to the voltage identification command, the initialization command Change the definition,

The host device according to claim 1, wherein:

5. The host device according to claim 4, wherein when the response to the voltage identification command is received, the initialization command includes information indicating that the card is a large capacity card.

6. The host device according to claim 5, wherein the initialization command includes information indicating that the card is a small capacity card.

[7] The initialization command includes a first operating voltage identifying unit and a second operating voltage identifying unit, wherein the first operating voltage identifying unit includes a plurality of first bits each corresponding to a voltage having a first width. Consisting of

The second operating voltage identification unit is composed of a plurality of second bits each corresponding to a voltage having a second width smaller than the first width.

The host device according to claim 4, wherein:

[8] It has a memory for recording information and a controller for controlling the memory, and can be operated by either the first voltage range or the voltage belonging to the second voltage range lower than the first voltage range. Yes,

A card configured to be supplied with a voltage identification command including a voltage range identification unit, an error detection unit, and a check pattern unit,

In response to the voltage identification command, a response including a voltage range identification unit and an error detection unit or a check pattern unit is issued.

The voltage range identification unit of the response has the same pattern as the voltage range identification unit of the voltage identification command.

The error detection unit of the response has a pattern configured such that a device receiving the response can detect the error in the response;

The check pattern portion of the response has the same pattern as the check pattern of the voltage identification command.

A card characterized by that.

[9] The memory records information according to a small capacity format or a large capacity format. If the card is supplied with an initialization command to initialize the memory, and the initialization command includes information to initialize the memory according to the small capacity format, the card is a small capacity card. Issue a response containing information to the effect,

The card according to claim 8.

The memory records information according to a small capacity format and a large capacity format, and the card is supplied with an initialization command to initialize the memory, and the initialization command initializes the memory according to the small capacity format. 9. The card according to claim 8, wherein a response to the initialization command is not issued when the information to be converted is not included.

Description

Specification

Card and host equipment

Technical field

TECHNICAL FIELD [0001] The present invention relates to a card and a host device, for example, confirmation of operating voltage and capacity of a memory card and a host device.

Background art

In recent years, in various portable electronic devices such as personal computers, PDAs, cameras, mobile phones and the like, a memory card which is one of removable storage devices is often used. PC cards and small SD™ cards are attracting attention as memory cards. The SD™ card is a memory card with built-in flash memory, card controller, etc., and is specifically designed to meet the demands for miniaturization, large capacity, and high-speed storage.

Conventionally, the operating voltage of a memory card and its host device is in the 3.3V (high voltage) range, and supports a voltage range of 2.7 to 3.6V. On the other hand, there is a need for operation that supports lower voltages, for example the 1.8V (low voltage) range, for example, the voltage range of 1.65 to 1.95V.

[0004] In addition, it is desired to realize an SD™ card capable of storing a large amount of information that is not sufficient for storing data with a large capacity with the capacity of a conventional memory card.

Disclosure of the invention

[0005] An object of the present invention is to provide a memory card and a host device in which operating voltage and capacity can be mutually confirmed.

[0006] The host device according to the first aspect of the present invention reads information from the card and writes information to the card, and belongs to either the first voltage range or the second voltage range lower than the first voltage range. A host device configured to supply a power supply voltage, and configured to issue a voltage identification command including a voltage range identification unit, an error detection unit, and a check pattern unit to the card; The voltage range identification unit includes information indicating whether the power supply voltage belongs to the first voltage range or the second voltage range, and the error detection unit receives the voltage identification command from the card. Of the voltage identification command it has a pattern configured to detect an error; and the check pattern portion has a preset pattern.

The card according to the second aspect of the present invention has a memory for recording information, and a controller for controlling the memory, and has a first voltage range and a second voltage range lower than the first voltage range. A card configured to be supplied with a voltage identification command including a voltage range identification unit, an error detection unit, and a check pattern unit, in response to the voltage identification command, a response including a voltage range identification unit and an error detection unit or a check pattern unit is issued, and the voltage range identification unit of the response is the voltage range identification unit of the voltage identification command. And the error detection unit of the response is configured so that the device that has received the response can detect the error of the response. The a, the switch Ecd pattern portion of the response have the same pattern and the check pattern of the voltage identification command, it is characterized.

Brief Description of Drawings

[0008] FIG. 1 is a diagram schematically showing main parts of a card and a host device according to a first embodiment of the present invention.

FIG. 2 is a diagram showing a data arrangement in the NAND flash memory in the memory card of the first embodiment.

[FIG. 3] FIG. 3 is a diagram exemplifying commands issued by the host device immediately before memory initialization.

[FIG. 4] FIG. 4 is a diagram showing a main part of the contents of a voltage check command.

FIG. 5 is a diagram showing a main part of the content of a response to a voltage check command.

[FIG. 6] FIG. 6 is a flowchart showing processing for checking the operating voltage range when the host device operates in the high voltage range.

[FIG. 7] FIG. 7 is a flowchart showing processing for checking the operating voltage range when the host device operates in the low voltage range.

FIG. 8 is a diagram showing a main part of the contents of a memory initialization command according to the second embodiment of the present invention. FIG. 9 is a diagram showing a main part of the response contents of the memory initialization command according to the second embodiment.

FIG. 10 is a flowchart showing a memory initialization process according to the second embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Hereinafter, embodiments of the present invention will be described with reference to the drawings. In the following description, components having substantially the same functions and configurations are denoted by the same reference numerals, and redundant description will be provided only when necessary.

[0010] (First embodiment)

The first embodiment relates to mutual confirmation of operating voltage ranges supported by the host device and the card.

[0011] When a card capable of low voltage operation is realized, a conventional card (high voltage card) that supports only high voltage operation, a card that supports low voltage and high voltage (two voltage card), and low voltage it is expected that a host device that supplies high voltage and a host device that supplies high voltage will circulate together.

As a result, when a host device that supplies a low voltage (low voltage host device) and a high voltage card are combined, the following problems may occur. Each card is initialized by a command from the host device when it is inserted into the host device. At the time of initialization, the host device issues a command for acquiring information in a register provided on the card that stores information on operating conditions. From this information, the host device can obtain information on the voltage supported by the card.

[0013] At the time of obtaining information on the operation condition, the high voltage card operates with a low voltage power source supplied from the host even though the low voltage operation is not supported. May be supplied. However, since the card is operating at a voltage that is not originally supported by the card, the correctness of the transfer of the operating condition register information itself cannot be guaranteed. For this reason, if the host device attempts to initialize the inserted card and the initialization fails, it is determined that the card does not support low voltage operation. It becomes. [0014] in the case of a conventional host device that supplies a high voltage and a two-voltage card, since both operate at a high voltage, no particular problem occurs.

FIG. 1 schematically shows the main parts of a card and a host device according to the first embodiment of the present invention. As shown in Figure 1, card 1 contains memory 3 and card controller 4.

[0016] Card 1 supports both low voltage (eg, 1.8V) operation and high voltage (eg, 3.3V) operation. In the case of low-voltage operation, the card 1 and the host device 2 are actually configured to be able to handle voltages in the range including 1.8 V (eg, 1.65 to 1.95 V). Similarly, in the case of high-voltage operation, it is configured to be compatible with a voltage in the range including 3.3 V (for example, 2.7 to 3.6 V). Typically, the operating voltage range itself is the same between the card 1 and the host device 2. An unused voltage region is provided between the low voltage range and the high voltage range.

The host device 2 includes a voltage supply unit 5, a reading Z writing unit 6, a command control unit 7, and the like. The voltage supply unit 5 operates with a high-voltage or low-voltage power supply potential Vdd and supplies the power supply potential Vdd and the common potential Vss to the card. Read Z writing unit 6 reads

data from and writes information to / from card 1. Command control unit 7 exchanges commands and responses with card 1. Reference numerals 11, 12, 13, 14 and 17 will be described in the second embodiment.

As the memory 3, for example, a NAND flash memory can be used. Figure 2 shows the data layout of NAND flash memory. Each page of NAND flash memory 11 168 6-minute redundant part) X 4), and 128 pages are one erasure unit (256kByte + 8kByte).

The NAND flash memory 21 includes a page buffer 21A for performing data input / output to / from the flash memory. The storage capacity of this page buffer 21A is 2112 bytes (2048 bytes + 64 bytes). When writing data, the page buffer 21A executes data input / output processing for the flash memory in units of one page corresponding to its own storage capacity.

[0020] When the storage capacity of the NAND flash memory 21 is, for example, 1 Gbit, 256 kByte. The number of blocks (erase units) is 512. The NAND flash memory 21 is manufactured by using, for example, a 0.09 μm process technology. In other words, the design rule of the NAND flash memory 21 is less than 0.1 μm.

Note that FIG. 2 illustrates the case where the erase unit is a 256 kbyte block, but it is also practically effective to construct the erase unit to be, for example, a 16 kbyte block. In this case, each page has 528 bytes (512 bytes worth of data storage + 16 bytes of redundancy), and 32 pages are one erasure unit (16 kByte + 0.5 kByte (where k is 1024)). The NAND flash memory 21 may be a binary memory that stores 1-bit information in one memory cell, or a multi-value memory that stores information of 2 bits or more in one memory cell. Anyway.

Next, an initialization method using the card 1 and the host device 2 in FIG. 1 will be described with reference to FIGS. 3 to 7. Various processes are included in the initialization process. First, an outline of commands issued by the host device 2 immediately before the initialization of the memory will be described. FIG. 3 is a diagram exemplifying commands issued by the host device 2 immediately before the initialization of the memory. Note that the card 1 and the host device 2 operate according to the operation voltage until the operation condition register capability of the memory 2 is acquired by the memory initialization command described later. During this time, card 1 must be able to operate with the operating voltage.

[0023] As shown in FIG. 3, with the start of initialization, the host device 2 issues a reset command CMDR. When the reset command CMDR is issued to card 1, each circuit force S of card 1 is reset.

[0024] Next, the host device 2 issues a voltage check command CMDV. This command is a command newly introduced in the present embodiment. For this reason, the conventional card 1 does not recognize this voltage check command CMDV, and does not return a response to the host device 2 even if this command is supplied. The supported operating voltage (operating voltage range) can be mutually confirmed between the host device 2 and the card 1 by using the voltage check command CMDV. The mutual confirmation method will be described in detail later.

Next, for example, when the card 1 supports various I/O functions with extended data storage capabilities, the host device 2 issues an initialization command CMDIO to the card 1. After this, Memory 1 initialization command is supplied. Memory initialization will be described in the second embodiment.

Next, the voltage check command CMDV will be described. Figure 4 shows the main parts of the contents of the voltage check command CMDV. As shown in FIG. 4, the voltage check command CMDV has at least a check pattern portion CPS and a voltage range identification portion VOLS. The voltage range identification unit VOLS has a pattern that uniquely indicates whether the host device 2 supports low voltage operation or high voltage operation.

[0027] The number of bits of the check pattern portion CPS and the voltage range identification portion VOLS can be arbitrarily set. However, it is desirable that the following conditions are satisfied. That is, as will be described later, the host device 2 and the card 1 recognize each other's operating voltage range by examining whether the bit pattern of the voltage range identifying unit VOLS matches or does not match. For this reason, the check pattern portion CPS can be set to about 8 bits and the voltage range identification portion VOLS can be set to about 4 bits, for example. The command section CM is provided with an index for identifying this command.

[0028] In order to confirm whether the command is correctly transmitted from the host device 2 to the card 1, an error detection code using an error detection code such as CRC (Cyclic Redundancy Check) in the voltage check command CMDV. Part ED is provided. Card 1 can detect an error in the voltage check command CMDV using the error detection code.

FIG. 5 shows a main part of the response content of the voltage check command CMDV. As shown in FIG. 5, the response of the voltage check command CMDV has at least a check pattern part CPA and a voltage range identification part VOLA. Card 1 forms the same bit pattern as the voltage check command CMDV in the check pattern section CPA, forms the same bit pattern as the voltage range identification section VOLS in the voltage range identification section VOLA, and returns a response to the host device. The response may be provided with the same error detection code part ED as in the case of the voltage check command CMDV. The host device 2 can detect an error in the response of the voltage check command CMDV by comparing the force using the error detection code and whether the response has the same pattern as the command. [0030] Next, a method for confirming the operating voltage range supported by the other party using the host device 2, the card 1, and the force voltage check command CMDV will be described. The processing differs depending on whether the host device 2 operates in the low voltage range or in the high voltage range. First, the case of high voltage range operation will be described. FIG. 6 is a flowchart showing the operation voltage range check process when the host device 2 operates in the high voltage range. As shown in FIG. 6, in step ST1, the host device 2 issues the voltage check command CMDV described above to the card 1.

[0031] In step ST2, the host device 2 determines whether or not there is a response to the voltage check command CMDV. As described above, since the conventional card does not recognize the voltage check command CMDV, it does not issue a response to this command. Therefore, the host device 2 determines that the card 1 is a conventional card, that is, the processing can be continued by the high voltage range operation, and shifts to a memory initialization process. Memory initialization will be described in the second embodiment.

On the other hand, when the card 1 being initialized is a card according to the present embodiment, the card 1 returns the response shown in FIG. At this time, the card 1 first observes the bit pattern of the voltage range identification unit VOLS of the voltage check command CMDV. A response having the same bit pattern in the voltage range identification unit VOLA is returned.

[0033] Next, in step ST3, the host device 2 confirms a match between the pattern of the voltage range identification unit VOLA in the response and the pattern of the voltage range identification unit VOLS in the voltage check command CMDV. When these matches are confirmed, the host device 2 knows that the card 1 is a new card capable of recognizing the voltage check command CMDV and supports the operating voltage range of the host device 2.

At the same time, the host device 2 confirms that the CRC check or the response bit pattern matches the command bit pattern. Thereby, it can be confirmed that the transfer of the voltage check command CMDV is reliable.

[0035] In the case of a path mode in which an error detection code is provided in the command, the correctness of the response is confirmed using, for example, the pattern of the error detection code part ED in the response as a CRC code. Also in the case of a bus mode in which the error detection code part ED is not provided in the voltage check command CMDV, the voltage range identification part VOLS and the voltage range identification part VOLA, and the check pattern parts CPS and CPA of the command and response respectively match. It is determined that the response is normal. If the response is determined to be normal, the voltage check process ends. Thereafter, the flow proceeds to memory initialization processing. This will be described in the second embodiment.

[0036] On the other hand, if the voltage range identification unit VOLS and the voltage range identification unit VOLA do not match, or (and) if the check pattern unit CPS and the check pattern unit CPA do not match, an error is detected by the error detection code. If so, the checking process of the operating voltage range is completed. As a result, the initialization process stops.

FIG. 7 is a flowchart showing the operation voltage range check process when the operation voltage of the host device 2 is within the low voltage range. The only difference from the high voltage range operation is the following. That is, if there is no response from card 1 in step ST2, it means that card 1 is a conventional card, that is, a high voltage card. Therefore, the initialization process stops to prevent the host device 2 operating in the low voltage range from processing the conventional card.

[0038] According to the card 1 and the host device 2 according to the first embodiment of the present invention, the card 1 and the host device 2 know the operating voltage range supported by the other party by exchanging newly provided commands, be able to. For this reason, subsequent initialization processing can be performed in normal operation according to the operating voltage range supported by both the card 1 and the host device 2. In addition, when the operating voltage ranges supported by the two do not match, the host device 2 can detect this and stop the initialization process. As a result, useless processing such as initialization in an abnormal state and host malfunction can be avoided.

[0039] Further, according to the first embodiment, the voltage check command CMDV has a check pattern, and the card 1 forms the same pattern as this check pattern during the response of the voltage check command CMDV. For this reason, by comparing these check patterns, it is assured that the transfer of the voltage check command CMDV is reliable. For this reason, even in the bus mode where no code error detector is provided in each command, Error in the application can be detected.

[0040] (Second Embodiment)

The second embodiment relates to a memory initialization method according to whether a memory mounted on a card is a large capacity memory or a small capacity memory.

[0041] In order to realize a card capable of storing a large amount of information (a large capacity card), it is necessary to newly set a format corresponding to the large capacity card. The file system with the new format is different from the conventional low-capacity format file system. And conventional host devices that follow the low-

capacity format cannot recognize the file system of a large capacity card. For this reason, if a conventional host device mistakenly initializes a large-capacity card, the card data may be destroyed.

[0042] The following four combinations occur depending on whether the host device supports large capacity and whether the card being initialized supports large capacity!

[0043] (1) Conventional host device (not supporting large capacity) + Conventional card (not supporting large capacity)

(2) Conventional host device + large capacity card (large capacity support)

(3) Large capacity host device (large capacity support) + Conventional card

(4) Large capacity host device + Large capacity card

It is desirable for the host device or (and) card to detect any of the above cases and take action accordingly.

As shown in FIG. 1, a card 11 according to the second embodiment of the present invention includes a large capacity memory 13 and a card controller 14. The host device 12 includes a command control unit 17. In addition to the function of the command control unit 7 of the first embodiment, the command control unit 17 supports a memory initialization command according to the second embodiment to be described later, and a conventional capacity card (small capacity card). And large capacity cards are both supported.

[0045] The content of the memory initialization command differs depending on where the memory arrives in the flowchart of the first embodiment. As a result of the process of operating voltage range check, when the process reaches A in Fig. 6, the host device 12 has a function to issue the voltage check command CMDV. is also supported. If the force being initialized is a conventional card, this corresponds to case (3) above. In this case, the host device 12 issues a conventional memory initialization command. The card controller 14 of the card 1 receives this memory initialization command, and initializes the memory according to the conventional format.

On the other hand, when the processing reaches B in FIG. 6 or FIG. 7, the host device 12 initializes the memory using a new memory initialization command shown below. FIG. 8 shows the main part of the contents of a new memory initialization command according to the second embodiment of the present invention. As shown in FIG. 8, the memory initialization command includes a first voltage identification unit V1S, a second voltage identification unit V2S, a capacity identification unit HCS, and a busy notification unit BS.

The first voltage identification unit V1S is composed of, for example, a plurality of bits, and each bit corresponds to a voltage having an appropriate width (for example, 0.1V). The voltage range supported by the first voltage identification unit V1S is the same as the high voltage operation range of the first embodiment. The host device 12 sets the bit indicating the currently applied voltage to "1".

[0046] The second voltage identification unit V2S includes 1 bit. Multiple bits are also possible.

This bit is set when the host device 12 is applying a voltage in the low voltage range. When the second voltage identification unit V2S has multiple bits, the width of the voltage covered by each bit of the second voltage identification unit V2S can be smaller than that of the first voltage identification unit V1S, for example, 0.05 V can do. By doing this, even if the operating voltage of the host device and card further decreases in the future, it will be possible to show its own operating voltage more finely. The voltage range supported by the second voltage identification unit V2S is the same as the low voltage operation range of the first embodiment.

[0049] An intermediate voltage range VM is provided between the voltage range covered by the first voltage identifying unit V1S and the voltage range covered by the second voltage identifying unit V2S. The host device 12 does not support the voltage range corresponding to the intermediate voltage range portion VM, and therefore, each bit in the intermediate voltage range portion VM cannot be "1".

[0050] By providing the intermediate voltage range portion VM, the following advantages can be obtained. In order to enable the card 11 to support two operating voltage ranges, the card controller 14 has a voltage regulator. The voltage regulator determines whether the power supply voltage from the host device 12 is a high voltage or a low voltage, and converts this power supply voltage into the operating voltage of the card 11. At this time, if the two operating voltage ranges are continuous, for example, when a voltage approximately in the middle of the two operating voltage ranges is supplied, it is difficult to determine the voltage regulator. This results in slow operation. Become. On the other hand, by providing an unused area, the voltage regulator can easily determine the range to which the supply voltage belongs.

[0051] The capacity identification unit HCS has a pattern indicating whether the host device 12 supports only a small capacity, both small capacity and large capacity. The busy notification unit BS is set to 0 or 1 in the response, and is unchanged (for example, "0") in the command. The new memory initialization command may have an error detection unit ED that has the same power as a CRC code.

FIG. 9 shows a main part of the response contents of the memory initialization command according to the second embodiment. As shown in Figure 9, each part of the response of the memory initialization command has the same format as the command, and includes the first voltage identification unit V1A, the second voltage identification unit V2A, the capacity identification unit HCA, and the busy notification unit BA. Contains.

The first voltage identification unit V1A has the same number of bits as the first voltage identification unit V1S in the command, and sets all the bits corresponding to the operation voltage supported by itself to, for example, "1".

[0054] Similarly, the second voltage identification unit V2A has the same number of bits as the second voltage identification unit V2S in the command. The card 11 sets all bits corresponding to the operating voltage supported by the card 11 to "1", for example.

The capacity identification unit HCA indicates whether the card 11 is a small capacity card or a large capacity card. The busy notification unit BS forms a bit pattern indicating that while the memory is being initialized.

Next, a memory initialization method will be described with reference to FIG. FIG. 10 is a flowchart showing a memory initialization process according to the second embodiment of the present invention. FIG. 10 shows the continuation of A and B in FIG. 6 and FIG. At least the card 11 and the host device 12 support the issue of the voltage check command CMDV as a condition for issuing the new memory initialization command. If the card 11 is a large capacity card, it is necessary to issue a new memory initialization command.

As shown in FIG. 10, in step ST11, the host device 2 issues a new memory initialization command shown in FIG. When the host device 2 supports a large capacity card, the capacity identification part HCS of this command is set to a bit pattern indicating that the large capacity card is supported. Note that when the host device is a conventional type, the voltage check command CMDV and the memory initialization command (new memory initialization command) according to the present embodiment are not issued. If the card being initialized is a conventional card, it corresponds to the case of (1) above, and the card 11 is initialized in the conventional small capacity format by the conventional memory initialization command.

which capacity differs by the conventional memory initialization command.

[0059] Since the memory initialization command is a conventional type, the capacity identification unit HCS should have a bit pattern that does not support large capacity. The card 11 that supports large capacity, that is, the capacity identification unit HCS can recognize that the bit pattern power also does not support the large capacity of the host device 2. In this case, it corresponds to the case (2) above, and the card 11 does not return a response to the memory initialization command in order to stop the initialization process. This prevents large capacity cards from being accidentally initialized by a small capacity format.

[0060] Next, in step ST12, the host device 12 determines whether or not there is a response to the new memory initialization command. If there is no response, the process ends. If there is a response, in step ST13, the host device 12 checks the bit pattern of the capacity identification unit HCA in the response. The card 11 being initialized is a new card and should support large capacity, so a bit pattern to that effect appears. In other words, this case corresponds to the case of (4) above.

[0061] Next, in step ST14, the host device 12 issues a new memory initialization command again.

[0062] Next, in step ST15, the host device 12 checks the bit pattern of the busy notification unit B A in the response. The host device 12 continues to issue a memory initialization command until this bit pattern force memory initialization is completed and a pattern indicating that is obtained. At this time, when the initialization of the memory 13 is started, only a response is returned, and the card 11 continues to ignore the contents of the memory initialization command itself.

In addition, the host device 12 performs a time-out check with respect to the time during which the memory 13 is being initialized. When the initialization of the memory 13 is completed, the processing proceeds to further processing (for example, acquisition of the ID of the card 11). [0064] According to the host device 12 and the card 11 according to the second embodiment of the present invention, information on a small capacity card or a large capacity card is provided in the memory initialization command. Using this information, the host device 12 and the card 11 can confirm whether or not the other party supports a large capacity. Only when both the host device 12 and the card 11 support a large capacity, the memory 13 is initialized with the large capacity. If either one does not support large capacity, the initialization process is canceled. Therefore, malfunction can be prevented even when old and new host devices and old and new cards are mixed.

[0065] In addition, within the scope of the idea of the present invention, those skilled in the art can conceive of various modifications and corrections. It is understood that it belongs to the scope of the present invention.

Industrial applicability

[0066] According to the present invention, it is possible to provide a card and a host device capable of mutually confirming the operating voltage and capacity.

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Priority And Related Applications

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Legal Events

Date	Code	Title	Description
2006-06-01	AK	Designated states	Kind code of ref document: A1 Designated state(s): AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GO GE GH GM GR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW
2006-06-01	AL	Designated countries for regional patents	Kind code of ref document: A1 Designated state(s): BW GH GM KE LS MW MZ NA SD SL SZ TZ UG ZM ZW AM AZ BY KG KZ MD RU TJ TM AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LU MC NL PL PT RO SE SI SK TR BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
2006-07-19	121	Ep: the epo has been informed by wipo that ep was designated in this application	
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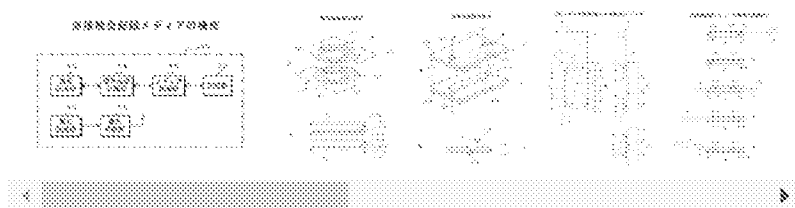
Patents

4192981



Recording media holding device

Images (12)



Classifications

G06K13/08 Feeding or discharging cards

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Japan

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Other languages: Japanese

Inventor: 津澤井, 昇大也, 野下里

Worldwide applications

2006 JP 2007 TW 08

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Claims (9)

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1. An insertion slot into which a non-contact type recording medium provided with an engagement portion on the rear side with respect to the insertion direction is inserted; in conjunction with the insertion of the non-contact type recording medium from the insertion port, a discharge port through which the inserted non-contact type recording medium is discharged,
A first engagement for holding the inserted non-contact type recording medium by engaging with an engaging portion of the non-contact type recording medium when the non-contact type recording medium is inserted to a preset position. With the joint,
A second engagement portion that is provided on the discharge port side and engages with an engagement portion of the non-contact type recording medium discharged from the discharge port, and holds the discharged non-contact type recording medium. that having a record media holding device.
2. With the non-contact type recording medium inserted from the insertion port, the inserted non-contact type recording medium is pushed out and discharged from the discharge port,
The second engagement portion engages with the engagement portion of the non-contact type recording medium pushed out from the discharge port when the non-contact type recording medium is inserted to the preset position. provided at the position
Recording medium holding device 言語 Motomeko 1 wherein.
3. A pressing portion for pressing the non-contact type recording medium is provided in a direction in which a reader / writer for reading and writing data to the non-contact type recording medium is provided ,
Recording medium holding device 言語 Motomeko 1 wherein.
4. The preset position is a position of the reader / writer that reads / writes data from / to the non-contact type recording medium and the position of the non-contact type recording medium that can perform at least data transmission ,
Recording medium holding device 言語 Motomeko 1 wherein.
5. When the non-contact type recording medium is inserted to a preset position, a latching portion provided with a latching claw for latching the front end and the rear end of the non-contact type recording medium,
A biasing portion that biases the latching portion so that the position of the latching claw is a first position for latching the non-contact type recording medium;
In the latching claw, the contact surface with which the front end of the non-contact type recording medium comes into contact when the non-contact type recording medium is inserted is formed so that the inserted non-contact type recording medium slides,
When the non-contact type recording medium is inserted, the non-contact type recording medium is slid on the contact surface, thereby generating a force against the

urging force of the urging portion, and the latching claw To a second position where the non-contact type recording medium is not latched, When the non-contact type recording medium is inserted to a preset position, the non-contact type recording medium is passed through a latching claw that forms a contact surface on which the non-contact type recording medium slides, and the latching claw is moved by the biasing portion. By the position is moved to the first position

Recording media holding device.

6. The latching portion includes a first arm in which a latching claw for latching a rear end of the non-contact type recording medium is provided at one end, and a connecting portion is provided at the other end. A latching claw for latching the front end of the non-contact type recording medium is provided at one end, and a second arm having a connecting portion connected to the connecting portion of the first arm is provided at the other end. Have The connected first arm and the second arm are swingably supported, and the latching claws of the first arm and the second arm are moved to the first position or the second position. It can move in conjunction with each other Recording medium holding device 記録媒体保持装置 5 wherein.
7. The latching part is provided with a release operation part for performing an operation of moving the latching claw from the first position to the second position . Recording medium holding device 記録媒体保持装置 5 wherein.
8. When the non-contact type recording medium is slid on the contact surface, there is provided a deterring unit that prevents the non-contact type recording medium from moving in the urging direction due to urging by the urging unit. The Recording medium holding device 記録媒体保持装置 5 wherein.
9. The preset position is a position of the reader / writer that reads / writes data from / to the non-contact type recording medium and the position of the non-contact type recording medium that can perform at least data transmission . Recording medium holding device 記録媒体保持装置 5 wherein.

Description

The present invention relates to a recording medium holding device. Specifically, when a non-contact type recording medium provided with an engaging portion on the rear side in the insertion direction is inserted from the insertion port to a preset position, the non-contact type recording medium is engaged with the engaging portion of the non-contact type recording medium. Then, the first engagement portion that holds the inserted non-contact type recording medium is engaged with the engagement portion of the non-contact type recording medium that is discharged from the discharge port, and is discharged. It has a 2nd engaging part holding a medium.

Conventionally, a portable contact type recording medium capable of reading and writing data, for example, a memory card that is configured using a storage element such as a semiconductor memory, and provided with a contact point for signal transmission and power supply, has a slot. Data is read and written using a type reader / writer. In this slot type reader / writer, by inserting a memory card into the card loading slot of the reader / writer, the contacts of the memory card and the contacts provided on the reader / writer are connected to read / write data. Further, in order to make it possible to easily remove the inserted memory card, as shown in Patent Document 1, an ejection mechanism is provided. In Patent Document 1, when the eject knob is slid, the memory card is removed by pushing the end face of the ejection groove of the memory card with the ejection claw.

2004-288202 gazette

By the way, as a portable recording medium as described above, not only a contact type recording medium having a contact as described above (for example, a memory card) but also a non-contact type recording medium without a contact (for example, an IC card). Etc.) is also used. Since this non-contact type recording medium is not provided with a contact, the recording medium is inserted into the card loading slot of the reader / writer, and the contact of the non-contact type recording medium and the contact of the reader / writer are connected or inserted. By removing the recording medium from the card loading slot of the reader / writer, it is not necessary to release the connection between the contact of the non-contact type recording medium and the contact of the reader / writer.

However, when the recording medium is inserted into and removed from the card loading slot like a conventional reader / writer, when replacing the recording medium, the recording medium loaded in the card loading slot is pulled out and then a new recording medium is inserted. Needs to be inserted into the slot, and it takes time to replace the recording medium. For this reason, for example, when an image captured by a video camera is written on a recording medium, if it takes time to replace the recording medium, an important scene may be missed. Further, in order to facilitate insertion and removal of the recording medium, injected mechanism and giggt mechanism of a recording medium becomes costly required.

Therefore, in the present invention is to provide a recording medium holding equipment that can exchange non-contact type recording medium easily.

The recording medium holding device according to the present invention includes an insertion port into which a non-contact type recording medium provided with an engagement portion on the rear side in the insertion direction is inserted, and a non-contact type recording medium inserted from the insertion port. For example, when the inserted non-contact type recording medium is pushed out in the inserting direction, and when the non-contact type recording medium is inserted at a preset position, that is, with respect to the non-contact type recording medium, A first holding the inserted non-contact type recording medium by engaging with the engaging portion of the non-contact type recording medium when inserted in a position where at least data transmission with a reader / writer for reading and writing can be performed. And the engagement portion of the non-contact type recording medium that is provided on the discharge port side and pushed out from the discharge port when the non-contact type recording medium is inserted to a preset position. Engage with, and has a second engaging portion for holding the non-contact type recording medium to be discharged.

The recording medium holding device according to the present invention is provided with a latching claw for latching the front end and the rear end of the non-contact type recording medium when the non-contact type recording medium is inserted to a preset position. And a biasing portion that biases the latching portion so that the position of the latching claw is a first position for latching the non-contact type recording medium. The contact surface with which the front end of the non-contact type recording medium abuts when the contact type recording medium is inserted is formed so that the inserted non-contact type recording medium slides, and when the non-contact type recording medium is inserted, By sliding the non-contact type recording medium on the contact surface, a force against the urging by the urging portion is generated, and the non-contact type recording medium is not latched by the second claw. The non-contact type recording media should be When the non-contact type recording medium is inserted to the set position, the non-contact type recording medium is passed through the latching claw that forms a contact surface, and the urging portion moves the position of the latching claw to the first position. By der things to be.

According to the present invention, when a non-contact type recording medium provided with an engagement portion on the rear side with respect to the insertion direction is inserted from the insertion port, the insertion is performed in conjunction with the insertion of the non-contact type recording medium. The non-contact type recording media is discharged from the discharge port. Further, when the non-contact type recording medium is inserted to a preset position, the engaging part and the first engaging part of the non-contact type recording medium are engaged, and the inserted non-contact type recording medium is inserted. Media is retained.

Furthermore, the engagement portion of the non-contact type recording medium to be ejected engages with the second engagement portion provided on the discharge port side, and the non-contact type recording medium to be ejected is held. Further, when the non-contact type recording medium is inserted to a preset position, the front end and the rear end of the non-contact type recording medium are hooked by the hooking claws, and the non-contact type recording medium is also held.

For this reason, since the non-contact type recording medium can be replaced simply by inserting the non-contact type recording medium from the insertion port, the time required for replacing the non-contact type recording medium is shortened. When the recording medium holding device is provided, it is possible to reduce the probability of missing an important scene. Further, when the inserted non-contact type recording medium is discharged from the discharge port, the non-contact type recording medium to be discharged engages with the engaging portion and the second engaging portion to be discharged. Since the mold recording medium is held, it is possible to reduce damage and loss due to dropping of the taken out non-contact recording medium when replacing the non-contact recording medium. Further, since the structure is simple, the recording medium holding device can be configured at low cost. Further, when holding the non-contact type recording medium by hooking the latching claw on the non-contact type recording medium, the non-contact type recording medium held can be made less likely to fall off. The contact-type recording medium can be reliably held.

Hereinafter, an embodiment of the present invention will be described with reference to the drawings. FIG. 1 is a block diagram showing a configuration of a non-contact type recording medium held by a recording medium holding device.

The non-contact type recording medium 10 includes a power transmission unit 11 for receiving power supply from a reader / writer (not shown) by non-contact power transmission, and a signal transmission unit 13 for reading / writing data with the reader / writer without contact. have. The reader / writer also includes a power transmission unit configured similarly to the power transmission unit 11 and a signal transmission unit configured similar to the signal transmission unit 13.

FIG. 2 illustrates a power transmission unit used when performing non-contact power transmission. As shown in FIG. 2A, the power transmission unit 11 of the non-contact type recording medium 10 is configured using, for example, a planar coil 112 in which an insulated single wire 111 is spirally wound in the same plane. Similarly to the power transmission unit 11, the power transmission unit 21 of the reader / writer is configured by using a planar coil 212 in which an insulated single wire 211 is wound in a spiral shape in the same plane.

Further, as shown in FIG. 2B, sheet-like insulating portions 113 and 114 are provided on both surfaces of the planar coil 112. Further, a metal sheet 115 is provided on the surface opposite to the surface facing the reader / writer to prevent leakage magnetic flux and the like. Similarly, sheet-like insulating portions 213 and 214 are provided on both surfaces of the planar coil 212. Further, a metal sheet 215 is provided on the surface opposite to the surface facing the non-contact type recording medium 10 to prevent leakage magnetic flux and the like.

Here, when an alternating current is supplied to the terminal of the planar coil 212 of the power transmission unit 21 to generate an alternating magnetic field, the planar coil 112 of the power transmission unit 11 is electromagnetically coupled between the power transmission unit 11 and the power transmission unit 21. An induced voltage is generated between the two terminals. The generated induced voltage is supplied to the power supply unit 12 shown in FIG.

The power supply unit 12 rectifies and smoothes the induced voltage generated by electromagnetic coupling between the power transmission unit 11 and the power transmission unit 21, and supplies the obtained DC voltage to each unit of the non-contact type recording medium 10.

FIG. 2 shows the case of using the planar coils 112 and 212 in which the single wires 111 and 211 are spirally wound in the same plane. However, for example, a planar coil is formed by providing a spiral pattern on the substrate. May be. In this case, a coil having a large number of turns can be formed easily and inexpensively.

In signal transmission between the non-contact type recording medium and the reader / writer, a frequency band higher than that used in non-contact power transmission is used so that data can be read and written at high speed. In addition, when data is read / written by bringing a non-contact type recording medium and a reader / writer into close contact with each other, it is possible to perform data transmission using line-to-line coupling without transmitting and receiving radio waves.

FIG. 3 shows a configuration of a signal transmission unit that performs data transmission using line-to-line coupling. 3B is a schematic cross-sectional view taken along the line I-I' in FIG. 3A.

As shown in FIG. 3A, the signal transmission unit 13 of the non-contact type recording medium 10 has a microstrip line structure in which one surface of a dielectric substrate 131 is a ground pattern 132 and a signal pattern 133 is formed on the other surface. One terminal of the signal pattern 133 is grounded via a via 134 provided through the dielectric substrate 131 and a termination resistor 135. Further, the other terminal is connected to the signal transmission processing unit 14 shown in FIG. 1 through a via 136 provided through the dielectric substrate 131.

The reader / writer 20 is also provided with a signal transmission unit 23 in the same manner as the signal transmission unit 13 of the non-contact type recording medium 10. That is, a microstrip line structure is formed in which one surface of the dielectric substrate 231 is a ground pattern 232 and a signal pattern 233 is formed on the other surface. One terminal of the signal pattern 233 is grounded via a via 234 provided through the dielectric substrate 231 and a termination resistor 235. The other terminal is connected to a signal transmission processing unit (not shown) of the reader / writer 20 through a via 236 provided through the dielectric substrate 231.

Further, when reading / writing data from / to the non-contact type recording medium 10, the signal pattern 133 and the signal pattern 233 face each other so that coupling between lines is likely to occur between the signal pattern 133 and the signal pattern 233. The non-contact type recording medium 10 and the reader / writer 20 are brought into close contact with each other.

Here, when a high-frequency signal is supplied from the signal transmission processing unit of the reader / writer to the signal transmission unit 23, line-to-line coupling occurs between the signal pattern 133 and the signal pattern 233, and the signal transmission processing unit of the non-contact type recording medium 10 14 is supplied with a high-frequency signal output from the signal transmission processing unit of the reader / writer. Further, when a high frequency signal is supplied from the signal transmission processing unit 14 to the signal transmission unit 13, line-to-line coupling occurs, and the signal transmission processing unit 14 of the non-contact type recording medium 10 is connected to the signal transmission unit 23 of the reader / writer. The high frequency signal output from is supplied.

The signal transmission processing unit 14 shown in FIG. 1 returns the high-frequency signal supplied from the signal transmission unit 13 to the signal before being processed by the signal transmission processing unit of the reader / writer and supplies the signal to the media control unit 15. The signal transmission processing unit 14 converts the signal supplied from the media control unit 15 into a high-frequency signal for transmission and supplies the signal to the signal transmission unit 13.

The media control unit 15 determines what instruction is given from the reader / writer based on the signal supplied from the signal transmission processing unit 14, and performs processing based on the determination result. For example, when it is determined that a writing request has been made from the reader / writer, the data supplied from the reader / writer is stored in the storage unit 16. When it is determined that a reading request is made from the reader / writer, the data requested from the reader / writer is read from the storage unit 16 and supplied to the signal transmission processing unit 14 as a signal of a predetermined format.

In the non-contact type recording medium 10 configured as described above, the power transmission unit 11, the power supply unit 12, the signal transmission unit 13, the signal transmission processing unit 14, the media control unit 15, and the storage unit 16 are hermetically sealed. Provide and integrate inside. In addition, the power transmission unit 11 and the signal transmission unit 13 are provided on the inner surface of the casing that is in close contact with the reader / writer so that power

transmission and signal transmission can be performed efficiently. As described above, since the non-contact type recording medium 10 is not provided with a contact, there is no contact failure due to adhesion of dust to the contact, and the possibility of damage to the internal circuit due to static electricity can be reduced. High reliability can be secured.

