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JOO

(54) **WEARABLE DEVICE AND METHOD OF OPERATING THE SAME**

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Related U.S. Application Data

(63) Continuation of application No. 14/665,274, filed on Mar. 23, 2015.

(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**

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G09G 5/00 (2006.01)
G06K 9/00 (2006.01)

(52) **U.S. Cl.**

CPC ***G06F 3/015*** (2013.01); ***G06F 3/013*** (2013.01); ***G06K 9/00671*** (2013.01); ***G09G 5/003*** (2013.01); *G09G 2354/00* (2013.01)

(57) **ABSTRACT**

Provided are a wearable device and a method of operating the same. The wearable device includes: a display configured to display content; a user input unit configured to receive a command of a wearer; and a controller configured to: when the content is reproduced in a state in which the wearable device is worn, output, through the display and based on content reproduction related information of the wearable device, information informing the wearer that stopping reproduction of the content is requestable, and control to stop the reproduction of the content in response to a reproduction stop request for the content, received through the user input unit in response to the output information, wherein the content reproduction related information corresponds to information influential on a health of the wearer when the content is reproduced in the state in which the wearable device is worn.

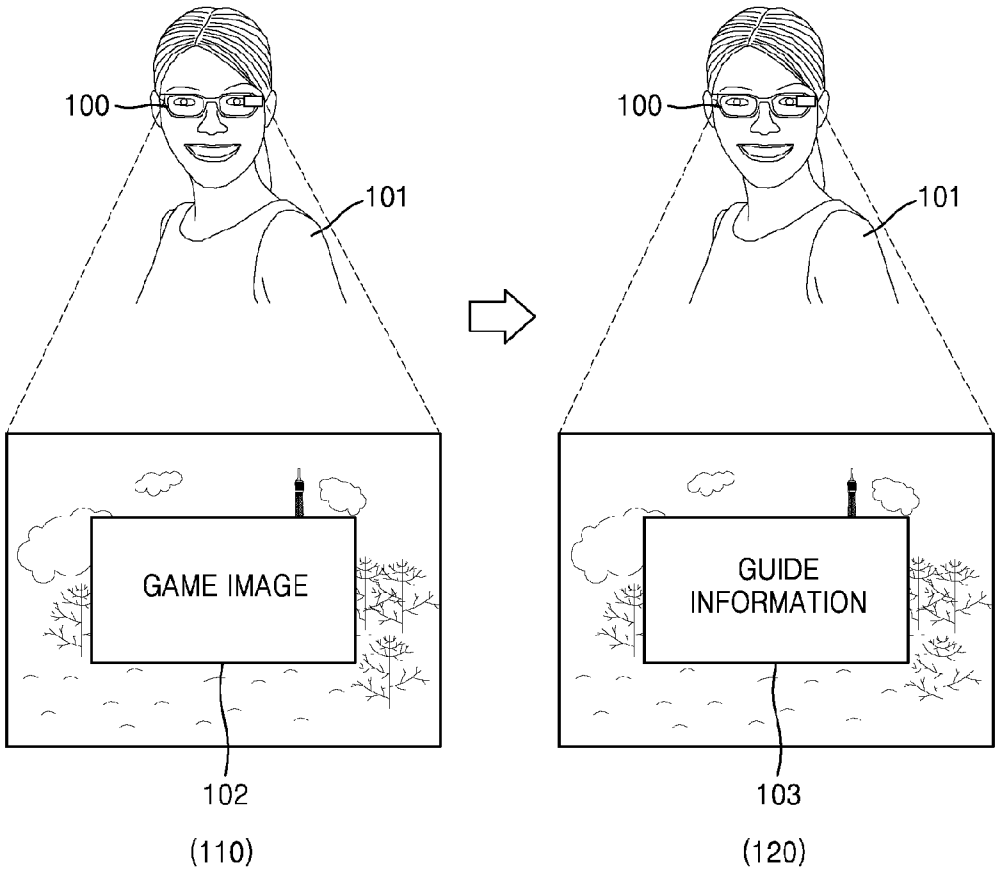


FIG. 1A

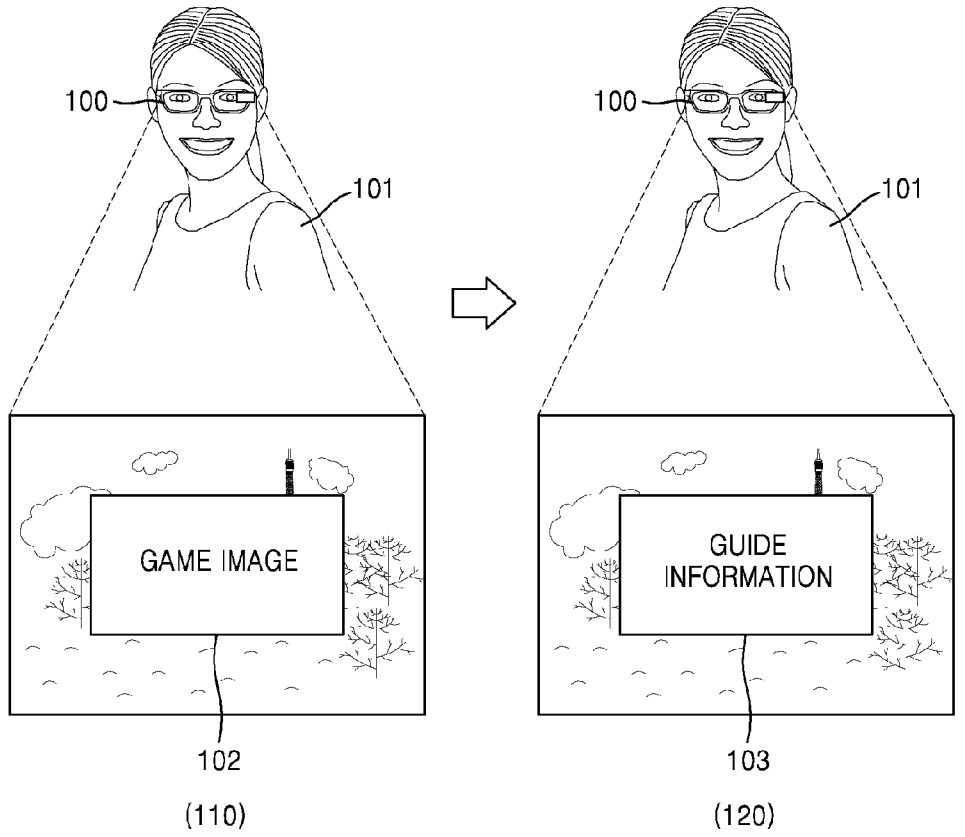


FIG. 1B

CONTENT REPRODUCTION RELATED INFORMATION OF WEARABLE DEVICE	OBTAINING METHOD	REPRODUCTION STOP REQUEST REFERENCE
REPRODUCTION TIME OF CONTENT	AFTER SENSING WEARING OF WEARABLE DEVICE, TIME COUNTED BY STARTING REPRODUCTION OF CONTENT IS OBTAINED AS REPRODUCTION TIME (Pt) OF CONTENT	Pt ≥ 2H
BATTERY CONSUMPTION AMOUNT	AFTER SENSING WEARING OF WEARABLE DEVICE, BATTERY REMAINS (Brq1) DETECTED BY STARTING REPRODUCTION OF CONTENT IS OBTAINED AS REFERENCE BATTERY REMAINS (Brq1) DIFFERENCE (D) BETWEEN THE DETECTED BATTERY REMAIN (Brq2) AND THE REFERENCE BATTERY REMAINS DETECTED DURING REPRODUCTION OF CONTENT IS OBTAINED AS BATTERY CONSUMPTION AMOUNT	D ≥ 50%
HEATING TEMPERATURE	AFTER SENSING WEARING OF WEARABLE DEVICE, TEMPERATURE (T) DETECTED BY USING TEMPERATURE SENSOR BY STARTING REPRODUCTION OF CONTENT IS OBTAINED AS HEATING TEMPERATURE	1. T ≥ 49℃ & MAINTAINING 1 HOUR 2. T ≥ 49℃

FIG. 1C-1

BIO INFORMATION OF WEARER		OBTAINING METHOD	REPRODUCTION STOP REQUEST REFERENCE
BIO INFORMATION BASED ON EYE	WHETHER EYE IS BLOODSHOT	USING COLOR DISTRIBUTION OF EYE IMAGE OBTAINED BY CAMERA	INCREASE RATE OF NUMBER OF PIXELS HAVING R VALUE APPROXIMATE 255 ≥ 40%
	WHETHER EYE IS DRY	1. USING VALUE SENSED BY HUMIDITY SENSOR 2. USING SOUND AND EYE IMAGE OBTAINED BY MICROPHONE INCLUDED IN ELECTRONIC PATCH	1. HUMIDITY ≤ 30% & MAINTAINING 1 HOUR 2. DETECTING SOUND GENERATED DUE TO DRY EYE FOR MORE THAN CERTAIN PERIOD OF TIME
	NUMBER OF EYE BLINK	USING EYE IMAGE OBTAINED DURING CERTAIN PERIOD OF TIME BY CAMERA	NUMBER OF EYE BLINK ≤ 9/PER MINUTE VARIANCE OF NUMBER OF EYE BLINK≥15%
	CYCLE OF EYE BLINK	USING EYE IMAGE OBTAINED DURING CERTAIN PERIOD OF TIME BY CAMERA	CYCLE OF EYE BLINK SECONDS ≥ 15초 VARIANCE OF CYCLE OF EYE BLINK≥15%
	WHETHER POSITION OF PUPIL IS CHANGED	USING EYE IMAGE OBTAINED DURING CERTAIN PERIOD OF TIME OR EYE IMAGE OBTAINED BY CERTAIN PERIOD OF TIME UNIT BY CAMERA	VARIANCE OF POSITION ≤ 0.4mm
	WHETHER PUPIL IS CHANGED	USING PUPIL IMAGE OBTAINED DURING CERTAIN PERIOD OF TIME OR PUPIL IMAGE OBTAINED BY CERTAIN PERIOD OF TIME UNIT BY CAMERA	CONTINUING MORE THAN 1 HOUR IN STATUS WHERE WIDTH OF PUPIL IS REDUCED

FIG. 1C-2

BIO INFORMATION OF WEARER		OBTAINING METHOD	REPRODUCTION STOP REQUEST REFERENCE
HEALTH INFORMATION	BODY TEMPERATURE	USING SENSING VALUE GENERATED BY BODY TEMPERATURE SENSOR OR VARIANCE OF SENSING VALUE OF BOBY TEMPERATURE SENSOR	BODY TEMPERATURE > AVERAGE BOBY TEMPERATURE, BODY TEMPERATURE < AVERAGE BODY TEMPERATURE, VARIANCE OF BODY TEMPERATURE > 1℃
	SWEATING AMOUNT	USING SWEATING AMOUNT GENERATED BY SWEATING SENSOR OR VARIANCE OF SWEATING AMOUNT	SWEATING AMOUNT > AVERAGE SWEATING AMOUNT, VARIANCE OF SWEATING AMOUNT > 10%
	BLOOD PRESSURE	USING BLOOD PRESSURE GENERATED BY BLOOD PRESSURE SENSOR OR VARIANCE OF BLOOD PRESSURE	BLOOD PRESSURE > NORMAL BLOOD PRESSURE, BLOOD PRESSURE < NORMAL BLOOD PRESSURE, VARIANCE OF BLOOD PRESSURE > 20%
	PULSE	USING PULSE GENERATED BY PULSE SENSOR OR VARIANCE OF PULSE	PULSE > NORMAL PULSE, PULSE < NORMAL PULSE, VARIANCE OF PULSE > 10%
	ACTIVITY	USING ACTIVITY OBTAINED BY HEALTH APPLICATION, LOCATION TRACKING APPLICATION, AND EXTERNAL ACTIVITY MEASUREMENT DEVICE OR VARIANCE OF ACTIVITY	ACTIVITY > NORMAL ACTIVITY
	BLOOD SUGAR	USING BLOOD SUGAR GENERATED BY BLOOD SUGAR SENSOR OR VARIANCE OF BLOOD SUGAR	BLOOD SUGAR > NORMAL BLOOD SUGAR, VARIANCE OF BLOOD SUGAR > 10%
	MEDICAL INFORMATION	USING MEDICAL INFORMATION RECEIVED FROM SERVER	CHANGE REPRODUCTION STOP REQUEST REFERENCE OF DIFFERENT INFORMATION ACCORDING TO DESCRIPTION OF INFORMATION

FIG. 1D

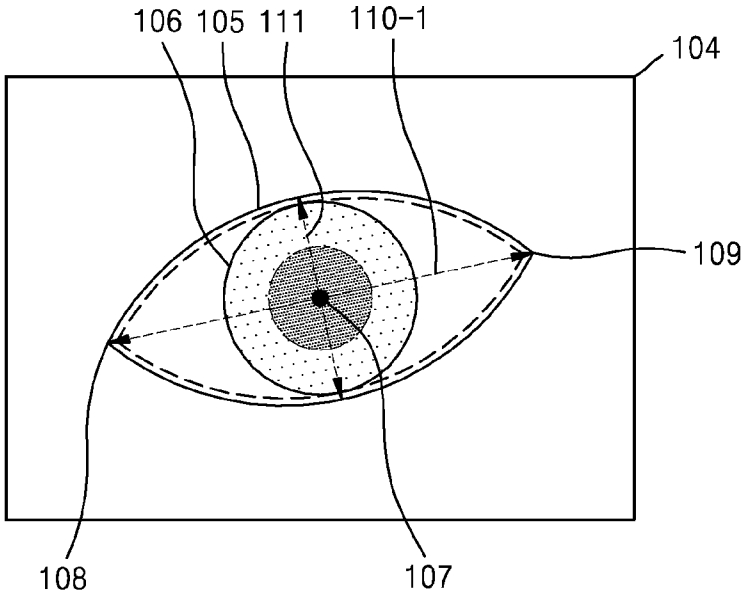


FIG. 1E

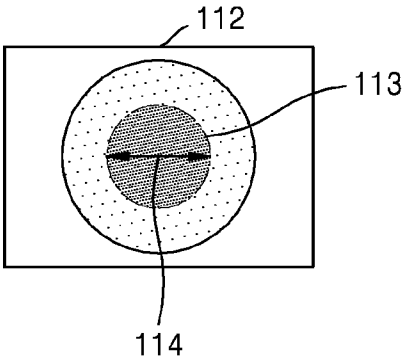


FIG. 1F

PERIPHERAL ENVIRONMENT INFORMATION	OBTAINING METHOD	REPRODUCTION STOP REQUEST REFERENCE
COLOR TEMPERATURE	USING SENSING VALUE OF WEARABLE DEVICE OR EXTERNAL DEVICE	COLOR TEMPERATURE AND MAINTENANCE TIME
LIGHT (OR INFRARED RAYS)		BRIGHTNESS LEVEL AND EXPOSURE TIME INFRARED RAY INDEX AND EXPOSURE TIME
TEMPERATURE		TEMPERATURE > REFERENCE TEMPERATURE VARIANCE OF TEMPERATURE > 3℃
HUMIDITY		HUMIDITY < 30%, HUMIDITY > 70%
WIND		INTENSITY OF WIND > INTENSITY OF REFERENCE WIND VARIANCE OF INTENSITY OF WIND > 10%
ALTITUDE		ALTITUDE > REFERENCE ALTITUDE VARIANCE OF ALTITUDE > 10%
AIR PRESSURE		AIR PRESSURE > REFERENCE AIR PRESSURE VARIANCE OF AIR PRESSURE > 10%
FINE DUST		DENSITY OF FINE DUST > DENSITY OF REFERENCE FINE DUST VARIANCE OF DENSITY OF FINE DUST > 10%

FIG. 1G

PERSONAL INFORMATION	OBTAINING METHOD	REPRODUCTION STOP REQUEST REFERENCE
AGE	USING AT LEAST ONE OF INPUT INFORMATION OF WEARER, INFORMATION STORED IN WEARABLE DEVICE, AND INFORMATION STORED IN EXTERNAL DEVICE	CHANGE REPRODUCTION STOP REQUEST REFERENCE OF DIFFERENT INFORMATION ACCORDING TO AGE
SCHEDULE INFORMATION		CHANGE REPRODUCTION STOP REQUEST REFERENCE OF DIFFERENT INFORMATION ACCORDING TO SCHEDULE DESCRIPTION

FIG. 1H

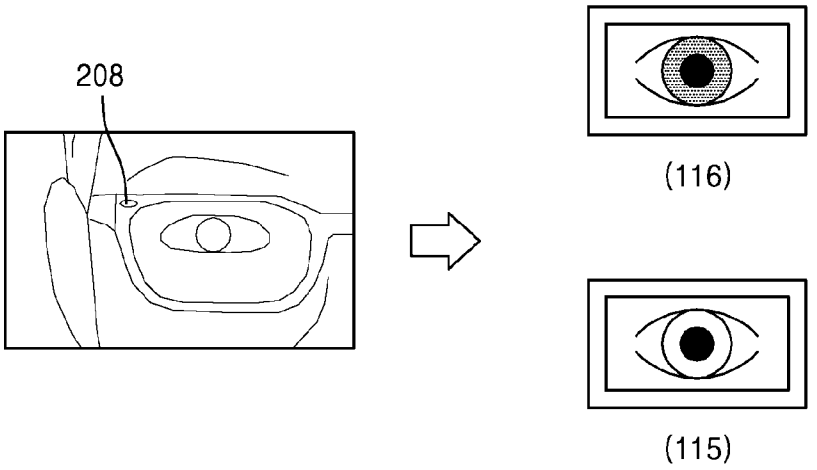


FIG. 2A

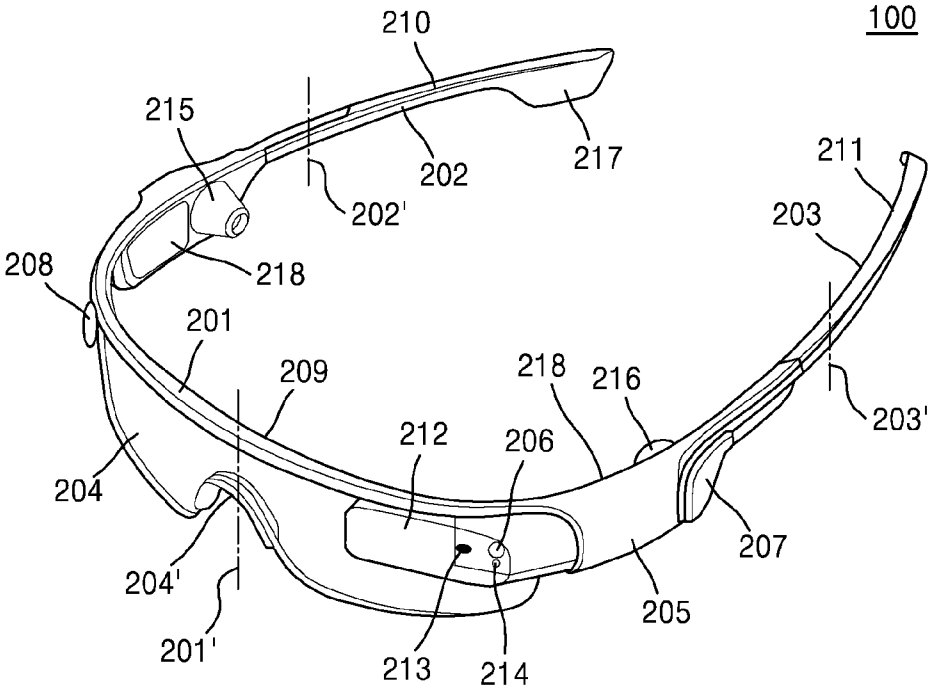

100
210
215
202
217
211
202'
203
208
218
201
209
218
216
203'
212
206
204
207
204'
205
201'
213
214

FIG. 2B

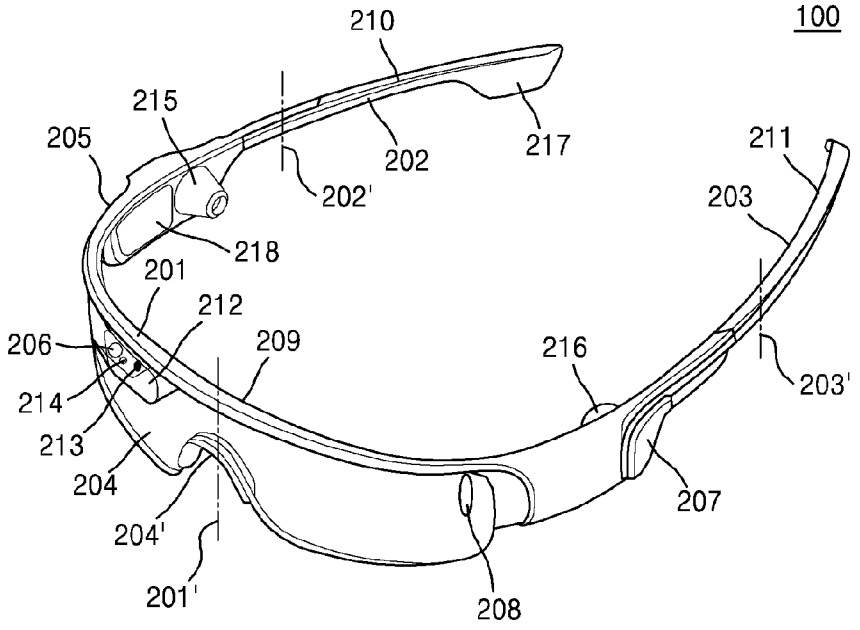
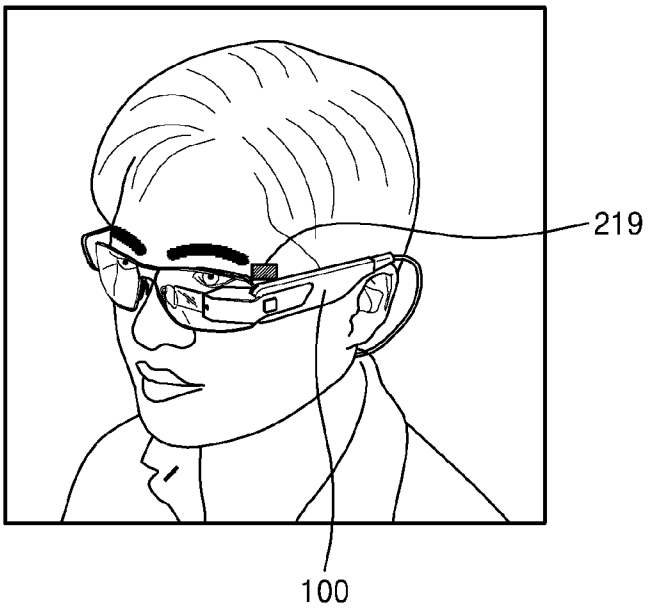

100
210
215
205
202
217
211
202'
203
218
201
212
206
209
216
203'
214
213
204
207
204'
201'
208

FIG. 2C



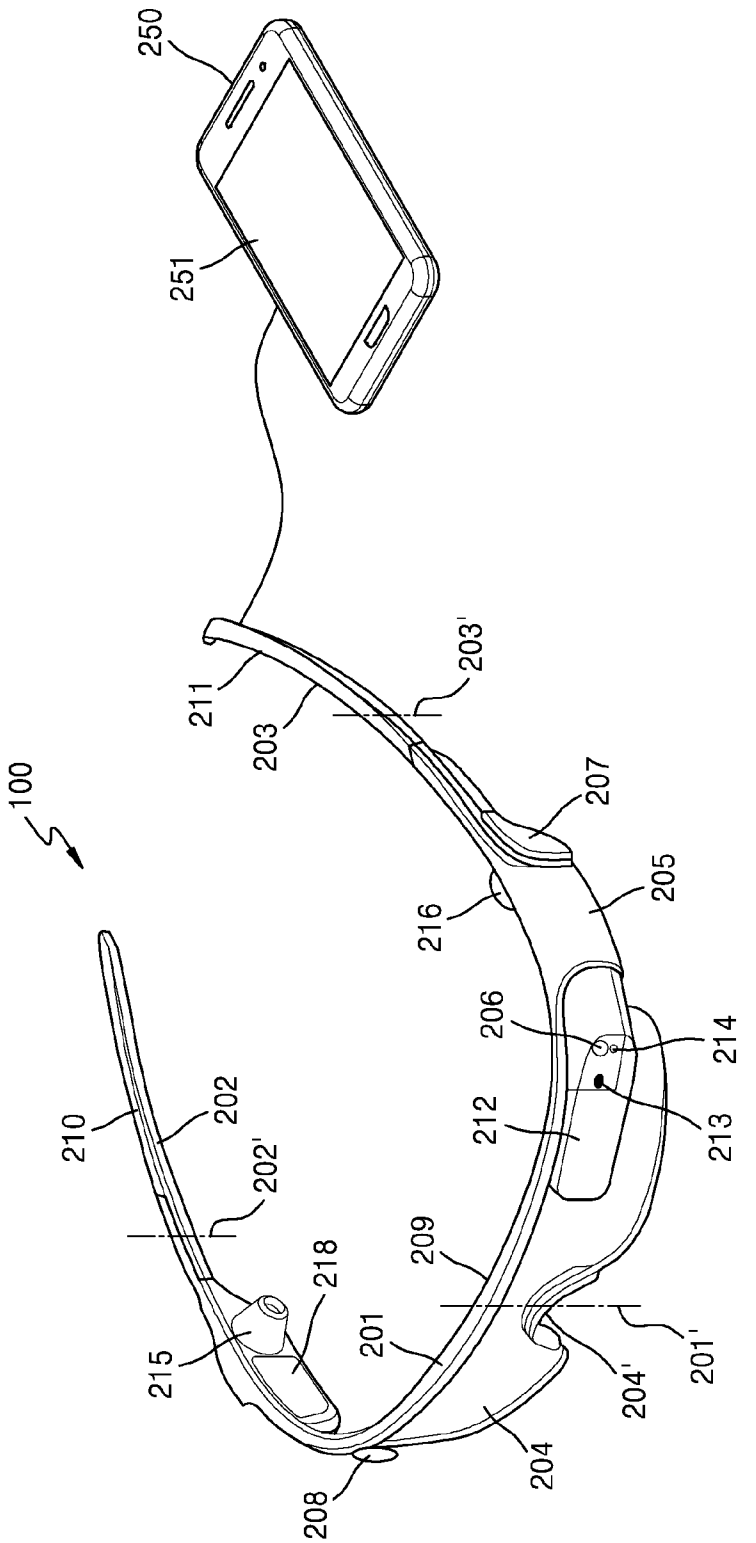

250
251
211
203
203'
100
207
205
216
206
214
213
212
210
202
202'
209
218
215
201
204'
201'
204
208

FIG. 2D

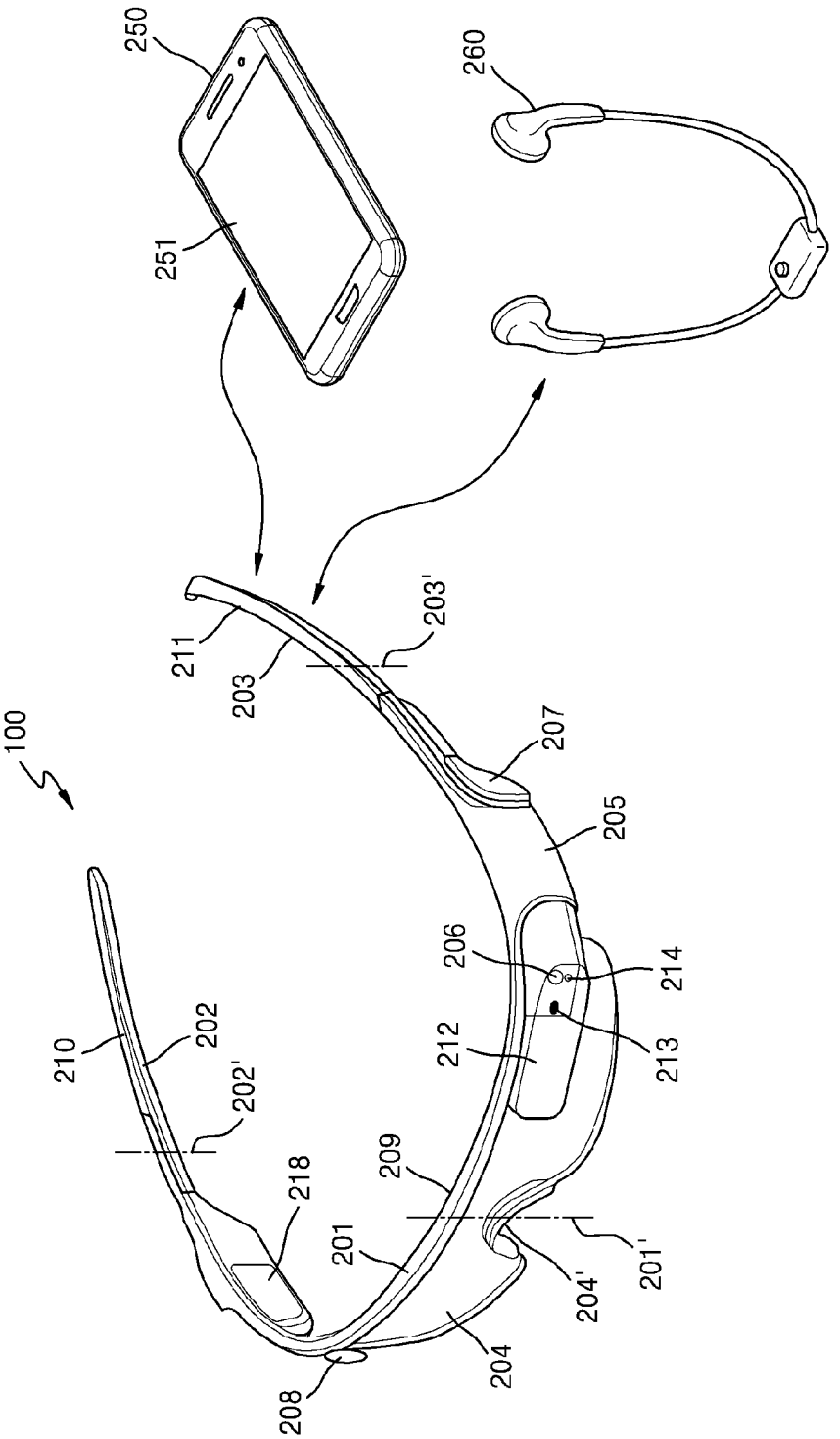

250
251
260
211
203
203'
100
207
205
206
214
213
212
210
202
202'
218
209
201
201'
204'
204
208

FIG. 2E

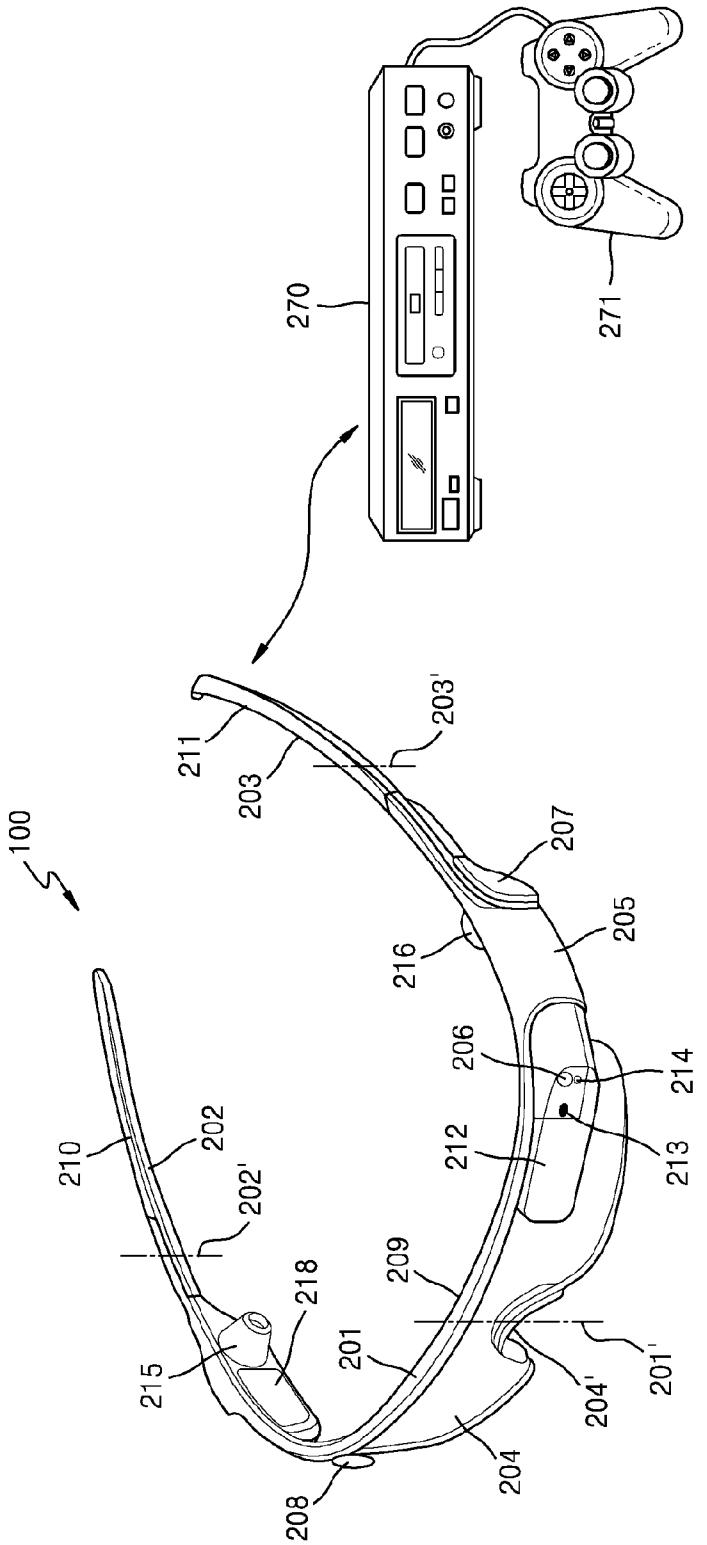

100
270
271
211
203
203'
207
205
216
206
214
213
212
210
202
202'
209
218
215
201
201'
204'
204
208

