

TITLE OF INVENTION: TICKET VERIFICATION SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This non-provisional application claims priority on Patent Application No(s). 112144024 filed in Taiwan on November 15th, 2023, the entire contents of which are hereby incorporated by reference.

BACKGROUND

[0002] 1. Technical Field

[0003] This disclosure relates to a ticket verification system and method.

[0004] 2. Related Art

[0005] In venues such as concerts, theaters, and various sports events, user needs to purchase ticket and obtain an exclusive quick response (QR) barcode from the ticket broker before entering the venue. When entering, user can verify by showing the quick response barcode, and can enter the venue after passing the verification. However, it is easy for parties with bad intentions to obtain the quick response barcode through secretly photographing the user's screen and then steal user's ticket.

SUMMARY

[0006] Accordingly, this disclosure provides a.

[0007] According to one or more embodiment of this disclosure, a ticket verification method includes: generating, by a mobile device, a first verification code according to ticket information; obtaining, by the mobile device, at least one of current location information and current time information when triggered by a trigger signal; generating, by the mobile device, a second verification code at least according to the at least one of the current location information and the current time information; switching, by the mobile device, displaying a plurality of displayed verification codes comprising the first verification code and the second verification code; obtaining, by a verification device, the first verification code and the

second verification code and obtaining the ticket information and the at least one of the current location information and the current time information accordingly; outputting, by the verification device, a third verification code to the mobile device when determining the ticket information and the at least one of the current location information and the current time information pass verification; obtaining, by the verification device, a to-be-verified code displayed by the mobile device after outputting the third verification code; and outputting, by the verification device, an entry allowed signal as a verification result when determining the to-be-verified code matches the third verification code.

[0008] According to one or more embodiment of this disclosure, a ticket verification system includes the mobile device and the verification device performing the ticket verification method described above.

[0009] In view of the above description, according to the ticket verification system and method of one or more embodiments of the present disclosure, by using the current location information as the device information for generating the verification code, the user of the mobile device may be allowed to enter the venue when the user of the mobile device is determined to be located at the event venue; and by using the current time information as the device information for generating the verification code, the user of the mobile device may be allowed to enter the venue when the user of the mobile device is determined to obtain the second verification code during the event. Therefore, the ticket may be prevented from being embezzled due to the verification code being screenshot or secretly photographed by verifying with two-stage verification codes, thereby effectively solving the problem of ticket forgery.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The present disclosure will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only and thus are not limitative of the present disclosure and wherein:

[0011] FIG. 1 is a block diagram illustrating a ticket verification system according to an embodiment of the present disclosure;

[0012] FIG. 2 is a block diagram illustrating a ticket verification system according to another embodiment of the present disclosure;

[0013] FIG. 3 is a flowchart illustrating a ticket verification method according to an embodiment of the present disclosure;

[0014] FIG. 4 is a flowchart illustrating verifying a to-be-verified code according to an embodiment of the present disclosure;

[0015] FIG. 5 is a flowchart illustrating generating a third verification code according to an embodiment of the present disclosure;

[0016] FIG. 6 is a flowchart illustrating obtaining a verification result according to an embodiment of the present disclosure;

[0017] FIG. 7 is a flowchart illustrating a ticket verification method according to another embodiment of the present disclosure; and

[0018] FIG. 8 is a flowchart illustrating outputting a second stage verification code according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0019] In the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. According to the description, claims and the drawings disclosed in the specification, one skilled in the art may easily understand the concepts and features of the present invention. The following embodiments further illustrate various aspects of the present invention, but are not meant to limit the scope of the present invention.

[0020] The ticket verification system and method described below is adapted to scenarios where user's ticket has to be verified for the user to enter a venue, such as concert, theater, sports event etc.

[0021] Please refer to FIG. 1, wherein FIG. 1 is a block diagram illustrating a ticket verification system according to an embodiment of the present disclosure. As shown in FIG. 1, the ticket verification system 1 includes a mobile device 11 and a verification device 12.

FIG. 1 illustrates the mobile device 11 as connected to the verification device 12, but the present disclosure is not limited thereto.