FIG. 4 illustrates the appearance of the recording medium holding device and the non-contact type recording medium. 4A is a front view, FIG. 4B is a plan view, and FIG. 4C is a left side view. The non-contact type recording medium 10 is inserted from the insertion port 32 of the recording medium holding device 30 attached to the reader / writer 20 with the surface on which the power transmission unit 11 and the signal transmission unit 13 are provided as the reader / writer 20 side. Further, the inserted non-contact type recording medium 10 is discharged from a discharge port 33 provided on the opposite side to the insertion port 32.

The non-contact type recording medium 10 is provided with an engaging portion that can hold the non-contact type recording medium 10 in a positioned state on the rear end side when the non-contact type recording medium 10 is inserted into the recording medium holding device 30. For example, the concave portions 19 are formed on both side surfaces of the non-contact type recording medium 10 as the engaging portion.

Further, the non-contact type recording medium 10 is inserted into the recording medium holding device 30, and the power transmission unit 11 of the non-contact type recording medium 10, the power transmission unit 21 of the reader / writer 20, and the signal transmission of the non-contact type recording medium 10. When the portion 13 and the signal transmission portion 23 of the reader / writer 20 are positioned to face each other, the first engagement portion that engages with the engagement portion of the non-contact type recording medium 10 at this position is held by the recording medium. Provided on both sides of the inside of the device 30. For example, convex portions 35 that engage with the concave portions 19 of the non-contact type recording medium 10 are provided on both side surfaces inside the recording medium holding device 30.

The convex portion 35 can be pushed outward by the inserted non-contact type recording medium 10, and is configured to apply an urging force so as to return to the original position when pushed out. For example, a part of the housing is used as an elastic body by cutting out the housing of the portion provided with the convex portion 35 into a U shape. Alternatively, the convex portion 35 is connected to the housing of the recording medium holding device 30 via an elastic body such as a leaf spring.

Further, the engaging surface of the concave portion 19 and the convex portion 35 is pushed out to the outer side when a predetermined force or more is applied to the inserted non-contact type recording medium in the insertion direction. It is formed so that the engagement with is released. For example, the engaging surface of the concave portion 19 and the convex portion 35 is formed in a spherical shape as shown in FIG. Further, the engaging surface of the concave portion 19 and the convex portion 35 may have a shape like a side surface of a cylinder, the concave portion 19 may have a valley shape, and the convex portion 35 may have a mountain shape.

When the concave portion 19 and the convex portion 35 are formed in this way, when the non-contact type recording medium 10 is inserted from the insertion port 32 of the recording medium holding device 30, the concave portion 19 and the convex portion 35 are engaged, and the non-contact type recording medium 10 The media 10 is positioned and held so that power transmission and signal transmission can be performed efficiently.

Further, the non-contact type recording medium inserted into the recording medium holding device 30 is pushed out from the discharge port 33, and a new non-contact type recording medium is inserted into the recording medium holding device 30. When the engagement portion of the non-contact type recording medium and the first engagement portion of the recording medium holding device 30 are engaged, the discharge port 33 is engaged with the engagement portion of the pushed non-contact type recording medium. The second engaging portion is provided on both side surfaces on the inside. That is, when the newly inserted concave portion 19 of the non-contact type recording medium and the convex portion 35 of the recording medium holding device 30 are engaged, it is discharged so as to be engaged with the concave portion 19 of the extruded non-contact type recording medium. Protrusions 36 are provided on both side surfaces inside the outlet 33. The convex portion 36 has a shape similar to that of the convex portion 35 and can be pushed outward by a non-contact type recording medium to be pushed out. When pushed outward, a biasing force is applied so as to return to the original position.

When the convex portion 36 is provided in this way, when a new non-contact type recording medium is inserted and the concave portion 19 and the convex portion 35 are engaged so that the inserted non-contact type recording medium is pushed out from the discharge port 33. The recessed portion 19 of the extruded non-contact type recording medium and the convex portion 36 provided at the discharge port 33 can be engaged to hold the extruded non-contact type recording medium so as not to drop off.

On the inner surface of the casing 31 of the recording medium holding device 30, pressing portions 39a and 39b for pressing the non-contact type recording medium in the direction of the reader / writer 20 are provided. Thus, by providing the pressing portions 39a and 39b, the non-contact type recording medium 10 is held so that the distance from the reader / writer 20 does not fluctuate at a minimum, so that the stability of the transmission path is increased and the power is increased. Transmission and signal transmission can be performed more efficiently. Further, rattling of the inserted non-contact type recording medium 10 can be prevented.

Furthermore, if the pressing portion 39a is provided in the vicinity of the convex portion 35, the concave portion 19 of the inserted non-contact type recording medium 10 is in a direction opposite to the pressing direction of the pressing portion 39a (upward direction in FIG. 4A).), When the engaging surface of the concave portion 19 and the convex portion 35 is formed in a spherical shape, for example, the non-contact type recording medium 10 is inserted to a preset position. The concave portion 19 and the convex portion 35 can be reliably engaged with each other.

Further, the pressing portion 39b is inserted if provided so as to press the leading end side of the non-contact type recording medium newly inserted up to a preset position and the rear end of the non-contact type recording medium that has been pushed out. In addition, the non-contact type recording medium can be pressed in the direction of the reader / writer 20, and the extruded non-contact type recording medium can be stably held.

If the notch 311 is provided on the insertion port 32 side of the housing 31, the non-contact type recording medium inserted using the notch 311 without newly inserting a non-contact type recording medium. Can be pushed out with a finger.

Next, a non-contact type recording medium loading / exchanging operation will be described with reference to FIG. In FIG. 5, the recording media holding device 30 is shown in a cross section for easy understanding of the operation.

As shown in FIG. 5A, the non-contact type recording medium 10a provided with the engaging portion on the rear side with respect to the insertion direction is inserted by the user from the insertion port 32 of the recording medium holding device 30. The inserted non-contact type recording medium 10a is pressed by the pressing portion 39 in the direction in which the reader / writer is provided.

As shown in FIG. 5B, the non-contact type recording medium 10a is set at a preset position, that is, a reader / writer that reads / writes data from / to the non-contact type recording medium, and a position that performs signal transmission and power transmission. Sometimes, the concave portion 19 of the non-contact type recording medium 10a and the convex portion 35 of the recording medium holding device 30 are engaged to hold the non-contact type recording medium 10a.

When replacing the non-contact type recording medium 10a, a new non-contact type recording medium 10b is inserted from the insertion port 32 of the recording medium holding device 30, and the non-contact type recording medium 10a is pushed out and discharged as shown in FIG. 5C. The gas is discharged from the outlet 33.

Thereafter, when the inserted non-contact type recording medium 10b is at a preset position as shown in FIG. 5D, the concave portion 19 of the non-contact type recording medium 10b and the convex portion 35 of the recording medium holding device 30 are engaged. The non-contact type recording medium 10b is held at a preset position. Further, the concave portion 19 of the discharged non-contact type recording medium 10a and the convex portion 36 of the recording medium holding device 30 are engaged. For this reason, the non-contact type recording medium 10a discharged from the discharge port 33 of the recording medium holding device 30 is held without dropping from the recording medium holding device 30. Thereafter, the non-contact type recording medium 10a held on the discharge port 33 side of the recording medium holding device 30 is inserted if it is pulled out from the discharge port 33 of the recording medium holding device 30 as shown in FIG. 5E. The non-contact type recording medium 10a that has been stored can be detached from the recording medium holding device 30.

As described above, the non-contact type recording medium can be held at a position where signal transmission and power transmission with the reader / writer are performed only by inserting the non-contact type recording medium from the insertion port of the recording medium holding device. In addition, when replacing the non-contact type recording medium, it is only necessary to insert a new non-contact type recording medium from the insertion port of the recording medium holding device. It can be done easily. Further, even if the inserted non-contact type recording medium is discharged from the discharge port of the recording medium holding device, the discharged non-contact type recording medium is held by the recording medium holding device. It is possible to prevent the recording medium from dropping from the recording medium holding device and causing damage or the like.

By the way, when the above-described recording medium holding device 30 is used in, for example, a portable electronic device, an impact or the like is applied to the electronic device, and the non-contact type recording medium 10 and the recording medium holding device 30 are not connected. If a force in the loading direction of the contact type recording medium or a direction opposite to the loading direction is applied, the non-contact type recording medium 10 may be detached from the recording medium holding device 30. Accordingly, a recording medium holding device 30a that can reliably hold a non-contact type recording medium will be described as a recording medium holding device having another configuration.

The recording medium holding device 30a is configured to latch a non-contact type recording medium by hooking hooks on the front end and the rear end of the non-contact type recording medium when the non-contact type recording medium is inserted to a preset position. Make sure to hold the recording media. Also, the latching state by the latching claw is released, and the held non-contact type recording medium is taken out.

FIG. 6 shows the appearance of a recording medium holding device having another configuration, and FIG. 7 shows an exploded perspective view. 8 shows the configuration of the latching portion 40 for latching the non-contact type recording medium in the recording medium holding device, FIG. 8A is a front view, and FIG. 8B is a II-II line in FIG. 8A. It is the cross-sectional schematic of a position. 6 and 7, the same reference numerals are given to portions corresponding to those in FIG. 4, and detailed description thereof is omitted.

The non-contact type recording medium 10 is inserted from the insertion port 32 of the recording medium holding device 30a attached to the reader / writer 20 with the surface on which the power transmission unit 11 and the signal transmission unit 13 are provided as the reader / writer 20 side. The insertion port 32 is formed by a housing 31 fixed to the reader / writer 20. In addition, the casing 31a suppresses the non-contact type recording medium 10 so that the inserted non-contact type recording medium 10 is positioned and the inserted non-contact type recording medium 10 is not separated from the reader / writer 20. To do. The casing 31a is notched so that the non-contact type recording medium 10 inserted from the insertion port 32 provided between the casing 31a and the reader / writer 20 can be easily inserted to a preset position. 312 is formed. When the non-contact type recording medium 10 can be inserted from an opening located on the opposite side to the insertion port 32, a notch 313 may be formed in the opening.

In the reader / writer 20, a groove-shaped storage portion 25 is formed on the surface facing the non-contact type recording medium 10 in the insertion direction of the non-contact type recording medium 10.

The latching portion 40 of the recording medium holding device 30a has a latching claw that is latched with the non-contact type recording medium 10 when the inserted non-contact type recording medium 10 reaches a preset position. Yes. The latching portion 40 is disposed in the storage portion 25 formed in the reader / writer 20.

The latching portion 40 includes a first latching claw that is latched with the rear end in the insertion direction of the non-contact type recording medium 10 when the inserted non-contact type recording medium 10 reaches a preset position; The second latching claw that is latched with the front end in the insertion direction is set to a first position at which the non-contact type recording medium 10 can be latched. In addition, when removing the held non-contact type recording medium 10 or replacing it with a new non-contact type recording medium, the first and second latching claws are attached so that the latching state is released. Move to the second position.

Here, in order to link the first latching claw and the second latching claw to the first or second position, the latching portion 40 has a configuration in which, for example, the first arm 41 and the second arm 42 are connected. To do. A first hooking claw 411 is formed at one end of the first arm 41. A connecting portion 412 is formed at the other end of the first arm 41. A second hooking claw 421 is formed at one end of the second arm 42. A connecting portion 422 that is connected to the connecting portion 412 of the first arm 41 is formed at the other end of the second arm 42.

The first arm 41 is fixed so as to be swingable about the shaft 413. Similarly to the first arm 41, the second arm 42 is also fixed so as to be swingable about the shaft 423. Further, the first arm 41 and the second arm 42 are connected via connecting parts 412 and 422 so that when one of the first arm 41 or the second arm 42 swings, the other swings. To do. Here, an axis extending in the direction of the connecting portion 422 is formed in the connecting portion 412. Further, a shaft hole is formed in the connecting portion 422 in the direction of the connecting portion 422. By inserting the shaft of the connecting portion 412 into the shaft hole of the connecting portion 422 and connecting the first arm 41 and the second arm 42, the first arm 41 or the second arm 42 can be interlocked.

In the first latching claw 411, the contact surface 411p with which the front end of the non-contact type recording medium 10 contacts when the non-contact type recording medium 10 is inserted is formed so that the inserted non-contact type recording medium 10 slides. To do. For example, the contact surface 411p is formed like a slope or a curved surface. In the figure, the contact surface 411p is formed as a curved surface.

The recording medium holding device 30a is provided with a latching portion 40 so that the positions of the first latching claw 411 and the second latching claw 421 are the first position for latching the non-contact type recording medium 10. An energizing part is provided. For example, elastic members 43 and 44 such as springs are interposed between the first arm 41 and the storage unit 25 and between the second arm 42 and the storage unit 25, respectively. In this way, by providing the elastic members 43 and 44 that are urging portions, the first hooking claw 411 and the second hooking claw 421 protrude from the surface of the reader / writer 20, and the non-contact type recording medium 10. It is possible to set the first position where it can be hooked.

Further, when the protruding amount of the first latching claw 411 increases, when the non-contact type recording medium 10 is inserted, the end of the first arm 41 and the front end of the non-contact type recording medium 10 are in contact with each other. Therefore, the non-contact type recording medium 10 cannot be slid on the contact surface 411p of the first latching claw 411. For this reason, it restricts limits so that the protrusion amount of the 1st latching claw 411 may not become larger than the protrusion amount set beforehand. For example, when the protrusion amount of the first latching claw 411 becomes a preset protrusion amount, the first arm 41 and the second arm 42 come into contact with the stop portion 26 provided in the storage portion 25 and swing. Configure to be regulated. In this way, since the protruding amount of the first latching claw 411 is limited, the inserted non-contact type recording medium 10 can be reliably slid on the contact surface 411p. In the second arm 42, the distance from the shaft 423 to the second latching claw 421 and the distance from the shaft 423 to the connecting portion 422 are set in the same

manner as the first arm 41, so that the second latching claw 421 is set. Can be set to the first position or the second position in conjunction with the first latching claw 411.

The position of the non-contact type recording medium 10 inserted from the insertion port 32 is regulated by the housing 31a. That is, when the non-contact type recording medium 10 is slid on the contact surface 411p of the first latching claw 411, the non-contact type recording medium 10 moves in the urging direction due to the urging by the elastic members 43 and 44. It is suppressed so that there is no. Therefore, when the inserted non-contact type recording medium 10 slides on the contact surface 411p, a force against the urging force of the elastic members 43 and 44 is applied to the latching portion 40. For this reason, the position of the first latching claw 411 is stored in the storage unit 25 from the first position where the non-contact type recording medium 10 is latched, and the non-contact type recording medium 10 is not latched. Moved to the second position. Further, since the first arm 41 and the second arm 42 are connected, the second latching claw 421 also moves from the first position to the second position in conjunction with the first latching claw 411.

The interval between the first latching claw 411 and the second latching claw 421 is an interval corresponding to the length in the insertion direction of the non-contact type recording medium 10, and the non-contact type recording medium 10 reaches a preset position. When inserted, the latching portion 40 is disposed so that the non-contact type recording medium 10 passes through the first latching claw 411. For this reason, when the non-contact type recording medium 10 reaches a preset position, the first hooking claw 411 and the second hooking claw 421 are moved from the surface of the reader / writer 20 by the urging force of the elastic members 43 and 44. Also moves to the protruding first position. That is, the first latching claw 411 is in a state of latching the rear end of the non-contact type recording medium 10 inserted at a preset position, and the second latching claw 421 is inserted at a preset position. Then, the front end of the non-contact type recording medium 10 is hooked. Therefore, the non-contact type recording medium 10 is held at a preset position by the first hooking claw 411 and the second hooking claw 421.

The first arm 41 is formed with a release operation unit 415. The release operation unit 415 moves the first hooking claw 411 and the second hooking claw 421 from the first position to the second position to release the hooked state of the non-contact type recording medium 10. It is something that is operated by the user.

Next, the loading operation of the non-contact type recording medium will be described with reference to FIG. In FIG. 9, the release operation unit 415 is omitted.

As shown in FIG. 9A, when the non-contact type recording medium 10 is inserted from the insertion port 32 of the recording medium holding device 30a, the non-contact type recording medium 10 slides on the contact surface 411p of the first latching claw 411. It becomes. Here, when the non-contact type recording medium 10 slides on the contact surface 411p, the urging force of the elastic members 43 and 44 is applied to the non-contact type recording medium 10. However, since the non-contact type recording medium 10 is restrained by the housing 31a, the first hooking claw 411 moves from the first position and is stored in the storage unit 25 as shown in FIG. It becomes the position. In addition, since the second hooking claw 421 is configured to be interlocked with the first hooking claw 411, the second hooking claw 421 is also stored in the storage unit 25.

When the rear end of the inserted non-contact type recording medium 10 passes through the first hooking claws 411, the first hooking claws 411 and the second hooking claws 421 are elastic members 43, 44 as shown in FIG. 9C. Accordingly, the first position protruding from the surface of the reader / writer 20 is restored. The distance between the first hooking claw 411 and the second hooking claw 421 is slightly wider than the length in the insertion direction of the non-contact type recording medium 10 as described above. Accordingly, the rear end of the non-contact type recording medium 10 is hooked by the first hooking claws 411, and the front end of the non-contact type recording medium 10 is hooked by the second hooking claws 421. Therefore, the non-contact type recording medium 10 can be held at a preset position by the first hooking claw 411 and the second hooking claw 421.

When the non-contact type recording medium 10 held by the recording medium holding device 30a is taken out, as shown in FIG. 9D, the release operation part (not shown) is operated in the direction of arrow F to 411 is moved to the second position stored in the storage unit 25. At this time, since the second hooking claw 421 moves to the second position in conjunction with the first hooking claw 411, the non-contact type recording medium by the first hooking claw 411 and the second hooking claw 421 is used. Ten hooking states are released. Therefore, if the orientation of the recording medium holding device 30a is set so that the non-contact type recording medium 10 falls, as shown in FIG. 9E, the held non-contact type recording medium 10 becomes the recording medium holding device 30a. It will be discharged from. Further, the non-contact type recording medium 10 may be sandwiched and extracted at the position of the notch 312 provided in the housing 31a.

Further, in the recording medium holding device 30a, when a non-contact type recording medium is loaded, the non-contact recording medium can be easily replaced only by inserting a new non-contact type recording medium.

FIG. 10 is a diagram for explaining the exchange operation of the non-contact recording medium, and the release operation unit 415 is omitted as in FIG.

As shown in FIG. 10A, the recording medium holding device 30a holds a non-contact type recording medium 10c. Here, when a new non-contact type recording medium 10d is inserted from the insertion port 32 of the recording medium holding device 30a, the non-contact type recording medium 10d slides on the contact surface 411p of the first latching claw 411. For this reason, the 1st latching claw 411 moves to the 2nd position accommodated in the accommodating part 25, as shown to FIG. 10B. Further, the second latching claw 421 also moves to the second position in conjunction with the first latching claw 411. That is, by inserting a new non-contact type recording medium 10d, the latched state of the held non-contact type recording medium 10c is released and it becomes a removable state.

When the newly inserted non-contact type recording medium 10d passes through the position of the first hooking claw 411, the first hooking claw 411 and the second hooking claw 421 are moved to the elastic member 43 as shown in FIG. 10C, 44 move to a first position protruding from the surface of the reader / writer 20. Therefore, the rear end of the non-contact type recording medium 10d is hooked by the first hooking claw 411, and the front end of the non-contact type recording medium 10d is hooked by the second hooking claw 421. Therefore, the new non-contact type recording medium 10d can be held at a desired position by the first hooking claw 411 and the second hooking claw 421. That is, the exchange operation of the non-contact recording medium is completed.

As described above, the non-contact type recording medium is securely held by the latching claw at a position where signal transmission and power transmission with the reader / writer are performed simply by inserting the non-contact type recording medium from the insertion port of the recording medium holding device. be able to. Furthermore, when an impact or the like is applied, it is possible to make it difficult to remove the non-contact type recording medium from the recording medium holding device. In addition, when replacing the non-contact type recording medium, it is only necessary to insert a new non-contact type recording medium from the insertion port of the recording medium holding device. It can be done easily.

The second hooking claw 421 is also formed so that the inserted non-contact type recording medium slides on the contact surface with which the front end of the non-contact type recording medium contacts when the non-contact type recording medium is inserted. For example, it is possible to provide a recording medium holding device in which the insertion direction of the non-contact recording medium is not limited.

Such a recording medium holding device can be used for an electronic device that can write data to or read data from an exchangeable recording medium. For example, in an electronic device using a video tape, a magnetic disk, an optical disk, or a contact type recording medium as an exchangeable recording medium, a non-contact type recording medium is used instead of these recording media, or a non-contact type recording medium is used. In addition, a recording medium holding device is provided in an electronic device in which this non-contact type recording medium can be used.

FIG. 11 shows a case where a non-contact type recording medium can be used by providing a reader / writer function in the image pickup apparatus, for example, and the recording medium holding device is provided in the image pickup apparatus in which the non-contact type recording medium can be used. Is shown FIG. 12 is a block diagram showing the configuration of an imaging apparatus that can use a non-contact type recording medium together with the configuration of the non-contact type recording medium. In FIG. 12, portions corresponding to those in FIG. 1 are denoted by the same reference numerals, and detailed description thereof is omitted.

In the imaging device 50, the light incident through the imaging lens 51 enters the imaging element 521 of the imaging unit 52, and a subject image is formed on the imaging surface. The imaging element 521 is configured using a solid-state imaging element such as a CCD or a CMOS, and outputs an imaging signal based on a subject image obtained by photoelectric conversion.

The video signal processing unit 522 performs noise removal and A / D conversion of the imaging signal output from the imaging element 521. In addition, process processing such as γ processing and knee correction processing is performed using image data obtained by performing A / D conversion. In addition, processing for compressing the image data after the process processing, processing for expanding the compressed image data, and the like are performed. Further, the video signal processing unit 522 supplies the image data to the connected electronic viewfinder 60 to display the image being captured or the recorded image.

The signal transmission processing unit 53 is connected to a signal transmission unit 54 configured similarly to the signal transmission unit 13. The signal transmission processing unit 53 processes the image data supplied from the video signal processing unit 522 so that signal transmission can be performed using the line-to-line coupling between the signal transmission unit 13 and the signal transmission unit 54. The obtained high frequency signal is supplied to the signal transmission unit 54. Further, the high-frequency signal supplied from the signal transmission unit 54 is processed and the image data read from the non-contact type recording medium 10 is supplied to the video signal processing unit 522. For example, the signal transmission processing unit 53 transmits the image data supplied from the video signal processing unit 522 on the assumption that a wireless communication method called UWB (Ultra Wide Band) is used.

The power supply unit 55 supplies power to each unit of the imaging device 50. The power transmission processing unit 56 supplies an alternating current to the planar coil of the power transmission unit 57 configured similarly to the power transmission unit 11. For example, the power transmission processing unit 56 performs switching of the DC voltage supplied from the power supply unit 55 and supplies the AC current by switching the polarity of the voltage applied between the terminals of the planar coil at a predetermined frequency.

The control unit 58 is provided with a user interface 59. The control unit 58 generates a control signal based on the operation signal supplied from the user interface 59, and controls the operations of the imaging unit 52, the signal transmission processing unit 53, and the power transmission processing unit 56 by this control signal.

In the imaging device 50 configured as described above, for example, when a recording operation is performed by the user, the operation of the power transmission processing unit 56 is controlled by the control unit 58 based on the operation signal supplied from the user interface 59, and non-recording is performed. Power is supplied to the contact recording medium 10. In addition, the control unit 58 controls the operation of the signal transmission processing unit 53 to transmit the image data of the captured image to the non-contact type recording medium 10 and perform the writing process.

When a user operation for reproducing the recorded captured image is performed, the control unit 58 controls the operation of the power transmission processing unit 56 based on the operation signal supplied from the user interface 59 to the contactless recording medium 10. To supply power. Further, the operation of the signal transmission processing unit 53 is controlled to request image data from the non-contact type recording medium 10, and based on the image data read from the non-contact type recording medium 10, for example, with the electronic viewfinder 60. Display an image.

Here, when exchanging the non-contact type recording medium, the user only has to insert a new non-contact type recording medium from the insertion port of the recording medium holding device. Can be exchanged. For this reason, it becomes possible to shorten the interruption time of imaging. In addition, even if the non-contact type recording medium is discharged from the discharge port of the recording medium holding device, the discharged non-contact type recording medium is held, so that mechanical impacts due to dropping or the like are applied to the non-contact type recording medium. It can prevent being added.

Further, the recording medium holding device can be applied not only to the imaging device but also to various electronic devices such as a television device, an audio device, a communication device, and an information terminal device provided with a reader / writer function. Further, although the above-described signal transmission processing unit 53 uses UWB, other transmission processing methods can be used by changing the frequency band characteristics of the signal transmission unit 54.

It is a figure which shows the structure of a non-contact-type recording medium. It is a figure which shows the structure of an electric power transmission part. It is a figure which shows the structure of a signal transmission part. It is a figure which shows the external appearance of a recording medium holding / maintenance apparatus and a non-contact type recording medium. It is a figure which shows the loading / exchange operation / movement of a non-contact-type recording medium. It is a figure which shows the external appearance of the recording-medium holding / maintenance apparatus of another structure. It is a disassembled perspective view of the recording media holding / maintenance apparatus of another structure. It is a figure which shows the structure of a latching / locking part. It is a figure which shows the loading operation / movement of a non-contact-type recording medium. It is a figure which shows exchange operation / movement of a non-contact-type recording medium. It is a figure which shows the external appearance of an imaging device. It is a figure which shows the structure of an imaging device.

Explanation of symbols

10, 10a, 10b, 10c, 10d ... Non-contact type recording media, 11, 57 ... Power transmission unit, 12 ... Power supply unit, 13, 54 ... Signal transmission unit, 14, 53 ...Signal transmission processing unit, 15 ... Media control unit, 16 ... Storage unit, 19 ... Recess, 20 ... Reader / writer, 21 ... Power transmission unit, 23 ... Signal transmission unit, 25 ... storage part, 26 ... stop part, 30, 30a ... recording medium holding device, 31, 31a ... casing, 32 ... insertion port, 33 ... discharge port, 35, 36 ... convex part, 39, 39a, 39b ... pressing part, 40 ... latching part, 41 ... first arm, 42 ... second arm, 43, 44 ... elastic 50, imaging device, 51, imaging lens, 52, imaging unit, 55, power supply unit, 56 Power transmission processing unit, 58 ... control unit, 59 ... user interface, 60 ... electronic viewfinder, 111, 211 ... single wire, 112, 212 ... planar coil, 113, 114, 213, 214 ... Insulating part, 115, 215 ... Metal sheet, 131, 231 ... Dielectric substrate, 132, 232 ... Ground pattern, 133, 233 ... Signal pattern, 134, 136, 234, 236 ... Via, 135, 235 ... Termination resistor, 311, 312, 313... Notch, 411... First hooking claw, 411 p. Connection unit, 413, 423, shaft, 415, release knob, 421, second latching claw, 521, image sensor, 522, video signal processing unit

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Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				

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JP93575042B2	1994-01-24	2004-10-06	ソニー株式会社	Memory card
JPH10232998A	1997-02-19	1998-09-02	Omron Corp	Communication equipment
JP349216782 *	1997-15-17	2004-02-03	富士通株式会社	adapter
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Priority And Related Applications

Child Applications (1)

Application	Priority date	Filing date	Relation	Title
JP2008201177A	2006-02-23	2008-08-04	Division	Non-contact type recording media

Priority Applications (2)

Application	Priority date	Filing date	Title
JP2006046826		2006-02-23	
JP2006239411A	2006-02-23	2006-09-04	Recording media holding device

Applications Claiming Priority (5)

Application	Filing date	Title
JP2006239411A	2006-09-04	Recording media holding device
TWD96105767A	2007-02-15	Recording medium and apparatus for holding the same
CN2009101641483A	2007-02-16	Recording medium and apparatus for holding the same
CN2007101035879A	2007-02-16	Recording medium and apparatus for holding the same
US11/675,851	2007-02-20	Recording medium and apparatus for holding the same

Legal Events

Date	Code	Title	Description
2008-05-19	A977	Report on retrieval	Free format text: JAPANESE INTERMEDIATE CODE: A971007 Effective date: 20080519
2008-06-04	A131	Notification of reasons for refusal	Free format text: JAPANESE INTERMEDIATE CODE: A131 Effective date: 20080603
2008-08-05	A521	Written amendment	Free format text: JAPANESE INTERMEDIATE CODE: A523 Effective date: 20080804
2008-08-20	TRDD	Decision of grant or rejection written	
2008-08-27	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01 Effective date: 20080826

2008-08-28	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01
2008-09-29	A61	First payment of annual fees (during grant procedure)	Free format text: JAPANESE INTERMEDIATE CODE: A61 Effective date: 20080908
2008-10-05	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20111003 Year of fee payment: 3
2011-10-04	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20121003 Year of fee payment: 4
2012-10-02	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20131003 Year of fee payment: 5
2013-10-03	LAPS	Cancellation because of no payment of annual fees	

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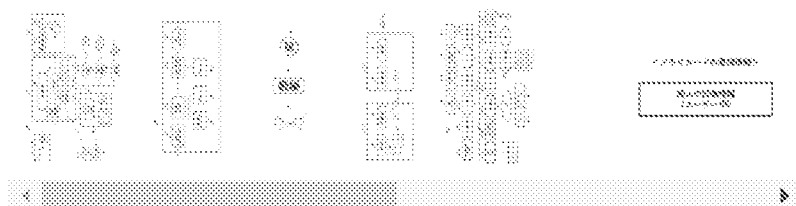
Patents

3805347



Control processing apparatus and image forming apparatus provided with the same

Images (13)



Classifications

G03G15/507 Machine control of apparatus for electrographic processes using a charge pattern, e.g. regulating different parts of the machine, multimode copiers, microprocessor control by using information from an external support, e.g. magnetic card being interleaved with the original or directly written on the original, e.g. using a control sheet

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Inventor: 安和 森本, 伸宏 茂木, 秀夫 齋藤

Worldwide applications

2004 [JP](#) 2005 [US](#) [EP](#) [GN](#)

Application JP2004256008A events ⓘ

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2005-03-16 Publication of JP2005074490A

2006-08-02 Application granted

2006-08-02 Publication of JP3805347B2

Status Expired - Fee Related

2024-09-02 Anticipated expiration

Info: Patent citations (8), Cited by (26), Legal events, Similar documents, Priority and Related Applications

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Claims (6)

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1. Detection means for detecting specific image data present in the input image data, information reading means for transmitting an electromagnetic wave signal to a memory card carried by the user who entered the detection area, and reading the user's recognition information; storage means for use function restriction information is stored that indicates the availability function for image data to which the specific image data which is previously set for each user is detected that the authentication based on the recognition information that the user read from the memory card portable, And a function whose use is restricted according to the use function restriction information when the user selects a function whose use is restricted for the image data in which the specific image data is detected by the use function restriction information. Has a control means which is not implemented.
2. The control means is configured such that when a user selects a function whose use is restricted with respect to the image data in which the specific image data is detected by the use function restriction information, the use is restricted according to the use function restriction information. The control processing apparatus according to claim 1, wherein an available function that can be replaced without being implemented is determined and implemented.
3. The said control means performs the image conversion process which converts the characteristic of the image data for which use is restricted to the characteristic of the usable image data when implementing the substitutable usable function. The control processing device described.
4. When the control unit implements the replaceable usable function, the function that is restricted in use by the use function restriction information after being converted into image data in which a predetermined portion of the image data including the specific image data is deleted, control processor according to claim 2, wherein the implement.
5. The said control means, when the use function with respect to the image data from which the specific image data is detected is implemented, the implemented use function, the type of image data, and the authenticated user are stored in the storage means. The control processing apparatus according to any one of claims 1 to 4.
6. An image forming apparatus comprising the control processing device according to claim 1.

Description

The present invention relates to a control processing apparatus that restricts a use function such as an image forming process for a specific document such as a confidential document, and an image forming apparatus including the control processing apparatus.

In recent image forming apparatuses (printers, fax machines, copiers, multifunction machines, etc.), the image forming apparatus is improved in image quality and equipped with multiple functions (reading, editing, printing, sending, filing, etc. of image data). Along with this, there is known one that restricts a use function such as an image forming process for a specific document including a specific original image such as a confidential document or a color document depending on a user.

As a specific example, there has been proposed a color copier that prohibits copying of a manuscript image on a printer unit when the manuscript image data read by the scanner unit of the color copier includes a specific manuscript image. When the control center receives a notification from a customer of a color copier whose copying is prohibited, the customer notifies the customer of the password of the color copier, and when the customer enters the password in the color copier, the prohibited copying is canceled and the original image is copied (see, for example, Patent Document 1).

In addition, the RFID sheet of a document set on a paper feed stand by allowing a user to carry an RFID (Radio Frequency-Identification) card and affixing an RFID sheet to a confidential document and providing a reader / writer in the copier, and the copier A copying machine has been proposed that reads the user's RFID card in front of the printer. In such a copying machine, the copying machine can copy the document only when the access right of the user read from the RFID card of the user is higher than the confidential level of the document read from the RFID sheet of the document on the sheet feeding table. (See, for example, Patent Document 2).

Japanese Patent Laying-Open No. 2003-50525 (FIG. 1) JP 2001-160117 A (FIG. 2)

However, this conventional technique has the following problems.

In other words, when it is recognized that the read original image data includes a specific original image, copying by the printer unit is prohibited, and when the original image is copied after waiting for a password input from the customer, the customer There was a problem that required a series of troublesome work of contacting the customer and entering the password received from the control center.

In addition, the copying machine can copy the document only when the access right of the user read from the RFID card of the user is higher than the confidential level of the document read from the RFID of the document on the sheet feeding table. In this case, there is a problem that a troublesome work of attaching an RFID sheet to a specific document is required, leading to an increase in cost, and degrading the quality of the specific document.

The present invention has been made in view of the above problems, and does not require troublesome work for the user, and image forming processing for a specific document including a specific original image is simple and low cost for each user. An object of the present invention is to provide a control processing apparatus capable of limiting the use functions such as the above and an image forming apparatus provided with the control processing apparatus.

The present invention detects a specific image data present in the input image data and sends the electromagnetic wave signal to enter the memory card a user mobile in the detection area read the recognition information for the user, the user There thus the user authenticated based on the recognition information read from the memory card portable, based on the usage function restriction information indicating an availability function for image data specific image data set in advance is detected, the detection is specific image data When a function whose use is restricted with respect to the image data thus selected is selected, the function whose use is restricted is not executed.

According to the present invention, without requiring troublesome work on the user, in a simple and low cost per user, it is possible to restrict the use functions such as image forming processing for the specific document including the specific original image.

The control processing device according to the first aspect of the present invention includes a detection unit that detects specific image data present in input image data, and an electromagnetic wave signal to a memory card carried by a user who enters the detection area. Information reading means for reading the user's recognition information and whether or not the specific image data set in advance for each user authenticated based on the recognition information read from the memory card carried by the user can be used for the detected image data A storage unit storing use function restriction information indicating a function, and the user selects a function whose use is restricted for the image data in which the specific image data is detected by the use function restriction information. In this case, a configuration having a control unit that does not implement a function that is restricted in accordance with the use function restriction information is adopted.

According to this configuration, for a user who is authenticated based on the recognition information read from the memory card carried by the user, the function whose use is restricted for the image data in which the specific image data is detected by the use function restriction information. When the function is selected, the function whose use is restricted according to the use function restriction information is not executed. Accordingly, it is possible to easily set a use function restriction on image data in which specific image data existing in the image data is detected for each user for various functions installed in the main body apparatus. As a result, it is possible to avoid a situation in which various functions for image data in which specific image data existing in the image data in the main apparatus is detected by an arbitrary user are used without limitation.

Further, since the specific image data exists in the input image data, it is detected in the image data. Thereby, it is possible to detect from a part of a normal image without requiring a special seal such as RFID in order to detect specific image data. As a result, it is possible to prevent the user from performing troublesome work, to prevent an increase in cost, and to prevent the quality of a specific document including specific image data from deteriorating.

According to a second aspect of the present invention, in the control processing device according to the first aspect, the control means is a function whose use is restricted for the image data in which the specific image data is detected by the use function restriction information. Is selected by the user, a function that is restricted according to the use function restriction information is not executed, and a replaceable usable function is determined and executed.

According to this configuration, when a user selects a function whose use is restricted with respect to image data in which specific image data is detected based on the use function restriction information, a replaceable usable function is determined according to the use function restriction information. And implement. For this reason, it is possible not only to restrict the use function but also to implement an alternative use function. As a result, while avoiding a situation in which various functions for image data by Ritoku constant image data is detected on any of the user is unlimited, it can be user experience is also maintained.

According to a third aspect of the present invention, in the control processing device according to the second aspect, the control means can use the characteristics of the image data whose use is restricted when the replaceable usable function is performed. A configuration is adopted in which image conversion processing is performed to convert the characteristics of image data.

According to this configuration, since the image conversion process for converting the characteristics of the image data whose use is restricted to the characteristics of the usable image data is performed, an alternative use function that requires image format conversion is performed. be able to. For example, when copy of image data including color data is instructed as specific image data, use of color data is restricted, while color data is converted to black and white data when copy of black and white data is allowed it is possible to carry out copying.

According to a fourth aspect of the present invention, in the control processing device according to the second aspect, the control unit deletes a predetermined portion of the image data including the specific image data when performing the replaceable usable function. After the conversion to the image data, a configuration is adopted in which a function whose use is restricted by the use function restriction information is implemented.

According to this configuration, when performing a substitutable use function, a process of converting a predetermined portion of image data including specific image data into image data is performed, so that no special processing is required from the user. Alternative use functions can be implemented.

A fifth aspect of the present invention, the control processor according to the first to fourth one aspect, the control means, if the specific image data is performed utilizing function for image data detected, the A configuration is adopted in which the used function, the type of image data, and the authenticated user are stored in the storage means.

According to this configuration, when the use function is performed on the image data in which the specific image data is detected, the used use function, the type of image data, and the authenticated user are stored in the storage unit. By reading the history, it is possible to monitor the usage function status of the authenticated user and specific image data such as confidential information as needed. As a result, risk management for specific image data such as confidential information can be more thoroughly performed.

An image forming apparatus according to a sixth aspect of the present invention employs a configuration including a control processing apparatus according to any one of the first to fifth aspects.

According to this configuration, the effect of the control processing device according to any one of the first to fifth aspects can be obtained in the image forming apparatus.

FIG. 1 is a block diagram showing a main configuration of a multifunction machine 100 equipped with a control processing apparatus according to the present embodiment.

As shown in the figure, a multifunction peripheral 100 according to the present embodiment includes a control processing apparatus 101 that controls the entire apparatus and performs image processing of input image data, and a document placed on a document table. A reading device 102 for reading, a printing device 103 for printing image data read by the reading device 102 or image data received via the PSTN or LAN, and an operation input from the user to the multifunction peripheral 100 and a current status And the like.

The control processing device 101 includes a main control unit 105, a program memory 106, a data memory 107, a reading control unit 108, an image processing unit 109, and an RFID control unit 110.

The main control unit 105 controls the control processing apparatus 101 and controls the entire multifunction peripheral 100. When performing various controls, the main control unit 105 reads and executes a control program stored in the program memory 106. When executing the control program, the data memory 107 is used as a work area. The reading control unit 108 controls the reading device 102 under the control of the main control unit 105.

The image processing unit 109 determines whether or not specific image data (described later) is present in the image data output from the CCD sensor 111 of the reading device 102 and performs image conversion processing according to the specific image data. Image data that has been subjected to image processing by the image processing unit 109 is input to the printing control unit 112 of the printing apparatus 103 and visualized on the surface of the photosensitive drum 114 via the LSU 113.

The RFID control unit 110 includes an antenna 115, and reads user identification information recorded in a memory card 116 carried by the user who enters the detection area. The memory card 116 includes an RFID chip 117 and transmits data registered in the card (hereinafter referred to as "registered data" as appropriate) to the RFID controller 110 via the antenna 118.

The panel device 104 includes a panel control unit 119 that controls the entire panel device under the control of the main control unit 105. The panel control unit 119 controls display on a display panel such as a touch panel while receiving input from operation keys and a large touch panel.