FIG. 2F

FIG. 3

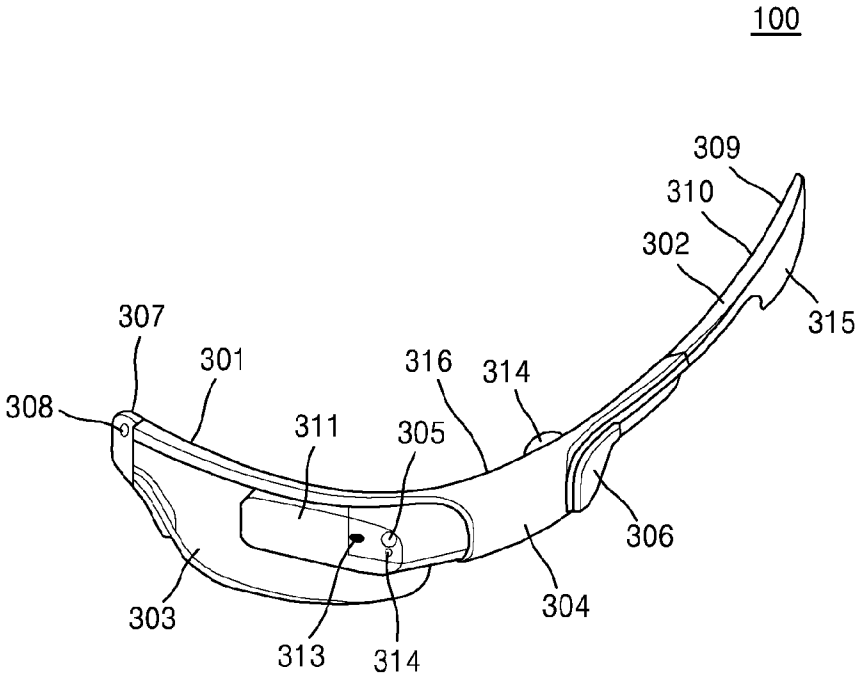

100
309
310
302
315
307
301
316
314
308
311
305
306
303
313
314
304

FIG. 4

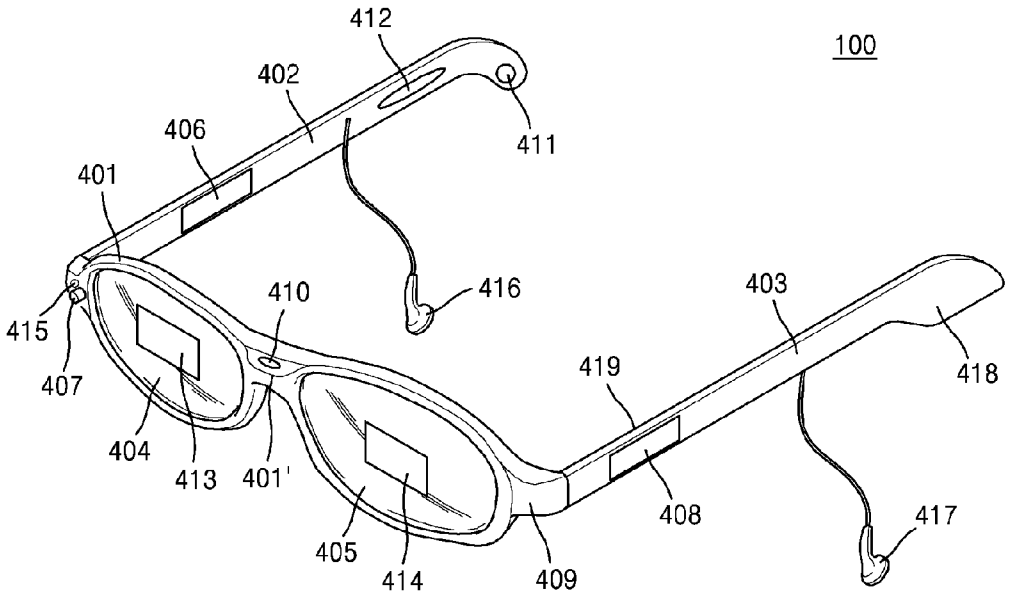

412
100
402
406
411
401
410
416
403
415
407
419
418
404
413
401'
408
417
405
414
409

FIG. 5A

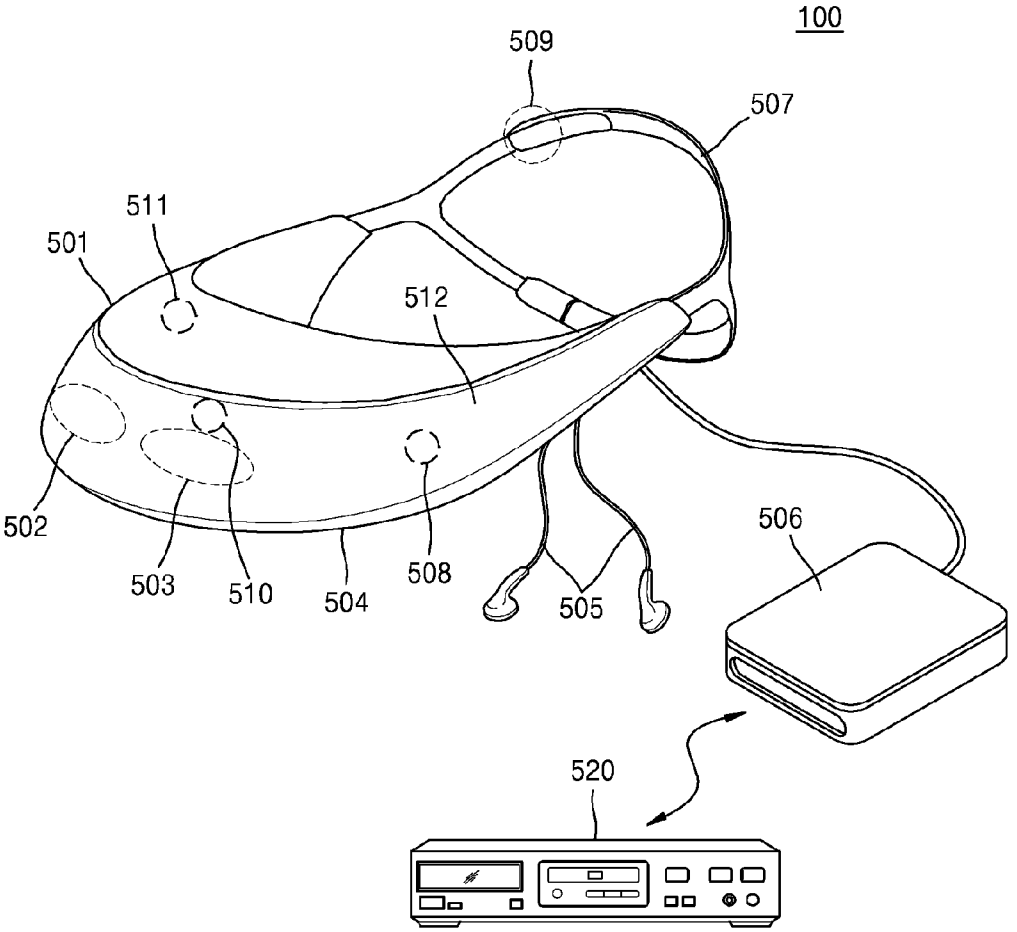


FIG. 5B

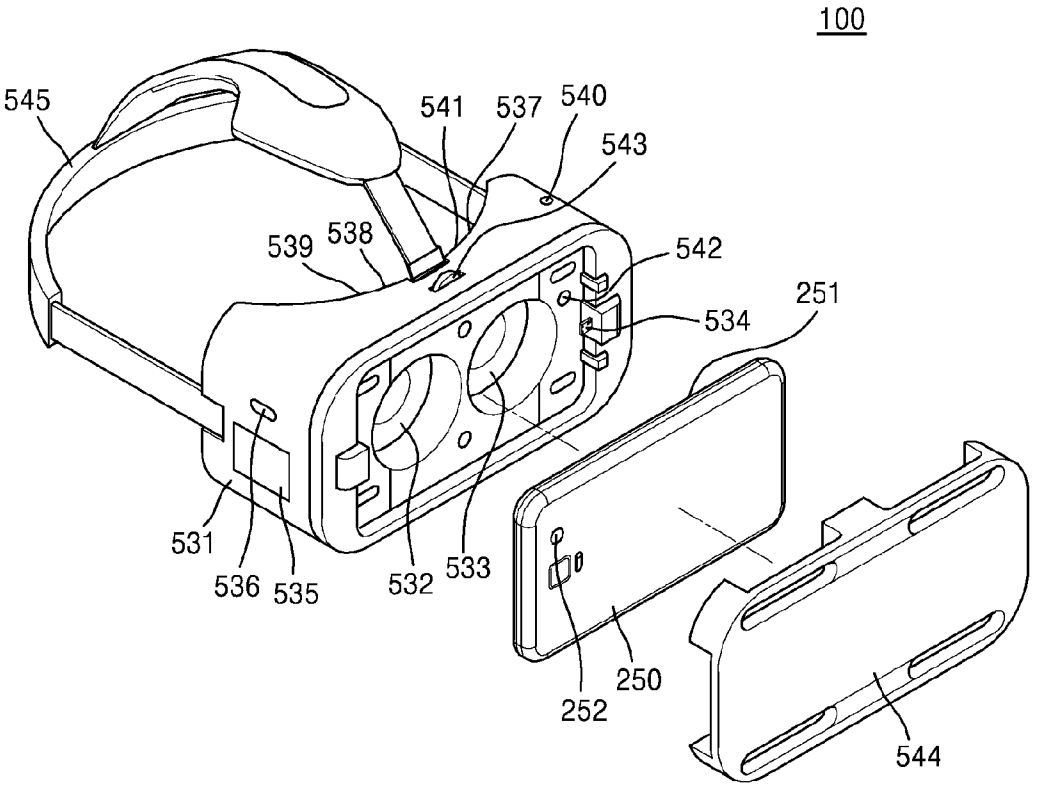

100
545
541
537
540
543
539
538
542
534
251
531
536
535
532
533
250
252
544

FIG. 6

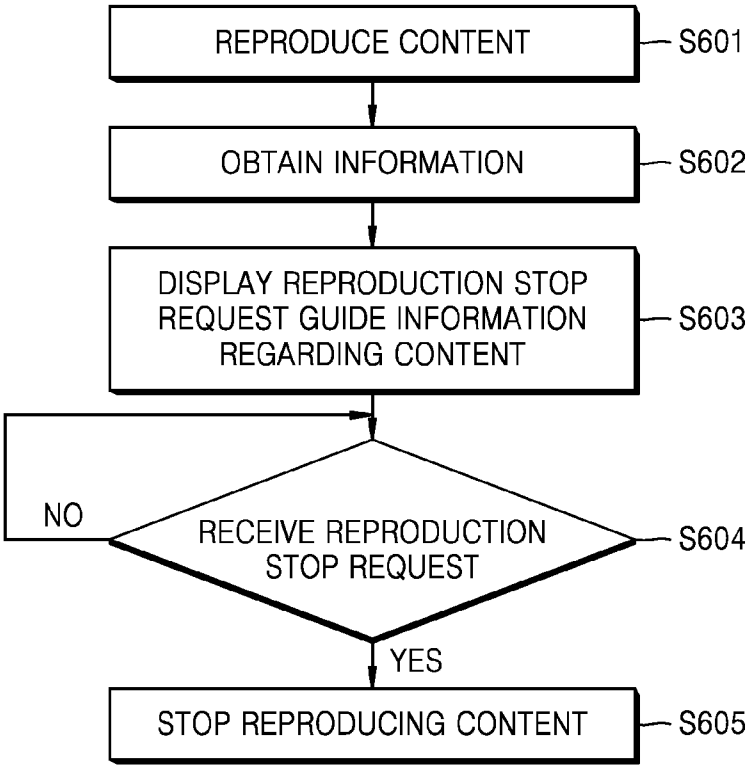

REPRODUCE CONTENT
S601
OBTAIN INFORMATION
S602
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S603
NO
RECEIVE REPRODUCTION STOP REQUEST
S604
YES
STOP REPRODUCING CONTENT
S605

FIG. 7

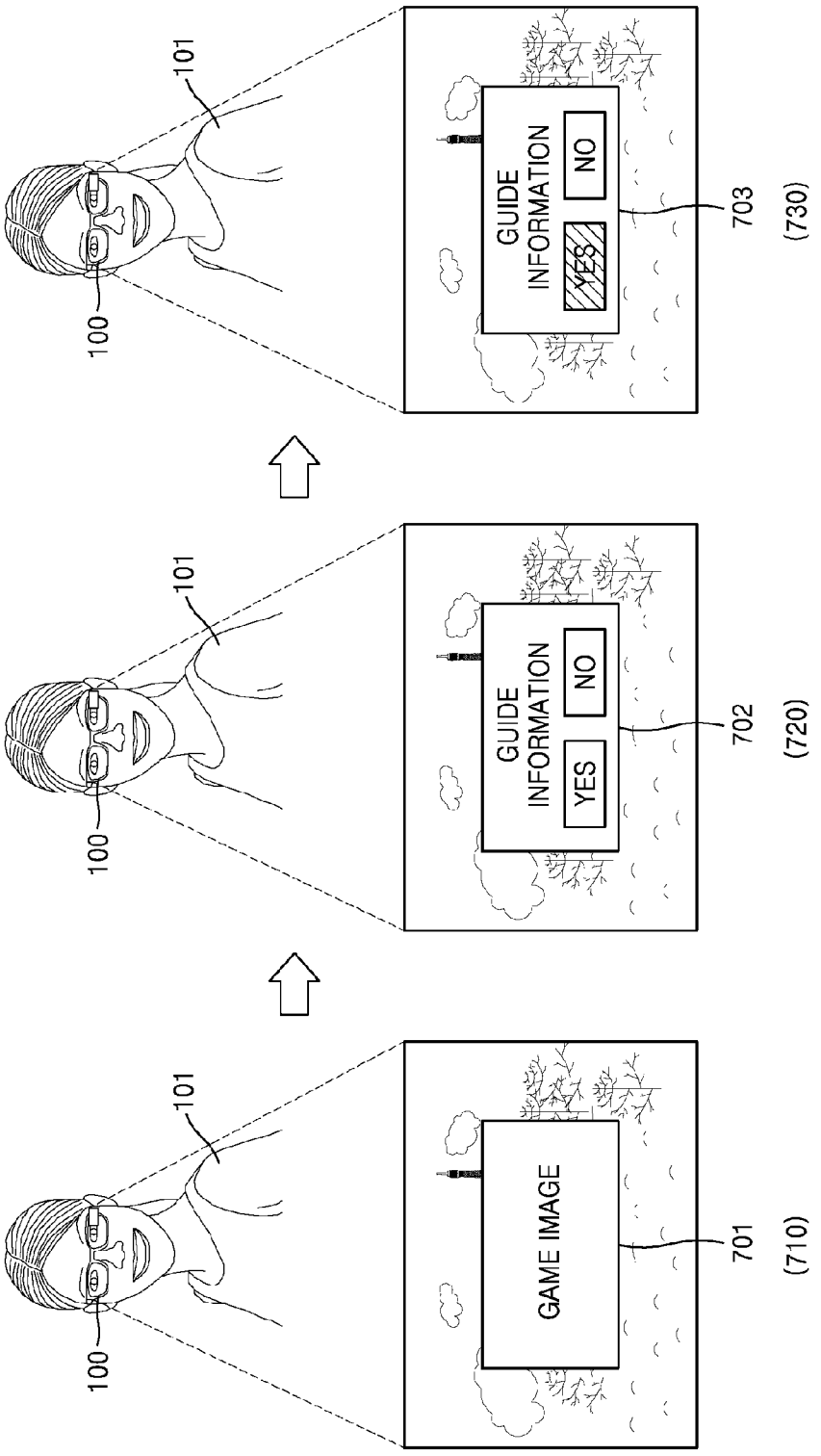

100
101
GAME IMAGE
701
(710)
100
101
GUIDE INFORMATION
YES
NO
702
(720)
100
101
GUIDE INFORMATION
YES
NO
703
(730)

FIG. 8A

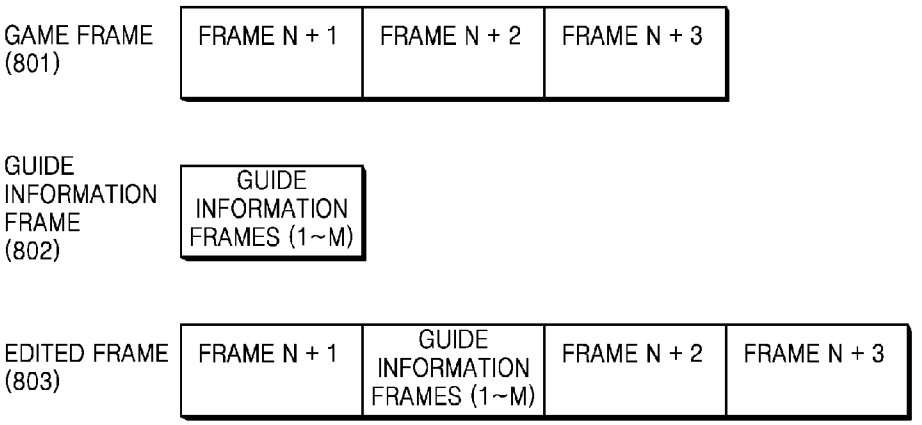

GAME FRAME (801)
FRAME N + 1
FRAME N + 2
FRAME N + 3
GUIDE INFORMATION FRAME (802)
GUIDE INFORMATION FRAMES (1~M)
EDITED FRAME (803)
FRAME N + 1
GUIDE INFORMATION FRAMES (1~M)
FRAME N + 2
FRAME N + 3

FIG. 8B

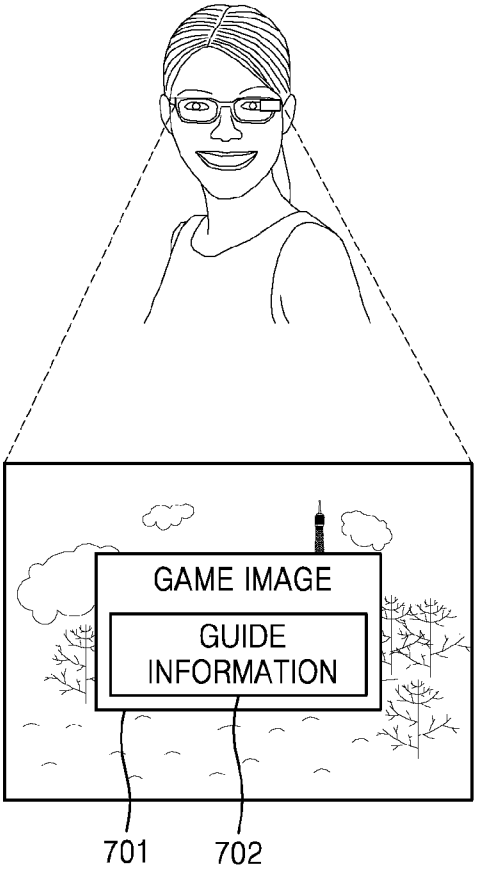


FIG. 8C

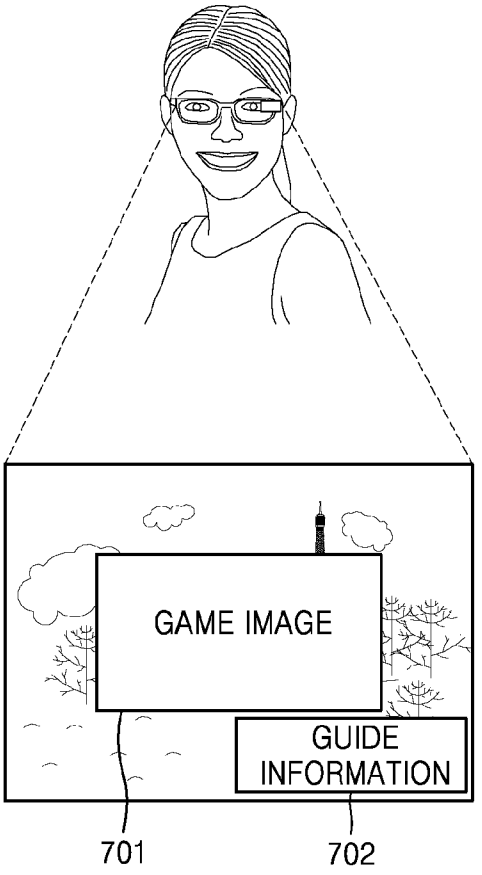


FIG. 9

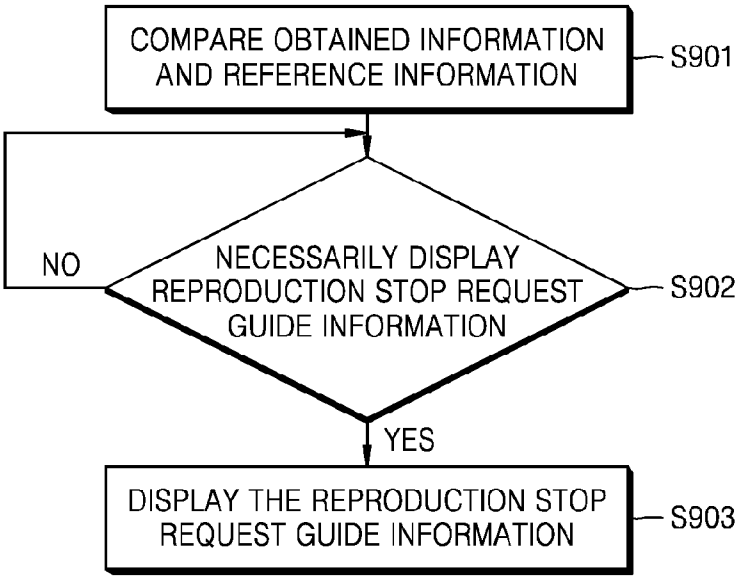

COMPARE OBTAINED INFORMATION AND REFERENCE INFORMATION
S901
NECESSARILY DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION
S902
NO
YES
DISPLAY THE REPRODUCTION STOP REQUEST GUIDE INFORMATION
S903

FIG. 10

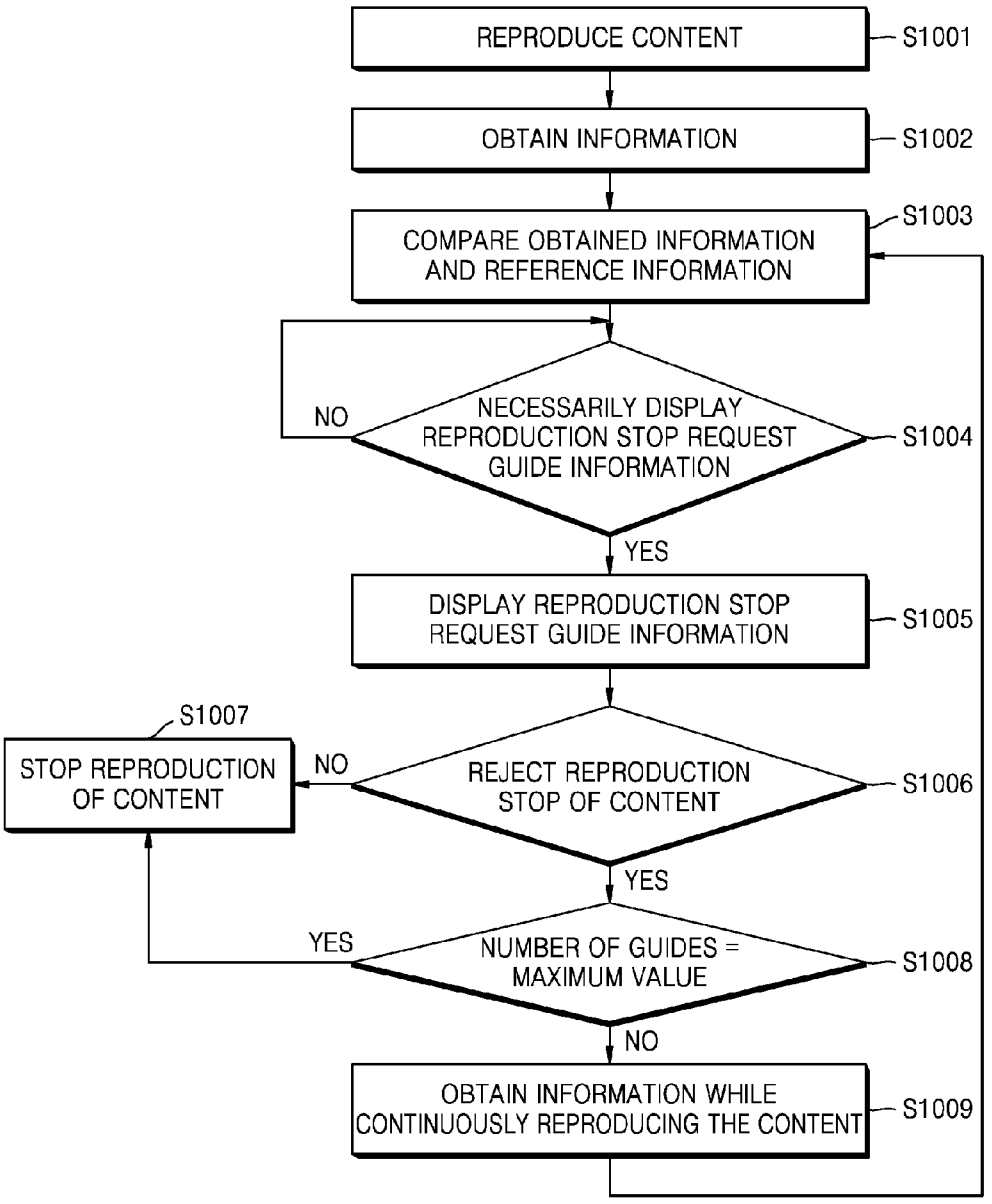

REPRODUCE CONTENT
S1001
OBTAIN INFORMATION
S1002
COMPARE OBTAINED INFORMATION AND REFERENCE INFORMATION
S1003
NECESSARILY DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION
S1004
NO
YES
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION
S1005
REJECT REPRODUCTION STOP OF CONTENT
S1006
NO
YES
STOP REPRODUCTION OF CONTENT
S1007
NUMBER OF GUIDES = MAXIMUM VALUE
S1008
YES
NO
OBTAIN INFORMATION WHILE CONTINUOUSLY REPRODUCING THE CONTENT
S1009

FIG. 11

REFERENCE INFORMATION	NUMBER OF GUIDES
1 HOUR	1
2 HOURS	2
3 HOURS	3
4 HOURS	4
MORE THAN 5 HOURS	5

FIG. 12

REFERENCE INFORMATION	NUMBER OF GUIDES
50%	1
60%	2
MORE THAN 70%	3

FIG. 13A

REFERENCE INFORMATION	NUMBER OF GUIDES
MAINTAIN AT 35 FOR 3 HOURS	1
MAINTAIN AT 44 FOR 2 HOURS	2
MAINTAIN AT 49 FOR 1 HOUR	3

FIG. 13B

REFERENCE INFORMATION	NUMBER OF GUIDES
49℃	1
49℃	2
49℃	3

FIG. 14

REFERENCE INFORMATION	NUMBER OF GUIDES
INCREASE RATE OF NUMBER OF PIXELS HAVING R VALUE APPROXIMATE 255 ≥ 20%	1
INCREASE RATE OF NUMBER OF PIXELS HAVING R VALUE APPROXIMATE 255 ≥ 30%	2
INCREASE RATE OF NUMBER OF PIXELS HAVING R VALUE APPROXIMATE 255 ≥ 40%	3

FIG. 15

REFERENCE INFORMATION	NUMBER OF GUIDES
HUMIDITY ≤ 30% MAINTAIN & 1 HOUR	1
HUMIDITY ≤ 30% MAINTAIN & 1 HOUR 30 MINUTES	2
HUMIDITY ≤ 30% MAINTAIN & 2 HOURS	3

FIG. 16

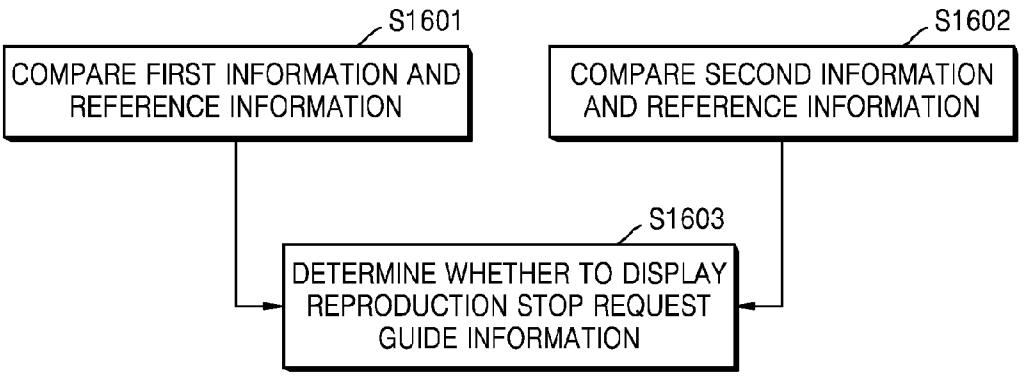

S1601
COMPARE FIRST INFORMATION AND REFERENCE INFORMATION
S1602
COMPARE SECOND INFORMATION AND REFERENCE INFORMATION
S1603
DETERMINE WHETHER TO DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION

FIG. 17

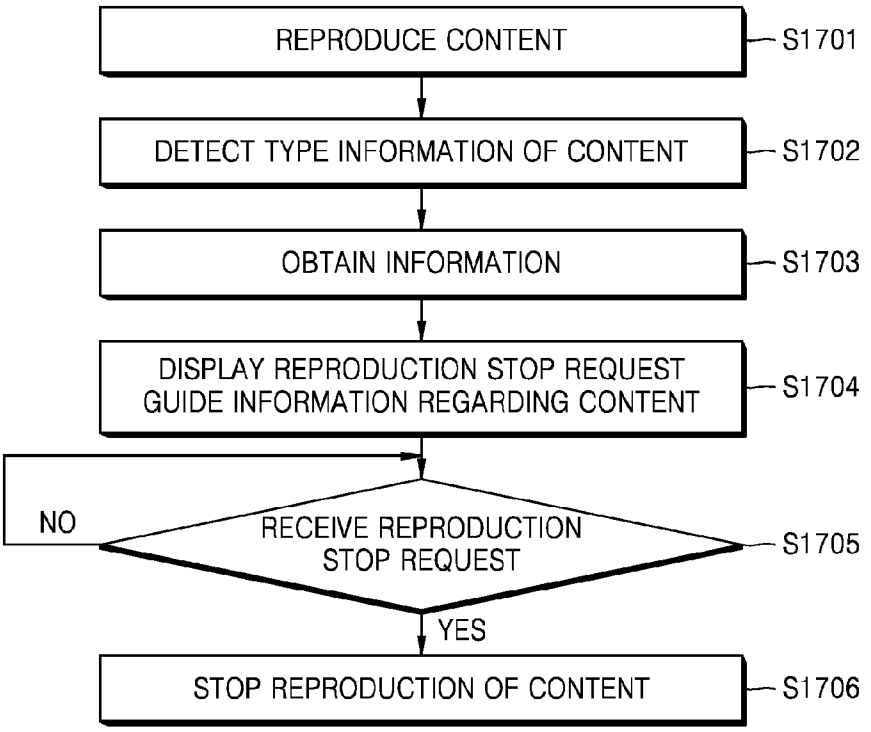

REPRODUCE CONTENT
S1701
DETECT TYPE INFORMATION OF CONTENT
S1702
OBTAIN INFORMATION
S1703
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S1704
NO
RECEIVE REPRODUCTION STOP REQUEST
S1705
YES
STOP REPRODUCTION OF CONTENT
S1706

FIG. 18

TYPE OF CONTENT	REFERENCE INFORMATION
GAME	1 HOUR
MOVIE	2 HOURS
E-BOOK	3 HOURS
MUSIC	4 HOURS

FIG. 19

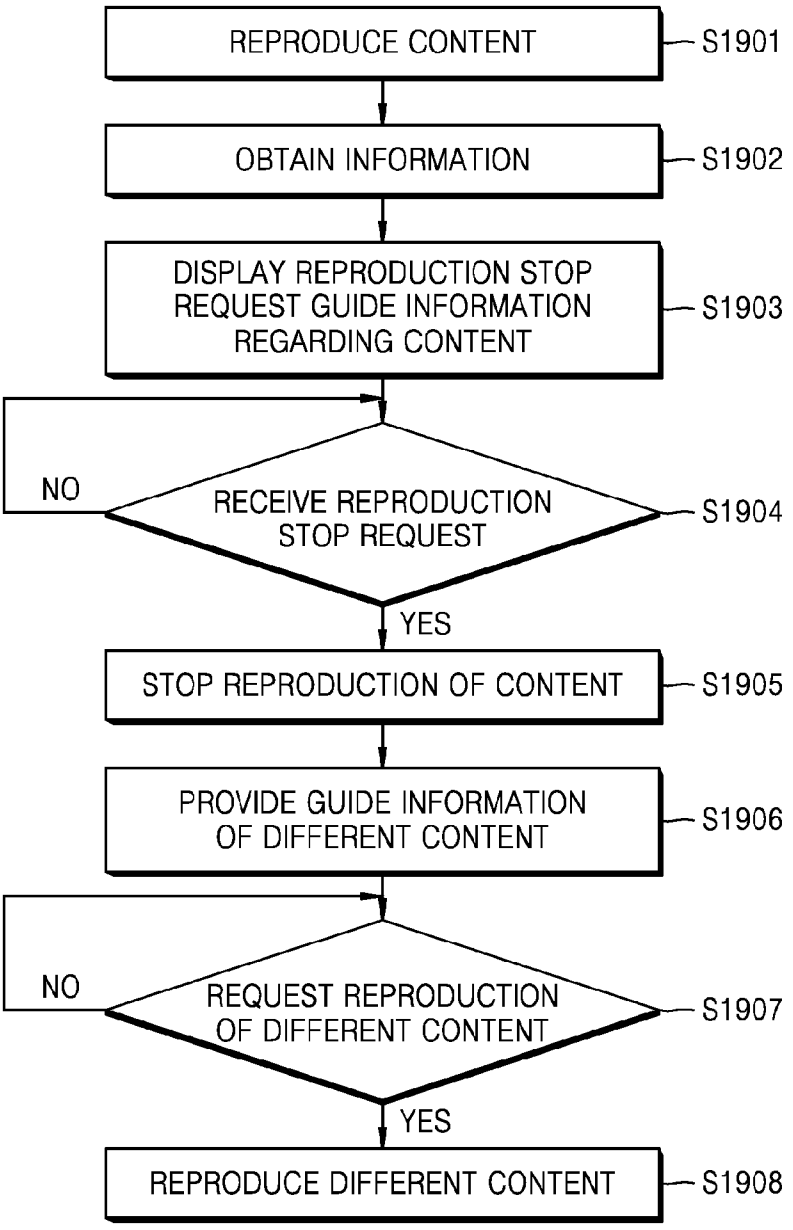

REPRODUCE CONTENT
S1901
OBTAIN INFORMATION
S1902
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S1903
NO
RECEIVE REPRODUCTION STOP REQUEST
S1904
YES
STOP REPRODUCTION OF CONTENT
S1905
PROVIDE GUIDE INFORMATION OF DIFFERENT CONTENT
S1906
NO
REQUEST REPRODUCTION OF DIFFERENT CONTENT
S1907
YES
REPRODUCE DIFFERENT CONTENT
S1908

FIG. 20

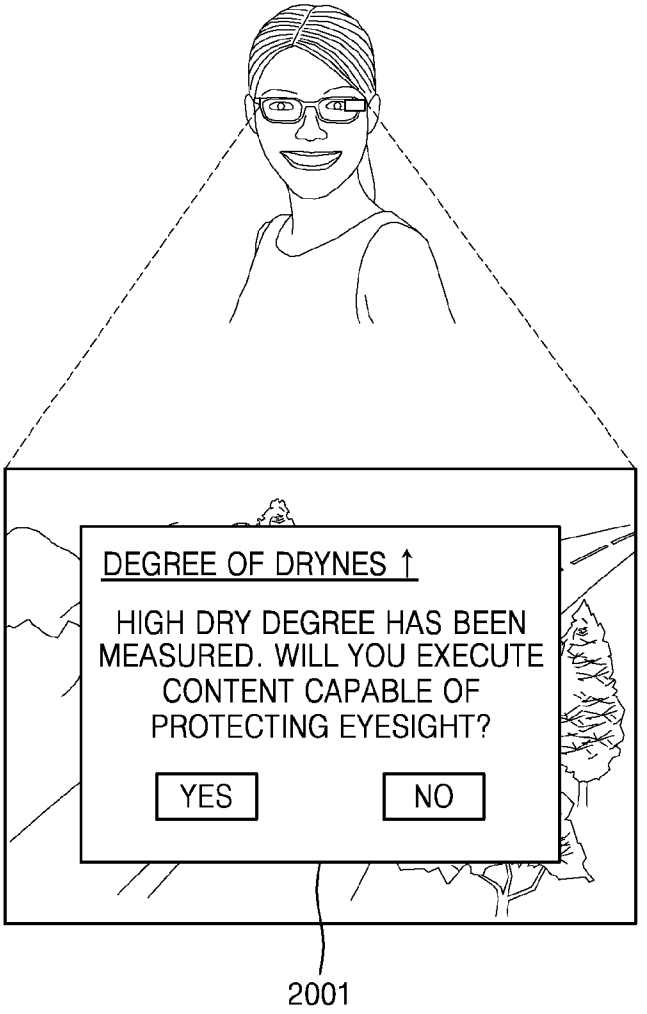

DEGREE OF DRYNES ↑
HIGH DRY DEGREE HAS BEEN MEASURED. WILL YOU EXECUTE CONTENT CAPABLE OF PROTECTING EYESIGHT?
YES
NO
2001