[0022] The mobile device 11 is configured to generate a plurality of displayed verification codes, and switch displaying the displayed verification codes. The mobile device 11 may be a smart phone, a smart watch or a tablet etc. The verification device 12 is configured to verify the displayed verification codes displayed by the mobile device 11, and allow the user of the mobile device 11 to enter the venue when the verification result indicates the codes pass the verification. The verification device 12 may include a scanner and one or more processors. The processor is, for example, a central processing unit, a graphics processing unit, a microcontroller, a programmable logic controller or any other processor with signal processing functions. In an embodiment, the scanner and said one or more processors may be disposed within a same device, said one or more processors may be connected to a local or cloud database to obtain comparison data required for verification described below. In another embodiment, said one or more processors of the verification device 12 may be implemented with a network host (server), and the network host may be in communication connection with the scanner to obtain verification code(s) obtained by the scanner, and perform subsequent verification according the comparison data stored by internal or external database.

[0023] Please refer to FIG. 2, wherein FIG. 2 is a block diagram illustrating a ticket verification system according to another embodiment of the present disclosure. As shown in FIG. 2, the ticket verification system 2 includes a mobile device 21 and a verification device 22. The mobile device 21 may be the same as the mobile device 11 of FIG. 1, details thereof are not repeated herein. The verification device 22 may include a scanning element 221 and a processing element 222. The scanning element 221 may be configured to scan the displayed verification codes displayed by the mobile device 2, transmit the displayed verification codes to the processing element 222, for the processing element 222 to verify the displayed verification codes. The displayed verification codes may be 2D barcodes, 3D barcodes and/or quick response (QR) code, etc.; the scanning element 221 may be a 2D barcode scanner, a 3D barcode scanner and/or a QR code scanner etc. The processing element 222 may be said

one or more processors described above, and may be disposed in the same device with the scanning element 221. The processing element 222 may also be implemented with the network host (server) described above. Further, the scanning element 221 and the processing element 222 may be integrated as a smart phone or a tablet, etc. FIG. 2 illustrates the mobile device 21 as connected to the processing element 222 of the verification device 22, but the present disclosure is not limited thereto.

[0024] The ticket verification method of one or more embodiments described below may be adapted to the ticket verification system of FIG. 1 and FIG. 2. The following uses the ticket verification system of FIG. 2 as an example for description. Please refer to FIG. 2 and FIG. 3, wherein FIG. 3 is a flowchart illustrating a ticket verification method according to an embodiment of the present disclosure. As shown in FIG. 3, the ticket verification method includes: step S101: generating, by a mobile device, a first verification code according to ticket information; step S103: obtaining, by the mobile device, device information when triggered by a trigger signal; step S105: generating, by the mobile device, a second verification code at least according to the device information; step S107: switching, by the mobile device, displaying a plurality of displayed verification codes comprising the first verification code and the second verification code; step S109: obtaining, by a verification device, the first verification code and the second verification code and obtaining the ticket information and the device information accordingly; and step S111: generating, by the verification device, a verification result at least according to the ticket information and the device information.

[0025] In step S101, the mobile device 21 may convert the ticket information into the first verification code or may extract the first verification code from the ticket information. The ticket information may be payment information obtained by the user when the user has paid for the ticket. For example, the user purchases the ticket on the ticket purchase website provided by the server of the ticket seller by using the mobile device 21, and the server provides the ticket information to the mobile device 21 after the purchase. The mobile device 21 may convert one or more pieces of data in the ticket information into the first verification

code; or, when the ticket information already includes a verification code, the mobile device 21 may use said verification code as the first verification code.

[0026] In step S103, the mobile device 21 is triggered by the trigger signal to obtain the device information. The mobile device 21 may be installed with an application corresponding to the processing element 222, and the trigger signal may be generated by the user clicking a corresponding button on the application or generated when the user opens the application, wherein the button may be a button presenting “generate verification code” or “obtain device information” etc. The device information may include at least one of current location information and current time information of the mobile device 21. For example, the mobile device 21 may obtain the current location information from global positioning system (GPS). Alternatively, the processing element 222 of the verification device 22 may be connected to a private network, and the ticket information includes a private password of the private network, so that the mobile device 21 may be connected to the private network according to the private password and obtain a random code from the processing element 222 of the verification device 22 through the private network as the current location information. Specifically, the mobile device 21 may be triggered by the trigger signal to search for the private network, and may present a password request interface for the user to input the private password, thereby connecting to the private network.

