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(54) **GAME CARD, GAME CARD SYSTEM, GAME  
CARD READER AND METHOD OF  
AUTHENTICATION AND FRAUD  
PREVENTION**

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(57) **ABSTRACT**

There is provided a game card, game card system, game card reader and method of authentication and fraud prevention. Machine-readable codes are provided on game cards. The code on a game card is read by a game card reader employing two code readers. One code reader uses visible light to read the code, or in the alternative to merely detect the presence of the code. The other code reader uses infrared to read the code. A fraudulent game card, copied or reproduced by photocopiers, scanners and digital cameras available to the general public, is detected based on the absence of a code reading from the second code reader. The presence of code information on a game card that is detectable using visible light, also indicates that the game card is not authentic.

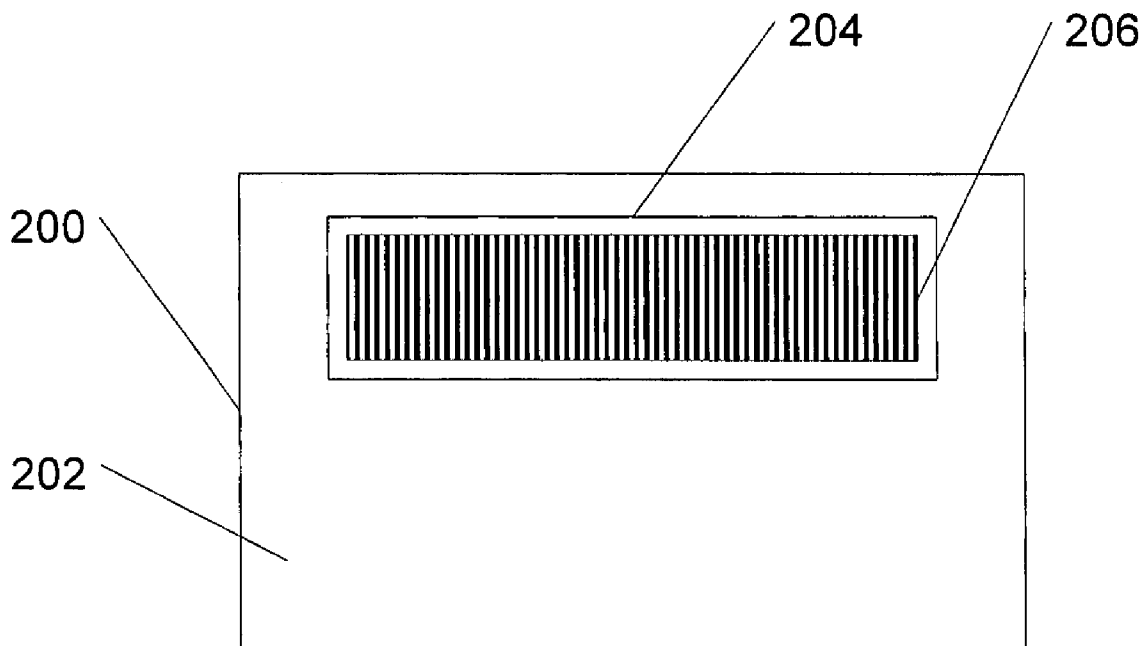
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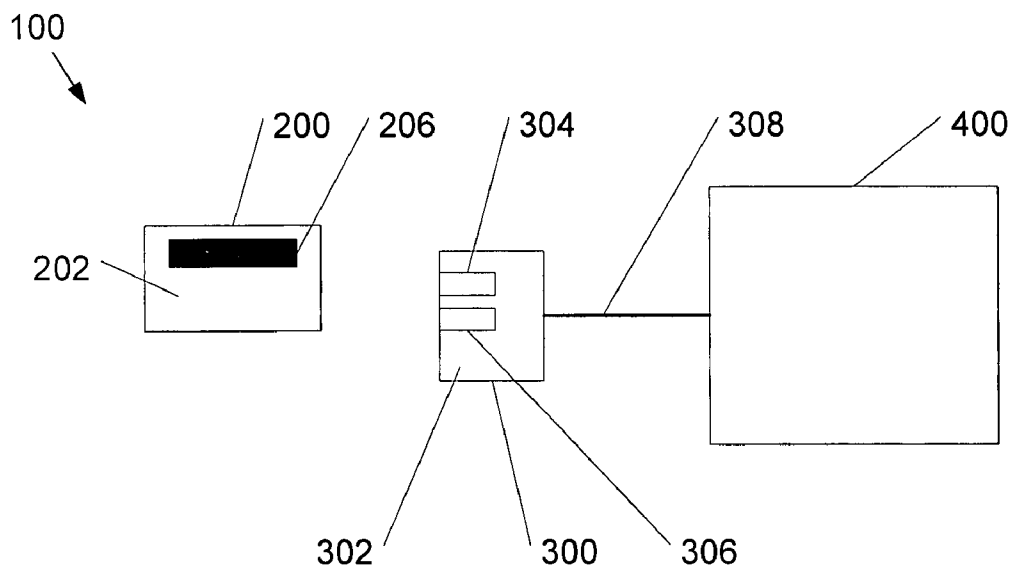