FIG. 21

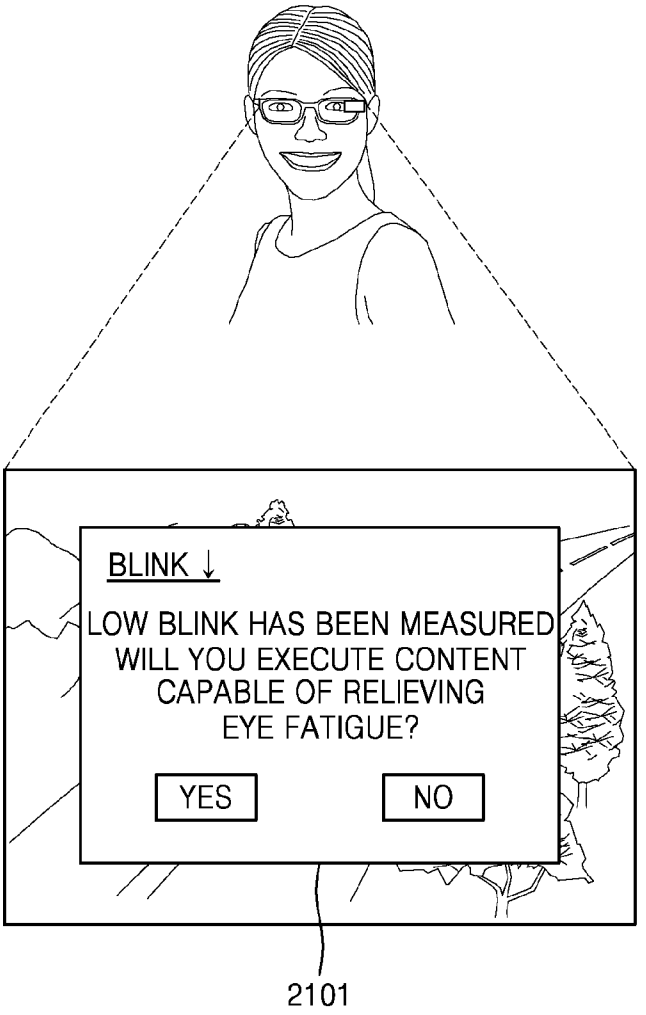

BLINK ↓
LOW BLINK HAS BEEN MEASURED
WILL YOU EXECUTE CONTENT
CAPABLE OF RELIEVING
EYE FATIGUE?
YES
NO
2101

FIG. 22

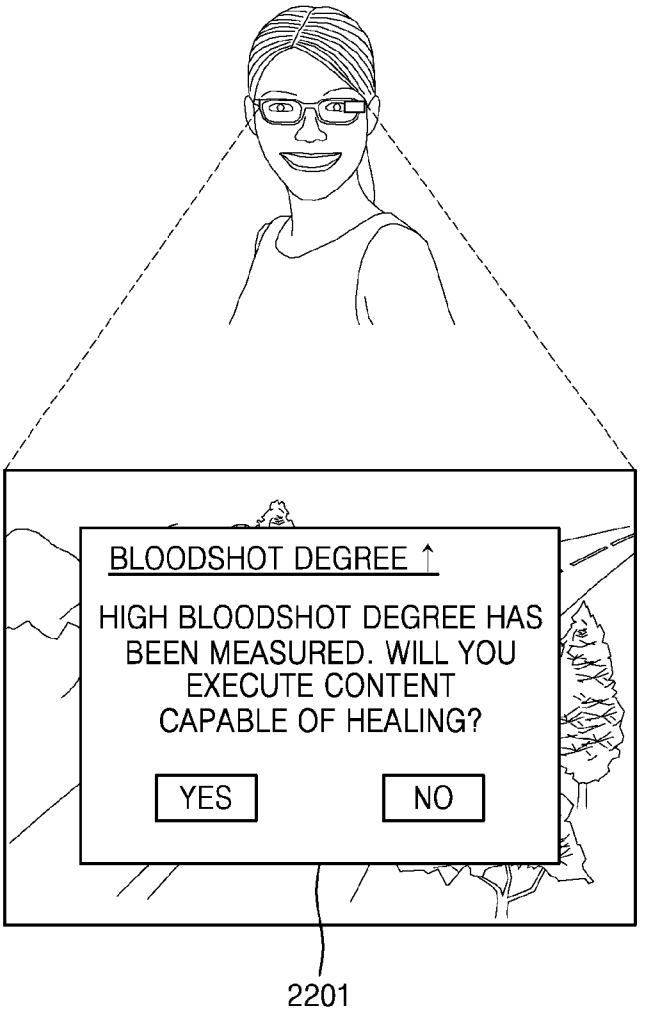

BLOODSHOT DEGREE ↑
HIGH BLOODSHOT DEGREE HAS BEEN MEASURED. WILL YOU EXECUTE CONTENT CAPABLE OF HEALING?
YES
NO
2201

FIG. 23

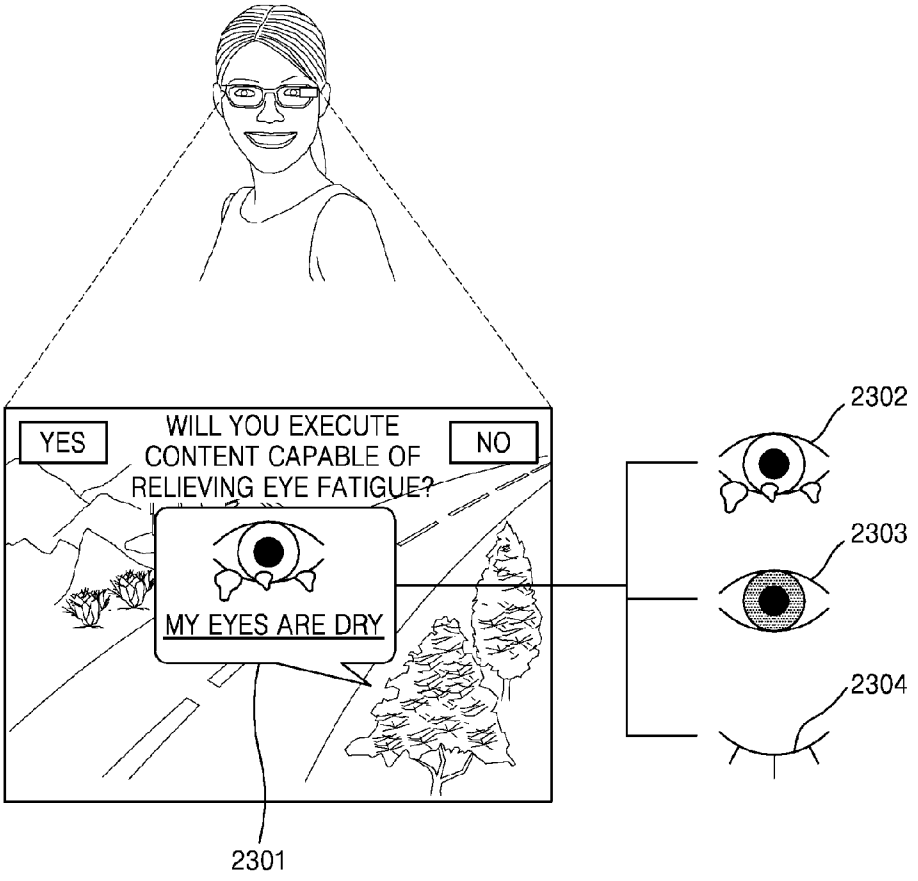

YES
WILL YOU EXECUTE CONTENT CAPABLE OF RELIEVING EYE FATIGUE?
NO
MY EYES ARE DRY
2301
2302
2303
2304

FIG. 24

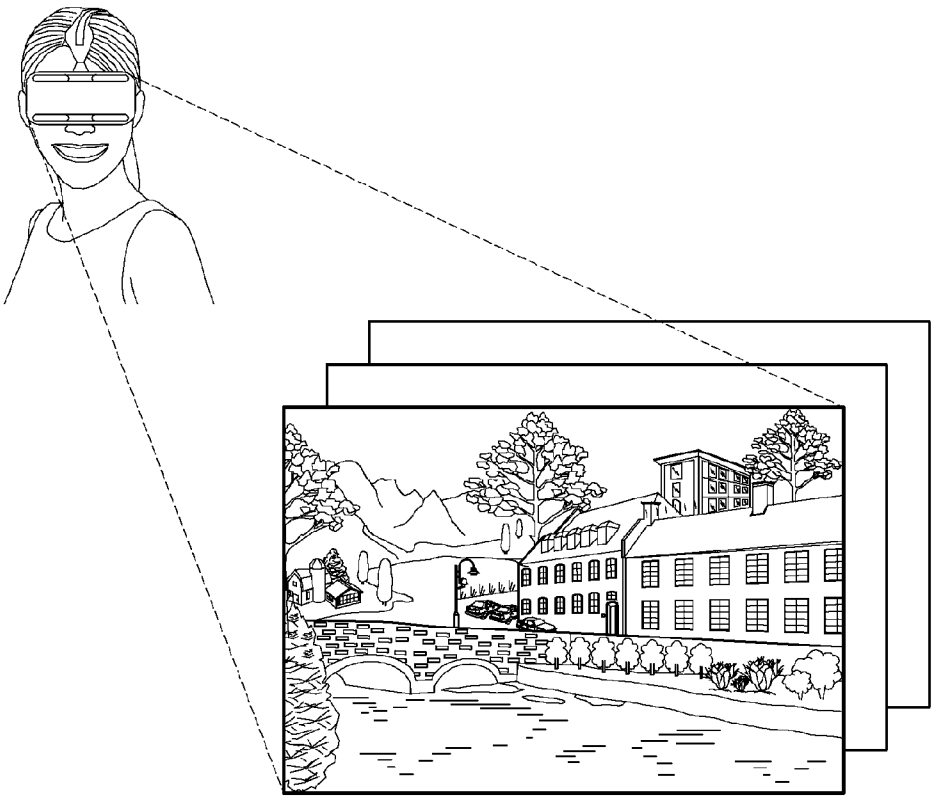


FIG. 25

FIG. 26

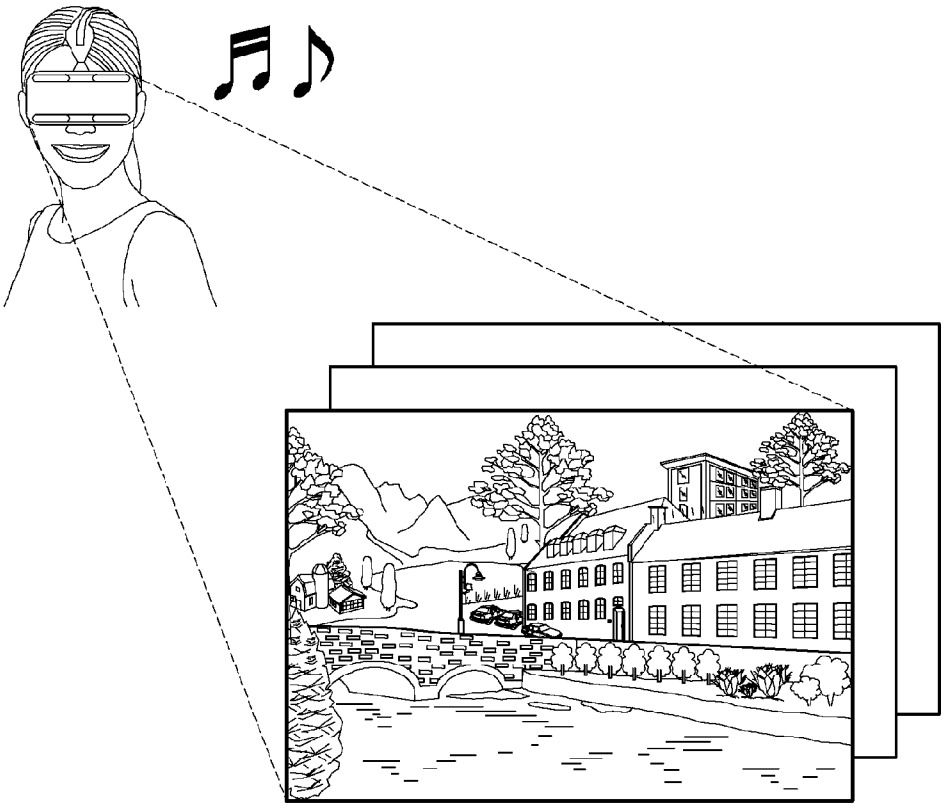


FIG. 27

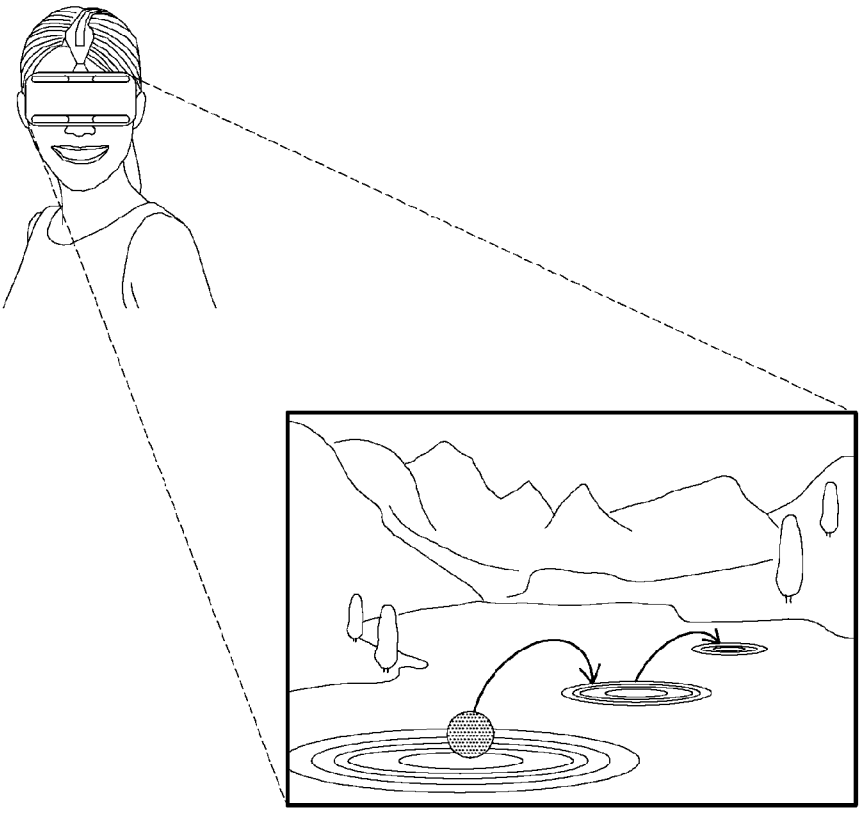


FIG. 28

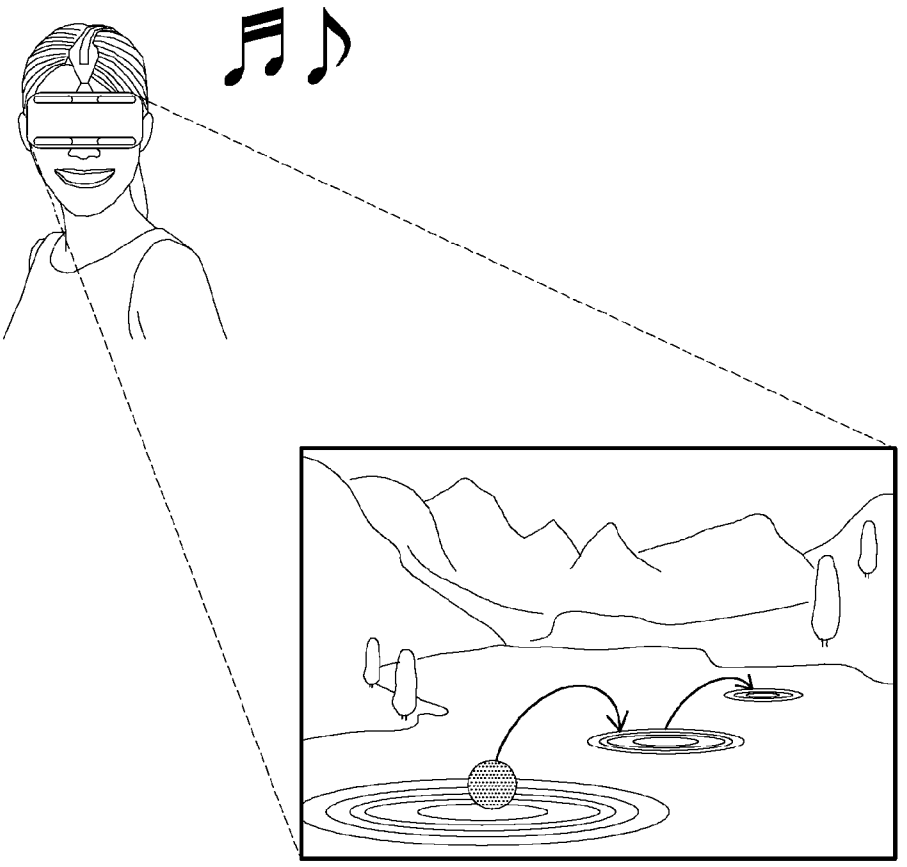


FIG. 29

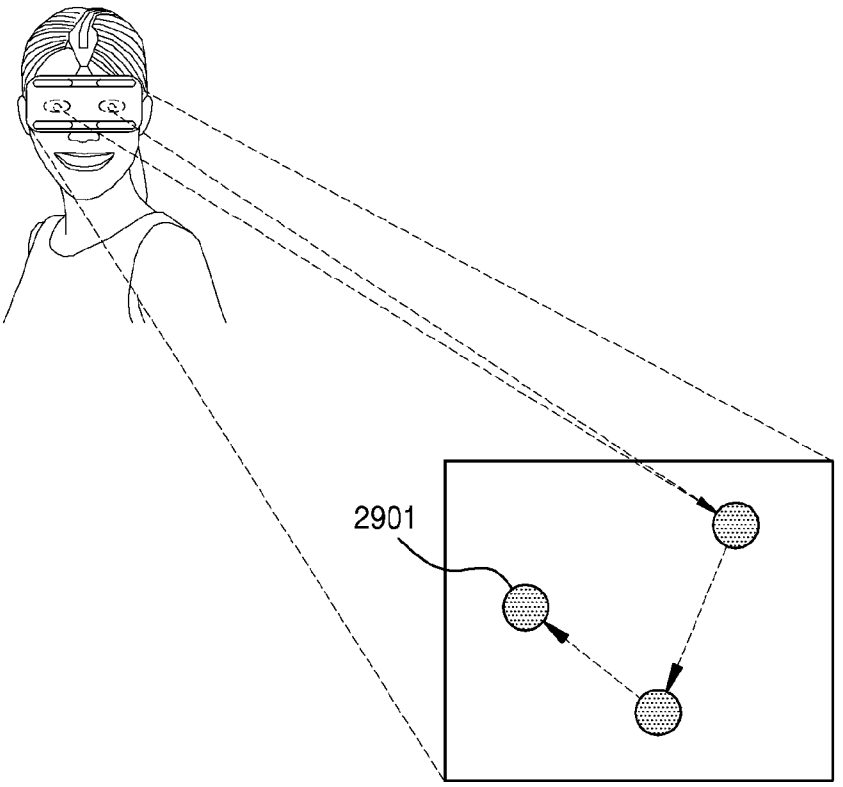


FIG. 30

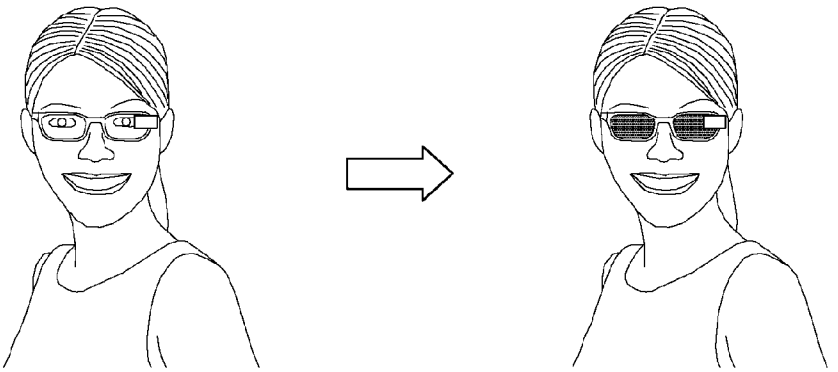


FIG. 31

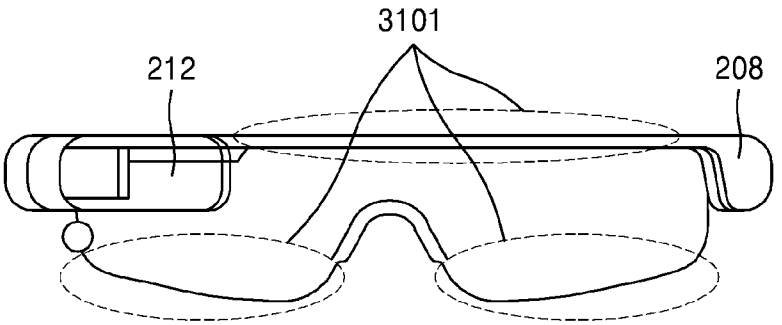


FIG. 32

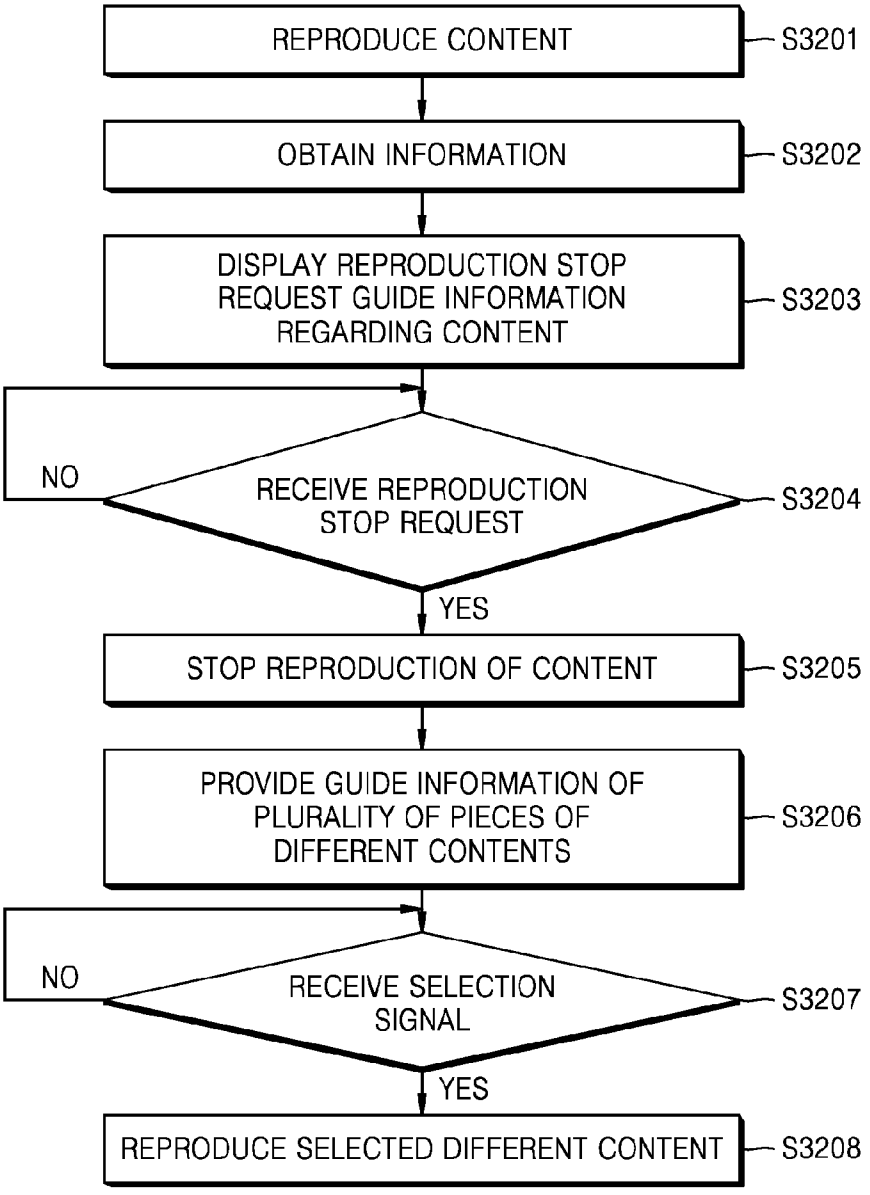
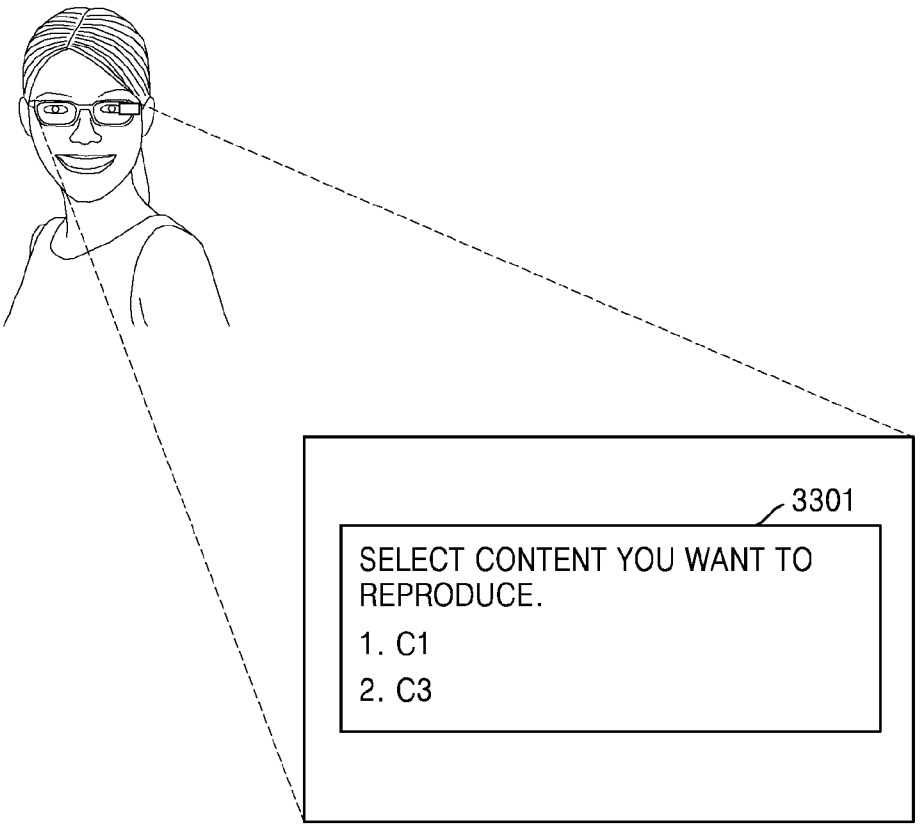

REPRODUCE CONTENT
S3201
OBTAIN INFORMATION
S3202
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S3203
NO
RECEIVE REPRODUCTION STOP REQUEST
S3204
YES
STOP REPRODUCTION OF CONTENT
S3205
PROVIDE GUIDE INFORMATION OF PLURALITY OF PIECES OF DIFFERENT CONTENTS
S3206
NO
RECEIVE SELECTION SIGNAL
S3207
YES
REPRODUCE SELECTED DIFFERENT CONTENT
S3208

FIG. 33



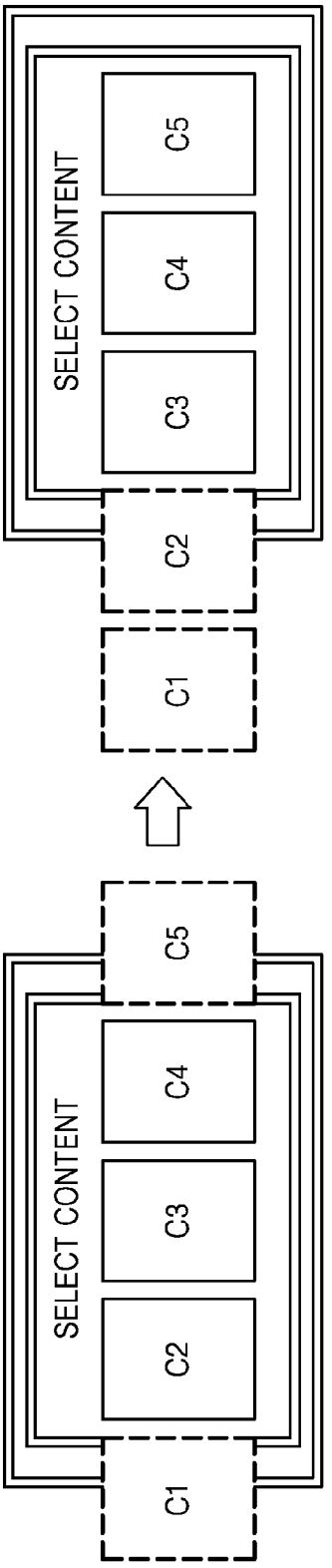


FIG. 34

FIG. 35

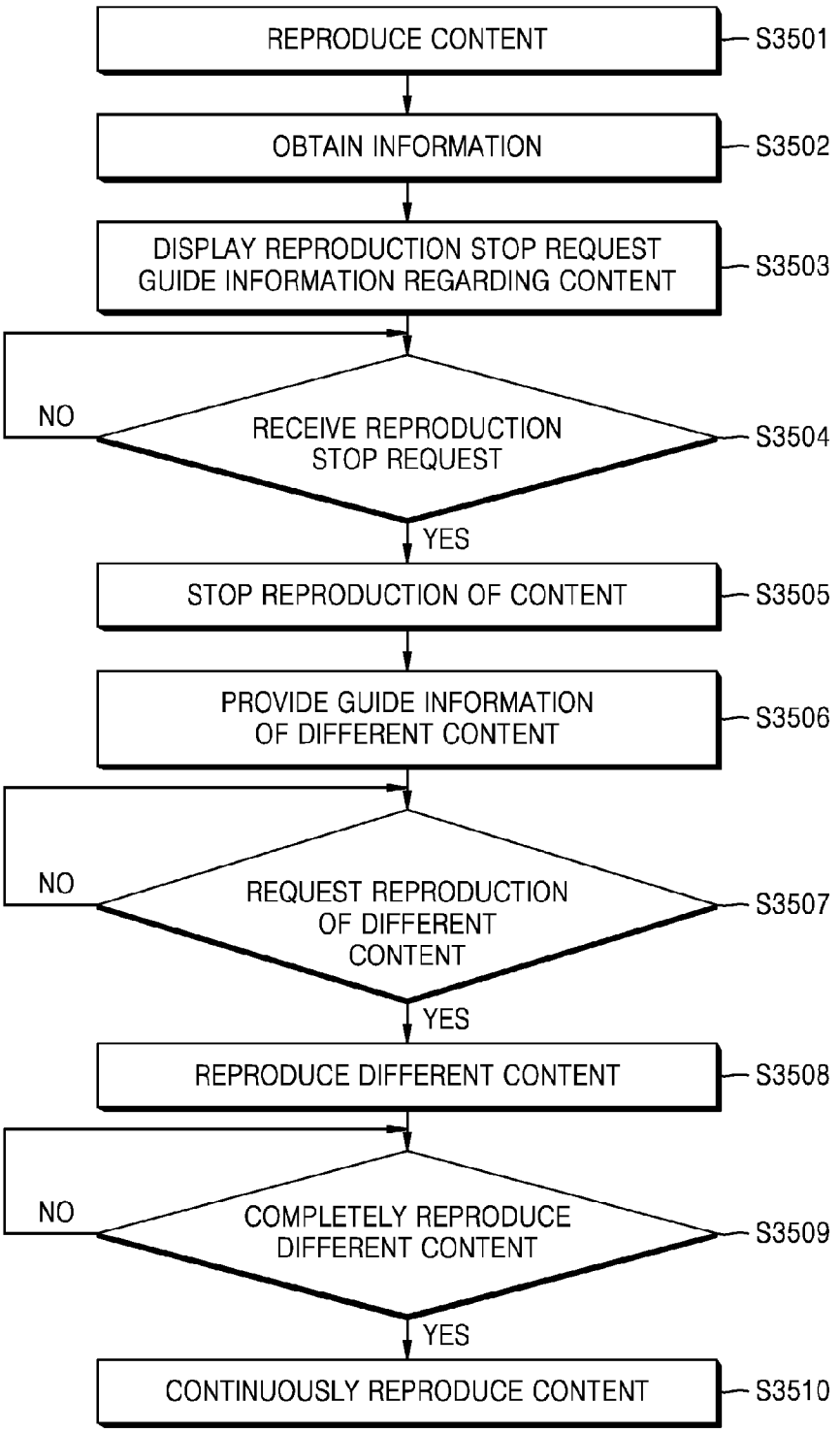

REPRODUCE CONTENT
S3501
OBTAIN INFORMATION
S3502
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S3503
NO
RECEIVE REPRODUCTION STOP REQUEST
S3504
YES
STOP REPRODUCTION OF CONTENT
S3505
PROVIDE GUIDE INFORMATION OF DIFFERENT CONTENT
S3506
NO
REQUEST REPRODUCTION OF DIFFERENT CONTENT
S3507
YES
REPRODUCE DIFFERENT CONTENT
S3508
NO
COMPLETELY REPRODUCE DIFFERENT CONTENT
S3509
YES
CONTINUOUSLY REPRODUCE CONTENT
S3510