The multifunction device 100 also includes a FAX control unit 120, a LAN control unit 121, and a file control unit 122. The FAX control unit 120, the LAN control unit 121, and the file control unit 122 perform the following control under the control of the main control unit 105. The FAX control unit 120 performs communication control of facsimile data via the PSTN. The LAN control unit 121 performs communication control with a server or personal computer (hereinafter referred to as "PC") connected on the LAN. The file control unit 122 performs processing such as registration, editing, and deletion of a file in the storage unit 123 such as a hard disk (HD).

FIG. 2 is a block diagram illustrating a configuration of the image processing unit 109 included in the control processing apparatus 101 according to the present embodiment.

In the image processing unit 109 shown in the figure, a read image processing circuit 201 performs a shading correction process and a scanner γ conversion process on the image data received from the reading apparatus 102. In the shading correction processing, light amount variation correction and CCD sensor 111 characteristic variation correction are performed. In the scanner γ conversion process, the read image data is γ-converted from reflectance data to density data so as to be easily handled by the printing apparatus 103.

The specific image detection circuit 202 detects specific image data in the image data received from the read image processing circuit 201. The specific image data refers to image data that is subject to restriction on the use of each function in the multifunction peripheral 100. For example, image data or color image data indicating a confidential document corresponds to the specific image data. The former is for avoiding disadvantages caused by free copying of confidential documents, facsimile transmission, and the like, and the latter is set as specific image data to avoid cost increase due to free copying of color images.

As shown in FIG. 2, a specific image data memory 203 and an image memory 204 are connected to the specific image detection circuit 202. The specific image data memory 203 stores sample data of specific image data in advance. On the other hand, the image memory 204 stores the image data received from the read image processing circuit 201. The specific image detection circuit 202 detects specific image data in the image data received from the read image processing circuit 201 by performing a matching process on the image data stored in both memories.

Here, sample data of specific image data stored in the specific image data memory 203 will be described. FIG. 3 is a diagram illustrating an example of sample data of specific image data stored in the specific image data memory 203.

In the figure, sample data of specific image data as image data indicating a confidential document is shown. FIG. 3A shows specific image data (specific image data A) composed of specific characters indicating "handle as secret". FIG. 3B shows specific image data (specific image data B) made up of specific characters indicating "handle as a secret that must be strictly guarded". Further, FIG. 3C shows specific image data having a specific shape indicating the meaning of "prohibit copying".

When the specific image data is color image data, the RGB components of the image data read by the reading device 102 are analyzed, and if each color component is equal to or greater than a predetermined threshold value, the color image data (specific image data) To be recognized as.

The image processing circuit 205 such as editing / conversion performs image processing such as editing or conversion of the image data received from the specific image detection circuit 202. In particular, the editing / conversion image processing circuit 205 performs image processing such as editing and conversion on the image

data when the designated function is restricted for the image data in which the specific image data is detected. When performing image processing, the image processing circuit 205 such as editing / conversion uses the image memory 206 as its work area. If the image data input from the specific image detection circuit 202 is not the image data from which the specific image data is detected, the image processing circuit 205 such as editing / conversion prints the image data without performing image processing. Output to the image processing circuit 207.

The print image processing circuit 207 performs halftone conversion processing, print area processing, and printer γ conversion processing on the image data received from the image processing circuit 205 such as editing / conversion. In the halftone conversion process, a pseudo gradation conversion process corresponding to the printing capability of the printing apparatus 103 is performed on the image data. In print area processing, white data is added in margin processing, mask processing in book processing, and the like are performed. In the printer γ conversion process, the output data is γ converted in accordance with the printing characteristics of the printing apparatus 103.

FIG. 4 is a block diagram showing the configuration of the RFID control unit 110 and the memory card 116 to be detected by the RFID control unit 110 included in the control processing apparatus 101 according to the present embodiment.

As shown in the figure, the RFID control unit 110 includes a control circuit 401, a modem circuit 402, and an antenna 115. The control circuit 401 performs control for reading and writing registration data (recognition information) stored in the memory card 116. The modem circuit 402 modulates and demodulates signals communicated with the memory card 116 instructed by the control circuit 401. The signal modulated by the modem circuit 402 is sent to the memory card 116 via the antenna 115. On the other hand, a signal coming from the memory card 116 via the antenna 115 is demodulated by the modem circuit 402 and then output to the control circuit 401.

On the other hand, the memory card 116 includes a control circuit 403, a memory 404, a modem circuit 405, a capacitor 406, and an antenna 118. The control circuit 403 performs control for performing processing according to the read / write instruction for the registered data in the memory card 116 from the RFID control unit 110. The memory 404 stores recognition information (user ID) of a user carrying the memory card 116 as registration data. The control circuit 403 reads or writes the recognition information stored in the memory 404 in response to an instruction from the RFID control unit 110. The modem circuit 405 modulates and demodulates signals communicated with the RFID control unit 110 instructed by the control circuit 403. The signal modulated by the modem circuit 405 is sent to the RFID control unit 110 via the antenna 118. On the other hand, a signal arriving from the RFID controller 110 via the antenna 118 is demodulated by the modem circuit 405 and then output to the control circuit 403. The capacitor 406 stores electromagnetic wave energy supplied from the RFID controller 110 via the antenna 118 as electric power.

FIG. 5 is a functional block diagram of the MFP 100 according to the present embodiment. In the figure, a part of the network is also illustrated. Further, the MFP 100 according to the present embodiment is equipped with a printer function, a copy function, a scanner function, a FAX function, an e-mail function, and a filing function. In FIG. 5, only the blocks related to are shown. In FIG. 5, the same reference numerals are given to the configurations common to the configurations shown in FIG. 1.

The multi-function device 100 can be connected to various servers 501 and client PCs 502 via a LAN. The server 501 includes a personal information server that holds a personal information table and performs personal authentication and distribution of personal information, and a WEB server that executes a job selected from a menu by a remote procedure method.

The multi-function peripheral control unit 503 is a part that performs overall control of the multi-function peripheral 100. The control executed by the main control unit 105 and the image processing unit 109 shown in FIG. The print control unit 112 is a part that executes processing for converting print data given from the client PC 502 or the like into image data of a predetermined format, and in particular, warms up the heater unit (fixing device) 504 of an image forming unit (not shown). A start instruction is given, and a cassette selection instruction is given to the cassette controller 505. The cassette control unit 505 selects a designated cassette from the cassettes (1) to (n) equipped in a plurality of stages and feeds the selected cassette to the image forming unit. The FAX control unit 120 includes a modem that is connected to the PSTN and executes a procedure for facsimile communication. The panel control unit 119 displays an operation screen or the like on the large touch panel 506 and interprets the operation content input by the user from the touch position and display content of the large touch panel 506.

The RFID control unit 110 has a function of reading and writing data from and to the memory card 116 using electromagnetic wave signals. When a magnetic field is applied from the RFID control unit 110 to the memory card 116, the return magnetic field at that time includes an influence (information) corresponding to the stored contents of the memory card 116. The RFID control unit 110 detects the stored contents of the memory card 116 from the return magnetic field. Conversely, information is written by electromagnetically changing the memory card 116 with an electromagnetic wave signal applied to the memory card 116 from the RFID controller 110. The RFID controller 110 reads / writes registration data to / from the memory card 116 in a detection area having a radius of about 1 m in a non-contact manner via an electromagnetic wave signal.

The personal information control unit 507 manages the write destination of the registration data read from the memory card 116. The personal information control unit 507 is a part that notifies the RFID control unit 110 of data to be written to the memory card 116. The LAN control unit 121 performs communication control with the server 501 and the client PC 502 on the LAN. The personal information server / F unit 508 executes processing for communicating with the personal information server among the servers 501 on the LAN. The data memory 107 functions as a storage unit that stores data received from the memory card 116 and the personal information server. The job control unit 509 is a part that gives instructions to the corresponding units when executing each job provided by each function such as a copy function, a printer function, a FAX function, a scanner function, an electronic mail function, and a file function.

The voice control unit 510 holds voice data for voice guidance. When a voice guidance instruction is given from the panel control unit 119 and the job control unit 509 in synchronization with a user operation, the voice control unit 510 outputs corresponding voice data to the speaker 511. The voice guidance is preferably voice for assisting the operation on the operation screen displayed on the large touch panel 506, but may have other contents. The panel angle position sensor 512 detects the angle of the large touch panel 506, and the panel angle drive motor 513 receives the control signal from the panel control unit 119 and adjusts the angle of the large touch panel 506. In this embodiment, the angle of the large touch panel 506 is adjustable, but a fixed configuration may be used.

FIG. 6 is a diagram showing registration information of the memory card 116.

As shown in the figure, the memory card 116 stores only the user ID as personal recognition information. Although it is preferable from the viewpoint of security that the registration information of the memory card 116 is limited to the user ID and no other personal information is stored, other personal information or group information may be stored.

FIG. 7 is a diagram showing the data structure of a personal information table registered in the personal information server as the server 501.

In the personal information server, there is a personal information table for each registered user. As shown in the figure, the personal information table includes a user ID serving as personal recognition information, personal information such as a department to which the user belongs, function information restricted by the registered user (hereinafter referred to as "function restriction information"), and it includes history information of functions used by the registered user (hereinafter referred to as "used function history information"). The usage function history information will be described later.

FIG. 8 is a diagram illustrating a configuration example of the function restriction information in the personal information table.

As shown in the figure, the function restriction information includes a function list in which functions to be restricted are listed in a list format, and information indicating whether or not each item of the function list is restricted (usability) (referred to as "usability information"). The availability information is divided according to the type of image data to be processed for each item in the function list. In the figure, the image data to be processed is normal image data not including specific image data (normal image shown in FIG. 8), and image data including color image data as specific image data (color shown in FIG. 8). Image, image data including the specific image data A shown in FIG. 8A (image A shown in FIG. 8), and image data including the specific image data B shown in FIG. 8B (image B shown in FIG. 8). Are divided according to the type of the four image data.

More specifically, the availability information and remarks of each function are registered corresponding to each item of the function list composed of the function name and its function. In this embodiment, "copy", "FAX", "InternetFAX / E-Mail", "scanner", and "file" are registered as function names.

Multiple functions are registered for each function name. For example, in the function name "copy", functions such as "color copy", "monochrome copy", and "double-sided copy" are registered. Among these functions, only the function that permits the use of the image data to be processed is set with "○" indicating the permission in the availability information.

For example, in the figure, in the function "color copy" of the function name "copy", when the image data to be processed is "color image", the use is not permitted, and "image A" and "image" in the case of "B", the use is permitted. In addition, the function "FAX" function "external transmission" is allowed to be used only when the image data to be processed is "normal image", and is allowed to be used for other image data. It shows the case of not doing. Further, in the function "monochrome file" of the function name "file", any image data is allowed to be used.

It should be noted that a specific number (numerical value) may be set for the availability as shown in the function "restricted transmission number" of the function name "FAX" and the function "restriction of resolution" of the function name "scanner". In the remarks, for example, a standard for determining availability is registered.

Next, an operation when an operation is instructed by the user to the multifunction peripheral 100 according to the present embodiment will be described with reference to FIGS. 9 and 10.

When the user instructing the operation to the multifunction device 100 carries the memory card 116 and approaches, it is detected by the RFID control unit 110 (S200). For example, the memory card 116 in which the identification information (user ID) of the person is written is put in an employee card holder carried by the employee (user) by dropping from the neck. The user ID in the memory card 116 is read by the RFID controller 110 when the user carrying the memory card 116 enters the detection area of the RFID controller 110 (assuming that it is about 1 m in this case).

The RFID control unit 110 stores the user ID read from the memory card 116 in the data memory 107 (S201). The multi-function peripheral control unit 503 reads the user ID stored in the data memory 107 and notifies the personal information server 1 / F unit 508 (S202).

As will be described later, when receiving the user ID, the server for personal information as the server 501 checks whether or not the personal information table of the user who has registered the user ID that matches the user ID is registered. Returns presence / absence information.

The personal information server 1 / F unit 508 confirms whether or not the user is registered in the personal information server from the registration presence / absence information (S203). If the personal information table of the user is not registered ("NO" in S204), the personal information server 1 / F unit 508 outputs an "unregistered user detection notification" to the panel control unit 119. Upon receiving the "unregistered user detection notification", the panel control unit 119 displays a message indicating that the device cannot be used on the large touch panel 506 (S205).

On the other hand, if the personal information table of the user has been registered ("YES" in S204), the personal information server 1 / F unit 508 extracts the personal information table data of the detected user from the personal information server, and the data memory 107 (S206).

The panel control unit 119 extracts the name of the detected user from the personal information table data stored in the data memory 107, and displays the name as a person who can use the device on the large touch panel 506 (S207). For example, if the name registered in the personal information of the personal information table is "Taro Matsushita", a character such as "Taro Matsushita has been authenticated" is displayed.

A menu screen is displayed together with the name of the detected user. On the menu screen, various function buttons for inputting instructions to the multifunction peripheral 100 are displayed. After this menu screen is displayed on the large touch panel 506, the user starts the operation (S208). Specifically, when a user selects a function button from the large touch panel 506, an operation such as color copying or external line transmission by FAX is started.

If the operation is started, the multifunction peripheral control unit 503 reads the image data of the document image to be processed by the reading device 102 (S209). Then, the presence or absence of specific image data in the read image data and the type of the specific image data are detected (S210). Information indicating the presence and type of the detected specific image data is notified to the job control unit 509.

Upon receiving this information, the job control unit 509 reads the function restriction information in the personal information table of the user stored in the data memory 107. Then, it is determined whether the function corresponding to the read image data among the functions designated by the function button corresponds to the function restriction information (S211).

If it does not correspond to the function restriction information, the job control unit 509 starts a job provided by the instructed function (S212). When the job is completed (S213), the personal information server 1 / F unit 508 records the usage function history in the usage function history information in the personal information table (S214). After recording the use function history in the personal information table, the multifunction peripheral control unit 503 ends the process.

FIG. 11 is a diagram illustrating a configuration example of usage function history information in the personal information table. FIG. 11 shows the user use function history information indicated by the user ID "0825abX".

As shown in the figure, the usage function history information includes a date, a user ID, a type of image data, and a usage function. In FIG. 11, the function history when color copying was performed on image data including specific image data A on August 25, 2004, and the image data including color image data on August 28, 2004 was displayed with a color scanner. It shows the case where the usage function history when reading is registered.

As described above, according to the MFP 100 according to the present embodiment, the usage function, the type of image data, and the like when stored without limiting the usage function for the image data in which the specific image data is detected are stored. Therefore, by reading the history of the stored information, it is possible to monitor the use function status for the authenticated user and the specific image data such as confidential information as needed. As a result, risk management for specific image data such as confidential information can be further thorough.

On the other hand, if it is determined in step S211 that the function restriction information is satisfied, the MFP control unit 503 determines whether an alternative function can be used by image processing such as editing / conversion (S215). If the alternative function is available, the MFP control unit 503 performs image processing on the image data (S216). After performing the image processing, the MFP overall control unit 503 ends the processing through the processing of S212 to S214.

Here, a case where an alternative function can be used by image processing such as editing / conversion will be described. In the following description, an example in which a color copy of image data including color image data is instructed by a certain user will be described. It is assumed that data shown in FIG. 8 is registered as function restriction information in the personal information table of the user.

As shown in FIG. 8, color copying of image data including color image data is restricted for the user. For this reason, the operation is not executed. However, as shown in the figure, the user is not limited to monochrome copying of image data including color image data. In such a case, the multifunction peripheral control unit 503 converts the color image data to be processed into monochrome image data, and then executes monochrome copying as an alternative function. The multifunction peripheral overall control unit 503 determines whether or not such an alternative function can be used, and executes the alternative function if possible.

As described above, according to the multifunction peripheral 100 according to the present embodiment, when a function whose use is restricted by the function restriction information is selected by the user, a substitute use function is executed according to the function restriction information. For this reason, it is possible not only to restrict the use function but also to execute a substitute use function. As a result, it is possible to maintain user convenience while avoiding a situation in which various functions for image data in which specific image data is detected in the main device by an arbitrary user are used without limitation.

In particular, in the MFP 100 according to the present embodiment, the necessary image processing is performed when the replaceable use function is performed, and thus the replaceable use function can be performed without requiring a special process from the user. be able to. As necessary image processing, for example, image conversion processing for converting the characteristics of image data is performed. For this reason, it is possible to execute an alternative use function that requires image format conversion.

Note that in the multifunction peripheral 100 according to the present embodiment, an arbitrary alternative function can be executed by advance setting. As described above, when color copying of image data including color image data is not permitted, monochrome copying of image data including monochrome image data is executed as an alternative function, or monochrome copying of image data including specific image data A is performed. When the image data is not allowed, a monochrome copy of the image data in which a predetermined portion (for example, a portion to be kept as confidential information) of the image data including the specific image data A is deleted can be executed as an alternative function. In the former case, it is possible to perform image processing such as adding gradation to monochrome image data in accordance with color image data before conversion.

On the other hand, if the alternative function is not available in the processing of S215, the job control unit 509 gives an "error notification" to the panel control unit 119 and the voice control unit 510 that the function cannot be used due to the use function restriction. Output. When the panel control unit 119 receives this "error notification", the panel control unit 119 displays an error message on the large touch panel 506 indicating that the use of the function is restricted. Upon receiving this "error notification", the voice control unit 510 emits an error sound from the speaker 511. At this time, the job control unit 509 does not accept the function instructed by the user (S217).

As described above, in the MFP 100 according to the present embodiment, when a function whose use is restricted is selected by the user, an error message indicating that the function is restricted is displayed on the large touch panel 506. The user can easily recognize that the function cannot be used, and can prompt the next processing.

The error message displayed on the large touch panel 506 is provided with a confirmation button. The confirmation button is used when canceling the error message and returning the process to S208. When the error message is displayed, the user presses the confirmation button to return to the original menu screen (S208) (S218). Then, such processing is repeated, and whether the job instructed by the user is completed (S219), or when the user gives up the operation, the job control unit 509 ends the processing.

FIG. 12 is a functional block diagram of the server 501 connected to the MFP 100 according to the present embodiment via a LAN. A server 501 shown in the figure includes a CPU 1201 that controls the entire apparatus. The memory 1202 stores a control program used when the CPU 1201 reads and controls the entire apparatus, and has a function as a work memory of the CPU 1201. A hard disk (HD) 1203 stores information to be distributed to the multifunction peripheral 100 according to the present embodiment. For example, when the server 501 functions as a personal information server, the above personal information table is stored for each registered user. When functioning as a WEB server, a menu for the MFP 100 and a job group associated therewith are stored. The network I / F unit 1204 is an interface part with the LAN.

The operation when the server 501 having the above configuration functions as a personal authentication server will be described with reference to FIG. FIG. 13 is a flowchart for explaining the operation when the server 501 according to the present embodiment functions as a server for personal authentication.

A server 501 serving as a personal authentication server monitors reception of various types of information from the multifunction peripheral 100 according to the present embodiment in a standby state. Specifically, reception of recognition information (user ID) (S1301), reception of a table information read request (S1302), and reception of other information (S1303) are monitored.

If the recognition information is received in S1301 while monitoring the reception of various types of information, the table information of the registered user is retrieved from the personal information table stored in the HD 1203 (S1304). Thereby, it is determined whether or not the received recognition information is registered in the personal information table. Then, the search result, that is, the presence / absence of registration of the recognition information is transmitted to the accessing multifunction device 100 (S1305).

On the other hand, if a table information read request is received in S1302, the table information of the registered user is extracted from the personal information table stored in the HD 1203 (S1306). As a result, the registered user table information associated with the previously received recognition information is extracted. Then, the table information is transmitted to the accessing multifunction device 100 (S1307).

If other information is received in S1303, the corresponding process corresponding to the information is performed (S1308). If the various processes are completed in S1305, S1307, and S1308, the server 501 ends the process. As described above, the server 501 determines a process according to various information received from the multi-function peripheral 100 and executes the process.

As described above, according to the multifunction peripheral 100 of the present embodiment, the function restriction information set in advance for the user authenticated based on the personal identification information (user ID) read from the memory card 116 is read from the server 501 and the data memory. The function which is stored in 107 and usable by the authenticated user for the image data in which the specific image data is detected is restricted according to the function restriction information. Thereby, it is possible to set a use function restriction on image data in which specific image data is easily detected for each user for various functions installed in the main device. As a result, it is possible to prevent a situation in which various functions for image data in which specific image data is detected in the main device by an arbitrary user are used without limitation.

The specific image data is detected from the input image data. Thereby, it is possible to detect from a part of a normal image without requiring a special RFID seal or the like to detect the specific image data. As a result, it is possible to prevent the user from performing troublesome work, to prevent an increase in cost, and to prevent the quality of a document including specific image data from deteriorating.

Furthermore, in MFP 100 according to the present embodiment, a personal information table in which personal information is registered is held on server 501 and user function restriction information corresponding to personal recognition information read from memory card 116 is stored. Read from server 501. According to this, since it is not necessary to register a personal information table on the multi-function peripheral 100, it is possible to realize function use restrictions in the multi-function peripheral 100 without preparing a large-capacity hard disk device or the like.

In particular, in the MFP 100 according to the present embodiment, the specific image data is configured with a specific shape or specific characters, so that the user can easily and reliably recognize that the specific document includes the specific image data. The specific image data can be detected easily and reliably. Further, since the image data is added as character image data, the quality of the specific document is not deteriorated. Furthermore, since the specific image data is configured with a specific color such as red, the user can more easily and reliably recognize that the specific image data includes the specific image data.

Also, in the multifunction peripheral 100 according to the present embodiment, the specific image data is composed of image data including color image data, so that the user can easily and reliably recognize that the specific document is a specific document, and Detection can be performed easily and reliably.

In this embodiment, personal information, function restriction information, and the like are registered in the server 501 functioning as a personal information server, and the personal information is read by the multi-function peripheral 100 and stored in the data memory 107. Explains the case. However, the present invention is not limited to this, and a storage device such as a large-capacity hard disk device may be provided in the multi-function device 100, and a personal information table may be registered and read out from the storage device. When such a change is made, it is possible to implement function use restrictions in the multifunction peripheral 100 only by the apparatus main body.

According to the multifunction peripheral of the present invention, it is possible to limit the use function such as image forming processing for a specific document including a specific document image for each user easily and at a low cost without requiring a troublesome operation from the user. This is useful in that a situation in which various functions of the multifunction peripheral can be used without any limitation by an arbitrary user.

A block diagram showing a main configuration of a multi-function peripheral equipped with a control processing apparatus according to the present embodiment The block diagram which shows the structure of the image process part which the control processing apparatus which concerns on the said embodiment has. The figure which shows an example of the sample data of the specific image data stored in the specific image data memory of the image processing part which concerns on the said embodiment. The block diagram which shows about the structure of the memory card used as the detection target of the RFID control part and RFID control part which the control processing apparatus which concerns on the said embodiment has Functional block diagram of the MFP according to the above embodiment The figure which shows the registration information of the memory card read / written by the multifunctional device which concerns on the said embodiment The figure which shows the data structure of the personal information table registered into the server (personal information server) connected to the multifunctional device which concerns on the said embodiment. The figure which shows an example of the function restriction / limiting information contained in the personal information table which the personal information server connected to the multifunctional device which concerns on the said embodiment registers. Flow chart for explaining the operation when an operation is instructed by the user to the multifunction peripheral according to the above embodiment Flow chart for explaining the operation when an operation is instructed by the user to the multifunction peripheral according to the above embodiment The figure shown about an example of the utilization function log / history registered into the utilization function log / history table provided on the personal information table of the server for personal information connected to the multifunctional device which concerns on the said embodiment. Functional block diagram of a server connected to the MFP according to the above embodiment Flow chart for explaining the operation of the server for personal authentication connected to the MFP according to the above embodiment

Explanation of symbols

DESCRIPTION OF SYMBOLS 100 MFP 101 Control processing device 102 Reading device 103 Printing device 104 Panel device 105 Main control unit 107 Data memory 109 image processing unit 110 RFID control unit 116 Memory card 202 Specific image detection circuit 203 Specific image data memory 205 Image such as editing / conversion Processing circuit 501 Server 503 Multi-function peripheral control unit 507 Personal information control unit 508 Personal information server I / F unit 509 Job control unit 1201 CPU 1202 Memory 1203 Hard disk (HD) 1204 Network I / F part

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Publication number	Priority date	Publication date	Assignee	Title
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JP4081947B2 *	1999-12-03	2008-04-30	富士ゼロックス株式会社	Device security management system
JP2003050525A	2001-08-08	2003-02-21	Ricoh Co Ltd	Image forming system, image forming method and recording medium
JP2003160117A	2001-11-26	2003-06-03	Sato Corp	Label sticking device
US6694115B2 *	2002-01-29	2004-02-17	Hewlett-Packard Development Company, L.P.	Altering print configurations for authorized users
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JP2004223989A	2003-01-27	2004-08-12	Ricoh Co Ltd	Image forming system
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Publication number	Priority date	Publication date	Assignee	Title
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JP2013012043A	2013-01-17	Image processing device, image processing system, and authentication device
JP4173081B2	2008-10-29	Image processing device
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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
JP2004256008A	2004-09-02	2004-09-02	Control processing apparatus and image forming apparatus provided with the same

Applications Claiming Priority (4)

Application	Filing date	Title
JP2004256008A	2004-09-02	Control processing apparatus and image forming apparatus provided with the same
US11/138,870	2005-07-26	Image forming apparatus and control method
EP05018620A	2005-08-26	Image forming apparatus with a controller for restricting its printing functions
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Legal Events

Date	Code	Title	Description
2006-01-25	A131	Notification of reasons for refusal	Free format text: JAPANESE INTERMEDIATE CODE: A131

Effective date: 20060124

2006-03-25	A521	Written amendment	Free format text: JAPANESE INTERMEDIATE CODE: A523 Effective date: 20060324
2006-04-17	TRDD	Decision of grant or rejection written	
2006-04-26	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01 Effective date: 20060425
2006-05-18	A61	First payment of annual fees (during grant procedure)	Free format text: JAPANESE INTERMEDIATE CODE: A61 Effective date: 20060509
2006-05-19	R150	Certificate of patent or registration of utility model	Free format text: JAPANESE INTERMEDIATE CODE: R150
2009-05-07	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20100519 Year of fee payment: 4
2010-05-11	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20110519 Year of fee payment: 5
2011-04-28	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20110519 Year of fee payment: 5
2011-05-10	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20120519 Year of fee payment: 6
2012-04-26	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20120519 Year of fee payment: 6
2012-05-08	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20130519 Year of fee payment: 7
2013-05-19	LAPS	Cancellation because of no payment of annual fees	

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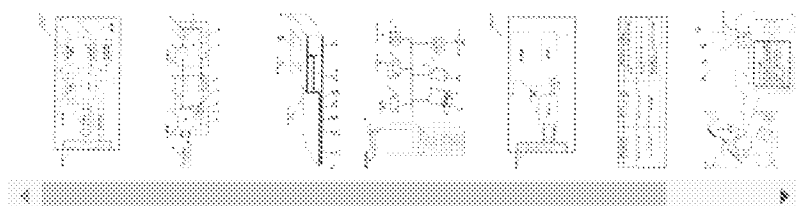


Modem card, modem card utilization system, and terminal

Abstract

<P>PROBLEM TO BE SOLVED: To utilize a public wireless network for another terminal using a modem card with a communication enterpriser according to a telephone subscription right contract using the relevant modem card, and to provide a position information function. <P>SOLUTION: A present modem card 10 comprises an interface unit 12 which inputs/outputs a signal with a terminal to which the relevant modem card 10 is connected; an authentication unit 15 which authenticates the right of usage of a speech or data communication using the modem card; a position information unit 16 which provides position information of the modem card 10; and a communication unit 17 which performs required communication. <P>COPYRIGHT: (C)2008,JPO&INPIT

Images (8)



Classifications

H04B1/3805 Transceivers, i.e. devices in which transmitter and receiver form a structural unit and in which at least one part is used for functions of transmitting and receiving with built-in auxiliary receivers

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Claims (16)

[Hide Dependent ^](#)

1. An interface unit for inputting / outputting standardized signals to / from one or more terminals to which the modem card is connected;
An authentication unit that authenticates the right to use the modem card for calls and data communications;
A location information section for providing location information of the modem card;
A communication unit that performs the required communication;
A modem card characterized by comprising:
 2. The modem card according to claim 1, further comprising a power source for storing information based on a function maintained by the terminal and maintaining the storage state.
 3. The modem card according to claim 2, wherein the information based on the function maintained by the terminal is an incoming state by voice communication
 4. The modem card according to claim 1, further comprising a function of storing an incoming record of voice communication.
 5. 2. The device according to claim 1, further comprising a function of detecting that the terminal has been removed from the terminal without performing a predetermined procedure on the terminal side, and notifying a predetermined organization based on the detection. Modem card.
 6. The modem card according to claim 1, wherein the authentication is performed by a SIM.
 7. The modem card according to claim 1, wherein the position information is obtained by GPS.
 8. The modem card according to claim 1, wherein the modem card is configured by SDIO.
 9. The modem card according to claim 1, further comprising a large-capacity memory for storing data used in the application of the terminal.
 10. The modem card according to claim 9, further comprising a function of downloading data used in an application of the terminal from the Internet using the communication unit.
 11. The data used in the application of the terminal is obtained by transferring data taken from an external recording medium such as a CD-ROM or an arbitrary device from the Internet to the large-capacity memory of the modem card. Item 10. The modem card according to item 9.
 12. 10. The modem card according to claim 9, wherein the data in the large-capacity memory includes any of map information, tourist spot information, transportation operation information, and shopping information
 13. 10. The modem card according to claim 9, further comprising a function of transferring data in the large-capacity memory based on position information provided by the position information unit to the terminal.

JP2008017440A

Japan

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Other languages: Japanese

Inventor: Takashi Kakimoto, 隆司 榎本

Worldwide applications

2007 [JP](#) [WO](#) [GB](#) [US](#)

Application JP2007014781A events ⓘ

2006-06-05 Priority to JP2006156095
2007-01-25 Application filed by Matsushita Electric Ind Co Ltd, 松下電器産業株式会社
2007-01-25 Priority to JP2007014781A
2008-01-24 Publication of JP2008017440A
Status Withdrawn

Info: Patent citations (6), Cited by (12), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Discuss

14. A modem for using the modem card according to any one of claims 1 to 13 as a modem card for public wireless network communication by a one-line contract with a communication carrier, and for using the modem card for public wireless network communication with a plurality of terminals A modem card utilization system that is commonly used as a card.
15. 15. A terminal comprising a card slot that can be used by connecting the modem card according to claim 1 to the modem card utilization system according to claim 14.
16. A means for selecting arbitrary data from data stored in the large-capacity memory of the modem card according to any one of claims 9 to 13 according to a user's instruction and appending to the content in the application of the terminal, The system for using a modem card according to claim 9.

Description

The present invention relates to a modem card that can be attached to a mobile phone terminal or the like (inserted into a card slot), a modem card using system using the same, and a terminal such as a mobile phone terminal or an application device terminal.

In W-CDMA mobile phone systems such as GSM (Global System for Mobile Communication) and FOMA (trademark), a one-chip IC card with a built-in CPU is used as a SIM card for subscriber authentication. In this cellular phone terminal, subscriber-related information is stored in the SIM card. Therefore, even if the model of the cellular phone is changed, the SIM card is replaced to immediately perform communication according to the contract with the communication carrier. You can receive service. That is, in these mobile phone terminals, a terminal function for making a call, data communication, and the like is separated from a use right authentication function given to a user by a communication carrier. When purchasing a mobile phone, a user selects a mobile phone terminal and a communication carrier that provides a SIM card. A communication carrier sells an IC card called a SIM card in which subscription right information (telephone number) is written. The user is provided with a SIM card under a contract with a communication carrier. The user can use the mobile phone terminal by attaching the received SIM card to the purchased mobile phone terminal regardless of the carrier. When using another mobile phone terminal, the other mobile phone terminal can be used with the same telephone number by replacing the SIM card with the other mobile phone terminal.

However, the SIM card can use a plurality of mobile phone terminals with the same telephone number. However, in order to use it for a terminal other than the mobile phone, the SIM card currently required for those terminals, such as a PCMCIA card or a compact flash (It was necessary to purchase a registered trademark card and install a SIM card. For example, in various information terminals and various information devices such as a notebook PC (personal computer) and PDA (personal digital assistant), voice communication and data communication are performed via a public wireless network. In this case, in most cases, a PCMCIA card or a CompactFlash (registered trademark) card cannot be mounted on a mobile phone, and only a SIM card needs to be mounted again, which is very inconvenient for the user. Absent. In order to avoid this inconvenience, it is necessary to conclude a new contract with the telecommunications carrier, which is different from the contract being used, and the telephone number is also different. In this way, mobile phone terminals and other terminals individually contract with a telecommunications carrier, and telephone numbers increase according to the number of contracts, which makes management complicated and costly. It was.

Also, recent mobile phone terminals are provided with a location information function. This location information can include the location of the terminal user or the terminal owner. However, there are few terminals other than the mobile phone terminal equipped with the position information function, and the provision of the position information function causes problems such as high cost and large size of the terminal. In addition, when a plurality of terminals are held at the same time, providing each terminal with a location information function is redundant.

Furthermore, in a system that obtains location information by GPS or base station cooperation, which is installed in a conventional car navigation system or mobile phone, and provides regional information (area map, restaurant, shopping information, etc.) associated with the location information, information is previously taken into an external recording medium such as a DVD or CD or a hard disk in the terminal via the Internet, or information is sequentially read from the external recording medium and used in a terminal application. In order to use the information recorded on the hard disk in the terminal also in other terminals, it is necessary to separately transfer data by wire or wirelessly. In this case, operations such as data transfer cooperation between both terminals are required, and it is necessary to place a terminal that holds data and a transfer destination terminal in the vicinity. I had to take a configuration that would damage it.

In view of the above, the applicant of the present invention can perform voice communication and data communication between a mobile phone terminal and other terminals with a one-line contract with a communication carrier, and is easy and inexpensive to manage. To prevent location information functions from being installed in terminals such as application devices, including mobile phone terminals, to ensure miniaturization of the terminals, and to provide location information functions at low cost when using the terminals. Researched earnestly.

The modem card according to the present invention includes an interface unit for inputting / outputting a standardized signal to / from one or a plurality of terminals to which the modem card is connected, and a right to use a telephone call or data communication by the modem card. An authentication unit that performs the above authentication, a location information unit that provides location information of the modem card, and a communication unit that performs required communication.

The position information is information on a position where the modem card is located.

The authentication unit can be configured by a SIM. The SIM information is information such as communication connection information such as a telephone number, connection information to the GSM network, and a personal identification number as user contract information. This information is authenticated.

In addition to the SIM, a UIM (user identity module) or an IC card may be used. This UIM card is also called a USIM card, and is a third-generation mobile phone card extended based on the SIM card used in the GSM mobile phone, and is sometimes referred to as a SIM card without any particular distinction. Personal information such as a telephone number is written on the UIM card. Used with FOMA FOMA cards and other cards.

Although the terminal is not particularly limited, for example, in addition to the information portable terminal, there are application devices such as a desktop computer, a notebook computer, a mobile phone, an audio device, and a home appliance.

The location information section includes location information that has been devised so far, including three-point positioning systems that use radio waves from mobile phone base stations, hyperbolic navigation systems, systems that use RFID, and those that use WiFi radio waves. Although it will not specifically limit if it can provide, Preferably it can comprise by GPS. GPS is a system that uses satellites to accurately determine where you are on the earth. In addition to GPS, the position information unit can be composed of a satellite-based positioning system (SPS) such as the Russian global navigation satellite system (GLONASS) and the European Galileo system.

The modem card can be configured by SDIO (security digital input / output). The SD (security digital) memory card is a memory card with a copyright protection function suitable for online music distribution. SDIO stores various functions in an SD card, which is a small memory card standard. The SDIO may be either SD or mini-SD, and may be a standard of a semiconductor memory card such as a PC card (PC card) or CF (compact flash) in addition to SDIO.

According to the modem card of the present invention, standardized signals are input / output to / from the terminal in the interface unit, so that the modem card can be used in common by a plurality of terminals and attached to each terminal. In this state, the authentication unit authenticates the user and enables communication such as voice and data. That is, voice, data, etc. can be communicated with a plurality of terminals with a one-line contract with a communication carrier using the modem card. Also, a location information section is built in the modem card, and the location information can be obtained at the terminal by attaching the modem card to the terminal.

The modem card of the present invention may further include a storage unit that stores information based on the function maintained by the terminal and a power supply unit that maintains the storage state of the storage unit.

The information based on the function maintained by the terminal is, for example, an incoming state by voice communication.

By configuring in this way, in addition to the operation of the modem card of the present invention, for example, when the modem card is attached to a terminal that does not support voice communication, the incoming state by voice communication at the modem card. By attaching to a terminal capable of voice communication later, a conversation by voice communication can be performed based on the incoming state by voice communication maintained.

The modem card of the present invention may further include a storage unit for storing incoming records of voice communications.

By configuring in this way, in addition to the operation of the modem card of the present invention described above, even if the voice communication is not supported or the incoming call cannot be answered immediately, the incoming call record is stored, so that the voice communication can be performed later. It is possible to make a return call based on the stored incoming call record after waiting for the terminal to be attached or to be able to respond.

The modem card of the present invention further includes a detection unit that detects that the terminal has been removed without going through a predetermined procedure on the terminal side, and an abnormality notification unit that notifies a predetermined engine based on the abnormality detection. It may be provided.

With this configuration, in addition to the operation of the modem card of the present invention, when the modem card is removed without going through a predetermined procedure on the terminal side, the abnormality is detected and notified to a predetermined engine. Therefore, damage due to theft can be prevented.

In addition, the modem card of the present invention may further include a large-capacity memory that stores data to be used in a terminal-side application.

By configuring in this way, in addition to the operation of the modem card of the present invention, information that can be commonly used by a plurality of terminals is recorded on the modem card, and information can be commonly used by each terminal by replacing the card. This eliminates the need for complicated data transfer between the terminals, and eliminates the need to place the data holding terminal and the transfer destination terminal in the vicinity, thereby improving user convenience.

In the modem card of the present invention, the data used in the terminal application may be downloaded from the Internet via the modem card communication unit.

With this configuration, in addition to the operation of the modem card of the present invention, data used on the terminal side can be obtained by using the communication unit provided in the modem card itself without connecting the modem card to other devices. Can be acquired.

In the modem card of the present invention, the data used in the terminal application is obtained by transferring data taken from an external recording medium such as a CD-ROM or any device from the Internet to the large capacity memory of the modem card. It may be.

By configuring in this way, in addition to the operation of the modem card of the present invention, the modem card is also connected to a CD or the like even when information desired to be used on the terminal side is stored only in an external recording medium such as a CD. Necessary data can be acquired in the modem card via any device (for example, a PC) that can read information from an external medium. Further, by transferring information downloaded from the Internet in advance to the modem card without using the communication function of the modem card, the charge for data communication can be reduced.

In the modem card of the present invention, the data in the large-capacity memory is map information, tourist spot information, transportation operation information, shopping information, and the like.

With such a configuration, the modem card of the present invention can provide useful information to the user at a travel destination or the like.

In the modem card of the present invention, data in a large-capacity memory that relies on the position information provided by the position information unit may be transferred to the terminal side.

With this configuration, the modem card of the present invention can provide information based on the location where the owner of the large-capacity memory modem card exists, so that it is useful at any point according to the movement of the user. Information can be provided. Furthermore, it is also possible to store the above-mentioned arbitrary information in the terminal in combination with the content produced by the user himself such as a photograph in a digital camera.

The modem card utilization system using the modem card according to the present invention selects arbitrary data from the data stored in the large capacity memory of the modem card according to a user instruction, and appends it to the content in the application on the terminal side. May be.

According to the modem card utilization system using the modem card of the present invention, out of the data in the large-capacity memory of the modem card, the user selects any information that the user wants to display on the terminal side and reads it to the terminal side. Arbitrary data read from the modem card can be appended to the contents on the terminal side, such as displaying the character information transferred from the modem card on the image being reproduced on the monitor.

A modem card utilization system using a modem card according to the present invention uses a modem card that communicates with a public wireless network with a one-line contract with a communication carrier, and a modem for communicating the modem card with a plurality of terminals through a public wireless network. Commonly used as a card.

