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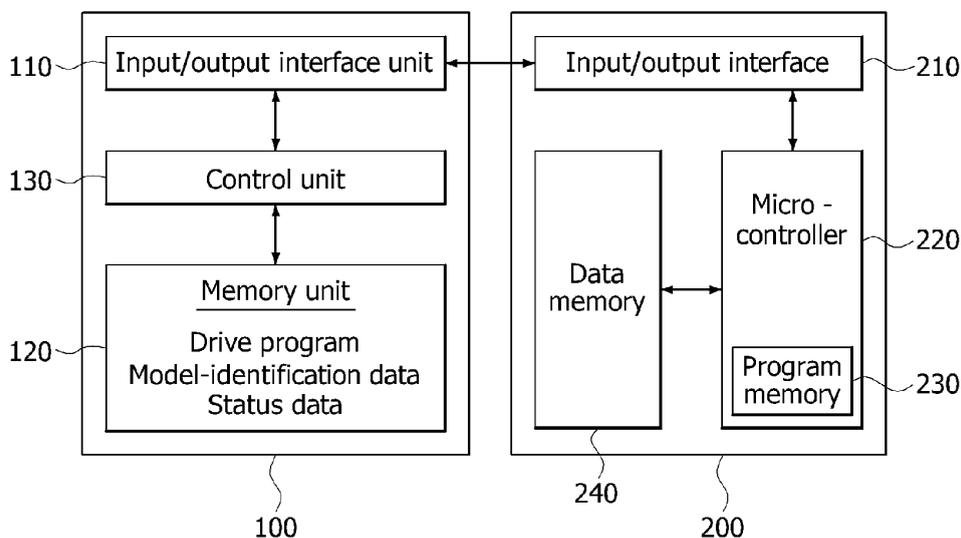
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(54) **CARTRIDGE CHIP MODEL-EXCHANGING METHOD**

(57) Disclosed herein is a cartridge chip model-exchange method, which includes: changing a drive program loaded in the cartridge chip; or changing model-identification data recorded in the cartridge chip; or changing the drive program loaded in the cartridge chip and changing the model-identification data recorded in

the cartridge chip. The cartridge chip model-exchange method allows a cartridge chip used for a cartridge for a previous model of printer to be exchanged for a cartridge chip suited to a target model of printer, either by changing the drive program loaded in the cartridge chip or by changing the model-identification data recorded in the cartridge chip.

**Fig. 1**



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**Description****[Technical Field]**

**[0001]** The present invention relates to an imaging device and, more particularly, to technology of reusing a cartridge chip mounted on a colorant cartridge for an imaging device.

**[Background Art]**

**[0002]** An imaging device, such as a printer, copier, facsimile, and the like, is provided with an ink cartridge, a toner cartridge or like detachable colorant cartridge. In general, the colorant cartridge includes a colorant storage unit for storing colorants (pigments or dyes) for black-and-white and/or color printing; a colorant discharge unit for discharging colorants to form an image in response to a request of the imaging device; and a cartridge chip having a memory unit for storing various data related to the colorant cartridge or the imaging device.

**[0003]** In addition to the memory unit, the cartridge chip includes an interface unit for enabling wired or wireless communication between the imaging device and the cartridge chip, and a controller having a function of retrieving or changing data stored in the memory unit in response to a request of the imaging device.

**[0004]** The memory unit of the cartridge chip may store data, such as a cartridge-identification mark which allows the imaging device to determine whether a mounted colorant cartridge is suited to the imaging device; a maximum number of pages that can be output from the colorant cartridge depending on colorant storage capacity of the colorant cartridge; a remaining number of pages that can be output depending on the amount of colorants remaining in the colorant cartridge; information regarding history of the colorant cartridge; and combinations thereof.

**[0005]** The cartridge chip may include data, values of which vary depending on use of the colorant cartridge. Thus, in order to reuse the colorant cartridge including such a cartridge chip, it is necessary not only to refill the colorant cartridge with colorants, but also to initialize the variable data in the cartridge chip.

**[0006]** Conventionally, a method of replacing a used colorant cartridge chip with a new cartridge chip storing initialized data in order to initialize the data of the cartridge chip is widely used. In this case, the used cartridge chip is discarded, causing several problems including environmental contamination and resource waste. Furthermore, in view of recycling business for colorant cartridges, a "cartridge chip data initializing method" requiring discard of a used cartridge chip and introduction of a new cartridge chip is a main cause of increasing recycling costs.