FIG. 36

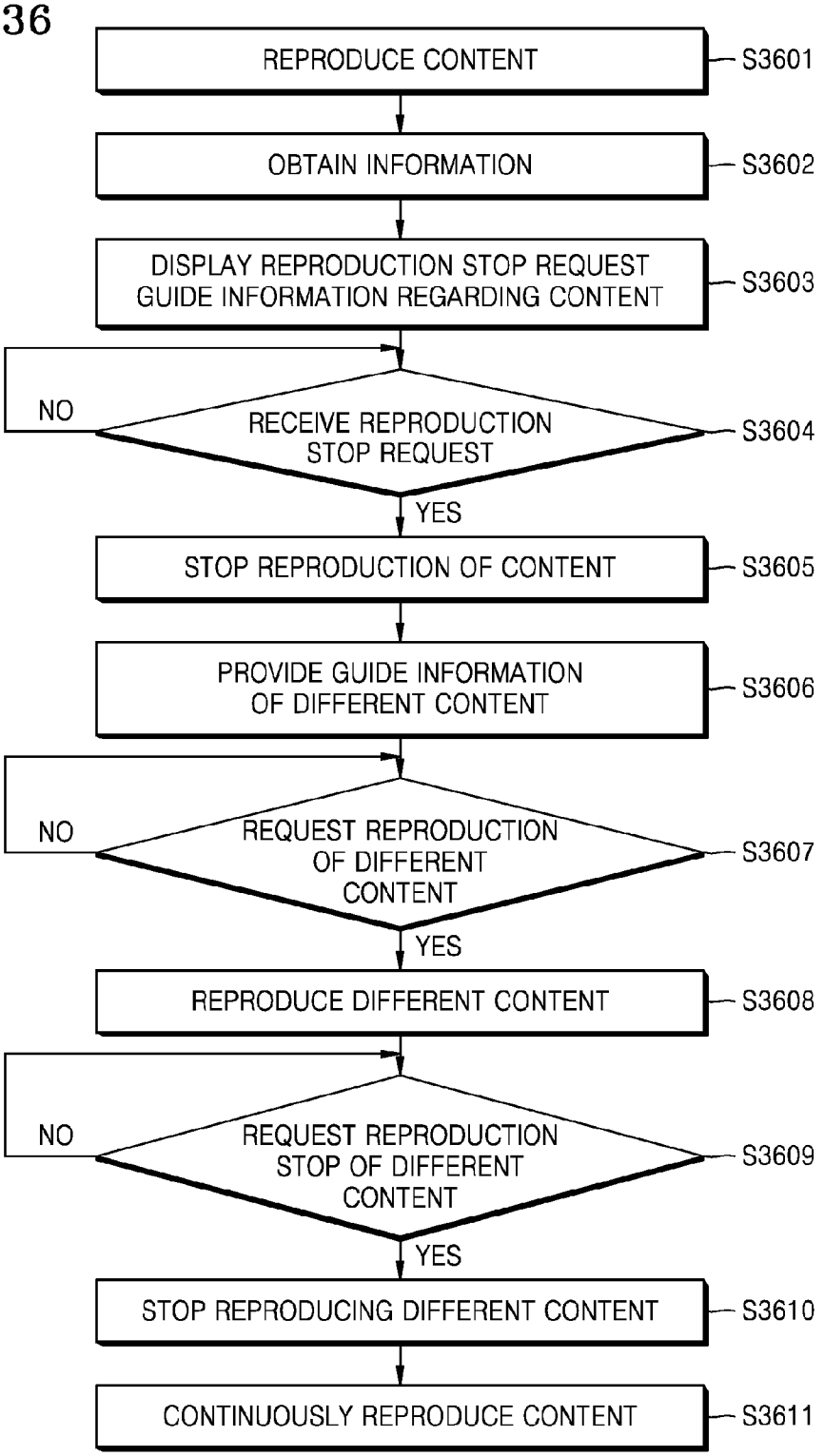

REPRODUCE CONTENT
S3601
OBTAIN INFORMATION
S3602
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S3603
NO
RECEIVE REPRODUCTION STOP REQUEST
S3604
YES
STOP REPRODUCTION OF CONTENT
S3605
PROVIDE GUIDE INFORMATION OF DIFFERENT CONTENT
S3606
NO
REQUEST REPRODUCTION OF DIFFERENT CONTENT
S3607
YES
REPRODUCE DIFFERENT CONTENT
S3608
NO
REQUEST REPRODUCTION STOP OF DIFFERENT CONTENT
S3609
YES
STOP REPRODUCING DIFFERENT CONTENT
S3610
CONTINUOUSLY REPRODUCE CONTENT
S3611

FIG. 37

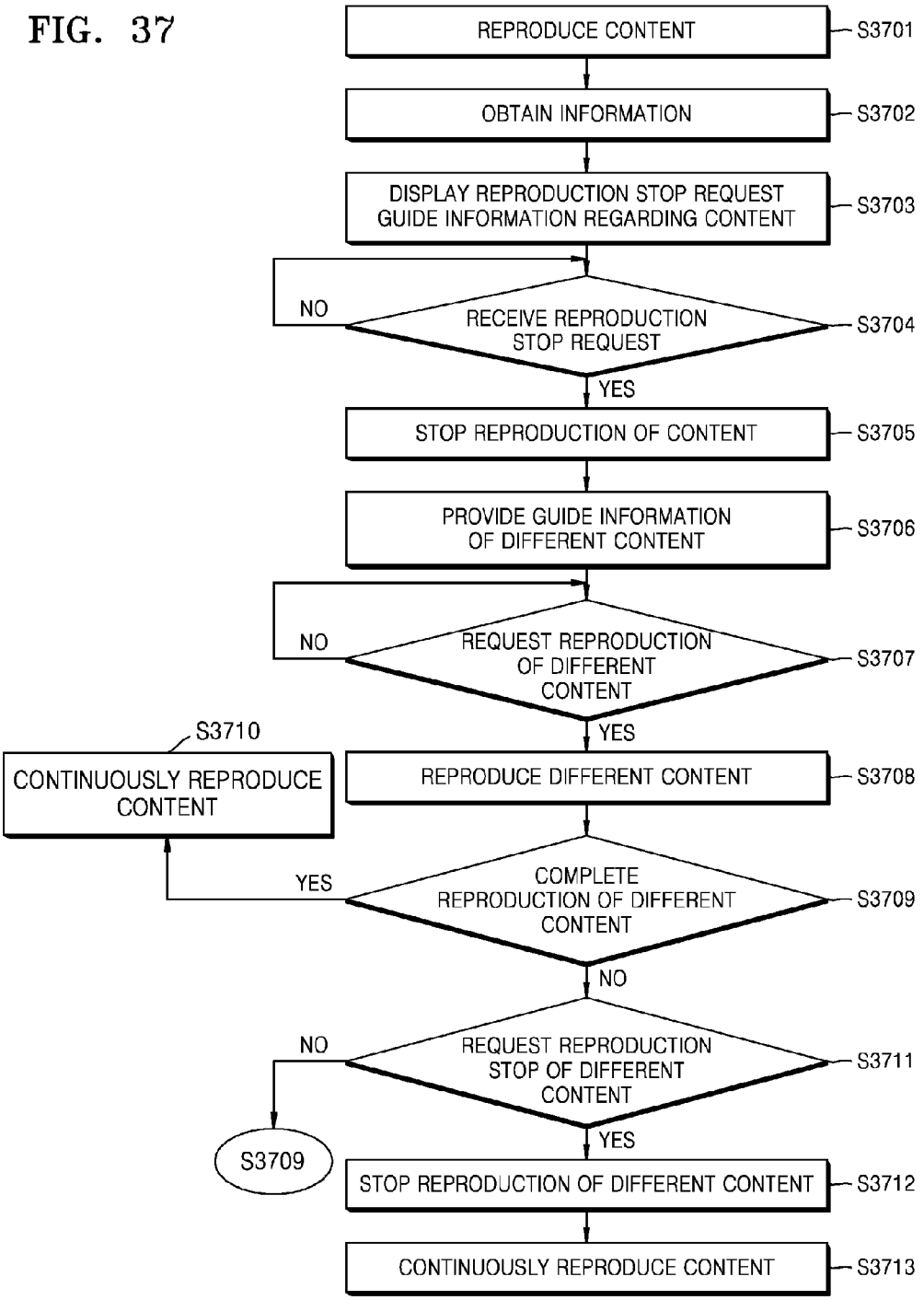

REPRODUCE CONTENT
S3701
OBTAIN INFORMATION
S3702
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S3703
NO
RECEIVE REPRODUCTION STOP REQUEST
S3704
YES
STOP REPRODUCTION OF CONTENT
S3705
PROVIDE GUIDE INFORMATION OF DIFFERENT CONTENT
S3706
NO
REQUEST REPRODUCTION OF DIFFERENT CONTENT
S3707
YES
S3710
CONTINUOUSLY REPRODUCE CONTENT
REPRODUCE DIFFERENT CONTENT
S3708
YES
COMPLETE REPRODUCTION OF DIFFERENT CONTENT
S3709
NO
NO
REQUEST REPRODUCTION STOP OF DIFFERENT CONTENT
S3711
S3709
YES
STOP REPRODUCTION OF DIFFERENT CONTENT
S3712
CONTINUOUSLY REPRODUCE CONTENT
S3713

FIG. 38

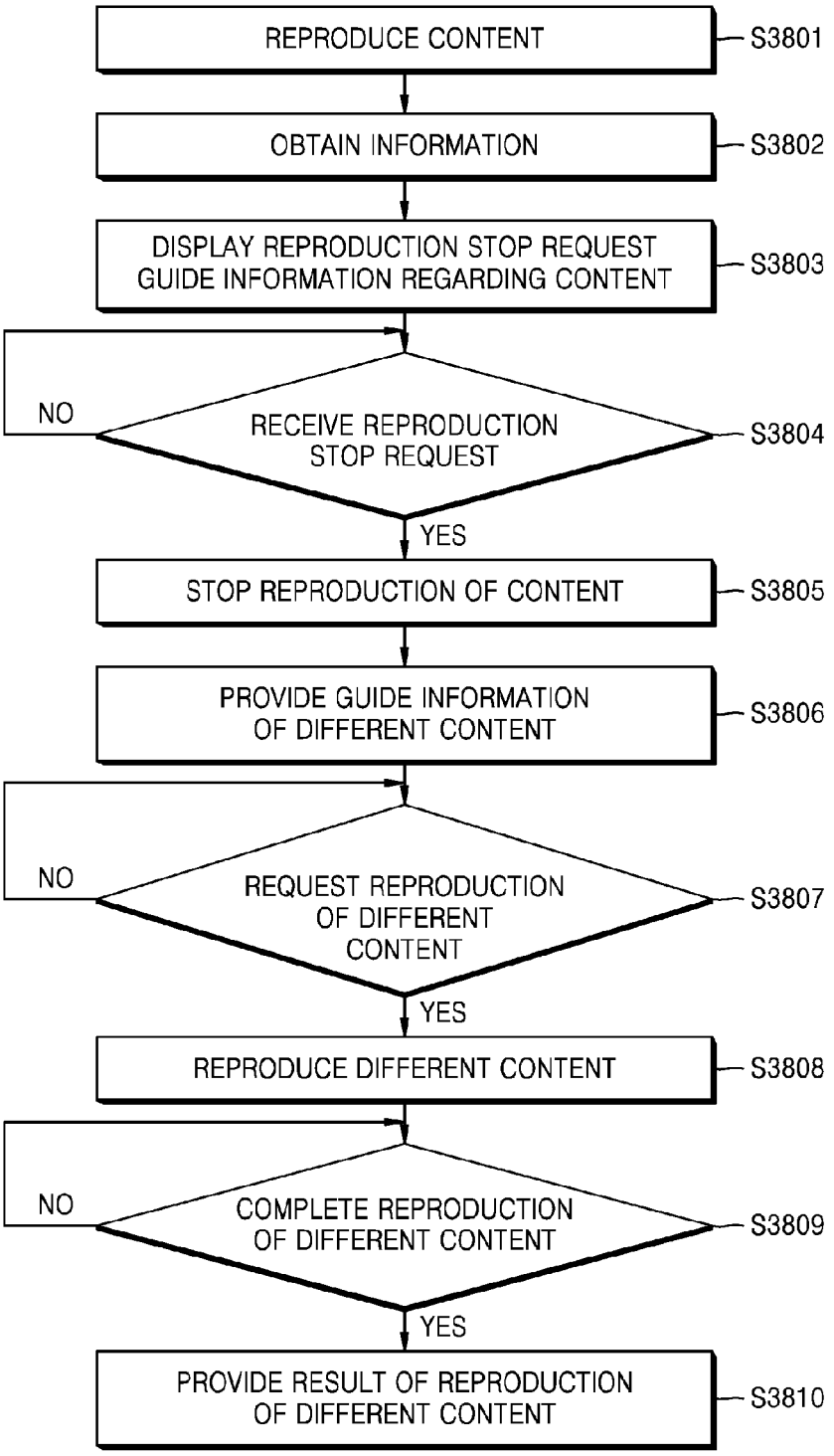

REPRODUCE CONTENT
S3801
OBTAIN INFORMATION
S3802
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
S3803
NO
RECEIVE REPRODUCTION STOP REQUEST
S3804
YES
STOP REPRODUCTION OF CONTENT
S3805
PROVIDE GUIDE INFORMATION OF DIFFERENT CONTENT
S3806
NO
REQUEST REPRODUCTION OF DIFFERENT CONTENT
S3807
YES
REPRODUCE DIFFERENT CONTENT
S3808
NO
COMPLETE REPRODUCTION OF DIFFERENT CONTENT
S3809
YES
PROVIDE RESULT OF REPRODUCTION OF DIFFERENT CONTENT
S3810

FIG. 39

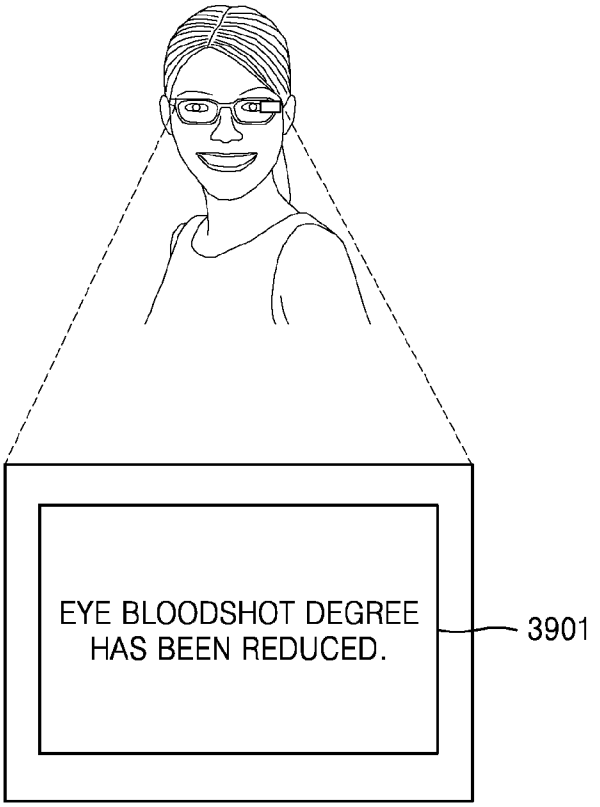


FIG. 40

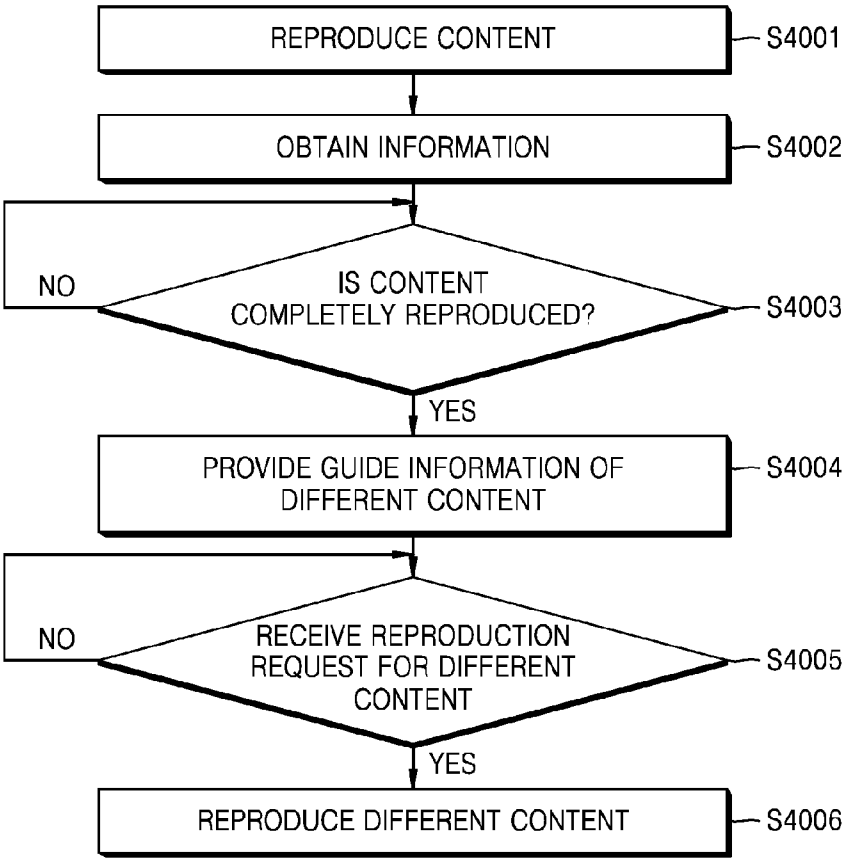

REPRODUCE CONTENT
S4001
OBTAIN INFORMATION
S4002
NO
IS CONTENT COMPLETELY REPRODUCED?
S4003
YES
PROVIDE GUIDE INFORMATION OF DIFFERENT CONTENT
S4004
NO
RECEIVE REPRODUCTION REQUEST FOR DIFFERENT CONTENT
S4005
YES
REPRODUCE DIFFERENT CONTENT
S4006

FIG. 41

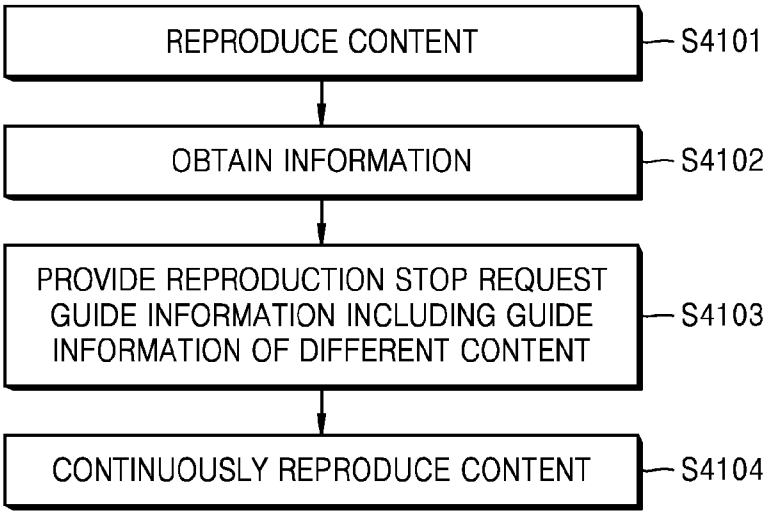

REPRODUCE CONTENT
S4101
OBTAIN INFORMATION
S4102
PROVIDE REPRODUCTION STOP REQUEST GUIDE INFORMATION INCLUDING GUIDE INFORMATION OF DIFFERENT CONTENT
S4103
CONTINUOUSLY REPRODUCE CONTENT
S4104

FIG. 42

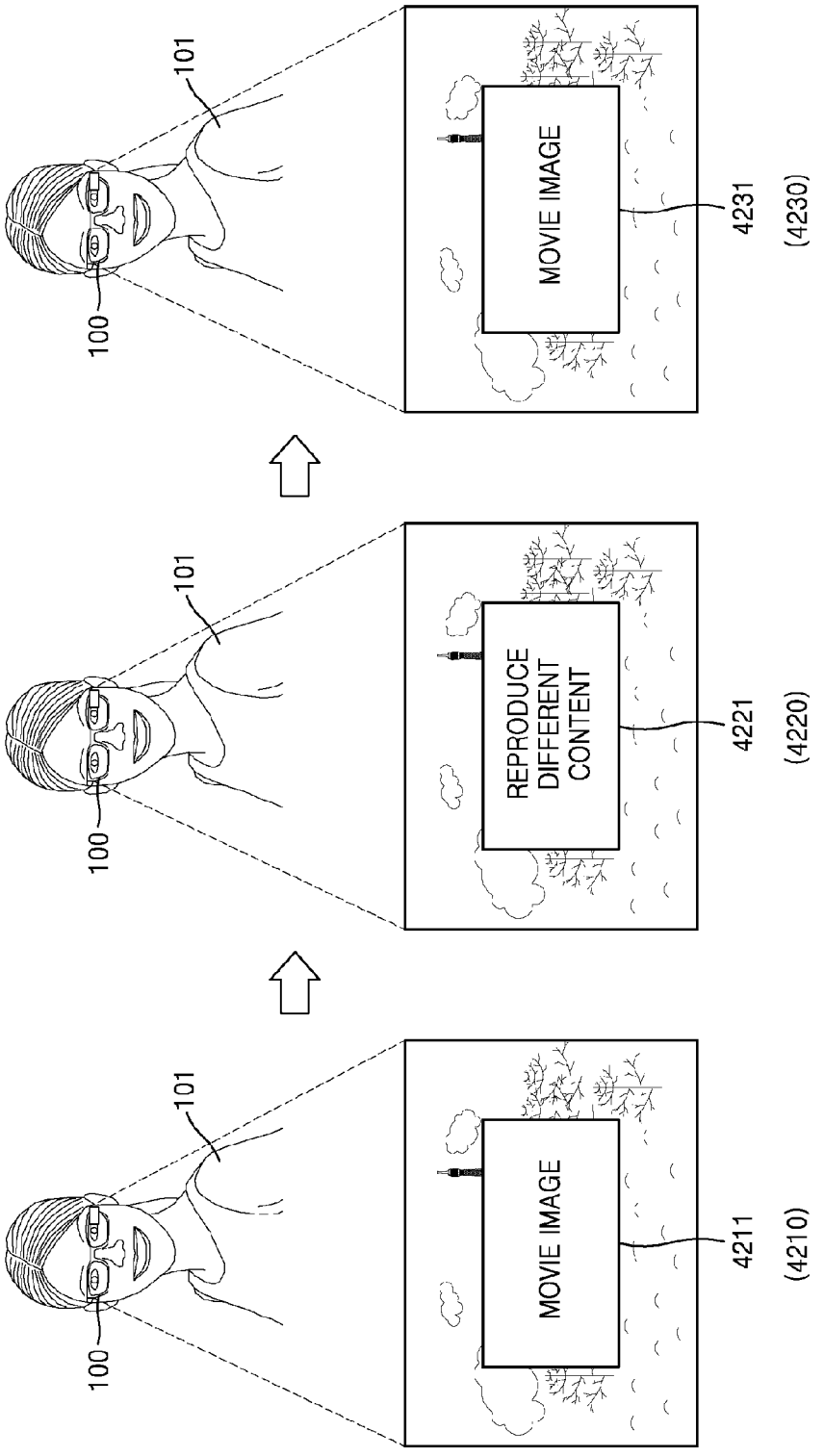

100
101
MOVIE IMAGE
4211
(4210)
100
101
REPRODUCE DIFFERENT CONTENT
4221
(4220)
100
101
MOVIE IMAGE
4231
(4230)

FIG. 43

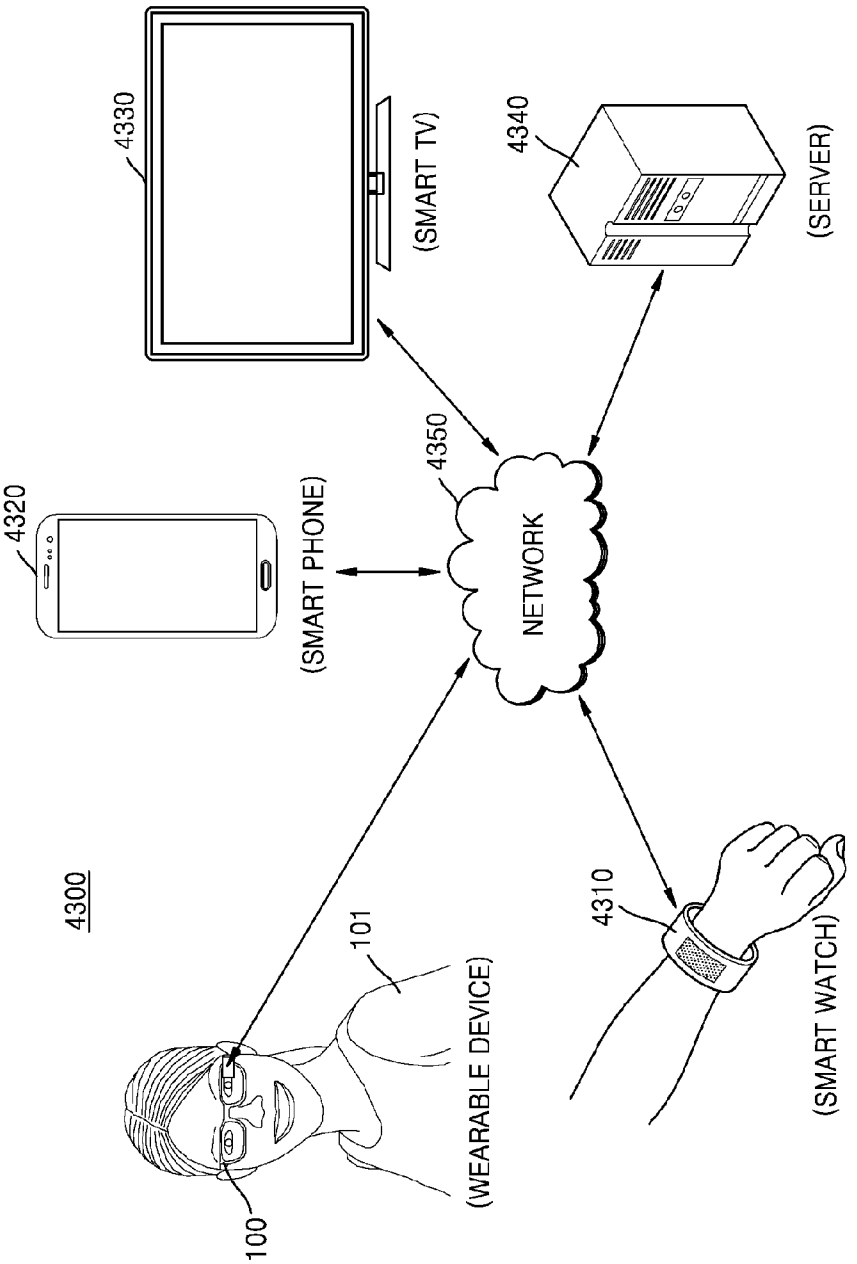

4300
4330
(SMART TV)
4340
(SERVER)
4320
(SMART PHONE)
4350
NETWORK
101
(WEARABLE DEVICE)
4310
(SMART WATCH)
100

FIG. 44

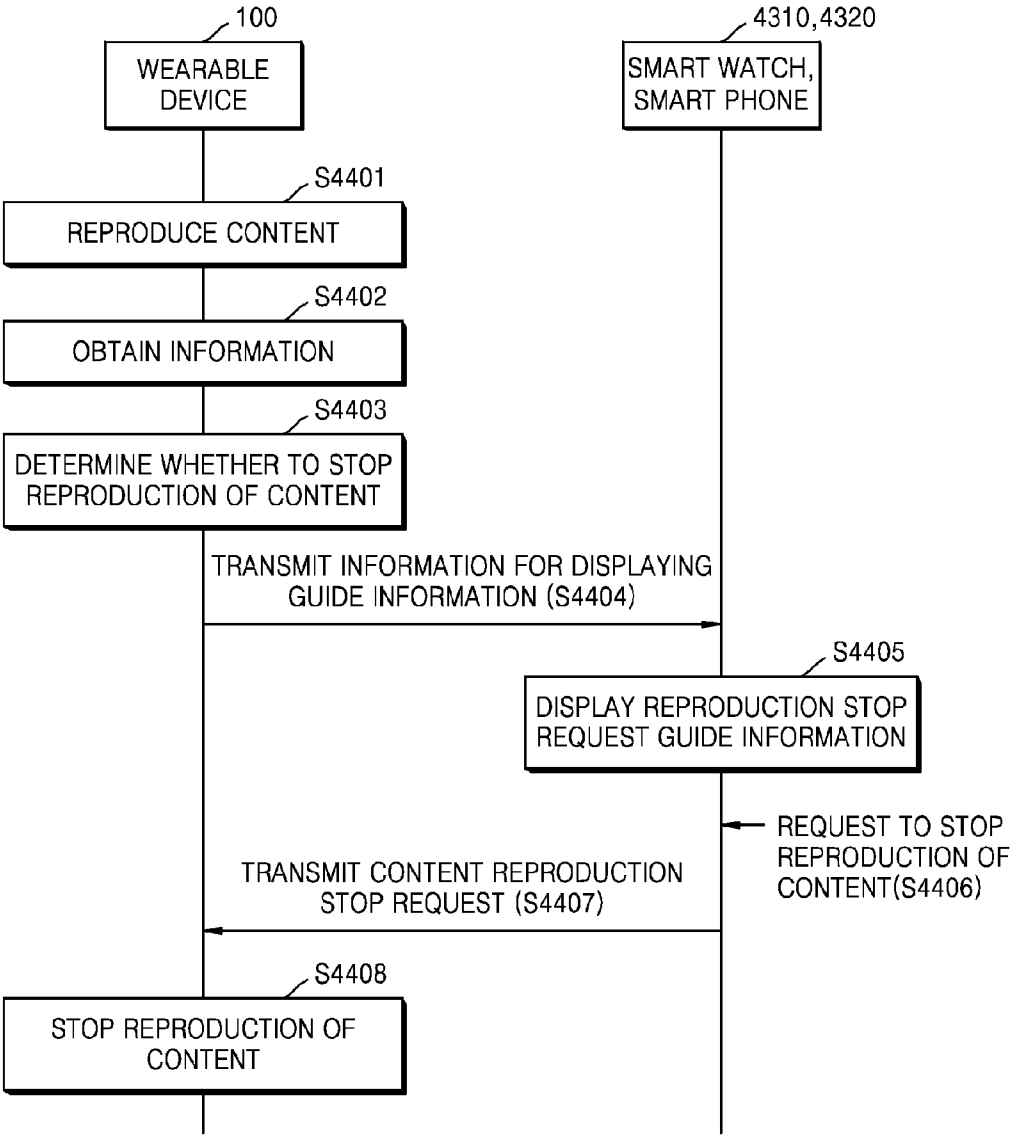

100
WEARABLE DEVICE
4310,4320
SMART WATCH, SMART PHONE
S4401
REPRODUCE CONTENT
S4402
OBTAIN INFORMATION
S4403
DETERMINE WHETHER TO STOP REPRODUCTION OF CONTENT
TRANSMIT INFORMATION FOR DISPLAYING GUIDE INFORMATION (S4404)
S4405
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION
REQUEST TO STOP REPRODUCTION OF CONTENT(S4406)
TRANSMIT CONTENT REPRODUCTION STOP REQUEST (S4407)
S4408
STOP REPRODUCTION OF CONTENT

FIG. 45

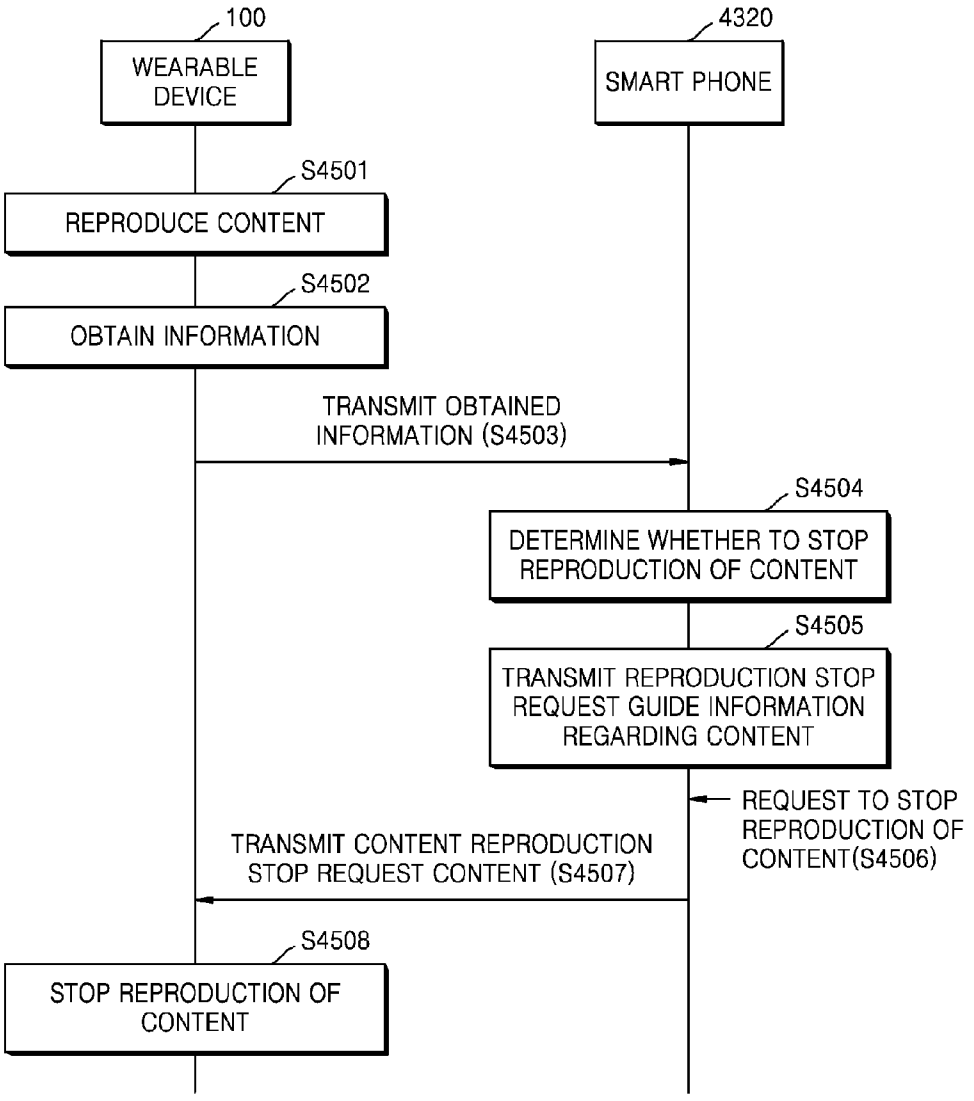

100
WEARABLE DEVICE
4320
SMART PHONE
S4501
REPRODUCE CONTENT
S4502
OBTAIN INFORMATION
TRANSMIT OBTAINED INFORMATION (S4503)
S4504
DETERMINE WHETHER TO STOP REPRODUCTION OF CONTENT
S4505
TRANSMIT REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
REQUEST TO STOP REPRODUCTION OF CONTENT(S4506)
TRANSMIT CONTENT REPRODUCTION STOP REQUEST CONTENT (S4507)
S4508
STOP REPRODUCTION OF CONTENT