[0027] In step S105, the mobile device 21 may convert the device information into the second verification code. As described above, the device information includes the current location information and the current time information, the mobile device 21 may generate the second verification code according to the current location information and the current time information. In step S107, the mobile device 21 switches a display of the first verification code and the second verification code. In other words, the mobile device 21 may first display the first verification code, then hide the first verification code and display the second verification code. It should be noted that the mobile device 21 may perform step S107 after obtaining the first verification code and the second verification code; or, the mobile device 21 may display the first verification code between step S101 and step S103, and switch to display the second verification code after step S105.

[0028] In step S109, the scanning element 221 of the verification device 22 may scan the first verification code and the second verification code displayed by the mobile device 21, and output the first verification code and the second verification code to the processing element 222. The processing element 222 may parse the first verification code and the second verification code to obtain the ticket information corresponding to the first verification code and the device information corresponding to the second verification code.

[0029] In step S111, the processing element 222 of the verification device 22 verifies the ticket information and the device information. For example, the processing element 222 may determine whether the ticket information and the device information match the respective default information, and use the determination result as the verification result. Further, when the verification result indicates that the ticket information and the device information pass verification, the processing element 222 may output a corresponding notification signal to the mobile device 21 or to a gate controller located at the scanning element 221 end, thereby allowing the user of the mobile device 21 to enter the venue.

[0030] By using the current location information as the device information for generating the verification code, the user of the mobile device may be allowed to enter the venue when the user of the mobile device is determined to be located at the event venue; and by using the current time information as the device information for generating the verification code, the user of the mobile device may be allowed to enter the venue when the user of the mobile device is determined to obtain the second verification code during the event. Therefore, the ticket may be prevented from being embezzled due to the verification code being screenshot or secretly photographed prior to the event.

[0031] Please refer to FIG. 2 and FIG. 4, wherein FIG. 4 is a flowchart illustrating verifying a to-be-verified code according to an embodiment of the present disclosure. Steps S203, S205 and S207 of FIG. 4 may be regarded as a detail flowchart of an embodiment of step S111 of FIG. 3. As shown in FIG. 4, verifying the to-be-verified code may include: step S201: obtaining the first verification code and the second verification code; step S203: determining whether the ticket information matches payment information and whether the device information matches event information; when the determination result of step S203 is

“yes”, performing step S205: outputting an entry allowed signal as the verification result; and when the determination result of step S203 is “no”, performing step S207: outputting an entry denied signal as the verification result. The implementation of step S201 may be the same as step S109 of FIG. 3, details thereof are not repeated herein.

[0032] In step S203, the processing element 222 uses the payment information and the event information to verify the ticket information and the device information, respectively, wherein the payment information and the event information may be the comparison data described above. For the ticket information, the processing element 222 may determine whether the ticket information matches the payment information. For example, the ticket information may include an order number, and the processing element 222 may determine whether the order number matches one of paid order numbers (i.e. payment information). For the device information, when the device information includes the current location information, the processing element 222 may determine whether the current location information matches event location information (i.e. the event information). For example, the processing element 222 determines whether a distance between geographical coordinates of the current location information and geographical coordinates of the preset event location information is shorter than a default distance. When the device information includes the current time information, the processing element 222 may determine whether the current time information matches event time information (i.e. the event information). For example, the event time information includes a starting time point and an ending time point of the event, and the processing element 222 determines whether a time difference between the current time information and the starting time point is shorter than a default duration.

[0033] When the processing element 222 determines that the ticket information matches the payment information and the device information matches the event information, in step S205, the processing element 222 outputs the entry allowed signal as the verification result, wherein the entry allowed signal may be output to the mobile device 21 or the gate controller located at the scanning element 221 end.

