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(54) **BIOMEDICAL INFORMATION PROCESSING SYSTEM USING AN APPLICATION PROGRAM COLLABORATED WITH AN OCULAR TEMPERATURE MEASUREMENT TECHNIQUE AND METHOD FOR THE SAME**

(71) Applicant: **UBIQUITY BIOMEDICAL CORPORATION**, TAIPEI CITY (TW)

(72) Inventors: **HORNG-JI LAI**, TAIPEI CITY (TW); **TE-LUN MA**, TAIPEI CITY (TW); **LI-PING YU**, TAIPEI CITY (TW); **HSIANG-CHING LEE**, TAIPEI CITY (TW)

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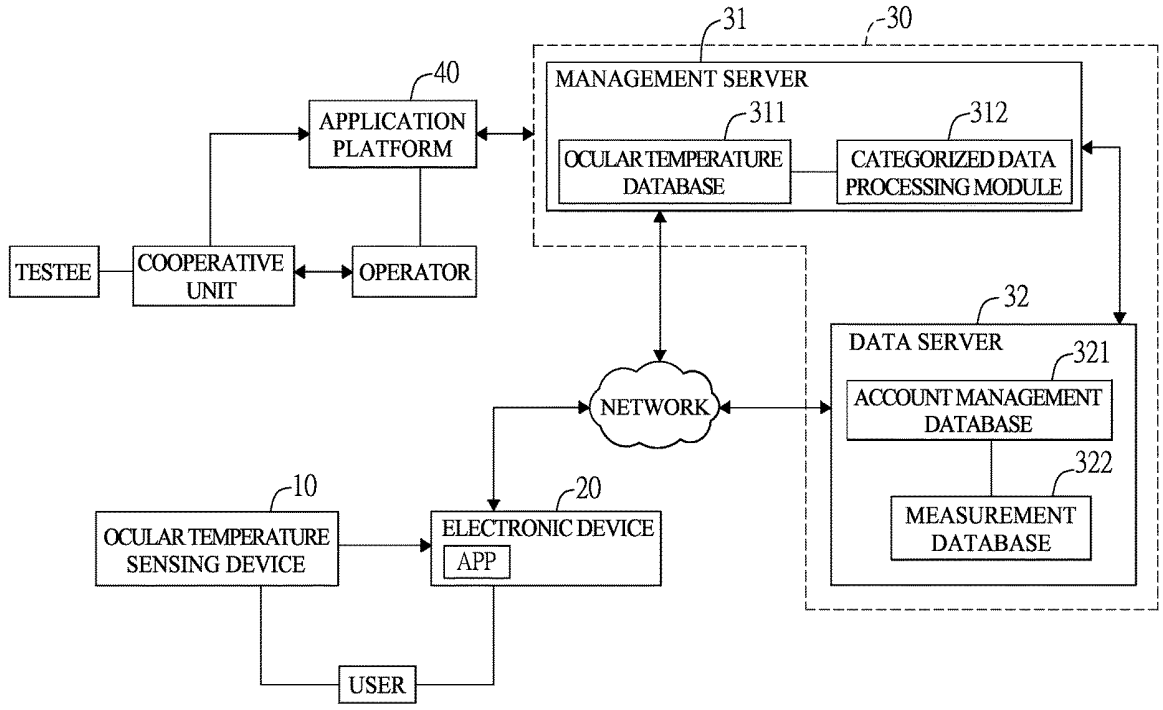
(57) **ABSTRACT**

A biomedical information processing system using an application program (APP) collaborated with an ocular temperature measurement technique includes an electronic device and a remote device. At least one user respectively holds an ocular temperature sensing device connected with the electronic device installed with an application program (APP). The electronic device exchanges information with the remote device. The ocular temperature sensing device acquires an instant ocular temperature measurement of a user, which is transmitted to the remote device through the APP. The remote device performs a characteristics comparison procedure according to a piece of comparison item information selected by the user on the APP to generate a comparison result. When the electronic device receives the comparison result from the remote device, the user can view the comparison result and create a tracking record through the electronic device for users to be aware of their eye health conditions at any time.



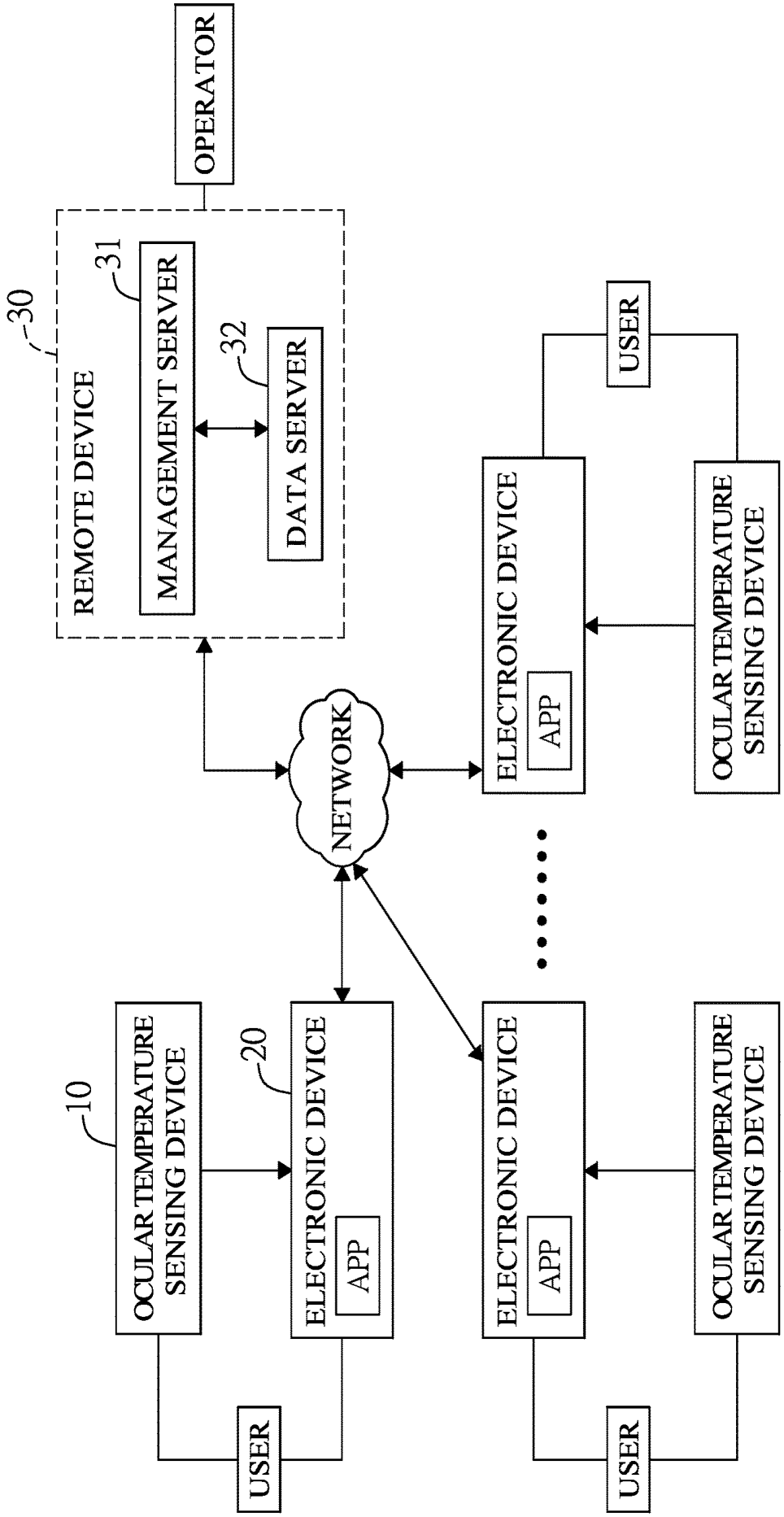

OPERATOR
30
REMOTE DEVICE
31
MANAGEMENT SERVER
32
DATA SERVER
NETWORK
10
OCULAR TEMPERATURE SENSING DEVICE
20
ELECTRONIC DEVICE
APP
USER
ELECTRONIC DEVICE
APP
OCULAR TEMPERATURE SENSING DEVICE
USER
ELECTRONIC DEVICE
APP
OCULAR TEMPERATURE SENSING DEVICE
USER