FIG. 46

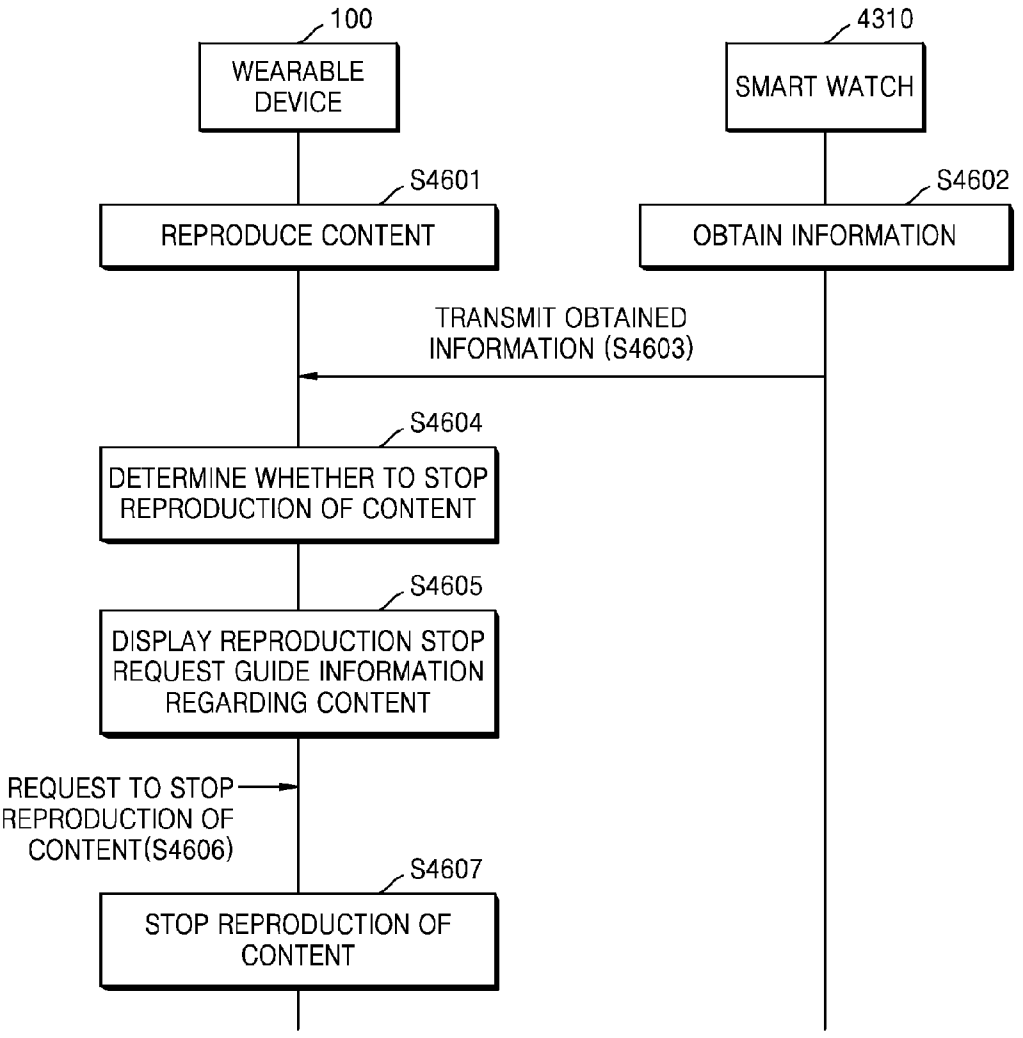

100
WEARABLE DEVICE
4310
SMART WATCH
S4601
REPRODUCE CONTENT
S4602
OBTAIN INFORMATION
TRANSMIT OBTAINED INFORMATION (S4603)
S4604
DETERMINE WHETHER TO STOP REPRODUCTION OF CONTENT
S4605
DISPLAY REPRODUCTION STOP REQUEST GUIDE INFORMATION REGARDING CONTENT
REQUEST TO STOP REPRODUCTION OF CONTENT(S4606)
S4607
STOP REPRODUCTION OF CONTENT

FIG. 47

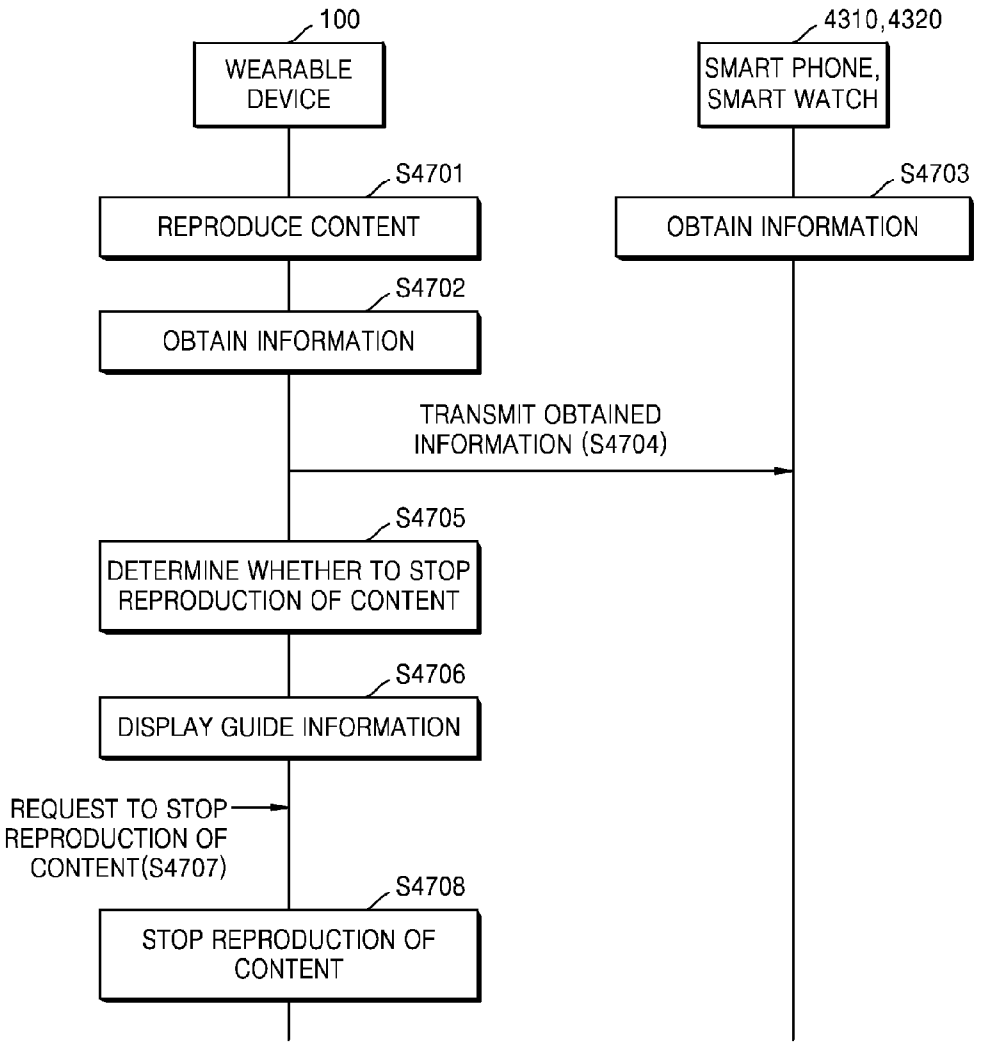

100
WEARABLE DEVICE
4310,4320
SMART PHONE, SMART WATCH
S4701
REPRODUCE CONTENT
S4703
OBTAIN INFORMATION
S4702
OBTAIN INFORMATION
TRANSMIT OBTAINED INFORMATION (S4704)
S4705
DETERMINE WHETHER TO STOP REPRODUCTION OF CONTENT
S4706
DISPLAY GUIDE INFORMATION
REQUEST TO STOP REPRODUCTION OF CONTENT(S4707)
S4708
STOP REPRODUCTION OF CONTENT

FIG. 48

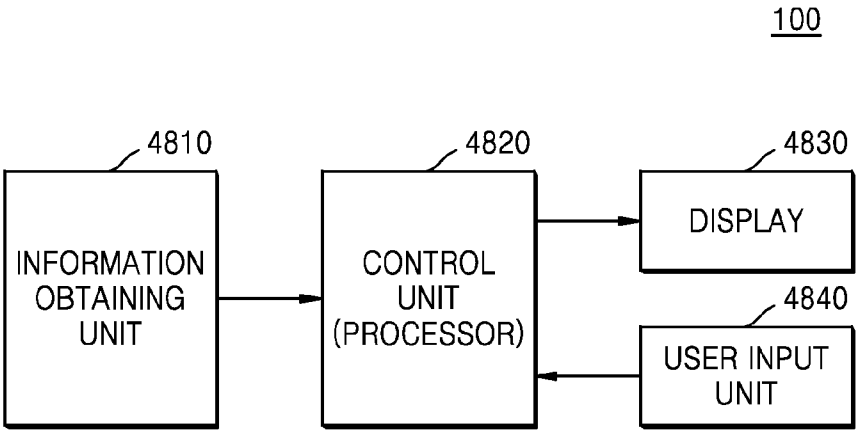

100
4810
INFORMATION OBTAINING UNIT
4820
CONTROL UNIT (PROCESSOR)
4830
DISPLAY
4840
USER INPUT UNIT

FIG. 49

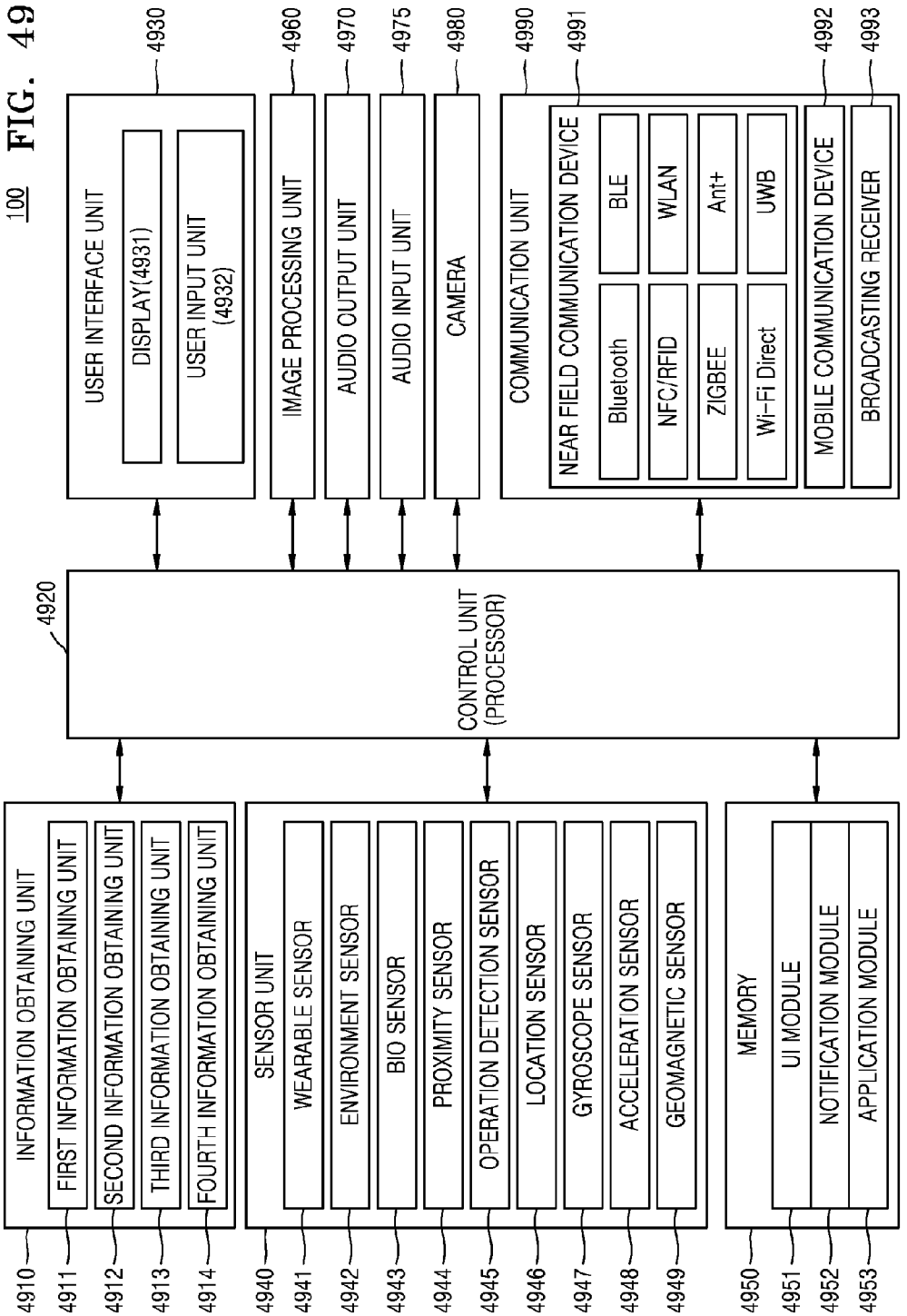
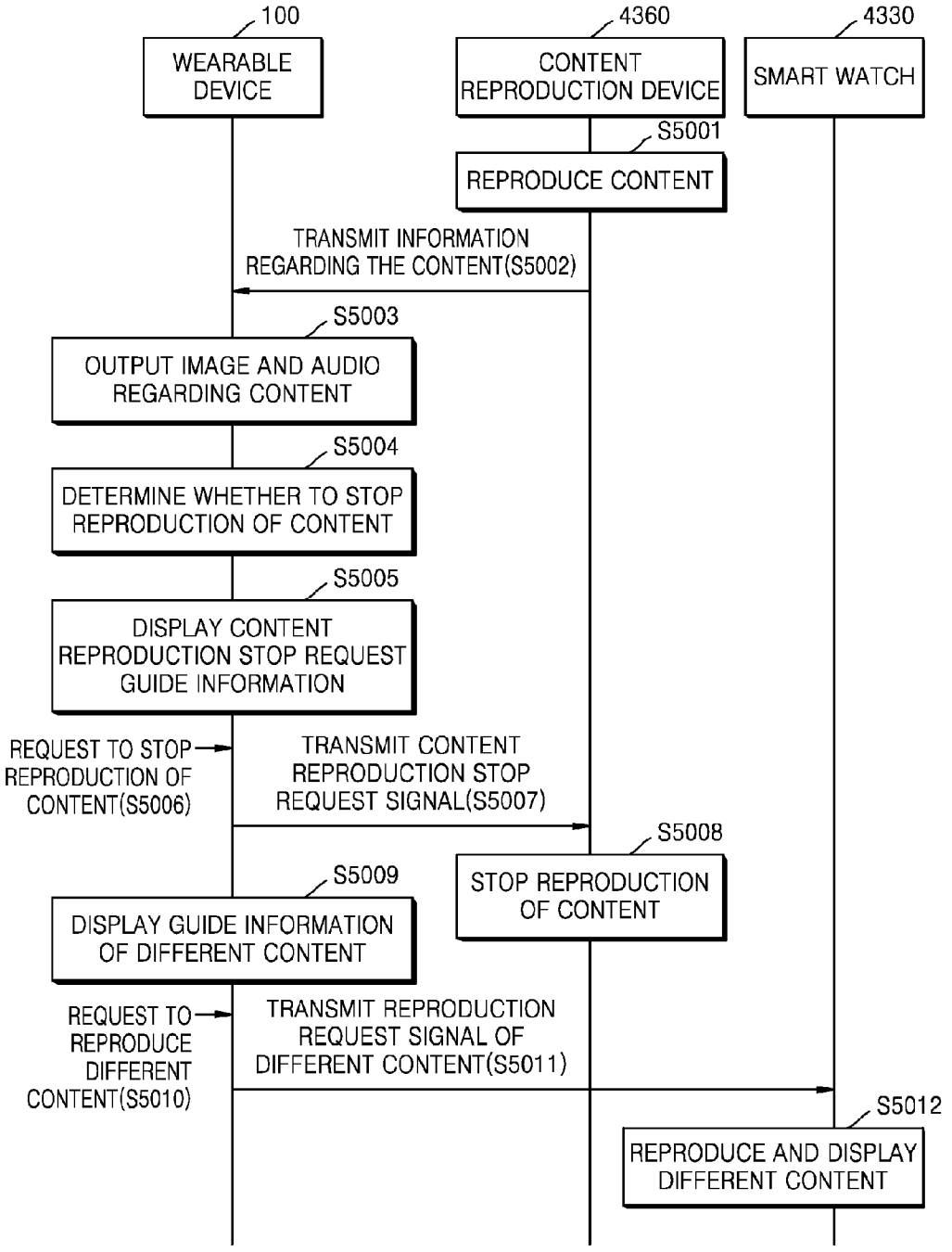

100
CONTROL UNIT (PROCESSOR)
4920
INFORMATION OBTAINING UNIT
4910
FIRST INFORMATION OBTAINING UNIT
4911
SECOND INFORMATION OBTAINING UNIT
4912
THIRD INFORMATION OBTAINING UNIT
4913
FOURTH INFORMATION OBTAINING UNIT
4914
SENSOR UNIT
4940
WEARABLE SENSOR
4941
ENVIRONMENT SENSOR
4942
BIO SENSOR
4943
PROXIMITY SENSOR
4944
OPERATION DETECTION SENSOR
4945
LOCATION SENSOR
4946
GYROSCOPE SENSOR
4947
ACCELERATION SENSOR
4948
GEOMAGNETIC SENSOR
4949
MEMORY
4950
UI MODULE
4951
NOTIFICATION MODULE
4952
APPLICATION MODULE
4953
USER INTERFACE UNIT
4930
DISPLAY(4931)
USER INPUT UNIT (4932)
IMAGE PROCESSING UNIT
4960
AUDIO OUTPUT UNIT
4970
AUDIO INPUT UNIT
4975
CAMERA
4980
COMMUNICATION UNIT
4990
NEAR FIELD COMMUNICATION DEVICE
4991
Bluetooth
BLE
NFC/RFID
WLAN
ZIGBEE
Ant+
Wi-Fi Direct
UWB
MOBILE COMMUNICATION DEVICE
4992
BROADCASTING RECEIVER
4993

FIG. 50


100
WEARABLE DEVICE
4360
CONTENT REPRODUCTION DEVICE
4330
SMART WATCH
S5001
REPRODUCE CONTENT
TRANSMIT INFORMATION REGARDING THE CONTENT(S5002)
S5003
OUTPUT IMAGE AND AUDIO REGARDING CONTENT
S5004
DETERMINE WHETHER TO STOP REPRODUCTION OF CONTENT
S5005
DISPLAY CONTENT REPRODUCTION STOP REQUEST GUIDE INFORMATION
REQUEST TO STOP REPRODUCTION OF CONTENT(S5006)
TRANSMIT CONTENT REPRODUCTION STOP REQUEST SIGNAL(S5007)
S5008
STOP REPRODUCTION OF CONTENT
S5009
DISPLAY GUIDE INFORMATION OF DIFFERENT CONTENT
REQUEST TO REPRODUCE DIFFERENT CONTENT(S5010)
TRANSMIT REPRODUCTION REQUEST SIGNAL OF DIFFERENT CONTENT(S5011)
S5012
REPRODUCE AND DISPLAY DIFFERENT CONTENT

WEARABLE DEVICE AND METHOD OF OPERATING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. application Ser. No. 14/665,274 filed Mar. 23, 2015, which claims priority from Korean Patent Application No. 10-2014-0033704, filed on Mar. 21, 2014 in the Korean Intellectual Property Office (KIPO), Korean Patent Application No. 10-2014-0091319, filed on Jul. 18, 2014 in the KIPO, and Korean Patent Application No. 10-2015-0004456, filed on Jan. 12, 2015 in the KIPO, the disclosures of which are incorporated herein in their entireties by reference.

BACKGROUND

[0002] 1. Field

[0003] Apparatuses and methods consistent with exemplary embodiments relate to a wearable device and a method of operating the wearable device, and more particularly, to a wearable device capable of protecting a user's health and a method of operating the wearable device.

[0004] 2. Description of the Related Art

[0005] As research into wearable devices has been actively conducted, various wearable devices have been released or their release is imminent. Examples of wearable devices include smart watches, smart glasses, and smart bands.

[0006] Wearable devices such as smart glasses may be configured to display content or allow a wearer to view content displayed on another device.

[0007] However, when the user putting on the wearable devices such as smart glasses views the content for a long time, the user may suffer from amblyopia, etc.

SUMMARY

[0008] Aspects of one or more exemplary embodiments provide a wearable device capable of protecting a user's health such as by reducing a wearer's fatigue or protecting a wearer's eyesight and a method of operating the wearable device.

[0009] Additional aspects will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of exemplary embodiments.

[0010] According to an aspect of an exemplary embodiment, there is provided a wearable device including: a display configured to display content; a user input unit configured to receive a command of a wearer; and a controller configured to: when the content is reproduced in a state in which the wearable device is worn, output, through the display and based on content reproduction related information of the wearable device, information informing the wearer that stopping reproduction of the content is requestable, and control to stop the reproduction of the content in response to a reproduction stop request for the content, received through the user input unit in response to the output information, wherein the content reproduction related information corresponds to information influential on a health of the wearer when the content is reproduced in the state in which the wearable device is worn.

[0011] The content reproduction related information of the wearable device may include at least one of: a reproduction time of the content in the state in which the wearable device is worn; a battery consumption amount of at least one of the wearable device and a device reproducing the content after starting the reproduction of the content in the state in which the wearable device is worn; and a heating temperature of the wearable device after starting the reproduction of the content in the state in which the wearable device is worn.

[0012] The wearable device may further include: a first information obtainer configured to obtain the content reproduction related information of the wearable device in connection with the reproduction of the content; and a second information obtainer configured to obtain bio information of the wearer in connection with the reproduction of the content, wherein the controller may be configured to output, through the display and based on the obtained content reproduction related information of the wearable device and the obtained bio information of the wearer, the information informing the wearer that stopping reproduction of the content is requestable.

[0013] The wearable device may further include: a third information obtainer configured to obtain peripheral environment information of the wearable device in connection with the reproduction of the content, wherein the controller may be configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained peripheral environment information of the wearable device, the information informing the wearer that stopping reproduction of the content is requestable.

[0014] The wearable device may further include: a fourth information obtainer configured to obtain personal information of the wearer in connection with the reproduction of the content, wherein the controller may be configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained personal information of the wearer, the information informing the wearer that stopping reproduction of the content is requestable.

[0015] The controller may be configured to continuously reproduce the content through the display when a reproduction stop rejection for the content is received through the user input unit in response to the output information informing the wearer that stopping reproduction of the content is requestable.

[0016] The controller may be configured to output, through the display, the information in a display form in which: the information is overlapped with the content; a frame of the information is inserted between frames of the content; or the information is displayed on a display region different from a display region on which the content is reproduced.

[0017] The controller may be configured to control the wearable device such that different content is viewable using the wearable device when the reproduction of the content is stopped in response to the reproduction stop request for the content.

[0018] The controller may be configured to output, through the display, information regarding a plurality of different pieces of contents, and to control the wearable device to allow viewing of content selected from among the plurality of different pieces of contents when a selection signal is received in response to the output information regarding the plurality of different pieces of contents.

[0019] The controller may be configured to output, through the display, the information by applying different reference information to the content reproduction related information of the wearable device according to a type of the content.

[0020] The controller may be configured to output the information informing the wearer that stopping reproduction of the content is requestable based on a comparison between the content reproduction related information and predetermined content reproduction stop request reference information.

[0021] According to an aspect of another exemplary embodiment, there is provided a method of operating a wearable device, the method including: reproducing content through a display of the wearable device; obtaining content reproduction related information of the wearable device, the content reproduction related information corresponding to information influential on a health of a wearer when the content is reproduced in a state in which the wearable device is worn; outputting, through the display and based on the obtained content reproduction related information, information informing the wearer that stopping reproduction of the content is requestable; and controlling the wearable device to stop the reproduction of the content in response to a reproduction stop request for the content, received through a user input in response to the output information.

[0022] The content reproduction related information of the wearable device may include at least one of: a reproduction time of the content in the status in which the wearable device is worn; a battery consumption amount of at least one of the wearable device and a device reproducing the content after starting the reproduction of the content in the status in which the wearable device is worn; and a heating temperature of the wearable device after starting the reproduction of the content in the status in which the wearable device is worn.

[0023] The method may further include: obtaining the content reproduction related information of the wearable device in connection with the reproduction of the content; and obtaining bio information of the wearer in connection with the reproduction of the content, wherein the outputting the information informing the wearer may include outputting, through the display and based on the obtained content reproduction related information of the wearable device and the obtained bio information of the wearer, the information informing the wearer.

[0024] The method may further include: obtaining peripheral environment information of the wearable device in connection with the reproduction of the content, wherein the outputting the information informing the wearer may include outputting, through the display and based on the content reproduction related information of the wearable device and the obtained peripheral environment information of the wearable device, the information informing the wearer.

[0025] The method may further include: obtaining personal information of the wearer in connection with the reproduction of the content, wherein the outputting the information may include outputting, through the display and based on the content reproduction related information of the wearable device and the obtained personal information of the wearer, the information informing the wearer.

[0026] The method may further include: receiving, by the wearable device, a continuous reproduction request for the content in response to the output, the information informing the wearer; and continuously reproducing the content in response to the received continuous reproduction request for the content.

[0027] The outputting the information informing the wearer may include outputting, through the display, the information informing the wearer in a display form in which: the information is overlapped with the content; a frame of the information informing the wearer is inserted between frames of the content on the display; or the information informing the wearer is displayed on a display region different from a display region on which the content is reproduced.

[0028] The method may further include reproducing, by the wearable device, different content when the reproduction of the content is stopped in response to the reproduction stop request for the content.

[0029] The reproducing the different content may include: outputting, through the display, information regarding a plurality of different pieces of contents; receiving a selection signal based on the output information regarding the plurality of different pieces of contents; and providing content selected from among the plurality of different pieces of contents in response to the received selection signal.

[0030] The outputting the information informing the wearer may include outputting, through the display, the information informing the wearer by applying different reference information to the content reproduction related information of the wearable device according to a type of the content.

[0031] According to an aspect of another exemplary embodiment, there is provided a non-transitory computer-readable recording medium having recorded thereon a program executable by a computer for performing the method.

[0032] According to an aspect of another exemplary embodiment, there is provided a wearable device including: a display configured to display content; a user input unit configured to receive a command of a wearer; and a controller configured to, when the content is reproduced in a state in which the wearable device is worn, output, through the display and based on content reproduction related information of the wearable device, information regarding stopping reproduction or viewing of the content, wherein the content reproduction related information corresponds to information influential on a health of the wearer.

[0033] The content reproduction related information of the wearable device may include at least one of: a reproduction time of the content in the state in which the wearable device is worn; a battery consumption amount of at least one of the wearable device and a device reproducing the content after starting the reproduction of the content in the state in which the wearable device is worn; and a heating temperature of the wearable device after starting the reproduction of the content in the state in which the wearable device is worn.

[0034] The wearable device may further include: a first information obtainer configured to obtain the content reproduction related information of the wearable device in connection with the reproduction of the content; and a second information obtainer configured to obtain bio information of the wearer in connection with the reproduction of the content, wherein the controller may be configured to output, through the display and based on the obtained content reproduction related information of the wearable device and the obtained bio information of the wearer, the information regarding stopping reproduction or viewing of the content.

[0035] The wearable device may further include: a third information obtainer configured to obtain peripheral environment information of the wearable device in connection with the reproduction of the content, wherein the controller may be configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained peripheral environment information

of the wearable device, the information regarding stopping reproduction or viewing of the content.

[0036] The wearable device may further include: a fourth information obtainer configured to obtain personal information of the wearer in connection with the reproduction of the content, wherein the controller may be configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained personal information of the wearer, the information regarding stopping reproduction or viewing of the content.

[0037] The controller may be configured to continuously reproduce the content through the display when a reproduction stop rejection for the content is received through the user input unit in response to the output information.

[0038] The controller may be configured to output, through the display, the information in a display form in which: the information is overlapped with the content; a frame of the information is inserted between frames of the content; or the information is displayed on a display region different from a display region on which the content is reproduced.

[0039] The controller may be configured to control the wearable device such that different content is viewable using the wearable device when the reproduction of the content is stopped in response to a reproduction stop request for the content input by the wearer in response to the output information.

[0040] The controller may be configured to output, through the display, information regarding a plurality of different pieces of contents, and to control the wearable device to allow viewing of content selected from among the plurality of different pieces of contents when a selection signal is received in response to the output information regarding the plurality of different pieces of contents.

[0041] The controller may be configured to output, through the display, the information by applying different reference information to the content reproduction related information of the wearable device according to a type of the content.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042] These and/or other aspects will become apparent and more readily appreciated from the following description of exemplary embodiments, taken in conjunction with the accompanying drawings in which:

[0043] FIG. **1**A is a diagram for explaining a method of operating a wearable device according to an exemplary embodiment;

[0044] FIG. **1**B is a table for explaining a method of obtaining content reproduction related information of a wearable device and a content reproduction stop request reference, according to an exemplary embodiment;

[0045] FIGS. **1**C-**1** and **1**C-**2** are tables for explaining a method of obtaining bio information of a wearer and a reproduction stop request reference, according to an exemplary embodiment;

[0046] FIG. **1**D is a diagram of an eye image for explaining a method of obtaining bio information regarding whether a position of a pupil is changed, according to an exemplary embodiment;

[0047] FIG. **1**E is a diagram of a pupil image for explaining a method of obtaining bio information regarding whether a pupil is changed, according to an exemplary embodiment;

[0048] FIG. **1**F is a table for explaining a method of obtaining peripheral environment information of a wearable device and a reproduction stop request reference, according to an exemplary embodiment;

[0049] FIG. **1**G is a table for explaining a method of obtaining personal information of a wearer and a reproduction stop request reference, according to an exemplary embodiment;

[0050] FIG. **1**H is a diagram for explaining a process of obtaining bio information regarding whether eyes are bloodshot by using an eye image obtained by using the bio information obtaining camera, according to an exemplary embodiment;

[0051] FIG. **2**A is a diagram of an example of a wearable device according to an exemplary embodiment;

[0052] FIG. **2**B is a diagram of another example of a wearable device according to an exemplary embodiment;

[0053] FIG. **2**C is a diagram for explaining a process of obtaining information used to determine whether eyes are dry, according to an exemplary embodiment;

[0054] FIG. **2**D is a diagram of another example of a wearable device according to an exemplary embodiment;

[0055] FIG. **2**E is a diagram of another example of a wearable device according to an exemplary embodiment;

[0056] FIG. **2**F is a diagram of another example of a wearable device according to an exemplary embodiment;

[0057] FIG. **3** is a diagram of another example of a wearable device according to an exemplary embodiment;

[0058] FIG. **4** is a diagram of another example of a wearable device according to an exemplary embodiment;

[0059] FIG. **5**A is a diagram of another example of a wearable device according to an exemplary embodiment;

[0060] FIG. **5**B is a diagram of another example of a wearable device according to an exemplary embodiment;

[0061] FIG. **6** is a flowchart for explaining a method of operating a wearable device according to an exemplary embodiment;

[0062] FIG. **7** is a diagram of an example for explaining the flowchart of FIG. **6**;

[0063] FIG. **8**A is a diagram for explaining a relationship between a reproduction stop request guide information frame and an image frame that are displayed, according to an exemplary embodiment;

[0064] FIGS. **8**B and **8**C are diagrams of examples of displaying reproduction stop request guide information according to one or more exemplary embodiments;

[0065] FIG. **9** is a detailed flowchart of an operation of displaying reproduction stop request guide information included in the flowchart of FIG. **6**;

[0066] FIG. **10** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0067] FIG. **11** is a table of a relationship between reference information set in a wearable device and the number of reproduction stop request guides when obtained information is a reproduction time of content, according to an exemplary embodiment;

[0068] FIG. **12** is a table of a relationship between reference information set in a wearable device and the number of reproduction stop request guides when obtained information is a battery consumption amount, according to an exemplary embodiment;

[0069] FIG. **13**A is a table of a relationship between reference information set in a wearable device and the number of reproduction stop request guides when obtained information

relates to a heating temperature and includes the heating temperature and maintenance time information, according to an exemplary embodiment;

[0070] FIG. **13**B is a table of a relationship between reference information set in a wearable device and the number of reproduction stop request guides when obtained information relates to a heating temperature and includes the heating temperature, according to an exemplary embodiment;

[0071] FIG. **14** is a table of a relationship between reference information set in a wearable device and the number of reproduction stop request guides when obtained information is information for determining whether eyes of a wearer are bloodshot, according to an exemplary embodiment;

[0072] FIG. **15** is a table of a relationship between reference information set in a wearable device and the number of reproduction stop request guides when obtained information is information for determining whether eyes of a wearer are dry, according to an exemplary embodiment;

[0073] FIG. **16** is a flowchart of determining whether to display reproduction stop request guide information on a display based on combinations of two pieces of information, according to an exemplary embodiment;

[0074] FIG. **17** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0075] FIG. **18** is a table of an example for explaining a relationship between a type of content and reference information;

[0076] FIG. **19** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0077] FIGS. **20** through **23** are diagrams of examples of displaying guide information according to an exemplary embodiment;

[0078] FIGS. **24** through **29** are diagrams of examples of different contents according to one or more exemplary embodiments;

[0079] FIG. **30** is a diagram for explaining an eye patch function or a sleep function that may be provided according to one or more exemplary embodiments;

[0080] FIG. **31** is a diagram of an example of a wearable device that may provide a heating function that may be provided according to one or more exemplary embodiments;

[0081] FIG. **32** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0082] FIG. **33** is a diagram of an example of displaying information regarding a plurality of pieces of selectable contents in the form of a list, according to an exemplary embodiment;

[0083] FIG. **34** is a diagram of an example of another screen that displays information regarding a plurality of pieces of selectable different contents, according to an exemplary embodiment;

[0084] FIG. **35** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0085] FIG. **36** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0086] FIG. **37** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0087] FIG. **38** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0088] FIG. **39** is a diagram of an example of a screen regarding a result of providing different content, according to an exemplary embodiment;

[0089] FIG. **40** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0090] FIG. **41** is a flowchart for explaining a method of operating a wearable device according to another exemplary embodiment;

[0091] FIG. **42** is a diagram of an example of temporarily stopping reproducing content and providing guide information of different content, according to an exemplary embodiment;

[0092] FIG. **43** is a diagram for explaining an operating system of a wearable device;

[0093] FIG. **44** is a flowchart for explaining a system operating method according to an exemplary embodiment;

[0094] FIG. **45** is a flowchart for explaining a system operating method according to another exemplary embodiment;

[0095] FIG. **46** is a flowchart for explaining a system operating method according to another exemplary embodiment;

[0096] FIG. **47** is a flowchart for explaining a system operating method according to another exemplary embodiment;

[0097] FIGS. **48** and **49** are block diagrams of devices according to one or more exemplary embodiments; and

[0098] FIG. **50** is a flowchart for explaining a system operating method according to another exemplary embodiment.

DETAILED DESCRIPTION

[0099] Reference will now be made in detail to exemplary embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. In this regard, the present exemplary embodiments may have different forms and should not be construed as being limited to the descriptions set forth herein. Accordingly, exemplary embodiments are merely described below, by referring to the figures, to explain aspects of the present description. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items. Expressions such as "at least one of," when preceding a list of elements, modify the entire list of elements and do not modify the individual elements of the list.

[0100] Accordingly, while exemplary embodiments are capable of various modifications and alternative forms, embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is no intent to limit exemplary embodiments to the particular forms disclosed, but on the contrary, exemplary embodiments are to cover all modifications, equivalents, and alternatives falling within the scope of the present disclosure. Also, while describing exemplary embodiments, detailed descriptions about related well known functions or configurations that may obscure the points of exemplary embodiments are omitted.

[0101] It will be understood that, although the terms first, second, etc., may be used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another.

[0102] The terms used in the present description are selected from among common terms that are currently widely used in consideration of their function in exemplary embodi-

ments. However, the terms may be different according to an intention of one of ordinary skill in the art, a precedent, or the advent of new technology. Also, in particular cases, the terms are discretionally selected by the applicant, and the meaning of those terms will be described in detail in the corresponding part of the detailed description. Therefore, the terms used in the present description are not merely designations of the terms, but the terms are defined based on the meaning of the terms and content throughout the present disclosure.

[0103] As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising" used herein specify the presence of stated features, integers, steps, operations, members, components, and/or groups thereof, but do not preclude the presence or addition of one or more other features, integers, steps, operations, members, components, and/or groups thereof. It will be understood that, although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms.

