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SELF SANITIZING ATTENDANCE RECORDER WITH THERMAL SCREENING

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(71) Applicant(s)
Ajay -;Sarita -;Parveen -

(72) Inventor(s)
Ajay;Jangir, Amit;Satti, Tanuj;Shrivastava, Virendra Kumar;Rajput, Sweety;Ranjan, Pallavi;Rani, Sangeeta;Kumar, Brijesh;Mittal, Ravi Kant

(74) Agent / Attorney
Michael Buck IP, PO Box 78, Red Hill, QLD, 4059, AU

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ABSTRACT

SELF SANITIZING ATTENDANCE RECORDER WITH THERMAL SCREENING

The present invention relates to an attendance recorder **100** comprising an electronic enclosure **102**, a face detection module **104** mounted on the enclosure **102** and configured to process facial samples of atleast one user received from a set of IR sensors **106**, a vein detection module **108** mounted on the enclosure **102** and configured to process vein sample(s) of another or same user received from a set of Near-Infrared LEDs 110, a thermal screening module **112** fitted on the enclosure **102** and operable to calculate temperature of the users using a set of Infra-Red thermal sensors, a touchscreen **114** mounted on the enclosure **102** to enable interactive display of results obtained from the first module **104**, second module **108** and third module **112** and a UV sanitization strip **116** augmented behind both, the touchscreen **114** and the second module **108,** to ensure their self-sanitization.

Ref. Figure 1

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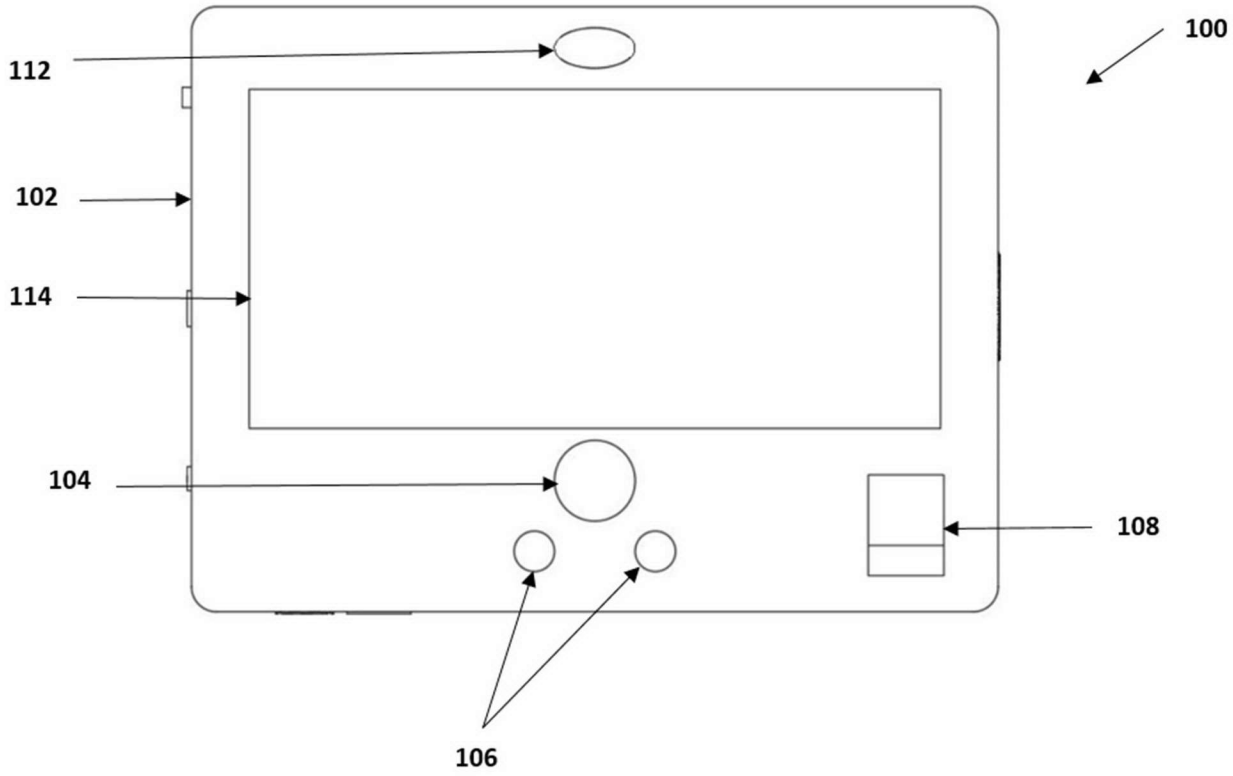

Figure 1

SELF SANITIZING ATTENDANCE RECORDER WITH THERMAL SCREENING

FIELD OF THE INVENTION

[0001] The present invention relates generally to the field of database maintenance and particularly to the field of attendance recorders. More particularly, present invention relates to smart attendance recorder that enables infection free recording of attendance using self-sanitization and thermal screening capabilities thereof.