[0034] When the processing element 222 determines that the ticket information does not match the payment information and/or the device information does not match the event

information, in step S207, the processing element 222 outputs the entry denied signal as the verification result, wherein the entry denied signal may be output to the mobile device 21 or the gate controller located at the scanning element 221 end, thereby denying the user of the mobile device 21 to enter.

[0035] Please refer to FIG. 2 and FIG. 5, wherein FIG. 5 is a flowchart illustrating generating a third verification code according to an embodiment of the present disclosure. Step S301 shown in FIG. 5 may be performed at the same time as step S103 of FIG. 3, step S303 may be performed at the same time as step S105 of FIG. 3. As shown in FIG. 5, generating the third verification code may include: step S301: obtaining, by the mobile device, another piece of device information when triggered by the mobile device; and step S303: generating, by the mobile device, a third verification code according to said another piece of device information.

[0036] The following uses an example of the device information described in FIG. 3 only includes the current location information. In step S301, the mobile device 21 obtains the current time information as another piece of device information after triggered by the trigger signal described in step S103 of FIG. 3. In step S303, the mobile device 21 converts the current time information into the third verification code. Further, in step S107 of FIG. 3, the displayed verification codes switched by the mobile device 21 may further include the third verification code.

[0037] In addition, when the device information described in FIG. 3 only includes the current time information, step S301 and step S303 may also be applied to the current location information to generate the third verification code according to the current location information.

[0038] Please refer to FIG. 2 and FIG. 6, wherein FIG. 6 is a flowchart illustrating obtaining a verification result according to an embodiment of the present disclosure. FIG. 6 may be regarded as a detail flowchart of an embodiment of step S111 of FIG. 3. As shown in FIG. 6, obtaining the verification result may include: step S401: outputting the third verification code to the mobile device when determining the ticket information and the device information pass verification; step S403: obtaining a to-be-verified code displayed by the

mobile device after outputting the third verification code; and step S405: outputting the entry allowed signal as the verification result when determining the to-be-verified code matches the third verification code.

[0039] In step S401, after the processing element 222 determines that the ticket information and the device information are verified, the processing element 222 may output the third verification code to the mobile device 21. As described above, the device information may include the current time information and the current location information. The processing element 222 may determine whether the ticket information and the device information pass verification by performing steps shown in FIG. 4. In addition, the processing element 222 may generate the third verification code according to random information. The random information may include a combination of one or both of random number(s) and random English letter(s).

[0040] In step S403, after outputting the third verification code, the scanning element 221 scans the to-be-verified code displayed by the mobile device 21, and outputs the to-be-verified code to the processing element 222.

[0041] In step S405, the processing element 222 determines whether the to-be-verified code is the same as the third verification code output in step S401, and outputs the entry allowed signal to the mobile device 21 or the gate controller located at the scanning element 221 end when determining the to-be-verified code is the same as the third verification code, thereby allowing the user of the mobile device 21 to enter.

[0042] Please refer to FIG. 2 and FIG. 7, wherein FIG. 7 is a flowchart illustrating a ticket verification method according to another embodiment of the present disclosure. The flowchart shown in FIG. 7 is performed by the verification device 12 of FIG. 1 or the verification device 22 of FIG. 2, the following uses the verification device 22 of FIG. 2 for description. As shown in FIG. 7, the ticket verification method includes: step S501: scanning at least one first stage verification code displayed by the mobile device; step S503: outputting a second stage verification code to the mobile device after said at least one first stage verification code passes verification; step S505: scanning the to-be-verified code displayed by the mobile device after outputting the second stage verification code; and step S507:

outputting the entry allowed signal after determining the to-be-verified code matches the second stage verification code.

[0043] In step S501, the scanning element 221 of the verification device 22 scans the first stage verification code displayed by the mobile device 21. The first stage verification code may include displayed verification codes different from each other, such as at least one of the first verification code and the second verification code of one or more embodiments described above. Further, the first stage verification code may include the first verification code generated according to the ticket information and the second verification code generated according to the device information (at least one of the current location information and the current time information). Further, the mobile device 21 may switch displaying the displayed verification codes.