[0104] FIG. **1**A is a diagram for explaining a method of operating a wearable device **100** according to an exemplary embodiment. FIG. **1**A is an example in which content reproduction stop request guide information **103**, which is for informing the wearer **101** (e.g., user) about a request to stop reproduction of content **102**, is displayed when a wearer **101** wears the wearable device **100** that reproduces the content **102**. The content reproduction stop request guide information **103** is used to protect the health of the wearer **101**. Protection of the health of the wearer **101** may include reduction of fatigue of the wearer **101** or protection of eyesight of the wearer **101**, although it is understood that one or more other exemplary embodiments are not limited thereto.

[0105] The wearable device **100** may have a form that may be worn on a user's head. For example, the wearable device **100** may have forms such as eyeglasses, spectacles, sunglasses, goggles, helmets, or other types of head mounted display devices.

[0106] The wearable device **100** may be temporarily fixed onto the user's head by a frame. The wearable device **100** may include a near-to-eye display that displays an image within several centimeters from user's eyes. The wearable device **100** may be referred to as a wearable computing display device or smart glasses.

[0107] FIG. **2**A is a diagram of an example of the wearable device **100** according to an exemplary embodiment. Referring to FIG. **2**A, the wearable device **100** is configured as glasses having a single display or a monocular display.

[0108] FIG. **2**B is a diagram of another example of the wearable device **100** according to an exemplary embodiment. Referring to FIG. **2**B, the wearable device **100** includes a display **212**, a camera **206**, a microphone **214**, a ray outputter **213**, a bio information obtaining camera **208**, and a temperature sensor **218**, which are also shown in FIG. **2**A in different locations of the wearable device **100**.

[0109] Referring to FIG. **2**A, the wearable device **100** is configured as glasses fixed to a face of the wearer **101** through the ears and the nose of the wearer **101**, but is not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may be attached to a helmet structure or may be modified as goggles.

[0110] The wearable device **100** of FIG. **2**A includes a lens frame **201**, side-arms **202** and **203**, a lens **204**, an on-board computer **205**, the camera **206**, a user input unit **207** (e.g., user input device or user inputter), the bio information obtaining camera **208**, a haptic module **211**, a display **212**, the ray outputter **213** (e.g., light outputter, light emitter, or light output device), the microphone **214**, audio output units **215** and **216** (e.g., audio output devices or audio outputters), a battery **217**, and the temperature sensor **218**.

[0111] Some elements of the wearable device **100** may be embedded therein and other elements thereof may be mounted outside of the wearable device **100**. For example, sensors **209** and **210** and the battery **217** may be embedded or included in the wearable device **100**. The display **212** may be mounted or provided outside the wearable device **100**. The elements embedded in the wearable device **100** and the elements mounted outside the wearable device **100** are not limited as described above. For example, the wearable device **100** may not include one or more of the sensors **209** and **210** and the haptic module **211**. In this case, by way of example, the wearable device **100** may include the sensor **210** only or may include sensors mounted in more locations than those shown in FIG. **2**A.

[0112] For example, the wearable device **100** may include a sweat sensor capable of sensing a sweating amount of the wearer **101** mounted in a location adjacent to the sensor **210**. Furthermore, the wearable device **100** may include a body temperature sensor capable of sensing a temperature of the wearer **101** mounted in at least one of the audio output units **215** and **216**.

[0113] The lens frame **201** and the side-arms **202** and **203** may be configured as solids such as plastic and/or metal or may be configured as solids such as hollow plastic and/or metal to include a material such as wirings used to connect the elements included in the wearable device **100**.

[0114] The lens frame **201** and the side-arms **202** and **203** of FIG. **2**A are integrally configured having no connection member or connector. Thus, the lens frame **201** and the side-arms **202** and **203** may be referred to as a frame of the wearable device **100**.

[0115] Structures of the lens frame **201** and the side-arms **202** and **203** are not limited as shown in FIG. **2**A.

[0116] For example, the wearable device **100** may include a connection member or connector (such as a hinge) between the lens frame **201** and the side-arms **202** and **203**. For example, the wearable device **100** may include connection members between the lens frame **201** and the right side-arm **202** and between the lens frame **201** and the left side-arm **203**. When the wearable device **100** includes the connection member as described above, the side-arms **202** and **203** may be folded in a direction of the lens frame **201**.

[0117] For example, the wearable device **100** may include connection members in a center **201'** of the lens frame **201**, between the lens frame **201** and the right side-arm **202**, between the lens frame **201** and the left side-arm **203**, and centers **202'** and **203'** of the side-arms **202** and **203**. When the wearable device **100** includes the connection members as described above, the lens frame **201** and the side-arms **202** and **203** may be folded in an inner direction based on each connection member, thereby minimizing a size of the wearable device **100**.

[0118] The connection members that are not shown may be configured as a screw assembly or may be configured by inserting rings into grooves and connecting the rings together, but are not limited thereto.

[0119] The side-arms **202** and **203** may be configured in such a manner that allows them to be worn on the ears of the wearer **101**. The side-arms **202** and **203** may be configured in a way that may extend to around the back of a head of the wearer **101**.

[0120] When the side-arms **202** and **203** are configured in such a manner that allows them to extend to around the back of the head of the wearer **101**, a band capable of fixing the side-arms **202** and **203** onto the head of the wearer **101** may be added between the side-arms **202** and **203**.

[0121] The band may be configured as an elastic band or may be configured as a length adjustable band such that the side-arms **202** and **203** may be fixed onto the head of the wearer **101** irrespective of a size of the head of the wearer **101**.

[0122] The wearable device **100** may attach a non-slip or non-sliding member capable of preventing the side-arms **202** and **203** from slipping or sliding to inner locations of the side-arms **202** and **203** contacting the back of earflaps of the wearer **101**. The non-slip or non-sliding member may be configured as a material such as silicone, but the material thereof is not limited thereto. The non-slip or non-sliding member may be attached to the inner sides of the side-arms **202** and **203**, but a shape thereof is not limited thereto.

[0123] The lens frame **201** may be configured in such a manner that allows the lens **204** to be detached. The lens **204** of FIG. **2**A may be configured integrally with a nosepiece **204'**, but is not limited thereto in one or more other exemplary embodiments. For example, when the lens **204** of FIG. **2**A is integrally with the nosepiece **204'**, the lens **204** may be configured as a right lens **404** and a left lens **405** as shown in FIG. **4** that will be described below.

[0124] The lens **204** may be configured as a transparent material in such a manner that allows the wearer **101** to see a real world. The lens **204** may be configured as a material capable of transmitting light reflected through the display **212**. The material that may be used as the lens **204** may include, for example, plastic such as polycarbonate or glass, but is not limited thereto in one or more other exemplary embodiments. The lens **204** may be configured as at least one coating lens of an anti-light reflection and antidazzle coating lens, an antifogging coating lens, and a sunscreen coating lens.

[0125] The on-board computer **205** may be connected to the elements included in the wearable device **100** by wire or wirelessly. The on-board computer **205** is positioned in a part of the left side-arm **203** adjacent to the lens frame **201**, but is not limited thereto in one or more other exemplary embodiments. For example, the on-board computer **205** may be positioned in a part of the right side-arm **202** as shown in FIG. **2**B. The on-board computer **205** may be positioned in another part of the wearable device **100**, such as another part of the left side-arm **203**.

[0126] The on-board computer **205** may receive data from, for example, the camera **206**, the user input unit **207**, the bio information obtaining camera **208**, the sensors **209**, **210**, and **218**, the microphone **214**, and the temperature sensor **218**. The on-board computer **205** may analyze the received data and generate information that is to be transmitted to the wearer **101** of the wearable device **100** through at least one of the display **212** and the audio output units **215** and **216**. The information may be transmitted by the ray outputter **213** through the display **212**.

[0127] The information that is to be transmitted to the wearer **101** may include at least one of a still image, a moving image (or video), text, and audio, but is not limited thereto in one or more other exemplary embodiments.

[0128] The camera **206** may be positioned outside the left side-arm **203** or may be embedded in the left side-arm **203**. The camera **206** may be mounted in another location of the wearable device **100**. For example, the camera **206** may be positioned in a part of the right side-arm **202** as shown in FIG. **2**B. According to another example, the camera **206** may be positioned in a part (for example, a center) of the lens frame **201**. The camera **206** may be configured as a camera used in a smart phone or a small camera such as a webcam, but is not limited thereto in one or more other exemplary embodiments. The camera **206** may be mounted in a location in which at least a part of the real world perceived by the wearer **101** of the wearable device **100** may be captured.

[0129] The user input unit **207** may include at least one of a touch pad operable by a finger of the wearer **101**, a button, and a switch operable by a push manipulation of the wearer **101**, but is not limited thereto in one or more other exemplary embodiments. The user input unit **207** may be positioned in a part of the left side-arm **203**, but may be positioned in another part of the wearable device **100** in one or more other exemplary embodiments. For example, the user input unit **207** may be positioned in at least one of another part of the left side-arm **203**, a part of the right side-arm **202** as shown in FIG. **2**B, and a part of the lens frame **201**.

[0130] The user input unit **207** may be used by the wearer **101** to input a command. The user input unit **207** may include an on/off switch or an on/off button capable of turning on/off power of the wearable device **100**.

[0131] The bio information obtaining camera **208** may capture an eye image of the wearer **101** or a pupil image. The eye image of the wearer **101** or the pupil image may be used to obtain bio information based on eyes of the wearer **101**. For example, the bio information based on the eyes using the eye image of the wearer **101** or the pupil image may include at least one piece of information among whether the eyes of the wearer **101** are bloodshot, an eye blink number of the wearer **101**, an eye blink cycle of the wearer **101**, whether a position of a pupil of the wearer **101** is changed, whether the pupil of the wearer **101** is changed, and the like, but is not limited thereto in one or more other exemplary embodiments.

[0132] The bio information obtaining camera **208** may be installed protruding from a right lower end of the lens frame **201**, but an installation thereof is not limited thereto in one or more other exemplary embodiments. For example, the bio information obtaining camera **208** may be embedded in the lens frame **201**. The bio information obtaining camera **208** may be positioned in another arbitrary part of the wearable device **100**. The bio information obtaining camera **208** may be installed in a position in which the eye image of the wearer **101** or the pupil image may be captured.

[0133] The sensor **209** may be a peripheral environment sensor capable of sensing a peripheral environment of the wearable device **100**. The sensor **209** may be positioned in a center inside of the lens frame **201**, but is not limited thereto in one or more other exemplary embodiments. For example, the sensor **209** may be mounted in at least one location among an inner part of the lens frame **201**, an outer part of the lens frame **201**, an inner part of the side-arms **202** and **203**, and an outer part of the side-arms **202** and **203** in addition to the center inside of the lens frame **201**, but an installation location and structure of the sensor **209** are not limited thereto in one or more other exemplary embodiments.

[0134] The sensor **209** may be configured as a sensor capable of sensing the peripheral environment such as a peripheral color temperature of the wearable device **100**, light (or infrared rays), temperature, humidity, wind, altitude, air pressure, fine dust, etc., but the peripheral environment to be sensed is not limited thereto in one or more other exemplary embodiments.

[0135] When the sensor **209** is a humidity sensor, the wearable device **100** may obtain bio information regarding whether the eyes of the wearer **101** are dry by using a value sensed by the sensor **109**. Thus, when the sensor **209** is the humidity sensor, the sensor **209** may operate as a sensor providing a bio signal based on the eyes of the wearer **101**.

[0136] The bio signal based on the eyes is used to obtain bio information based on the eyes. For example, the humidity sensor may express the bio signal based on the eyes as an electrical signal corresponding to a water vapor amount with respect to air per cubic meter (g/m3). The bio information based on the eyes may express the electrical signal output from the humidity sensor in units of grams (g).

[0137] The sensor **210** may be a sensor capable of sensing whether the wearable device **100** is worn. The sensor **210** is positioned in an inner side of the right side-arm **202** contacting the back of the ears of the wearer **101**, but a location thereof is not limited thereto in one or more other exemplary embodiments. For example, the sensor **210** may be positioned in an inner side of the left side-arm **203** contacting the back of the ears of the wearer **101** or may be positioned in an inner side of a location in which the battery **217** contacting the back of the ears of the wearer **101** is embedded.

[0138] The sensor **210** may be configured as, for example, a pressure sensor. When the sensor **210** is configured as the pressure sensor, the sensor **210** may transmit a sensing value indicating whether pressure is applied and a magnitude of the pressure to the on-board computer **205**. Thus, the on-board computer **205** may detect a wearing time of the wearable device **100** based on the sensing value received from the sensor **210**.

[0139] The haptic module **211** is positioned in a point adjacent to an edge of the inner side of the left side-arm **203** of the wearable device **100**, but an installation location thereof is not limited thereto in one or more other exemplary embodiments. For example, the haptic module **211** may be positioned in a part of the inner side of the right side-arm **202** or may be positioned in another point of the wearable device **100**.

[0140] The haptic module **211** may be configured as a material capable of producing various tactile effects that the wearer **101** may feel. For example, the haptic module **211** may be configured as a material capable of producing various tactile effects such as a material capable of producing a vibration effect, a material capable of producing a stimulus effect on a contact skin surface, a material capable of producing a stimulus effect based on spray or suction of air, a material capable of producing a stimulus effect through contact of an electrode, a material capable of producing a stimulus effect using an electrostatic force, a material capable of producing cold and warm sensations using a device capable of absorbing or generating heat, and the like, but the materials used as the haptic module **211** are not limited thereto in one or more other exemplary embodiments.

[0141] The display **212** is connected to the left side-arm **203** of the wearable device **100** and positioned in a left upper end of the lens **204**, but a location thereof is not limited thereto in one or more other exemplary embodiments. For example, the display **212** may be connected to the right side-arm **202** such that the display **212** is positioned in a right center of the lens **204** or may be connected to the left side-arm **203** such that the display **212** is positioned in a left center of the lens **204**.

[0142] The display **212** may be connected to the right side-arm **202** of the wearable device **100** and positioned in a right upper end of the lens **204** as shown in FIG. **2**B.

[0143] The display **212** of FIG. **2**A may be configured as a translucent optical waveguide (for example, a prism), but is not limited thereto in one or more other exemplary embodiments. The display **212** may reflect light output from the light outputter **213** to focus an image on a fovea of retina of the eyes of the wearer **101**.

[0144] The light outputter **213** may be configured as, for example, a mini projector, but is not limited thereto in one or more other exemplary embodiments.

[0145] The microphone **214** may receive or capture a voice of the wearer **101**, sound other than the voice of the wearer **101**, etc.

[0146] The audio output units **215** and **216** are configured as earphones that may be mounted in the ears of the wearer **101** of the wearable device **100**, but are not limited thereto in one or more other exemplary embodiments. The audio output unit **215** may be positioned in the inner side of the right side-arm **202** such that the audio output unit **215** may be mounted on a right ear of the wearer **101** of the wearable device **100**. The audio output unit **216** may be positioned in the inner side of the left side-arm **203** such that the audio output unit **216** may be mounted on a left ear of the wearer **101** of the wearable device **100**.

[0147] The audio output units **215** and **216** may be mounted in such a manner that allows them to be fixed to the wearable device **100** as shown in FIG. **2**A, but are not limited thereto in one or more other exemplary embodiments. For example, the audio output units **215** and **216** may be configured to be detachable from the wearable device **100**. Thus, the wearer **101** of the wearable device **100** may selectively wear the audio output units **215** and **216** on the ears of the wearer **101**.

[0148] When the audio output units **215** and **216** are detachable from the wearable device **100**, the audio output units **215** and **216** may be positioned in the inner sides of the side-arms **202** and **203** contacting the back of the ears of the wearer **101**. Accordingly, the wearer **101** may get the audio output units **215** and **216** out of the side-arms **202** and **203** and then wear the audio output units **215** and **216** on the ears of the wearer **101**.

[0149] When the audio output units **215** and **216** are worn on the ears of the wearer **101** from the side-arms **202** and **203**, the audio output units **215** and **216** may be connected to the wearable device **100** by wire or wirelessly.

[0150] When the audio output units **215** and **216** are connected to the wearable device **100** by wired, a connection line between the audio output units **215** and **216** and the wearable devices **100** may be embedded in the wearable device **100** when the audio output units **215** and **216** are mounted in the wearable device **100**.

[0151] When the audio output units **215** and **216** are connected to the wearable device **100** wirelessly, the audio output units **215** and **216** may communicate with the wearable device **100** based on a near field wireless communication. When the audio output units **215** and **216** are connected to the wearable device **100** wirelessly, each of the audio output units

215 and 216 and the on-board computer 205 may include a communication module capable of performing near field communication.

[0152] The wearable device 100 may include a connection member based on an elastic material (for example, a spring) between the audio output units 215 and 216 and the wearable device 100. In this case, a shape of the connection member based on the elastic material may be changed according to locations of the ears of the wearer 101.

[0153] For example, the connection member may be modified to allow the audio output units 215 and 216 to be inclined in at least one direction among an east direction, a west direction, a south direction, a north direction, an east-west direction, a west-south direction, and a south-north direction or may be modified according to a rotation of 360 degrees.

[0154] When the wearable device 100 includes the connection member based on the elastic material between the audio output units 215 and 216 and the wearable device 100, the audio output units 215 and 216 and the wearable device 210 may be configured to communicate with each other by wire or wirelessly.

[0155] The audio output units 215 and 216 may be configured as a bone conduction speaker. The audio output units 215 and 216 according to one or more exemplary embodiments may output guide information as an audio signal informing that it may be requested to stop reproducing content.

[0156] A body temperature sensor capable of sensing a temperature of the wearer 101 may be mounted in at least one of the audio output units 215 and 216. A sensing value output from the body temperature sensor mounted in the audio output units 215 and 216 may be transmitted to the on-board computer 205. The on-board computer 205 may obtain temperature information of the wearer 101 by using the received sensing value.

[0157] The battery 217 is embedded in an edge of the right side-arm 202 of the wearable device 100, but is not limited thereto in one or more other exemplary embodiments. For example, the battery 217 may be embedded in an edge of the left side-arm 203 of the wearable device 100. The wearable device 100 may mount a connector or a port in a location adjacent to a location in which the battery 217 is embedded. The connector or the port is used to connect an external power supply device and the battery 217 and charge the battery 217. The connector or the port may be configured as, for example, a universal series bus (USB) jack.

[0158] The battery 217 may be embedded in a detachable frame in the right side-arm 202 of the wearable device 100. The frame in which the battery 217 is embedded may include the connector or the port capable of connecting the external power supply device and the battery 217 and charge the battery 217. The frame in which the battery 217 is embedded and the wearable device 100 may be configured to be connected to each other by using the USB jack, but are not limited thereto in one or more other exemplary embodiments. The frame in which the battery 217 is embedded may be referred to as a battery pack. The temperature sensor 218 may be mounted in a location adjacent to the on-board computer 205 of the wearable device 100 to sense a heating temperature of the wearable device 100. A sensing value output from the temperature sensor 218 may be transmitted to the on-board computer 205. The on-board computer 205 may obtain the heating temperature of the wearable device 100 by using the received sensing value. A location of the temperature sensor 218 is not limited as described above.

[0159] FIG. 2C is a diagram for explaining a process of obtaining information used to determine whether eyes are dry. The wearable device 100 may receive sound generated when the eyes are dry from an electronic patch 219 in which a microphone is embedded as shown in FIG. 2C. The electronic patch 219 may include a communication module (e.g., communication device or communicator) capable of wireless communication with the wearable device 100. The communication module may communicate with the wearable device 100 based on short-distance communication such as Near Field Communication (NFC), Bluetooth, infrared rays, etc.

[0160] To receive the sound generated when the eyes are dry from the electronic patch 219, the wearable device 100 may execute an application for the electronic patch 219 as a background application when reproducing content. The electronic patch 219 may be attached to the location adjacent to the eyes of the wearer 101. The microphone embedded in the electronic patch 219 may block sound around the wearer 101 or the voice of the wearer 101 and receive the sound generated when the eyes are dry by using a location in which the electronic patch 219 is attached.

[0161] FIG. 2D is a diagram of another example of the wearable device 100 according to an exemplary embodiment. Referring to FIG. 2D, the wearable device 100 may be connected to a mobile device 250 by wire (for example, a USB cable) to transmit and receive data to and from the mobile device 250, but a method of transmitting and receiving the data between the wearable device 100 and the mobile device 250 is not limited thereto in one or more other exemplary embodiments. For example, the wearable device 100 and the mobile device 250 may be connected to each other wirelessly (for example, near field communication such as Bluetooth) to transmit and receive the data. The mobile device 250 includes a display 251.

[0162] The wearable device 100 may receive content that is to be reproduced from the mobile device 250. Reproduction of the content using the wearable device 100 may be controlled according to a user input through the mobile device 250 or the user input unit 207.

[0163] An operation of the wearable device 100 may be controlled according to the user input through the mobile device 250 or the user input unit 207. When the operation of the wearable device 100 is controlled by the mobile device 250, the wearable device 100 may not include the on-board computer 205. According to another exemplary embodiment, when the operation of the wearable device 100 is controlled by the mobile device 250, the on-board computer 205 included in the wearable device 100 may be controlled by the mobile device 250.

[0164] The wearable device 100 of FIG. 2D may not include the battery 217 of FIG. 2A and may receive power from the mobile device 250. Furthermore, the wearable device 100 of FIG. 2D may not include the microphone 214 and the audio output units 215 and 216 and may use a microphone and an audio output unit that are embedded in the mobile device 250.

[0165] FIG. 2E is a diagram of another example of the wearable device 100 according to an exemplary embodiment. The wearable device 100 of FIG. 2E may transmit and receive data to and from the mobile device 250 by wire or wirelessly like the wearable device 100 of FIG. 2D.

[0166] The wearable device 100 of FIG. 2E may not include the battery 217 like the wearable device 100 of FIG. 2D and may receive power from the mobile device 250.

[0167] The wearable device **100** of FIG. **2**E does not include the audio output units **215** and **216** and may output audio through wearable earphones **260**. The wearable device **100** of FIG. **2**E may be connected to the wearable earphones **260** wirelessly (for example, through Bluetooth communication) or by wire and output an audio signal included in reproduced content through the wearable earphones **260**. The wearable earphones **260** may be referred to as mobile earphones.

[0168] FIG. **2**F is a diagram of another example of the wearable device **100** according to an exemplary embodiment. The wearable device **100** of FIG. **2**F may be connected to a content reproduction device **270** by wire or wirelessly. The content reproduction device **270** may include a game reproduction device, a video reproduction device, a broadcasting set top box, etc., but is not limited thereto in one or more other exemplary embodiments. The content reproduction device **270** may provide content that is to be reproduced and/or power to the wearable device **100** of FIG. **2**F by wire or wirelessly.

[0169] The wearable device **100** of FIG. **2**F may control an operation of the content reproduction device **270** according to a user input through the user input **207**. The content reproduction device **270** may be controlled according to a user input through a dedicated input device **271**.

[0170] FIG. **3** is a diagram of another example of the wearable device **100** according to an exemplary embodiment. The wearable device **100** of FIG. **3** is in the form of glasses having a one-eyed lens **303** (i.e., a lens for one eye) and a single display or a monocular display like the wearable device **100** of FIG. **2**A. The wearable device **100** of FIG. **3** is in the form of one-eyed glasses fixed to a face of the wearer **101** through a left ear of the wearer **101** and a left side of a nose of the wearer **101**, but is not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may be configured as one-eyed glasses fixed to the face of the wearer **101** through a right ear of the wearer **101** and a right side of the nose of the wearer **101**. The wearable device **100** may be attached to a helmet structure.

[0171] The wearable device **100** of FIG. **3** includes a lens frame **301**, a side-arm **302**, a lens **303**, an on-board computer **304**, a camera **305**, a user input unit **306** (e.g., user input device or user inputter), a bio information obtaining camera **307**, sensors **308**, **309**, and **316**, a haptic module **310**, a display **311**, a light outputter **312** (e.g., ray outputter, light emitter, or light outputting device), a microphone **313**, an audio output unit **314** (e.g., audio output device or audio outputter), and a battery **315**.

[0172] Elements and components included in the wearable device **100** of FIG. **3** are not limited as shown in FIG. **3**. For example, the wearable device **100** of FIG. **3** may not include one or more of the sensors **308**, **309**, and **316** and the haptic module **310**. For example, the wearable device **100** of FIG. **3** may include only the sensor **309** among the sensors **308**, **309**, and **316** or may include sensors mounted in more locations than those shown in FIG. **3**. For example, the wearable device **100** of FIG. **3** may include a sweat sensor for sensing a sweating amount of the wearer **101** and a body temperature sensor for sensing a temperature of the wearer **101** mounted therein as described above with reference to the wearable device **100** of FIG. **2**A.

[0173] The lens frame **301** may be configured in such a manner that allows the lens **303** to be detached as described above with reference to FIG. **2**A. The wearable device **100** of FIG. **3** may include a connection member (e.g., connector) between the lens frame **301** and the side-arm **302** as described with reference to FIG. **2**A. The wearable device **100** of FIG. **3** may include a connection member in a center of the side-arm **302** as described with reference to FIG. **2**A.

[0174] The lens **303**, the on-board computer **304**, the camera **305**, the user input unit **306**, the bio information obtaining camera **307**, the sensors **308**, **309**, and **316**, the haptic module **310**, the display **311**, the light outputter **312**, the microphone **313**, the audio output unit **314**, and the battery **315** that are included in the wearable device **100** of FIG. **3** may be positioned and configured similar to the lens **204**, the on-board computer **205**, the camera **206**, the user input unit **207**, the bio information obtaining camera **208**, the sensors **209**, **210**, and **218**, the haptic module **211**, the display **212**, the ray outputter **213**, the microphone **214**, the audio output units **215** and **216**, and the battery **217**, respectively, that are included in the wearable device **100** of FIG. **2**A. The sensor **308** included in the wearable device **100** of FIG. **3** may correspond to the sensor **209** included in the wearable device **100** shown in FIG. **2**A. The sensor **309** included in the wearable device **100** of FIG. **3** may correspond to the sensor **210** shown in FIG. **2**A. The sensor **316** included in the wearable device **100** of FIG. **3** may correspond to the sensor **218** shown in FIG. **2**A.

[0175] Elements included in the wearable device **100** of FIG. **3** are not limited as described above. For example, the wearable device **100** of FIG. **3** may be configured to be connected to at least one of the mobile device **250**, the wearable earphones **260**, and the content reproduction device **270** by wire or wirelessly like the wearable device **100** of FIGS. **2**D through **2**F.

[0176] When the wearable device **100** of FIG. **3** is connected to at least one of the mobile device **250**, the wearable earphones **260**, and the content reproduction device **270**, the elements included in the wearable device **100** of FIG. **3** may be changed or vary like the elements included in the wearable device **100** of FIGS. **2**D through **2**F.

[0177] FIG. **4** is a diagram of another example of the wearable device **100** according to an exemplary embodiment. Referring to FIG. **4**, the wearable device **100** has a binocular display. The wearable device **100** of FIG. **4** may be attached to a helmet structure or may be modified in the form of goggles.

[0178] The wearable device **100** of FIG. **4** includes a lens frame **401**, side-arms **402** and **403**, lenses **404** and **405**, an on-board computer **406**, a camera **407**, a user input unit **408** (e.g., user input device or user inputter), a bio information obtaining camera **409**, sensors **410**, **411**, and **410**, a haptic module **412**, displays **413** and **414**, a microphone **415**, audio output units **416** and **417** (e.g., audio output devices or audio outputters), and a battery **418**.

[0179] The lens frame **401** included in the wearable device **100** of FIG. **4** may be configured integrally with a nosepiece **401'**. The lens frame **401** may be configured as one of various shapes such as rectangular, oval, and circular shapes, but is not limited thereto in one or more other exemplary embodiments. The lens frame **401** may be configured as a material similar to that of the lens frame **201** of the wearable device **100** of FIG. **2**A.

[0180] The lenses **404** and **405** of FIG. **4** may be configured as an arbitrary material suitable for displaying information such as an image or graphics projected through light outputters (such a projector described above with reference to FIG. **2**A) that are not shown. The lenses **404** and **405** of FIG. **4** may be configured as a material capable of overlapping a real

world that the wearer **101** of the wearable device **100** may see through the lenses **404** and **405** and the information such as the image or the graphics projected through the light outputters (e.g., light emitters, light outputting devices, or ray outputters). The material constituting the lenses **404** and **405** may be configured as plastic or glass like a material constituting the lens **204** described above with reference to FIG. **2**A, but is not limited thereto in one or more other exemplary embodiments.

[0181] The side-arms **402** and **403**, the on-board computer **406**, the camera **407**, the user input unit **408**, the bio information obtaining camera **409**, the sensors **410**, **411**, and **419**, the haptic module **412**, the microphone **415**, the audio output units **416** and **417**, and the battery **418** that are included in the wearable device **100** of FIG. **4** may be installed in different locations from those of the side-arms **202** and **203**, the on-board computer **205**, the camera **206**, the user input unit **207**, the bio information obtaining camera **208**, the sensors **209**, **210**, and **218**, the haptic module **211**, the microphone **214**, the audio output units **215** and **216**, and the battery **217** that are included in the wearable device **100** of FIG. **2**A, but functions or constructions thereof may be similar. The sensor **410** of FIG. **4** may correspond to the sensor **209** of FIG. **2**A. The sensor **411** of FIG. **4** may correspond to the sensor **210** of FIG. **2**A. The sensor **419** of FIG. **4** may correspond to the sensor **218** of FIG. **2**A. Constructions and locations of the elements included in the wearable device **100** of FIG. **4** are not limited as described above.

[0182] The displays **413** and **414** included in the wearable device **100** of FIG. **4** may display the information such as the image or the graphics projected by the light outputters mounted on an inner surface of each of the side-arms **402** and **403**. The light outputters may be configured as the light outputter **213** included in the wearable device **100** of FIG. **2**A, but is not limited thereto in one or more other exemplary embodiments.

[0183] The wearable device **100** of FIG. **4** may be modified to allow the lenses **404** and **405** to operate as displays. In this case, the lenses **404** and **405** may be configured as transparent displays or translucent displays. When the lenses **404** and **405** are configured as the translucent displays, the lenses **404** and **405** may be configured as a material such as at least one light wave guide (for example, a prism), an electroluminescent display, or a liquid crystal display (LCD), but are not limited thereto in one or more other exemplary embodiments.

[0184] When the lenses **404** and **405** of FIG. **4** are configured as the transparent displays, the light outputters are not mounted in the wearable device **100** of FIG. **4**, and information generated by the on-board computer **406** may be directly displayed on the lenses **404** and **405**. The transparent display is a display having a certain degree of transparency so that an area behind a screen thereof may be seen.

[0185] The wearable device **100** of FIG. **4** may be connected to at least one of the mobile device **250**, the wearable earphones **260**, and the content reproduction device **270** by wire or wirelessly as described above with reference to FIGS. **2**D through **2**F. When the wearable device **100** of FIG. **4** is connected to at least one of the mobile device **250**, the wearable earphones **260**, and the content reproduction device **270**, the wearable device **100** of FIG. **4** may be modified or vary like the wearable device **100** of FIGS. **2**D through **2**F. For example, the wearable device **100** of FIG. **4** may not include the battery **418**.

[0186] FIG. **5**A is a diagram of another example of the wearable device **100** according to an exemplary embodiment. The wearable device **100** of FIG. **5**A has a binocular display. The wearable device **100** of FIG. **5**A may be modified as a helmet structure.

[0187] The wearable device **100** of FIG. **5**A includes a frame **501** configured as a plastic material, two independent displays **502** and **503** adjacent to eyes of the wearer **101** in an inner side of the frame **501**, a user input unit **504** (e.g., user input device or user inputter) in an entire surface of a lower portion of the frame **501** or in a part thereof, earphones **505**, a battery pack **506** connected to the frame **501** by wire, a head fixing band **507** used to fix the wearable device **100** onto a head of the wearer **101**, a computer **508** embedded in the frame **501**, a bio information obtaining camera **510**, and sensors **509**, **511**, and **512**. The wearable device **100** of FIG. **5**A may be modified to include a battery therein.

[0188] The displays **502** and **503** of FIG. **5**A may use a display such as a high definition (HD) organic light emitting diode (OLED) panel, but are not limited thereto in one or more other exemplary embodiments. The displays **502** and **503** of FIG. **5**A may be configured to see two-dimensional (2D) content and three-dimensional (3D) content.

[0189] The user input unit **504** of FIG. **5**A is configured as at least one of a power on/off button, a menu selection button, an adjustment button, locations adjustment switches of the displays **502** and **503**, and a push manipulation based button and switch including a volume switch, but is not limited thereto in one or more other exemplary embodiments. For example, the user input unit **504** may be configured as a touch panel.

[0190] The battery pack **506** of FIG. **5**A may include a communication module capable of receiving content wirelessly and an interface capable of receiving content by wire. The interface may include a high definition multimedia interface (HDMI) port, but is not limited in one or more other exemplary embodiments. The battery pack **506** of FIG. **5**A may be connected to the content providing device **520** through the communication module or the interface by wire or wirelessly. The content providing device **520** may include a device such as the game reproduction device, the video game device, the broadcasting set top box, etc.

[0191] The battery pack **506** of FIG. **5**A may be simultaneously connected to the wearable device **100** and the content providing device **520** through the communication module wirelessly. The battery pack **506** of FIG. **5**A may be connected to the wearable device **100** by wire and the content providing device **520** by wirelessly, through the communication module and the interface. The battery pack **506** of FIG. **5**A may be connected to the wearable device **100** and the content providing device **520** through the interface by wire. The battery pack **506** of FIG. **5**A may be connected to the wearable device **100** wirelessly and the content providing device **520** by wire, through the communication module and the interface.

[0192] When the battery pack **506** of FIG. **5**A is connected to the wearable device **100** and the content providing device **520** through the communication module wirelessly, the battery pack **506** may transmit content received from the content providing device **520** to the wearable device **100** through the communication module and may transmit a control signal related to reproduction of content received from the wearable device **100** to the content providing device **520**. The content

providing device **520** may operate according to the control signal received through the battery pack **506**.

[0193] The sensor **509** of FIG. **5**A may be positioned in an inner side of the head fixing band **507** to sense whether the wearable device **100** is worn like the sensor **210** of FIG. **2**A. The bio information obtaining camera **510** of FIG. **5**A may be positioned in an upper end of the left display **503** to perform the same function as that of the bio information obtaining camera **208** of FIG. **2**A. The sensor **511** of FIG. **5**A may be positioned in a part of an upper surface of the frame **501** to sense peripheral environment information of the wearable device **100** like the sensor **209** of FIG. **2**A. The sensor **512** of FIG. **5**A may be mounted in a location adjacent to the on-board computer **508** to sense a heating temperature of the wearable device **100** of FIG. **5**A.

[0194] Locations of the bio information obtaining camera **510** and the sensors **509**, **511**, and **512** of FIG. **5**A are not limited as described above in one or more other exemplary embodiments. The bio information obtaining camera **510** and the sensors **509**, **511**, and **512** may be mounted in locations different from the above-described location of the wearable device **100** of FIG. **5**A. For example, the bio information obtaining camera **510** of FIG. **5**A may be positioned adjacent to the right display **502**.

[0195] The haptic module **211**, the microphone **214**, etc., of FIG. **2**A may be additionally mounted in a part of the wearable device **100** of FIG. **5**A. The wearable device **100** of FIG. **5**A may mount or include a forehead support in an upper end of the frame **501**. The forehead support is used to support a weight of the wearable device **100**. The wearable device **100** of FIG. **5**A may include a body temperature sensor for sensing a temperature of the wearer **101** and a sweating sensor for sensing a sweating amount of the wearer **101** mentioned in FIG. **2**A.