FIG. 1

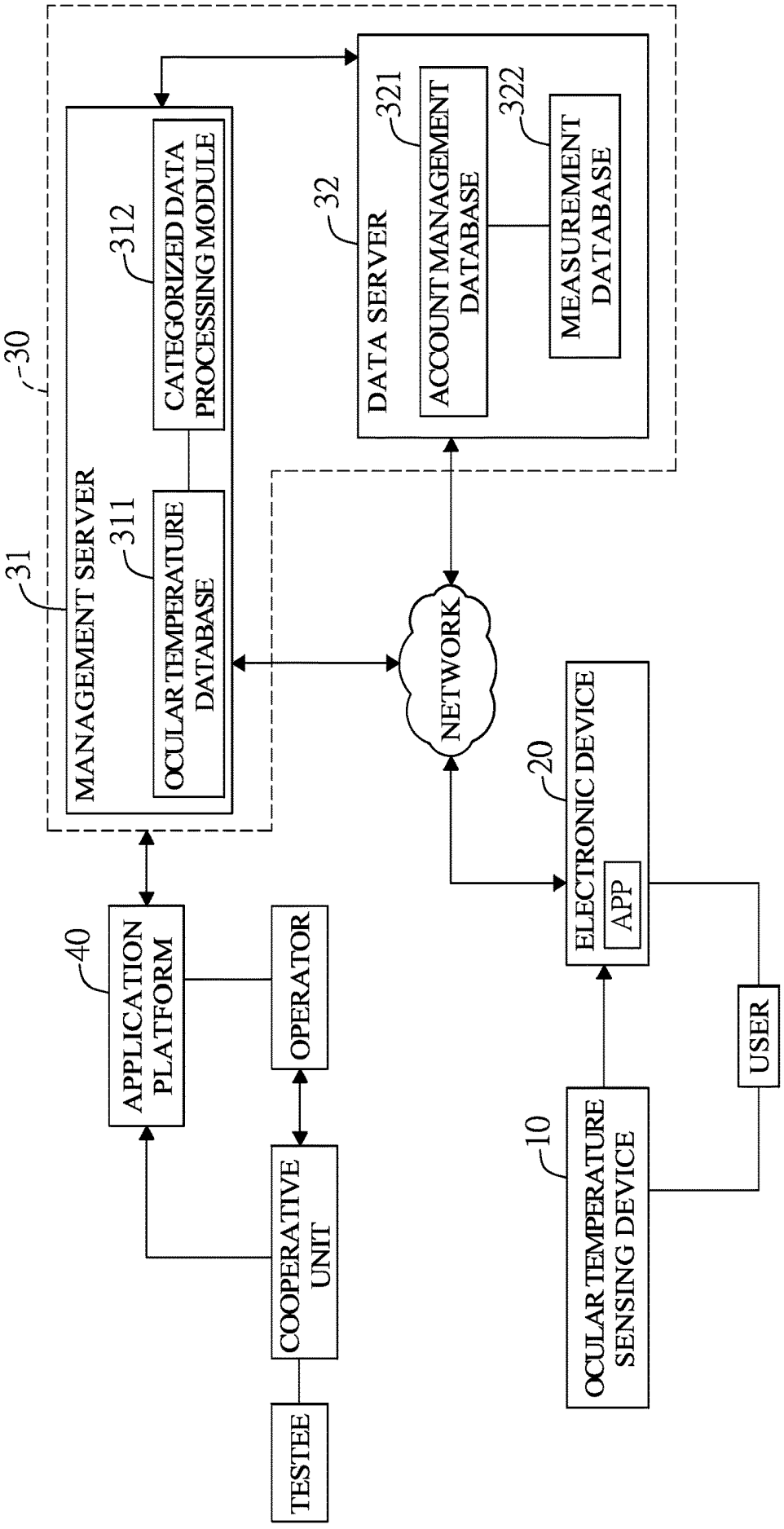

30
MANAGEMENT SERVER
31
CATEGORIZED DATA PROCESSING MODULE
312
OCULAR TEMPERATURE DATABASE
311
DATA SERVER
32
ACCOUNT MANAGEMENT DATABASE
321
MEASUREMENT DATABASE
322
NETWORK
ELECTRONIC DEVICE
20
APP
APPLICATION PLATFORM
40
OPERATOR
COOPERATIVE UNIT
TESTEE
OCULAR TEMPERATURE SENSING DEVICE
10
USER

FIG. 2

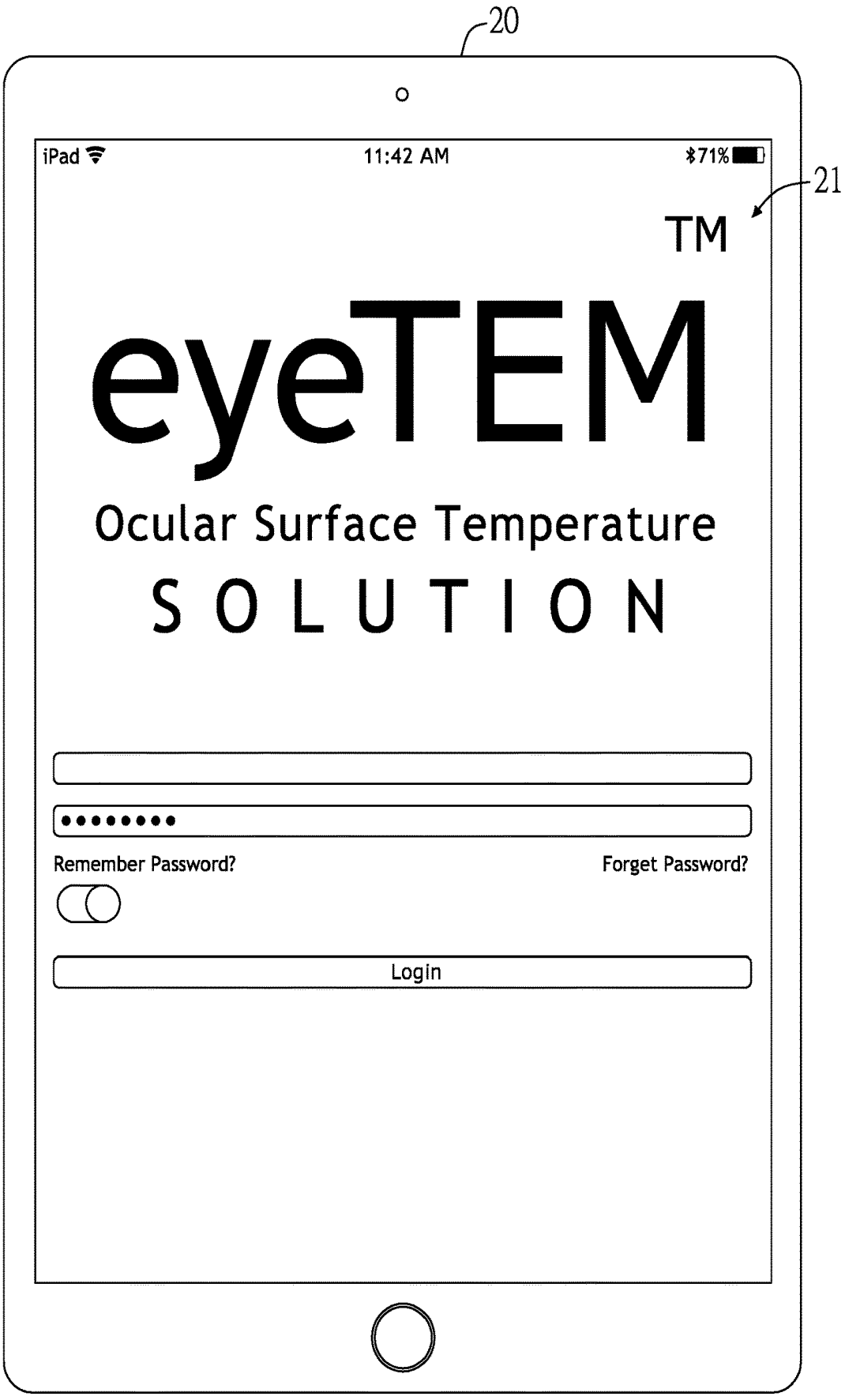

20
iPad
11:42 AM
71%
21
TM
eyeTEM
Ocular Surface Temperature
SOLUTION
Remember Password?
Forget Password?
Login