**[0007]** To solve such problems of environmental pollution and resource waste resulting from discard of the used cartridge chip, for example, Korean Patent No.

10-0769738 suggests use of a "resetter" capable of initializing a cartridge chip, such as a universal resetter. Such a cartridge chip resetter is used to initialize and reuse the used cartridge chip.

5 **[0008]** However, in the field of conventional colorant cartridges, generally, a cartridge chip for a colorant cartridge pertaining to a certain model cannot be used for a colorant cartridge pertaining to other models. Therefore, a cartridge chip used for a colorant cartridge of a certain model cannot be reused for a colorant cartridge of another model even after resetting the cartridge chip.

10 **[0009]** Meanwhile, U.S. Patent No. 7,988,928 B2 discloses a universal cartridge chip, which can be used for various kinds of imaging devices. The universal cartridge chip includes a memory member for storing imaging cartridge data, and a controller for controlling the cartridge chip, determining whether the imaging device is a first type or second type of imaging device, and operating the imaging device in a first operation mode when the imaging device is the first type imaging device or in a second operation mode when the imaging device is the second type imaging device. In the universal cartridge chip, the controller monitors sequences of communication signals received from the imaging device, and determines whether the imaging device is the first type or the second type of imaging device based on the sequences of the communication signals. That is, the universal cartridge chip requires an additional process for determining the model of the imaging device through communication with the imaging device before normal operation of the cartridge chip. However, such an additional process can additionally cause an initial communication error between the universal cartridge chip and the imaging device, or a determination error of the universal cartridge chip. Accordingly, it is difficult to prevent a possibility that the additional process can further cause error occurrence in an initial inter-recognition process. Further, U.S. Patent No. 7,988,928 B2 does not teach or suggest any method for reusing the universal cartridge chip.

**[Disclosure]****[Technical Problem]**

45 **[0010]** The present invention takes into consideration the fact that incompatibility of a cartridge chip between various models of colorant cartridges causes a serious reduction in a recyclability of the cartridge chip. This is because a recycling ratio varies depending on the models of the colorant cartridges. That is, most cartridge chips for colorant cartridge models having low recycling demand are discarded instead of being reused.

50 **[0011]** For various reasons, some quantities of new cartridge chips are introduced in the field of recycling colorant cartridges. However, if a cartridge chip used for a colorant cartridge of a certain model can be reused for colorant cartridges of other models, it is possible to achieve a significant reduction in consumption of new

cartridge chips. Accordingly, the problems of environmental pollution caused by the discarded cartridge chips and resource waste caused by consumption of new cartridge chips for replacement can be effectively solved.

**[0012]** The present invention is based on an idea that such problems can be solved if model exchange of the cartridge chip is allowed. Therefore, the present invention is directed to providing a method and apparatus for exchanging a cartridge chip model.

#### **[Technical Solution]**

**[0013]** One aspect of the present invention provides a cartridge chip model-exchange method including: changing a drive program loaded in a cartridge chip; or changing model-identification data recorded in the cartridge chip; or changing the drive program loaded in the cartridge chip and changing the model-identification data recorded in the cartridge chip.

**[0014]** Another aspect of the present invention provides a cartridge chip model-exchanging apparatus, which includes: an input/output interface unit provided with a communication circuit for communication with a cartridge chip; a memory unit storing at least one drive program for a target model, or at least one model-identification data for the target model, or at least one drive program and model-identification data for the target model; and a control unit outputting the drive program for the target model stored in the memory unit, or the model-identification data for the target model stored in the memory unit, or the drive program and model-identification data for the target model stored in the memory unit to the cartridge chip through the input/output interface unit.

**[0015]** Typically, the cartridge chip includes an input/output interface unit; a control unit; a program memory; and a data memory. The input/output interface unit includes a communication circuit for allowing the cartridge chip to perform wired or wireless communication with an imaging device. The control unit provides an arithmetic circuit, a logic circuit, a control circuit or a combination thereof, needed for driving the drive program. The program memory is loaded with the drive program providing a procedure for controlling operation of the cartridge chip. The data memory records cartridge model-identification data and cartridge status data.