BACKGROUND OF THE INVENTION

[0002] Background description includes information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[0003] Undoubtedly, maintaining the record of attendance has always remained an unavoidable task for all types of workplaces. Earlier, representatives maintained attendance records by manually noting down the details such as entry time, exit time, date, and purpose of users entering a premise. The process of manually taking attendance was quite time-consuming and required manpower to be present explicitly therefor.

[0004] Gradually, with the growth of the technology, manual attendance recording was replaced by attendance recording machines based on the principle of biometric verification of users. Herein, biometric samples of all the relevant users (face, fingerprint, palmprint, iris and/or voice) are acquired by multiple sensors, stored to create a database of users to be verified later, and processed to

verify the identity of users attempting to authenticate their identity. The attendance recorders mark the attendance of the users passing the verification test, else request reattempts.

[0005] Heretofore, many biometric attendance recorders have been envisioned. Unfortunately, all such attendance recorders require contact of users with the machine for acquiring biometric samples. Like, fingerprint recognition mandates the contact of fingerprints on the acquisition portion, thereby matching the fingerprints with those stored in the database to validate the identity of the requesting user. Similar is the case with palmprint recognition and some other biometric variants.

[0006] Moreover, biometric machines are usually optimized to equip touchscreen for user interaction. Users access the machine for different purposes by touching the screen of the attendance machine and thereby, making a contact. Since attendance machines facilitate such functionalities to multiple users, it is quite easy to spread infections, if present, from one user to another, thereby spreading communicable infections.

[0007] Several attempts have been made to utilize contactless face recognition and/or iris recognition for contactless attendance recording. Still, there are potential risks of transmission of infections from one user to another user due to close proximity made by all the users with biometric attendance recorders whilst marking attendance therein.

[0008] Hence, there is an unavoidable need to envision attendance recorders that are contactless in nature and incorporate features to prevent the spread of infection amongst users using such machines, thus ensuring the safety of users and spreading health-related awareness amongst them.

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OBJECTS OF THE INVENTION

[0009] The principal object of the present invention is to overcome the disadvantages of the prior art.

[0010] An object of the present invention is to provide a self-sanitizing attendance recorder.

[0011] Another object of the present invention is to configure an additional feature of real-time temperature screening in attendance recorders.

[0012] Another object of the present invention is to facilitate multiple options for biometric verification.

[0013] Another object of the present invention is to provide an Vein ID based secure verification of attempting users.

[0014] Yet another object of the present invention is to provide an attendance recorder facilitating secure and contactless data verification and maintenance.

[0015] The foregoing and other objects, features, and advantages of the present invention will become readily apparent upon further review of the following detailed description of the preferred embodiment as illustrated in the accompanying drawings.

SUMMARY OF THE INVENTION

[0016] The present invention relates to an attendance recorder evolved to prevent the spreading of communicable infections by incorporating self-sanitization and temperature screening capabilities therein.

[0017] According to an embodiment of the present invention, an attendance recorder comprises an electronic enclosure, a first module mounted on the enclosure and configured to process facial samples of atleast one user received from a first set of sensors, a second module mounted on the enclosure and configured to process vein sample(s) of another or the same user received from a second set of sensors, a third module fitted on the enclosure and operable to calculate temperature of the users using a third set of sensors, a touchscreen mounted on the enclosure to enable interactive display of results obtained from the first module, second module and third module and a UV sanitization strip augmented behind both, the touchscreen and the second module, to ensure their self-sanitization.

[0018] According to an embodiment of present invention, the first module, the second module and the third module is preferably used to detect face images, finger vein images and indicate abnormal temperature ranges respectively.

[0019] According to an embodiment of present invention, the first set of sensors **106**, the second set of sensors and the third set of sensors is electively chosen to be Infrared face detection sensors, Near Infrared light emitting diodes and Infrared thermal screening sensors respectively.

[0020] According to an embodiment of present disclosure, the attendance recorder further comprises an audio input unit and an audio output unit for facilitating speech recognition of the users.

[0021] According to an embodiment of present disclosure, the attendance recorder further comprises an Ethernet port adapted to allow data transmission to a multitude of local area networks.

[0022] While the invention has been described and shown with particular

reference to the preferred embodiment, it will be apparent that variations might be possible that would fall within the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The accompanying drawings are included to provide a further understanding of the present disclosure and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

[0024] In the figures, similar components and/or features may have the same reference label. Further various components of the same type may be distinguished by following the reference label with a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any of the similar components having the same reference label irrespective of the second reference label.

Figure 1 illustrates a front view of an exemplary attendance recorder with thermal screening, according to an embodiment;

Figure 2 illustrates an isometric view of an exemplary attendance recorder with thermal screening, according to an embodiment;

Figure 3 depicts another isometric view of an exemplary attendance recorder with thermal screening, according to an embodiment;

Figure 4 illustrates a schematic view of vein recognition of a user, according to an embodiment of present invention.