FIG. 3

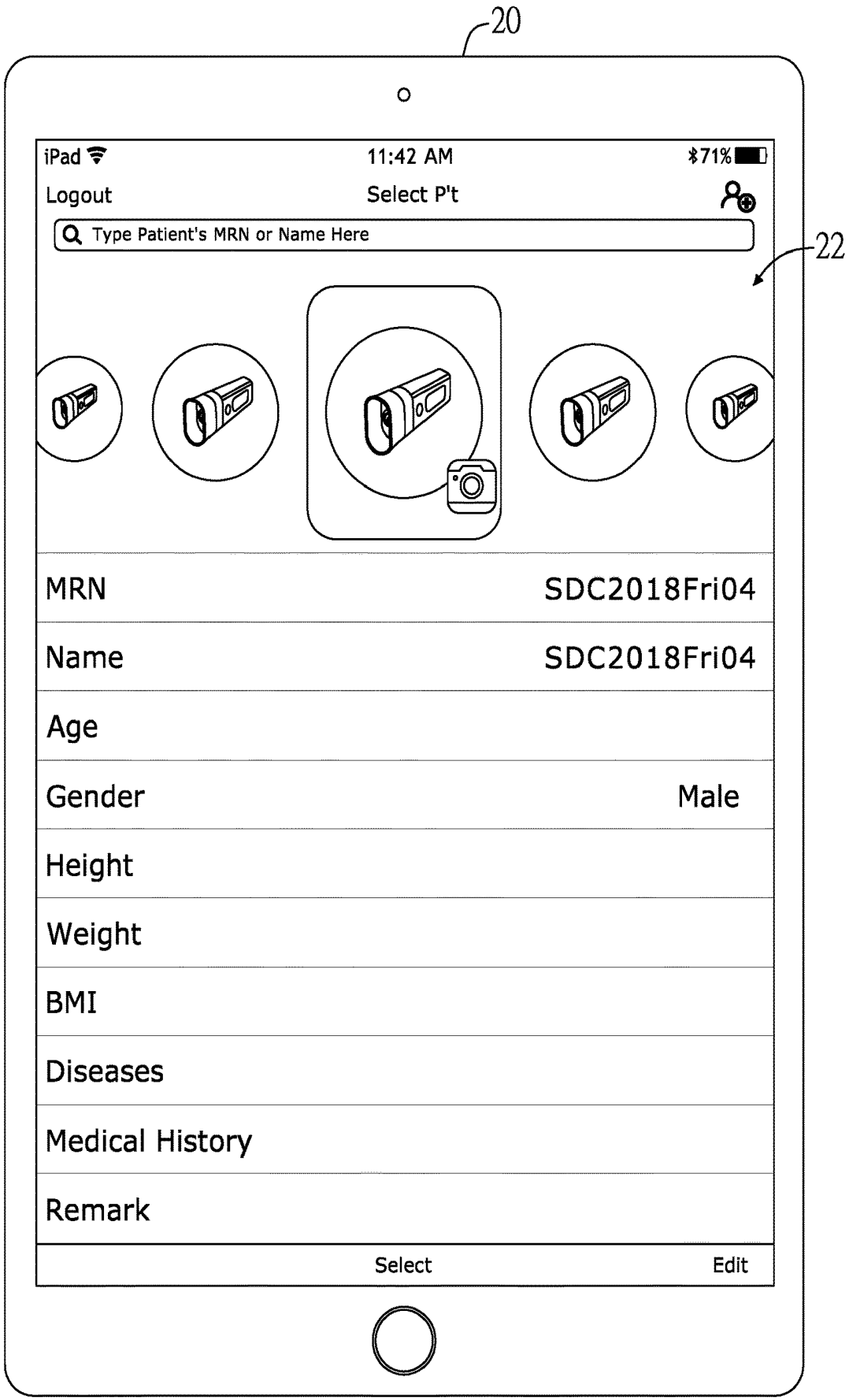

20
iPad
11:42 AM
71%
Logout
Select P't
Type Patient's MRN or Name Here
22
MRN
SDC2018Fri04
Name
SDC2018Fri04
Age
Gender
Male
Height
Weight
BMI
Diseases
Medical History
Remark
Select
Edit

FIG. 4

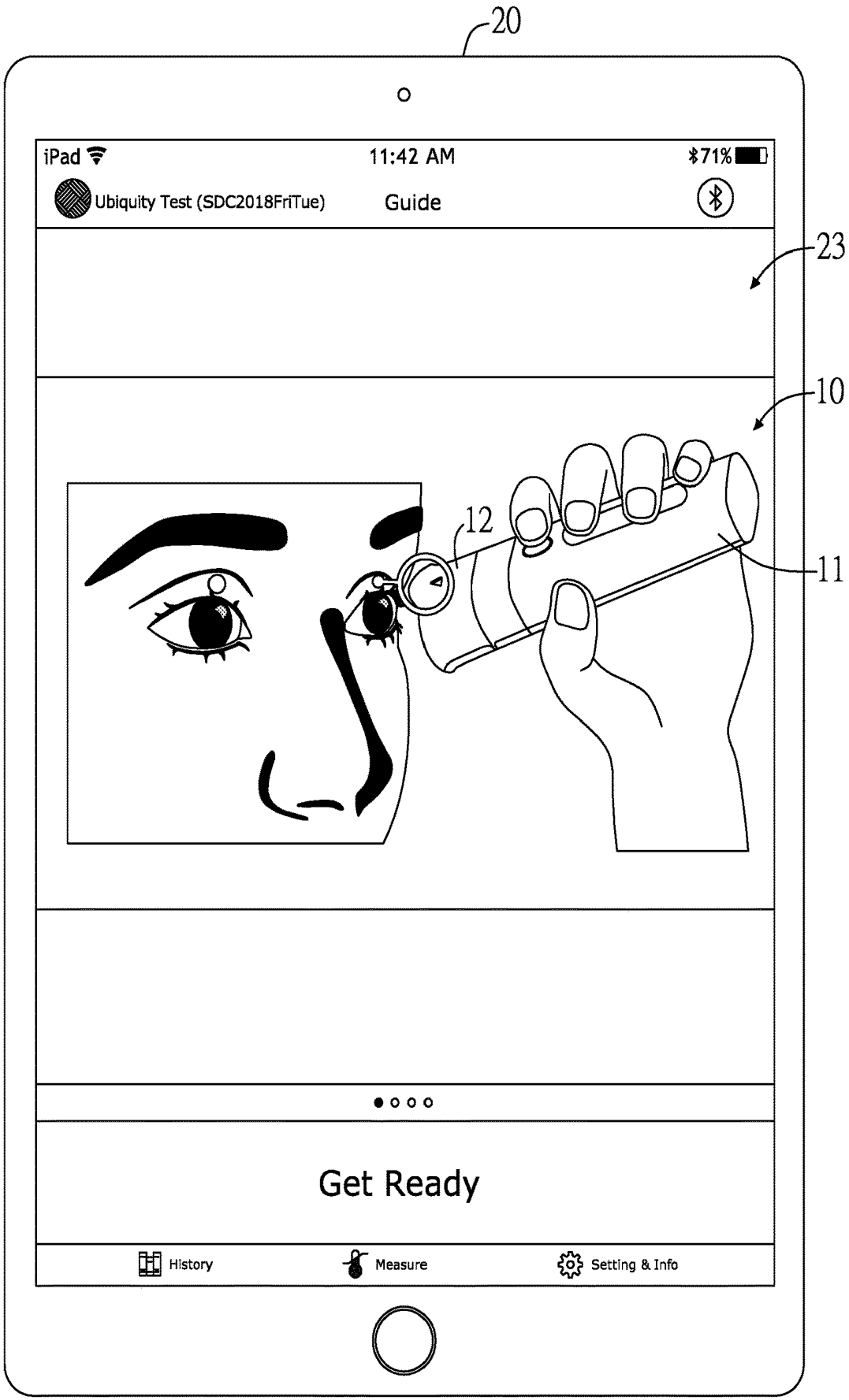

20
iPad
11:42 AM
71%
Ubiquity Test (SDC2018FriTue)
Guide
23
10
12
11
Get Ready
History
Measure
Setting & Info