[0044] In step S503, the processing element 222 of the verification device 22 performs verification on the first stage verification code, and outputs the second stage verification code to the mobile device 21 when the first stage verification code passes verification, wherein the processing element 222 may perform verification on the first stage verification code according to step S203 shown in FIG. 4. The method of generating the second stage verification code by processing element 222 may be the same as the method of generating the third verification code described above. In other words, the second stage verification code may be the third verification code described above. The mobile device 21 may obtain the verification code by connecting to the processing element 222 of the verification device 22 using any network, wherein said any network may be mobile network or Wi-Fi etc.

[0045] In step S505, the mobile device 21 displays the to-be-verified code, the scanning element 221 scans the to-be-verified code displayed by the mobile device 21 and outputs the to-be-verified code to the processing element 222. As described above, the mobile device 21 may display the to-be-verified code through the application interface.

[0046] In step S507, the processing element 222 determines whether the to-be-verified code is the same as the second stage verification code. When the processing element 222 determines that the to-be-verified code is the same as the second stage verification code, the processing element 222 outputs the entry allowed signal to the mobile device 21 or the gate

controller located at the scanning element 221 end, thereby allowing the user of the mobile device 21 to enter the venue. On the contrary, when the processing element 222 determines that the to-be-verified code is different from the second stage verification code, the processing element 222 outputs the entry denied signal to the mobile device 21 or the gate controller located at the scanning element 221 end, thereby denying the user of the mobile device 21 from entering the venue.

[0047] Through the embodiment of FIG. 7, the ticket may be prevented from being embezzled due to the verification code being screenshot or secretly photographed, thereby effectively solving the problem of ticket forgery.

[0048] Please refer to FIG. 2 and FIG. 8, wherein FIG. 8 is a flowchart illustrating outputting a second stage verification code according to an embodiment of the present disclosure. Step S601 of FIG. 8 may be regarded as a detail flowchart of an embodiment of step S503 of FIG. 7. As shown in FIG. 8, outputting the second stage verification code may include: step S601: determining the mobile device is connected to the private network; and step S603: outputting the second stage verification code through the private network. In this embodiment, the processing element 222 may be connected to the private network, and the ticket information may include the private password.

[0049] In step S601, the processing element 222 detects whether the mobile device 21 is connected to the private network. Specifically, the mobile device 21 may be connected to the private network according to the private password in the ticket information. Since the beginning of the starting time point of the event time information, the processing element 222 may periodically or non-periodically detect whether the mobile device 21 is connected to the private network.

[0050] When the processing element 222 detects that the mobile device 21 is connected to the private network, in step S603, the processing element 222 outputs the second stage verification code through the private network. Therefore, after outputting the second stage verification code, the processing element 222 may perform step S505 and step S507 of FIG. 7.

[0051] Accordingly, even if the mobile device 21 itself is not equipped with a mobile network, the mobile device 21 may still be connected to the processing element 222 to obtain the second stage verification code by using the private password in the ticket information to connect to the private network.

[0052] Further, in another embodiment, step S503 of FIG. 7 may further include the processing element 222 first determining whether the mobile device 21 is a registered device, and step S603 is performed after determining the mobile device 21 is the registered device. Said registered device may be a device registered to the verification device 22 end (for example, the network host (server)) in advance by using one or more of phone number, account and password.

[0053] In addition, in all of the embodiments above, after the verification device outputting the entry allowed signal, the processing element of the verification device may generate a pass verification code based on the ticket information, the device information and the entry allowed signal (for example, based on bits of the entry allowed signal), and provide the pass verification code to the mobile device, wherein valid time of the pass verification code corresponds to event time in the ticket information. In other words, the starting time point and the ending time point of the valid time may be the same as the starting time point and the ending time point of the event, respectively; or, the starting time point of the valid time may be later than the starting time point of the event by a default duration, and the ending time point of the valid time may be earlier than the ending time point of the event by the default duration, wherein the default duration may be 5 minutes or 10 minutes, the present disclosure is not limited thereto.