FIG. 1

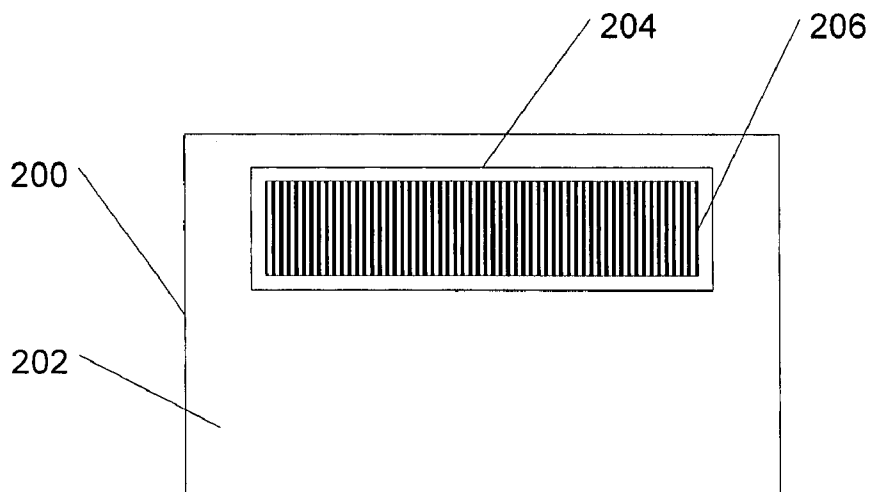