FIG. 5

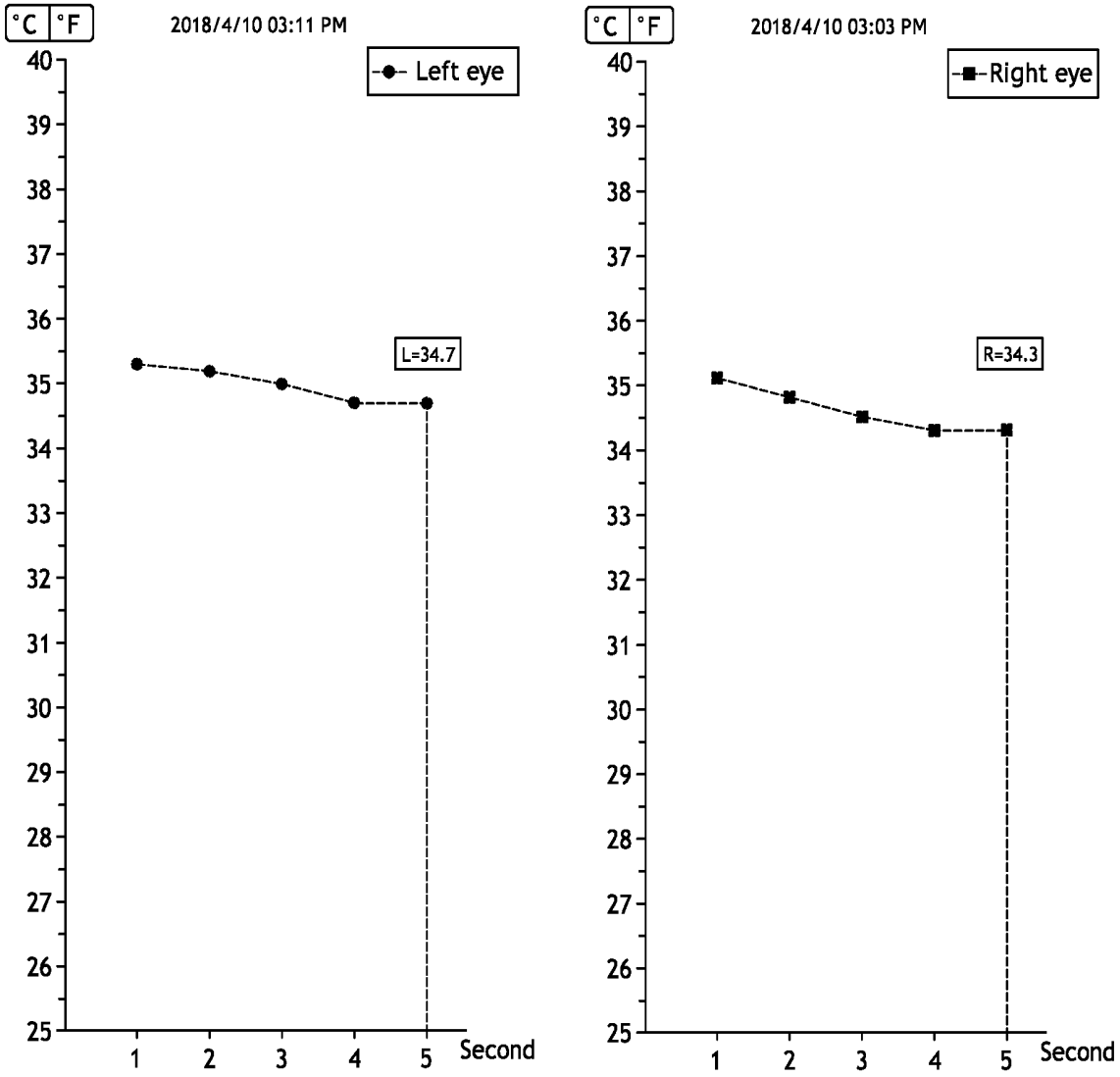

°C
°F
2018/4/10 03:11 PM
Left eye
L=34.7
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
1
2
3
4
5
Second
°C
°F
2018/4/10 03:03 PM
Right eye
R=34.3
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
1
2
3
4
5
Second

FIG. 6

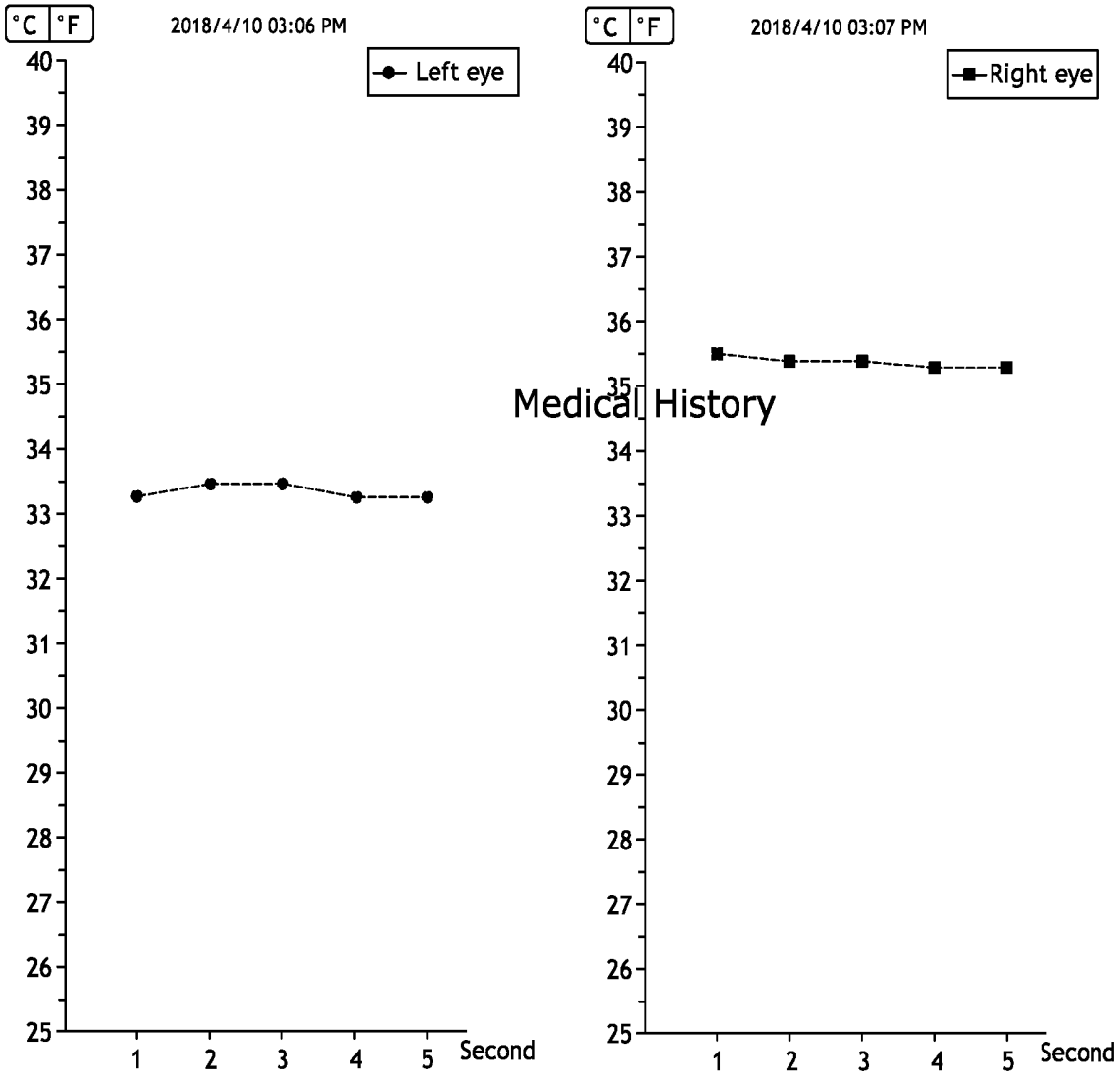

°C °F
2018/4/10 03:06 PM
Left eye
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
1 2 3 4 5 Second
°C °F
2018/4/10 03:07 PM
Right eye
Medical History
1 2 3 4 5 Second

FIG. 7

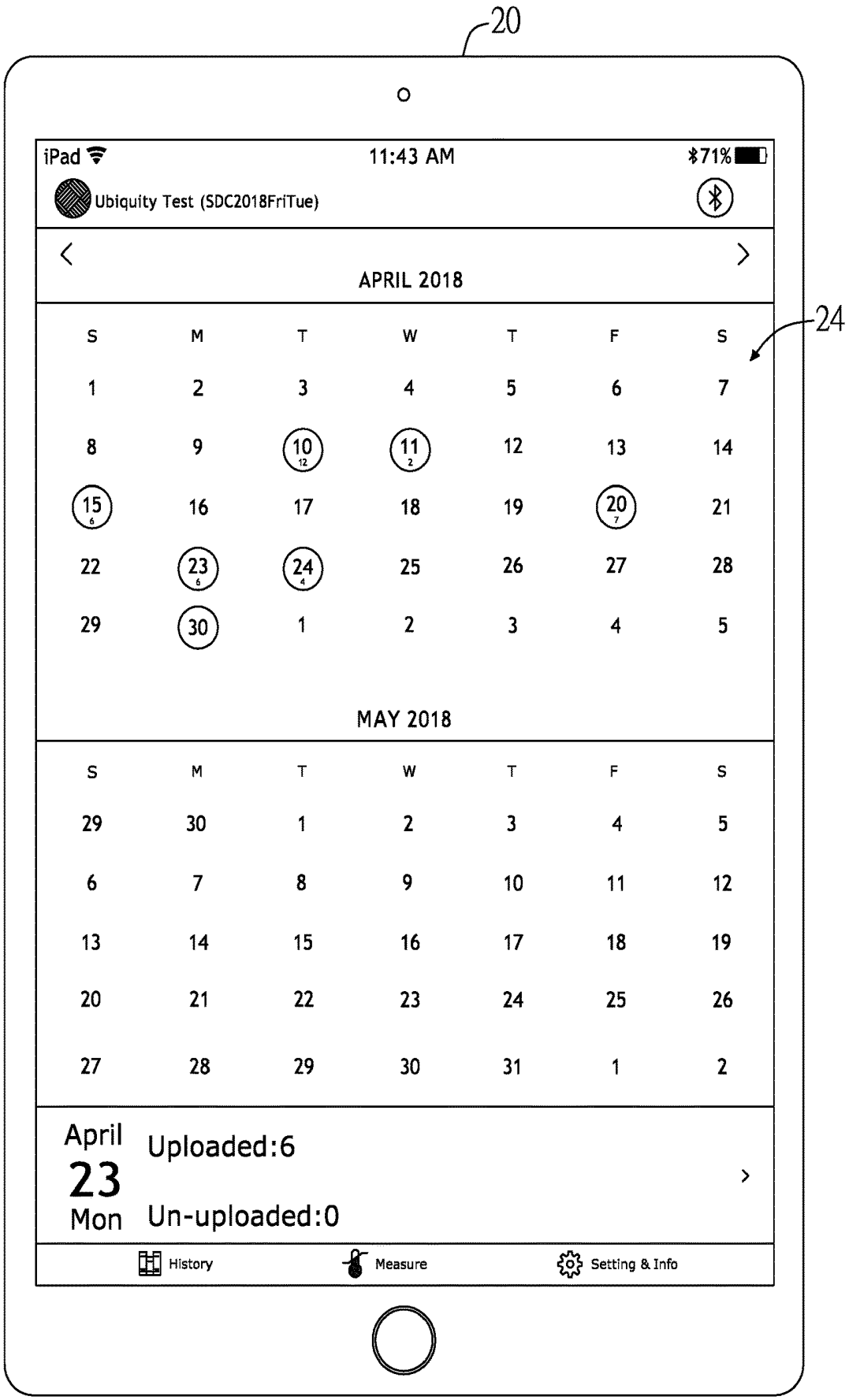

20
iPad
11:43 AM
71%
Ubiquity Test (SDC2018FriTue)
APRIL 2018
24
S M T W T F S
1 2 3 4 5 6 7
8 9 10 12 11 2 12 13 14
15 6 16 17 18 19 20 7 21
22 23 6 24 4 25 26 27 28
29 30 1 2 3 4 5
MAY 2018
S M T W T F S
29 30 1 2 3 4 5
6 7 8 9 10 11 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31 1 2
April
23
Mon
Uploaded:6
Un-uploaded:0
History
Measure
Setting & Info