According to the modem card utilization system using the modem card of the present invention, voice, data, etc. can be communicated with a plurality of terminals by a one-line contract with a communication carrier using the modem card, the telephone number of the mobile phone terminal, etc. Can be managed easily by sharing the subscription right information, and the cost can be reduced as compared with a plurality of contracts with a telecommunications carrier. In addition, by mounting a modem card with a built-in position information section, position information can be easily provided at each terminal without causing an increase in cost and an increase in size.

The terminal of the present invention is provided with a card slot that can be used by connecting a modem card.

According to the present invention, it is possible to perform voice communication and data communication between a mobile phone terminal and other terminals with a one-line contract with a communication carrier, facilitating management of subscription right information such as a telephone number, and the like. Only one line contract

with a telecommunications carrier is required and it is inexpensive. In addition, since the location information section is built in the modem card, the location information function can be provided at a low cost while maintaining the miniaturization of the terminal even in terminals other than the mobile phone terminal.

An embodiment of the present invention will be described with reference to FIGS. FIG. 1 is a block diagram of a modem card, FIG. 2 is a partial detail view of the modem card, FIG. 3 is a cutaway perspective view of the modem card, and FIG. 4 is an explanatory diagram of a modem card utilization system using the modem card.

Referring to FIG. 1, a modem card 10 according to the embodiment has a rectangular shape in a plan view that can be inserted into a memory card slot of an application device (terminal), and is a longitudinal side that is the side inserted into the memory card slot. The connection terminal portion 11 is provided on the direction insertion end side.

The application device provided with the memory card slot is not particularly limited, and examples thereof include a portable information terminal, a desktop computer, a notebook computer, a mobile phone, an audio device, and a home appliance.

The modem card 10 has contacts arranged in a plurality of staggered two rows connected to a large number of contacts inside the card slot of the application device at the connection terminal portion 11 thereof.

The modem card 10 is mainly composed of a one-chip microcomputer. In FIG. 1, the modem card 10 includes a one-chip microcomputer as a modem card 10 and its functions are expressed in blocks for understanding.

The modem card 10 includes a digital signal interface unit 12, a power supply control unit 13, a control unit 14, a user / device authentication function unit 15, a position information unit 16, and a communication unit 17.

The digital signal interface unit 12 is an interface for standardizing the signal in the modem card and inputting / outputting signals such as packet data and audio data to / from the application device side.

The power supply control unit 13 includes a charger (not shown), preferably a high-capacity charger (Power Cap) such as an electric double layer capacitor, and stably supplies power to all functional blocks in the modem card 10. I do.

The control unit 14 controls the internal block.

The user / device authentication function unit 15 is an authentication unit that performs processing for user authentication and device authentication of a SIM / UIM / IC card or the like.

By this user / device authentication function unit 15, the modem card 10 has a SIM function.

The position information unit 16 includes a positioning satellite signal receiving antenna unit 16a, a positioning satellite signal receiving unit 16b, and a positioning algorithm processing unit 16c. The positioning satellite signal receiving antenna unit 16a is a small antenna that receives an RF carrier wave of a positioning signal such as a GPS satellite. The positioning satellite signal receiving unit 16b performs a reception process on an RF carrier wave of a satellite signal such as a GPS satellite. The positioning algorithm processing unit 16c processes the satellite signal transmitted from the GPS satellite, and determines the position information of the application device in which the modem card 10 is inserted.

The location information unit 16 has a GPS function due to the above configuration.

The communication unit 17 includes a public radio signal transmission / reception antenna unit 17a and a public radio signal RF transceiver unit 17b. The public radio signal transmitting / receiving antenna unit 17a is a small antenna that transmits and receives an RF carrier wave of a public radio signal. The public radio signal RF transceiver unit 17b performs transmission / reception processing on the RF carrier wave of the public radio signal.

In addition, the arrow of the connection line shown with the continuous line between each block shows the flow of various signals, and the arrow of the connection line shown with a broken line shows power supply control.

By inserting the modem card 10 having the above configuration into the memory card slot of the application device, the application device in which the modem card 10 is inserted can directly access the public wireless network, and the modem Using the card 10, public wireless network communication by a plurality of application devices is possible while having one contract with a communication carrier.

In addition, the modem card 10 can be used in common with a mobile phone terminal having a public wireless network function by inserting and connecting to a memory card slot of an application device that requires a public wireless network communication function. Become.

Also, the modem card 10 acquires packet communication, voice communication, system power supply stability, an interface for the communication, a SIM including a subscriber authentication function of the mobile phone system, and location information of the mobile phone itself from the satellite. A function such as GPS is provided, and wireless connection to the application device is possible.

In the system using the modem card 10, when the modem card 10 is taken out from the memory card slot of the application device, the control unit 14 includes the power control unit 13, the position information unit 16, the communication unit 17, and the user / The device authentication function unit 15 is controlled to maintain a function desired by the user such as an incoming call within a certain period of time with the charging power in the modem card 10, and the memory card slot without a recognition procedure in advance. Function that can be notified to a third party by charging power inside the modem card 10, recording the incoming call record in the modem card 10, and attaching the modem card 10 to another application device Even in such a case, the function that can be transmitted to the called party is controlled based on the record.

In addition, with reference to FIG. 2, the outline of a structure of the control part 14 and the communication part 17 is shown. The control unit 14 includes, for example, a DSP (digital signal processor) 31, a CPU 32, an SRAM (static random access memory) 33, a flash memory 34, an A / D converter 35, and a prefilter (pre-filter). Filter) 36, a D / A converter 37, and a PostFilter (post filter) 38.

The communication unit 17 includes a public radio signal transmitting / receiving antenna unit 17a and a public radio signal RF transceiver unit 17b. The public radio signal RF transceiver unit 17b includes an Rx (receiver) 41, an LNA (low noise amplifier) 42, a Tx (transmitter) 43, a PA (power amplifier) 44, and a public radio signal transmission / reception unit. It is comprised by SW (switch) 45 which switches transmission / reception by the antenna part 17a.

In the communication unit 17, when the switching SW 45 switches to the receiving side (Rx), the signal received by the public radio signal transmitting / receiving antenna unit 17a is input into the public radio signal RF transceiver unit 17b. In the public radio signal RF transceiver unit 17b, the received signal is amplified by an LNA (low noise amplifier) 42, received by an Rx (receiver) 41, and then given to the control unit 14. In the control unit 14, the received signal is filtered by the pre-filter 36, AD-converted by the AD converter 35, and input to the DSP 31. The DSP 31 performs DSP processing on the received signal and outputs it to the digital signal interface unit 12. Further, in the control unit 14, when the DSP 31 receives the digital signal from the digital signal interface unit 12, the DSP 31 performs a necessary DSP process,

performs DA conversion by the DA converter 37, filters by the post filter 38, and performs communication processing. 17 to output. In the communication unit 17, the switching SW 45 switches to the transmission side (Tx), and the Tx (transmitter) 43, the PA (power amplifier) 44 of the public radio signal RF transceiver unit 17b, and the public radio signal transmission / reception antenna unit 17a are connected. Send through.

In the above configuration, the control unit 14 is configured to be able to execute the above functions by the CPU 32, SRAM 33, and flash memory 34.

The description of the control unit 14 and the communication unit 17 is not described in detail above, but the incoming call state and the incoming call history are stored in the SRAM 33 and the flash memory 34 in the control unit 14.

The hardware of the modem card 10 will be described with reference to FIG. FIG. 3 is a perspective view in which the side surface of the modem card 10 is broken. The connection terminal portion 11 is not shown. The modem card 10 in this embodiment is an SDIO modem card that is used by being inserted into a memory card slot having the same shape as the SD memory card of various application devices.

Reference numeral 51 denotes an SDIO LSI corresponding to the digital signal interface unit 12.

Reference numeral 52 denotes a BB (baseband) LSI corresponding to the control unit 14.

Reference numeral 53 denotes a PM (power management) IC corresponding to the power supply control unit 13 for regulating the power supply.

Reference numeral 54 denotes an RF module corresponding to the communication unit 17.

Reference numeral 55 denotes a GPS receiver corresponding to the position information unit 16.

Reference numeral 56 denotes a SIM corresponding to the user / device authentication function unit 18. In the SIM 56, subscription right information (telephone number) is written, and is attachable / detachable so that the manufacturer can write it.

Reference numeral 57 denotes a PowerCap (electric double layer capacitor).

Reference numeral 58 denotes an ANT (antenna). The antenna 58 corresponds to the antennas 16a and 17a of the position information unit 16 and the communication unit 17, respectively.

FIG. 4 shows a digital home appliance ubiquitous network modem card utilization system as an example of a modem card utilization system using the modem card 10 of the embodiment. The modem card 10 is removed from the memory card slot of the mobile phone 61 and is inserted into a card slot (for example, SD memory card slot) of an application device such as the PC 62, PDA 63, car navigation device 64, game machine 65, video camera 66, digital camera 67, etc. Installing.

That is, each application device 61-67 has a card slot having a common structure for mounting the modem card 10, and by mounting the modem card 10, the application devices 61-67 are directly connected to the public wireless network. It becomes possible to connect to a network, and voice communication and data communication can be performed.

When the modem card 10 according to the embodiment is used, the modem function provided in the modem card 10 is not limited to the cellular phone 61 after the single contract with the communication carrier for use of the cellular phone 61 by the SIM function. By simply inserting the card into the card slot of each of the plurality of other application devices 62-67, each application device 62-67 can perform public wireless network communication.

In this way, by connecting the modem card 10 having the public wireless network communication function contracted with the communication carrier to the application devices 62-67 that require the public wireless network communication function, the public wireless network communication function is provided to the mobile phone. 61 can be used in common. Therefore, each application device 61-67 can perform voice communication and data communication with only a one-line contract with a communication carrier, management of subscription right information such as a telephone number is easy, and only a contract with a communication carrier. It is inexpensive because it only takes

Further, by attaching the modem card 10 having the GPS function to the mobile phone 61 and the application devices 62-67, information on the current position provided in the mobile phone 61 is also provided free of charge in each application device 62-67, be able to. In addition, since the position information unit 16 is built in the modem card 10, the application devices 62-67 are not increased in size.

Further, since the modem card 10 handles digital information, data input / output to / from the application devices 62-67 including the mobile phone 61 via the digital signal interface unit 12 is clear. Furthermore, since it is an SDIO modem card, the modem card 10 can be miniaturized, and as a result, the application devices 62-67 including the cellular phone 61 can be miniaturized.

In addition to the basic configuration described above, the following functions can be added as needed: function maintenance, incoming call history maintenance, function stop / notification in case of abnormality, and large-capacity memory.

First, functional maintenance will be described.

When the modem card 10 is attached to an application device (mobile digital home appliance) 62-67 other than the mobile phone 61, the application device 62-67 basically supports packet data communication but supports voice communication. A case that cannot be fully conceived can be assumed. In such a case, the incoming call state is maintained for a while until the modem card 10 is replaced with an application device capable of voice communication (for example, the mobile phone 61), and the telephone can be immediately called after the replacement. It is assumed that a certain charge is charged in the PowerCap 57 in the system. Specifically, an incoming voice communication may be received when the modem card 10 is inserted into the application device 62-67 that does not support voice communication. The modem card 10 detects an incoming call by the public radio signal transmission / reception antenna unit 17a, notifies the control unit 14 of the incoming call from the public radio signal RF transceiver unit 17b, and receives an incoming call state in a register in the SRAM 33 serving as a storage unit. is set. While the public radio signal RF transceiver unit 17b detects an incoming call, the incoming state of the register remains set, and the setting is canceled when the incoming call is cut off.

The purpose of PowerCap 57 is to stably supply power to the modem card 10. Specifically, the instantaneous power at the time of transmission often exceeds the maximum rating of the power supplied in the modem card 10. When non-transmission, power is constantly stored in the PowerCap 57, and when the maximum transmission power exceeds the average power supplied in the card, the power stored in the PowerCap 57 is used, so that the average allowable power supplied from outside the card is exceeded. It is deployed for the purpose of designing so that there is no.

When the modem card 10 is removed from the application device 62-67, the modem card 10 detects this and supplies power to the PMIC 53 from the PowerCap 57 serving as a power supply unit according to a command from the CPU 32. The PMIC 53 supplies power to the SRAM 33 and the public radio signal RF transceiver unit 17b, and maintains the incoming state of the modem card 10.

Thereafter, when the modem card 10 is connected to a voice communication-compatible device (for example, the mobile phone 61), the modem card 10 detects it and the CPU 32 checks the incoming state setting register in the SRAM 33. When the incoming state is detected, the incoming state is notified from the modem card 10 to the application device 61 by the instruction of the CPU 32, and the user can immediately start a conversation.

In the above example, the function for maintaining the application device is an incoming state by voice communication. However, the present invention is not limited to this. For example, the incoming of the packet data communication in an application device that does not support packet data communication. You may hold / maintain a state. Specifically, when new music information and new information from a music or video download site are received and it is free trial content, there is a case where it is desired to immediately start downloading. In that case, if the application device with the modem card attached is not suitable for playing the content after downloading, change the attachment destination to an application device suitable for playback while maintaining the incoming state. The content can be reproduced.

Next, the reception history holding will be described.

It can be assumed that there is an incoming voice communication while using an application device that does not support voice communication, or that an incoming call response cannot be made immediately even when an application device that supports voice communication is used. In such a case, the incoming call record is stored in the modem card 10 and connected to a device capable of voice communication later so that a return call can be made.

Specifically, when the modem card 10 is inserted into the application device 62-67 that does not support voice communication, there is a case where an incoming voice communication is received and a response cannot be made immediately. The modem card 10 detects an incoming call by the public radio signal transmission / reception antenna unit 17a, notifies the control unit 14 of the incoming call from the public radio signal RF transceiver unit 17b, and receives the incoming call number in the flash memory 34 serving as a storage unit. The date and time are recorded, and the incoming call history is maintained.

Thereafter, when the modem card 10 is connected to a voice communication-compatible device (for example, the mobile phone 61), the modem card 10 detects this and confirms the presence or absence of incoming history data in the flash memory 34. When the incoming call history is detected, the incoming call history information is notified from the modem card 10 to the application device 61 by the instruction of the CPU 32, and the user can make a return call.

Next, the function stop / notification at the time of abnormality will be described.

When the modem card 10 is removed without following the predetermined procedure on the application device side, the predetermined institution is notified that the abnormal withdrawal has been detected, and the function of the modem card 10 is stopped (theft) Prevention function).

For example, since the modem card 10 can hold the IC card function in the SIM chip in the SIM function unit, the fact is detected when the modem card 10 is removed without following the predetermined procedure on the application device side. The control unit 14 determines the charge of a card company or the like that provides an IC card function via the public radio signal RF transceiver unit 17b and the public radio signal transmission / reception antenna unit 17a serving as a notification unit. Notification is given to the company (predetermined organization). In this case, the IC card function and the SIM function are stopped if there is no report such as "not theft" within a predetermined time. Specifically, the card company receives anomaly information transmitted from the modem card 10 and automatically detects user information and anomaly information. Thereafter, the card company prepares to stop the IC card function / SIM function in the modem card and notifies the user by some preset means. If there is no report such as "not abnormal" from the user within a certain period of time, complete function stop will be implemented. In addition, when the IC card function or SIM function is executed by the user at the stage of function stop preparation, the card company can also notify "abnormality detection". At that time, after some identity authentication, "not abnormal" You can also file a declaration.

In addition, when the modem card 10 held by an employee handling confidential information at a corporate corporation or the like is stolen, the fact that the modem card 10 is removed without going through the predetermined procedure on the application device side is the fact. The control unit 14 is input to the control unit 14 serving as the detection unit, and the control unit 14 receives the invalidation application for the modem card 10 through the public radio signal RF transceiver unit 17b and the public radio signal transmission / reception antenna unit 17a serving as the notification unit. This is notified to the corporation (predetermined institution), and the modem card 10 is invalidated within a predetermined time. Specifically, although depending on the security level of the application device to which the modem card 10 is attached, if high security is required, the invalidation process is performed in cooperation with the IC card company immediately after removal. Also, in some cases, an invalidation application is sent out without permission, and if there is no declaration through identity verification to the company corporation (predetermined institution) or card company within a certain period of time, the invalidation process is automatically performed. Apply.

In the above example of function maintenance and incoming call history retention, the incoming call state and incoming call history are stored in the SRAM 33 and flash memory 34 in the control unit 14, but in the SRAM and flash memory outside the control unit 14. You may make it memorize / store

Next, mounting of a large capacity memory will be described.

When common data can be used in multiple terminals connected to the modem card, a large capacity memory is provided in the modem card, data acquired from the Internet via the communication unit is stored in the large capacity memory, and the modem card is By transferring data to each connected terminal, it is possible to use common data among a plurality of arbitrary devices only by replacing the card. At this time, the current position information of the owner of the modem card is acquired via the position information section, and the data based on the current position information is selected from the data stored in the large-capacity memory and transferred to the terminal side. .

Specifically, the memory card 10 inserted in the digital camera 67 as shown in FIGS. 4 and 5 acquires data from the Internet via the communication unit 17 and stores the acquired data in the large-capacity memory 18. The data acquired at this time is, for example, a database in which tourist spot information as shown in FIG. 6 is associated with information on a geographical position (latitude / longitude) where the tourist spot exists. When the user performs a predetermined operation on an application installed in the digital camera 67, the digital camera 67 requests the modem card 10 to provide information depending on the current position. In response to this request, the modem card 10 transfers information on the tourist spot based on the position information obtained via the position information unit 16 from the large-capacity memory 18 to the application of the digital camera 67. For example, when the latitude / longitude information "48.85 / 2.35" of the current position is acquired via the position information unit 16, "Notre Dame" is the closest tourist spot to the position information obtained in the database in the large-capacity memory 18. "Temple" is selected, and the tourist spot name and additional information are transferred to the digital camera 67. A monitor based on the information transferred from the large-capacity memory 18 is displayed on the monitor of the digital camera 67 as shown in FIG.

In the example shown in FIG. 7, only the character information acquired from the large-capacity memory 18 is displayed on the monitor, but the content stored on the terminal side can be displayed by the user among the information stored in the large-capacity memory 18. You may display in the form which adds the designated arbitrary information. For example, during moving image shooting with the digital video camera 66, information depending on the shooting point can be transferred from the modem card 10 to the camera 66 side and displayed by superimposing the information on the image being shot. In the digital video camera 66 of FIG. 8, the explanatory text related to the shooting point is displayed on the monitor as a telop together with the moving image being shot.

In the above example, data is taken into the large-capacity memory 18 via the communication unit 17 of the modem card 10. However, the modem card 10 is taken into the large-capacity memory 18 in advance via an arbitrary device such as a PC. May be.

In addition, depending on the capacity of the large-capacity memory 18, the type of information to be stored and the amount of information can be increased or decreased.

FIG. 5 shows only the minimum necessary blocks for explaining the embodiment peculiar when the large-capacity memory 18 is mounted. The basic configuration and operation of the modem card 10 are shown in FIG. 1. It is the same as that.

As in the examples of the digital camera 67 and the digital video camera 66 described above, in the system using the modem card 10 of the present invention, a plurality of terminals have specifications such as hardware and software corresponding to the modem card 10. In this case, the information recorded in the large-capacity memory 18 can be shared by simply replacing the modem card 10 from the digital camera 67 to the digital video camera 66. The same applies to other terminals such as the mobile phone 61 shown in FIG. In addition, information (not only latitude / longitude data but also neighboring famous land information) transferred from the modem card 10 is combined and stored in the terminal with respect to contents produced by the user himself / herself on the terminal owned by the user such as the digital video camera 66. It is also possible to make it. As a result, users can obtain much higher value information compared to simple content created by the users, and by providing such information to content providers, the value of the content on the provider side is also expected to increase. It can.

The modem card and the modem card utilization system using the same according to the present invention can be applied to various VoIP terminals such as a cellular phone, a PC, a PDA, a digital camera, and a game machine.

It is a block diagram of a modem card in an embodiment of the present invention. It is a block diagram of the control part and communication part of FIG. FIG. 2 is a cutaway perspective view of a hardware configuration of the modem card in FIG. 1. It is explanatory drawing of the system using the modem card of FIG. FIG. 2 is a diagram in which a large-capacity memory is mounted on the modem card of FIG. 1. It is a figure which shows the example of the data stored in a mass memory. It is explanatory drawing of the system using the modem card of FIG. It is explanatory drawing of the system using the modem card of FIG.

Explanation of symbols

DESCRIPTION OF SYMBOLS 10 Modem card 11 Connection terminal part 12 Digital signal interface part 13 Power supply control part 14 Control part 15 User / apparatus authentication function part (authentication part)

16 Position information section 16a Positioning satellite signal receiving antenna section 16b Positioning satellite signal receiving section 16c Positioning algorithm processing section 17 Communication section 17a Public radio signal transmitting / receiving antenna section 17b Public radio signal RF transceiver section 18 Large capacity memory

Patent Citations (6)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
WO2000059243A1 *	1999-03-26	2000-10-05	Swisscom Mobile Ag	Chip card with integrated time determination system
JP2000292522A *	1999-04-12	2000-10-20	Japan Radio Co Ltd	Positioning card
JP383508582 *	1999-11-15	2006-10-18	ソニー株式会社	Semiconductor memory device and electronic device
JP392105782 *	2001-05-11	2007-05-30	株式会社エス・ティ・ティ・ドコモ	Access method and communication terminal
FR2846464B1 *	2003-12-31	2006-02-24	Radiotelephone Sfr	METHOD OF ALARMING AN AUTONOMOUS COMPUTER
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* Cited by examiner, † Cited by third party, ‡ Family to family citation

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Publication	Publication Date	Title
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US9161205B1	2015-10-13	Secure global mobile device and home base station
KR100614744B1	2006-03-21	Method for using smart card and mobile phone implementing the same
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Priority And Related Applications

Priority Applications (2)

Application	Priority date	Filing date	Title
JP2006156095		2006-06-05	
JP2007014781A	2006-06-05	2007-01-25	Modem card, modem card utilization system, and terminal

Applications Claiming Priority (4)

Application	Filing date	Title
JP2007014781A	2007-01-25	Modem card, modem card utilization system, and terminal
PCT/JP2007/060966	2007-05-30	Modem card
US12/503,515	2007-05-30	Modem card
GB0321992A	2007-05-30	Modem card

Legal Events

Date	Code	Title	Description
2010-01-20	A621	Written request for application examination	Free format text: JAPANESE INTERMEDIATE CODE: A621 Effective date: 20100119
2011-01-07	A761	Written withdrawal of application	Free format text: JAPANESE INTERMEDIATE CODE: A761 Effective date: 20110106

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Patents

I433560



Power negotiation for small rfid card

Classifications

G06K19/07 Record carriers with conductive marks, printed circuits or semiconductor circuit elements, e.g. credit or identity cards also with resonating or responding marks without active components with integrated circuit chips

[View 2 more classifications](#)

TWI433560B

Taiwan

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[View Prior Art](#)
[Similar](#)
Other languages: Chinese

Inventor: Siva G Narendra, Prabhakar Tadepalli, Saurav Chakraborty

Worldwide applications

 2009 [TW 091](#)

Application TW98126588A events

2008-08-08 Priority to US18838208P

2009-08-06 Application filed by Tyfone Inc

2010-06-16 Publication of TW201023662A

2014-04-01 Application granted

2014-04-01 Publication of TWI433560B

Info: Patent citations (1), Cited by (7), Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Discuss

Claims (13)

[Hide Dependent](#)

1. A method performed by a device having an additional slot compatible with a memory card, the additional slot compatible with the memory card is powered off after an inactivity cycle to save power, the method comprising: Optionally transmitting a memory card write command to the additional slot compatible with the memory card for maintaining undisturbed power to the additional slot compatible with the memory card, wherein the memory card write command includes a data A hidden command within the column causes the hidden command to be periodically sent to a radio frequency identification (RFID) card coupled to the additional slot compatible with the memory card to maintain power to provide RFID functionality.
2. The method of claim 1, wherein the memory card write command includes a unique data string to identify the memory card write command as having the hidden command.
3. The method of claim 1, wherein the step of periodically transmitting the memory card write command comprises: setting the hidden command ignored by the RFID card in an additional slot compatible with the memory card Form the memory card write command.
4. The method of claim 1, wherein the step of periodically transmitting the memory card write command to the additional slot compatible with the memory card including, sending the memory card write command to one of the following: an SD slot, a mini SD slot, or a micro SD slot.
5. A method of modifying power transfer to a dual interface smart card controller, the dual interface smart card controller being located on a memory card compatible radio frequency identification (RFID) card, the method comprising a device having a memory card slot Executing, the method includes the steps of: embedding a hidden command into a memory card write command, the hidden command being to the dual interface smart card controller on the memory card compatible radio frequency identification (RFID) card Determining a modification of the power transfer; and transmitting the memory card write command to the memory card compatible RFID card, the memory card write command including the hidden command such that when the hidden command is determined not to transition to the double The interface smart card controller performs power transfer modification on the dual interface smart card controller; wherein the step of embedding a hidden command into a memory card write command includes including a data string to the memory card Writing a command in one of the data fields to identify the memory card write command as having the hidden command, and including a command index in the data column of the memory card write command To identify the type of the hidden command.
6. The method of claim 5, wherein the step of transmitting the memory card write command to the memory card compatible RFID card comprises transmitting the memory card command to the memory card slot.
7. The method of claim 6, wherein the step of transmitting the memory card write command to the memory card slot comprises: transmitting the memory card write command to one of: an SD slot, a mini SD slot, or a micro SD slot.
8. A method of modifying power transfer to a dual interface smart card controller, the dual interface smart card controller being located on a memory card compatible radio frequency identification (RFID) card, the method being inserted into a memory card slot of a device The memory card is implemented by a compatible RFID card, the method comprising the steps of: receiving, at a memory card controller, a memory card write command from the memory card slot of the device, the memory card write command comprising a data string is written in one of the memory card write commands to identify the memory card write command to include a hidden command,

wherein the memory card write command includes a command index to the memory card write command in the data column, to identify the type of the hidden command; and when the hidden command is determined not to switch to the dual interface smart card controller, modify the power transfer to the dual interface smart card controller, the dual interface The smart card controller is placed on the memory card compatible RFID card together with the memory card controller.

9. The method of claim 8, wherein the step of modifying the power transfer to the dual interface smart card controller comprises removing power from the dual interface smart card controller.
10. The method of claim 8, wherein the step of modifying the power transfer to the dual interface smart card controller comprises applying power to the dual interface smart card controller.
11. The method of claim 8, further comprising receiving a second memory card write command at the memory card controller, wherein the second memory card write command includes a hidden command having an instruction to Reset the dual interface smart card controller.
12. A computer readable medium encoded with instructions that, when accessed by a memory card controller located on a memory card compatible radio frequency identification (RFID) card, causes the execution to be patented The steps described in item 8 of the scope.
13. The computer readable medium of claim 12, wherein the step of modifying power transfer to the dual interface smart card controller comprises cycling power to the dual interface smart card controller.

Description

Power negotiation for small RFID cards

The present invention is generally directed to contactless communication devices and, more particularly, to small radio frequency identification (RFID) cards.

RFID "tags" can be divided into two broad categories: active tags and passive tags. Active tags are characterized by a source of electrical power, such as a battery. Active tags typically transmit information by broadcasting over the selection of RF carrier frequencies, where the RF carrier frequency is selected using an RF carrier generated by a region. Active tags are typically used for long distance transmissions and are often referred to as "far field communications" (FFC). Antennas that use active RFID tags have a greater tendency to do so to allow communication over long distances.

Passive tags are not powered. The passive tag can obtain the energy required to supply the tag from an interrogating RF field, and use the energy source to transmit the response code by modulating the impedance (which is the impedance that the antenna presents to the challenge field). Thereby the reflection is modulated back to the signal reading the antenna. Passive tags are typically used for transmission over short distances and are often referred to as "near field communications" (NFC). For example, passive tags operating at 13.56 MHz are typically designed to communicate with RFID readers at distances of a few centimeters.

Passive tags are typically connected to "loop antennas". An example of a loop antenna is shown in U.S. Patent No. 6,568,600 to Carpiar and others, issued May 27, 2003. The device described in U.S. Patent No. 6,568,600 can be considered a "credit card size" passive RFID card (more specifically, a card that meets ISO 7816 size requirements). The loop antenna is necessarily large because the passive tag is powered by the energy received by the antenna from the signal transmitted by the RFID reader.

Figure 12 shows the power supply voltage developed over time by rectifying the voltage induced in the loop antenna by the presence of an interrogating RF field. Once the power supply voltage reaches a threshold, the tag is activated and operational. As the antenna size decreases and the power supply voltage takes a long time to reach the threshold, the labeling operation may not meet the specifications of the response time. Below this antenna size, the power supply voltage will never reach this threshold and the tag will never start.

The antenna design for RFID applications is described in the application note published by Dr. Youbok Lee of Microchip Technology, Inc. in 2003 (not documented in the month) under the heading "Antenna Circuit Design for RFID Applications". Dr. Lee's application note details how to determine the size requirements for a passive RFID tag antenna operating at 13.56 MHz. On page 5 of this application note, Dr. Lee showed that the optimal radius of the loop antenna coil is 1.414 times the required read distance. This analysis confirms that a credit card sized loop antenna can be nearly optimized for a reading distance of approximately several centimeters.

In many applications, it can be seen that passive tags are being widely used. For example, mobile device manufacturers embed passive RFID tags into actions for NFC applications in the device. Exemplary mobile applications include, but are not limited to, ticket sales and mobile payments. U.S. Patent No. 7,333,062 issued to Leizerovich et al. on February 19, 2008, shows a mobile telephone with an integrated loop antenna for an NFC device. As shown in U.S. Patent No. 7,333,062, the mobile phone provides the real estate necessary to implement a 13.56 MHz loop antenna.

The way to implement passive tags in smaller mobile devices has been tried many times. These attempts failed to achieve limited success, in part due to the size of the loop antenna. For example, Figure 13 shows the implementation of an RFID tag in a secure digital (SD) memory card manufactured by Wireless Dynamics, Inc. of Calgary, Alberta Canada. Card 1300 includes an antenna, but the SD card is therefore significantly too large. Also by way of example, U.S. Publication No. 2006/0124755 A1 shows a memory card with a passive tag, but the card must be inserted into a slot to access loop antennas on different devices. According to this implementation, the actual condition of the mobile device is still dependent on the implementation of the loop antenna. Therefore, it is foreseeable that the size of the antenna will be taken as an obstacle to further miniaturize the passive RFID tag.

There is a need for a small footprint RFID tag that can accommodate an antenna without relying on external devices. There is also a need for a memory card compatible RFID tag that is compatible with a standard memory card slot on a mobile device.

One aspect of the present invention discloses a method of maintaining undisturbed power for an additional slot compatible with a memory card, the method comprising periodically The memory card is compatible with the additional slot to send a memory card write command.

Another aspect of the present invention discloses a method of modifying power transfer to a dual interface smart card controller, the method comprising the steps of: embedding a hidden command into a memory card write command, the hidden command pair A dual interface smart card controller on a memory card compatible radio frequency identification (RFID) card that specifies modification of power transfer; and transmits the memory card write command to the memory card compatible RFID card.

Yet another aspect of the present invention discloses a method of modifying power transfer to a dual interface smart card controller, the method comprising the steps of: receiving a command at a memory card controller, wherein the command includes an instruction to For modifying power transmission to a dual interface smart card controller; the dual interface smart card controller is co-located on the memory card with the memory card controller; and modifying the power transmission of the dual interface smart card controller.

Yet another aspect of the present invention is directed to a computer readable medium encoded with instructions that, when accessed by a memory card controller, cause the memory card controller to perform the following actions: Receiving a command at the memory card controller, wherein the command includes an instruction to modify power transfer to a dual interface smart card controller, the dual interface smart card controller being co-located with the memory card controller on a memory card; and modifying the power transfer to the dual interface smart card controller.

In the following detailed description, reference may be made to the accompanying drawings, which are only specific embodiments of the invention are shown for purposes of illustration. The specific embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. It will be appreciated that the various embodiments of the invention are different, but are not mutually exclusive. For example, the specific features, structures, or characteristics of a particular embodiment can be implemented in other specific embodiments without departing from the spirit and scope of the invention. In addition, it should be understood that the location or configuration of the various elements in the disclosed embodiments may be modified without departing from the spirit and scope of the invention. Therefore, the following detailed description is not to be considered as limiting, and the scope of the invention is defined by the scope of the appended claims. In the drawings, like reference numerals will be used throughout the

Figure 1 shows a mobile computing device and a small RFID card compatible with the memory card slot. The mobile computing device 110 is shown in FIG. 1 as a mobile phone, but this is not a limitation of the invention. For example, the mobile computing device 110 can be a personal digital assistant (PDA), a smart phone, a mobile phone, a handheld computer, a desktop computer, or any other device capable of functioning as described herein.

The mobile computing device 110 includes a memory card slot 112. The memory card slot 112 is a slot that can accept the RFID card 120. For example, the memory card slot 112 can have a physical dimension that is compatible with the RFID card 120 and can have a communication interface that operates using a protocol that is compatible with the RFID card 120. As used herein, the term "memory card slot" can be any add-on slot that accepts a card with memory and can be like a Accessed by the mobile computing device shown in Figure 1. For example, a memory card slot can be compatible with an industry standard communication protocol, or can be compatible with widely accepted communication protocols, and this communication protocol does not have to be officially incorporated into an industry standard. Examples include slots that are compatible with the Multimedia Memory Card (MMC) protocol, the Memory Stick DUO protocol slot, the Secure Digital (SD) protocol slot, and the Smart Media protocol. The slot. The above list is for illustrative purposes only and is not intended to be exhaustive. In addition to the protocols explicitly set forth above, the memory card slot 112 can be compatible with many memory card slot agreements without departing from the scope of the present invention.

The RFID card 120 includes an electrical contact 122 that is part of a host interface that can communicate with the memory card slot 112. For example, electronic contacts 122 may provide connectivity for communication protocols for memory cards. The RFID card 120 includes RFID functionality and may also include memory that is accessible by the mobile computing device 110. For example, in some embodiments, the RFID card 120 includes a smart card controller and an inductive component that can interact with an NFC reader (eg, an ISO 14443 suitable interface). In other embodiments, the RFID card 120 does not include memory accessed by the mobile computing device 110. The RFID card 120 can include functions other than memory and RFID.

In various embodiments of the invention, the RFID functionality in the RFID card is accessed by the mobile computing device 110 using a memory card access command that has been defined for memory card insertion. Slot 112. Accordingly, embodiments of the present invention enable the RFID function to perform functions other than memory access without defining new commands. In some embodiments, new commands for RFID are embedded within the data bits, and the new commands are followed by a memory card read/write command. The RFID card 120 then determines whether the newly entered data bit is for a regular read/write memory card function or for an RFID function. In other words, functions other than the standard memory card function can be accessed through a "hidden" command in the data stream, which can be exchanged using existing memory card access commands and functions. In accordance with various embodiments of the present invention, both existing memory card functions and RFID functions can be implemented without requiring changes to the manner in which the host-side agreement is established.

The combination of mobile computing device 110 and RFID card 120 can be used for any purpose. For example, in some embodiments, the RFID card 120 can interact with a point-for-sale payment device to achieve the effect of a mobile payment. Also by way of example, in some embodiments, the RFID card 120 can be used in a wave-pay manner ticket sales in a mass transit environment, such as MIFARE.

Figure 2 shows a block diagram of a mobile computing device. The mobile computing device 110 includes an antenna 240, a radio frequency circuit 230, a processor 210, a memory 220, and a memory card slot 112. In some embodiments, the mobile computing device 110 is a mobile phone or includes a mobile phone function. For example, antenna 240 and RF circuitry 230 can be used to communicate with a cellular telephone network. Moreover, in some embodiments, the mobile computing device 110 is a wireless local area network (WLAN) or a wireless wide area network (WWAN) device. For example, antenna 240 and RF circuitry 230 can be utilized to communicate with a wireless access point. In some embodiments, the antenna 240 and the wireless circuit 230 is ignored, and the mobile computing device 110 is unable to utilize the wireless connection.

Processor 210 represents a processor that is capable of communicating with other blocks shown in mobile computing device 110. For example, processor 210 can be a microprocessor, a digital signal processor (DSP), a microcontroller, or the like. Further, processor 210 can be constructed in accordance with a state machine or other sequence logic. In operation, processor 210 can read instructions from memory 220 and perform actions in response to the instructions. For example, processor 210 can execute program instructions that can affect communication between mobile computing device 110 and devices coupled to memory card slot 112.

The memory card slot 112 is referenced in conjunction with Figure 1 and described above. Memory card slot 112 includes circuitry that is compatible with RFID card 120. The mobile computing device 110 can communicate with the RFID card 120 by using a standard set of memory card access commands. For example, the processor 210 can use a memory card write command to write to the memory within the RFID card 120 and can use the memory card read command to read data from the memory within the RFID card 120.

The mobile computing device 110 can access the RFID functionality within the RFID card 120 using a "hidden" command embedded within the memory card access command. For example, a memory card write command can include a unique data string to identify the memory card write command as a command that is transferred to a purpose other than memory write. In addition, the sector address supplied to the memory card write command can be set to a specific address value to further identify the memory card write command as a converted command. In addition to the specified address / data value can be recorded The memory card access command is recognized as a command that is converted for purposes other than memory access, and the memory access command can include a data bit to further specify the type and function of the hidden command. The sample format of the hidden command is further described below. In some embodiments, a read command is issued immediately after a write command to initiate a flow of data from a non-memory card function to a host side, wherein the data of the write command has a hidden command. The combination of the memory card write command and the memory card read command can be used in this manner to form a hidden read command.

In some embodiments, the memory card slot 112 is powered down after a period of inactivity to conserve power. For example, power may be activated to the memory card slot 112 when the processor 210 issues a memory card write or read command, but may be powered off later to conserve power. When the memory card slot 112 is powered off, any device coupled to the memory card slot is also powered off. For example, if the RFID card 120 (Fig. 1) is coupled to the memory card slot, the RFID card 120 will also be powered off when the memory card slot 112 is powered off.

In various embodiments of the invention, processor 210 executes software resident in memory 220 to maintain power to memory card slot 112 (and to RFID card 120). For example, the periodic hidden command may be sent to the RFID card 120 for the purpose of continuing power supply, while the RFID card 120 is expected to provide

the functionality of the RFID. Also as an example, a hidden command can be sent to the RFID card 120 for the purpose of circulating power to a smart card controller resident on the card. These hidden commands are described in detail below in conjunction with the following figures.

Figure 3A shows an RFID card with integrated sensing elements and compatible with a memory card. The RFID card 300 represents a possible embodiment of the RFID card 120 (Fig. 1). The RFID card 300 includes a host interface 310, a memory card controller 340, a memory 360, a smart card controller 330, a program memory 332, and a small inductive component 350. The RFID card is capable of communicating with a memory card slot within the mobile computing device. Further, the RFID card 300 does not require a memory card slot to implement an extended input/output function. For example, and not by way of limitation, in a particular embodiment of the SD, the RFID card 300 can operate in any SD memory card slot and does not require a secure digital input/output (SDIO) memory card slot.

The host interface 310 includes an electronic contact to interact with the memory card slot. For example, host side interface 310 includes contacts such as contacts 122 (Fig. 1). Also by way of example, in some embodiments, host side interface 310 includes concealed electronic contacts. The host interface 310 can also include circuitry such as drivers, receivers, terminals, and the like.

In the particular embodiment represented by Figure 3A, memory card controller 340 uses a memory card access command to communicate with the mobile device. The memory card controller can also communicate with the memory 360. The memory card controller determines whether each command should form a memory operation with the memory 360, whether a hidden command should be converted to the smart card controller 330, or whether the memory card controller 340 should act in response to the hidden command. In some embodiments, memory card controller 340 executes instructions stored in internal memory or stored in memory 360. In some embodiments, the memory card controller 340 includes a special purpose hardware that is in the process of determining a command. It should be useful if it should be converted. In other embodiments, the memory card controller 340 can be a microcontroller that is equivalent in all respects to the controller found in the memory card, except for the program it executes.