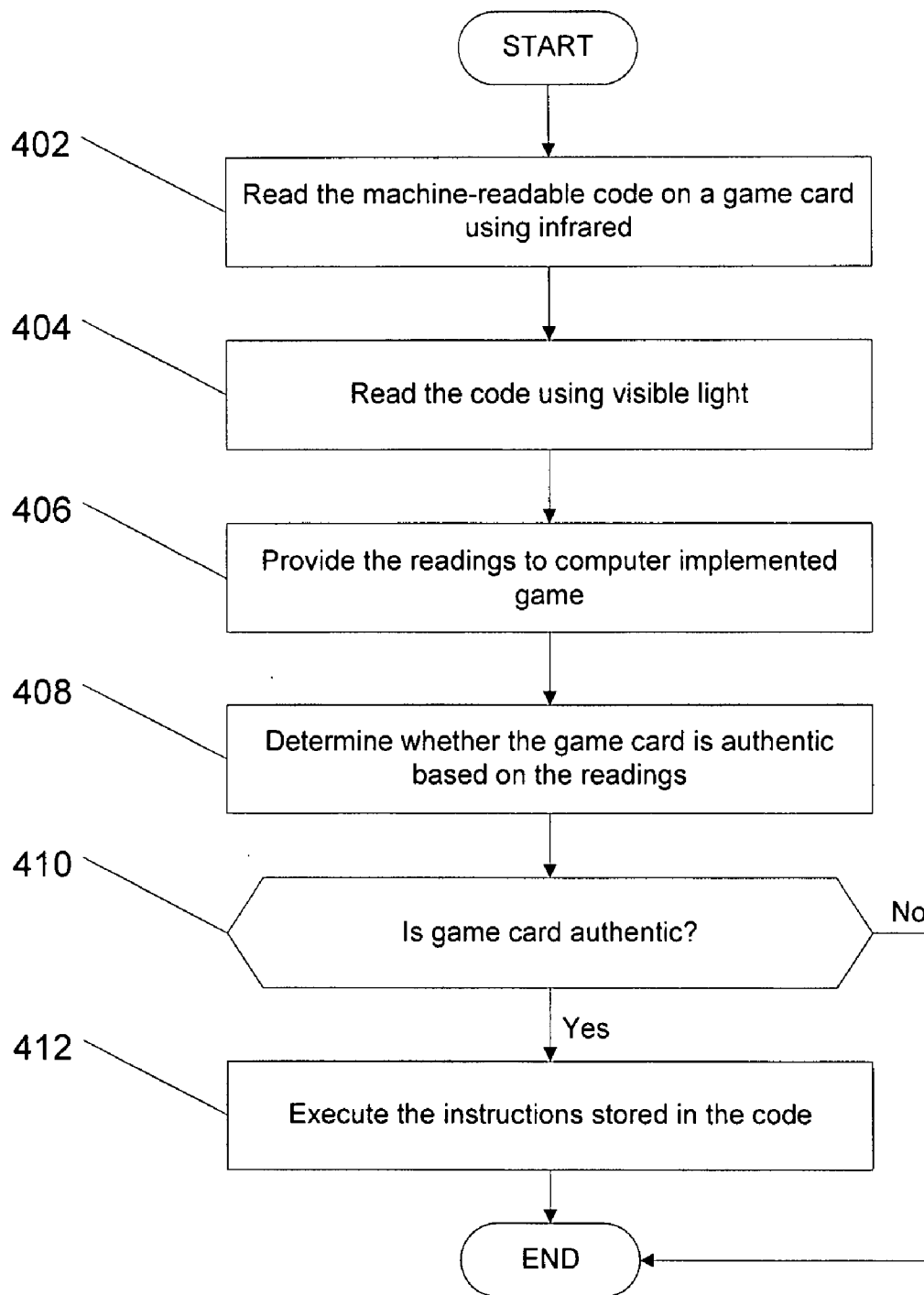
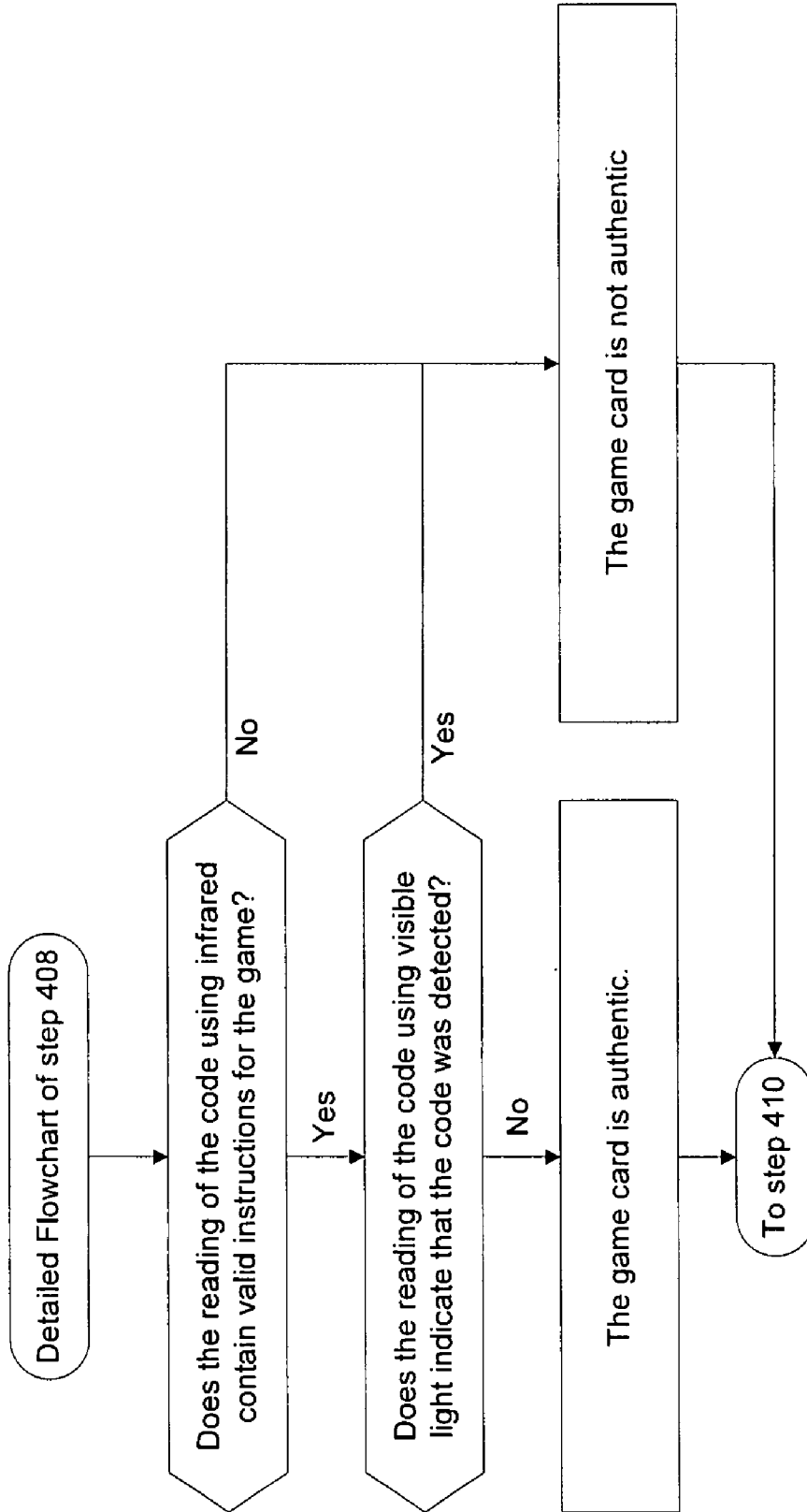