FIG. 8

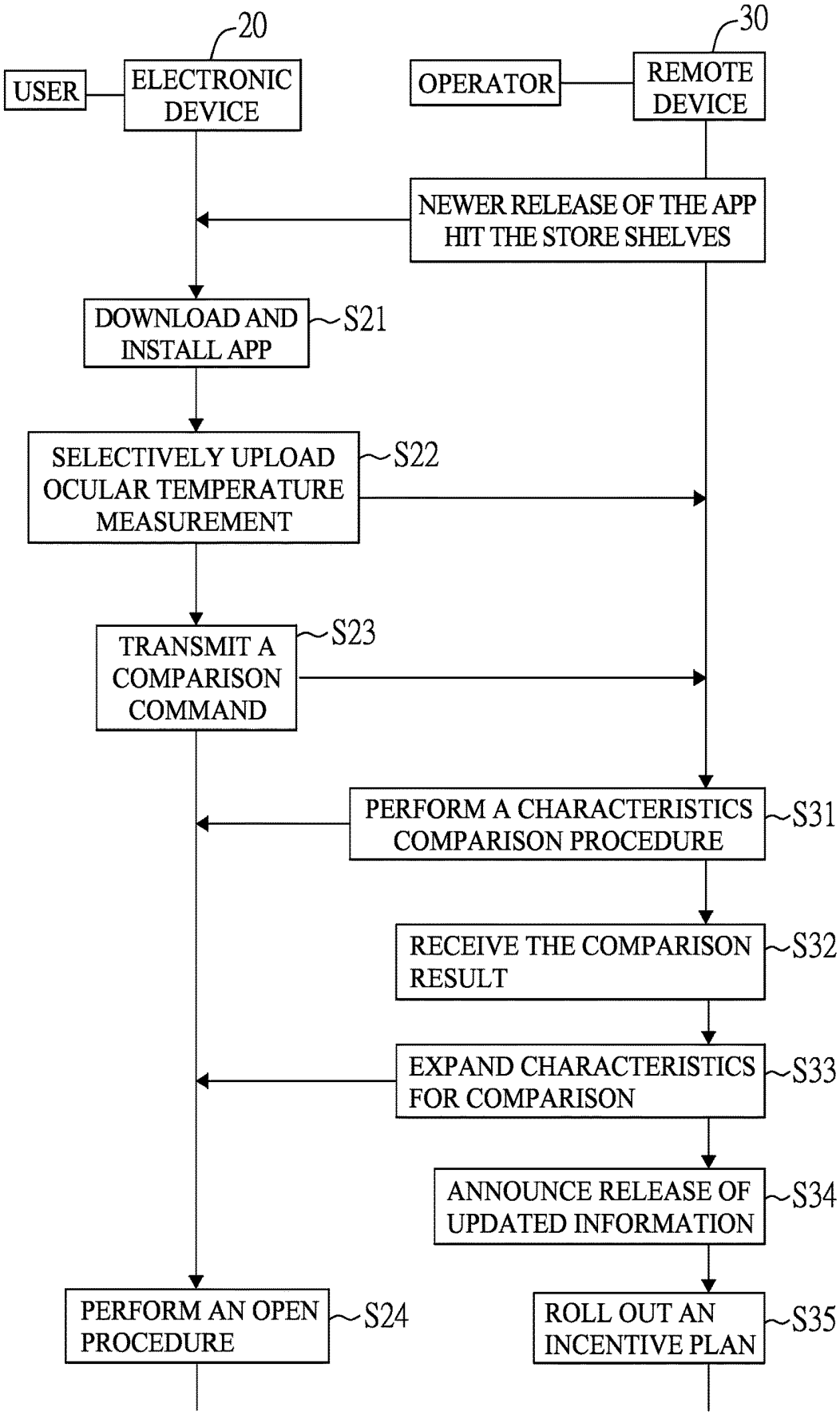

20
30
USER
ELECTRONIC DEVICE
OPERATOR
REMOTE DEVICE
NEWER RELEASE OF THE APP HIT THE STORE SHELVES
DOWNLOAD AND INSTALL APP
S21
SELECTIVELY UPLOAD OCULAR TEMPERATURE MEASUREMENT
S22
TRANSMIT A COMPARISON COMMAND
S23
PERFORM A CHARACTERISTICS COMPARISON PROCEDURE
S31
RECEIVE THE COMPARISON RESULT
S32
EXPAND CHARACTERISTICS FOR COMPARISON
S33
ANNOUNCE RELEASE OF UPDATED INFORMATION
S34
PERFORM AN OPEN PROCEDURE
S24
ROLL OUT AN INCENTIVE PLAN
S35

FIG. 9

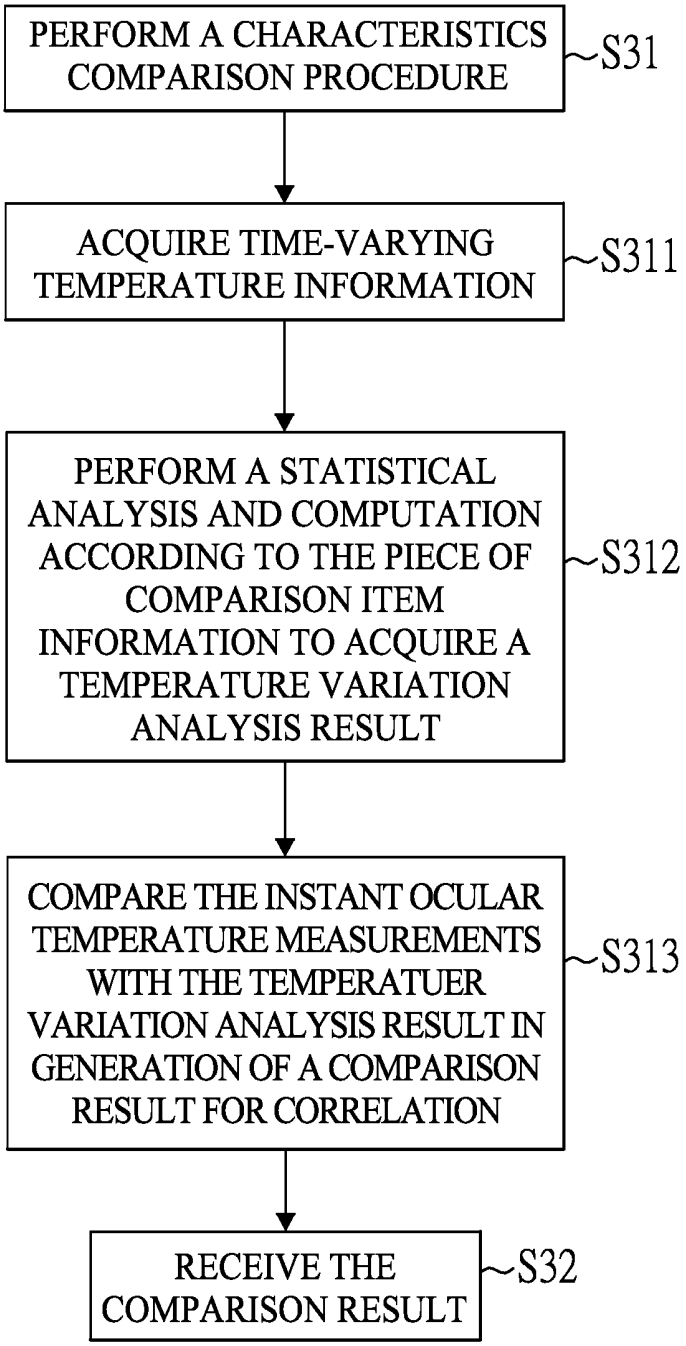

PERFORM A CHARACTERISTICS COMPARISON PROCEDURE
S31
ACQUIRE TIME-VARYING TEMPERATURE INFORMATION
S311
PERFORM A STATISTICAL ANALYSIS AND COMPUTATION ACCORDING TO THE PIECE OF COMPARISON ITEM INFORMATION TO ACQUIRE A TEMPERATURE VARIATION ANALYSIS RESULT
S312
COMPARE THE INSTANT OCULAR TEMPERATURE MEASUREMENTS WITH THE TEMPERATUER VARIATION ANALYSIS RESULT IN GENERATION OF A COMPARISON RESULT FOR CORRELATION
S313
RECEIVE THE COMPARISON RESULT
S32

FIG. 10

BIOMEDICAL INFORMATION PROCESSING SYSTEM USING AN APPLICATION PROGRAM COLLABORATED WITH AN OCULAR TEMPERATURE MEASUREMENT TECHNIQUE AND METHOD FOR THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a biomedical information processing system and a method for the same and, more particularly, to a biomedical information processing system using an application program collaborated with an ocular temperature measurement technique and a method for the same.