**[0016]** The drive program may have, for example, a basic function such as a function of receiving communication signals from the imaging device, a function of reading a data memory, a function of writing data memory, a function of transmitting communication signals to the imaging device, or a combination thereof. Also, the drive program may include procedures of performing processing and/or responding to a request from the imaging device, through such basic functions. Depending on models of the imaging device, the drive program is typically varied in a detailed process for achieving the basic functions, a detailed process for providing the procedures, and the like. In other words, the cartridge chips of different models

are provided with different drive programs, respectively. Due to such a difference in the drive program, if a cartridge chip used in an imaging device cartridge for a previous model is directly used for an imaging device cartridge for a different model, the imaging device of the different model cannot normally recognize the cartridge chip, and thus performs a printing operation abnormally. However, if the drive program for the previous model is exchanged into a drive program for a target model in accordance with the method of the present invention, the imaging device for the target model can normally recognize the cartridge chip even though the cartridge chip used in the imaging device cartridge for the previous model is mounted on the imaging device cartridge for the target model.

**[0017]** For instance, a cartridge chip used in an HP-1300 printer may be exchanged into a cartridge chip applicable to an HP-2300 printer. It may be assumed that the HP-1300 printer requests a signal having a header of "AA 8C B5 24 A7 2F D0 53 50" to be received from the cartridge chip. In this case, if there is no header of "AA 8C B5 24 A7 2F D0 53 50", the HP-1300 printer determines that an unsuitable cartridge chip is mounted. Therefore, for example, in response to a retrieve request from the HP-1300 printer that inquires about a value stored in a data memory address of "00", the drive program of the cartridge chip for the HP-1300 model must successively output a header signal of "AA 8C B5 24 A7 2F D0 53 50" and the value of the address of "00". After receiving the output signal, the HP-1300 printer determines that a suitable cartridge chip is mounted, based on the header signal of "AA 8C B5 24 A7 2F D0 53 50", and then uses the received value of the address of "00". On the other hand, it may be assumed that the HP-2300 printer requests a signal having a header of "AA 8C B5 2B A0 87 11 10 40" to be received from the cartridge chip. In this case, if there is no header of "AA 8C B5 2B A0 87 11 10 40", the HP-2300 printer determines that an unsuitable cartridge chip is mounted. Therefore, for example, in response to a retrieve request from the HP-2300 printer that inquires about a value stored in a data memory address of "00", the drive program of the cartridge chip for the HP-1300 model must successively output a header signal of "AA 8C B5 2B A0 87 11 10 40" and the value of the address of "00". In order to convert the cartridge chip used in the HP-1300 printer model into a cartridge chip applicable to the HP-1300 printer model, the drive program outputting the header signal of "AA 8C B5 24 A7 2F D0 53 50" must be exchanged into the drive program outputting the header signal of "AA 8C B5 2B A0 87 11 10 40".

**[0018]** The model-identification data may contain a character, a numeral, a symbol, or a combination thereof, which indicates the model of the cartridge including the cartridge chip. In order to determine whether the mounted cartridge is suitable, the imaging device transmits a communication signal for retrieving the model-identification data to the cartridge chip. The cartridge chip reads the

model-identification data recorded in the data memory through operation of the drive program, and then transmits the communication signal containing the model-identification data to the imaging device. The imaging device reads the model-identification data transmitted from the cartridge chip and determines whether the mounted cartridge is suitable. If the model-identification data recorded in the cartridge chip indicates a different model even though the mounted cartridge is suitable for the imaging device in practice, the imaging device determines that the mounted cartridge is unsuitable. However, when the model-identification data for the previous model is exchanged into the model-identification data for the target model by the method according to the present invention, the imaging device of the target model determines that a suitable cartridge is mounted, even though the cartridge chip used in the cartridge for the imaging device of the previous model is mounted on the imaging device of the target model.

**[0019]** In accordance with relationship between the previous model and the target model, model exchange may be achieved by simply changing the drive program loaded in the cartridge chip, or the model exchange may be achieved by simply changing the model-identification data recorded in the cartridge chip, or the target model, model exchange may be achieved by changing the drive program loaded in the cartridge chip and changing the model-identification data recorded in the cartridge chip.