Figure 5 shows a flow chart explaining the process of biometric database creation and storage of multiple users, according to some embodiments of present invention

Figure 6 presents a flow chart explaining the process of user verification and thereby attendance recording, according to some embodiments of present

invention.

DETAILED DESCRIPTION OF THE INVENTION

[0025] As used in the description herein and throughout the claims that follow, the meaning of "a," "an," and "the" includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of "in" includes "in" and "on" unless the context clearly dictates otherwise.

[0026] If the specification states a component or feature "may", "can", "could", or "might" be included or have a characteristic, that particular component or feature is not required to be included or have the characteristic.

[0027] Exemplary embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary embodiments are shown. This disclosure may however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. These embodiments are provided so that this disclosure will be thorough and complete and will fully convey the scope of the disclosure to those of ordinary skill in the art. Moreover, all statements herein reciting embodiments of the disclosure, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents as well as equivalents developed in the future (i.e., any elements developed that perform the same function, regardless of structure).

[0028] Various terms as used herein are shown below. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

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[0029] In some embodiments, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiments of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0030] The present invention relates to an attendance recorder configured to perform temperature screening whilst pursuing contactless biometric user verification and conducts self-sanitization thereafter, thereby ensuring infection-free attendance recording.

[0031] Referring to Figure 1, in an embodiment, an attendance recorder comprises of an electronic enclosure **102**, a first module **104** mounted on the enclosure **102** that constitutes face recognition module, a first sent of sensors **106** in association with the face recognition module, that constitute Infra-Red (IR) face detection sensors, a second module **108** mounted on the enclosure **102** that is ideally vein recognition module, a second set of sensors **110** in association with the vein recognition module, that constitute Near Infrared Light Emitting diodes (NIR-LEDs), a third module **112** operable for thermal screening using a third set of sensors ideally chosen to be Infra-Red (IR) thermal screening sensors, a touchscreen **114** mounted on the enclosure **102** and an Ultra-Violet (UV) sanitization strip **116**.

[0032] It would be appreciated by a person skilled in the art, that though the foreseeing embodiments are disclosed as per their best mode, other alternative

embodiments may be suitably used as a modification thereof. Like, biometric trait recognition process used in the present disclosure may be performed using, *inter alia*, fingerprint, palmprint, iris and gait. Further on, other modified forms of sensors may be used to replace the disclosed IR face detection **106** and thermal sensors for facial detection and thermal screening respectively, and NIR-LEDs **110** for vein detection.

[0033] In an embodiment, the process of facial recognition may be based on determining the shape and size of jaw, chin, shape and location of the eyes, eyebrows, nose, lips, and/or cheekbones. 2D facial scanners may be reading and recording the face geometries. The facial geometry may be transferred to a recording database in terms of points. Further, a comparison algorithm may be used to perform face matching and thereby determining results.

[0034] Procedurally, the face detection module **104** receives the input data in the form of facial images and picks-out different features from those images by implementing different algorithms. The extracted features may be set as a standard to extract differences between multiple faces. Successful and unsuccessful facial detection may be notified to users by the touchscreen **114**,

[0035] It would be appreciated by a person skilled in the art that the features may be chosen from wrinkles, eyebrows, nose structures, but not limited thereto and several other variations are possible. Module **104** may be accompanied by IR sensors **106** that function as heat measuring and face-detecting sensors for enabling contactless facial detection of the user in proximity.

[0036] In an embodiment, the process of vein recognition **108** may either identify vascular patterns in the bank of hands or fingers. To identify patterns in hands, near-infrared rays generated from a bank of Light-Emitting Diodes (LEDs) **110** may be adapted to penetrate the skin of the back of a user's hand. Due to significant differences in absorbance of blood vessels and other tissues, the

reflected near-infrared rays may produce an extracted vascular pattern. From the extracted vascular pattern, substantially feature-rich data such as vessel branching points, vessel thickness, and branching angels may be extracted and stored as a template.

[0037] Referring to Figure 2, the near-infrared rays generated from the bank of LEDs penetrate the finger or hand and may be absorbed by the blood vessels such that the areas in which the rays are absorbed (i.e., veins) appear as dark areas. The vein patterns created in this way may be digitized and compressed in order to register them as a template. The procedure does not involve any contact with the disclosed module. The digital imaging of veins is carried out by Non-Infrared – Light Emitting Diodes (NIR-LEDs) **110** arranged in a definite array and Charged Coupled Device (CCD) cameras **128**.

[0038] A record of vein image database is maintained by processing one or more images of the user, wherein such images chategorized by allotting a user specific Vein ID. This in turn ensures safe identification and secure authorization and proves to be propitious as far as security is concerned in this data driven world.