2. Description of the Related Art

[0002] Technological diversification brings forth social prosperity and advancement on the one hand and in the meantime also results in the issue of using 3C products too much. Recently, smart phones, tablet personal computers (PC), notebook computers and the like become widespread and seem to be all around us. However, certain eye conditions or even eye diseases, such as dry eye syndrome or nearsightedness, may arise from overuse of the 3C products over a long period of time. On the other hand, some medical experiments show that ocular surface temperature can reflect not only health conditions or pathological changes of eyes but other symptoms rather than dry eye syndrome or nearsightedness when ocular surface temperature is detected to be rising. Presently, before finding out the causes of eye conditions and diseases and getting medical treatment from professional medical institution, patients may have suffered from eye discomfort for a while. Such treatment delay certainly causes pain or inconvenience to busy modernized people in their daily life.

[0003] As disclosed in Taiwanese Patent No. 1597049, entitled "Wearable ocular surface temperature monitor apparatus and system using the same" (hereinafter called conventional technique), the apparatus is composed of a frame and an ocular temperature monitor module. The ocular temperature monitor module has a first temperature sensor and a temperature signal processing circuit. The first temperature sensor in installed inside the frame to measure an ocular surface temperature of a user's eye, provides an electrical signal to the temperature signal processing circuit, and transmits a wireless signal out for a mobile device to receive the wireless signal, such that the user's ocular temperature can be determined if it is abnormal and the user's ocular temperature can be instantly displayed.

[0004] As can be seen from the conventional technique, a wearable ocular surface temperature monitor apparatus, which takes the form of a spectacle and mainly detects one or more users' ocular surface temperatures, is provided. With the aid of the mobile device, users' ocular temperature can be determined if it is normal through a simple approach. However, the conventional technique can only allow users to be aware of their ocular surface temperature. If interested in digging deeper into the cause of disease or syndrome, users may take the measure of speculating the cause themselves or finding relevant information on the web instead of an actual visit to medical institution for diagnosis in person. The way of finding the cause of disease of syndrome is simply inconvenient, time-consuming and not timely enough to meet the need of the fast-paced contemporary people.

SUMMARY OF THE INVENTION

[0005] An objective of the present invention is to provide a biomedical information processing system using an application program collaborated with an ocular temperature measurement technique and a method for the same, which employ the ocular temperature measurement technique and a cloud processing technique to perform a trending analysis targeting at ocular temperature variation of testees, compare the ocular temperature measurements with cloud information for users to efficiently acquire the analysis report for health conditions relevant to or observed from the eyes, such that eye symptoms or other eye-related diseases can be identified and prevented for fulfillment of preventive medicine.

[0006] To achieve the foregoing objective, the biomedical information processing method using an application program collaborated with an ocular temperature measurement technique, wherein the method is performed by an application program (APP) installed in an electronic device connected to a remote device and the method comprises:

[0007] selectively acquiring an instant ocular temperature measurement;

[0008] selectively uploading the instant ocular temperature measurement to the remote device;

[0009] transmitting a comparison command including a piece of comparison item information optionally having at least one characteristic item selected by a user of the electronic device to the remote device;

[0010] instructing the remote device to perform a characteristic comparison procedure to generate a comparison result according to the piece of comparison item information; and

[0011] receiving the comparison result and relevant information transmitted from the remote device.

[0012] Given the foregoing method, the remote device can store multiple pieces of testee information, and users just need to activate the APP in the electronic device connected to the remote device and select the piece of comparison item information from the APP. When the electronic device selectively acquires an instant ocular temperature measurement of a present user and uploads the measurement to the remote device, the remote device performs the characteristics comparison procedure to generate a comparison result according to the piece of comparison item information selected by the present user, and transmits the comparison result back to the electronic device. By virtue of the APP, the comparison result and relevant information can be checked at any time and a tracking record can be created. Attributable to the analysis of ocular temperature variation, the present invention can get hold of user's health conditions associated with or observed from the eyes.

[0013] To achieve the foregoing objective, the biomedical information processing system using an application program collaborated with an ocular temperature measurement technique includes an ocular temperature sensing device, an electronic device, and a remote device.

[0014] The ocular temperature sensing device selectively acquires an instant ocular temperature measurement of a present user and built in with a communication protocol.

[0015] The electronic device has an application program (APP) installed therein to connect to the ocular temperature sensing device through the communication protocol and receive the instant ocular temperature measurement.

[0016] The remote device stores multiple pieces of testee information and exchanges information with the electronic device through a network.

[0017] The APP in the electronic device allows the present user to configure basic information with multiple characteristic items of the present user and select a piece of comparison item information optionally including at least one characteristic item selected from the basic information on a default or runtime basis. When selectively acquiring the instant ocular temperature measurement, the electronic device selectively uploads the instant measurement to the remote device and transmits a comparison command including the piece of comparison item information to the remote device, the remote device then performs a characteristics comparison procedure to generate a comparison result according to the selectively acquired instant ocular temperature measurement and the comparison command, and transmits the comparison result and relevant information back to the electronic device for the present user to check the comparison result and the relevant information or create a tracking record at any time through the APP in the electronic device.

[0018] From the foregoing system architecture, an operator of the system can store all pieces of testee information at the remote device, users can launch the APP in the electronic device to connect with the ocular temperature sensing device through the communication protocol and selectively measure ocular temperature with the ocular temperature sensing device to acquire the instant ocular temperature measurement, select the piece of comparison item information through operation of the APP, and selectively upload the measurement and transmit the comparison command to the remote device, and the remote device performs the characteristics comparison procedure according to the measurement and the comparison command. When the electronic device receives the comparison result and the relevant information transmitted back from the remote device, users can check the comparison result or create a tracking record through the APP. Accordingly, users' awareness of eye health conditions at any time can be always there through the analysis of ocular temperature variation.

[0019] Other objectives, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. **1** is a functional block diagram showing system architecture of a first embodiment of a biomedical information processing system in accordance with the present invention;

[0021] FIG. **2** is a functional block diagram showing system architecture of a second embodiment of a biomedical information processing system in accordance with the present invention;

[0022] FIG. **3** is a schematic diagram showing a state of logging in an application program installed in an electronic device of the biomedical information processing system in FIG. **1** or **2**;

[0023] FIG. **4** is a schematic diagram showing a state of selecting a pairing device through the application in FIG. **3**;

[0024] FIG. **5** is a schematic diagram showing a state of running a tutorial for operation of an ocular temperature sensing device from the application in FIG. **3**;

[0025] FIG. **6** is a trending diagram showing a state of displaying an ocular temperature analysis result on the application in FIG. **3**;

[0026] FIG. **7** is trending diagram showing a state of displaying another ocular temperature analysis result on the application in FIG. **3**;

[0027] FIG. **8** is a schematic diagram showing a state of tracking records through the application in FIG. **3**;

[0028] FIG. **9** is a flow diagram of a biomedical information processing method in accordance with the present invention; and

[0029] FIG. **10** is a flow diagram of a step of performing a characteristics comparison procedure in FIG. **9**.

DETAILED DESCRIPTION OF THE INVENTION

[0030] With reference to FIG. **1**, a biomedical information processing system using an application program collaborated with an ocular temperature measurement technique in accordance with the present invention includes an ocular temperature sensing device **10** and an electronic device **20** for a user, and a remote device **30** for an operator. The remote device **30** stores multiple pieces of testee information and exchange information with the electronic device **20** through a network. In the present embodiment, the user holds the ocular temperature sensing device **10** and the electronic device **20** for operation, and the electronic device **20** is a handheld mobile device, a smart phone, a tablet PC or a notebook computer.

[0031] The ocular temperature sensing device **10** serves to acquire an instant ocular temperature measurement and is built in with a communication protocol. The electronic device **20** has a dedicated application program (hereinafter called APP) installed therein to pair with the ocular temperature sensing device **10** for connection through the communication protocol to receive the instant ocular temperature measurement. In the present embodiment, the communication protocol is a Bluetooth protocol, a WiFi (Wireless Fidelity) protocol, or a protocol for wired communication.

[0032] The APP in the electronic device **20** allows the user to configure basic information with multiple characteristic items of a user and select a piece of comparison item information optionally including at least one characteristic item selected from the basic information on a default or runtime basis. When selectively acquiring the instant ocular temperature measurement, the electronic device **20** selectively uploads the instant ocular temperature measurement to the remote device **30** and transmits a comparison command including the piece of comparison item information to the remote device **30**. The remote device **30** then performs a characteristics comparison procedure to generate a comparison result according to the selectively acquired instant ocular temperature measurement and the comparison command, and transmits the comparison result and relevant information back to the electronic device **20** for the user to check the comparison result and the relevant information or create a tracking record at any time through the APP in the electronic device **20**.