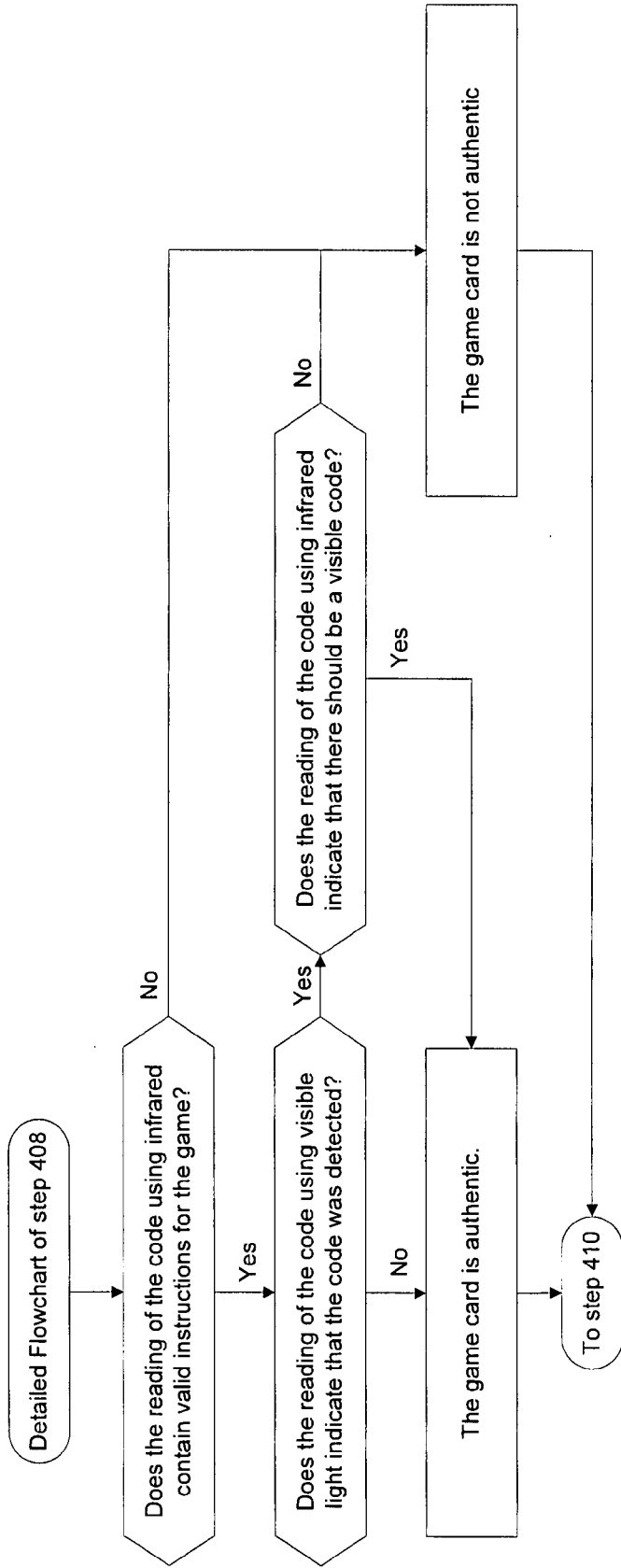
FIG. 2



**FIG. 3**



**FIG. 4**



**FIG. 5**

**GAME CARD, GAME CARD SYSTEM, GAME CARD READER AND METHOD OF AUTHENTICATION AND FRAUD PREVENTION**

**BACKGROUND OF THE INVENTION**

**Field of the Invention**

[0001] This invention relates in general to game cards, game card systems, game card readers and methods of authentication and fraud prevention and in particular to game cards, game card systems, game card readers and methods of game card authentication and fraud prevention for computer implemented games.

[0002] Computer implemented games, such as video games and the like, and trading card games are well known in the art. U.S. Patent Application No. 2005/0020337 to Simmons combines elements of these two types of games and describes a barcode used to store a "cheat code" which confers some gaming advantage to the player of an interactive computer game.

[0003] U.S. Pat. No. 6,119,943 to Christy discloses a barcode reader having two scanner heads, one for reading barcodes with IR ("infrared") light and the other for reading visible barcodes. Both barcodes are read at the same time. The main purpose of the invention is to increase the amount of information capable of being stored in the barcode read by overprinting barcodes one on top of the other.

[0004] U.S. Pat. No. 6,269,169 to Funk et al. describes a document reader for reading documents such as passports. The reader uses a number of different light sources and wavelengths of light to sequentially scan the document to obtain multiple images. The document is first classified as to type by comparing the results of a first scan to a database of document types. Once classified, the anti-counterfeiting information read out of the library is used to analyze the multiple scans for evidence of counterfeiting.

[0005] The above references do not disclose game card systems and methods that employ IR and visible codes to authenticate genuine game cards for a computer implemented game and reject fraudulent cards. The references also do not disclose authentication systems which reject game cards based on the presence of visible barcode information.

**SUMMARY OF THE INVENTION**

[0006] The game card, game card system, game card reader and method of authentication and fraud prevention described herein seek to overcome the above disadvantages.

[0007] This is accomplished by providing machine-readable codes on game cards. The codes are read by a game card reader employing two code readers. One code reader uses visible light to at least detect the presence of the codes. The other code reader uses infrared to read the codes. A fraudulent code, copied or reproduced by photocopiers, scanners and digital cameras available to the general public, is detected based on an analysis the output from the two code readers. If the presence of a code on a game card is detected by the code reader using visible light, the game card is not authentic. If the code is not readable by the infrared code reader, the game care is not authentic.

[0008] Accordingly, there is described herein embodiments of the applicant's game cards, game card systems, game card readers and methods of authentication and fraud prevention.