Memory 360 can be any type of volatile or non-volatile memory. For example, the memory 360 can be a volatile memory such as static random access memory (SRAM) or dynamic random access memory (DRAM). Also by way of example, memory 360 can be a non-volatile memory such as a NDR flash memory or a NAND flash memory. In various embodiments of the invention, memory 360 represents a memory that can be accessed by a mobile computing device using a memory card access command, the memory card access commands being defined for this purpose.

When the RFID card 300 is communicating with a memory card slot within a mobile computing device, the mobile computing device can transmit a memory card access command to access the memory 360. Also as an example, the mobile computing device can send a memory card access command with a hidden command. The memory card controller 340 detects the presence of the hidden command and uses the communication bus 342 to transfer all or part of the memory access commands to the smart card controller 330. Communication bus 342 can have any number of conductors and can take any form. For example, the communication bus 342 can be a serial port, a parallel port, or can include a plurality of data wires, a plurality of address wires, and/or a wire capable of carrying a control signal, such as a clock signal. In some embodiments, memory card controller 340 takes one or more actions in response to a hidden command. For example, the memory card controller 340 can modify the clock signal in response to a hidden command.

The memory card controller 340 can detect hidden commands in a number of ways. For example, in some embodiments, the memory card access command can include a particular address value or a particular data value. The memory card controller 340 detects a command including one or both of a specific address value or a specific material value and appropriately routes the command. The particular address value and specific data value used for this purpose can be considered here as a hidden command address value and a hidden command data value.

In some embodiments, the memory card controller 340 can detect the presence of a hidden command based solely on the hidden command address value. In these specific embodiments, the memory card controller 340 checks the address value included in a memory card access command, and if the command matches the hidden command address value, converts it (or takes some actions). In some embodiments, the memory card controller 340 detects the presence of a hidden command based only on the hidden command data value. In these particular embodiments, the memory card controller 340 checks a data value included in the memory card access command and converts the command if it matches the hidden command data value. In still further embodiments, the memory card controller 340 can detect the presence of a hidden command based on both the hidden command address value and the hidden command data value. In these embodiments, the memory card controller 340 will only switch commands if both the memory card access address and the data match the hidden command address value and the hidden command data value, respectively.

Hiding command address values and hiding command data values can be specified in a number of ways. For example, all RFID cards can be released with a fixed value. In these embodiments, the same hidden command is used each time the RFID function is accessed. The address and/or data value is included in the memory card access command. Also as an example, different RFID cards can be released with unique values. In these specific embodiments, each RFID card can provide these values to a mobile computing device when needed. Also as an example, the hidden command address and/or data value may be specified by the mobile computing device. In other further embodiments, the hidden command address and data value can be dynamic. The hidden command address and data value can be changed each time power is applied or on a periodic basis.

The smart card controller 330 receives the hidden commands converted by the memory card controller 340. The smart card controller 330 further translates the hidden commands and performs actions in response thereto. The smart card controller 330 executes the instructions stored in the program memory 332. In some embodiments, program memory 332 is embedded within smart card controller 330, while in other embodiments program memory 332 is part of memory 360.

The smart card controller 330 is a dual interface smart card controller having one of a plurality of interfaces including an RFID function. In some embodiments, the smart card is a passive RFID tag reader that is compatible with the NFC application. For example, smart card controller 330 can be a device that implements all or part of the ISO 14443 standard for contactless NFC devices. Also by way of example, smart card controller 330 can be a dual interface smart card controller capable of implementing both ISO 7816 and ISO 14443 for contact/contactless requirements. The "SmartMX" family of controllers available from NXP in Netherlands is an example of a suitable dual interface smart card controller. These controllers provide RFID functionality at 13.56 MHz, this Various embodiments of the invention can operate at 13.56 MHz, but are not limited to operating at this frequency. In some embodiments, the smart card controller interacts with the MIFARE system for ticketing applications.

The smart card controller 330 receives power from the host interface. By not receiving power from the interrogating RF field, the necessity of using one of the loop antennas for power generation can be negated. The smart card controller 330 includes an antenna port 334. The antenna 334 is coupled to the small inductive element 350.

The small inductive component 350 includes a coil wound around a magnetic core. The coil is too small for drawing power from the interrogating RF field, but since the smart card controller 330 is powered by the host device through the host interface 310, this approach is not necessary. The small inductive component 350 interacts with the antenna within the RFID reader in a manner that approximates the interaction of the primary and secondary coils within the transformer. The RFID reader has a coil that resonates at 13.56 MHz, which acts like a main line of a transformer. The small inductive component 350 functions as a secondary line to the transformer. Accordingly, the transmitter can "see" the impedance of the secondary coil (small sensing element 350). The smart card controller 334 can use circuitry to modulate the reflected signal to modify the impedance at the antenna 334.

The small sensing element 350 can be made very small. For example, in some embodiments, the RFID card 120 is a miniSD card and the small sensing element 350 is small enough to be completely contained within the apparent size of the miniSD. The specific embodiment of the small inductive element within the apparent size of the memory card is as described below with reference to FIG.

In various embodiments of the invention, the memory card controller 340 and The smart card controller 330 is implemented in many different ways. For example, in some embodiments, the various components are implemented as hardware. In these embodiments, the various components can be implemented as individual integrated circuits or as a combined integrated circuit. Also by way of example, in some embodiments, various components may be implemented as a software, or a combination of hardware and software. In some embodiments, RFID card 300 can include a microprocessor, and the components can be implemented as a software module running on the microprocessor. In other embodiments, RFID card 300 can include multiple processors, and the components can be implemented as software modules that are interspersed across the plurality of processors.

Figure 3B shows a block diagram of a memory card compatible RFID card with integrated sensing elements. The RFID card 302 represents a possible embodiment of the RFID card 120 (Fig. 1). The RFID card 302 includes a host interface 310, a memory card controller 340, a memory 360, a smart card controller 340, a program memory 332, and a small inductive component 350, all of which are described above with reference to FIG. 3A. The RFID card 302 is capable of communicating with a memory card slot within the mobile computing device. Still further, the RFID card 302 does not require a memory card slot to implement extended input/output functions. For example, and not by way of limitation, in an SD embodiment, the RFID card 302 can operate in any SD memory card slot without the need for a secure digital input/output (SDIO) memory card slot.

In the particular embodiment represented by FIG. 3B, smart card controller 330 receives power from memory card controller 340. In these embodiments, the memory controller 340 can provide the smart card controller 330. The power is directly controlled. The memory controller 340 can apply and/or remove power from the smart card controller 330 in response to commands received through the host interface. For example, the memory controller 340 can receive a hidden command to reset the smart card controller 330 by re-starting through power cycling.

Figure 4 shows a photo of a memory card compatible RFID card with integrated sensing elements. The RFID card 120 is displayed in an apparent size of an SD card, which is not a limitation of the present invention. The RFID card 120 includes an electronic contact 122, a memory card controller 340, a smart card controller 330, a memory 360, a magnetic core 450, and a coil 452, all of which are fixed to the circuit board 402.

The magnetic core 450 and the coil 452 can be implemented as a small inductive element 350 (Fig. 3). As can be seen in the photo, the small sensing element can be assembled into the overall size of the memory card. The small inductive component does not provide power to the smart card controller 330, so it is not necessary to make the size larger for this purpose.

Figure 5 shows the data portion of a memory card write command. Included are hidden command material values 510, status bar 520, password field 530, device ID 532, command index 540, and hidden command related material 550. In the example of Fig. 5, the length of the data portion is 512 bytes, which is not a limitation of the present invention. Any number of numbers can be included in the write command, and the fields in Figure 5 can be of any length.

In the example of Figure 5, the hidden command data value is 256 bits in length, although any length can be used herein without departing from the scope of the invention. In some embodiments, the hidden command data value 510 is used to The memory write command is recognized as a hidden command. When a write command receives a material owned by the first 256 bits (which matches the hidden command data value), the command is recognized as a command to be converted to the smart card controller. As described above, a hidden command address value can be used to associate or otherwise unrelated to a hidden command data value to identify the memory write command as a hidden command.

When the memory is written as a hidden command, the remaining fields are more important. For example, if the first 256 bits do not match the hidden command data value (or if the write address does not match the hidden command address value, or both), then the remaining in the data column The bit is treated as if it were in the general memory write command. Conversely, when the memory write is a hidden command, the remaining fields are used to further translate the hidden command.

Memory card controller 340 (Figs. 3 and 4) verifies the hidden command data value 510, status bar 520, and, if possible, the password field 530 and device ID 532. In some embodiments, if the command is recognized as a hidden command, the memory card controller 340 forwards the password 530, the command index 540, and the associated material 550 to the smart card controller 330. In other embodiments, memory card controller 340 can take action directly based on hidden commands.

Status bar 520 can include any information related to the status of the hidden command. For example, status bar 520 can include one or more bits to indicate to memory card controller 340 whether the host side (mobile computing device) desires the smart card to return data in response to the hidden command. For example, when the status bar 520 indicates a write meaning, the memory card controller 340 will forward the password, device ID, command index, and related data without expecting to return any data to the host. Also by way of example, when the status bar 520 indicates a read, the memory card controller 340 may, in the event that the smart card 330 is expected to provide data to transmit data to the host in response to a memory card read command, forward the password, device ID, command index, and related materials. A combination of a memory card write command followed by a memory card read command can be used to provide a "read" function to the smart card controller. The reading operation from the smart card controller is further described below with reference to Fig. 3.

The password field 530 includes a password to allow the smart card controller 330 to authenticate the token with the host. In some embodiments, each hidden command includes a password. Each time the password, device ID, command index, and related data are converted to the smart card controller, the password is checked to authenticate the token with the host.

Device ID 532 uniquely identifies the host (mobile computing device). The device ID can be checked by the smart card controller to ensure that the token is inserted into the host side to which it is authenticated. Some embodiments of the present invention use device IDs to enforce a unique host/card pair, while other embodiments allow the smart card controller functionality to be accessed by any host.

The command index 540 identifies the type of hidden command. The number of possible hidden commands is limited only by the number of bits configured on them. Any number of bits can be configured to the command index 540 without departing from the scope of the invention. Hidden command related material 550 can be used for various types of hidden commands And use it differently. Any number of bits can be used to hide the command related material 550.

The information shown in Figure 5 is provided as an example, and the data field of the memory card access command may include more or less data fields than the data fields shown in Figure 5. . The invention is not limited by the content or number of fields within a memory card access command.

Figure 6 shows a flow chart in accordance with various embodiments of the present invention. In some embodiments, method 600 can be used by a mobile computing device to communicate with an RFID card within a memory card slot. In some embodiments, method 600, or portions thereof, is performed by a mobile computing device having a memory card slot, while in other embodiments, method 600, or portions thereof, is software Executed. The various actions within method 600 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 6 are ignored from method 600.

The method 600 begins at 610 where a data pattern and an address value are received from an RFID card within a memory card slot. The data pattern corresponds to the hidden command data value, and the address value corresponds to the hidden command address value. In some embodiments, the mobile device only receives the data

value, while in other embodiments, the mobile device only receives the address value. In some embodiments, the action of 615 occurs once when the RFID card is first inserted into the memory card slot. The mobile computing device can use the address and data values whenever the mobile device establishes a hidden command. In other embodiments, each time the RFID card is inserted into the memory card slot, the action of 615 will occur. In still further embodiments, the action of 610 may occur periodically. Whenever action 610 occurs, the data patterns may be the same or different, and the address values may be the same or different.

At 620, the data field of the memory card access command is populated by the data pattern so that the command is converted to the smart card on the RFID card. For example, the data pattern can be written to the data field as a hidden command material value 510 (Fig. 5).

At 630, one of the address fields of the memory card access command is filled with the address value to further cause the command to be converted to the smart card controller. In some embodiments, only one of 620 or 630 is used. In these embodiments, the presence of the hidden command is represented by the data pattern alone or by the address value alone.

At 640, the data field of the memory card access command is filled with a command string to specify purposes other than memory card access. For example, a command string can be written to the data column as a command index 540 for the smart card controller. This command can be used for any purpose. For example, one or more hidden commands may have the sole purpose of maintaining power to the memory card slot such that the RFID card continues to receive power.

At 650, the data field of the memory card access command is filled with a password to authenticate access to the RFID card coupled to the memory card slot. In some embodiments, a password is included in the data field of each hidden command. In other embodiments, a password is only included at the beginning of an exchange.

At 660, a memory card access command is sent to the memory card plug The RFID card of the slot. For example, a mobile computing device (110, Figures 1, 2) can send a memory card access command to an RFID card in the memory card slot (112, Figures 1, 2) (120, first, third, 4 picture). The RFID card includes a memory card controller (340, Figure 3) to convert commands based on the data fields filled in method 600.

Figure 7 shows a flow chart in accordance with various embodiments of the present invention. In some embodiments, method 700 can be used by an RFID card within a memory card slot. In some embodiments, method 700, or portions thereof, is performed by a memory card controller within a memory card compatible RFID card, and in other embodiments, method 700, or portions thereof, it is executed by the software. The various actions in method 700 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 7 are ignored from method 700.

The method 700 begins at 710 with a memory card access command received from a mobile computing device via a host interface. The action of 710 corresponds to an RFID card within the memory card slot of the mobile computing device that receives a memory card access command.

At 720, the memory card controller checks the criteria in the memory card access command to determine if the memory card access command should be converted to a smart card controller resident on the RFID card. The criterion can be one or both of a hidden command data value or a hidden command address value. If there is a criterion match at 730, a hidden command is presented and at least a portion of the memory card access command is converted at 740. If there is no criterion is the phase If there is no hidden command, it will be rendered and memory access will be performed at 750.

Figure 8 shows a flow chart showing various embodiments in accordance with the present invention. In some embodiments, method 800 can be used by an RFID card within a memory card slot. In some embodiments, the method 800, or portions thereof, is performed by a memory card controller within the RFID card, while in other embodiments, the method 800, or portions thereof, is performed by a software carried out. The various actions in method 800 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 8 are ignored from method 800.

The method 800 begins at 810 with a memory card access command received from a mobile computing device via a host interface. If the memory card write command is determined to be a hidden command, the process continues until 840; otherwise, the memory write is performed at 830.

At 840, the hidden command is converted to the smart card controller. If the hidden command is judged to be "read" at 850, the handler continues at 860; otherwise, the hidden command handler is considered complete. At 860, the memory card controller retrieves non-memory data from the smart card controller, and at 870, the memory card read command is received from the mobile computing device. At 880, non-memory data is passed back to the mobile computing device.

Method 800 illustrates how a mobile computing device can perform reading from a smart card controller within a memory card compatible RFID card. The mobile computing device issues a memory card write command with a hidden command. The hidden command has a status field indicating the read, and then the mobile computing device issues a memory card read command. The handler in the card receives the hidden command, recognizes it as a read, and then passes the data back to the mobile computing device in response to subsequent memory card read commands.

Figure 9 shows a flow chart showing various embodiments in accordance with the present invention. In some embodiments, method 900 can be used by an RFID card within a memory card slot. In some embodiments, the method 900, or portions thereof, is performed by a smart card controller within the RFID card, while in other embodiments, the method 900, or portions thereof, is performed by a software carried out. The various actions in method 900 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 9 are ignored from method 900.

The method 900 begins at 910 with a smart card access command receiving a command from the memory card controller. This command corresponds to a hidden command received by the memory card controller. At 950, the smart card controller determines if the command is a "dummy" command that is primarily used to maintain power to the memory card slot. If not, the smart card function specified in the command will be executed at 930. If so, the command is ignored at 960.

The method 900 can allow a memory card compatible RFID card within the memory card slot to remain powered while the memory card slot within the host device is being removed to save power. This is to construct a hidden command for the software within the memory card access command, which will hide the command. A cooperative effort between the memory card controller that switches to the smart card controller and the smart card controller that ignores the command. According to the embodiment represented by Figure 3A, the manner in which power is supplied to the RFID also provides power to the smart card controller, thereby allowing the use of a small inductive device, as shown in Figures 3 and 4.

Figure 10 shows a flow chart in accordance with various embodiments of the present invention. In some embodiments, method 1000 can be used by an RFID card within a memory card slot. In some embodiments, the method 900, or portions thereof, is performed by a memory card controller within the RFID card, while in other embodiments, the method 900, or portions thereof, is performed by a software carried out. The various actions in method 900 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 10 are ignored from method 1000.

The method 1000 begins at 1010 with a memory card controller receiving a hidden command from a mobile computing device. If at 1020, the memory card controller determines that the hidden command is about to be converted to the smart card controller, the command is converted at 1030. If the command is not ready to be converted, the memory card controller does not convert the command; however, at 1040 the memory card controller can take other actions based on the hidden command. For example, the memory card controller can modify a clock signal provided to the smart card controller. Also as an example, the memory card controller can assert a reset signal to the smart card controller. Still as an example, the memory card controller can modify the power transfer to the smart card controller. In Figure 3B

in a particular embodiment, the memory card controller can modify the power transfer to the smart card controller. Power transfer can be modified by means of removing power, applying power, circulating power, and the like

The step of modifying the power transfer to the smart card controller can be a collaborative effort between the host side computing device and the memory card controller within the RFID card. For example, the power supplied to the memory card slot can be maintained by supplying a virtual concealment command to the RFID card, as described above with reference to FIG. When power is continuously supplied to the memory card slot, a hidden command can be used to enable the memory card controller to modify, apply, or recycle power to the smart card controller.

Modifications to power delivery may allow for additional security features. For example, turning off the power to the smart card controller will show that the smart card is inactive, and thus the inferior reader can be prevented from unnecessary reading of the card. Since the antenna is too small to provide sufficient power to the smart card controller, in order to properly operate the card reading function, it is necessary to obtain power from the memory card controller or from the host interface.

Figure 11 shows a method of authenticating a mobile computing device to one or more functions within a memory card compatible RFID card. The method 1100 begins at block 1110, where an activation code is received at the RFID card from the mobile computing device. At 1120, the received activation code is compared to the code stored in the RFID card. If the activation code matches, then at 1140 the RFID card receives a password from the mobile computing device and stores the password in the RFID card at 1150 for later use. If the activation code does not match, then at 1160 the RFID card determines if the number of allowed trials has exceeded Over. If the number of allowable attempts has been exceeded, then the RFID card issuer is contacted at 1170, and if the number of allowable attempts has not been exceeded, then the method will repeat the attempt until the number of allowable attempts has been exceeded.

Method 1100 can be performed when an RFID card is issued to a user. For example, the RFID card can be a mobile payment card issued by a financial institution. A user-initiated code can be provided to "activate" the RFID card. When the user successfully enters the activation code, the user is provided with a set of passwords that will be stored for use in future hidden commands.

In some embodiments, multiple non-memory functions within the RFID card are identified using method 1100. For example, each of a plurality of non-memory functions may have a stored activation code, and each function has been activated separately. Each of the separately activated functions may have a different password, or the plurality of functions may share a password.

While the invention has been described with respect to the embodiments of the embodiments of the present invention, it is understood that the invention may be modified and changed as can be readily understood by those skilled in the art without departing from the spirit and scope of the invention. Such modifications and variations are considered to fall within the scope of the invention and the scope of the appended claims.

- 110-- Mobile computing device
- 112-- memory card slot
- 120--RFID card
- 122--Electronic contact
- 210-- processor
- 220-- memory
- 230--Wireless RF Circuit
- 240--Antenna
- 310--Host interface
- 330--Smart Card Controller
- 332-- Program memory
- 334--Antenna
- 340-- Memory Card Controller
- 342--Communication bus
- 350--Small sensing elements
- 360-- memory
- 402--Circuit board
- 450-- Magnetic core
- 452--core coil

Figure 1 shows a mobile computing device and a memory card slot compatible Small RFID card; Figure 2 shows a block diagram of a mobile computing device; Figure 3A-3B shows a block diagram of a memory card compatible RFID card with integrated sensing elements, Figure 4 shows a memory card with an integrated sensing element Photograph of compatible RFID card; Figure 5 shows the data portion of a memory write command; Figures 6-11 show a flow chart of a method in accordance with various embodiments of the present invention, and Figure 12 shows the presence of an interrogation In the case of an RF field, the power supply voltage developed over time by rectifying the voltage induced in the loop antenna; and Figure 13 shows one of the prior art RFIDs in a secure digital (SD) memory card The label is implemented.

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Patents

2007139909



Secure mobile information management system and method

Abstract

Mobile phones are used to advise users of information or changes that meet certain criteria. A website may provide storage, filter information, and send information to the phone for storage based on topic. In different embodiments, e-mails may be searched, information may be sent to different parties, and signals may be sent locally to exchange information. Information may include account or travel information. Different embodiments include methods for authorizing actions, authenticating access, authorizing transactions, and providing positional awareness using mobile phones. Actions and access include computer access, physical access, and financial transactions. Methods of providing positional awareness may involve location coordinates, monitoring the location of mobile phones, and providing alarms. Various embodiments include software on mobile phones and a website.

Classifications

H04W4/14 · Short messaging services, e.g. short message services [SMS] or unstructured supplementary service data [USSD]

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WO2007139909A3

WBO (PCT)

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Other languages: French

Inventor: Sean Moshir, Kevin H Moshir, Houman Shafieezadeh

Worldwide applications

 2007 [WQ](#) AU EP US CA EP 2011 US 2015 US

Application PCT/US2007/012436 events ⓘ

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2007-05-25 Application filed by Celltrust Corp, Sean Moshir, Kevin H Moshir, Houman Shafieezadeh

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上海商信信息科技有限公司

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Priority And Related Applications

Child Applications (1)

Application	Priority date	Filing date	Relation	Title
US11/807,024	2006-05-25	2007-05-25	Continuation-in-Part	Secure mobile information management system and method

Priority Applications (4)

Application	Priority date	Filing date	Title
US80905206P	2006-05-25	2006-05-25	US Provisional Application
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Applications Claiming Priority (12)

Application	Filing date	Title
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US15/846,559	2017-12-19	Dissemination of real estate information through text messaging

Legal Events

Date	Code	Title	Description
2008-03-26	121	Ep. the epo has been informed by wipo that ep was designated in this application	Ref document number: 07795316 Country of ref document: EP Kind code of ref document: A2
2008-07-24	DPE1	Request for preliminary examination filed after expiration of 19th month from priority date (pct application filed from 20040101)	
2008-10-30	WWE	Wipo information: entry into national phase	Ref document number: 2650852 Country of ref document: CA
2008-10-31	WWE	Wipo information: entry into national phase	Ref document number: 2007795316 Country of ref document: EP
2008-11-11	WWE	Wipo information: entry into national phase	Ref document number: 2007267898 Country of ref document: AU
2008-11-26	NENP	Non-entry into the national phase in:	Ref country code: DE
2008-12-04	ENP	Entry into the national phase in:	Ref document number: 2007267898

Country of ref
document: AU

Date of ref
document:
20070525

Kind code of ref
document: A

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Patents

I323424



Memory card control apparatus and protection method thereof

Classifications

G06F1/28 Supervision thereof, e.g. detecting power-supply failure by out of limits supervision

TWI323424B

Taiwan

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Other languages: Chinese

Inventor: An Ming Lee, Zhen-Guo Sun, Ying-Hui Zhu, Chih Ching Chien

Worldwide applications

 2006 [TW](#) 2007 [US](#)

Application TW095147686A events

2006-12-19 Application filed by Realtek Semiconductor Corp

2006-12-19 Priority to TW095147686A

2008-07-01 Publication of TW200828126A

2010-04-11 Application granted

2010-04-11 Publication of TWI323424B

Info: Patent citations (7), Cited by (9), Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Discuss

Claims (1)

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1. 1. L/W24. X. Patent application scope: L. A control device for accessing a memory card, the control device comprising: - a bus bar used as a signal transmission line between the control device and the memory card, And the bus bar has a power signal line for providing a power signal to the memory card; a detecting circuit for detecting an operating state of the control device, and generating a notification when the operating state exceeds a predetermined operating range And a stupid adjustment circuit coupled to the bus bar and the detecting circuit for adjusting a current on the power signal line according to the notification signal and not turning off the power signal; so that the operation of the control device The state falls within the predetermined operating range. 2. The control device of claim 2, wherein the operational state is a current state on the power signal line. 3. as claimed in claim 1, wherein the detection circuit comprises: a current path, a current flowing through the predetermined current and generating a predetermined voltage; and a comparator coupled Connected to the current path and the power signal line for comparing the predetermined voltage with the power signal to generate the notification signal. 4. The control device of claim 1, wherein the adjustment circuit is a voltage supply circuit. The voltage supply circuit adjusts the amount of current on the power signal line according to the notification signal. 5. If the application of the research patent tamping item I is controlled, the life ladder will think about your ambient temperature state. 6. The control device of claim 1, wherein the detecting circuit comprises: a voltage generating circuit for generating a positive temperature coefficient voltage and a negative temperature coefficient voltage; and a Luyi comparator coupled The voltage generating circuit is configured to compare the positive temperature coefficient voltage with the negative temperature coefficient voltage to generate the notification signal. 7. The control device of claim 1, wherein the control device has a storage unit for storing the notification signal. 8. If the control device of the above-mentioned item 1 is applied, it is coupled to a warning device. The warning device is used to generate a signal according to the notification signal. 9. The control device of claim 1, further coupled to a computer system, wherein when the detecting circuit generates the notification signal, the control device sends an interrupt signal to notify The computer system. 10. A method for protecting a memory card control device, the memory card control device having a bus bar, and the bus bar having a power supply line to output a power signal, the protection method comprising: a beta measurement Controlling one of the operating states> and generating a notification when the operating state exceeds the pre-23424 operating range; and adjusting the current on the power signal line based on the notification signal and not under the power signal, The operational state of the control device is caused to fall within the predetermined operational range. * * *. * f.u. The protection method described in claim 10 wherein the operational state is the current state on the power signal line. 12. The protection method of claim 1, wherein the step of detecting the operational state of the memory card control device comprises: providing a predetermined current to generate a predetermined voltage; and comparing the predetermined voltage with the The power signal is used to generate the notification signal. 13. The method of protecting according to claim 10, further comprising: storing the sin notification signal in a storage unit; and controlling the operation of the memory card control device according to the notification signal in the storage unit. H. The protection method according to claim 10, further comprising: providing a warning device </ RT> the warning device is issued according to the notification signal - an alert signal. . 15. The protection method according to item H) of the patent application, wherein the memory card control 1323424 - the device is further coupled to a computer system, the protection method further comprises: "issuing one when the notification status number is generated" The ten-break signal (interrupt signal) is used to inform the computer system. 16. A method for protecting a memory card control device. The memory card control device has a bus bar, and the bus bar has a power signal line for outputting a power signal. The protection method includes: #Detecting an ambient temperature state 'and generate a notification signal when the ambient temperature state exceeds a predetermined temperature range; and, according to the 6-hai notification signal, it does not turn off. Close the power signal to 'adjust the current on the power transmission line' to make the ambient temperature The state falls within the predetermined temperature range. 17. The method of claim 16, wherein the step of detecting the ambient temperature state comprises. p a positive temperature coefficient voltage and a negative temperature coefficient

voltage; and comparing the positive temperature coefficient voltage to the negative. The temperature coefficient voltage is used to generate the notification signal.

18. The method of claim 16, wherein the method further comprises: storing the sin notification signal in a storage unit; and controlling the operation of the memory card control device according to the notification signal in the storage unit. For example, in the protection method described in claim 16, the method further includes: 1323424 provides a warning device, and the warning device sends a warning signal according to the notification signal. 20. The protection method of claim 16, wherein the memory card control device is further coupled to a computer system, the protection method further comprising: when the notification signal is generated, an interrupt signal is sent to notify The computer system.

XI. Schema: Reference 20

Description

IX. Description of the Invention: [Technical Field] The present invention relates to a memory card control device and related protection method, and more particularly to a memory card control device having over temperature protection or over current protection. [Prior Art] In modern life, in order to record diverse data, a variety of memory cards (such as Secure Digital (SD) Card, Memory Stick (MS) Card, or Compact Flash (CF) Card, etc.) has been generally developed. In order to facilitate the user to read the above memory card, a memory card control system (or card reader) that can read the data content of different memory cards will be required. The memory card control system generally has a single-slot structure or a multi-slot structure, wherein the single-slot structure is accessed for a memory card having a single or similar structure, and the multi-slot structure can be adapted to different characteristics. The memory card is used for access. With the improvement of the access mechanism, the memory card control system with multi-slot structure has gradually become the mainstream specification. However, due to the variety of memory cards, the use of the memory card in the wrong slot may occur in the use of 'memory card and memory card control (four) system internal circuit short circuit or JE error caused by the internal memory card. The content of the data is damaged, and even the ... it card and the memory card control (4) are also likely to be damaged. In addition, improper use or improper environment (such as wet or high temperature environment) may cause unexpected damage. Therefore, when designing the memory card control system, it is necessary to design the relevant security mechanism. The data content of the security card control (4) system, memory card or needle (4) is protected from damage. In general, the conventional overcurrent protection machine directly cuts off the lion's position in the memory card slot to avoid the error or damage of the memory card, and the corresponding power supply of the memory card slot. It is possible to provide other parts of the memory card control system, and the actual power supply corresponding to the memory card slot may cause the memory card control system to lose the local operation function. The related technology may refer to the Republic of China Patent Publication No. 1155090 patent specification. SUMMARY OF THE INVENTION Therefore, it is an object of the present invention to provide a memory card replenishing device for adjusting the amount of current flowing through a slot without closing the slot and a method for lifting the same to solve the above problem. . According to an embodiment of the invention, there is disclosed a control device for accessing a memory card, the control device comprising a bus bar, a detecting circuit and an adjusting circuit. The busbar side serves as a signal transmission line between the memory card and the memory card, and the bus bar has a power signal line to provide a power signal to the memory card, and the circuit is used for detecting the control device. The operation state, and when the operation state exceeds the predetermined operation range, a notification signal is generated, and the adjustment circuit is connected to the bus bar and the ... circuit, and is based on the notification signal and does not close the power supply nickname The current of the 5 $\geq$ power supply line is adjusted downward, so that the operation state of the control device falls within the predetermined operation range. 1323424 According to an embodiment of the present invention, a method for protecting a memory card control device is disclosed, wherein the memory card control device has a bus bar, and the bus bar has a power signal line for outputting a power signal. The protection method includes: detecting an operation state of the memory card control device, and generating an notification signal when the operation state exceeds a predetermined operation range; and adjusting the notification signal according to the notification signal without turning off the power signal The current on the power signal line causes the operational state of the control device to fall within the predetermined operational range. According to an embodiment of the present invention, a method for protecting a memory card control device is disclosed. The beta memory card control device has a bus bar, and the bus bar has a power source line to output a power signal. The protection method includes: detecting an ambient temperature state, generating an notification signal when the ambient temperature state exceeds a predetermined temperature range, and adjusting the power supply nickname according to the notification signal without turning off the power signal. The current on the line causes the environmental thirst state to fall within the predetermined temperature range. [Embodiment] Referring to Fig. 1, Fig. 1 is a schematic view showing an embodiment of a memory card control system 1 of the present invention. As shown in FIG. 1, the memory card control system 1 is coupled to a computer system 102 and includes a memory card control device 105, at least one slot 110 and an external circuit 115, wherein The card control device 105 is connected to the slot 110 through a bus bar BUS2, and the bus bar BUS2 includes at least one power signal line to provide a power signal to the slot 110, so that the memory is inserted when the memory card is inserted into the slot 11. The card can be operated by the power signal, and the memory card control device 105 1323424 includes a voltage conversion circuit 120, at least one detection circuit 125, at least one adjustment circuit 130, and a spur circuit 135. For the sake of explanation, only one slot, one detecting circuit, and one adjusting circuit are shown in FIG. 1 without affecting the technical content disclosed in the present invention. However, in other embodiments, the memory card control system A plurality of slots, a plurality of detection circuits, and a plurality of adjustment circuits may also be included, which is not a limitation of the present invention. In an embodiment of the present invention, it is assumed that the internal circuit of the memory card control device 105 and the memory card in the slot no operate at the same operating voltage. The voltage conversion circuit 120 is used to switch the memory card control device. The external power supply of 5 is converted into the internal power of the memory card control device 1 and the power supply required for the memory card in the slot no (for example, converting an external power supply having 5 volts into a power supply having 3.3 ... * volts) The converted power supply is transmitted to the internal circuit of the memory card control device 105 and the memory card in the slot no by the internal power bus BUS, and the detection circuit 125 is used to detect the operation of the memory card control device 105. State (for example, if the current on the power signal line of the bus BUS2 is too large, or when the external ambient temperature is too high... Lu, etc.) 'When the operating state exceeds a predetermined operating range, a notification signal will be generated and communicated via the internal signal. The row Bus 儲存 stores the notification signal in the register of the control circuit 135, and the control circuit 135 transmits the notification signal to the adjustment circuit 130 to control the adjustment circuit 130 to adjust the power. Control means to adjust the memory card] bo is the case according to the informing signal does not turn off the power source to an operating state signal to fall Q5 of the predetermined operating range. Please refer to FIG. 2, which is a schematic diagram of an embodiment of the detecting circuit 125 and the adjusting circuit 130 shown in FIG. 1 of the present invention. As shown in FIG. 2, the detecting circuit 125 includes a comparator COM, a transistor Q1, and a reference current source, and the adjusting circuit 130 includes transistors a and Q3, wherein the reference current source u is a pre-current. The source and the gate voltage of the transistor Q are also a fixed voltage. Therefore, referring to the *mref#t&ss body q, it is decorated as a current and the non-inverting input (+) of the health cOMP will have a predetermined The reference voltage Vref, and the output signal S&itn« will be used as the power supply number and output to the slot 11 in the first figure. In addition, the power supply VDD shown in Fig. 2 is the conversion shown in Fig. 1. The converted power supply provided by circuit 120, under normal operating conditions, the voltage level of the output signal Scut (that is, the voltage level v of the inverting input terminal (1) of the comparator COMP) will be higher than the reference voltage Vref. At this time, the output level of the comparator COMP will be maintained at a low logic level; conversely, since the gate voltage of the transistor Q2 (1/4 is connected to the solid voltage, Yes, the conduction of the transistors Q2, Q3) The resistance value can be regarded as fixed. If the voltage level V is less than the reference voltage vref, it indicates the output signal. The Scut has a large current value, that is, the amount of current flowing through the slot 110 becomes large at this time. Therefore, when the voltage level v is smaller than the reference voltage Vref, the comparator COMP outputs the notification signal Sc having a high logic level. And the notification signal Sc will be transmitted to the gate voltage of the transistors a, Q2 to raise the original voltage level 'so 'the transistor, Q2 will be turned off' and since the transistor Q2 is assumed in this embodiment The aspect ratio (aSpect rati) is larger than the aspect ratio of the transistor Q3, so 'although the transistor Q3 remains conductive at this time, however, since the resistance value of the transistor Q3 is higher than the resistance value of the transistor Q2, the adjustment is made. The circuit 130 only

allows a small current to pass and thus effectively limits the amount of current flowing through the slot 11. In other words, when an overcurrent condition occurs (i.e., when the transistors Q1, Q2 are turned off). And (when turned on) At this time there is still a current on the transistor Q3 or a predetermined current to provide 1323424. the memory card in the slot 110 so that the memory card can still be accessed. In another embodiment Assuming that the internal circuit of the memory card control device 105 and the memory card in the slot 110 operate at different operating voltages, the voltage conversion circuit 120 is only used to convert the external power supply of the memory card control device 105 into a memory card control. The power supply required by the internal circuit of the device 105 (for example, converting an external power supply having 5 volts to a power supply having 3.3 volts), and the adjustment circuit 13 is implemented by a power supply circuit for converting the voltage conversion circuit. The converted power supply provided by 120 is further converted into the power required by the memory card in the slot 110 (for example, converting the converted power supply having 3.3 volts into a power supply having 1.5 to 1.8 volts), at this time, since the adjustment circuit 130 is For the power supply circuit, a maximum supply current amount can be adjusted according to the notification signal to achieve the purpose of limiting the maximum current flowing through the slot 11(). this variation is also within the scope of the present invention. Furthermore, in addition to detecting the current flowing through the power signal line, the memory card of the slot 11 can be protected from damage by detecting the ambient temperature state and not turning off the power signal, please refer to 3, FIG. 3 is a schematic diagram of an embodiment of the detecting circuit 3 for detecting an ambient temperature state of the present invention. Please note that in the present embodiment, the detecting circuit 300 And the adjustment circuit 130 shown in FIG. 2 (which is composed of a plurality of transistors) is used for the purpose of adjusting the amount of current flowing into the slot; however, in another embodiment, the adjustment circuit is also This can be achieved by a power supply circuit, i.e., by limiting the maximum amount of current supplied to limit the amount of current flowing through the socket 110, which is also within the scope of the present invention. As shown in FIG. 3, the detection circuit 300 includes a voltage generating circuit having a temperature negative phase, a shutdown voltage, a voltage generating unit 305 and a temperature positive correlation electric generating unit 31, and a comparator COMP in which a temperature is negatively correlated. The voltage generating unit 305 generates a voltage V1 according to the transistor itself and the negative phase of the dish, and the temperature positive paste voltage generating unit 31 generates a voltage V2 according to the characteristic that the transistor itself is positively correlated with the temperature. For example, in the case of a bipolar junction transistor (Bipolar junction), a difference in emitter junction voltage (i.e., emitter and base) corresponding to a negative correlation with temperature can be used. The voltage difference between the poles) (4) The voltage is taken as the voltage V1, and a voltage value corresponding to a thermal voltage positively related to the temperature is used as the voltage V2; when operating at a lower ambient temperature state, The voltage V1 will be less than the voltage V2, therefore, the output of the comparator COMP will remain at a low logic level, inversely, when operating at a higher ambient temperature state (i.e., the ambient temperature state exceeds - the predetermined temperature range) Time) due to electricity The pressure V1 is positively correlated with the temperature and the electroacoustic V1 is negatively correlated with the temperature (that is, the higher the temperature, the higher the voltage value of the voltage V2 and the smaller the voltage value of the voltage V1), so that the electric voltage V2 will be greater than the voltage V1. At this time, the comparator COMP generates the notification signal Sc having a high logic level and stores the notification signal Sc to the control circuit via the internal signal bus, and then the control circuit transmits the notification signal Sc to the adjustment circuit 13 in order to control the adjustment circuit 130, the adjustment circuit 130 adjusts the amount of current flowing through the slot 11 to fall within a predetermined operating range without turning off the power signal according to the notification signal Sc; The detecting circuit 3 can also use a reference voltage (a voltage that does not substantially change with temperature) to be compared with a temperature coefficient, and when the temperature coefficient related voltage is greater than or less than the reference voltage, a notification is issued. The signal has been temperature-protected, and such similar changes are also within the scope of the present invention. 1323424 In addition, the horse has solved the problem between the memory card control system and the electric job. The error or interruption of the connection mechanism causes the conventional overcurrent protection mechanism to not notify the user of the problem by the computer system. In the above embodiment, the memory card control system 100 can set a warning in the external circuit 115. The device, wherein the alert device sends a specific alert signal according to the notification signal stored in the control circuit 135. For example, the alert device can be implemented by using a light emitting diode (LED) display or a speaker. In addition, in another embodiment, if the connection mechanism between the memory card control device 105 and the computer system 102 is not erroneous or interrupted, the computer system 102 can still be used to inform the user whether the current memory card is It is placed in the wrong slot 'At this time' because the connection between the memory card swept device 105 and the computer system 102 can also be connected by other types of bus bars, and is not limited to the use of the universal serial bus (Universal Serial Bus) is used to make the connection. Therefore, when the debt measurement circuit 125 in the memory card control device 105 generates the notification signal, the control circuit 135 can set a The software variable (for example, writes the specific software variable into a predetermined register) and sends an interrupt signal to inform the computer system 102, and the application in the computer system 102 only needs to check the current setting. The data content of a specific software variable can inform the user whether a memory card has been placed in the wrong slot. Please refer to FIG. 4, which is a flow chart of an embodiment of the protection method of the present invention. The protection method of the present invention is applied to a memory card control device (for example, a memory card control device 105 having the circuit structure shown in Fig.), and it is noted that the steps of the protection method of the present invention are substantially obtained under the same result. It is not necessary to follow the execution order of Figure 4. The protection method of the present invention comprises the following steps: 1. Step 400: Start. Step 402: Current state on the power signal line. Step 404: Tear off whether the current state on the power supply letter is over the operating range. If yes, go to step 410; otherwise, go to step 406. Step 406: Investigate an ambient temperature state. Step 408: Determine whether the ambient temperature state exceeds a silent temperature range. If yes, go to step 410; otherwise, go back to step 402 to continue monitoring. Step 410: Adjust the current on the power signal line under the power signal. Next, return to step 402 to continue monitoring. Since the detailed operation of the memory card control device has been clearly disclosed, those skilled in the art should be able to easily understand the operation of each step in Fig. 4, and therefore, it is not separately mentioned. The above description is only the preferred embodiment of the present invention, and all scale changes and modifications made in accordance with the scope of the present invention should be within the scope of the present invention. [Simplified description of the drawings] Fig. 1 is a schematic diagram of a memory card control (four) system of the present invention. Fig. 2 is a schematic view showing an embodiment of the measurement circuit and the adjustment circuit shown in Fig. 1 of the present invention. 1323424 FIG. 3 is a schematic diagram of an embodiment of a detection circuit for detecting an ambient temperature state of the present invention. Figure 4 is a flow chart of an embodiment of the protection method of the present invention. [Main component symbol description] 100 Memory card control system 102 Computer system 105 Memory card control device 110 Slot 115 External circuit 120 Voltage conversion circuit 125 Detection circuit 130 Adjustment circuit 135 Control circuit 300 Detection circuit 305 Temperature negative correlation voltage generation unit 310 temperature positive correlation voltage generation - early 315 voltage generation circuit

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Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
TW095147686A	2006-12-19	2006-12-19	Memory card control apparatus and protection method thereof

Applications Claiming Priority (2)

Application	Filing date	Title
TW095147686A	2006-12-19	Memory card control apparatus and protection method thereof
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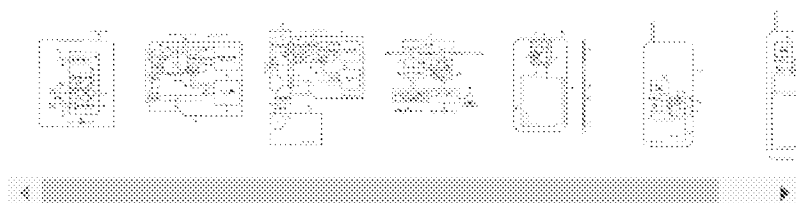


Card type storage device, adapter for the same, and host device

Abstract

<P>PROBLEM TO BE SOLVED: To provide a card type storage device that can be appropriately powered from any type of host device, and an adapter and a host device that can be loaded with the storage device. <P>SOLUTION: Power terminals PW1 and PW2 are powered by the host device. Antenna terminals ANT1 and ANT2 are connected to an antenna for contactless communication disposed in the host device to receive a signal from the antenna. A control circuit 14 has a wireless communication function and an IC card function. A power generation circuit 14c is included in the control circuit 14 to generate power in response to the signal from the antenna. A switch circuit 14d is included in the control circuit 14 to switch the power supplied to the power terminals and the power from the power generation circuit. <P>COPYRIGHT: (C)2006, JPO&NCIPI

Images (7)



Classifications

G06K19/077 Constructional details, e.g. mounting of circuits in the carrier

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Claims (6)

[Hide Dependent](#) ^

1. A power supply terminal for receiving power supply from the host device;
An antenna terminal connected to a non-contact communication antenna provided in the host device and receiving a signal from the antenna;
A control circuit having a wireless communication function and an IC card function;
A power supply generation circuit included in the control circuit for generating a power supply in response to a signal from the antenna;
A card-shaped storage device comprising: a power supply included in the control circuit and supplied to the power supply terminal; and a switching circuit for switching a power supply from the power supply generation circuit.
2. The card-like memory according to claim 1, wherein the switching circuit switches between a power source supplied from the power source terminal and a power source supplied from the power source generating circuit in accordance with a voltage supplied to the power source terminal, apparatus.
3. The card storage device according to claim 1, wherein the switching circuit switches between power supplied from the power supply terminal and power supplied from the power generation circuit in response to a command from the host device.
4. A non-contact communication antenna;
A power supply circuit for generating power;
A card-like shape having a power generation circuit that has a wireless communication function and an IC card function and generates a power according to a signal from the antenna, and a switching circuit that switches between the power from the power generation circuit and the power from the power circuit A mounting unit that can be mounted with a storage device and to which the antenna and the card-shaped storage device are connected when mounted,
A host device comprising: a host control unit that generates a command for controlling the switching circuit.
5. A non-contact communication antenna;
A power supply circuit for generating power;
A card-like shape having a power generation circuit that has a wireless communication function and an IC card function and generates a power according to a signal from the antenna, and a switching circuit that switches between the power from the power generation circuit and the power from the power circuit A mounting unit that can be mounted with a storage device and to which the antenna and the card-shaped storage device are connected when mounted,
A host device comprising: power control means for shutting off power generated by the power supply circuit when the card-like storage device is operated by power from the power generation circuit.
6. A card-shaped body,
A non-contact communication antenna provided in the main body;
An adapter for a card-like storage device, comprising: a connector connected to the card-like storage device connected to the antenna and capable of non-contact communication.