[0196] FIG. **5**B is a diagram of another example of the wearable device **100** according to an exemplary embodiment. The mobile device **250** may be mounted in the wearable device **100** of FIG. **5**B. The wearable device **100** of FIG. **5**B may be connected to the mobile device **250** by wire or wirelessly. The wearable device **100** of FIG. **5**B uses the display **251** of the mobile device **250** as a display.

[0197] The wearable device **100** of FIG. **5**B may view content reproduced on the display **251** through two independent lenses **532** and **533** corresponding to two eyes of the wearer **101**. The lenses **532** and **533** are lenses that may distort viewing of the wearer **101**.

[0198] The wearable device **100** of FIG. **5**B may be connected to the mobile device **250** by using a USB jack **534**, but is not limited thereto in one or more other exemplary embodiments. The wearable device **100** may be connected to the mobile device **250** based on near field wireless communication or other wireless communication (e.g., Bluetooth). If the USB jack **534** is used to connect the wearable device **100** and the mobile device **250**, the mobile device **250** may be controlled according to a user input received through a touch pad **535** of the wearable device **100**.

[0199] The touch pad **535** is positioned in a right side of the frame **531** of the wearable device **100** but may be positioned in another side of the frame **531**. The USB jack **534** is positioned in a left side but may be positioned in a right side of the frame **531**.

[0200] The wearable device **100** of FIG. **5**B includes a back button **536** in a location adjacent to the touch pad **535**. The back button **536** may act as a see-through button. That is, if the back button **536** is pressed for a certain period of time, a rear camera **252** included in the mobile device **250** may operate. When the rear camera **252** operates, the wearer **101** may view a real peripheral situation through the rear camera **252** in real time while wearing the wearable device **100**.

[0201] The wearable device **100** of FIG. **5**B includes a head tracking sensor **537**, an infrared (IR) sensor **538**, a bio information obtaining camera **539**, a peripheral environment sensor **540**, a wearable sensor **541**, a heating temperature sensor **542**, a focus adjustment ring **543**, a front plastic cover **544**, and a head fixing band **545**, but is not limited thereto in one or more other exemplary embodiments.

[0202] The wearable device **100** may detect a movement of the wearer **101** by using a value sensed by the head tracking sensor **537** and the IR sensor **538** of FIG. **5**B and provide an image displayed on the display **251** of the mobile device **250** to an ultra-large wide screen according to the detected movement of the wearer **101**. The focus adjustment ring **543** of FIG. **5**B is a button capable of adjusting a screen according to the viewing of the wearer **101**.

[0203] Locations of elements included in the wearable device **100** of FIG. **5**B are not limited as shown in FIG. **5**B.

[0204] The on-board computers **205**, **304**, **406**, and **508** included in the wearable device **100** of FIGS. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, **4**, and **5**A may include a control unit (or a processor) and a memory, but are not limited thereto in one or more other exemplary embodiments. The control unit (e.g., controller) and the memory will be described in detail with reference to FIGS. **48** and **49**. The on-board computers **205**, **304**, **406**, and **508** may control all functions of the wearable device **100**.

[0205] Modifications of the wearable device **100** of FIGS. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, **4**, **5**A, and **5**B may receive sound obtained by a microphone included in the electronic patch **219** based on wireless communication as described with reference to FIG. **2**C.

[0206] One or more exemplary embodiments will be described below based on the wearable device **100** of FIG. **2**A below, but may be applied to the wearable device **100** of FIGS. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, **4**, **5**A, and **5**B and modifications thereof.

[0207] Meanwhile, the content **102** of FIG. **1**A may be reproduced (or provided) according to a reproduction command of the wearer **101**. For example, the wearable device **100** may reproduce a game image **102** reproduced according to a game reproduction command of the wearer **101** through the display **212**, as exemplified by the screen **110** of FIG. **1**A. An audio signal reproduced along with the game image **102** may be reproduced through the audio output units **215** and **216**.

[0208] The screens **110** and **120** of FIG. **1**A are examples including the reproduced image **102** and an image of a real peripheral situation (i.e., real image) that may be viewed through the wearable device **100**. However, when the wearable device **100** is configured as shown in FIG. **5**A or **5**B, the wearer **101** may view the game image **102** only (i.e., without the real image) reproduced through the wearable device **100**.

[0209] The content reproduced by the wearable device **100** is not limited to the game image **102** of FIG. **1**A in one or more other exemplary embodiments. For example, the content reproduced by the wearable device **100** may include content of which reproduction is required or controlled based on an application installed in the wearable device **100**.

[0210] The application installed in the wearable device **100** may include, for example, a video player application, an

album application, a camera application, a Digital Multimedia Broadcasting (DMB) application, a map application, a browser application, an application store application, a video call application, a news and weather application, a calendar application, an Instant Messenger (IM) application, a phone book application, an e-mail application, a content sharing application, an electronic book application, a social media application, a messaging application, an augmented reality application, and the like, but is not limited thereto in one or more other exemplary embodiments.

[0211] The applications described throughout the specification refer to programs for performing an objective operation by using the wearable device **100**. For example, the e-mail application is a program for transmitting and receiving e-mails and managing the transmitted and received e-mails. The content described throughout the specification may be provided in at least one form from among a still image, a moving image, audio, text, and multimedia, but is not limited thereto in one or more other exemplary embodiments.

[0212] When content is being reproduced by the wearable device **100** that the wearer **101** is wearing, the wearable device **100** may obtain at least one of content reproduction related information of the wearable device **100**, bio information of the wearer **101**, peripheral environment information of the wearable device **100**, and personal information of the wearer **101**. The above-described information obtained by the wearable device **100** represents information that may influence health of the wearer **101**.

[0213] The content reproduction related information of the wearable device **100** may include information based on an operation of the wearable device **100**. For example, the content reproduction related information of the wearable device **100** may include information based on at least one of a content reproduction time, a battery consumption amount of the wearable device **100**, a temperature of the wearable device **100**, a heating state (e.g., overheating state) of the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, the battery consumption amount of the wearable device **100** may be a battery consumption amount of another device (for example, the mobile device **250**) for reproducing content.

[0214] A method of obtaining the content reproduction related information of the wearable device **100** may be the same as or similar to that described with reference to a table of FIG. **1**B, but is not limited thereto in one or more other exemplary embodiments. FIG. **1**B is a table for explaining a method of obtaining the content reproduction related information of the wearable device **100** and a content reproduction stop request reference, according to an exemplary embodiment. The content reproduction stop request reference is a reference (i.e., reference information) for displaying the content reproduction stop request guide information **103**. The content reproduction stop request guide information **103** indicates information informing the wearer **101** that it may be requested to stop reproduction of the content. The content reproduction stop request guide information **103** may be expressed as notification information or alarm information. According to another exemplary embodiment, information regarding a stopping of viewing of the content or wearing of the wearable device **100** (e.g., a screen advising the user to stop viewing content or to remove the wearable device **101**) may be output instead of the content reproduction stop request guide information **103**. Numerical values of FIG. **1**B are mere examples and it is understood that one or more other exemplary embodiments are not limited thereto.

[0215] Referring to FIG. **1**B, a reproduction time of the content may be obtained in connection with content reproduction performed by the wearable device **100**. For example, the wearable device **100** may obtain time counted by starting reproduction of the content as the reproduction time Pt (or a providing time) of the content after the wearable sensor **210** senses wearing of the wearable device **100**.

[0216] Referring to FIG. **1**B, a battery consumption amount of the wearable device **100** may be obtained in connection with the content reproduction performed by the wearable device **100**. For example, the wearable device **100** obtains battery remains (e.g., remaining battery life) detected by starting the content reproduction as a reference battery remains Brq**1** after the wearable sensor **210** senses the wearing of the wearable device **100**. The wearable device **100** may periodically detect battery remains Brq**2** during a content reproduction period and obtain a difference (s=Brq**2**−Brq**1**) between the reference battery remains and the periodically detected battery remains as the battery consumption amount of the wearable device **100**. The battery remains may be detected by using discharge current and voltage of a battery **217**.

[0217] Referring to FIG. **1**B, a heating temperature of the wearable device **100** may be obtained in connection with the content reproduction performed by the wearable device **100**. For example, the wearable device **100** may obtain a temperature T detected by using the temperature sensor **218** during the content reproduction after the wearable sensor **210** senses the wearing of the wearable device **100** and the content reproduction is started, as the heating temperature of the wearable device **100**.

[0218] The heating temperature may be updated every time a sensing value of the temperature sensor **218** is received. The wearable device **100** may periodically operate the temperature sensor **218** to receive the sensing value of the temperature sensor **218** or may periodically monitor the sensing value of the temperature sensor **218** to obtain the heating temperature after the content reproduction is started.

[0219] As described above, information of the wearable device **100** may be obtained by using a sensing value of at least one sensor (for example, the temperature sensor **218**) mounted in the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, the battery consumption amount may be obtained by using the discharge current and voltage of the battery **217**.

[0220] When the battery **217** is not included in the wearable device **100**, and, for example, a battery of the mobile device **250** connected to the wearable device **100** by wire or wirelessly is used in the wearable device **100**, the above-described battery consumption amount may be a battery consumption amount of the mobile device **250**.

[0221] The method of obtaining the content reproduction related information of the wearable device **100** is not limited as shown in FIG. **1**B. For example, the wearable device **100** may obtain the content reproduction related information of the wearable device **100** based on a content reproduction start point irrespective of the sensing value of the wearable sensor **210**.

[0222] If the wearable device **100** receives the sensing value indicating a wearing status from the wearable sensor **210** irrespective of the content reproduction start point, the wearable device **100** may periodically monitor the battery

remains to obtain the battery consumption amount by using a difference of the monitored battery remains over time. When the battery consumption amount is obtained as described above, a point where the above-described reference battery remains Brq**1** is detected is a point where wearing of is sensed by the sensing value of the wearable sensor **210**.

[0223] If the wearable device **100** receives the sensing value indicating a wearing status from the wearable sensor **210** irrespective of the content reproduction start point, the wearable device **100** may periodically monitor an output value of the temperature sensor **218** to obtain the heating temperature.

[0224] The wearable device **100** may obtain bio information of the wearer **101** as described with reference to tables of FIGS. **1**C-**1** and **1**C-**2**, but a method of obtaining the bio information of the wearer **101** by using the wearable device **100** is not limited thereto in one or more other exemplary embodiments. FIGS. **1**C-**1** and **1**C-**2** are tables for explaining a method of obtaining the bio information of the wearer **101** and a reproduction stop request reference. The reproduction stop request reference may be a reference for displaying the reproduction stop request guide information **103** as described with reference to FIG. **1**B. Numerical values of FIGS. **1**C-**1** and **1**C-**2** are mere examples and it is understood that one or more other exemplary embodiments are not limited thereto.

[0225] Referring to FIGS. **1**C-**1** and **1**C-**2**, the bio information of the wearer **101** obtained by the wearable device **100** may include at least one of at least one piece of bio information based on eyes of the wearer **101** and health information of the wearer **101**, but is not limited thereto in one or more other exemplary embodiments.

[0226] The at least one piece of bio information based on the eyes of the wearer **101** may include information indicating whether the eyes of the wearer **101** are bloodshot, whether the eyes are dry, an eye blink number, an eye blink cycle, whether a position of a pupil is changed, whether the pupils are changed, and the like, but is not limited thereto in one or more other exemplary embodiments.

[0227] The at least one piece of bio information based on the eyes of the wearer **101** may be obtained by using at least one of the bio information obtaining camera **208**, the sensor **209**, and the external electronic patch **219** that are mounted in the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, the health information of the wearer **101** may be obtained by using a sensor mounted in an external device.

[0228] The wearable device **100** may obtain bio information regarding whether the eyes are bloodshot by using a color distribution of an eye image obtained by the bio information obtaining camera **208** after wearing of the wearable device **100** is sensed by using the sensing value of the wearable sensor **210** and content reproduction is started. The color distribution of the eye image may include a value indicating a ratio of pixels having an R value (i.e., red value) that is approximate to 255 among total pixels included in the eye image, but is not limited thereto in one or more other exemplary embodiments. The R value approximate to 255 may mean, for example, the R value equal to or greater than a predetermined number (e.g., 240), but is not limited thereto in one or more other exemplary embodiments.

[0229] FIG. **1**H is a diagram for explaining a process of obtaining bio information regarding whether eyes are bloodshot by using an eye image obtained by using the bio information obtaining camera **208**. The wearable device **100** may periodically obtain the eye image by using the bio information obtaining camera **208** when content reproduction is started by the wearable device **100** and during the content reproduction as shown in FIG. **1**H.

[0230] The wearable device **100** may compare a color distribution of an eye image **115** when the content reproduction is started and a color distribution of an eye image **116** periodically obtained during the content reproduction to determine whether the eyes are bloodshot. The wearable device **100** may obtain a result of determining whether the eyes are bloodshot as the bio information regarding whether the eyes are bloodshot.

[0231] The wearable device **100** may obtain bio information regarding whether the eyes are dry by using a value indicating humidity sensed by the sensor **209** after wearing of the wearable device **100** is sensed, using the sensing value of the wearable sensor **210**, and content reproduction is started. For example, if wearing of the wearable device **100** is sensed by using the sensing value of the wearable sensor **210** and then content reproduction is started, the wearable device **100** may obtain the bio information regarding whether the eyes are dry by using an electrical signal with respect to sound received from the electronic patch **219** and the eye image obtained by the bio information obtaining camera **208**.

[0232] If wearing of the wearable device **100** is sensed by using the sensing value of the wearable sensor **210** and then content reproduction is started, the wearable device **100** may compare eye images obtained by the bio information obtaining camera **208** for a certain period of time (for example, one second) to obtain the bio information regarding the eye blink number and the eye blink cycle.

[0233] If wearing of the wearable device **100** is sensed by using the sensing value of the wearable sensor **210** and then content reproduction is started, the wearable device **100** may compare eye images obtained by the bio information obtaining camera **208** for a certain (e.g., predetermined) period of time (for example, a content reproduction time) or by a certain period of time (for example, 30 minutes) unit to obtain the bio information regarding whether the position of the pupil is changed.

[0234] FIG. **1**D is a diagram of an eye image **104** for explaining a method of obtaining bio information regarding whether a position of a pupil is changed, according to an exemplary embodiment. Referring to FIG. **1**D, every time the eye image **104** is obtained by the bio information obtaining camera **208** as shown in FIG. **1**D, the wearable device **100** detects an eye region **105**, a pupil region **106**, and a center point **107** from the eye image **104** by using an eye recognition algorithm. The eye recognition algorithm may include an outline detection algorithm. The wearable device **100** may compare a location of the center point **107** detected from the eye image **104** to obtain the bio information regarding whether the position of the pupil is changed.

[0235] The eye recognition algorithm may be configured to detect an eye region **105** by using the outline detection algorithm, detect a line segment **110**-**1** connecting points **108** and **109** on the eye region **105**, detect a line segment **111** vertically bisecting a line segment, and detect a point that the detected line segments **110**-**1** and **111** cross as the center point **107**, but is not limited thereto in one or more other exemplary embodiments.

[0236] The wearable device **100** may obtain the bio information regarding whether the position of the pupil is changed by using an eyes tracking method of the wearer **101** based on

2D coordinate information of the center point **107** of FIG. **1**D. The 2D coordinate information of the center point **107** may be center coordinate information of a pupil region **114**. To track eyes of the wearer **101** by using the center coordinate information of the pupil region **114**, the wearable device **100** may store reference pupil center coordinate information in advance. The reference pupil center coordinate information may be detected as information indicating where the eyes of the wearer **101** stay on an image displayed on the display **212**.

[0237] If the 2D coordinate information of the center point **107** is obtained, the wearable device **100** compares the 2D coordinate information and the reference pupil center coordinate information stored in advance. As a comparison result, the wearable device **100** detects the reference pupil center coordinate information stored in advance that is identical to the obtained 2D coordinate information of the center point **107**. The wearable device **100** may determine a location of the display **212** corresponding to the detected reference pupil center coordinate information as an eye location of the wearer **101**. The wearable device **100** may obtain the bio information regarding whether the position of the pupil of the wearer **101** is changed by using an eyes track function of the wearer **101**. The eyes track function of the wearer **101** is not limited as described above.

[0238] If wearing of the wearable device **100** is sensed by using the sensing value of the wearable sensor **210** and then content reproduction is started, the wearable device **100** may obtain the bio information regarding whether the position of the pupil is changed by using a pupil image obtained by the bio information obtaining camera **208** for a certain period of time (for example, a content reproduction time) or by a certain period of time (for example, 30 minutes) unit.

[0239] FIG. **1**E is a diagram of a pupil image **112** for explaining a method of obtaining bio information regarding whether a pupil is changed, according to an exemplary embodiment. Referring to FIG. **1**E, every time the pupil image **112** is obtained by the bio information obtaining camera **208** as shown in FIG. **1**E, the wearable device **100** detects a pupil region **113** and a diameter **114** of the pupil region **113** from the pupil image **112** by using an eye recognition algorithm. The wearable device **100** may compare the pupil region **113** and the diameter **114** of the pupil region **113** detected from the pupil image **112** to obtain the bio information regarding whether the pupil is changed.

[0240] A method of obtaining the bio information regarding whether the pupil is changed is not limited as described above. For example, according to another exemplary embodiment, the wearable device **100** may compare a width of the pupil region **113** included in the pupil image **112** to obtain the bio information regarding whether the pupil is changed. The wearable device **100** may detect a radius by using the diameter **114** of the pupil region **113** and detect the width of the pupil region **113** by applying the detected radius to an equation of calculating a width of a circle.

[0241] The bio information based on the eyes of the wearer **101** is not limited as described above. For example, the wearable device **100** may obtain the bio information based on the eyes of the wearer **101** based on a point where content reproduction is started irrespective of the sensing value of the wearable sensor **210**.

[0242] The wearable device **100** may obtain the health information of the wearer **101** related to the content reproduction. For example, if wearing of the wearable device **100** is sensed by using the sensing value of the wearable sensor **210** and then the content reproduction is started, the wearable device **100** may obtain a value sensed by a bio sensor (for example, a body temperature sensor mounted in one of the audio output units **215** and **216**) mounted in the wearable device **100** or a bio sensor mounted in an external device as the health information (for example, a temperature of the wearer **101**). The bio sensor may include, for example, a body temperature sensor, a sweating sensor, a blood pressure sensor, a pulse sensor, a blood sugar sensor, etc., but is not limited thereto in one or more other exemplary embodiments.

[0243] When content reproduction is started, the wearable device **100** may periodically detect a sensing value of the bio sensor, compare the detected sensing values, and obtain a detected variance or difference as the health information of the wearer **101**.

[0244] The wearable device **100** may obtain health information of the wearer **101** such as a sweating amount, a blood pressure, a pulse, a blood sugar, etc., like the above-described health information regarding a body temperature.

[0245] The wearable device **100** may obtain information regarding an activity amount (for example, a moving distance of the wearer **101**, a moving speed of the wearer **101**, a calorie consumption amount of the wearer **101**, etc.) of the wearer **101** by using a location tracking application of the wearable device **100**, a health application, or an external device (for example, an activity amount measuring device of the wearer **101** such as a communicable pedometer, a treadmill, etc.).

[0246] When the content reproduction is started after wearing of the wearable device **100** is sensed, the wearable device **100** may obtain the activity amount of the wearer **101**, but a method of obtaining the activity amount of the wearer **101** is not limited thereto in one or more other exemplary embodiments. For example, when the content reproduction is started irrespective of the sensing value of the wearable sensor **210**, the wearable device **100** may obtain the activity amount of the wearer **101**. Also, when the content reproduction is started, the wearable device **100** may obtain the activity amount of the wearer **101**, compare the activity amount of the wearer **101** periodically obtained during a content reproduction period and the activity amount of the wearer **101** obtained when the content reproduction is started, and obtain an activity variance of the wearer **101** as information regarding the activity amount of the wearer **101**.

[0247] If the content reproduction is started after wearing of the wearable device **100** is sensed, the wearable device **100** may access an information management server such as a medical information management server to obtain medical information of the wearer **101** from received medical information. The medical information may include, for example, past medical history information, current medical history information, etc., but is not limited thereto in one or more other exemplary embodiments.

[0248] A method of obtaining peripheral environment information of the wearable device **100** may be the same as described with respect to a table of FIG. **1**F. FIG. **1**F is a table for explaining the method of obtaining peripheral environment information of the wearable device **100** and a reproduction stop request reference, according to an exemplary embodiment. Numerical values of FIG. **1**F are mere examples and it is understood that one or more other exemplary embodiments are not limited thereto.

[0249] Referring to FIG. **1**F, the peripheral environment information of the wearable device **100** may include at least one of information regarding a peripheral color temperature

of the wearable device **100**, light (or infrared rays), temperature, humidity, wind, altitude, air pressure, fine dust, and the like, but is not limited thereto in one or more other exemplary embodiments.

[0250] If content reproduction is started after wearing of the wearable device **100** is sensed by a sensing value of the wearable sensor **210**, the wearable device **100** may obtain the peripheral environment information of the wearable device **100** by using a sensing value of the at least one sensor **209** mounted in the wearable device **100** or a sensing value of at least one sensor mounted in an external device (for example, a smart watch, etc.) connected to the wearable device **100** but is not limited thereto in one or more other exemplary embodiments.

[0251] For example, the wearable device **100** may obtain the peripheral environment information of the wearable device **100** at the time of reproducing content irrespective of the sensing value of the wearable sensor **210**. The wearable device **100** may obtain the peripheral environment information of the wearable device **100** by using an environment information providing application providing environment information based on a physical location of the wearable device **100**. The wearable device **100** may be connected to an environment information providing server by using the environment information providing application to receive the environment information from the environment information providing server.

[0252] A method of obtaining personal information of the wearer **101** may be the same as or similar to that described with reference to a table of FIG. **1**G, but is not limited thereto. FIG. **1**G is a table for explaining a method of obtaining the personal information of the wearer **101** and a reproduction stop request reference, according to an exemplary embodiment.

[0253] Referring to FIG. **1**G, the personal information of the wearer **101** may include at least one of age information and schedule information, but is not limited thereto.

[0254] If content reproduction is started after wearing of the wearable device **100** is sensed by a sensing value of the wearable sensor **210**, the wearable device **100** may request the wearer **101** to input the age information and obtain information input according to a request as the age information of the wearer **101**. A method of obtaining the age information of the wearer **101** is not limited thereto in one or more other exemplary embodiments. For example, if the content reproduction is started, the wearable device **100** may request the age information of the wearer **101** from life log information of the wearer **101** stored in the wearable device **100**, life log information stored in an external device of the wearable device **100**, or personal information management software (PIMS) and obtain information received in response to a request as the age information of the wearer **101**.

[0255] If the content reproduction is started after wearing of the wearable device **100** is sensed by the sensing value of the wearable sensor **210**, the wearable device **100** may request the schedule information having information related to currently reproduced content from the life log information of the wearer **101** stored in the wearable device **100**, the life log information stored in the external device of the wearable device **100**, or the PIMS and obtain information received in response to a request as the age information of the wearer **101**.

[0256] The information related to the currently reproduced content may include the schedule information of the wearer **101** having time information before or after the content reproduction, but is not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may request a schedule input from the wearer **101** before reproducing the content and obtain information input according to a request as the schedule information of the wearer **101**.

[0257] The wearable device **100** may obtain the personal information of the wearer **101** related to a content reproduction start time irrespective of the sensing value of the wearable sensor **210**.

[0258] The wearable device **100** may display the reproduction stop request guide information **103** regarding content, like in the screen **120** of FIG. **1**A, by using the obtained information. The reproduction stop request guide information **103** regarding content may be provided to prevent or solve a problem that may occur to the wearer **101** when the content is continuously reproduced by the wearable device **100**.

[0259] For example, the wearable device **100** may display the reproduction stop request guide information **103** regarding content so as to protect health (e.g., reducing eye fatigue) of the wearer **101** who views content reproduced by the wearable device **100**.

[0260] Relaxing of the eye fatigue of the wearer **101** described with reference to exemplary embodiments may be expressed in various ways based on an effect that may be provided to the wearer **101**. For example, reducing of the eye fatigue of the wearer **101** may be expressed as influencing the health of the wearer **101** like relaxing of tension and reducing eye fatigue of the wearer **101**, protecting of eyesight of the wearer **101**, relieving of stress and stabilizing the mind (e.g., reducing dizziness) of the wearer **101**, improving of concentration of the wearer **101**, etc. Various expressions regarding influencing of the health of the wearer **101** are not limited as described above.

[0261] To determine whether to display the reproduction stop request guide information **103** regarding the content by using the obtained information, the wearable device **100** may set or store reproduction stop request reference information. The reproduction stop request reference information (hereinafter referred to as reference information) may differ according to the information obtained by the wearable device **100**. Furthermore, according to an exemplary embodiment, the wearer **101** may set or adjust the reference information.

[0262] Referring to FIG. **1**B, when the information obtained by the wearable device **100** is the reproduction time Pt of the content, the reference information may be set as time information. The time information set as the reference information may take into consideration the time expected to build up or cause the eye fatigue of the wearer **101**.

[0263] For example, if the reproduction time Pt is more than 2 hours (2H), the wearable device **100** may display the reproduction stop request guide information **103** on the display **212** as shown on the screen **120** of FIG. **1**A. Reference information regarding the reproduction time Pt of the content is not limited to 2 hours. For example, the reference information regarding the reproduction time Pt of the content may include at least one piece of predetermined time information such as 3 hours, 3 hours 30 minutes, etc.

[0264] Referring to FIG. **1**B, when information obtained by the wearable device **100** is a battery consumption amount, the reference information may be set as ratio information (for example, 50%). The reference information may take into consideration the battery consumption amount expected to build up or cause the eye fatigue of the wearer **101**. The

wearable device **100** may detect the battery consumption amount in such a manner that the wearable device **100** may detect difference information between battery remains (i.e., remaining battery life). For example, when the content reproduction is started, and the battery remains detected by the wearable device **100** is 90%, and when the battery remains detected during the content reproduction is 40%, the wearable device **100** may detect the battery consumption amount as 50%.

[0265] When the reference information is set as 50%, if the battery consumption amount detected by the wearable device **100** is more than 50%, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212** as shown on the screen **120** of FIG. **1**A. The reference information regarding the battery consumption amount is not limited to 50% in one or more other exemplary embodiments. For example, the reference information regarding the battery consumption amount may include at least one piece of ratio information (%) such as 40%, 45%, etc.

[0266] Referring to FIG. **1**B, if the information obtained by the wearable device **100** is a heating temperature, and includes information regarding the heating temperature and a maintenance time, the reference information may include a temperature and maintenance time information. The reference information may take into consideration the heating temperature and time for maintaining the heating temperature that are expected to build up or cause the eye fatigue of the wearer **101**.

[0267] For example, if the heating temperature is maintained at 49 degrees for more than 1 hour, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212** as shown on the screen **120** of FIG. **1**. To detect a maintenance time of the heating temperature, the wearable device **100** may measure time from a time at which the heating temperature is detected as 49 degrees.

[0268] The reference information regarding the heating temperature is not limited thereto in one or more other exemplary embodiments. For example, the reference information regarding the heating temperature set in the wearable device **100** may include at least one of the heating temperature and maintenance time information such as maintaining at 49 degrees for more than 2 hours or 50 degrees for 1 hour 30 minutes, etc. The reference information regarding the heating temperature is not limited to 49 degrees.

[0269] Referring to FIG. **1**B, when the information obtained by the wearable device **100** relates to the heating temperature, and includes the heating temperature, the reference information set in the wearable device **100** may include a temperature. The reference information may take into consideration the heating temperature expected to build up or cause the eye fatigue of the wearer **101**. A cycle for receiving a sensing value by the temperature sensor **218** set in the wearable device **100** may take into consideration the eye fatigue of the wearer **101**. For example, a cycle for receiving the sensing value by the temperature sensor **218** may be set as 30 minutes. When the sensing value by the temperature sensor **218** received at the cycle of 30 minutes is 49 degrees, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**.

[0270] Referring to FIG. **1**C-**1**, when the information obtained by the wearable device **100** is information regarding whether the eyes of the wearer **101** are bloodshot, the reference information set in the wearable device **100** may include information (for example, 40%) regarding an increase rate of the number of pixels (for example, pixels having an R value greater than 241) having the R value approximate to 255. The wearable device **100** may compare the number of the pixels having the R value approximate to 255 and included in an eye image detected when content reproduction is started and the number of the pixels having the R value approximate to 255 and included in an eye image detected during the content reproduction to detect the increase rate of the number of pixels having the R value approximate to 255 by using a difference. Referring to FIG. **1**C-**1**, if the increase rate of the number of pixels having the R value approximate to 255 is more than 40%, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212** as shown on the screen **120** of FIG. **1**A.

[0271] The reference information for detecting whether eyes are bloodshot set in the wearable device **100** is not limited as described above. For example, the reference information for detecting whether the eyes are bloodshot may be set to determine if the number of pixels having the R value approximate to 255 exceeds 50% of the total number of pixels. When the reference information is set as described above, if content reproduction is started, the wearable device **100** obtains an eye image by using the bio information obtaining camera **208** by a certain period of time unit. The wearable device **100** checks if the number of pixels having the R value approximate to 255 included in the obtained eye image exceeds 50% of the total number of pixels. If the number of pixels having the R value approximate to 255 included in the obtained eye image exceeds 50% of the total number of pixels, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**.

[0272] The reference information for detecting whether the eyes are bloodshot set in the wearable device **100** may be based on the number of pixels having the R value equal to 255.

[0273] Referring to FIG. **1**C_**1**, when the information obtained by the wearable device **100** is information regarding whether the eyes of the wearer **101** are dry, and uses the sensor **209**, the reference information set in the wearable device **100** may include humidity information (for example, 30%) and maintenance time information (for example, 1 hour). For example, if content reproduction is started, the wearable device **100** may monitor a sensing value of the sensor **209** by a certain period of time unit. If it is determined that the sensing value of the sensor **209** is maintained for more than 1 hour below 30%, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. To determine if the sensing value is maintained for more than 1 hour, the wearable device **100** may measure time from a time at which the sensing value of the sensor **209** is detected at below 30%.

[0274] The reference information for determining whether the eyes are dry set in the wearable device **100** is not limited as described above. For example, the reference information for determining whether the eyes are dry may be set to humidity below 30% for more than 2 hours, humidity below 29% for 1 hour 30 minutes, etc. The reference information for determining whether the eyes are dry set in the wearable device **100** may be based on a humidity variance or difference. For example, if it is detected that the humidity variance is reduced by more than 20%, the wearable device **100** may set the reference information for determining whether the eyes are dry such that the reproduction stop request guide information **103** may be displayed on the display **212**.

[0275] The humidity included in the reference information for determining whether the eyes of the wearer **101** are dry may be variably set according to an average humidity of an environment in which the wearable device **100** is used.

[0276] Referring to FIG. **1**C-**1**, the reference information for determining whether the eyes are dry may be set to determine whether the eyes are dry by using an electrical signal regarding sound received from a microphone included in the electronic patch **219** of FIG. **2**C and an eye image obtained by the bio information obtaining camera **208**.

[0277] For example, the wearable device **100** may detect an amplitude of the electrical signal regarding the sound received from the electronic patch **219** at a time in which an eye blink is detected by an eye image obtained by the bio information obtaining camera **208**. The electrical signal may indicate a magnitude level of the sound. The wearable device **100** detects an amplitude of the electrical signal regarding the sound received from the electronic patch **219** at a time in which the eye blink is not detected by the eye image.

[0278] The wearable device **100** compares the amplitude of the electrical signal detected at the time in which the eye blink is detected and the amplitude of the electrical signal detected at the time in which the eye blink is not detected. As a result of the comparison, if the amplitude of the electrical signal detected at the time in which the eye blink is detected is greater than the amplitude of the electrical signal detected at the time in which the eye blink is not detected, the wearable device **100** checks if the greater amplitude continues to be detected for a certain (e.g., predetermined) period of time (for example, 30 minutes).

[0279] If the amplitude of the electrical signal detected at the time in which the eye blink is detected is greater than the amplitude of the electrical signal detected at the time in which the eye blink is not detected for a certain period of time, the wearable device **100** may set the reference information for determining whether the eyes are dry so that the reproduction stop request guide information **103** may be displayed on the display **212**.

[0280] To detect the eye blink, the eye image obtained by the bio information obtaining camera **208** may be a moving image continuously photographed for a certain period of time.

[0281] Referring to FIG. **1**C-**1**, the reference information regarding the eye blink number may be set below 9 times per minute, though it is understood that this is merely an example and one or more other exemplary embodiments are not limited thereto. In the present example, if content reproduction is started by the wearable device **100**, the wearable device **100** detects the eye blink number per minute by using an eye image obtained by the bio information obtaining camera **208**. If the detected eye blink number is below 9 times per minute, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. The eye image obtained by the bio information obtaining camera **208** to detect the eye blink number may be a continuously photographed moving image during a certain period of time.

[0282] The reference information regarding the eye blink number is not limited as described above. For example, the wearable device **100** may set the reference information regarding the eye blink number so that the reproduction stop request guide information **103** may be displayed on the display **212** if a status in which the eye blink number is below 9 times per minute is maintained for more than 30 minutes. The reference information may set the eye blink number per minute below 6 times.

[0283] The reference information regarding the eye blink number may be set based on a variance or a difference of the eye blink number. For example, the wearable device **100** compares the eye blink number detected from the eye image obtained by the bio information obtaining camera **208** at a certain period during a content reproduction period. As a result of the comparison, if the variance of the eye blink number is more than 15%, the wearable device **100** may set the reference information regarding the eye blink number so that the reproduction stop guide information **103** may be displayed on the display **212**. The variance of the eye blink number may include both an increase and a decrease in the eye blink number.

[0284] Referring to FIG. **1**C-**1**, the reference information regarding the eye blink cycle may be set as 15 seconds. For example, if the content reproduction is started by the wearable device **100**, the wearable device **100** detects the eye blink cycle based on an eye image obtained by the bio information obtaining camera **208**. If time corresponding to the detected eye blink cycle is more than 15 seconds, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. The reference information regarding the eye blink cycle is not limited as described above. A moving image continuously photographed for a certain period of time may be the eye image obtained by the bio information obtaining camera **208** to detect the eye blink cycle.

[0285] The reference information regarding the eye blink cycle may be set as a variance or a difference of the eye blink cycle. For example, the wearable device **100** detects the eye blink cycle at a certain (e.g., predetermined) cycle by using the eye image obtained by the bio information obtaining camera **208** while the content is reproduced by the wearable device **100**. The wearable device **100** compares the detected eye blink cycle. As a result of the comparison, if the variance of the eye blink cycle is more than 15%, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. The variance of the eye blink cycle may include both a case in which the eye blink cycle is increased and a case in which the eye blink cycle is decreased.

[0286] Referring to FIG. **1**C-**1**, the reference information for determining whether the position of the pupil is changed may be set to determine if a location variance is below 0.4 mm. For example, if the content reproduction is started by the wearable device **100**, the wearable device **100** detects the center point **107** as described with reference to FIG. **1**D based on the eye image obtained by the bio information obtaining camera **208**. If a distance between a location of the center point **107** detected from a previous eye image and a location of the center point **107** detected from a current eye image is below 0.4 mm, the wearable device **100** may determine that there is little position change in the pupil of the wearer **101**.

[0287] According to the determination, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. The eye image obtained by the bio information obtaining camera **208** to determine whether the position of the pupil is changed may be a moving image continuously photographed during a certain period of time.