[0009] In particular, in one aspect, there is provided a game card for providing an advantage to a player of a computer implemented game including a game card reader for providing readings of the game card to the game, the game card comprising: a substrate; an overlay imaged on the substrate, the overlay reflecting infrared; and a machine-readable code imaged on top of the overlay for storing instructions for the game, the code being absorptive of infrared, the code being readable by the game card reader; wherein a visible contrast between the code and the overlay is low; and wherein the instructions are for instructing the game to provide the advantage to the player.

[0010] In another aspect, there is provided a game card reader for providing instructions to a computer implemented game including game cards, the game cards including a machine-readable code for storing the instructions, the game card reader comprising: a housing; a first code reader and a second code reader in the housing for reading the code on at least one of the game cards adjacent to the housing, the first code reader comprising a visible light detector, the second code reader comprising an infrared detector; an emitter in the housing for emitting visible light, an emitter in the housing for emitting infrared; and a connection for providing readings of the code by the first code reader and the second code reader to the game.

[0011] In a further aspect, there is provided a method of authentication and fraud prevention for a game card, the game card for providing an advantage to a player of a computer implemented game, the game card including a machine-readable code for storing instructions for the game, the method comprising the steps of: reading the code using infrared; reading the code using visible light; providing the reading of the code using infrared and the reading of the code using visible light to the computer implemented game; determining authenticity of the game card based on an analysis of the reading of the code using infrared and the reading of the code using visible light; and executing the instructions if the game card is authentic.

[0012] In another aspect, there is provided a game card system for authenticating game cards and preventing fraud comprising: a computer-implemented game; a game card reader connected to the game; and game cards; wherein at least one of the game cards comprises: a) an overlay imaged on a substrate, the overlay reflecting infrared; b) a machine-readable code imaged on the overlay for storing instructions for the game, the code being absorptive of infrared, the code being readable by the game card reader; wherein a visible contrast between the code and the overlay is low, wherein the game card reader comprises: a) a housing; b) a first code reader and a second code reader in the housing for reading the code on the at least one of the game cards adjacent the housing, the first code reader comprising a visible light detector, the second code reader comprising an infrared detector; c) an emitter in the housing for emitting visible light, d) an emitter in the housing for emitting infrared; wherein the game card reader is adapted to provide to the game over the connection: a) a reading of the code on the at least one of the game cards adjacent the housing by the first code reader; and b) a reading of the code on the at least one of the game cards adjacent the housing b) the second code reader; wherein the game is adapted to determine the authenticity of the at least one of the game cards adjacent the housing based on an analysis of the readings of the code by the first and second code readers; and wherein the game is adapted to execute the instructions stored

in the code on the at least one of the game cards adjacent the housing if the at least one of the game cards is authentic.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0013] In the drawings:

[0014] Embodiments of the applicant's game cards, game card systems, game card readers and methods of authentication and fraud prevention will now be described by way of example and with reference to the accompanying drawings in which:

[0015] FIG. 1 shows a simplified block diagram of one of the applicant's game card systems.

[0016] FIG. 2 shows a front view of the game card of FIG. 1 when viewed under infrared.

[0017] FIG. 3 shows a flowchart of one of the applicant's methods of authentication and fraud prevention.

[0018] FIG. 4 shows a detailed flowchart of one embodiment of step 408 of FIG. 3.

[0019] FIG. 5 shows a detailed flowchart of another embodiment of the step 408 of FIG. 3.

#### DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

[0020] The applicant's game cards, game card systems, game card readers and methods of authentication and fraud prevention are herein described in detail.

[0021] Machine-readable codes, for example barcodes, comprise a series of alternating dark portions and spaces. A code reader features a light emitter and a light detector, for example a photodiode sensor, that are generally placed next to each other. To read a code, a reader can be passed over the code in a relatively steady motion or the reader remains stationary and the code is "swiped" against it in a relatively steady motion. The detector measures the intensity of the light reflected back from the code. Dark portions in the code absorb light and spaces reflect light. In order for a code to be read reliably, the amount of light reflected by the dark portions must be significantly lower than the amount of light reflected by the spaces, i.e. a sufficient contrast must exist between the dark bars and blank spaces. If the contrast between the bars and the spaces is low, the code will not be readable.

[0022] Most imaging processes produce various colors by combining appropriate percentages of three primary colors of the "subtractive" or "reflected light" color model: Cyan (C), Magenta (M) and Yellow (Y), with a carbon-based Black (K) added for density and contrast. This process is also known as the CMYK process.

[0023] Certain imaging processes, for example modern digital printing processes, are capable of printing exceptionally dark areas using the three CMY colours only. A black color, using carbon-based "K" ink, printed on top of this CMY background will have a very low visible contrast with respect to the CMY background and will not be readable using ordinary visible-light barcode readers. However, the carbon-based black "K" ink remains highly absorptive (that is non-reflective) in the infrared spectrum, whereas the CMY-printed background area, however dark under visible light, will reflect a significant amount of infrared. Therefore, a barcode printed using carbon-based black "K" ink on a saturated CMY background will provide sufficient contrast for reliable reading when illuminated and viewed with infrared.