[0039] Additionally, the thermal screening module **112** mounted on enclosure **102** may use IR sensors to screen the temperature of the user's body. The notification about the user's body temperature and its deviation from the standard body temperature may be notified on the touchscreen **114**, thereby warning the user of any possible health issues. Herein, the touchscreen **114** facilitates the notifications pertaining to all the aforementioned modules.

[0040] Referring now to Figure 3, the UV sanitization strip **116** is augmented behind the touchscreen **114** and the behind the screen of vein detection module **108** in order to ensure continual self-sanitization by the attendance recorder. The strip may be layered between the gap of the applied offset between the touchscreen and the enclosure **102**. Similarly, strip **116** may also be augmented

between the gap of the applied offset between the vein acquisition screen and the module circuitry disposed therebelow. Ideally, the UV strip **116** performs sanitization after every user of the attendance recorder **100**, thereby ensuring removal of any virus present on the touchscreen **114**.

[0041] As indicated in figure 3 and figure 4 and according to some embodiments, an Audio input unit **118**, Audio Output unit **120**, USB port **124**, Ethernet port **122** and an LED indicator **126** may be adapted on the enclosure. The audio input unit **118** and audio output unit **120** facilitates speech recognition of the users, preferably via a microphone and speaker respectively. The audio output port **120** may also work as an indicator of delivering sound upon feeding or authentication of data. Optionally, audio output port **120** may be used as a source of indication/warning to users. Multiple ways of feeding data may be provided by this fortunate inclusion of an audio recognition facility.

[0042] According to an embodiment, USB port **124** may be used to assist in firmware update of motherboard/microprocessor fitted in the attendance recorder **100**. Additionally, Gigabit Ethernet **122** may allow data transmission to a multitude of Local Area Network (LAN) (system, server, or any storage device) or any server with a data rate of 1 Billion bits per second or more.

[0043] A person skilled in the art would appreciate the fact that many modifications of the aforementioned disclosure are possible. A secondary battery source may be functionalized when the system functions on stand-by mode, different colors indicators may be used to showcase different color according to the assigned functions taken at that point of time, a monthly report may be generated using the data extracted from the disclosed attendance recorder, such that the data may include but not limited to user's date of entry-exit, temperature, working days and no. of leaves and more.

[0044] Referring now to Figure 5, a flow chart explaining the process of

biometric database creation and storage of multiple users **200** is illustrated, according to some embodiments of present invention. In an embodiment, camera and IR sensors **202** are used to capture the samples **204**, followed by pre-processing of the samples **206** is the reference format standardized for an attendance recorder database management system. The biometric feature of the subject under test is compared with the already existing images in the reference database **210**. The subject under test is included in the reference database in case of an unsuccessful identification **208** and neglected as a duplicate action in case the subject is already found to be present in the reference database **212**.

[0045] Referring now to Figure 6, a flow chart explaining the process of user verification and thereby attendance recording **300** is shown, according to some embodiments of present invention. In an embodiment, camera and IR sensors **302** are used to capture the samples **304**, followed by pre-processing of the samples **306** is the reference format standardized for an attendance recorder database management system. The biometric feature of the subject under test is compared with the already existing images in the reference database **310**. In case the features of the subject under test successfully match with the features of any of the images already present in the database, the test is found to be a "Successful Match" and the attendance is recorded **308**. In case the features of the subject under test remains unsuccessful to be matched with the features of any of the images already present in the database, the test is found to be an "Unsuccessful Match" and an error is displayed to show denial of attendance recoding **312**.

[0046] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "includes" and "including" should be interpreted as referring to elements,

components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced. Where the specification claims refers to at least one of something selected from the group consisting of A, B, C ….and N, the text should be interpreted as requiring only one element from the group, not A plus N, or B plus N, etc. The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the appended claims.

[0047] While embodiments of the present disclosure have been illustrated and described, it will be clear that the disclosure is not limited to these embodiments only. Numerous modifications, changes, variations, substitutions, and equivalents will be apparent to those skilled in the art, without departing from the spirit and scope of the disclosure, as described in the claims.

ADVANTAGES OF THE INVENTION

[0048] The present invention provides a self-sanitizing attendance recorder.

[0049] The present invention provides an additional feature of real-time temperature screening in attendance recorders.

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[0050] The present invention facilitate multiple contactless biometric verification options.

[0051] The present invention provides an attendance recorder facilitating secure and contactless data verification and maintenance.

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I Claim:

1) An attendance recorder **100**, comprising:

- **i)** an electronic enclosure **102**;
- **ii)** a first module **104** mounted on said enclosure **102** and configured to process facial samples of atleast one user received from a first set of sensors **106**;
- **iii)** a second module **108** mounted on said enclosure **102** and configured to process vein sample(s) of another or said user received from a second set of sensors **110**;
- **iv)** a third module **112** fitted on said enclosure **102** and operable to calculate temperature of said users using a third set of sensors;
- **v)** a touchscreen **114** mounted on said enclosure **102** to enable interactive display of results obtained from said first module **104**, second module **108** and third module **112**; and
- **vi)** a UV sanitization strip **116** augmented behind said touchscreen **114** and said second module **108** to ensure self-sanitization thereof.