**[0020]** Next, a cartridge chip model-exchange method in accordance with the present invention will be described in more detail. The cartridge chip model-exchange method includes changing a drive program loaded in a cartridge chip; and changing the model-identification data recorded in the cartridge chip.

**[0021]** The operation of changing the drive program is to change a drive program for a previous model loaded in a cartridge chip into a drive program for a target program.

**[0022]** Typically, the cartridge chip is provided with a program memory for loading the drive program. Therefore, the operation of changing the drive program may be performed by reloading a binary code of the drive program for the target model into the program memory.

**[0023]** The program memory of the cartridge chip may include a re-programmable read-only-memory (RE-PROM), a flash memory, and the like. In the case where the cartridge chip has a program memory like the RE-PROM, for example, a ROM writer may be used to reload a binary code of the drive program for the target model into the program memory. Alternatively, in the case where the cartridge chip employs a microcontroller having a function of downloading the drive program, a computer having a function of uploading the drive program is connected to the input/output interface of the cartridge chip and then the drive program for the target model stored in the computer is transmitted to the cartridge chip, thereby allowing the drive program for the target model to be reloaded into the program memory of the cartridge

chip.

**[0024]** Also, the operation of changing the drive program may be performed by deleting, modifying or adding a part of the drive program for the previous model loaded in the cartridge chip. If it is possible to exchange the drive program for the previous model into the drive program for the target model by deleting, modifying or adding a part of the drive program for the previous model loaded in the cartridge chip, the drive program is exchangeable without reloading the entire drive program for the target model.

**[0025]** The operation of changing the model-identification data is to change the model-identification data for the previous model recorded in the cartridge chip into the model-identification data for the target program.

**[0026]** Typically, the cartridge chip is provided with a data memory for storing the model-identification data. Therefore, the operation of changing the model-identification data may be performed by recording the model-identification data for the target model in the data memory again.

**[0027]** The data memory of the cartridge chip may include a re-programmable read-only-memory (RE-PROM), a flash memory, and the like. In the case where the cartridge chip has a data memory like the RE-PROM, for example, a ROM writer may be used to rerecord a hexa-code of the model-identification data for the target model into the data memory. Alternatively, in the case where the cartridge chip employs a microcontroller having a function of downloading data, a computer having a function of uploading the data is connected to the input/output interface of the cartridge chip and then the model-identification data for the target model stored in the computer is transmitted to the cartridge chip, thereby allowing the model-identification data for the target model to be rerecorded in the data memory of the cartridge chip.

**[0028]** Meanwhile, an address of the data memory in which the model-identification data of a certain item is recorded may be varied depending on models. In this case, the operation of changing the model-identification data may be performed by recording the model-identification data for the target model in an address of the data memory for the target model.

**[0029]** In another embodiment, the cartridge chip model-exchange method may further include resetting cartridge status data of the cartridge chip.

**[0030]** The cartridge status data may include, for example, a serial number of the cartridge, a manufacture date, a rotation number of a photoconductive drum, the number of printed pages, a remaining amount of colorants, the number of remaining printable pages, or combination thereof. The imaging device of the previous model and the imaging device of the target model may require different combination of the cartridge status data from each other. Also, the imaging device of the previous model and the imaging device of the target model may retrieve different addresses of the data memory of the cartridge chip in order to obtain the cartridge status data of the

same item. In this case, if the cartridge chip maintaining the cartridge status data set up for the previous model is applied to the imaging device of the target model, the imaging device of the target model cannot operate normally. Therefore, in order to more fully achieve model exchange of the cartridge chip, there may be a need for resetting the cartridge status data of the cartridge chip.

**[0031]** The cartridge status data may be reset, for example, by recording an initial value of the combined status data required by the imaging device of the target model in an address of the data memory required by the imaging device of the target model.

**[0032]** In addition, the cartridge status data may be reset by deleting, modifying or adding a part of the cartridge status data for the previous model recorded in the data memory of the cartridge chip. If it is possible to exchange the cartridge status data for the previous model into the cartridge status data for the target model by deleting, modifying or adding a part of the cartridge status data for the previous model loaded in the cartridge chip, the cartridge status data may be reset without rerecording the entire cartridge status data for the target model.

**[0033]** Next, a cartridge chip model-exchanging apparatus in accordance with the present invention will be described in more detail.