[0024] The applicant's game cards have a code that is absorptive of infrared printed on a background that is infrared-reflective, for example a black barcode of carbon-based "K" ink printed on a CMY-based dark purple background. When viewed in visible light, the black-on-purple code has a very low contrast, and indeed will not be readable or detectable by an ordinary barcode reader using visible light. However, if the code is illuminated by infrared, the code will have a high contrast when viewed by a barcode reader sensitive to infrared, since the black "K" bars absorb infrared and the CMY-based background is highly reflective to infrared. The applicant's code will be readable by an infrared barcode reader, but not by a barcode reader using visible light only.

[0025] Photocopiers, scanners and digital cameras available to the general public capture images utilizing the "additive" or "emitted light" color model, with Red (R), Green (G) and Blue (B) as primary colours. They are, therefore, unable to distinguish very well between carbon-based "K" and CMY-based dark areas of the code image. When the captured RGB image is converted back into the CMYK color model in order to be duplicated, the barcode will no longer be black "K" overprinted on the CMY-based background. Instead, both the barcode and background will comprise significant percentages of all four colors (C, M, Y and K) and will not be capable of providing sufficient contrast under either visible or infrared for the code to be successfully read. Thus, the applicant's game card system protects against fraudulent duplication of game cards by photocopying or by printing a scanned or digitally photographed image of a genuine game card.

[0026] However, an infrared barcode reader will read both carbon-based black-on-CMY barcodes and also ordinary barcodes printed using any dark color on a light background, as long as the dark colour is absorptive of infrared. Therefore, the applicant's game card reader has a first detector and a second detector. The first detector is sensitive to visible light only and the second detector is sensitive to infrared only. The game card reader has either a single emitter that emits both visible light and infrared, or two separate emitters, one for emitting visible light and a second for emitting infrared. In the case were the game card reader has two separate emitters, the emitters may be combined with the corresponding detector to comprise a first sensor that is sensitive to visible light only, and a second sensor that is sensitive to infrared only.

[0027] The first sensor is included in a first code reader that is sensitive to visible light only. To save costs, it is not necessary that the first code reader of applicant's game card reader actually be able to read the code. It is sufficient that the first code reader only be capable of detecting the presence of a normal visible code on the game card. The second sensor is included in a second infrared code reader that is sensitive to infrared only and is capable of reading the code.

[0028] By determining that the first (visible light) code reader detected the code, the computer implemented game can identify and reject fraudulent cards that may have been created by reproducing the pattern of a genuine code in a dark colour on a light-coloured background. By determining that the second (infrared) code reader is unable to read a code, the computer implemented game can identify and reject fraudulent cards that may have been reproduced by photocopying or by printing a scanned or digitally photographed image of a genuine game card.

[0029] FIG. 1 shows a game card system 100 for authenticating game cards and preventing fraud. The system includes

a computer-implemented game **400**, a game card reader **300** connected to the game, and game cards such as game card **200**.

[0030] FIG. 2 shows an embodiment of the game card **200** viewed under infrared. Game card **200** includes a substrate **202** and an overlay **204** imaged on the substrate. Imaging can be accomplished by a number of processes well known in the art, for example a digital printing process. The overlay **204** reflects infrared. The overlay can comprise any infrared reflecting material, for example, combinations of CMY inks. A machine-readable code **206**, for example a barcode, is imaged on top of the overlay **204**. The code **206** can comprise any infrared absorbing (that is non-reflecting) material, for example a carbon-based “K” ink. The code **206** stores instructions for the game. These instructions generally instruct the game to give some form of advantage to a game user. The instructions could, for example, instruct the game to give a user access to particular game features including access to the game itself, access to particular levels, unlimited life for a game character, or unlimited ammunition. Those skilled in the art will readily appreciate that it would be possible to include many other game advantages and game features in the instructions.

[0031] The visible contrast between the code **206** and the overlay **204** is so slight that the code **206** cannot be read or detected by code-reading machines using visible light. However, due to the high infrared contrast between the code **206**, which is absorptive of infrared, and the overlay **204**, which is highly reflective of infrared, the code **206** can be easily read by code-reading machines utilizing infrared. Moreover, when the combination of overlay **204** and code **206** is reproduced by copying machines utilizing the “additive” or “emitted light” color model, for example, photocopiers, scanners and digital cameras available to the general public, the resulting visible and infrared contrast between the code **206** and the overlay **204** is so slight that the code **206** cannot be read by code-reading machines using infrared or visible light, and the presence of code **206** cannot be detected by a detector sensitive to visible light only.