2) The attendance recorder as claimed in claim 1, wherein said first module **104**, said second module **108** and said third module **112** is preferably used to detect face images, finger vein images and indicate abnormal temperature ranges respectively.

3) The attendance recorder as claimed in claim 1, wherein said first set of sensors **106**, said second set of sensors **110** and said third set of sensors is electively chosen to be Infrared face detection sensors, Near Infrared Light Emitting Diodes and Infrared thermal screening sensors respectively.

4) The attendance recorder as claimed in claim 1, further comprising an audio input unit **118** and an audio output unit **120** for facilitating speech recognition of said users.

5) The attendance recorder as claimed in claim 1, further comprising Ethernet port **122** adapted to allow data transmission to a plurality of local area networks.

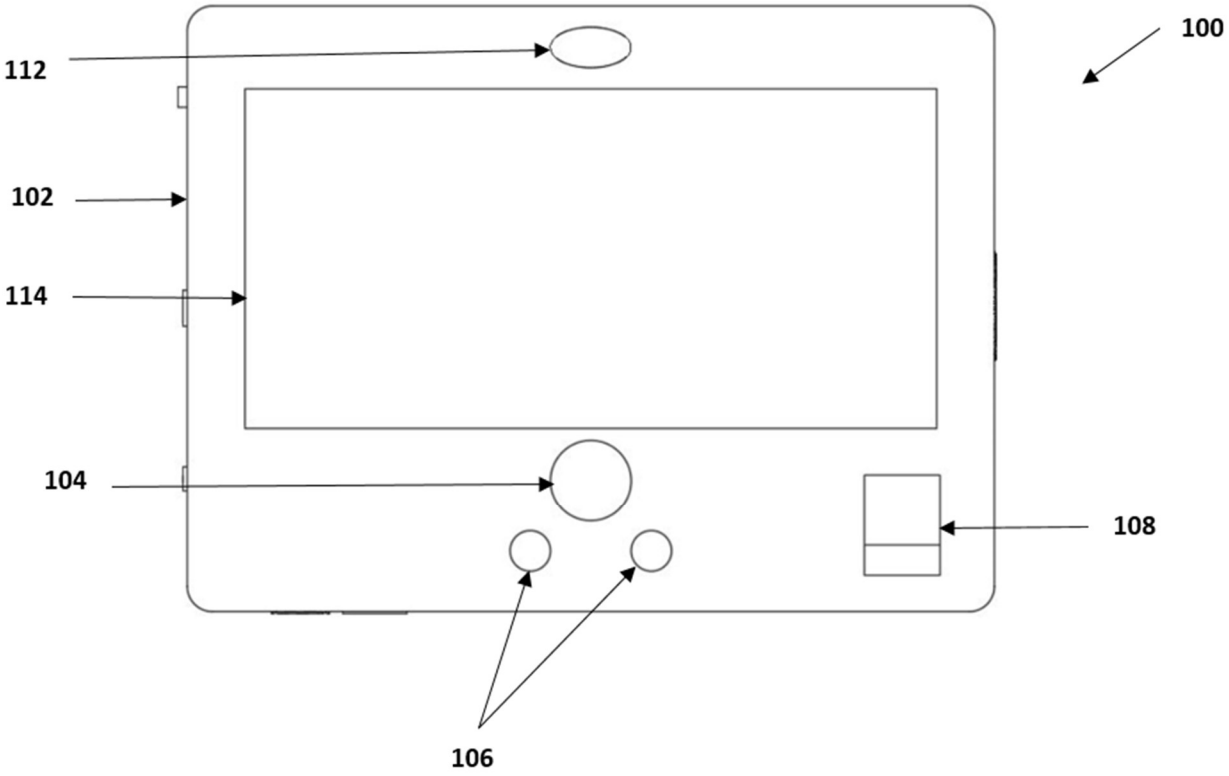

Figure 1

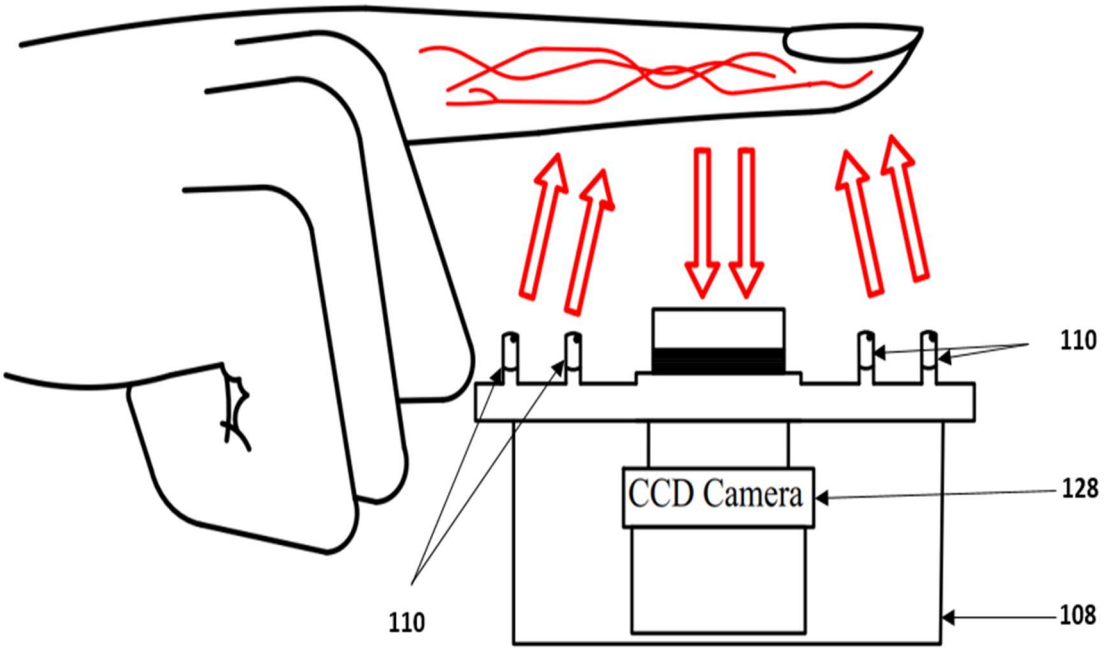

Figure 2

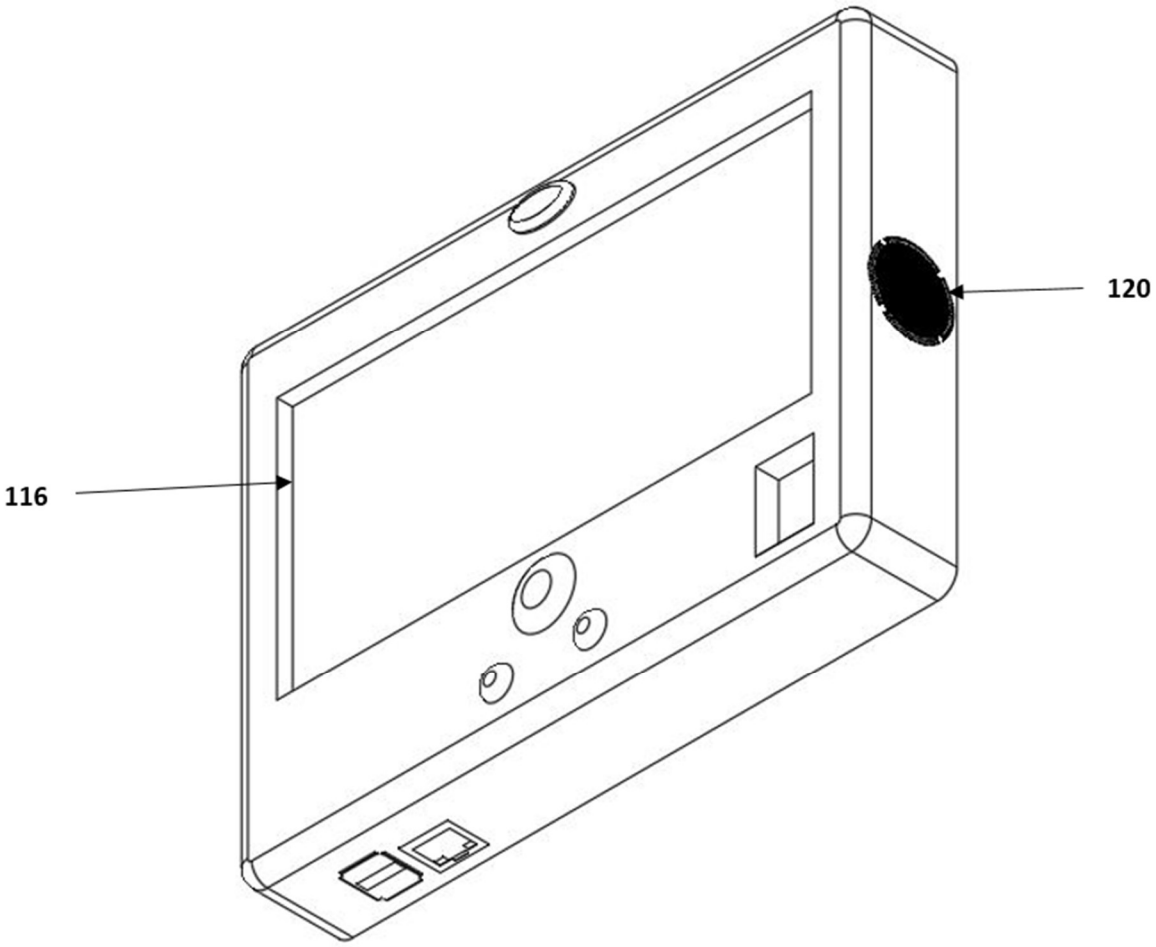

Figure 3

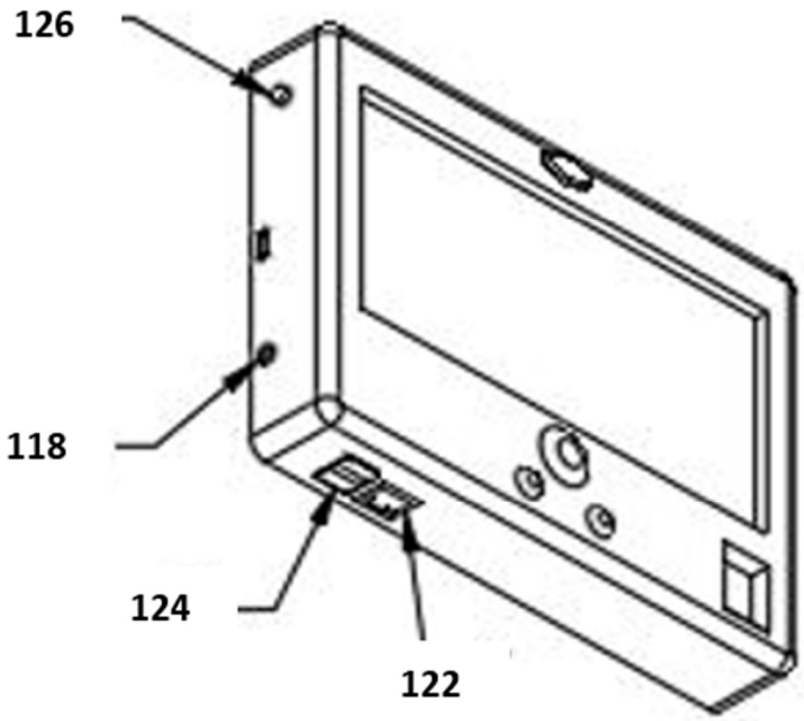

Figure 4

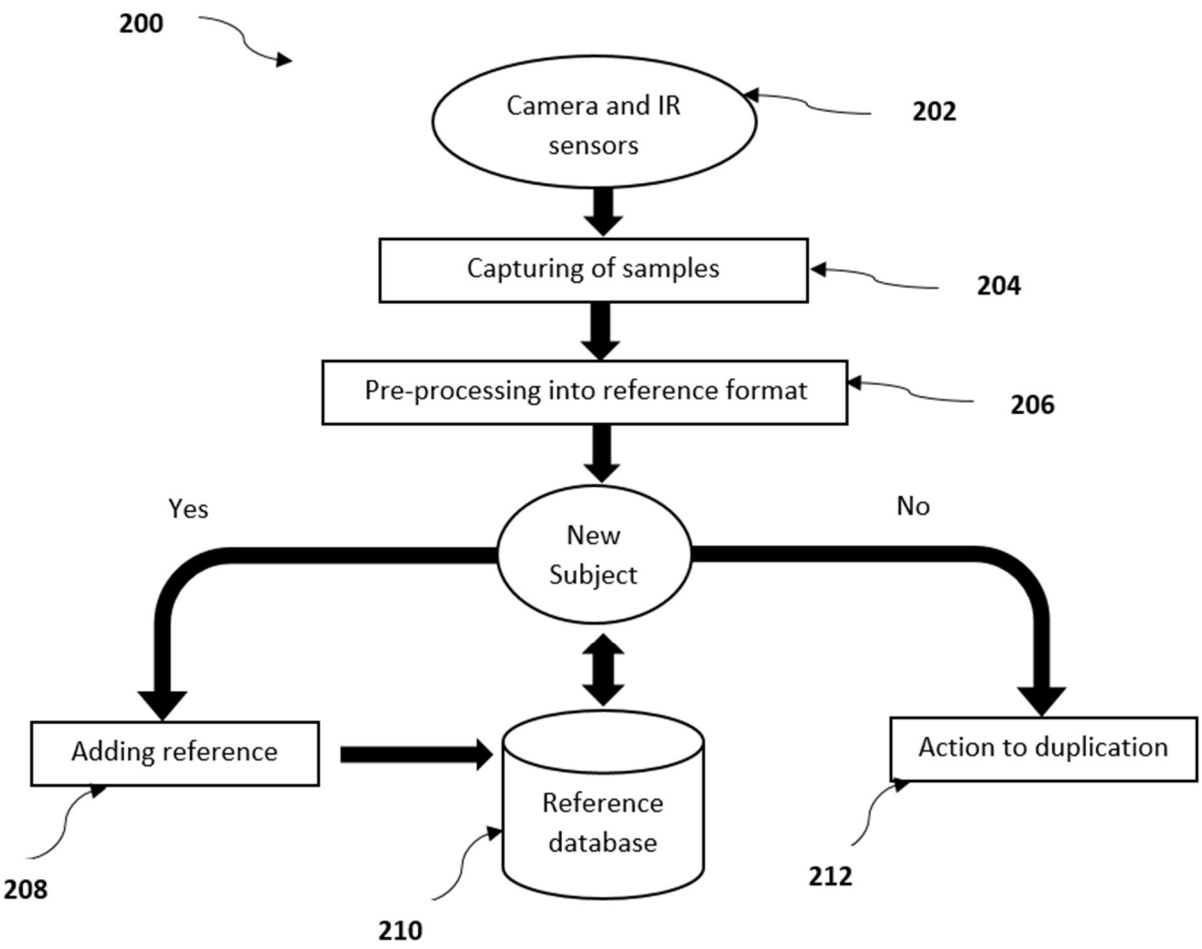
200
Camera and IR sensors
202
Capturing of samples
204
Pre-processing into reference format
206
Yes
New Subject
No
Adding reference
Reference database
Action to duplication
208
210
212