Description

The present invention relates to an improvement in the function of a memory card with a built-in IC card function, and more particularly to an improvement in a power supply method for a memory card with a built-in IC card function.

In recent years, a memory card incorporating an IC card function that is significantly smaller than a business card size has been developed. It is considered that this memory card is used by being attached to a card type adapter as an external memory of a host device such as a mobile phone.

However, since the memory card itself does not have a power source, a means for supplying power to the memory card by some method is required. On the other hand, power is supplied from the host side of an electronic device or the like to which the memory card is mounted, or when the supply is cut off, it is detected from an antenna for contactless communication provided on the memory card. A method using electric power obtained by electromagnetic induction has already been proposed (see, for example, Patent Document 1).

By the way, the power supply method from the electronic device as the host device to which the memory card is mounted to the memory card has been diversified in recent years. For this reason, it is desired that any type of host device can appropriately supply power to the memory card.

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The present invention provides a card-like storage device that can supply power appropriately from any type of host device, an adapter to which the storage device is mounted, and a host device.

An aspect of the card-like storage device of the present invention includes a power supply terminal for receiving power supply from a host device, an antenna terminal connected to a non-contact communication antenna provided in the host device, and receiving a signal from the antenna. A control circuit having a wireless communication function and an IC card function; a power generation circuit that is included in the control circuit and generates power according to a signal from the antenna; and is included in the control circuit and is supplied to the power supply terminal. And a switching circuit for switching the power supply from the power generation circuit.

An aspect of the host device of the present invention includes a contactless communication antenna, a power supply circuit that generates power; a power generation circuit that has a wireless communication function and an IC card function and generates power according to a signal from the antenna. A card-like storage device comprising a switching circuit for switching between a power supply from the power supply generation circuit and a power supply from the power supply circuit, and a mounting portion to which the antenna and the card-like storage device are connected when mounted; A host control unit for generating a command for controlling the switching circuit.

An aspect of the host device of the present invention includes a contactless communication antenna, a power supply circuit that generates power, a power generation circuit that has a wireless communication function and an IC card function and generates power according to a signal from the antenna. A card-like storage device comprising a switching circuit for switching between a power supply from the power supply generation circuit and a power supply from the power supply circuit, and a mounting portion to which the antenna and the card-like storage device are connected when mounted; In the case where the card-like storage device is operated by the power supply from the power supply generation circuit, power supply control means for cutting off the power supply generated by the power supply circuit is provided.

An aspect of the adapter of the present invention includes a card-shaped main body, a non-contact communication antenna provided in the main body, a connector connected to the antenna and connected to a card-shaped storage device capable of non-contact communication. It has.

According to the present invention, it is possible to provide a card-like storage device that can supply power appropriately from any type of host device, an adapter to which the storage device is mounted, and a host device.

Hereinafter, embodiments of the present invention will be described with reference to the drawings.

FIG. 2 shows an embodiment of a card-like storage device, for example a memory card 11. The memory card 11 contains, for example, a card controller chip 12, a nonvolatile semiconductor memory chip 13, and an IC card function chip 14 in a card case 11-1. For example, a connector 15 is provided on one side of the memory card 11. The connector 15 has, for example, a plurality of terminals to which one end of the bus 16 is connected, two terminals to which the power supply voltage VDD and the ground potential VSS are connected, and two terminals to which an antenna is connected.

The card controller chip 12 includes a bus interface (I / F) circuit 12a, a memory control unit 12b, and an IC card control unit 12c. The bus I / F circuit 12a is connected to the other end of the bus 16, and is also connected to the memory control unit 12b and the IC card control unit 12c. The bus I / F circuit 12a supplies a clock signal CLK, a command CMD, data DAT0-3, and the like supplied from a host device (not shown) via the bus 16 to the memory control unit 12b and the IC card control unit 12c. For example, data supplied from the control unit 12b and the IC card control unit 12c is output to the bus 16. The memory control unit 12b is connected to the nonvolatile semiconductor memory chip 13 via the bus 17, and the IC card control unit 12c is connected to the IC card function chip 14 via the wiring 18. Note that the card controller chip 12 protects the copyright of the content data stored in the nonvolatile semiconductor memory chip 13, for example, CPRM (Content Protection for Recordable Media) based authentication and encryption / encryption based on a common key system. It also has a decoding function.

The non-volatile semiconductor memory chip 13 is a flash memory composed of, for example, NAND type EEPROM cells. The nonvolatile semiconductor memory 13 performs data writing, reading, and erasing in accordance with an instruction from the memory control unit 12b by using, for example, 8-bit data and a command interface.

In addition, an area (data storage area) in which data of the nonvolatile semiconductor memory chip 13 is written is divided into a plurality of areas in accordance with stored data. For example, the nonvolatile semiconductor memory chip 13 includes a general area for storing user data and a secure area for storing important data as data storage areas. The general area is an area that a user who uses the memory card 11 can freely access and use. The secure area is an area that can be accessed only when the validity of the host device 21 is proved by mutual authentication with the host device 21 connected to the memory card 11.

In addition, the IC card function chip 14 is connected to the IC card control unit 12c by the wiring 18 and is connected to the antenna terminal of the connector 15 through the wiring 19. The IC card function chip 14 has a non-contact wireless communication function, and can transmit and receive electromagnetic signals via the antenna of the host device when the memory card 11 is connected to the host device.

The IC card function chip 14 is a semiconductor chip having a so-called IC card function such as a credit card, a cash card, prepaid money, an employee ID, various licenses as a public ID, and a passport. The IC card function chip 14 realizes an IC card function. For example, public key encryption (PKI), stronger common key encryption (AES: Advanced Encryption Standard, etc.), tamper resistance, etc. Has advanced security functions. In order to realize this advanced security function, the IC card function chip 14 incorporates a nonvolatile semiconductor memory (not shown) for storing the above data.

The power supply voltage VDD and the ground potential VSS supplied from the host device to the power supply terminals PW1 and PW2 of the connector 15 are supplied to the card controller chip 12, the nonvolatile semiconductor memory chip 13, and the IC card function chip 14, respectively.

FIG. 3 shows a state where the memory card 11 is connected to the host device 21. As the host device 21, for example, a mobile phone or a card-like adapter can be applied. The host device 21 includes, for example, a host control unit 22, a power supply circuit 23, a battery 25, for example, a loop-shaped non-contact communication antenna 24. The host control unit 22 is connected to a plurality of terminals of the connector 15 via the bus 23. The host control unit 22 generates a clock signal, various commands, and data for controlling the memory card 11.

The power supply voltage VDD and the ground potential VSS output from the power supply circuit 23 are supplied to the power supply terminals PW1 and PW2 of the connector 15, respectively. Furthermore, one end and the other end of the antenna 24 are connected to the antenna terminal of the connector 15.

FIG. 4 shows a logical interface having the configuration shown in FIG. A schematic operation will be described with reference to FIGS. 4, 2, and 3.

When accessing the nonvolatile semiconductor memory 13 of the memory card 11 from the host device 21, writing or reading of data to or from the nonvolatile semiconductor memory chip 13 is controlled in accordance with a memory access command sent from the host device 21. That is, the memory control unit 12b writes the write data received from the host device 21 via the bus 16 and the bus I / F circuit 12a to the general area or the secure area of the nonvolatile semiconductor memory chip 13, and the nonvolatile semiconductor memory data read from the chip 13 is transferred to the host device 21 via the bus I / F circuit 12a and the bus 16.

On the other hand, when data is transmitted / received to / from the IC card function chip, the IC card function chip is controlled in accordance with an McEX (Mobile Communication Extension Standard) extension command transmitted from the host device 21. That is, the McEX extension command sent from the host device 21 is supplied to the IC card control unit 12c via the bus 16 and the bus I / F circuit 12a. The IC card control unit 12c transmits the received command data (C-APDU: Command-Application Protocol Data Unit) to the IC card function chip 14 in accordance with a communication protocol compliant with ISO7816. Further, the IC card control unit 12c receives data (R-APDU: Response-Application Protocol Data Unit) received from the IC card function chip 14 by a communication protocol compliant with ISO7816 via the bus I / F circuit 12a and the bus 16. Transfer to the host device 21.

When using the IC card function, the antenna 24 of the host device 21 is brought close to an external device having a non-contact communication function, for example, an antenna 32 of a reader / writer 31 as shown in FIG. In this state, communication is performed between the reader / writer 31 and the IC card function chip 14 via the antenna 32 and the antenna 24.

FIG. 1 shows a power supply switching function provided in the IC card function chip 14 according to the embodiment. The IC card function chip 14 includes a contact interface (I / F) circuit (wired interface) 14a, a non-contact interface (I / F) circuit (antenna interface) 14b, a power generation circuit 14c, and a power switching circuit 14d. It is out. The contact I / F circuit 14a is connected to the IC card control unit 12c by the wiring 18. The contact I / F circuit 14a is an interface circuit conforming to ISO7816, and performs 1-bit serial communication with the IC card control unit 12c. The non-contact I / F circuit 14b is an ISO 14443-compliant interface circuit for performing wireless communication via a host device described later, and is connected to the antenna terminal of the connector 15 via the wiring 19. When the antenna of the host device is connected to the connector 15, the power generation circuit 14c generates a power necessary for the operation of the IC card function chip 14 from a signal supplied via the antenna. The power supply switching circuit 14d is supplied with the power output from the power generation circuit 14c and the power supplied from the host device via the connector 15. The power supply switching circuit 14d is configured to contact one of a power supply output from the power supply generation circuit 14c and a power supply supplied from the host device via the connector 15 in accordance with a control signal supplied from the contact I / F circuit 14a. This is supplied to the I / F circuit 14b.

Next, the operation of the IC card function built-in memory card will be described with reference to FIGS.

As shown in FIG. 3, in a state where the memory card 11 is mounted on the host device 21, the power switching circuit 14d determines whether power is supplied from the power terminals PW 1 and PW 2 of the connector 15. When it is detected that power is supplied from the power supply terminals PW1 and PW2, the power supply switching circuit 14d supplies power from the power supply terminals PW1 and PW2 to the non-contact I / F circuit 14b. For this reason, the memory card 11 performs wireless communication with the reader / writer 31 by non-contact operation with the power from the power supply circuit 23 of the host device 21.

Further, when the power switching circuit 14d detects that no power is supplied from the power terminals PW1 and PW2 due to a decrease in the voltage of the battery 25 of the host device 21, or the host device does not have a power source. When the power switching circuit 14d detects that no power is supplied, the power switching circuit 14d supplies the power from the power generation circuit 14c to the non-contact I / F circuit 14b. For this reason, the memory card 11 performs wireless communication with the reader / writer 31 by non-contact operation with electric power from the electromagnetic induction from the non-contact communication antenna 24 of the host device 21. Thus, the memory card 11 can change the power supply form from the host device according to the power supply status of the host device.

5 to 7 show usage patterns of the memory card.

FIG. 5 shows a state in which the memory card 11 is mounted on the card-like adapter 51. The adapter 51 does not have a power source such as a battery in the main body, and has an antenna 52, a connector 53, and a storage portion 54 for the memory card 11. The connector 53 is connected to the antenna 52. By inserting the memory card 11 into the housing 54 and connecting the memory card 11 to the connector 53, the memory card 11 and the antenna 52 are connected. Since this adapter 51 does not have a power supply, when the memory card 11 is attached to the card-like adapter 51, the power supply switching circuit 14d selects the power supply generation circuit 14c. The power generation circuit 14c generates power from a signal received by electromagnetic induction by the antenna 52, and supplies it to the non-contact I / F circuit 14b. In this state, a non-contact operation by wireless communication is possible.

Further, the power supply switching circuit 14d can be controlled by a command output from the host control unit 22 of the host device 21. That is, it is possible for the host device 21 to switch the power supply switching circuit 14d using a command according to the power supply capability of the host device 21.

For example, as shown in FIG. 6, the size of the loop antenna 61 provided in the mobile phone as the host device 21 may be small, and sufficient power may not be supplied to the IC card function chip 14. In such a case, the host control unit 22 supplies power to the IC card function chip 14 from the power supply circuit 23 shown in FIG. 3 of the host device 21, so that the power supply switching circuit 14d uses the power supply terminals PW1 and PW2 of the connector 15. Output the command to be selected. Specifically, the host control unit 22 sends command data (C-APDU) that instructs the non-contact I / F circuit 14b in the IC card function chip 14 to be supplied with power from the power terminals PW1 and PW2. And sent to the card controller chip 12 via the bus 16. The card controller chip 12 transmits command data (C-APDU) to the IC card function chip 14 via the wiring 18 by the ISO7816 communication protocol. The IC card function chip 14 can communicate with the card controller chip 12 through the contact I / F circuit 14a, and the power supply switching circuit 14d is contactless based on command data (C-APDU) received from the card controller chip 12. Switching is performed so that power is supplied from the power supply terminals PW1 and PW2 to the I / F circuit 14b. As described above, the IC card function chip 14 is supplied with power from the power terminals PW1 and PW2 according to the command, and can perform a non-contact operation by wireless communication.

Alternatively, as shown in FIG. 7, when the size of the loop antenna 71 provided in the mobile phone is large and sufficient power can be supplied to the IC card function chip 14, the host control unit 22 uses the power generation circuit. In order to supply power to the IC card function chip 14 from 14c, the power supply switching circuit 14d outputs a command for selecting the antenna terminals ANT1 and ANT2 of the connector 15. This command is supplied to the IC card function chip 14 in the same

manner as described above, and the IC card function chip 14 is supplied with power from the power supply generation circuit 14c according to this command, and can perform a non-contact operation by wireless communication. .

According to the above embodiment, the IC card function chip 14 is provided with the power supply generation circuit 14c and the power supply switching circuit 14d. The power supply switching circuit 14d is provided with the presence / absence of the voltages at the power supply terminals PW1 and PW2 and the command supplied from the host device 21. Can be switched. Therefore, regardless of whether or not a host device equipped with a contactless communication antenna can directly supply power to the memory card, the memory card 11 incorporating the IC card function can perform wireless communication by contactless operation. It becomes. That is, since the power supply to the IC card function chip 14 can be switched according to the power supply capability of the host device to which the memory card 11 is mounted or the power supply form of the host device, the memory card 11 can be connected to various host devices. Can be installed.

In addition, a host device that can supply power from the power supply circuit 23 to the IC card function chip 14 and from the antenna 24 can reduce power consumption of the host device by selecting power supply from the antenna 24. The consumption of the battery 26 can be suppressed.

In the above example, the power source of the memory card is switched by issuing a command to the card. However, the memory card may operate with the power supplied from the antenna by cutting off the power supply to the memory card without using a command. That is, as indicated by a broken arrow in FIG. 3, for example, when a memory card having an IC card function is attached to the host device, the host control unit 22 may stop the operation of the power supply circuit 23. .

Note that the adapter 51 shown in FIG. 5 further includes a conversion control circuit between a memory card interface and a PCMCIA (Personal Computer Memory Card International Association) card interface, so that the memory card can be used in a PCMCIA slot of a personal computer. May be provided.

The present invention is not limited to the above embodiment, and can be applied to various host devices and memory cards incorporating IC card functions.

The block diagram which shows the principal part of the memory card which concerns an embodiment of this invention. The block diagram which shows the memory card which incorporated the IC card function chip; tip shown in FIG. FIG. 3 is a configuration diagram showing a state in which the memory card shown in FIG. The figure which shows the logical interface of the memory card shown in FIG. The block diagram which shows an example of the card-shaped adapter which can mount; wear with the memory card shown in FIG. The block diagram which shows an example of the mobile telephone as a host apparatus which can mount; wear with the memory card shown in FIG. The block diagram which shows the other example of the mobile telephone as a host apparatus which can mount; wear with the memory card shown in FIG.

Explanation of symbols

DESCRIPTION OF SYMBOLS 11 ... Memory card, 21 ... Host apparatus, 14 ... IC card functional chip, 14c ... Power supply generation circuit, 14d ... Power supply switching circuit, 15 ... Connector, PW1, PW2 ... Power supply terminal, ANT1, ANT2 ... Antenna terminal, 24, 52, 61, 71 antennas.

Patent Citations (9)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
JP2000090221A	1998-09-09	2000-03-31	Hitachi Maxell Ltd	Non-contact ic card
JP4053704B2 *	2000-01-05	2008-02-27	株式会社東芝	IC card with built-in wireless interface function, antenna module, information processing device
JP3657178B2 *	2000-07-10	2005-06-08	沖電気工業株式会社	IC card
JP2002279378A	2001-03-16	2002-09-27	Jr East Mechatronics Co Ltd	Multiple power supply combination type ic card
JP2003189488A	2001-12-20	2003-07-04	Toshiba Corp	Terminal, electronic medium, and method for supplying power in terminal
JP2003271915A	2002-03-13	2003-09-26	Jr East Mechatronics Co Ltd	Plug-in type ic card with non-contact type antenna built therein
US20030239631A1 *	2002-06-17	2003-12-18	Hitachi, Ltd.	IC card
JP2004348235A	2003-05-20	2004-12-09	Toshiba Corp	Portable electronic device and portable terminal device
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JP2008181110A *	2006-12-27	2008-08-07	Semiconductor Energy Lab Co Ltd	Display device
JP2008197499A *	2007-02-14	2008-08-28	Nobuyuki Kasuga	Image display card and power supply device for image display card
JP2009140465A *	2007-12-06	2009-06-25	Avermedia Technologies Inc	Tv card with power-switching function
JP2015133095A *	2014-01-14	2015-07-23	株式会社東芝	Memory device including radio antenna
Family To Family Citations				

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JP4534962B2 *	2005-11-16	2010-09-01	ソニー株式会社	Information recording apparatus, non-contact recording medium and recording method therefor
GB0325635D0	2005-12-16	2006-01-25	Innovision Res & Tech Plc	Chip card and method of data communication
GB2444798B *	2006-12-15	2010-06-30	Innovision Res & Tech Plc	Communications devices comprising near field RF communicators
GB0709671D0	2006-12-15	2007-02-21	Innovision Res & Tech Plc	Nfc communicator and method of data communication
WO2007138021A1 *	2006-05-29	2007-12-06	Paschalis Papagrigoriou	Method for communication with a multi-function memory card
WO2008013230A1 *	2006-07-26	2008-01-31	Panasonic Corporation	Nonvolatile storage device, nonvolatile storage system, and host device
US7991155B2 *	2006-12-13	2011-08-02	Tyfone, Inc.	Secure messaging
KR100849224B1 *	2007-02-01	2008-07-31	삼성전자주식회사	Method and memory card system for supplying power with a memory card of the memory card system
US20080244208A1 *	2007-03-30	2008-10-02	Narendra Siva G	Memory card hidden command protocol
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US8290433B2 *	2007-11-14	2012-10-16	Blaze Mobile, Inc.	Method and system for securing transactions made through a mobile communication device
US9741027B2 *	2007-12-14	2017-08-22	Tyfone, Inc.	Memory card based contactless devices
CN101393744A *	2008-04-18	2008-11-12	上海瑞纳电子科技有限公司	Chip for signal amplifier of radio frequency recognition system and signal amplifier thereof
US7961101B2	2008-08-08	2011-06-14	Tyfone, Inc.	Small RFID card with integrated inductive element
US8451122B2	2008-08-08	2013-05-28	Tyfone, Inc.	Smartcard performance enhancement circuits and systems
EP2401708A4 *	2009-02-24	2012-08-15	Tyfone Inc	Contactless device with miniaturized antenna
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CN101916950B *	2010-04-06	2013-09-12	上海复旦微电子集团股份有限公司	Safety chip concentrator
JP2012163865A *	2011-02-16	2012-09-06	Toshiba Corp	Memory system
CN102880958B *	2011-07-13	2016-08-10	中国银联股份有限公司	Data process and storage device
TW459188B	2012-03-09	2014-11-01	Phison Electronics Corp	Memory card with smart card function and power control method and power control circuit thereof
CN103325409B *	2012-03-22	2016-03-23	群联电子股份有限公司	The storage card of tool intelligent card function and power control method thereof and power control circuit
JPS70345281 *	2014-03-06	2015-04-22	パナソニックＩｐマネジメント株式会社	Information processing apparatus and information processing method
US10146476B2	2015-04-28	2018-12-04	Toshiba Memory Corporation	Wireless communication device, method for controlling wireless communication device, game system, and memory system

* Cited by examiner, † Cited by third party, ‡ Family to family citation

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US10496918B2	2019-12-03	Cards and devices with multifunction magnetic emulators and methods for using the same
JP2006172122A	2006-06-29	Card type storage device
US20100181377A1	2010-07-22	Card reader with near field communication function and near field communication device thereof
JP2007317178A	2007-12-06	Ic module and cellular phone
ES2380750T3	2012-05-18	Microprocessor card
KR101825326B1	2018-02-02	Portable electronic device

JP2006236200A	2006-09-07	Card type storage device and host device thereof
KR200329847Y1	2003-10-10	Usb driving device use smartcard reader
US8708232B2	2014-04-29	Bank card with display screen
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JP2006101542A	2006-04-13	Cellular phone terminal
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JP2006107380A	2006-04-20	Information processor, information processing method, memory device and computer program
CN100962528C	2008-01-16	Contactless CPU card compatible to logic encryption card
JP3983885B2	2007-09-26	Compound IC card and IC module for compound IC card
KR100734168B1	2007-07-02	Secure data storage apparatus with memory card interface
JP5693824B2	2015-04-01	IC card processing device, IC card, and IC card processing system
JP2005173744A	2005-06-30	Noncontact ic tag
JP2004310583A	2004-11-04	Communication system
JP2007257543A	2007-10-04	Composite portable electronic equipment and composite ic card
JP2002245425A	2002-08-30	Card type storage device
KR200342949Y1	2004-02-21	Dummy Terminal for Reading Smart Card
KR20090035781A	2009-04-13	Card module with plural card ics
JP2008065388A	2008-12-18	Mobile telephone terminal provided with ic card function

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
JP2004363399A	2004-12-15	2004-12-15	Card type storage device, adapter for the same, and host device

Applications Claiming Priority (4)

Application	Filing date	Title
JP2004363399A	2004-12-15	Card type storage device, adapter for the same, and host device
US11/250,406	2005-10-28	Card-shaped memory device incorporating IC card function, adapter for the same and host device
CNA200810186385XA	2005-12-15	Card-shaped memory device incorporating IC card function
CN2005101295783A	2005-12-15	Host device

Legal Events

Date	Code	Title	Description
2007-09-05	A621	Written request for application examination	Free format text: JAPANESE INTERMEDIATE CODE: A621 Effective date: 20070904
2009-10-07	A977	Report on retrieval	Free format text: JAPANESE INTERMEDIATE CODE: A971007 Effective date: 20091007
2009-10-14	A131	Notification of reasons for refusal	Free format text: JAPANESE INTERMEDIATE CODE: A131 Effective date: 20091013
2009-12-15	A521	Written amendment	Free format text: JAPANESE INTERMEDIATE CODE: A523

Effective date: 20091214

2010-03-10 A02 Decision of refusal

Free format text: JAPANESE INTERMEDIATE CODE: A02

Effective date: 20100309

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Patents

4403431



Communication system and communication apparatus

Classifications

H01Q9/28 Conical, cylindrical, cage, strip, gauze, or like elements having an extended radiating surface; Elements comprising two conical surfaces having collinear axes and adjacent apices and fed by two-conductor transmission lines

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JP4403431B2

Japan

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Other languages: Japanese

Inventor: 藤田 和城

Worldwide applications

 2007 [JP](#) 2008 [US](#) [CN](#)
Application JP2007157906A events ⓘ

2007-06-14 Application filed by ノーリック株式会社

2007-06-14 Priority to JP2007157906A

2008-12-25 Publication of JP2008311960A

2010-01-27 Application granted

2010-01-27 Publication of JP4403431B2

Status Expired - Fee Related

2027-06-14 Anticipated expiration

Info: Patent citations (17), Cited by (45), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Discuss

Claims (19)

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1. A transmitter circuit unit that generates a high-frequency signal for transmitting data, a transmitter including a high-frequency coupler that transmits the high-frequency signal as an electrostatic field or an induction electric field,
A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler;
The high frequency coupler of the transmitter and the receiver includes a coupling electrode, a resonance unit for strengthening electrical coupling between the coupling electrodes, and a magnetic loss disposed in the vicinity of the coupling electrode. It has a radio wave absorber made of materials.
Transmitting the high-frequency signal by electric field coupling between high-frequency couplers facing the transmitter and the receiver;
A communication system characterized by the above
2. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication system according to claim 1.
3. The resonance unit constitutes a bandpass filter that passes a desired high frequency band between the high frequency couplers of the transmitter and the receiver.
The communication system according to claim 1.
4. The resonating part is composed of a distributed constant circuit.
The communication system according to claim 1.
5. The radio wave absorber is composed of a magnetic loss material in which the spin responsible for magnetization gives a magnetic loss due to a delay caused by a change in a high frequency magnetic field, and generates a magnetic field in a radio wave that travels while alternately repeating a magnetic wave and an electric wave. By suppressing the propagation of radio waves generated from the high-frequency coupler, or preventing the arrival of radio waves from the outside to the high-frequency coupler;
The communication system according to claim 1.
6. The coupling electrode is formed inside or on the surface of the radio wave absorber.
The communication system according to claim 1.
7. A communication circuit unit for processing a high-frequency signal for transmitting data,
A high-frequency coupler for electric field coupling with an opposing communication partner;
The high frequency coupler includes a coupling electrode, a resonating unit for strengthening electrical coupling between the coupling electrodes, and a radio wave absorption device including a magnetic loss material disposed in the vicinity of the coupling electrode. With a body,
Transmitting the high-frequency signal by electric field coupling of an electrostatic field or an induction electric field with a high-frequency coupler on the communication

partner side,
A communication device.

8. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication apparatus according to claim 7.
9. The resonating unit constitutes a band-pass filter that passes a desired high-frequency band with a communication partner high-frequency coupler.
The communication apparatus according to claim 7.
10. The resonating part is composed of a distributed constant circuit.
The communication apparatus according to claim 7.
11. The radio wave absorber is composed of a magnetic loss material in which the spin responsible for magnetization gives a magnetic loss due to a delay caused by a change in a high frequency magnetic field, and generates a magnetic field in a radio wave that travels while alternately repeating a magnetic wave and an electric wave. By suppressing the propagation of radio waves generated from the high-frequency coupler, or preventing the arrival of radio waves from the outside to the high-frequency coupler.
The communication apparatus according to claim 7.
12. The coupling electrode is formed inside or on the surface of the radio wave absorber.
The communication apparatus according to claim 7.
13. A transmitter circuit unit that generates a high-frequency signal for transmitting data, a transmitter including a high-frequency coupler that transmits the high-frequency signal as an induction magnetic field,
A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler;
The high-frequency coupler of the transmitter and the receiver includes a coupling coil and a radio wave absorber made of a dielectric loss material disposed in the vicinity of the coupling coil,
Transmitting the high-frequency signal by coupling an induction magnetic field between high-frequency couplers facing the transmitter and the receiver;
A communication system characterized by the above
14. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication system according to claim 13.
15. The radio wave absorber is composed of a dielectric loss material that gives a dielectric loss by a delay caused by a change in a high frequency electric field by a dipole that provides dielectric properties, or a current in phase with the electric field flows and converts electromagnetic wave energy into heat. By suppressing the generation of the electric field in the radio wave traveling while alternately repeating the magnetic field wave and the electric field wave, the propagation of the radio wave generated from the high frequency coupler is suppressed, or the radio wave from the outside to the high frequency coupler is suppressed. Prevent arrival,
The communication system according to claim 13.
16. A communication circuit unit for processing a high-frequency signal for transmitting data;
A high-frequency coupler for magnetically coupling with an opposing communication partner;
The high-frequency coupler includes a coupling coil and a radio wave absorber made of a dielectric loss material disposed in the vicinity of the coupling coil.
Transmitting the high-frequency signal by magnetic field coupling of an induction magnetic field with a high-frequency coupler on the communication partner side,
A communication device.
17. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication apparatus according to claim 16.
18. The radio wave absorber is composed of a dielectric loss material that gives a dielectric loss by a delay caused by a change in a high frequency electric field by a dipole that provides dielectric properties, or a current in phase with the electric field flows and converts electromagnetic wave energy into heat. By suppressing the generation of the electric field in the radio wave traveling while alternately repeating the magnetic field wave and the electric field wave, the propagation of the radio wave generated from the high frequency coupler is suppressed, or the radio wave from the outside to the high frequency coupler is suppressed. Prevent arrival,
The communication apparatus according to claim 16.
19. Rectifying the high-frequency signal transmitted between the high-frequency couplers, further comprising power generation means for generating power,
The communication device according to claim 7, wherein the communication device is a device.

Description

The present invention relates to a communication system and a communication apparatus that perform large-capacity data communication between information devices, and more particularly, to perform data communication without interference with other communication systems using an electrostatic field or an induction electric field between information devices. BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to a communication system and communication apparatus for performing communication, and a communication system and communication apparatus for performing data communication without interference with other communication systems using an induction magnetic field between information devices.

More specifically, the present invention relates to a communication system and a communication apparatus that transmit a high-frequency signal using an electrostatic field or an induced electric field between information devices arranged at a short distance, and between information devices arranged at a short distance. BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to communication systems and communication devices that transmit high-frequency signals using an induced magnetic field, and in particular, efficiently transmit high-frequency signals between couplers mounted on each information device, and use electric field coupling or magnetic field coupling at a short distance. The present invention relates to a communication system and a communication apparatus that can perform large-capacity transmission.

Recently, when moving data between small information devices such as exchanging data such as images and music with a personal computer, it is possible to use a general-purpose cable such as an AV (Audio Visual) cable or a USB (Universal Serial Bus) cable. The use of a wireless interface is increasing instead of a method using a

medium such as a connected data communication or a memory card. According to the latter, it is not necessary to change the connector and route the cable every time data is transmitted, which is convenient for the user. Many information devices equipped with various cableless communication functions have also appeared. As a method of transmitting data between small devices without a cable, radio waves that transmit and receive wireless signals using an antenna, such as wireless LAN (Local Area Network) and Bluetooth (registered trademark) communication represented by IEEE 802.11, are used. Communication methods have been developed.

In addition, a communication method called "ultra-wide band (UWB)", which has been attracting attention in recent years, uses a very wide frequency band of 3.1 GHz to 10.6 GHz, and transmits large-capacity wireless data of about 100 Mbps in a short distance. Therefore, a large amount of data such as a moving image or music data for one CD can be transferred at high speed in a short time.

The UWB communication has a communication distance of about 10 m from the relationship of transmission power, and a short-range wireless communication system such as PAN (Personal Area Network) is assumed. For example, in IEEE 802.15.3, a data transmission system having a packet structure including a preamble has been devised as an access control system for UWB communication. In addition, Intel Corporation is considering a wireless version of USB (Universal Serial Bus), which is widely used as a general-purpose interface for personal computers, as a UWB application.

In addition, UWB communication allows data transmission exceeding 100 Mbps without occupying a transmission band of 3.1 GHz to 10.6 GHz, and considering the ease of making an RF circuit, 3.1-4. A transmission system using a 9 GHz UWB low band is also actively developed.

Here, under the Radio Law in Japan, the electric field strength (the strength of radio waves) at a distance of 3 meters from the radio equipment is below a predetermined level, that is, about the noise level for other radio systems in the vicinity. With weak radio, there is no need to obtain a radio station license, and the development and manufacturing costs of the radio system can be reduced. The above-described UWB communication can configure a short-range wireless communication system with a relatively low electric field level from the relationship of transmission power. However, when a UWB communication system is configured by a radio wave communication system that transmits and receives radio signals using an antenna, it is difficult to suppress the generated electric field to such a weak level.

Many of the conventional wireless communication systems adopt a radio communication system, and propagate signals using a radiation electric field generated when a current is passed through an antenna (antenna). In this case, since a radio wave is emitted from the transmitter side regardless of whether there is a communication partner, there is a problem that it becomes a generation source of an interference radio wave for a nearby communication system. Further, since the antenna on the receiver side receives not only the desired wave from the transmitter but also a radio wave arriving from a distance, it is easily affected by the surrounding interfering radio waves and causes a decrease in reception sensitivity. Further, when there are a plurality of communication partners, it is necessary to perform complicated settings in order to select a desired communication partner. For example, when a plurality of sets of wireless devices perform wireless communication in a narrow range, it is necessary to perform communication by performing division multiplexing such as frequency selection in order to avoid mutual interference. In addition, since radio waves cannot communicate when their polarization directions are orthogonal, it is necessary for the antennas to have the same polarization direction between the transceivers.

For example, when considering a contactless data communication system at a close distance of several millimeters to several centimeters, the transmitter / receiver is strongly coupled at a short distance, while a signal is transmitted to a long distance to avoid interference with other systems. It is preferable not to arrive. In addition, it is desirable that the devices that perform data communication do not depend on each other's posture (orientation) when they are brought close to each other, and that they are coupled, that is, have no directivity. In addition, in order to perform large-capacity data communication, it is desirable that broadband communication is possible.

The wireless communication includes a communication method using an electrostatic field or an induction field in addition to the radio wave communication using the radiated electric field. For example, in an existing non-contact communication system mainly used for RFID (Radio Frequency Identification), an electric field coupling method or an electromagnetic induction method is applied. The static electric field and the induction electric field are inversely proportional to the cube of the distance and the square of the distance with respect to the distance from the source, respectively, so that the electric field strength (radio wave strength) at a distance of 3 meters from the radio equipment is below a predetermined level. Weak wireless is possible, and there is no need to obtain a radio station license. Also, in this type of contactless communication system, the transmission signal attenuates steeply according to the distance. Therefore, when there is no communication partner in the vicinity, a coupling relationship does not occur, so that other communication systems are not disturbed. Further, even when radio waves arrive from a distance, the coupler (coupler) does not receive radio waves, so that it is not necessary to receive interference from other communication systems. In other words, it can be said that contactless / ultra-short-range communication by electric field coupling using an induced electric field or an electrostatic field is suitable for realizing weak wireless.

A contactless ultra-short-range communication system has several advantages over a normal wireless communication system. For example, when wireless signals are exchanged between devices that are relatively distant from each other, the quality of signals in the wireless section will decrease depending on the presence of surrounding reflectors and the expansion of the communication distance. Therefore, there is no dependence on the surrounding environment, and high quality

transmission with a low error rate is possible using a high transmission rate. Also, in the ultra short-range communication system, there is no room for unauthorized devices to intercept transmission data, and it is not necessary to consider prevention of hacking and ensuring confidentiality on the transmission path.

Further, in radio wave communication, since the antenna needs to have a size that is about one-half or one-fourth of the wavelength λ used, the apparatus inevitably increases in size. On the other hand, there is no such restriction in the ultra short-range communication system using an induced electric field or an electrostatic field.

For example, by forming a communication auxiliary body set in which RFID tags are positioned between a plurality of communication auxiliary bodies, and arranging RFID tags attached to a plurality of products so as to be sandwiched between the communication auxiliary bodies, RFID There has been proposed an RFID tag system that enables stable reading / writing of information even when tags are overlapped (see, for example, Patent Document 1).