[0032] The game card reader **300** will now be described in more detail. The game card reader **300** includes a housing **302**. A first code reader **304** and a second code reader **306** are arranged in the housing for reading the code **206** on game card **200** that is adjacent to the housing. The first code reader **304** uses only visible light to read the code and comprises a visible light emitter and a visible light detector. The second code reader **306** uses only infrared to view the code and comprises an infrared emitter and an infrared detector. In the alternative, as mentioned above, the visible light emitter and infrared emitter may be combined into a single emitter that emits both visible light and infrared. In that case, first code reader **304** would comprise only a visible light detector, and second code reader **306** would comprise only an infrared detector. In a further alternative, and in particular, to save manufacturing costs, it is only necessary that the first code reader **304** has the ability to detect the presence of a visible code on the game card **200** and does not require the additional ability to read the code **206**. These types of code readers and detectors are well known in the art and are not discussed further by the applicant herein.

[0033] The game card reader **300** includes a microprocessor (not shown) for buffering data received from the code readers **304**, **306**, verifying checksums included in the code, filtering out gross reading errors, decoding and formatting

raw code data into a predetermined format that can be used by the computer-implemented game **400**. In the alternative, these functions can be performed by the computer-implemented game **400**. The game card reader **300** is connected to the computer-implemented game **400** by connection **308**. The connection **308** can be made by via a USB connection, by Bluetooth™ technology, infrared or the like. When game card **200** is adjacent the game card reader **300**, the code readers **304**, **306** read the code **206** and provide two code readings, one from each code reader, to the game **400**. The code readings can, for example, comprise a unique sequence of numbers which can be recognized by the game as valid game instructions to perform a certain action in the game. In the instance when first code reader **304** does not read the code **206**, but merely detects the presence of a normal visible code, the code reading from code reader **304** comprises only an indication that a visible code has or has not been detected. When code readers **304** or **306**, are unable to read or detect the code **206** on the adjacent game card, no reading will be provided to the game or, alternatively, a reading will be provided indicating that the code reader was unable to read or detect the code. In another aspect of the system **100**, the game card reader **300** can provide the two code readings to the game **400** in a combined reading. In another aspect of the system, the game card reader **300** can provide an indication whether the first code reader **304** using visible light detected the code.

[0034] Based on an analysis of the code readings provided to the game **400**, the game is adapted to determine the authenticity of the game card **200** adjacent the game card reader **300**. If the card **200** is determined to be authentic, the game executes the instructions stored in the code **206**. Generally, the game card **200** is determined to be authentic if the second code reader **306** using infrared detects and reads the code **206**, the code contains valid instructions for the game, and the visible light code reader **304** does not indicate that the code **206** was detected. Thus, when a genuine code is fraudulently reproduced in visible ink with high contrast, the fraud will be detected, since the visible light code reader **304** will indicate that the code was detected.

[0035] Alternatively, the card **200** is determined to be authentic if the second code reader **306** using infrared reads the code **206**, the code contains valid instructions for the game, and the reading of the code by the first code reader **304** using visible light does not contain valid instructions for the game. Generally, the reading of the code **206** will not contain valid instructions for the game **400** when, for example, the code is not detected on the game card **200** or the code is detected but the code is not a code that is recognized by the game as containing valid game instructions.

[0036] FIG. 3 is a flowchart showing one embodiment of the applicant’s method of authentication and fraud prevention as employed by game card system **100**. It generally comprises the steps of:

[0037] 1. reading the machine-readable code **206** on game card **200** using infrared, step **402**;

[0038] 2. reading the code **206** using visible light, step **404**;

[0039] 3. providing the reading of code using infrared and the reading of code using visible light to the computer implemented game **400**, step **406**;

[0040] 4. determining authenticity of the game card **200** based on an analysis of the reading of the code using infrared and the reading of the code using visible light, step **408**; and



[0041] 5. if the game card is authentic, step 410, executing instructions stored in the code, step 412.

[0042] A detailed flowchart of one embodiment of step 408 is shown in FIG. 4. In this embodiment, the reading of the code 206 by first code reader 304 using visible light consists only of an indication whether the code was detected. A game card is determined to be authentic if the second code reader 306 using infrared reads the code 206, the code contains valid instructions for the game, and the first code reader 304 using visible light does not indicate that the code 206 was detected.

[0043] In another embodiment of the method, the game card is determined to be authentic if the second code reader 306 using infrared reads the code 206, the code contains valid instructions for the game, and the reading of the code by the first code reader 304 using visible light does not contain valid instructions for the game.

[0044] A detailed flowchart of another embodiment of step 408 is shown in FIG. 5. This embodiment includes the additional step of determining whether the reading of the code 206 using infrared indicates that there should be a code detectable using visible light on the game card 200. This embodiment of the method can identify game cards, for example older versions of game cards, which were imaged using conventional barcodes detectable using visible light, but which are still authentic. These game cards would be determined to be not authentic by the steps shown in FIG. 4, due to the presence of code 206 detectable using visible light. However, in the embodiment described in FIG. 5, these game cards would be determined to be authentic based on an indication, for example a particular card series number, in the reading of the code 206 using infrared. In other words, a game card is determined to be authentic if the second code reader 306 using infrared reads the code 206, the code contains valid instructions for the game, the reading of the code by the first code reader 304 using visible light consists of an indication that the code was detected, and the reading of the code by the second code reader 306 using infrared contains information that indicates that the code should be detectable by the first code reader using visible light.