Figure 5

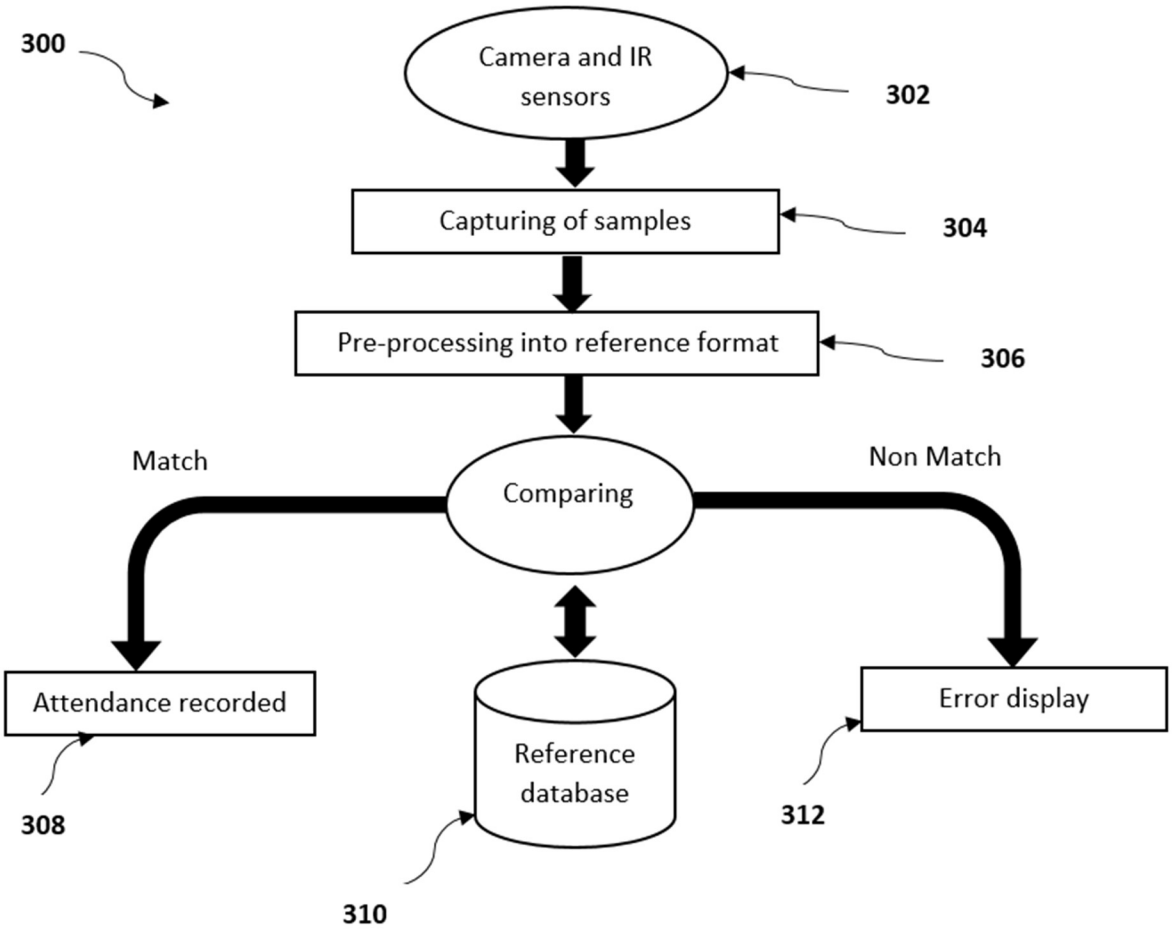

Figure 6