[0033] The remote device **30** for the operator includes a management server **31** and a data server **32**. With further reference to FIG. **1**, the management server **31** and the data server **32** are mutually connected. The management server **31** serves to store multiple pieces of testee information of multiple users and multiple characteristics corresponding to the respective characteristic items in the basic information of each user. The data server **32** stores multiple pieces of account information of the multiple users and the multiple ocular temperature measurements of the multiple users. When the electronic device **20** selectively acquires the instant ocular temperature measurement of a present user and selectively uploads the instant measurement to the data server **32** of the remote device **30** and transmits the comparison command including the piece of comparison item information to the management server **31** of the remote device **30**, the management server **31** and the data server **32** of the remote device **30** perform the characteristics comparison procedure to generate the comparison result.

[0034] With reference to FIG. **2**, the management server **31** includes an ocular temperature database **311** and a categorized data processing module **321**. The ocular temperature database **311** and the categorized data processing module **321** are mutually connected. The data server **32** includes an account management database **321** and a measurement database **322**. The account management database **321** and the measurement database **322** are mutually connected. The ocular temperature database **311** is built up with multiple pieces of screened comparison item information and multiple characteristics corresponding thereto. The categorized data processing module **312** serves to process the multiple pieces of screened comparison item information and the characteristics in the ocular temperature database **311**. The account management database **321** serves to store the piece of account information of each user registered through the APP. The measurement database **322** serves to store the instant ocular temperature measurements associated with the account information of each registered user. In the present embodiment, the multiple pieces of screened comparison item information and the characteristics corresponding thereto can be downloaded from an application platform **40** provided by the operator. The application platform **40** may be a portal website for a cooperative unit, such as a hospital, a school, a vendor or the like, and the operator to log in. The cooperative unit may transmit the multiple pieces of testee information to the remote device **30** through the application platform **40** to update and expand the multiple pieces of screened comparison item information and the characteristics corresponding thereto in the ocular temperature database **311**.

[0035] Hence, after the electronic device **20** selectively acquires the instant ocular temperature measurement of the present user, the APP of the electronic device **20** selectively uploads the instant measurement to the data server **32** of the remote device **30**. The account management database **321** of the data server **32** stores the instant measurement, if available, in a corresponding position of the measurement database **322** according to the piece of account information of the present user. Meanwhile, the APP of the electronic device **20** transmits the comparison command to the management server **31** of the remote device **30** according to the piece of comparison item information configured by the present user for the categorized data processing module **312** of the management server **31** to acquire a corresponding piece of comparison item information and characteristics corresponding thereto in the ocular temperature database **311**. Subsequently, a historical ocular temperature measurement associated with the present user in the data server **32** is transmitted to the management server **31**. The categorized data processing module **312** performs the characteristics comparison procedure with the historical ocular temperature measurement, the corresponding piece of comparison item information and the corresponding characteristics. When acquiring the comparison result, the remote device **30** then transmits the comparison result back to the electronic device **20**.

[0036] To elaborate operation of the biomedical information processing system, with reference to FIGS. **3** and **4**, the present user can launch the APP on the electronic device **20** and activate a login module **21** of the APP for the user to input the piece of account information through the login module **21** and further activates a pairing and characteristics module **22**. The present user can select one of multiple ocular temperature sensing devices to be paired through the pairing and characteristics module **22** for the electronic device **20** to pair with the selected ocular temperature sensing device **10** through the communication protocol. The pairing and characteristics module **22** further allows the present user to configure the basic information of the user and select the piece of comparison item information on the default or runtime basis. The piece of comparison item information may include age, gender, physical conditions, diseases, and the like.

[0037] After configuration of the piece of comparison item information is completed, with reference to FIG. **5**, the APP of the electronic device **20** further provides a tutorial **23** for operation of the ocular temperature sensing device **10** to facilitate user's comprehension in operating the ocular temperature sensing device **10**. In the present embodiment, the ocular temperature sensing device **10** is a handheld device and has a grip portion **11** being cylindrical and an eyelid positioning member **12**. The eyelid positioning member **12** is mounted on a top of the grip portion **11**. During operation, the eyelid positioning member **12** of the ocular temperature sensing device **10** is directed to the user's eyelid to abut against an upper portion of the eyelid, such that the eyelid can be lifted up with the eye exposed such that the ocular temperature sensing device **10** can rapidly and conveniently measure the temperature at the center of the ocular surface of the eye.

[0038] With reference to FIGS. **6** and **7**, after the ocular temperature sensing device **10** transmits the multiple instant ocular temperature measurements measured over a period of time to the electronic device **20**, the electronic device **20** records an average ocular temperature at each second over the period of time according to the instant ocular temperature measurement. The average ocular temperature at each second is obtained by taking an average of corresponding ocular temperatures measured within the second. The electronic device **20** then groups all the average ocular temperatures over the period of time as time-varying temperature information, and uploads the time-varying temperature information along with the piece of account information and the piece of comparison item information to the remote device **30**. In the present embodiment, the time-varying temperature information is represented by a time-temperature curve with measured ocular temperatures varying over time.

[0039] When the APP of the electronic device **20** uploads the time-varying temperature information to the data server **32** of the remote device **30** and the comparison command including the piece of comparison item information configured by the user to the management server **31** of the remote device **30**, the categorized data processing module **312** of the management server **31** retrieves corresponding piece of comparison item information and corresponding characteristics in the ocular temperature database **311** and the data server **32** transmits the historical ocular temperature measurement associated with the present user to the management server **31**, such that the categorized data processing module **312** performs the characteristics comparison procedure with the historical ocular temperature measurement, the corresponding piece of comparison item information, and the corresponding characteristics. After a comparison result is obtained, the remote device **30** transmits the comparison result back to the electronic device **20**. Additionally, the APP of the electronic device **20** can display the time-varying temperature information to show variation of ocular temperatures measured over the period of time and in the past, or obtain an ocular temperature variation rate, a highest ocular temperature, a lowest ocular temperature, a temperature range within which the ocular temperature measurements are situated.

[0040] Furthermore, the characteristics comparison procedure first acquires the time-varying temperature information from the instant ocular temperature measurement, then performs a statistical analysis and computation according to at least one characteristic (the characteristic may be purely gender or a certain disease) to acquire a temperature variation analysis result, compares the instant ocular temperature measurement of the present user with the temperature variation analysis result in generation a comparison result for correlation, and eventually transmits the comparison result for correlation to the electronic device **20**. Given a female user over thirty as an example, the corresponding characteristics in the piece of comparison item information include age and gender. The age and the gender associated with the present user are provided for the statistical analysis and computation so as to obtain the temperature variation analysis result as a comparison with the instant ocular temperature measurement of the present user. In the present embodiment, the temperature variation analysis result includes a temperature range with all ocular temperatures measured therein associated with at least one characteristic, a temperature variation trend, and the like for the user to compare with.

[0041] To further explain how to acquire the time-varying temperature information, perform the statistical analysis and computation according to at least one characteristic, and generate a comparison result for correlation. With reference to FIGS. **6** and **7**, given an instant ocular temperature measurement having multiple temperatures (e.g. 1,000 temperature values) measured over a sampling time period in a few seconds (e.g. 5 seconds) with respect to an identical characteristic as an example, the instant ocular temperature measurement is calculated to obtain the time-varying temperature information with an average ocular temperature at each second within the sampling time period, and a method including but not limited to a linear regression method is applied to the time-varying temperature information for computation in generation of a straight line. The slope of the straight line is a basis of comparison for the instant ocular temperature measurement associated with the characteristic. In the mean time, multiple error bars respectively drawn at multiple seconds of the sampling time period in the temperature variation analysis result can be mutually connected to define a correlation range within which the instant ocular temperature measurement should fall. Once a specific instant ocular temperature measurement associated with the characteristic falls within the correlation range, it indicates that the specific instant ocular temperature measurement has a higher degree of correlation with the temperature variation analysis result, or in other words, the specific instant ocular temperature measurement is close within a range to an average ocular temperature measurement measured from other users and calculated based on a statistical approach.

[0042] With reference to FIG. **8**, the APP of the electronic device **20** further provides a date-based recording module **24** for the present user to click any date on the APP of the electronic device **20**, such that the date-based recording module **24** can show entire instant ocular temperature measurements of the present user at the date for the present user to view. The present user can upload the entire instant ocular temperature measurements of the date from the APP of the electronic device **20** to the remote device **30** for backup or for other subsequent processing. The date-based recording module **24** has a usage count recording function to acquire a user's usage count which can be taken as a criterion applied to an incentive plan.

[0043] Based on the description of the foregoing embodiments, with reference to FIG. **9**, a biomedical information processing method using an application program collaborated with an ocular temperature measurement technique in accordance with the present invention can be further derived. For implementation of the method, the electronic device **20** of the user is connected to the remote device **30** of an operator, and the operator can allow a newer release of the APP to hit the store shelves at any time for the user to download. The method is performed by the electronic device **20** and includes the following steps.

[0044] Step S**21**: Download and install the APP in the electronic device to selectively acquire an instant ocular temperature measurement.

[0045] Step S**22**: Selectively upload the instant ocular temperature measurement to the remote device **30**.