[0054] In view of the above description, the ticket verification system and method according to one or more embodiments of the present disclosure may prevent the ticket from being embezzled due to the verification code being screenshot or secretly photographed by verifying with two-stage verification codes, thereby effectively solving the problem of ticket forgery. Further, by using the current location information as the device information for generating the verification code, the user of the mobile device may be allowed to enter the venue when the user of the mobile device is determined to be located at the event venue; and

by using the current time information as the device information for generating the verification code, the user of the mobile device may be allowed to enter the venue when the user of the mobile device is determined to obtain the second verification code during the event. Therefore, the ticket may be prevented from being embezzled due to the verification code being screenshot or secretly photographed prior to the event. According to the embodiment of private password and private network, even if the mobile device is not equipped with a mobile network, the mobile device may still be connected to the processing element to obtain the second stage verification code by using the private password in the ticket information to connect to the private network.

CLAIMS

What is claimed is:

[Claim 1]

A ticket verification method, comprising:

- generating, by a mobile device, a first verification code according to ticket information;
- obtaining, by the mobile device, at least one of current location information and current time information when triggered by a trigger signal;
- generating, by the mobile device, a second verification code at least according to the at least one of the current location information and the current time information;
- switching, by the mobile device, to display a plurality of displayed verification codes comprising the first verification code and the second verification code;
- obtaining, by a verification device, the first verification code and the second verification code, and obtaining the ticket information and the at least one of the current location information and the current time information accordingly;
- outputting, by the verification device, a third verification code to the mobile device when determining the ticket information and the at least one of the current location information and the current time information pass verification;
- obtaining, by the verification device, a to-be-verified code displayed by the mobile device after outputting the third verification code; and
- outputting, by the verification device, an entry allowed signal as a verification result when determining the to-be-verified code matches the third verification code.

[Claim 2]

The ticket verification method according to claim 1, wherein the verification device is connected to a private network, the ticket information comprises a private password of the private network, and obtaining the current location information comprises:

- connecting to the private network according to the private password; and
- obtaining a random code from the verification device through the private network as the current location information.

[Claim 3]

The ticket verification method according to claim 1, wherein the mobile device is installed with an application, and the trigger signal is generated when the application is opened.

[Claim 4]

The ticket verification method according to claim 1, wherein determining the ticket information and the at least one of the current location information and the current time information pass the verification by the verification device comprises:

determining whether the ticket information matches payment information and whether the current location information matches event location information;

wherein the verification device determines the ticket information and the current location information pass the verification when determining the ticket information matches the payment information and the current location information matches the event location information.

[Claim 5]

The ticket verification method according to claim 1, wherein determining the ticket information and the at least one of the current location information and the current time information pass the verification by the verification device comprises:

determining whether the ticket information matches payment information and whether the current time information matches event time information;

wherein the verification device determines the ticket information and the current time information pass the verification when determining the ticket information matches the payment information and the current time information matches the event time information.

[Claim 6]

The ticket verification method according to claim 1, further comprising:

generating, by the verification device, a pass verification code based on the ticket information, the current location information and the verification result and providing, by the verification device, the pass verification code to the mobile device after outputting the entry allowed signal,

wherein valid time of the pass verification code corresponds to event time in the ticket information.

[Claim 7]

The ticket verification method according to claim 1, wherein the verification device is connected to a private network, the ticket information comprises a private password of the private network, and outputting the third verification code to the mobile device comprises:

determining, by the verification device, the mobile device is connected to the private network,

wherein the third verification code is output to the mobile device connected to the private network through the private network.

[Claim 8]

The ticket verification method according to claim 7, wherein outputting the third verification code to the mobile device further comprises:

determining, by the verification device, whether the mobile device is a registered device, wherein outputting the third verification code is performed when determining the mobile device is the registered device.

[Claim 9]

The ticket verification method according to claim 1, wherein outputting the third verification code to the mobile device further comprises:

generating the third verification code according to random information.

[Claim 10]

A ticket verification system, comprising the mobile device and the verification device performing the ticket verification method according to any one of claims 1-9.