[0045] All of the above features provide an illustration of preferred embodiments of the applicant's game cards, game card systems, game card readers and methods of authentication and fraud prevention, but are not intended to limit the scope of the invention, which is fully described in the claims below.

What is claimed is:

1. A game card for providing an advantage to a player of a computer implemented game including a game card reader for providing readings of the game card to the game, the game card comprising:

- a substrate;
  - an overlay imaged on said substrate, said overlay reflecting infrared; and
  - a machine-readable code imaged on top of said overlay for storing instructions for the game, said code being absorptive of infrared, said code being readable by the game card reader;
- wherein a visible contrast between said code and said overlay is low; and
- wherein said instructions are for instructing the game to provide the advantage to the player.

2. The game card of claim 1, wherein said overlay is imaged using a combination of cyan, magenta and yellow inks and said machine-readable code is imaged using a carbon-based ink.

3. A game card reader for providing instructions to a computer implemented game including game cards, the game cards including a machine-readable code for storing the instructions, the game card reader comprising:

- a housing;
- a first code reader and a second code reader in said housing for reading the code on at least one of the game cards adjacent to said housing, said first code reader comprising a visible light detector, said second code reader comprising an infrared detector;
- an emitter in said housing for emitting visible light, an emitter in said housing for emitting infrared; and
- a connection for providing readings of the code by said first code reader and said second code reader to the game.

4. The game card reader of claim 3, wherein said reading of the code by said first code reader comprises an indication of whether the code was detected by said first code reader.

5. A method of authentication and fraud prevention for a game card, the game card for providing an advantage to a player of a computer implemented game, the game card including a machine-readable code for storing instructions for the game, the method comprising the steps of:

- reading the code using infrared;
- reading the code using visible light;
- providing said reading of the code using infrared and said reading of the code using visible light to the computer implemented game;
- determining authenticity of the game card based on an analysis of said reading of the code using infrared and said reading of the code using visible light; and
- executing said instructions if said game card is authentic.

6. The method of claim 5, wherein said reading of the code using visible light comprises only an indication whether the code was detected using visible light.

7. The method of claim 6, wherein said game card is authentic if:

- said reading of the code using infrared contains valid instructions for the game, and
- said indication whether the code was detected using visible light indicates that the code was not detected.

8. The method of claim 5, wherein said step of determining authenticity of the game card comprises the step of determining whether said reading of the code using infrared indicates that the code should be detectable by the step of reading the code using visible light.

9. The method of claim 8, wherein the game card is authentic if:

- said reading of the code using infrared contains valid instructions for the game;
- said reading of the code using visible light comprises of an indication that the code was detected; and
- said reading of the code using infrared indicates that the code should be detectable by the step of reading the code using visible light.

10. The method of claim 4, wherein the game card is authentic if:

- said reading of the code using infrared contains valid instructions for the game, and
- said reading of the code using visible light does not contain valid instructions for the game.

**11.** A game card system for authenticating game cards and preventing fraud comprising:  
 a computer-implemented game;  
 a game card reader connected to said game; and  
 game cards;  
 wherein at least one of said game cards comprises:  
 a) an overlay imaged on a substrate, said overlay reflecting infrared;  
 b) a machine-readable code imaged on said overlay for storing instructions for said game, said code being absorptive of infrared, said code being readable by said game card reader;  
 wherein a visible contrast between said code and said overlay is low,  
 wherein said game card reader comprises:  
 a) a housing;  
 b) a first code reader and a second code reader in said housing for reading said code on said at least one of said game cards adjacent said housing, said first code reader comprising a visible light detector, said second code reader comprising an infrared detector;  
 c) an emitter in said housing for emitting visible light,  
 d) an emitter in said housing for emitting infrared;  
 wherein said game card reader is adapted to provide to said game over said connection:  
 a) a reading of said code on said at least one of said game cards adjacent said housing by said first code reader; and  
 b) a reading of said code on said at least one of said game cards adjacent said housing by said second code reader;

wherein said game is adapted to determine the authenticity of said at least one of said game cards adjacent said housing based on an analysis of said readings of said code by said first and second code readers; and  
 wherein said game is adapted to execute said instructions stored in said code on said at least one of said game cards adjacent said housing if said at least one of said game cards is authentic.

**12.** The game card system of claim **11**, wherein said reading of said code by said first code reader comprises an indication whether said code was detected by said first code reader.

**13.** The game card system of claim **12**, wherein said game is adapted to determine that said at least one of said game cards adjacent said housing is authentic if:

said reading of said code by said second code reader contains valid instructions for said game, and  
 said indication whether the code was detected by said first code reader indicates that the code was not detected.

**14.** The game card system of claim **11**, wherein said game is adapted to determine that said at least one of said game cards adjacent said housing is authentic if:

said reading of said code by said second code reader contains valid instructions for said game, and  
 said reading of said code by said first code reader does not contain valid instructions for said game.

**15.** The game card system of claim **11**, wherein said overlay is imaged using a combination of cyan, magenta and yellow inks and said machine-readable code is imaged using a carbon-based ink.

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