[0046] Step S**23**: Transmit a comparison command including a piece of comparison item information optionally having at least one characteristic item selected by the user to the remote device **30**.

[0047] Step S**31**: Instruct the remote device **30** to perform a characteristics comparison procedure to generate a comparison result according to the piece of comparison item information.

[0048] Step S**32**: Receive the comparison result and relevant information transmitted from the remote device.

[0049] The method further includes the following steps when the operator intends to expand the characteristics for comparison.

[0050] Step S**33**: Expand characteristics for comparison through the remote device **30**.

[0051] Step S**34**: Announce release of updated information.

[0052] Step S**35**: Roll out an incentive plan.

[0053] The method further includes the following step when the electronic device **20** receives the updated information.

[0054] Step S**24**: Perform an open procedure to acquire expanded characteristics.

[0055] Step S**31** further includes the following sub-steps.

[0056] Step S**311**: Acquire time-varying temperature information. The APP of the electronic device **20** records an average ocular temperature at each second over a period of time according to the instant ocular temperature measurement. The average ocular temperature at each second is obtained by taking an average of multiple ocular temperatures measured over the second. The electronic device **20** then groups all the average ocular temperatures over the period of time as the time-varying temperature information, and uploads the time-varying temperature information to the remote device **30**

[0057] Step S**312**: Perform a statistical analysis and computation according to at least one characteristic to acquire a temperature variation analysis result through the remote device **30**.

[0058] Step S**313**: Compare the instant ocular temperature measurements with the temperature variation analysis result in generation of a comparison result for correlation through the remote device **30**.

[0059] In the present embodiment, the temperature variation analysis result includes a temperature range of ocular temperatures measured associated with a characteristic, a temperature variation trend, and the like.

[0060] By virtue of the foregoing method, the remote device **30** stores the multiple pieces of testee information, and the APP of the electronic device **20** of the user is connected to the remote device **30** for the user to select the piece of comparison item information. When the electronic device **20** selectively acquires the instant ocular temperature measurements of the user and selectively uploads the measurements to the remote device **30**, the remote device **30** performs the characteristics comparison procedure according to the piece of comparison item information configured by the user in generation of the comparison result, and transmits the comparison result back to the electronic device **20**. The comparison result and relevant information at any time can be checked and stored as records for tracking through the APP of the electronic device **20**. In view of comparison and analysis of ocular temperature variation, users can instantly get hold of their eye health conditions.

[0061] Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only. Changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A biomedical information processing method using an application program collaborated with an ocular temperature measurement technique, wherein the method is performed by an application program (APP) installed in an electronic device connected to a remote device and the method comprises:

selectively acquiring an instant ocular temperature measurement;

selectively uploading the instant ocular temperature measurement to the remote device;

transmitting a comparison command optionally including a piece of comparison item information having at least one characteristic item selected by a user of the electronic device to the remote device;

instructing the remote device to perform a characteristic comparison procedure to generate a comparison result according to the piece of comparison item information; and

receiving the comparison result and relevant information transmitted from the remote device.

2. The method as claimed in claim **1**, wherein the step of instructing the remote device to perform a characteristic comparison procedure further comprises:

acquiring time-varying temperature information;

performing a statistical analysis and computation according to the piece of comparison item information to acquire a temperature variation analysis result; and

comparing the instant ocular temperature measurement with the temperature variation analysis result in generation of a comparison result for correlation.

3. The method as claimed in claim **2**, wherein in the step of acquiring the time-varying temperature information, the APP of the electronic device records an average ocular temperature at each second over a period of time according to the instant ocular temperature measurement, the average ocular temperature at each second is obtained by taking an average of multiple ocular temperatures measured over the second, and the electronic device then groups all the average ocular temperatures over the period of time as the time-varying temperature information, and uploads the time-varying temperature information to the remote device.

4. The method as claimed in claim **2**, wherein in the step of comparing the instant ocular temperature measurement with the temperature variation analysis result in generation of a comparison result for correlation, multiple error bars respectively drawn at multiple seconds of a sampling time period in the temperature variation analysis result are mutually connected to define a correlation range within which the instant ocular temperature measurement falls, and when the instant ocular temperature measurement associated with the at least one characteristic falls within the correlation range, it indicates that the instant ocular temperature measurement has a higher degree of correlation with the temperature variation analysis result.

5. The method as claimed in claim **2**, wherein the temperature variation analysis result includes a temperature range with ocular temperatures measured therein associated with one of the optionally selected at least one characteristic item of the piece of comparison item information or a temperature variation trend.

6. The method as claimed in claim **3**, wherein the temperature variation analysis result includes a temperature range with ocular temperatures measured therein associated with one of the optionally selected at least one characteristic item of the piece of comparison item information or a temperature variation trend.

7. The method as claimed in claim **4**, wherein the temperature variation analysis result includes a temperature range with ocular temperatures measured therein associated with one of the optionally selected at least one characteristic item of the piece of comparison item information or a temperature variation trend.

8. A biomedical information processing system using an application program collaborated with an ocular temperature measurement technique, comprising:

an ocular temperature sensing device selectively acquiring an instant ocular temperature measurement of a present user and built in with a communication protocol;

an electronic device having an application program (APP) installed therein to connect to the ocular temperature sensing device through the communication protocol and receive the instant ocular temperature measurement; and

a remote device storing multiple pieces of testee information and exchanging information with the electronic device through a network;

wherein the APP in the electronic device allows the present user to configure basic information with multiple characteristic items of the present user and select a piece of comparison item information optionally including at least one characteristic item selected from the basic information on a default or runtime basis, when selectively acquiring the instant ocular temperature measurement, the electronic device selectively uploads the instant measurement to the remote device and transmits a comparison command including the piece of comparison item information to the remote device, the remote device then performs a characteristics comparison procedure to generate a comparison result according to the selectively acquired instant ocular temperature measurement and the comparison command, and transmits the comparison result and relevant information back to the electronic device for the present user to check the comparison result and the relevant information or create a tracking record at any time through the APP in the electronic device.

9. The system as claimed in claim 8, wherein the remote device includes:

a management server storing multiple pieces of testee information of the multiple users and multiple characteristics corresponding to the respective characteristic items in the basic information of each user; and

a data server connected to the management server, and storing multiple pieces of account information of the multiple users and the instant ocular temperature measurements of the multiple users;

wherein when the electronic device selectively acquires the instant ocular temperature measurement from the present user, selectively uploads the instant ocular temperature measurement to the data server, and transmits the comparison command including the piece comparison item information to the management server, the management server and the data server perform the characteristics comparison procedure to generate the comparison result.

10. The system as claimed in claim 9, wherein

the management server includes:

an ocular temperature database built in with multiple pieces of screened comparison item information and characteristics corresponding thereto; and

a categorized data processing module connected to the ocular temperature database and processing a corresponding piece of screened comparison item information and the characteristics corresponding thereto in the ocular temperature database; and

the data server includes:

an account management database storing the piece of account information of each user registered through the APP; and

a measurement database connected to the account management database storing the instant ocular temperature measurement associated with account information of each registered user.

11. The system as claimed in claim 10, wherein the APP of the electronic device includes:

a login module allowing each user to input a corresponding piece of account information therethrough;

a pairing and characteristics module allowing the present user to configure the basic information of each user, select the piece of comparison item information, and select one of multiple ocular temperature sensing devices to be paired therethrough for the electronic device to pair with the selected ocular temperature sensing device;

a tutorial for operation of the ocular temperature sensing device; and

a date-based recording module showing entire instant ocular temperature measurements of the present user at a selected date for the present user to view.

12. The system as claimed in claim 8, wherein the ocular temperature sensing device is a handheld device and has:

a grip portion being cylindrical; and

an eyelid positioning member mounted on a top of the grip portion.

13. The system as claimed in claim 9, wherein the ocular temperature sensing device is a handheld device and has:

a grip portion being cylindrical; and

an eyelid positioning member mounted on a top of the grip portion.

14. The system as claimed in claim 10, wherein the ocular temperature sensing device is a handheld device and has:

a grip portion being cylindrical; and

an eyelid positioning member mounted on a top of the grip portion.

15. The system as claimed in claim 11, wherein the ocular temperature sensing device is a handheld device and has:

a grip portion being cylindrical; and

an eyelid positioning member mounted on a top of the grip portion.

* * * * *

专利名称(译)	使用与眼温测量技术和方法协作的应用程序的生物医学信息处理系统		
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[标]发明人	LAI HORNG JI YU LI PING		
发明人	LAI, HORNG-JI MA, TE-LUN YU, LI-PING LEE, HSIANG-CHING		
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摘要(译)

使用与眼温度测量技术协作的应用程序（APP）的生物医学信息处理系统包括电子设备和远程设备。 至少一个用户分别持有与安装有应用程序（APP）的电子设备连接的眼温感测设备。 电子设备与远程设备交换信息。 眼温感测设备获取用户的即时眼温测量值，该测量值通过APP传输到远程设备。 远程设备根据用户在APP上选择的一条比较项信息执行特征比较过程，以产生比较结果。 当电子设备从远程设备接收到比较结果时，用户可以查看比较结果并通过电子设备创建跟踪记录，以使用户随时了解他们的眼睛健康状况。