**[0034]** The cartridge chip model-exchanging apparatus includes: an input/output interface unit provided with a communication circuit for communication with a cartridge chip; a memory unit storing at least one drive program for a target model, or at least one model-identification data for the target model, or at least one drive program and model-identification data for the target model; and a control unit outputting the drive program for the target model stored in the memory unit, or the model-identification data for the target model stored in the memory unit, or the drive program and model-identification data for the target model stored in the memory unit to the cartridge chip through the input/output interface unit.

**[0035]** For example, the input/output interface unit may be of a serial communication type (for example, I2C communication, 3-wire communication, 1-wire communication), or a radio frequency communication type. Besides, various communication types compatible with the communication type of the cartridge chip to be an object of the model exchange may be used.

**[0036]** The memory unit may be, for example, a ROM, a REPRAM, a flash memory, a RAM, a magnetic disc, a magnetic tape, or an optical disc.

**[0037]** The control unit may be, for example, a custom integrated circuit, a semi-custom integrated circuit, a programmable gate array, a microprocessor, or a microcontroller.

**[0038]** In the model exchange of the cartridge chip employing the microcontroller having a function of downloading a drive program, if the input/output interface unit of the cartridge chip model-exchanging apparatus according to the present invention is connected to the input/output interface of the cartridge chip, the controller trans-

mits the drive program for the target model stored in the memory unit to the cartridge chip, thereby allowing the drive program for the target model to be reloaded in the program memory of the cartridge chip. Further, the controller transmits the model-identification data for the target model stored in the memory unit to the cartridge chip, thereby allowing the model-identification data for the target model to be rerecorded in the data memory of the cartridge chip.

**[0039]** In the cartridge chip model-exchanging apparatus in accordance with another embodiment of the present invention, the memory unit may additionally contain information about a memory address for the model-identification data of the target model, and the control unit may transmit the information about the memory address for the model-identification data of the target model together with the model-identification data for the target model to the cartridge chip. Therefore, the model-identification data for the target model can be recorded in the memory address for the model-identification data of the target model.

**[0040]** In the cartridge chip model-exchanging apparatus in accordance with a further embodiment of the present invention, the memory unit may additionally contain information about cartridge status data for the target model, and the control unit may additionally transmit the information about the cartridge status data for the target model (an initial value and/or memory address) to the cartridge chip. As a result, the cartridge status data of the cartridge chip may be reset.

#### **[Advantageous Effects]**

**[0041]** As such, a cartridge chip model-exchange method according to the present invention may change a drive program loaded in a cartridge chip and model-identification data recorded in the cartridge chip, thereby allowing exchange of the cartridge chip used in a cartridge for an imaging device of a previous model into a cartridge chip suited to an imaging device of a target model.

**[0042]** By the cartridge chip model-exchange method of the present invention, a cartridge chip used in a colorant cartridge of a certain model may be reused in a colorant cartridge of a different model, thereby significantly reducing consumption of new cartridge chips for replacement. As a result, the present invention may effectively solve the problems of environmental pollution caused by discard of used cartridge chips and resource waste caused by consumption of new cartridge chips for replacement.

#### **[Description of Drawing]**

**[0043]** Fig. 1 is a block diagram of a process of performing a cartridge chip model-exchange method according to one embodiment of the present invention using a cartridge chip model-exchanging apparatus according

to one embodiment of the present invention.

**[Best Mode]**

**[0044]** Fig. 1 is a block diagram of a process of performing a cartridge chip model-exchange method according to one embodiment of the present invention using a cartridge chip model-exchanging apparatus according to one embodiment of the present invention. The model exchanging apparatus 100 includes an input/output interface unit 110, a memory unit 120, and a control unit 130.

**[0045]** A cartridge chip 200 employs a microcontroller 220 having a function of downloading a drive program and data. More specifically, the microcontroller 220 having the function of downloading a drive program and data may be typically loaded, for example, with a "basic instruction recognition routine" or an "operating system (OS)" in itself or a program memory embedded in the microcontroller 220 originally (or from the factory). As the "basic instruction recognition routine" or the "operating system (OS)" of the cartridge chip 200 operates, the drive program or data may be downloaded in the cartridge chip 200.