In addition to the apparatus main body and a mounting means for mounting the apparatus main body on the body, the antenna coil and the data communication means for performing data communication with an external communication device through the antenna coil in a non-contact manner. A data communication device using an induction magnetic field in which an antenna coil and data communication means are arranged in an outer case provided in the upper part of the device body has been proposed (see, for example, Patent Document 2).

In addition, an antenna coil for data communication with an external device is mounted on a memory card inserted into the portable information device, and an RFID antenna coil is disposed outside the memory card insertion slot of the portable information device. A proposal has been made on a mobile phone having an RFID that secures a communication distance without impairing portability (see, for example, Patent Document 3).

A conventional RFID system using an electrostatic field or an induction electric field uses a low frequency signal, and therefore has a low communication speed and is not suitable for a large amount of data transmission. In the case of a communication method using an induction magnetic field by an antenna / coil, if there is a metal plate on the back of the coil, communication cannot be performed, and a large area is required on the plane on which the coil is arranged. There are also implementation issues. Further, the loss in the transmission path is large, and the signal transmission efficiency is not good.

On the other hand, the present inventors transmit a high-frequency signal by electric field coupling, that is, super transmission that transmits the above UWB communication signal using electric field coupling by an electrostatic field or an induction electric field, or magnetic field coupling by an induction magnetic field. We believe that high-speed data transmission considering confidentiality can be realized by a short-range communication system using a weak electric field that does not

enables high-speed data transmission considering confidentiality and is realized by a short-range communication system using a weak electric field that does not require a license as a radio station. In the UWB communication system using an electrostatic field or an induction field, the present inventors consider that a large amount of data such as a moving image or music data for one CD can be transferred in a short time.

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In radio communication systems using radio fields that radiate electric fields, radio signals can be propagated far away, but in radio frequency radio communication systems, unintended radio waves can interfere with other radio systems, and peripheral information devices. Communication may be hindered by external interference radio waves. If a radio wave absorber is placed in the vicinity of the antenna of the wireless device, unnecessary radio waves can be blocked, but the desired radio wave that propagates the desired signal is also absorbed and communication cannot be performed.

On the other hand, in the case of an electric field coupling type non-contact communication system in which a communication distance is limited to a short distance and coupled by an electrostatic field or an induction electric field, or a magnetic field coupling type non-contact communication system coupled by an induction magnetic field, a coupling electrode. Alternatively, if the coil is ideally designed, generation of unnecessary radio waves can be suppressed and reception of external radio waves can be prevented. As described above, high-speed data transmission considering confidentiality can be realized by a very short-range communication system that transmits an UWB communication signal using an electrostatic field, by a weak electric field that does not require a license as a radio station.

However, in practice, it is difficult to design a high-frequency circuit so as to completely suppress the radiated electric field, and even a communication device originally designed to be an electric field coupling type may not be able to detect minor mismatches in the circuit or the ground. There is a problem that unnecessary radio waves are oscillated or received by a flowing current or the like. For example, assuming that the input power to the coupler is 100, a situation in which a ratio of 10 is radiated as a radio wave is also conceivable. As described above, the radio wave generated by the radiated electric field propagates farther than the static electric field and the induced electric field, so that the influence on the external electronic device and the influence on the external electronic device are large.

The present invention has been made in view of such a technical problem, and its main purpose is to suitably transmit a high-frequency signal between information devices arranged at a short distance by using an electrostatic field or an induced electric field. An excellent communication system and communication apparatus capable of suitably transmitting a high-frequency signal using an induced magnetic field between information devices arranged at a short distance are provided. It is in.

A further object of the present invention is to provide an excellent communication system capable of efficiently transmitting a high-frequency signal between couplers mounted on each information device and enabling large-capacity transmission using electric field coupling or magnetic field coupling at a short distance, and it is to provide a communication device.

A further object of the present invention is to prevent the generation of an electrostatic field and an induction field, and to prevent external interference while suitably transmitting a high-frequency signal using electric field coupling or magnetic field coupling between information devices arranged at a short distance. It is an object of the present invention to provide an excellent communication system and communication apparatus that can suppress generation of a radiation electric field.

The present invention has been made in consideration of the above-described problems. The first aspect of the present invention is a transmission circuit unit that generates a high-frequency signal for transmitting data, and a high-frequency signal that transmits the high-frequency signal as an electrostatic field or an induction field. A transmitter with a coupler;

A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler; The high frequency coupler of the transmitter and the receiver includes a coupling electrode, a resonance unit for strengthening electrical coupling between the coupling electrodes, and a radio wave absorber disposed in the vicinity of the coupling electrode. With Transmitting the high-frequency signal by electric field coupling between high-frequency couplers facing the transmitter and the receiver; This is a communication system characterized by the above.

However, "system" here refers to a logical collection of a plurality of devices (or functional modules that realize specific functions), and each device or functional module is in a single housing. It does not matter whether or not (hereinafter the same).

Many wireless communication systems typified by wireless LANs use a radiated electric field that is generated when a current is passed through an antenna, so that radio waves are emitted regardless of whether there is a communication partner. In addition, the radiated electric field attenuates gently in inverse proportion to the distance from the antenna, so that the signal reaches a relatively far distance and becomes a source of disturbing radio waves to nearby communication systems, and the antenna on the receiver side also surrounds it. The reception sensitivity decreases due to the effects of interference. In short, in the radio wave communication system, it is difficult to realize wireless communication limited to a communication partner at a short distance.

On the other hand, the communication system according to the present invention includes a transmitter that generates a high-frequency signal such as UWB for transmitting data and a receiver that receives and processes the high-frequency signal. Are opposed by a static electric field or an induced electric field when they are opposed to each other at a close distance, and a high frequency signal is transmitted in a non-contact manner.

In a communication system using this type of electrostatic field or induction field, a coupling relationship does not occur when there is no communication partner nearby. In addition, the electric field strengths of the induction electric field and the electrostatic field are steeply attenuated in inverse proportion to the square and the cube of the distance, respectively. That is, an unnecessary electric field is not generated and the electric field does not reach far, so that it does not disturb other communication systems. Further, even when radio waves arrive from a distance, the coupling electrode does not receive radio waves, so that it is not necessary to receive interference from other communication systems. Therefore, weak radio that does not require a radio station license is possible, and it is not necessary to consider prevention of hacking and ensuring confidentiality on the transmission path. In addition, since it is a broadband communication using high-frequency signals such as UWB, it is possible to perform a large-capacity communication over a very short distance. For example, a large amount of data such as a moving image or music data for one CD can be transmitted at high speed in a short time. Can be transferred.

Here, in the high frequency circuit, a propagation loss occurs according to the propagation distance with respect to the wavelength. Therefore, when transmitting a high frequency signal such as UWB, it is necessary to suppress the propagation loss sufficiently low.

Therefore, in the communication system according to the present invention, the high-frequency coupler of the transmitter and the receiver includes a resonance unit and an impedance matching unit. The electric field coupling is strengthened by the mutual resonance parts, and the impedance matching part is configured to match the impedance between the electrodes of the transmitter and the receiver, that is, the coupling part, and suppress the reflected wave. In other words, the pair of high frequency couplers of the transmitter and the receiver are configured to operate as a band pass filter that passes a desired high frequency band.

The impedance matching unit and the resonance unit can be configured by a lumped constant circuit in which a series inductor and a parallel inductor are connected to a high-frequency signal transmission path, for example. However, since the lumped constant circuit determines constants such as inductance L and capacitance C based on the center frequency, impedance matching is not achieved in a band outside the assumed center frequency, and the operation as designed is do not do. In other words, it works effectively only in a narrow band. Particularly in the high frequency band, the resonance frequency is influenced by the fine structure of the lumped constant circuit portion and the variation of inductors and capacitors having a small value, so that it is difficult to adjust the frequency. In addition, when the impedance

matching part and the resonance part are configured with lumped constants, if a small chip inductor is used as the inductor, there is a loss inside the chip inductor, and the propagation loss between the high frequency couplers becomes large. is there.

Further, when the coupler is accommodated in the casing of the device, it is assumed that the center frequency is shifted due to the influence of the surrounding metal parts. For this reason, it is necessary to design the coupler in advance so as to effectively operate at a wide frequency. When a plurality of devices having a narrow band are arranged, the band of the entire system is further narrowed, so that it is difficult to simultaneously use a plurality of high-frequency couplers in a broadband communication system.

Therefore, in the communication system according to the present invention, the high-frequency coupler changes the coupling electrode and the impedance matching unit and the resonance unit for impedance matching between the coupling electrodes from a lumped constant circuit to a distributed constant circuit. By configuring instead, a broader band is realized.

The high-frequency coupler is mounted on a printed circuit board as one of the mounting components, similarly to a circuit module constituting a communication circuit unit that processes a high-frequency signal that transmits data. In such a case, the distributed constant circuit can be configured as a stub composed of a microstrip line or a coplanar waveguide formed on a printed circuit board. Then, a ground is formed on the other surface of the printed circuit board, and the tip portion of the stub may be connected to the ground through a through hole in the printed circuit board. The stub has a length approximately half of the wavelength of the used frequency. Then, the coupling electrode may be disposed at a position substantially at the center of the stub that is the maximum amplitude position of the standing wave.

The coupling electrode can be configured as a conductor pattern deposited on the surface of a spacer made of an insulator. The spacer is a circuit component that is surface-mounted on the printed circuit board. When the spacer is mounted on the printed circuit board, the conductor pattern of the coupling electrode is located approximately at the center of the stub through the through hole in the spacer. Connected to position. Further, by using an insulator having a high dielectric constant as a spacer, the length of the stub can be made shorter than a half wavelength due to the wavelength shortening effect.

However, it is difficult to completely suppress the radiated electric field in the design of an actual high-frequency circuit, and even a communication device originally designed as an electric field coupling type as described above may have a slight mismatch in the circuit or in the ground. There is a problem that unnecessary radio waves are oscillated or received by the current flowing through the.

Therefore, in the communication system according to the present invention, when the high frequency couplers of the transceiver are coupled by an electrostatic field or an induction field, a magnetic loss material is disposed in the vicinity of the coupling electrode.

It is effective to use a radio wave absorber to suppress a radiation electric field that propagates far away and has a large influence between electronic devices. When the radio wave absorber is considered as a distributed constant circuit at a high frequency, the distributed series resistance R (Ω / m) and the distributed parallel conductance G (S / m) play a role of absorbing energy. Here, the distributed series resistance R corresponds to μ'' representing the imaginary part of the complex permeability, and the distributed parallel conductance G is the sum of ϵ'' representing the imaginary part of the complex permittivity and the conductivity σ divided by the angular frequency ω . That is, it corresponds to $\epsilon'' + \sigma / \omega$. The electromagnetic wave absorber is composed of a magnetic loss material having a complex dielectric constant μ'' , a dielectric loss material having a complex dielectric constant ϵ'' , and a conductivity having a conductivity σ depending on the material constant responsible for the loss. The loss material can be classified into three types: the magnetic loss μ'' is caused by the spin responsible for the magnetization in the magnetic material being delayed by the change in the high frequency magnetic field, and the dielectric loss ϵ'' is the dielectric pole that causes the dielectric property of the high frequency electric field. The conductor loss σ is caused by the fact that a current in phase with the electric field flows and the energy of the electromagnetic wave is converted into heat.

Here, the radio wave is a wave in which an "electric field wave" and a "magnetic field wave" are sequentially transmitted through the air, and is a kind of electromagnetic wave. Usually, when a current is passed through a conductor such as an antenna, a magnetic field is generated around the conductor, and an electric field is generated in conjunction with the magnetic field, and a magnetic field is generated by this electric field. A magnetic field and an electric field are alternately repeated, and radio waves arrive up to a relatively long distance (see FIG. 27). The wave of the electric field and the wave of the magnetic field interact like a chain and proceed in the traveling direction of the wave while maintaining an orthogonal relationship (see FIG. 28).

As described above, since the radio wave is accompanied by both the electric field wave and the magnetic field wave, only one of the waves is suppressed, and the other wave is significantly attenuated, so that the propagation can be suppressed. That is, the radio wave can be similarly suppressed by a magnetic loss material that mainly absorbs and attenuates a magnetic field and a dielectric loss material that mainly absorbs and attenuates an electric field.

In a communication system that performs non-contact communication by electric field coupling between opposing electrodes as in the present invention, even if the magnetic loss material is around the coupling electrode, the radio wave is absorbed by the magnetic loss material, and the induced electric field are not easily affected. Therefore, the magnetic loss material placed near the coupling electrode suppresses the effects of unnecessary radio waves and external interference radio waves, and at the same time, stable data communication can be performed by electric field coupling between the transmitter and the receiver at a short distance. it can.

A second aspect of the present invention provides a transmitter circuit unit that generates a high-frequency signal for transmitting data, a transmitter including a high-frequency coupler that transmits the high-frequency signal as an induction magnetic field,

A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler; The high-frequency coupler of the transmitter and receiver includes a coupling coil and a radio wave absorber disposed in the vicinity of the coupling coil, Transmitting the high-frequency signal by coupling an induction magnetic field between high-frequency couplers facing the transmitter and the receiver, This is a communication system characterized by the above.

According to a second aspect of the present invention, in a magnetic field coupling type communication system in which a transceiver includes a coil coupled to an induction magnetic field and performs non-contact communication at a short distance by magnetic coupling, the coupling coil is a dielectric loss material. It is arranged in a position in the inside or surface. In this case, similar to the case of a non-contact communication system using electric field coupling, if the dielectric loss material is around the coil, the radio wave is absorbed by the dielectric loss material, but the induced magnetic field is hardly affected. For this reason, radio waves are absorbed by dielectric loss material placed near the coupling coil, but at the same time it is stable due to magnetic coupling between the transmitter and receiver at a short distance, while suppressing the effects of unnecessary radio emissions and external interference radio waves. Data communication can be performed.

According to the present invention, electric field coupling is generated in the high frequency band between the couplers of the transceiver and operates effectively in a wide band, and a large-capacity transmission is achieved by forming an electric field coupling transmission line or a magnetic field coupling transmission line that is resistant to noise. An excellent communication system and communication apparatus that can be provided can be provided. The impedance matching part and the resonance part of the high-frequency coupler can be configured as a pattern on the printed circuit board that is a distributed constant circuit, that is, a stub, and can operate suitably in a wide band.

In addition, according to the present invention, an excellent communication system capable of efficiently transmitting a high-frequency signal between couplers

mounted on each information device and enabling large-capacity transmission using electric field coupling or magnetic field coupling at a short distance. In addition, a communication device can be provided.

According to the present invention, it is possible to prevent electromagnetic waves emitted from the transmitter from adversely affecting other electronic devices by suppressing the exchange of unnecessary radio waves, and to prevent malfunction due to external interference radio waves.

Other objects, features, and advantages of the present invention will become apparent from more detailed description based on embodiments of the present invention described later and the accompanying drawings.

Hereinafter, embodiments of the present invention will be described in detail with reference to the drawings.

The present invention relates to a communication system that performs data transmission between information devices using electric field coupling of an electrostatic field or an induction electric field. According to a communication method based on an electrostatic field or an induced electric field, when there is no communication partner nearby, there is no coupling relationship and no radio waves are emitted, so that other communication systems are not disturbed. Further, even when radio waves arrive from a distance, the coupler does not receive radio waves, so that it is not necessary to receive interference from other communication systems.

In the conventional radio communication using an antenna, the electric field strength of the radiated electric field is inversely proportional to the distance, whereas in the induced electric field, the electric field strength is inversely proportional to the distance squared, and in the static electric field, the electric field strength is inversely proportional to the cube of the distance. Therefore, according to the communication method based on electric field coupling, it is possible to configure a weak radio having a noise level for other radio systems in the vicinity, and it is not necessary to obtain a license from the radio station.

An electrostatic field that varies with time may be referred to as a "quasi-electrostatic field". In this specification, however, the electrostatic field is collectively referred to as an "electrostatic field".

Conventional communication using an electrostatic field or an induction field uses a low-frequency signal and is not suitable for transmitting a large amount of data. On the other hand, in the communication system according to the present invention, high-capacity transmission is possible by transmitting a high-frequency signal by

electric field coupling. Specifically, by applying a communication method using a high frequency and a wide band, such as UWB communication, to electric field coupling, it is possible to realize weak data and large capacity data communication.

UWB communication uses a very wide frequency band of 3.1 GHz to 10.6 GHz, and can realize high-capacity wireless data transmission of about 100 Mbps despite a short distance. In addition, UWB communication allows data transmission exceeding 100 Mbps without occupying a transmission band of 3.1 GHz to 10.6 GHz, and considering the ease of making an RF circuit, 3.1-4. A transmission system using a 9 GHz UWB low band is also actively developed.

The present inventors consider that a data transmission system using UWB low band is one of effective wireless communication technologies installed in mobile devices. For example, it is possible to realize high-speed data transmission in a short-distance area such as an ultra-high-speed short-range DAN (Device Area Network) including a storage device. According to a UWB communication system using electric field coupling such as an electrostatic field and an induction field, data communication by a weak electric field is possible and, for example, a large amount of data such as a moving image or music data for one CD can be quickly and quickly. : think it can be transferred with.

FIG. 1 shows a configuration example of a non-contact communication system using electric field coupling by an electrostatic field or an induction electric field. The illustrated communication system includes a transmitter 10 that transmits data and a receiver 20 that receives data. As shown in the figure, when the high-frequency couplers of the transceivers are arranged face to face, the two electrodes operate as one capacitor, and as a whole operate like a band-pass filter; the two high-frequency couplers High-frequency signals can be efficiently transmitted between the two. In the communication system shown in the figure, in order to suitably form a transmission path by electric field coupling, sufficient impedance matching is achieved between the high-frequency couplers of the transmitter and receiver, and it operates effectively in a high frequency band and in a wide band. It is necessary to.

The transmitter / receiver electrodes 14 and 24 of the transmitter 10 and the receiver 20 are disposed to face each other with a spacing of, for example, about 3 cm, and can be coupled to each other. The transmission circuit unit 11 on the transmitter side generates a high-frequency transmission signal such as a UWB signal based on transmission data when a transmission request is generated from a higher-level application, and the signal propagates from the transmission electrode 14 to the reception electrode 24. Then, the receiving circuit unit 21 on the receiver 20 side demodulates and decodes the received high-frequency signal and passes the reproduced data to the upper application.

According to a communication method using a high frequency and a wide band like UWB communication, it is possible to realize ultrahigh-speed data transmission of about 100 Mbps at a short distance. In addition, when UWB communication is performed by electric field coupling instead of radio wave communication, the electric field strength is inversely proportional to the cube of the distance or the square of the distance, so the electric field strength (radio wave strength) at a distance of 3 meters from the radio equipment is By suppressing the frequency to a predetermined level or less, it is possible to obtain a weak radio that does not require a radio station license, and a communication system can be configured at low cost. In addition, when data communication is performed at an extremely short distance by the electric field coupling method, the signal quality is not deteriorated by the reflecting objects present in the vicinity, and it is not necessary to consider the prevention of hacking and ensuring the confidentiality on the transmission line. There are advantages such as.

On the other hand, since the propagation loss increases according to the propagation distance with respect to the wavelength, it is necessary to sufficiently suppress the propagation loss when a high-frequency signal is propagated by electric field coupling. In a communication system that transmits high-frequency broadband signals such as UWB signals by electric field coupling, even ultra-short-distance communication of about 3 cm is equivalent to about one-half wavelength for the used frequency band of 4 GHz, so it is ignored. It is a length that cannot be done. In particular, the problem of characteristic impedance is more serious in a high-frequency circuit than in a low-frequency circuit, and the influence of impedance mismatch becomes apparent at the coupling point between the electrodes of the transceiver.

In communication using frequencies in the kHz or MHz band, the propagation loss in space is small, so that the transmitter and receiver have a coupler consisting only of electrodes as shown in FIG. 2, and the coupling part is simply a parallel plate capacitor. Even in the case of operating as, it is possible to perform desired data transmission. However, in communication using high frequency in the GHz band, since propagation loss in space is large, it is necessary to suppress signal reflection and improve transmission efficiency. As shown in FIG. 3, even if the high-frequency signal transmission path is adjusted to a predetermined characteristic impedance Z_0 in each of the transmitter and the receiver, impedance matching is performed at the coupling portion only by coupling with a parallel plate capacitor, I can't take it. For this reason, in the impedance mismatching part in a coupling part, a signal is reflected, a propagation loss arises, and efficiency falls. For example, even if the high-frequency signal transmission line connecting the transmission circuit unit 11 and the transmission electrode 14 is a coaxial line with 50Ω impedance matching, the impedance at the coupling portion between the transmission electrode 14 and the reception electrode 24 is low. If they are mismatched, the signal is reflected to cause a propagation loss.

Therefore, as shown in FIG. 4, the high-frequency couplers disposed in the transmitter 10 and the receiver 20 are connected to the plate-like electrodes 14 and 24, the series inductors 12 and 22, and the parallel inductors 13 and 23, respectively. Connected to the transmission line. When such a high-frequency coupler is disposed facing each other as shown in FIG. 5, the two electrodes operate as one capacitor and operate like a band-pass filter as a whole. High-frequency signals can be efficiently transmitted between the two. Here, the high-frequency signal transmission line indicates a coaxial cable, a microstrip line, a coplanar line, or the like.

Here, if the purpose is simply to perform impedance matching between the electrodes of the transmitter 10 and the receiver 20, that is, the coupling portion, to suppress the reflected wave, each coupler is connected as shown in FIG. 6A. It is not necessary to configure the flat electrodes 14 and 24, the series inductors 12 and 22 and the parallel inductors 13 and 23 to be connected to the high-frequency signal transmission path, and each coupler is formed as a flat electrode 14 as shown in FIG. 6B. , 24 and a series inductor may be connected to a high-frequency signal transmission line. That is, even when a series inductor is inserted on the high-frequency signal transmission line, when there is a coupler on the receiver side at a very short distance facing the coupler on the transmitter side, the impedance at the coupling portion becomes continuous. It is possible to design as such.

However, in the configuration example shown in FIG. 6B, there is no change in the characteristic impedance before and after the coupling portion, so the magnitude of the current does not change. On the other hand, as shown in FIG. 6A, when connected to the ground via the parallel inductance before the electrode at the end of the high-frequency signal transmission path, the coupler alone has the characteristic impedance Z_0 on the near side of the coupler. On the other hand, the characteristic impedance Z_{1st} at the end of the coupler is reduced (that is, $Z_0 > Z_{1st}$), so that it has a function as an impedance conversion circuit, and the output current of the coupler with respect to the input current I_0 to the coupler, I_1 can be amplified (ie, $I_0 < I_1$).

7A and 7B show a state in which an electric field is induced by electric field coupling between electrodes in each of the couplers with and without the parallel inductance. From this figure, it can be understood that the coupler is provided with a parallel inductor in addition to the series inductor, thereby inducing a larger electric field and causing strong coupling between the electrodes. When a large electric field is induced near the electric field as shown in FIG. 7A, the generated electric field propagates in the front direction of the electrode surface as a longitudinal wave that vibrates in the traveling direction. This electric wave makes it possible to propagate a signal between the electrodes even when the distance between the electrodes is relatively large.

Therefore, in a communication system that transmits high-frequency signals such as UWB signals by electric field coupling, the essential conditions for a high-frequency coupler are as follows.

- (1) There is an electrode for coupling by an electric field.
- (2) There is a parallel inductor for coupling with a stronger electric field.
- (3) in the frequency band used for communication, the inductor and capacitor constants are set so that impedance matching can be achieved when the coupler is placed face to face.

As shown in FIG. 5, the band-pass filter comprising a pair of high-frequency couplers whose electrodes face each other has its pass frequency f_0 determined by the inductance of the series inductor and the parallel inductor and the capacitance of the capacitor constituted by the electrodes. can do. FIG. 8 shows an equivalent circuit of a bandpass filter composed of a set of high-frequency couplers. If the characteristic impedance R_0 [Ω], the center frequency f_0 [Hz], the phase difference between the input signal and the passing signal is α [radian] ($\pi < \alpha < 2\pi$), and the capacitance of the capacitor constituted by the electrodes is $C/2$. The constants L_1 and L_2 of the parallel and series inductances constituting the band pass filter can be obtained by the following equations according to the operating frequency f_0 .

Further, when the coupler functions as an impedance conversion circuit as a single unit, the equivalent circuit is as shown in FIG. in the illustrated circuit diagram, an impedance conversion circuit that converts the characteristic impedance from R_1 to R_2 by selecting the parallel inductance L_1 and the series inductance L_2 in accordance with the operating frequency f_0 so as to satisfy the following equation. Can be configured.

As described above, in the non-contact communication system shown in FIG. 1, a communication device that performs UWB communication uses the high-frequency coupler shown in FIG. 4 instead of using an antenna in a conventional radio communication device of radio wave communication system. As a result, it is possible to realize ultra-short distance data transmission having unprecedented characteristics.

As shown in FIG. 5, the two high-frequency couplers whose electrodes face each other with a very short distance operate as a band-pass filter that passes a signal in a desired frequency band, and a single high-frequency coupler. Acts as an impedance conversion circuit that amplifies the current. On the other hand, when the high-frequency coupler is placed alone in free space, the input impedance of the high-frequency coupler does not match the characteristic impedance of the high frequency signal transmission path, so that the signal entering from the high-frequency signal transmission path is reflected in the high-frequency coupler. Not radiated outside.

Therefore, in the non-contact communication system shown in FIG. 1, when there is no partner to communicate with on the transmitter side, radio waves do not flow like an antenna, and the partner to communicate with approaches each electrode. Only when a capacitor is formed, high-frequency signals are transmitted by impedance matching as shown in FIG.

Here, consider the electromagnetic field generated in the coupling electrode on the transmitter side. FIG. 10 shows an electromagnetic field generated by a minute dipole. As shown in the figure, the electromagnetic field is roughly divided into an electric field component (transverse wave component) E_θ that vibrates in a direction perpendicular to the propagation direction and an electric field component (longitudinal wave component) E_R that vibrates in a direction parallel to the propagation direction. . In addition, a magnetic field H_ϕ is generated around the minute dipole. The following equation represents the electromagnetic field due to a small dipole, but since an arbitrary current distribution can be considered as a continuous collection of such small dipoles, the electromagnetic field induced thereby has similar properties (for example, (See, "Antenna / Radio Wave Propagation" by Yasuto Mushiaki (Corona, pages 16-18)).

As can be seen from the above equation, the transverse wave component of the electric field includes a component that is inversely proportional to the distance (radiated electric field), a component that is inversely proportional to the square of the distance (induced electric field), and a component that is inversely proportional to the cube of the distance (electrostatic field).). Further, the longitudinal wave component of the electric field is composed of only a component inversely proportional to the square of the distance (inductive electric field) and a component inversely proportional to the cube of the distance (electrostatic field), and does not include the component of the radiated electromagnetic field. Further, the electric field E_R becomes maximum in the direction in which $|\cos \theta| = 1$, that is, in the direction of the arrow in FIG.

In the radio communications are widely used in wireless communication, radio wave emitted from an antenna is a transverse wave $E_{\theta\text{eta}}$ oscillating in the perpendicular direction its traveling direction, the radio wave can not communicate with the direction of polarization is orthogonal. In contrast, electromagnetic waves emitted from the coupling electrode in a communication system utilizing an electrostatic field or an induced electric field, in addition to the transverse wave $E_{\theta\text{eta}}$, including longitudinal wave E_R which oscillates in the traveling direction. The longitudinal wave E_R is also called "surface wave". Incidentally, a surface wave can also propagate through the inside of a medium such as a conductor, a dielectric material, or a magnetic material.

Of the transmission waves using an electromagnetic field, those having a phase velocity v smaller than the light velocity c are called slow waves, and those having a larger phase velocity v are called fast waves. The surface wave corresponds to the former slow wave.

longitudinal wave electric field component E_z is generated on the surface of the coupling electrode, but the transverse wave component E_θ including the radiation electric field is changed to E_R . Since it is relatively small, almost no radio waves are emitted. That is, no disturbing wave to other neighboring systems is generated. Also, most of the signal input to the high frequency coupler is reflected by the electrode and returns to the input end.

On the other hand, when one set of high-frequency couplers is used, that is, when the high-frequency couplers are arranged at a short distance between the transmitter and the receiver, the coupling electrodes are coupled mainly by a quasi-electrostatic field component to form one capacitor. It works like a bandpass filter and is in a state where impedance matching is achieved. Therefore, most of the signal / power is transmitted to the other party in the passing frequency band, and the reflection to the input end is small. The "short distance" here is defined by the wavelength λ , and corresponds to the distance d between the coupling electrodes being $d \ll \lambda / 2\pi$. For example, when the use frequency f_0 is 4 GHz, the distance between the electrodes is 10 mm or less.

Also, when placing the EFC medium distance between the transmitter and the receiver are on the periphery of the coupling electrode of the transmitter, the electrostatic field is attenuated, the longitudinal wave electric field E_R mainly composed of an induced electric field is generated. Longitudinal wave electric field E_R is received by the coupling electrode of the receiver, the signal is transmitted. However, in comparison with the case where both couplers are arranged at a short distance, in the high frequency coupler on the transmitter side, the ratio of the input signal reflected by the electrode and returning to the input end becomes higher. The "medium distance" here is defined by the wavelength λ , the distance d between the coupling electrodes is about 1 to several times larger than $\lambda / 2\pi$, and the distance between the electrodes is 10 to 40 mm when the use frequency f_0 is 4 GHz. At the time.

As described above, in the high-frequency coupler shown in FIG. 4, the operating frequency f_0 of the impedance matching unit is determined by the constants L_1 and L_2 of the parallel inductor and the series inductor. It is a general circuit manufacturing method to configure these series inductors 12 and 22 and parallel inductors 13 and 23 with circuit elements that are regarded as lumped constant circuits. However, it is known that a lumped constant circuit has a narrower band than a distributed constant circuit in a high-frequency circuit, and the inductor constant becomes small when the frequency is high, so that there is a problem that the resonance frequency shifts due to variations in the constant.

Therefore, in the present invention, the high frequency coupler is configured by replacing the lumped constant circuit from the lumped constant circuit and the distributed constant circuit in the impedance matching section and the resonance section, thereby realizing a wide band. FIG. 11 shows a configuration example of a high-frequency coupler using a distributed constant circuit for the impedance matching unit and the resonance unit.

In the illustrated example, a high-frequency coupler is disposed on a printed circuit board 101 having a ground conductor 102 formed on the lower surface and a printed pattern formed on the upper surface. Instead of a parallel inductor and a series inductor, a microstrip line or a coplanar waveguide, that is, a stub 103 is formed as an impedance matching unit and a resonance unit of a high frequency coupler, and a transmission / reception circuit is connected via a signal line pattern 104. The module 105 is connected. The stub 103 is connected to the ground 102 on the lower surface via a through hole 106 penetrating the printed circuit board 101 at the tip, and is short-circuited, and is connected to the coupling electrode 108 via a metal wire 107 near the center of the stub 103. is done.

The "stub" in the technical field of electronics is a general term for electric wires with one end connected and the other end not connected or connected to the ground, and is used for adjustment, measurement, impedance matching, filters, etc. Provided on the way.

The length of the stub 103 is about a half wavelength of the high frequency signal, and the signal line 104 and the stub 103 are formed by a microstrip line, a coplanar line, or the like on the printed circuit board 101. When the length of the stub 103 is a half wavelength and the tip is short-circuited, the voltage amplitude of the standing wave generated in the stub 103 becomes 0 at the tip of the stub, and from the center of the stub, that is, from the tip of the stub 103. It is maximum at a quarter wavelength (see FIG. 12). By connecting the coupling electrode 108 with the metal wire 107 at the center of the stub 103 having the maximum voltage amplitude, a high-frequency coupler with good propagation efficiency can be made.

Since the impedance matching section is composed of a stub 103, that is, a distributed constant circuit composed of a microstrip line or a coplanar waveguide on the printed circuit board 101, uniform characteristics can be obtained over a wide band. Therefore, the communication system shown in FIG. On the other hand, it is possible to apply a frequency spread modulation scheme such as DSSS (Direct Sequence Spread Spectrum) and OFDM (Orthogonal Frequency Division Multiplexing). The stub 103 is a microstrip line or a coplanar waveguide on the printed circuit board 101, and since its direct current resistance is small, there is little loss even for a high-frequency signal, and propagation loss between high-frequency couplers can be reduced.

Since the size of the stub 103 constituting the distributed constant circuit is as large as about a half wavelength of a high-frequency signal, the dimensional error due to manufacturing tolerances is very small compared to the overall length, resulting in variations in characteristics. Hateful.

FIG. 13 shows a comparison of frequency characteristics of the high-frequency coupler when the impedance matching unit is composed of a lumped constant circuit and a distributed constant circuit. However, the high-frequency coupler in which the impedance matching unit is configured by a lumped constant circuit, as shown in FIG. 14, a coupling electrode is disposed at the tip of the signal line pattern on the printed circuit board via a metal wire, and the signal line it is assumed that a parallel inductor component is mounted at the tip of the pattern, and the other end of the parallel inductor is connected to a ground conductor through a through hole in the printed circuit board. Moreover, as shown in FIG. 15, the high frequency coupler which comprised the impedance matching part with the distributed constant circuit has a metal wire in the center of the stub formed on the printed circuit board and having a length of a half wavelength. It is assumed that a coupling electrode is provided and the stub is connected to the ground conductor at the tip thereof through a through hole in the printed circuit board. It is assumed that each high frequency coupler is adjusted so that the operating frequency is around 3.8 GHz. 14 and 15, a high frequency signal is transmitted from the port 1 to the port 2 by the microstrip line, and each high frequency coupler is disposed in the middle of the microstrip line. The frequency characteristic is measured as a transfer characteristic from port 1 to port 2 and the result is shown in FIG.

Since the high-frequency coupler can be regarded as an open end when it is not coupled with other high-frequency couplers, the high-frequency signal input from the port 1 is not supplied to the high-frequency coupler but is transmitted to the port 2 as it is. Therefore, in the vicinity of 3.8 GHz, which is the operating frequency of the high frequency coupler, the propagation loss S_{21} representing the signal intensity transmitted from the port 1 to the port 2 is a large value in either high frequency coupler. However, in the case of the high frequency coupler shown in FIG. 14, the value of S_{21} is greatly reduced at a frequency deviating back and forth from the operating frequency. On the other hand, it can be seen that the high frequency coupler shown in FIG. 15 maintains good characteristics with a large value of S_{21} over a wide frequency band centered on the operating frequency. That is, it can be said that the high-frequency coupler operates effectively in a wide band by configuring the impedance matching unit with a distributed constant circuit.

In the vicinity of the center of the stub 103, the coupling electrode 108 is connected via the metal wire 107, and it is preferable that the metal wire is connected at the approximate center of the coupling electrode 108. This is because, by connecting a high-frequency transmission line to the center of the coupling electrode, current flows evenly in the electrode, and unnecessary radio waves are not emitted in the direction substantially perpendicular to the electrode surface in front of the electrode (see FIG. 16A). For example, if a high-frequency transmission line is connected at a position offset from the center of the coupling electrode, an unequal current flows in the termination electrode and operates like a microstrip antenna, radiating unnecessary radio waves. (See FIG. 16B).

Also, in the field of radio wave communication, as shown in FIG. 17, a "capacitance loaded type" antenna is widely known in which a metal is attached to the tip of an antenna element to provide a capacitance, and the height of the antenna is shortened. At first glance, the structure is similar to the coupler shown in FIG. Here, the difference between the coupler used in the transceiver in this embodiment and the capacity loaded antenna will be described.

The capacitively loaded antenna shown in FIG. 17 radiates radio waves in the directions B_1 and B_2 around the radiating element of the antenna, but the A direction is a null point that does not radiate radio waves. When the electric field generated around the antenna is examined in detail, the radiation electric field attenuated in inverse proportion to the distance from the antenna, the induced electric field attenuated in inverse proportion to the square of the distance from the antenna, and the distance from the antenna 3 An electrostatic field that decays in inverse proportion to the power is generated. Since the induced electric field and the electrostatic field are attenuated more rapidly depending on the distance than the radiated electric field, only the radiated electric field is discussed in a normal wireless system, and the induced electric field and the electrostatic field are often ignored. Therefore, even the capacitively loaded antenna shown in FIG. 17 generates an induced electric field and an electrostatic field in the direction A, but since it attenuates quickly in the air, it is actively used in radio communication. Absent.

Up to this point, the configuration of a high-frequency coupler used in a transceiver has been described in an electric field coupling type non-contact communication system in which a communication distance is limited to a short distance and coupling is performed by an electrostatic field or an induction electric field. If the coupling electrode is ideally designed, generation of unnecessary radio waves can be suppressed and reception of external radio waves can be prevented. This also applies to a magnetic field coupling type non-contact communication system in which coupling is performed by an induction magnetic field between coupling coils.

However, in practice, it is difficult to design a high-frequency circuit so as to completely suppress the radiated electric field, and even a communication device originally designed to be an electric field coupling type may not be able to detect minor mismatches in the circuit or the ground. There is a problem that unnecessary radio waves are oscillated or received by a flowing current or the like.

For example, in the high frequency coupler shown in FIG. 11, in order to avoid the electric field coupling between the ground conductor 102 and the coupling electrode 108 and to ensure the electric field coupling action with the high frequency coupler on the receiver side, the printed circuit board 101 is used. A sufficient height from the stub 103 on the circuit mounting surface to the coupling electrode 108 connected through the metal wire 107 must be taken. However, if the height from the circuit mounting surface to the coupling electrode 108 is too large, the metal wire 107 connecting the printed circuit board 101 and the coupling electrode 108 acts as an antenna, which is unnecessary due to the current flowing through the inside. Radio waves are emitted.

For example, assuming that the input power to the coupler is 100, a situation in which a power of 10 is radiated as a radio wave can be considered. As described above, the radio wave generated by the radiated electric field propagates farther than the static electric field and the induced electric field, so that the influence on the external electronic device and the influence on the external electronic device are large.

Therefore, in the communication system according to the present invention, the impedance matching section and the resonance section of the high frequency coupler are configured by a distributed constant circuit to widen the band, and a radio wave absorber is not provided in the high frequency coupler. Introducing a system that suppresses the exchange of radio waves, suppresses electromagnetic waves emitted from radios, and prevents adverse effects on other electronic devices and malfunctions caused by external interference radio waves.

It is effective to use a radio wave absorber to suppress a radiation electric field that propagates far away and has a large influence between electronic devices. When the radio wave absorber is considered as a distributed constant circuit at a high frequency, the distributed series resistance R (Ω / m) and the distributed parallel conductance G (S / m) play a role of absorbing energy. Here, the distributed series resistance R corresponds to μ'' representing the imaginary part of the complex permeability, and the distributed parallel conductance G is the sum of ϵ'' representing the imaginary part of the complex permittivity and the conductivity σ divided by the angular frequency ω . That is, it corresponds to $\epsilon'' + \sigma / \omega$. The electromagnetic wave absorber is composed of a magnetic loss material having a complex dielectric constant μ'' , a dielectric loss material having a complex dielectric constant ϵ'' , and a conductivity having a conductivity σ depending on the material constant responsible for the loss. There are three types of lossy materials.

The magnetic loss μ'' here is caused by the fact that the spin responsible for the magnetization in the magnetic material is delayed in the change of the high-frequency magnetic field. The magnetic material causing such magnetic loss has a high magnetic permeability such as ferrite. In addition, the dielectric loss ϵ'' is caused by the fact that the dipole providing the dielectric property is delayed from the change of the high frequency electric field. Further, the conductor loss σ is generated when a current having the same phase as the electric field flows and the energy of the electromagnetic wave is converted into heat. Incidentally, in the high frequency region, absorption due to dielectric loss of radio waves and absorption due to conductor loss may not be distinguished, and they may be collectively defined as dielectric loss. As

a dielectric loss material, what impregnated carbon to resin, such as urethane foam and styrene, is mentioned, for example.

Here, radio waves are waves in which "electric field waves" and "magnetic field waves" are sequentially transmitted through the air. Electric field waves and magnetic field waves interact like a chain and maintain an orthogonal relationship. Proceed in the direction of wave travel (see FIGS. 27 and 28). That is, since a radio wave is accompanied by both an electric field wave and a magnetic field wave, only one of the waves is suppressed, and the other wave is significantly attenuated, so that the propagation can be suppressed.

Magnetic loss materials can absorb radio waves by losing magnetic field waves and disrupting their interaction with electric field waves, but they do not affect electric fields such as electrostatic and induction fields. It is done. Therefore, in the present embodiment, as the radio wave absorber, a magnetic loss material that mainly absorbs and attenuates the magnetic field is disposed in the vicinity of the coupling electrode of the high frequency coupler. For example, a magnetic material such as ferrite can be used as the radio wave absorber.

The magnetic loss material disposed in the vicinity of the coupling electrode absorbs unwanted radio waves generated from the coupling electrode and interference waves coming from the outside as a result of the loss of the magnetic field component of the electromagnetic wave. In addition, although the induction magnetic field also suffers loss, there is no influence on the electric field coupling by the electrostatic field or induction electric field with the high frequency coupler on the communication partner side. Therefore, in the electric field coupling type non-contact communication system as shown in FIG. 1, it is possible to suppress the influence of unnecessary radio wave emission and external interference radio waves, and at the same time, stable data by electric field coupling of an electrostatic field at a short distance. Transmission can be performed.

As a modification of the above, in a magnetic field coupling type non-contact communication system in which the transmitter / receiver includes a coil coupled by an induction magnetic field and performs non-contact communication at a short distance by magnetic coupling, the coupling coil is a dielectric loss. It is conceivable to arrange it inside or on the surface of the material.

As already mentioned, radio waves are waves in which "electric field waves" and "magnetic field waves" are sequentially transmitted through the air. However, dielectric loss materials lose electric field waves and interact with magnetic field waves. By disrupting the action, radio waves can be absorbed, but it is considered that magnetic fields such as induced magnetic fields are not affected. Therefore, a dielectric loss material that mainly absorbs and attenuates the electric field is disposed as a radio wave absorber in the vicinity of the coupling coil of the high frequency coupler. For example, a resin such as urethane foam or styrene impregnated with carbon can be used as the radio wave absorber.

The dielectric loss material disposed in the vicinity of the coupling coil, the electric field component of the electromagnetic wave as a result of loss, interference waves coming from unwanted radio waves or external generated by coupling coil is absorbed. In addition, although an electric field such as an electrostatic field or an induction field also suffers a loss, there is no influence on the magnetic field coupling by the induction magnetic field with the high frequency coupler on the communication partner side. Therefore, in the magnetic field coupling type non-contact communication system, it is possible to suppress the influence of unnecessary radio wave radiation and external interference radio waves, and at the same time, perform stable data transmission by magnetic field coupling of induction magnetic fields at a short distance.

Hereinafter, a case where a magnetic loss material is applied to a coupling electrode of a high-frequency coupler for performing electric field coupling type non-contact communication will be described as a specific example.

FIG. 18 shows a configuration example in which a magnetic loss material is arranged in the vicinity of the coupling electrode of the high frequency coupler shown in FIG. As shown in the figure, by covering the coupling electrode, the metal wire, and the resonance part with a magnetic loss material, it is possible to suppress the influence of unnecessary radio wave radiation and external noise.

Here, the current flowing through the coupling electrode will be examined in detail. When the center of the coupling electrode is connected to the resonance part composed of the stub through the metal wire, as shown in FIG. 19, the current A and the current B are opposite to each other in the outer peripheral direction from the center of the coupling electrode. Flows. The radio waves generated by the currents A and B are also opposite to each other and cancel each other, so that no radio waves are emitted. On the other hand, a current C flows through the metal wire connecting the coupling electrode and the resonance part toward the coupling electrode. No current flows in the opposite direction to this current C. That is, the current C flowing through the metal wire is not canceled and causes unnecessary radio waves.

On the other hand, in the present embodiment, as shown in FIG. 18, a magnetic loss material is disposed so as to cover the metal wire, and a magnetic field wave generated as a current passes through the gold loss wire. As a result, the generation of radio waves can be suppressed.

As a modification of the high frequency coupler shown in FIG. 18, as shown in FIG. 20, the magnetic loss material may be removed from the surface of the coupling electrode. As described with reference to FIG. 19, when joining with a metal wire at the center of the coupling electrode, currents flowing through the coupling electrode cancel each other and no radio wave is generated (see FIG. 19A). There is no need to coat with a magnetic loss material. Further, according to such a configuration, the distance between the two coupling electrodes for communication can be further reduced, and the communication quality can be improved by increasing the electric field strength.

FIG. 21 shows another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode. In the drawing, a $\lambda/2$ -length stub as a resonance part is formed on a printed circuit board as a print pattern, and a conductor pin as a metal wire protrudes from a substantially central part thereof. On the other hand, the box made of magnetic loss material has a depth substantially equal to the height of the pin, and a coupling electrode is formed on the bottom surface thereof by plating or the like. Attach this box so that it is joined to the printed circuit board at the edge of the opening (or accommodate the pin inside the box), and attach so that the tip of the pin abuts at the approximate center of the coupling electrode. Determine the position. The box-shaped magnetic loss material is mounted on the printed circuit board by a process such as reflow soldering.

22 and 23 show still another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode.

As shown in FIG. 22, for example, a magnetic loss material having an appropriate height in a quadrangular prism shape is provided with a through hole to be inserted. A conductive material is formed on the top surface of the magnetic loss material and the inner periphery of the through hole by a process such as vapor deposition. The conductive pattern on the upper surface forms a coupling electrode, the conductive part attached to the inner periphery of the through hole corresponds to a metal wire for supplying current, and the conductive part at the lower end of the through hole is a connection terminal for a resonance part made of a stub. It becomes. Similar to the above, a $\lambda/2$ -length stub as a resonance part is formed on the printed circuit board as a print pattern, and the position of the magnetic loss material is determined and attached so that the connection terminal abuts substantially at the center. The magnetic loss material is mounted on the printed circuit board by a process such as reflow soldering. Further, as shown in FIG. 23, the magnetic loss material can be formed in a hollow shape.

Although the electric field coupling type non-contact communication system has been described above, the effect of the magnetic loss material on the electrode that performs electric field coupling is the same as the coupling coil that performs magnetic field coupling in the magnetic field coupling type non-contact communication system. This is similar to the effect brought about by the dielectric loss material. Therefore, as shown in FIG. 24, even when the coupling coil is covered with a dielectric

loss material, the electromagnetic wave generated from the wireless device is prevented from adversely affecting other electronic devices, and the malfunction due to the external interference radio wave is prevented. Can be prevented.

So far, a mechanism for transmitting signals between a pair of high frequency couplers in the electric field coupling type non-contact communication system shown in FIG. 1 has been described. Here, when a signal is transmitted between two devices, energy transfer is inevitably involved. Therefore, this type of communication system can be applied to power transmission. As described above, the electric field E generated by the EFC antenna of the transmitter is the air propagates as a surface wave, power can be taken out by rectifying and stabilizing a signal received by the EFC at the receiver.

FIG. 25 shows a configuration example when a communication system using a high frequency coupler is applied to power transmission.

In the illustrated system, a charger connected to an AC power source and a wireless communication device are brought close to each other, so that power is transmitted and charged to the wireless communication device in a non-contact manner via a high-frequency coupler built in them. However, the high frequency coupler is used only for power transmission.

When the receiving high-frequency coupler is not near the transmitting high-frequency coupler, most of the power input to the transmitting high-frequency coupler is reflected and returns to the DC / AC inverter side. Radiation can be suppressed. In addition, slight radio wave radiation leaking from the metal wire connected to the center of the coupling electrode is absorbed by the magnetic loss material provided in the vicinity of the metal wire, thereby further suppressing the leaked radio wave to the outside. It becomes possible. When performing non-contact power transmission, since the transmission output is generally larger than the output power for communication purposes, suppression of leaked radio waves is particularly demanding.

Moreover, although the example which performs charge to a radio | wireless communication apparatus was given in the figure, you may make it perform the non-contact electric power transmission not only to a radio | wireless machine but the music player or a digital camera, for example.

FIG. 26 shows another configuration example in which a communication system using a high-frequency coupler is applied to power transmission. The illustrated system is configured to use a high-frequency coupler and a surface wave transmission line for both power transmission and communication.

The timing for performing communication and power transmission is switched by a communication / transmission (reception) switching signal sent from the transmission circuit unit. For example, communication and power transmission may be switched at a predetermined cycle. At this time, the power transmission output can be kept optimal by adding the charging state to the communication signal and feeding back to the charger side. For example, when charging is completed, the information may be sent to the charger side, and the power transmission output may be set to zero.

In the system shown in the figure, the charger is connected to an AC power supply. However, for example, the battery can be used to distribute power from another mobile phone to a mobile phone with a low battery. It may be used.

The present invention has been described in detail above with reference to specific embodiments. However, it is obvious that those skilled in the art can make modifications and substitutions of the embodiment without departing from the gist of the present invention.

In the present specification, the embodiment applied to a communication system in which a UWB signal is data-transmitted by electric field coupling in a cableless manner has been mainly described, but the gist of the present invention is not limited to this. For example, the present invention can be similarly applied to a communication system that uses a high-frequency signal other than the UWB communication method and a communication system that performs data transmission by electric field coupling using a relatively low frequency signal.

In this specification, the embodiment applied to a communication system that performs non-contact communication by electric field coupling between opposing electrodes has been mainly described. However, the transmitter / receiver includes a coil that couples to an induced magnetic field, and is magnetically It can also be applied to magnetic-field-coupled communication systems that perform non-contact communication at short distances by coupling, and is stable while suppressing adverse effects on other systems caused by unnecessary radio waves and malfunctions caused by external interference radio waves. Non-contact communication can be realized.

In the present specification, the embodiment in which the present invention is applied to a system that performs data communication between a pair of high-frequency couplers has been mainly described. However, when a signal is transmitted between two devices, it is inevitable. It is naturally possible to apply this type of communication system to power transmission because it involves energy transfer.

In short, the present invention has been disclosed in the form of exemplification, and the description of the present specification should not be interpreted in a limited manner. In order to determine the gist of the present invention, the claims should be taken into consideration.

FIG. 1 is a diagram illustrating a configuration example of a non-contact communication system using electric field coupling by an electrostatic field or an induction electric field. FIG. 2 is a diagram showing a configuration example in which a transmitter and a receiver include a coupler composed only of electrodes in a communication using frequencies in the kHz or MHz band, and the coupling portion simply operates as a parallel plate capacitor. FIG. 3 is a diagram illustrating a state in which a propagation loss occurs due to reflection of a signal in an impedance mismatching portion in a coupling portion in communication using a high frequency in the GHz band. FIG. 4 is a diagram showing an equivalent circuit of a high-frequency coupling circuit in which an impedance matching unit and a resonance unit are configured by a lumped constant circuit. FIG. 5 is a diagram illustrating a state in which the electrodes of the high-frequency coupler illustrated in FIG. 4 are arranged to face each other. FIG. 6A is a diagram for explaining the characteristics of the high-frequency coupler shown in FIG. 4 alone. FIG. 6B is a diagram for explaining the characteristics of the high-frequency coupler shown in FIG. 4 alone. FIG. 7A is a diagram illustrating a state in which the high frequency coupler induces an electric field by the function as an impedance converter. FIG. 7B is a diagram illustrating a state in which the high frequency coupler induces an electric field by the function as an impedance converter. FIG. 8 is a diagram showing an equivalent circuit of a bandpass filter configured by arranging the two high-frequency couplers shown in FIG. 4 to face each other. FIG. 9 is a diagram showing an equivalent circuit of an impedance conversion circuit configured as a single high-frequency coupler. FIG. 10 is a diagram showing an electromagnetic field generated by a minute dipole. FIG. 11 is a diagram illustrating a configuration example of a high-frequency coupler using a distributed constant circuit for the impedance matching unit and the resonance unit. FIG. 12 is a diagram illustrating a state in which a standing wave is generated in the stub 103. FIG. 13 is a diagram showing a comparison of the frequency characteristics of the high-frequency coupler when the impedance matching unit is composed of a lumped constant circuit and a distributed constant circuit. FIG. 14 is a diagram illustrating a high-frequency coupler in which an impedance matching unit is configured by a lumped constant circuit. FIG. 15 is a diagram illustrating a high-frequency coupler in which an impedance matching unit is configured by a distributed constant circuit. FIG. 16A is a diagram illustrating a state in which a high-frequency transmission line is connected to the center of the coupling electrode. FIG. 16B is a diagram illustrating a state in which a high-frequency transmission line is connected to a position having an offset from the center of the coupling electrode, and an unequal current flows in the conclusion electrode. FIG. 17 is a diagram showing a configuration example of a "capacitance loaded type" antenna in which a metal is attached to the tip of the antenna element to give a capacitance and the height of the antenna is shortened. 18 is a diagram showing a configuration example in which a magnetic loss material is arranged in the vicinity of the coupling electrode of the high-frequency coupler shown in FIG. FIG. 19 is a diagram for explaining radio waves generated in the high frequency coupler. FIG. 20 is a diagram illustrating a configuration example of a high-frequency coupler in which a magnetic loss material is removed from the

surface of the coupling electrode. FIG. 21 is a diagram illustrating another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode. FIG. 22 is a diagram showing another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode. FIG. 23 is a diagram showing another configuration example of the high-frequency coupler in which a magnetic loss material is arranged in the vicinity of the coupling electrode. FIG. 24 is a diagram illustrating a configuration example of a wireless device in which a dielectric loss material is disposed in the vicinity of a coil that performs magnetic field coupling. FIG. 25 is a diagram showing a configuration example when the communication system using the high-frequency coupler shown in FIG. 1 is applied to power transmission. FIG. 26 is a diagram showing another configuration example in which the communication system using the high-frequency coupler shown in FIG. 1 is applied to power transmission. FIG. 27 is a diagram showing a state in which when a current is passed through a conductor such as an antenna, a magnetic field is generated around the conductor, an electric field is generated in conjunction with this, and a magnetic field is generated by this electric field. FIG. 28 is a diagram showing a state in which an electric wave and a magnetic wave interact like a chain and proceed in the wave traveling direction while maintaining an orthogonal relationship.

Explanation of symbols

DESCRIPTION OF SYMBOLS 101 ... Printed circuit board 102 ... Ground 103 ... Stub 104 ... Signal line 105 ... Transmission / reception circuit 106 ... Through hole 107 ... Metal wire 108 ... Coupling electrode 109 ... Spacer 110 ... Through hole 111, 112 ... Microstrip line or coplanar waveguide

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JP5287377B2 *	2009-03-12	2013-09-11	ソニー株式会社	COMMUNICATION DEVICE, HIGH FREQUENCY COUPLER, AND COMPOSITE COMMUNICATION DEVICE
JP5282626B2 *	2009-03-30	2013-09-04	ソニー株式会社	Communication device and high frequency coupler
KR101232857B1	2009-06-25	2013-02-13	가부사키가야사 무라타 세이사쿠쇼	Power transfer system and noncontact charging device
CN103401321B *	2009-06-25	2016-05-25	株式会社村田製作所	Power delivery system and non-contact charging device
JP5310316B2 *	2009-06-30	2013-10-09	ソニー株式会社	High frequency coupler and communication device
JP5347813B2 *	2009-08-03	2013-11-20	ソニー株式会社	Communication apparatus and communication method
JP4897028B2 *	2009-10-21	2012-03-14	Ｓｍｋ株式会社	Coupling electrode unit
JP5451345B2 *	2009-12-01	2014-03-26	キャノン株式会社	Wireless communication device
JP2011193088A *	2010-03-12	2011-09-29	Sony Corp	High-frequency coupler, and communication device
US20120203620A1	2010-11-08	2012-08-09	Douglas Howard Dobyns	Techniques For Wireless Communication Of Proximity Based Marketing
US892989B2	2011-03-22	2015-01-06	Radium, Inc.	Techniques for wireless communication of proximity based content
US8880100B2	2011-03-23	2014-11-04	Radium, Inc.	Proximity based social networking
CN202127130U *	2011-06-17	2012-01-25	百慕大商泰科资讯科技有限公司	Intelligent card connector with radio frequency identification module
JP6074747B2	2011-11-01	2017-02-08	パナソニックＩｐマネジメント株式会社	Resonant coupler
WO2014017419A1 *	2012-07-23	2014-01-30	株式会社東芝	Magnetic resonance imaging apparatus, bed device, and rf coil device
JP6211807B2 *	2012-07-23	2017-10-11	東芝メディカルシステムズ株式会社	Magnetic resonance imaging system
US9883281B2	2012-07-23	2018-05-29	Toshiba Medical Systems Corporation	Magnetic resonance imaging apparatus, bed device and RF coil device
JP6073606B2	2012-09-03	2017-02-01	東芝メディカルシステムズ株式会社	Magnetic resonance imaging apparatus and digital wireless communication apparatus
US9927504B2	2012-09-12	2018-03-27	Toshiba Medical Systems Corporation	Magnetic resonance imaging apparatus
JP6184067B2 *	2012-09-12	2017-08-23	東芝メディカルシステムズ株式会社	Magnetic resonance imaging system
JP6088814B2 *	2012-12-17	2017-03-01	古河電気工業株式会社	Wireless power transmission system
JP6021652B2 *	2013-01-16	2016-11-09	東芝メディカルシステムズ株式会社	Magnetic resonance imaging apparatus and RF coil apparatus
JP6281863B2 *	2013-03-08	2018-02-21	国立大学法人大阪大学	Photonic crystal slab electromagnetic wave absorber and high-frequency metal wiring circuit, electronic component, transmitter, receiver and proximity wireless communication system
JP6328678B2 *	2013-03-18	2018-05-09	昭和電工株式会社	Wireless power feeding method and wireless power feeding system

CN105359437B *	2013-06-24	2018-06-19	英赛尔库尔公司	Portable device including being used for the electrode for being transmitted by internal electric current data
KR102102644B1 *	2013-12-24	2020-04-21	엘지전자 주식회사	Mobile terminal
US9838082B2	2014-08-29	2017-12-05	Freelink Technologies	Proximity boundary based communication
US10079573B2 *	2014-09-11	2018-09-18	Opg Technologies, LLC	Embedding data on a power signal
JP6670452B2 *	2014-12-08	2020-03-25	ソニー株式会社	Antenna and communication device
US10164685B2	2014-12-31	2018-12-25	Freelink Technologies Inc.	Spatially aware wireless network
JP5975555B1 *	2015-12-08	2016-03-23	株式会社 e N F C	Transmission system, transmission apparatus, and transmission method
US10373045B2	2016-12-01	2019-09-06	Avery Dennison Retail Information Services, LLC	Coupling of RFID straps to antennae using a combination of magnetic and electric fields
JP2019036823A	2017-08-14	2019-03-07	ソニーセミコンダクタソリューションズ株式会社	Communication device, communication system, and communication method
CN109802235B *	2017-11-16	2021-11-30	华为技术有限公司	Surface wave excitation device

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
JP4403431B2	2010-01-27	Communication system and communication apparatus
JP4915058B2	2012-04-11	Power transmission device, power reception device, and power transmission system
JP4345851B2	2009-10-14	Communication system and communication apparatus
JP5003625B2	2012-08-15	High frequency coupler
JP5267638B2	2013-08-21	High frequency coupler
JP4345850B2	2009-10-14	Communication system and communication apparatus
JP4893488B2	2012-03-07	Communications system
US8013795B2	2011-09-06	Communication system and communication apparatus
JP5083122B2	2012-11-28	High frequency coupler and electric field signal radiating element
JP4983425B2	2012-07-25	Communication device
JP2011193086A	2011-09-29	High-frequency coupler, and communication device
JP4983749B2	2012-07-25	High frequency coupler and electric field signal radiating element
JP4983418B2	2012-07-25	Communication device

Priority And Related Applications

Child Applications (1)

Application	Priority date	Filing date	Relation	Title
JP2008216229A	2008-08-26	2008-08-26	Division	High frequency coupler and electric field signal radiating element

Priority Applications (1)

Application	Priority date	Filing date	Title
JP2007157986A	2007-06-14	2007-06-14	Communication system and communication apparatus

Applications Claiming Priority (3)

Application	Filing date	Title
JP2007157905A	2007-06-14	Communication system and communication apparatus
US12/138,803	2008-06-13	Communication system and communication apparatus
CNA2006101259709A	2008-06-16	Communication system and communication apparatus

Legal Events

Date	Code	Title	Description
2009-04-10	A977	Report on retrieval	Free format text: JAPANESE INTERMEDIATE CODE: A971007 Effective date: 20090410
2009-04-22	A131	Notification of reasons for refusal	Free format text: JAPANESE INTERMEDIATE CODE: A131 Effective date: 20090421
2009-06-17	A521	Written amendment	Free format text: JAPANESE INTERMEDIATE CODE: A523 Effective date: 20090616
2009-09-29	TRDD	Decision of grant or rejection written	
2009-10-07	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01 Effective date: 20091006
2009-10-08	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01
2009-11-09	A61	First payment of annual fees (during grant procedure)	Free format text: JAPANESE INTERMEDIATE CODE: A61 Effective date: 20091019
2009-11-13	R151	Written notification of patent or utility model registration	Ref document number: 4403431 Country of ref document: JP Free format text: JAPANESE INTERMEDIATE CODE: R151
2009-11-13	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20121113 Year of fee payment: 3
2009-11-16	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20121113 Year of fee payment: 3
2012-11-13	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2012-11-13	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20131113 Year of fee payment: 4
2013-11-12	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2014-11-11	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2015-11-10	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2016-11-15	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2017-11-14	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2018-11-13	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2019-11-13	LAPS	Cancellation because of no payment of annual fees	

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number: 175023**OR**☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☒ The address associated with Customer Number: 175023**OR**

Firm or individual name		
Address		
City	State	Zip
Country		
Telephone		Email

Assignee name and address: iCashe, Inc.
5331 S. Macadam Ave. #251
Portland, OR 97239

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature 	Date 10/14/2020
Name Siva G. Narendra	Telephone 503-704-7204
Title President, iCashe, Inc	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/021,347

RECEIPT DATE / TIME
01/14/2022 07:16:13 PM ET

ATTORNEY DOCKET #
18.115.001US9.10

Title of Invention

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2310

FILED BY Katherine Campbell

PATENT CENTER # 60489060

FILING DATE 09/15/2020

CUSTOMER # 35781

FIRST NAMED
INVENTOR Siva G. Narendra

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Usman Mughal

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
18P115001US9_10_CADS.pdf	10	Application Data Sheet	604 KB
Warning: This is not a USPTO supplied ADS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
18P115001US9_10_iCashe_373C.pdf	3	Assignee showing of ownership per 37 CFR 3.73	117 KB
iCashe_GPOA_signed.pdf	1	Power of Attorney	2064 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
18P115001US9_10_CADS.pdf	086DA3675445FF1CE3B34BCADC009568731ECB965C3623E41 231513C3278EDB61390EFADC77C5BFAA3D7862B64E3DA8E5 1A1FAED508E79286D44EBE06BCE29A4
18P115001US9_10_iCashe_37 3C.pdf	4BBD50BA83B981F07929644BC8C0A5C6BCB8C50B528894B6C 4D11D6F80B13A360B6CF4D794EA6F06BA69A606D3752B65A6 24BE5C1F3BA3C12AE1F7875BB042B5
iCashe_GPOA_signed.pdf	78B281E25EAD72F7806857712BEF21246ED66F2F83FB7174AE E3944DC2C6E32C2BBD4EEDDED4D1DD9B0C94F138A195CC7 5430D944D923A8EE37468AA0C7627B2

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: iCashe, Inc.Application No./Patent No.: 17/021,347Filed/Issue Date: September 15, 2020Titled: MOBILE PHONE WITH MAGNETIC CARD EMULATIONiCashe, Inc., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Tyfone, Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 053776, Frame 0085, or for which a copy thereof is attached.2. From: Tyfone, Inc. To: iCashe, Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 053965, Frame 0413, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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STATEMENT UNDER 37 CFR 3.73(c)

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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).



As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Usman Mughal/

Signature

Usman Mughal

Printed or Typed Name

2022-01-14

Date

62887

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Siva	G.	Narendra		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Portland	State/Province	OR	Country of Residence	US

Mailing Address of Inventor:

Address 1	7180 SW 84th Ave.				
Address 2					
City	Portland	State/Province	OR		
Postal Code	97223	Country i	US		

Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Thomas	N.	Spitzer		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Portland	State/Province	OR	Country of Residence	US

Mailing Address of Inventor:

Address 1	2642 SW Bucharest Ct.				
Address 2					
City	Portland	State/Province	OR		
Postal Code	97225	Country i	US		

Inventor	3				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Prabhakar		Tadepalli		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

City	Bangalore	Country of Residence ⁱ	N
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Mailing Address of Inventor:

Address 1	E24 Chaithanya Smaran		
Address 2	Whitefield Hoskote Road		
City	Bangalore	State/Province	Ka
Postal Code	560067	Country ⁱ	IN
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.			

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence Information of this application.			
Customer Number	35781		
Email Address	dana.lemoine@tyfone.com	Add Email	Remove Email

Application Information:

Title of the Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		
Attorney Docket Number	115.001US9.10	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	16	Suggested Figure for Publication (if any)	23

Filing By Reference:

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For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country ⁱ

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

Publication Information:
☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	35781		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
17/021,347	Continuation of	16218733	2018-12-13		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16218733	Continuation of	15658208	2017-07-24	10185909	2019-01-22
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15658208	Continuation of	14948325	2015-11-22	9715649	2017-07-25
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14948325	Continuation of	14747770	2015-06-23	9202156	2015-12-01

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14747770	Continuation of	14680684	2015-04-07	9092708	2015-07-28
Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14680684	Continuation of	13592323	2012-08-22	9004361	2015-04-14
Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13592323	Continuation of	13304663	2011-11-27	8573494	2013-11-05
Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13304663	Continuation of	13114434	2011-05-24	8091786	2012-01-10
Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13114434	Continuation of	12941410	2010-11-08	7954715	2011-06-07
Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12941410	Continuation of	12539369	2009-08-11	7828214	2010-11-09
Prior Application Status		Patented			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12539369	Continuation of	11063291	2005-02-22	7581678	2009-09-01
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013. NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant	1	Remove
------------------	---	---------------------------------------

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

☒ Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
---	--	----------------

Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest
---	--

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Fyfone, Inc- iCashe, Inc.
-------------------	---------------------------

Mailing Address Information For Applicant:

Address 1	5331 SW Macadam Ave		
Address 2	Suite 251		
City	Portland	State/Province	OR
Country	US	Postal Code	97239
Phone Number	503-226-3939----	Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

Assignee	1		
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
			Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.			☒
Organization Name	Tyfone, Inc. iCashe, Inc.		
Mailing Address Information For Assignee including Non-Applicant Assignee:			
Address 1	5331 SW Macadam Avenue		
Address 2	Suite 251		
City	Portland	State/Province	OR
Country i	US	Postal Code	97239
Phone Number	503-226-3939	Fax Number	
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.			Add

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Usman Mughal/		Date (YYYY-MM-DD)	2022-01-14
First Name	Usman	Last Name	Mughal	Registration Number
				62887
Additional Signature may be generated within this form by selecting the Add button.				Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10	2310
Tyfone, Inc. Patent Dept. 5331 SW Macadam Avenue Suite 251 Portland, OR 97239			EXAMINER HAUPT, KRISTY A	
			ART UNIT	PAPER NUMBER
			2876	
			NOTIFICATION DATE	DELIVERY MODE
			01/14/2022	ELECTRONIC

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed 1/10/2022 in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

** Both*

- ☒ The IDS lacks a statement as specified in 37 CFR 1.97(e).
- ☐ The IDS lacks the fee set forth in 37 CFR 1.17(p).
- ☐ The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

N. Horne, for

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10

CONFIRMATION NO. 2310

POA ACCEPTANCE LETTER



OC000000131196136

175023
Mughal IP PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

Date Mailed: 01/20/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/14/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/megga/



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United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
17/021,347	09/15/2020	2876	2070	18.115.001US9.10	18	3

175023
Mughal IP PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

CONFIRMATION NO. 2310
CORRECTED FILING RECEIPT



Date Mailed: 01/20/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Siva G. Narendra, Portland, OR;
Thomas N. Spitzer, Portland, OR;
Prabhakar Tadepalli, Bangalore, INDIA;

Applicant(s)

iCashe, Inc., Portland, OR;

Assignment For Published Patent Application

iCashe, Inc., Portland, OR

Power of Attorney: The patent practitioners associated with Customer Number 175023

Domestic Priority data as claimed by applicant

This application is a CON of 16/218,733 12/13/2018 PAT 10803370
which is a CON of 15/658,208 07/24/2017 PAT 10185909
which is a CON of 14/948,325 11/22/2015 PAT 9715649
which is a CON of 14/747,770 06/23/2015 PAT 9202156
which is a CON of 14/680,684 04/07/2015 PAT 9092708
which is a CON of 13/592,323 08/22/2012 PAT 9004361
which is a CON of 13/304,663 11/27/2011 PAT 8573494
which is a CON of 13/114,434 05/24/2011 PAT 8091786
which is a CON of 12/941,410 11/08/2010 PAT 7954715
which is a CON of 12/539,369 08/11/2009 PAT 7828214
which is a CON of 11/063,291 02/22/2005 PAT 7581678

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 10/01/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/021,347**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Preliminary Class

235

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10

CONFIRMATION NO. 2310

POWER OF ATTORNEY NOTICE



OC000000131196110

35781
Tyfone, Inc.
Patent Dept.
5331 SW Macadam Avenue
Suite 251
Portland, OR 97239

Date Mailed: 01/20/2022

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/14/2022.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/megga/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:
Siva Narendra

Application No.: 17/021,347

Filed: September 15, 2020

For: MOBILE PHONE WITH MAGNETIC
CARD EMULATION

Examiner:
Kristy A. Haupt

Art Group: 2876

Confirmation No.: 2310

Docket No.: 115.001US9.10

Mail Stop **Issue Fee**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 C.F.R. § 1.312

Dear Examiner:

This Amendment is in response to the Notice of Allowance mailed November 10, 2021.
Applicants respectfully request the Examiner to enter this Amendment.

LISTING OF CLAIMS

1. (Previously Presented) A mobile phone comprising:
a memory to hold transaction data for use in a plurality of transactions;
a current carrying conductor capable of producing a time-varying magnetic field that represents the transaction data in the plurality of transactions;
a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;
a driver to excite the current carrying conductor; and
a processor coupled to control the driver.
2. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field represents a point-of-sale transaction.
3. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field represents an access transaction.
4. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field represents a credit card transaction.
5. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field emulates a swipe of a magnetic card.
6. (Original) The mobile phone of claim 1 wherein the driver comprises a current driver.

7. (Previously Presented) A mobile phone comprising:
- a memory to hold transaction data for use in a plurality of transactions;
 - a conductor that when excited by a reversing polarity current produces a time-varying magnetic field that represents the transaction data in the plurality of transactions;
 - a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;
 - a driver to excite the conductor; and
 - a processor coupled to control the driver.
8. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field represents a point-of-sale transaction.
9. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field represents an access transaction.
10. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field represents a credit card transaction.
11. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field emulates a swipe of a magnetic card.
12. (Original) The mobile phone of claim 7 wherein the driver comprises a current driver.
13. (Previously Presented) A mobile phone comprising:
- a memory to hold transaction data for use in a plurality of transactions;
 - a conductor that when excited by a reversing polarity current that varies in amplitude

produces a time-varying magnetic field that represents the transaction data in the plurality of transactions;

a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;

a driver to excite the conductor; and

a processor coupled to control the driver.

14. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field represents a point-of-sale transaction.

15. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field represents an access transaction.

16. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field represents a credit card transaction.

17. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field emulates a swipe of a magnetic card.

18. (Original) The mobile phone of claim 13 wherein the driver comprises a current driver.

19. (Previously Presented) The mobile phone of claim 1 wherein the network is one of a cellular network or a wireless local area network.

20. **(Currently Amended)** The mobile phone of claim 1 wherein [[the]]downloaded transaction data is valid for a limited number of transactions and the one or more parts of

the transaction data is downloaded periodically.

21. **(Currently Amended)** The mobile phone of claim 1, wherein the transaction data includes a transaction number used for each transaction of the plurality of transactions.

22. (Previously Presented) The mobile phone of claim 7 wherein the network is one of a cellular network or a wireless local area network.

23. **(Currently Amended)** The mobile phone of claim 7 wherein [[the]]downloaded transaction data is valid for a limited number of transactions and the one or more parts of the transaction data is downloaded periodically.

24. **(Currently Amended)** The mobile phone of claim 7, wherein the transaction data includes a transaction number used for each transaction of the plurality of transactions.

25. (Previously Presented) The mobile phone of claim 13 wherein the network is one of a cellular network or a wireless local area network.

26. **(Currently Amended)** The mobile phone of claim 13 wherein [[the]]downloaded transaction data is valid for a limited number of transactions and the one or more parts of the transaction data is downloaded periodically.

27. **(Currently Amended)** The mobile phone of claim 13, wherein the transaction data includes a transaction number used for each transaction of the plurality of transactions.

REMARKS

This listing of claims will replace all prior versions and listings of claims in the application. Claims 20, 21, 23, 24, 26, and 27 are amended. No claims are added. No claims are cancelled in this response. Hence, claims 1-27 are pending.

CLAIM AMENDMENTS

Applicants amend claims 20, 21, 23, 24, 26, and 27 to fix typographical errors. Applicants respectfully request Examiner to enter the amendments. No new matter has been introduced.

COMMENTS ON THE STATEMENT OF REASONS FOR ALLOWANCE

The guidance provided at M.P.E.P. § 1302.14 under the heading, “Reasons for Allowance,” sets forth:

In most cases, the examiner's actions and the applicant's replies make evident the reasons for allowance, satisfying the “record as a whole” proviso of [37 CFR 1.104(e)]. This is particularly true when applicants fully comply with 37 CFR 1.111(b) and (c) and 37 CFR 1.133(b). Thus, where the examiner's actions clearly point out the reasons for rejection and the applicant's reply explicitly presents reasons why claims are patentable over the reference, the reasons for allowance are in all probability evident from the record and no statement should be necessary.

Applicants respectfully submit that Applicants’ previously filed responses are “repl[ies that] explicitly present[] reasons why claims are patentable over the [cited references].” Thus, Applicants respectfully submit that the Statement of Reasons for Allowance should be understood only to refer to the arguments made of record, and should not be understood as requiring or implying that other reasons for allowance have been relied on in allowing the claims. Therefore, all reasons for allowance should be understood from the arguments clearly set forth in the prosecution history, and the Statement of Reasons for Allowance should not be construed as narrowing the claims.

CONCLUSION

Pursuant to 37 C.F.R. § 1.136(a)(3), Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 60-4139.

Respectfully submitted,
MUGHAL IP P.C.

01/26/22

Date

/Usman Mughal/

Usman Mughal

Reg. No. 62,887

Attorney for Applicants

1500 NW Bethany Blvd. Suite 200

Beaverton, OR 97006

971-634-0286

docketing@impactpatents.com



ELECTRONIC PAYMENT RECEIPT

APPLICATION #
17/021,347

RECEIPT DATE / TIME
01/26/2022 07:54:18 PM ET

ATTORNEY DOCKET #
18.115.001US9.10

Title of Invention

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2310

FILED BY Katherine Campbell

PATENT CENTER # 60501782

AUTHORIZED BY Usman Mughal

CUSTOMER # 175023

FILING DATE 09/15/2020

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Siva G. Narendra

Payment Information

PAYMENT METHOD
CARD / 9863

PAYMENT TRANSACTION ID
E20221PJ54520435

PAYMENT AUTHORIZED BY
Katherine Campbell

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2501	UTILITY ISSUE FEE	600.00	1	600.00
TOTAL AMOUNT:				\$600.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage

submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

35781 7590 11/10/2021
iCashe, Inc.
Patent Dept.
5331 SW Macadam Avenue
Suite 251
Portland, OR 97239

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10	2310

TITLE OF INVENTION: MOBILE PHONE WITH MAGNETIC CARD EMULATION

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$0.00	\$600	02/10/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAUPT, KRISTY A	2876	235-492000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Mughal IP P.C.

2

3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

iCashe, Inc.

Portland, OR, US

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No.

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Usman Mughal/

Date January 25, 2022

Typed or printed name Usman Mughal

Registration No. 62887



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/021,347

RECEIPT DATE / TIME
01/26/2022 07:54:18 PM ET

ATTORNEY DOCKET #
18.115.001US9.10

Title of Invention

MOBILE PHONE WITH MAGNETIC CARD EMULATION

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CONFIRMATION # 2310

FILED BY Katherine Campbell

PATENT CENTER # 60501782

FILING DATE 09/15/2020

CUSTOMER # 175023

FIRST NAMED
INVENTOR Siva G. Narendra

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Usman Mughal

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
115P001US9_10_Issue_Fee _Transmittal.pdf	1	Issue Fee Payment (PTO-85B)	149 KB
115-001US9- 10_312_Amend.pdf	7	-	44 KB
115-001US9- 10_312_Amend-A.NA.pdf	(1-1) 1	Amendment after Notice of Allowance (Rule 312)	24 KB
115-001US9- 10_312_Amend-CLM.pdf	(2-5) 4	Claims	32 KB
115-001US9- 10_312_Amend-REM.pdf	(6-7) 2	Applicant Arguments/Remarks Made in an Amendment	29 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
115P001US9_10_Issue_Fee_Transmittal.pdf	7667B11EA16B6F13431353F7466A85D9518FFE1EDE1F88E715 ACCBAC4815A09ED927067759A0EB5F8B113B2F7F459111C5E 5E8A3D2FD3D1F560F75071E898FA8
115-001US9-10_312_Amend.pdf	7F338347AB76129094D2D14DCB0D4559F139655A73261E0320 EB3BA8CC43CCA5B63429758A9AC5352947B9596292438E81E 875F3CA6D3EC256E1B5AED6D42D6F
115-001US9-10_312_Amend-A.NA.pdf	FFA4E9C9713DE6DC60E8582975F340927BF2C2DD849A42FF5 8260CC75CCBE4AFC654717A3F97A0D630A46B6AA427F1DF5 A1E198CA5977ED4B79FBBD1830D56F5
115-001US9-10_312_Amend-CLM.pdf	534DA39B8854B1308D52E07A99BD95660E76C605F91037F7CE BCF6282687055103C965BC2ECE64AD168B0099781CAE3CA5 D9A1305FAFE5DC2D6F3EF4312378D
115-001US9-10_312_Amend-REM.pdf	E9232105951D122931B47E87EDF0F49F0D3B6FAA795BC751B9 DD99223073011BE26FE2439342672CC9A504A1DDF7A961041 DDF94EC0F202C7E199A33B0008CDE

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10	2310
175023	7590	02/04/2022	EXAMINER	
Mughal IP PC			HAUPT, KRISTY A	
iCashe, Inc.				
1500 NW Bethany Blvd.				
Suite 200				
Beaverton, OR 97006				
			ART UNIT	PAPER NUMBER
			2876	
			NOTIFICATION DATE	DELIVERY MODE
			02/04/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@impactpatents.com
eofficeaction@apcoll.com

Response to Rule 312 Communication	Application No.	Applicant(s)	
	17/021,347	Narendra et al.	
	Examiner	Art Unit	AIA (FITF) Status
	KRISTY A HAUPT	2876	No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☒ The amendment filed on 26 January 2022 under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☒ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

/KRISTY A HAUPT/ Primary Examiner, Art Unit 2876	
---	--

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:
Siva Narendra

Application No.: 17/021,347

Filed: September 15, 2020

For: MOBILE PHONE WITH MAGNETIC
CARD EMULATION

Examiner:
Kristy A. Haupt

Art Group: 2876

Confirmation No.: 2310

Docket No.: 115.001US9.10

Mail Stop **Issue Fee**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 C.F.R. § 1.312

Dear Examiner:

This Amendment is in response to the Notice of Allowance mailed November 10, 2021.
Applicants respectfully request the Examiner to enter this Amendment.

OK TO ENTER: /K.A.H/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	03/08/2022	11270174	18.115.001US9.10	2310

175023 7590 02/16/2022
Mughal IP PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional inventors):

Siva G. Narendra, Portland, OR;
Thomas N. Spitzer, Portland, OR;
Prabhakar Tadepalli, Bangalore, INDIA;

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

iCashe, Inc., Portland, OR;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.