**[0046]** The input/output interface unit 110 of the model exchanging apparatus 100 is connected to an input/output interface 210 of the cartridge chip 200. The control unit 130 of the model exchanging apparatus 100 transmits a drive program for a target model stored in the memory unit 120 to the cartridge chip 200 through the input/output interface unit 110. The microcontroller 220 of the cartridge chip 220 loads the drive program for the target model received from the model exchanging apparatus 100 into the program memory 230. In addition, the model exchanging apparatus 100 transmits model-identification data for the target model, status data of the cartridge for the target model, and memory address information for the target model, which are stored in the memory unit 120, to the cartridge chip 200. The microcontroller 220 of the cartridge chip 200 records the model-identification data for the target model and the status data of the cartridge for the target model, which are received from the model exchanging apparatus 100, in a designated address of the data memory 230.

**[Industrial Applicability]**

**[0047]** The present invention may be applied to recycling of a cartridge chip mounted on a colorant cartridge for an imaging device.

**Claims**

1. A cartridge chip model-exchange method comprising:

changing a drive program loaded in a cartridge

chip; or

changing model-identification data recorded in the cartridge chip; or

changing the drive program loaded in the cartridge chip and changing the model-identification data recorded in the cartridge chip.

2. The method of claim 1, wherein the changing the drive program comprises reloading a binary code of the drive program for a target model into a program memory of the cartridge chip.

3. The method of claim 1, wherein the changing the drive program comprises deleting, modifying or adding a part of the drive program for a previous model loaded in the cartridge chip.

4. The method of claim 1, wherein the changing the model-identification data comprises rerecording the model-identification data for the target model in the data memory of the cartridge chip.

5. The method of claim 1, wherein the changing the model-identification data comprises recording the model-identification data for the target model in an address of a data memory for the target model.

6. The method of claim 1, further comprising: resetting cartridge status data of the cartridge chip.

7. The method of claim 6, wherein the resetting cartridge status data comprises recording an initial value of the status data of combination required by an imaging device of a target model in an address of a data memory required by the imaging device of the target model.

8. The method of claim 6, wherein the resetting cartridge status data comprises deleting, modifying or adding a part of the cartridge status data for a previous model recorded in the data memory of the cartridge chip

9. A cartridge chip model-exchanging apparatus comprising:

an input/output interface unit provided with a communication circuit for communication with a cartridge chip;

a memory unit storing at least one drive program for a target model, or at least one model-identification data for the target model, or at least one drive program and model-identification data for the target model; and

a control unit outputting the drive program for the target model stored in the memory unit, or the model-identification data for the target model stored in the memory unit, or the drive program

and model-identification data for the target model stored in the memory unit to the cartridge chip through the input/output interface unit.

- 10. The apparatus of claim 9, wherein the memory unit further comprises information about an address of a data memory for model identification of the target model, and the control unit transmits the address of the data memory for the model identification of the target model together with model identification data of the target model to the cartridge chip.
- 11. The apparatus of claim 9, wherein the memory unit further comprises cartridge status data for the target model, and the control unit further transmits the cartridge status data for the target model to the cartridge chip.

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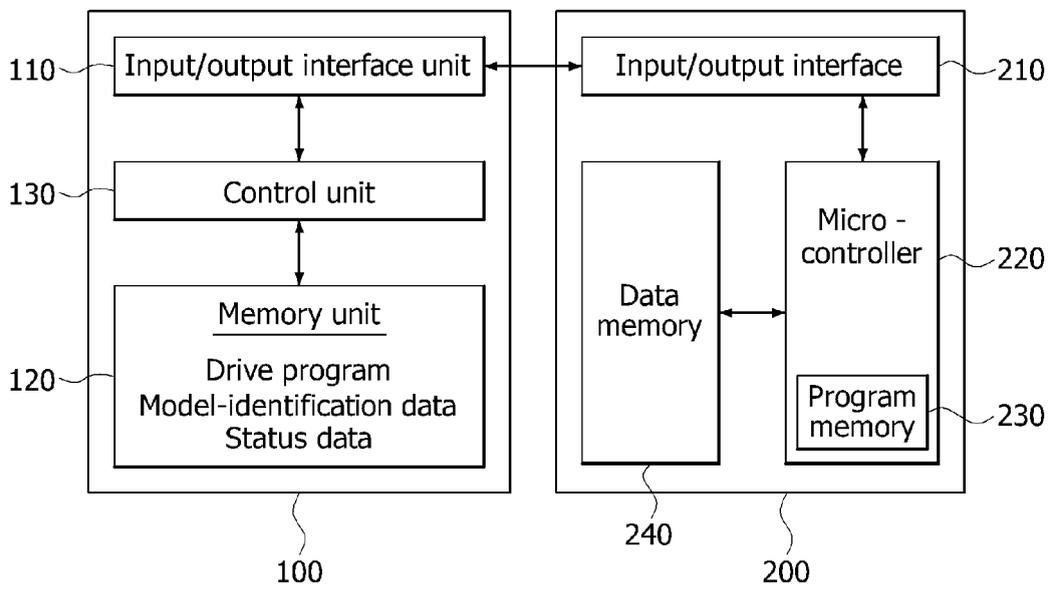
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Fig. 1



INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/KR2009/005456**

<p>A. CLASSIFICATION OF SUBJECT MATTER <b>G06F 3/12(2006.01)i, G06F 9/02(2006.01)i, G06F 9/06(2006.01)i</b></p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>																	
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) G06F 3/12; G03G 15/00; G03G 15/06; G03G 21/00; G03G 21/10</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean Utility models and applications for Utility models: IPC as above Japanese Utility models and applications for Utility models: IPC as above</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) &amp; Keywords: cartridge chip</p>																	
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>KR 10-2007-0069794 A (PARK &amp; OPC CO., LTD.) 03 July 2007 See abstract, claims 1 and 6, figures 2 and 4 and related description</td> <td>1-11</td> </tr> <tr> <td>Y</td> <td>KR 10-0769738 B1 (CIPHER ELECTRONICS. CO., LTD.) 23 October 2007 See abstract, claim 1, paragraphs [0013]-[0016] in the detailed description, figure 1</td> <td>1-11</td> </tr> <tr> <td>A</td> <td>JP 2005-172934 A (WORLD NETWORK KK) 30 June 2005 See abstract, claims 1-4, figure 1</td> <td>1-11</td> </tr> <tr> <td>A</td> <td>US 7088928 B2 (BURCHETTE et al.) 08 August 2006 See abstract, claims 1 and 9, figure 1</td> <td>1-11</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	KR 10-2007-0069794 A (PARK & OPC CO., LTD.) 03 July 2007 See abstract, claims 1 and 6, figures 2 and 4 and related description	1-11	Y	KR 10-0769738 B1 (CIPHER ELECTRONICS. CO., LTD.) 23 October 2007 See abstract, claim 1, paragraphs [0013]-[0016] in the detailed description, figure 1	1-11	A	JP 2005-172934 A (WORLD NETWORK KK) 30 June 2005 See abstract, claims 1-4, figure 1	1-11	A	US 7088928 B2 (BURCHETTE et al.) 08 August 2006 See abstract, claims 1 and 9, figure 1	1-11
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.															
Y	KR 10-2007-0069794 A (PARK & OPC CO., LTD.) 03 July 2007 See abstract, claims 1 and 6, figures 2 and 4 and related description	1-11															
Y	KR 10-0769738 B1 (CIPHER ELECTRONICS. CO., LTD.) 23 October 2007 See abstract, claim 1, paragraphs [0013]-[0016] in the detailed description, figure 1	1-11															
A	JP 2005-172934 A (WORLD NETWORK KK) 30 June 2005 See abstract, claims 1-4, figure 1	1-11															
A	US 7088928 B2 (BURCHETTE et al.) 08 August 2006 See abstract, claims 1 and 9, figure 1	1-11															
<p><input type="checkbox"/> Further documents are listed in the continuation of Box C.      <input checked="" type="checkbox"/> See patent family annex.</p>																	
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<p>Date of the actual completion of the international search <b>06 SEPTEMBER 2010 (06.09.2010)</b></p>		<p>Date of mailing of the international search report <b>06 SEPTEMBER 2010 (06.09.2010)</b></p>															
<p>Name and mailing address of the ISA/KR                   Korean Intellectual Property Office                  Government Complex-Daejeon, 139 Seonsa-ro, Daejeon 302-701,                  Republic of Korea                  Facsimile No. 82-42-472-7140</p>		<p>Authorized officer</p> <p>Telephone No.</p>															

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