[0288] Referring to FIG. **1**C-**1**, the reference information for determining whether the pupil is changed may be set to

determine if a reduced width of the pupil continues for more than 1 hour. For example, if the content reproduction is started by the wearable device **100**, the wearable device **100** detects the diameter **114** of the pupil region **113** as described with reference to FIG. **1**E based on a pupil image obtained by the bio information obtaining camera **208**. The wearable device **100** calculates the width of the pupil region **113** based on the detected diameter **114** of the pupil region **113**. The wearable device **100** compares a width of the pupil region **113** detected from a current pupil image and a width of the pupil region **113** detected from a previous pupil image to determine if the width of the pupil region **113** is reduced.

[0289] If it is determined that the width of the pupil region **113** detected from the current pupil image is smaller than the width of the pupil region **113** detected from the previous pupil image, the wearable device **100** determines if the reduced width of the pupil region **113** continues for more than a predetermined time (e.g., 1 hour). To determine if the reduced width of the pupil region **113** continues for more than 1 hour, the wearable device **100** may measure time from a time at which the reduced width of the pupil region **113** is detected.

[0290] If it is determined that the reduced width of the pupil region **113** continues for more than 1 hour, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. The pupil image obtained by the bio information obtaining camera **208** to determine whether the pupil is changed may be a moving image continuously photographed for a certain period of time.

[0291] The reference information for determining whether the pupil is changed is not limited as described above. For example, according to another exemplary embodiment, the wearable device **100** may determine whether a diameter of the pupil detected from the pupil image is maintained at below about 3 mm for more than 1 hour 30 minutes to display the reproduction stop request guide information **103** on the display **212**.

[0292] Alternatively, the wearable device **100** detects a diameter of the pupil detected from a currently obtained pupil image. The wearable device **100** compares a diameter detected from a previously obtained pupil image and the diameter of the pupil detected from the currently obtained pupil image to determine if the diameter of the pupil is reduced. If it is determined that the reduced diameter of the pupil continues for more than 1 hour, the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. In the above-described case, the reference information for determining whether the pupil is changed includes information for determining if the diameter of the pupil smaller than a previous diameter of the pupil is maintained for more than 1 hour. The bio information regarding whether the above-described pupil is changed may be referred to as bio information regarding a status of the pupil.

[0293] Referring to FIG. **1**C-**2**, when a body temperature of the wearer **101** is higher or lower than an average body temperature during a content reproduction period, reference information regarding the body temperature may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, if a body temperature variance of the wearer **101** increases by 1° C. during the content reproduction period, the reference information regarding the body temperature may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**. The average body temperature may be an average body temperature of the wearer **101**, although it is understood that one or more other exemplary embodiments are not limited thereto. For example, according to another exemplary embodiment, the average body temperature may be a generally known average body temperature (e.g., a predetermined average body temperature).

[0294] In the generally known average body temperature, the average body temperature set in the wearable device **100** may differ according to whether the wearer **101** is an adult or a child. For example, the average body temperature set in the wearable device **100** may be 36.6~36.9° C. in the adult and 36.0~37.5° C. in the child. The average body temperature may be differently applied according to a location in which the body temperature of the wearer **101** is measured. For example, different average body temperatures may be applied according to a case where the body temperature is measured based on an ear of the wearer **101** and a case where the body temperature is measured based on an armpit of the wearer **101**.

[0295] The location in which the body temperature is measured may be determined according to a body temperature measurement device. For example, when the body temperature device is an earring or in-ear type, the wearable device **100** may recognize the measured body temperature as a body temperature based on the ear. When the body temperature measurement device is a shoulder band type, the wearable device **100** may recognize the measured body temperature as a body temperature based on the armpit. The body measurement device may be an external device connected to the wearable device **100** by wire or wirelessly and may be a wearable device. The wearable device **100** may recognize if the body temperature measurement device is the earring type or the shoulder band type based on identification information of the body temperature measurement device.

[0296] Referring to FIG. **1**C-**2**, when a sweating amount of the wearer **101** is greater than an average sweating amount during the content reproduction period, reference information regarding the sweating amount may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments.

[0297] For example, if a variance or difference of the sweating amount of the wearer **101** during the content reproduction period is greater than 10%, the reference information regarding the variance of the sweating amount may be set such that the wearable device **100** may display the reproduction stop request guide information **103** on the display **212**. The average sweating amount may be an average sweating amount of the wearer **101**, but is not limited thereto in one or more other exemplary embodiments.

[0298] The reference information regarding the sweating amount may be differently set according to a use environment of the wearable device **100**. For example, reference information regarding a sweating amount in an environment having a small sweating amount due to a dry use environment of the wearable device **100** and reference information regarding a sweating amount in an environment having a large sweating amount due to a humid use environment thereof may be differently set.

[0299] Referring to FIG. **1**C-**2**, if a blood pressure of the wearer **101** is higher or lower than a normal blood pressure

during the content reproduction period, reference information regarding the blood pressure may be set such that the reproduction stop request stop guide **103** may be displayed on the display **212** by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, if it is determined that a blood pressure variance of the wearer **101** during the content reproduction period is higher than 20%, the reference information regarding the blood pressure may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**.

[0300] Referring to FIG. **1**C-**2**, if a pulse of the wearer **101** is faster or slower than a normal pulse, reference information regarding the pulse may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, if a pulse variance of the wearer **101** during the content reproduction period is greater than 10%, the reference information regarding the pulse may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**.

[0301] Referring to FIG. **1**C-**2**, if a blood sugar of the wearer **101** is higher than a normal blood sugar during the content reproduction period, reference information regarding the blood sugar may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. For example, if it is determined that a blood sugar variance of the wearer **101** is higher than 20%, the reference information regarding the blood sugar may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100** but is not limited thereto.

[0302] Referring to FIG. **1**C-**2**, if an activity amount of the wearer **101** is greater than a normal activity amount during the content reproduction period, reference information regarding an activity amount may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. The normal activity amount may be represented as an activity amount (for example, a numerically expressed moving distance, a moving speed, a calorie consumption amount, a heart rate, etc.) in which a breath or breathing rate of the wearer **101** may be determined to be a certain state.

[0303] Referring to FIG. **1**C-**2**, the wearable device **100** may change reference information regarding information (for example, content reproduction related information of the wearable device **100**, bio information of the wearer **101**, peripheral environment information of the wearable device **100**, etc.) used by the wearable device **100** to display the reproduction stop request guide information **103** on the display **212** by using obtained medical information.

[0304] For example, when the wearer **101** is determined as a diabetes patient based on medical information obtained by the wearable device **100**, the wearable device **100** may change the reference information regarding the blood sugar variance from 20% to 10%. If the wearer **101** is determined to suffer from conjunctivitis based on the medical information obtained by the wearable device **100**, the wearable device **100** may change reference information for determining whether eyes are bloodshot. The wearable device **100** may change reference information related to content reproduction related information of the wearable device **100**, peripheral environment information of the wearable device **100**, etc., based on the medical information.

[0305] Referring to FIG. **1**F, reference information regarding a color temperature may be set based on a peripheral color temperature of the wearable device **100** and maintenance time during the content reproduction period. For example, when the color temperature corresponds to dark blue light, if 2 hours has elapsed, the reference information regarding the color temperature may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**. When the color temperature is a light red light, if 4 hours has elapsed, the reference information regarding the color temperature may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**. The reference information regarding the color temperature is not limited as described above.

[0306] Referring to FIG. **1**F, reference information regarding light may be set according to a peripheral brightness level and exposure time of the wearable device **100** during the content reproduction period. Reference information regarding infrared rays may be set according to a peripheral infrared index and exposure time of the wearable device **100** during the content reproduction period

[0307] Referring to FIG. **1**F, if a peripheral temperature of the wearable device **100** is higher than a reference (e.g., predetermined) temperature or a temperature variance or difference is higher than 3° C. during the content reproduction period, reference information regarding a temperature may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**.

[0308] Referring to FIG. **1**F, if a peripheral humidity of the wearable device **100** is lower than 30% or higher than 70% during the content reproduction period, reference information regarding a humidity may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**.

[0309] Referring to FIG. **1**F, if a peripheral wind strength of the wearable device **100** is higher than a reference (e.g., predetermined) wind strength or a wind strength variance is higher than 10% during the content reproduction period, reference information regarding wind may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**. The reference wind strength may be indoor wind strength, but is not limited thereto in one or more other exemplary embodiments.

[0310] Referring to FIG. **1**F, if a peripheral altitude of the wearable device **100** is higher than a reference (e.g., predetermined) altitude (for example, 700 m) during the content reproduction period or an altitude variance during a short period of time (for example, 5 minutes) is higher than 40%, reference information regarding an altitude may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**.

[0311] Referring to FIG. **1**F, if a peripheral air pressure of the wearable device **100** is higher than a reference (e.g., predetermined) air pressure (for example, 2 air pressure) or an air pressure variance or difference is higher than 10% during the content reproduction period, reference information regarding an air pressure may be set such that the reproduc-

tion stop request guide information **103** may be displayed on the display **212** by the wearable device **100**.

[0312] Referring to FIG. **1**F, if a peripheral fine dust concentration of the wearable device **100** is higher than a reference (e.g., predetermined) fine dust concentration (for example, 30~80 μg/m^3) or a fine dust concentration variance or difference is higher than 10% during the content reproduction period, reference information regarding fine dust may be set such that the reproduction stop request guide information **103** may be displayed on the display **212** by the wearable device **100**. A reference regarding the fine dust concentration may be divided into a fine dust mode and an ultrafine dust mode.

[0313] Referring to FIG. **1**G, the wearable device **100** may change reference information regarding information used to determine whether to display the reproduction stop request guide information **103** on the display **212** during the content reproduction period according to other information, e.g., age information and schedule information.

[0314] For example, the wearable device **100** may differentiate the reference information of the information used to determine whether to display the reproduction stop request guide information **103** on the display **212** according to age groups. For example, the wearable device **100** may change reference information regarding a content reproduction time applied to 20 s from 2 hours to 4 hours, change the reference information regarding the content reproduction time applied to 30 s from 2 hours to 3 hours, and maintain the reference information regarding the content reproduction time applied to 40 s to 2 hours.

[0315] The wearable device **100** may change the reference information of the information used to determine whether to display the reproduction stop request guide information **103** on the display **212** according to schedules. For example, when a schedule of the wearer **101** includes a meeting before content is reproduced, the wearable device **100** may change reference information regarding a content reproduction time from 2 hours to 1 hour. When a next day schedule of the wearer **101** is a holiday, the wearable device **100** may change the reference information regarding the content reproduction time from 2 hours to 4 hours.

[0316] The reference information may be set by the wearable device **100** in advance based on an experimentally determined value, by the wearer **101**, or by an external device of the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. The experimentally determined value may be obtained by monitoring reproduction related information of the wearable device **100** that is generated when content is reproduced by the wearable device **100**, bio information of the wearer **101**, peripheral environment information of the wearable device **100**, personal information of the wearer **101**, etc., but is not limited thereto in one or more other exemplary embodiments.

[0317] The reproduction stop request references of FIGS. **1**B, **1**C-**1**, **1**C-**2**, **1**F, and **1**G represent reference information used to determine whether the wearable device **100** displays the content reproduction stop request guide information **103** on the display **212**.

[0318] FIG. **6** is a flowchart for explaining a method of operating the wearable device **100** according to an exemplary embodiment. FIG. **7** is a diagram of an example for explaining the flowchart of FIG. **6**, according to an exemplary embodiment. The flowchart of FIG. **6** will be described with reference to FIG. **7** below.

[0319] In operation S**601**, when reproduction of a game selected by the wearer **101** is started by the wearable device **100**, a game image **701** is reproduced through the display **212**. Accordingly, as shown on a screen **710** of FIG. **7**, the wearer **101** of the wearable device **100** views a real world provided the lens **204** and the display **212**.

[0320] When the wearable device **100** is configured as shown in FIG. **5**A or **5**B, the wearer **101** may view the game image **701** reproduced through the wearable device **100**.

[0321] When reproducing of the game image **702** is started, in operation S**602**, the wearable device **100** obtains at least one piece of information from among content reproduction related information of the wearable device **100**, bio information of the wearer **101**, peripheral environment information of the wearable device **100**, and personal information of the wearer **101** that are generated or obtained and relate to the reproducing of content.

[0322] The content reproduction related information of the wearable device **100**, the bio information of the wearer **101**, the peripheral environment information of the wearable device **100**, and the personal information of the wearer **101** may be obtained as descried above with reference to FIGS. **1**B through **1**G.

[0323] In operation S**603**, the wearable device **100** displays reproduction stop request guide information **702** regarding the content by using the obtained information. The reproduction stop request guide information **702** may be displayed on the display **212** as shown on a screen **720** of FIG. **7**. The reproduction stop request guide information **702** may be a reproduction stop request guide information image for informing the wearer **101** that it may be requested to stop reproducing the content (e.g., suggesting to the user to stop reproducing the content).

[0324] Referring to the screen **720** of FIG. **7**, the reproduction stop request guide information **702** may include at least one of a query language (for example, do you want to stop reproducing content?) regarding whether to stop reproducing content, an input item regarding a command (for example, yes) used to request a stop of the reproducing of the content, an input item regarding a command (for example, no) used to reject a stop of the reproducing of the content, etc., but is not limited thereto in one or more other exemplary embodiments.

[0325] For example, the query language regarding whether to stop reproducing the content may be output as an audio signal, and the reproduction stop request guide information **702** may include the input item regarding the command (for example, yes) used to request the stop of the reproducing of the content and the input item regarding the command (for example, no) used to reject the stop of the reproducing of the content.

[0326] The command used to request the stop of the reproducing of the content and the command used to reject the stop of the reproducing of the content may be received as a voice signal of the wearer **101**. If a command based on the voice signal of the wearer **101** is received through the microphone **214**, the wearable device **100** may change the reproduction stop request guide information **702** to reproduction stop request guide information **703** shown on a screen **730** of FIG. **7**. The wearer **101** may confirm based on the screen **730** of FIG. **7** that the input item (for example, yes) has been selected based on the voice signal of the wearer **101**.

[0327] Referring to the screens **720** and **730** of FIG. **7**, the wearable device **100** displays the reproduction stop request guide information **702** and **703** on a region on which the game

image **701** is displayed. To display the reproduction stop request guide information **702** and **703** like the screens **720** and **730** of FIG. **7**, the wearable device **101** may temporarily stop reproducing the game image **701** and provide the reproduction stop request guide information **702** and **703**. A period in which reproduction of the game image **702** is temporarily stopped may be set in advance according to a period to display the reproduction stop request guide information **702** and **703**. In one or more exemplary embodiments, the period may be adjusted by a user input or by an application's (e.g., game application) settings. Furthermore, according to one or more other exemplary embodiments, the game image **702** may not be temporarily stopped while the reproduction stop request guide information **702** and **703** is output.

[0328] To display the reproduction stop request guide information **702** and **703** like the screens **720** and **730** of FIG. **7**, the wearable device **100** may use a method of inserting a still image or a moving image into a moving image.

[0329] FIG. **8**A is a diagram of an example of explaining a relationship between a game frame **801** and a reproduction stop request guide information frame **802** as a frame structure of inserting a moving image into a moving image. The game frame **801** is a frame regarding or corresponding to the game image **701** of FIG. **7**. The reproduction stop request guide information frame **802** is a frame regarding or corresponding to the reproduction stop request guide information **702** and **703** of FIG. **7**.

[0330] Referring to FIG. **8**A, the wearable device **100** obtains or generates a frame **803** edited by inserting an M number of reproduction stop request guide information frame **802** between a frame N+1 and a frame N+2 of the game frame **801**. The frame described in FIG. **8**A is based on an intra (I) frame, though it is understood that this is merely exemplary and one or more other exemplary embodiments are not limited thereto. The M number of reproduction stop request guide information frame **802** may be determined according to a time at which the reproduction stop request guide information **702** is to be reproduced. For example, when the reproduction stop request guide information **702** is reproduced for 2 seconds, M may be 60. A section in which the reproduction stop request guide information **702** is reproduced is not limited as described above.

[0331] If a command (for example, yes) of the wearer **101** as described above is received in the section in which the reproduction stop request guide information **702** is reproduced, the wearable device **100** may change content of the reproduction stop request guide information frame **802** from the screen **720** of FIG. **7** to the screen **730**. According to the insertion of the reproduction stop request guide information frame **802**, the wearable device **100** may change a reproduction section of an audio signal corresponding to a subsequent frame including the frame N+2 of the game frame **801** to be synchronized with the frame N+2 of the game frame **802**.

[0332] The wearable device **100** may overlap and display the reproduction stop request guide information **702** on the game image **701** as shown in FIG. **8**B. The wearable device **100** may overlap the reproduction stop request guide information **702** on the game image **701** in a manner similar to that when inserting subtitle information into an image, but is not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may display the reproduction stop request guide information **702** in the form of a popup window. When the reproduction stop request guide information **702** is displayed in the form of the popup window, the wearable device **100** may continuously reproduce the game image **701**. The wearable device **100** may set a region in which the wearer **101** has no difficulty in viewing the game image **701** as a region to which the reproduction stop request guide information **702** may be overlapped.

[0333] The wearable device **100** may display the reproduction stop request guide information **702** as shown in FIG. **8**C on a display region independent from (e.g., separated from) the game image **701**. When the reproduction stop request guide information **702** is displayed on the display region independent from the game image **701** as shown in FIG. **8**C, the wearable device **100** may transmit the reproduction stop request guide information **702** to another device (or an external device) to display the reproduction stop request guide information **702** on a display of the other device. The other device may be a device whose display is positioned in a real world that may be viewed through the lens **204** of the wearable device **100**. For example, the other device may be a device such as a television (TV), a personal computer (PC), a mobile device, a monitor, a display, a tablet device, a projector device, etc.

[0334] To display the reproduction stop request guide information **702** as shown in FIG. **8**C, in a situation where the reproduction stop request guide information **702** is to be displayed, the wearable device **100** may transmit information regarding the reproduction stop request guide information **702** to the other device. The information regarding the reproduction stop request guide information **702** may include a reproduction stop request guide information message, but is not limited thereto in one or more other exemplary embodiments. For example, the information regarding the reproduction stop request guide information **702** may include the reproduction stop request guide information **702** and display standard information regarding the reproduction stop request guide information **702**. The display standard information may include at least one of a resolution and format information (for example, JPG, etc.) of the reproduction stop request guide information **702**, but is not limited thereto in one or more other exemplary embodiments. The format information of the reproduction stop request guide information **702** indicates a file format of the reproduction stop request guide information **702**.

[0335] A communication channel between the wearable device **100** and the other device may be set when the reproduction stop request guide information **702** is to be displayed, but is not limited thereto in one or more other exemplary embodiments. For example, the communication channel between the wearable device **100** and the other device may be set before the reproduction stop request guide information **702** is to be displayed. That is, the wearable device **100** may transmit the information regarding the reproduction stop request guide information **702** to a device whose display is positioned in the real world that may be viewed through the lens **204** among other devices in which the communication channel is set.

[0336] The device whose display is positioned in the real world that may be viewed through the lens **204** among other devices may be selected by the wearer **101** based on a list of devices connected to the wearable device **100**.

[0337] For example, the wearable device **100** receives and stores information regarding a location of another device when the communication channel is set. The wearable device **100** may select another device based on the stored information regarding the location of another device and a current

location of the wearable device **100**. When another device is a mobile device, the location information of the other device stored in the wearable device **100** may be changed every time the location of the other device is changed. The communication channel between the other device and the wearable device **100** may be set based on near field wireless communication or wireless communication such as Bluetooth, RFID, etc., but is not limited thereto.

[0338] When the reproduction stop request guide information **702** is displayed as shown in FIGS. **8**B and **8**C, the wearable device **100** may display more brief information than reproduction stop request guide information displayed on the screen **720** of FIG. **7**.

[0339] When the reproduction stop request guide information **702** is displayed as shown on the screen **720** of FIG. **7**, if a reproduction stop request for content is received through the user input unit **207** (operation S**604**), the wearable device **100** stops reproducing the content (operation S**605**). Since reproduction of the content is stopped, the wearable device **100** may display an image indicating a status in which content is not reproduced to a region in which the game image **701** and the reproduction stop request guide information **702** and **703** are provided, but is not limited thereto in one or more other exemplary embodiments. The image indicating the status in which the content is not reproduced may be a black image or a white image, but is not limited thereto in one or more other exemplary embodiments.

[0340] If the reproduction stop request for the content is not received in operation S**604** of FIG. **6**, the wearable device **100** maintains a standby status until the reproduction stop request for the content is received.

[0341] The flowchart of FIG. **6** may be modified such that if the reproduction stop request for the content is not received in operation S**604**, an operation of the wearable device **100** may return to operation S**601**.

[0342] A failure in receiving the reproduction stop request for the content may include a content reproduction stop request rejection. When it is determined that the reproduction stop request for the content is not received since the content reproduction stop request rejection is received in operation S**604** of FIG. **6**, the operation of the wearable device **100** may return to operation S**601** to continuously reproduce content being reproduced.

[0343] FIG. **9** is a detailed flowchart of operation S**603** of displaying the reproduction stop request guide information **702** of FIG. **6**, according to an exemplary embodiment. FIG. **9** is an example of displaying the reproduction stop request guide information **702** one time by using one piece of reference information.

[0344] In operation S**901**, the wearable device **100** compares information obtained in operation S**602** and the reference information. The reference information may be determined according to the information obtained in operation S**602** as described above with reference to FIGS. **1**B through **1**G.

[0345] As a result of the comparison in operation S**901**, if it is determined to display the reproduction stop request guide information **702** (operation S**902**), the wearable device **100** displays the reproduction stop request guide information **702** as described above with reference to FIGS. **7**, **8**B, and **8**C (operation S**903**). A method of displaying the reproduction stop request guide information **702** may be set in the wearable device **100** in advance or may be selected by the wearer **101**, but is not limited thereto in one or more other exemplary embodiments. In a case where it is determined to display the reproduction stop request guide information **702**, a status is indicated, in which the health of the wearer **101** may be influenced (for example, eye fatigue) since the wearer **101** views content reproduced by the wearable device **100** as described above with reference to FIGS. **1**A through **1**G. The status may be determined based on the reference information set according to obtained information as described above with reference to FIGS. **1**B through **1**G.

[0346] FIG. **10** is a flowchart for explaining a method of operating the wearable device **100** according to another exemplary embodiment. FIG. **10** is an example of displaying the reproduction stop request guide information **702** a plurality of times by using reference information.

[0347] In operations S**1001** and S**1002**, the wearable device **100** operates similarly to operations S**601** and S**602** of FIG. **6**.

[0348] In operation S**1003**, the wearable device **100** compares information obtained in operation S**1002** and the reference information. The form or number of the reference information may be different according to the obtained information.

[0349] FIG. **11** is a table of a relationship between reference information set in the wearable device **100** and the number of reproduction stop request guide information when obtained information is a reproduction time of content, according to an exemplary embodiment. Referring to the table of FIG. **11**, the form of the reference information is time, the number of the reference information is 5, and the number of the reproduction stop request guide information is 5, but the form and number of the reference information and the number of the reproduction stop request guide information are not limited thereto in one or more other exemplary embodiments.

[0350] FIG. **12** is a table of a relationship between reference information set in the wearable device **100** and the number of reproduction stop request guide information when obtained information is a battery consumption amount, according to an exemplary embodiment. Referring to the table of FIG. **12**, the form of the reference information is a ratio, the number of the reference information is 3, and the number of the reproduction stop request guide information is 3, but the form and number of the reference information and the number of the reproduction stop request guide information are not limited thereto in one or more other exemplary embodiments.

[0351] FIG. **13**A is a table of a relationship between reference information set in the wearable device **100** and the number of reproduction stop request guide information when obtained information relates to a heating temperature and includes the heating temperature and maintenance time information, according to an exemplary embodiment. Referring to the table of FIG. **13**A, the form of the reference information is a temperature and time, the number of the reference information is 3, and the number of the reproduction stop request guide information is 3, but the form and number of the reference information and the number of the reproduction stop request guide information are not limited thereto in one or more other exemplary embodiments.

[0352] FIG. **13**B is a table of a relationship between reference information set in the wearable device **100** and the number of reproduction stop request guide information when obtained information relates to a heating temperature and includes the heating temperature, according to an exemplary embodiment. Referring to the table of FIG. **13**B, the form of the reference information is a temperature, the number of the reference information is 1, and the number of the reproduc-

tion stop request guide information is 3, but the form and number of the reference information and the number of the reproduction stop request guide information are not limited thereto in one or more other exemplary embodiments.

[0353] FIG. **14** is a table of a relationship between reference information set in the wearable device **100** and the number of reproduction stop request guide information when obtained information is information for determining whether eyes of the wearer **101** are bloodshot, according to an exemplary embodiment. Referring to the table of FIG. **14**, the form of the reference information is an increase rate in the number of pixels having an R value approximate to 255, the number of the reference information is 3, and the number of the reproduction stop request guide information is 3, but the form and number of the reference information and the number of the reproduction stop request guide information are not limited thereto in one or more other exemplary embodiments.

[0354] When it is determined whether the eyes are bloodshot by using a plurality of pieces of reference information as shown in FIG. **14**, whether the eyes are bloodshot may represent a bloodshot degree of the eyes. For example, when the increase rate is 20%, the bloodshot degree of the eyes may be a low level, when the increase rate is 30%, the bloodshot degree of the eyes may be a middle level, and when the increase rate is 40%, the bloodshot degree of the eyes may be a high level. However, it is understood that these rates are merely exemplary, and one or more other exemplary embodiments are not limited thereto.

[0355] FIG. **15** is a table of a relationship between reference information set in the wearable device **100** and the number of reproduction stop request guide information when obtained information is information for determining whether eyes of the wearer **101** are dry, according to an exemplary embodiment. Referring to the table of FIG. **15**, the form of the reference information is humidity and time information, the number of the reference information is 3, and the number of the reproduction stop request guide information is 3, but the form and number of the reference information and the number of the reproduction stop request guide information are not limited thereto in one or more other exemplary embodiments.

[0356] When it is determined whether the eyes of the wearer **101** are dry by using a plurality of pieces of reference information as shown in FIG. **15**, whether the eyes of the wearer **101** are dry may represent a degree of dryness of the eyes. For example, when the degree of dryness of the eyes is determined based on humidity and time as shown in FIG. **1**C-**2**, in a maintenance status for 1 hour at humidity 30%, the degree of dryness of the eyes may be a low level, in a maintenance status for 1 hour 30 minutes at humidity 30%, the degree of dryness of the eyes may be a middle level, and in a maintenance status for 2 hours at humidity 30%, the degree of dryness of the eyes may be a high level. However, it is understood that these values are merely exemplary, and one or more other exemplary embodiments are not limited thereto.

[0357] The number of the reproduction stop request guide information of FIGS. **11** through **12**, **13**A, **13**B, and **14** through **15** indicates the number of the reproduction stop request guide information **702** displayed on the display **212**. When the number of the reference information is plural, the number of the reproduction stop request guide information may be the same as the number of the reference information, but is not limited thereto in one or more other exemplary embodiments. For example, a plurality of numbers of the reproduction stop request guide information may be set with respect to one piece of the reference information as shown in FIG. **13**B. The greater the number of the reproduction stop request guide information, the higher the eye fatigue of the wearer **101**.

[0358] The number of reproduction stop request guide information allocated to one piece of reference information may be set in the wearable device **100** in advance according to a type of obtained information, but is not limited thereto in one or more other exemplary embodiments. For example, the number of reproduction stop request guide information allocated to one piece of reference information may be set by the wearer **101** or by an external device (for example, a service providing server, etc.) of the wearable device **100** and may be provided to the wearable device **100**.

[0359] In addition to bio information of the wearer **101** of FIGS. **14** and **15**, a table indicating bio information of FIGS. **1**C-**1** and **1**C-**2**, and a relationship between at least one piece of reference information regarding peripheral environment information of FIG. **1**F may be set in the wearable device **100**. The table set in the wearable device **100** may be made, obtained, or generated based on a reproduction stop request reference defined in FIGS. **1**C-**1**, **1**C-**2**, and **1**F. At least one piece of reference information with respect to the obtained information and the number of reproduction stop request guide information may be differently set based on medical information of the wearer **101** described in FIG. **1**C-**2** and personal information of the wearer **101** described in FIG. **1**G.

[0360] Meanwhile, when information obtained in operation S**1002** is a content reproduction time, in operation S**1003** of FIG. **10**, the wearable device **100** compares the reference information of FIG. **11** and a reproduction time of obtained content.

[0361] As a result of the comparison, if the reproduction time of the obtained content is 1 hour, in operation S**1004**, the wearable device **100** determines to display the reproduction stop request guide information **702** on the display **212**. Accordingly, the wearable device **100** displays the reproduction stop request guide information **702** on the display **212** (operation S**1005**).

[0362] If the wearer **101** requests a content reproduction stop in operation S**1006** based on the displayed reproduction stop request guide information **702**, in operation S**1007**, the wearable device **100** stops reproducing the content. An operation of the wearable device **100** to stop reproducing the content may be performed as in operation S**605** of FIG. **6**.

[0363] In operation S**1006** of FIG. **10**, if the wearer **101** rejects the content reproduction stop, in operation S**1008**, the wearable device **100** checks the number of the reproduction stop request guide information **702**. As a result of check, if the number of the reproduction stop request guide information **702** is not identical to a maximum value, the wearable device **100** obtains a content reproduction time while continuously reproducing the content in operation S**1009**.

[0364] The maximum value may be differently set according to respective obtained information. The maximum value may be determined according to the number of the reference information or may be determined according to a fatigue management level of the wearer **101** during a content reproduction period. For example, when the fatigue management level of the wearer **101** is a low level (weak level), the maximum value may be set such that the reproduction stop request guide information **702** may be displayed one time with respect to one piece of reference information as shown in FIGS. **11**, **12**, **13**A, **14**, and **15**.

[0365] When the fatigue management level of the wearer **101** is a high level (strong level), the maximum value may be set such that the reproduction stop request guide information **702** may be displayed a plurality of times with respect to one piece of reference information as shown in FIG. **13**B. A case where the fatigue management level of the wearer **101** is a low level and a case where the fatigue management level of the wearer **101** is a high level are not limited as described above.

[0366] When it is configured that one may be selected from a plurality of the fatigue management levels (for example, a high level mode and a low level mode) of the wearer **101** with respect to information (for example, a heating temperature) that is to be obtained by the wearable device **100**, the wearer **101** may select the fatigue management level of the wearer **101** before content is reproduced, but is not limited thereto in one or more other exemplary embodiments. The wearable device **100** may display guide information on the display **212** before reproducing the content such that the wearer **101** may select the fatigue management level of the wearer **101**.

[0367] The high level mode of the fatigue management level of the wearer **101** may be a mode in which the reproduction stop request guide information **702** is displayed a plurality of times with respect to one piece of reference information. The low level mode of the fatigue management level of the wearer **101** may be a mode in which the reproduction stop request guide information **702** is displayed one time with respect to one piece of reference information. A condition for determining whether to relax the fatigue of the wearer **101** may be set such that the high level mode of the fatigue management level of the wearer **101** is more restrictive than the low level mode of the fatigue management level of the wearer **101**.

[0368] In the table of FIG. **11**, the maximum value is 5. In the tables of FIGS. **12**, **13**A, **13**B, and **14** through **15**, the maximum value is 3. However, it is understood that the maximum value with respect to respective information is not limited thereto in one or more other exemplary embodiments.

[0369] Meanwhile, in operation S**1009** of FIG. **10**, if a content reproduction time is obtained while content is reproduced, the wearable device **100** returns to operation S**1003** to repeatedly perform the above-described process.

[0370] As a result of the check in operation S**1008**, if the number of the reproduction stop request guide information **702** is identical to the maximum value, the wearable device **100** does not display the reproduction stop request guide information **702** on the display **212**, but forcibly stops reproducing the content in operation S**1007**.

[0371] The operations of the wearable device **100** based on operations S**1008** and S**1007** are not limited as described above. For example, as a result of the check in operation S**1008**, if the number of displaying the reproduction stop request guide information **702** on the display **212** is identical to the maximum value, the wearable device **100** may stop reproducing the content. When stopping the reproducing of the content, the wearable device **100** may provide guide information regarding a content reproduction stop. The guide information regarding the content reproduction stop may be provided as, for example, "reproduction of content will be stopped in C minutes". The wearer **101** may previously prepare for a forcible stop of reproduction of the content according to the guide information regarding the content reproduction stop.

[0372] When the obtained information is a content reproduction time, and the reference information set in the wearable device **100** is as shown in the table of FIG. **11**, the reproduction stop request guide information **702** may be provided 5 times at the maximum according to a content reproduction stop rejection command of the wearer **101** based on the flowchart of FIG. **10**.

[0373] When the obtained information is a battery consumption amount, and the reference information set in the wearable device **100** is as shown in the table of FIG. **12**, the reproduction stop request guide information **702** may be provided 3 times at the maximum according to the content reproduction stop rejection command of the wearer **101** based on the flowchart of FIG. **10**.

[0374] When the obtained information is a heating temperature and maintenance time, and the reference information set in the wearable device **100** is as shown in the table of FIG. **13**A, the reproduction stop request guide information **702** may be provided 3 times at the maximum according to the content reproduction stop rejection command of the wearer **101** based on the flowchart of FIG. **10**.

[0375] When the obtained information is a heating temperature, and the reference information set in the wearable device **100** is as shown in the table of FIG. **13**B, the reproduction stop request guide information **702** may be provided 3 times at the maximum according to the content reproduction stop rejection command of the wearer **101** based on the flowchart of FIG. **10**.

[0376] When the obtained information is a bloodshot degree of eyes, and the reference information set in the wearable device **100** is as shown in the table of FIG. **14**, the reproduction stop request guide information **702** may be provided 3 times at the maximum according to the content reproduction stop rejection command of the wearer **101** based on the flowchart of FIG. **10**.

[0377] When the obtained information is a degree of dryness of eyes based on a peripheral humidity, and the reference information set in the wearable device **100** is as shown in the table of FIG. **15**, the reproduction stop request guide information **702** may be provided 3 times at the maximum according to the content reproduction stop rejection command of the wearer **101** based on the flowchart of FIG. **10**.

[0378] A repeated process based on the maximum value of FIG. **10** will now be described in more detail with reference to the table regarding the content reproduction time of FIG. **11**.

[0379] Since the number of the reproduction stop request guide information **702** is one time in operation S**1008** as described above, the wearable device **100** obtains content reproduction time information while continuously providing content in operation S**1009** and returns to operation S**1003** to compare the obtained content reproduction time information and reference information.

[0380] As a result of the comparison, if the content reproduction time is 2 hours, in operation S**1004**, the wearable device **100** determines to display the reproduction stop request guide information **702** on the display **212**. Accordingly, in operation S**1005**, the wearable device **100** displays the reproduction stop request guide information **702** on the display **212**.

[0381] If the wearer **101** requests a content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** stops reproducing the content in operation S**1007**.

[0382] If the wearer **101** rejects the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** checks if the number of provid-

ing the reproduction stop request guide information **702** (or a reproduction stop request guide number) is identical to a maximum value in operation S**1008**. Referring to FIG. **11**, since the number of providing the reproduction stop request guide information **702** is 2 times at present, the wearable device **100** determines that the number of providing the reproduction stop request guide information **702** is not identical to 5 times, which is the maximum value.

[0383] Accordingly, the wearable device **100** continuously reproduces content to obtain content reproduction time information in operation S**1009** and returns to operation S**1003** to compare the obtained content reproduction time information and reference information.

[0384] If the content reproduction time information is 3 hours, in operation S**1004**, the wearable device **100** determines to display the reproduction stop request guide information **702** on the display **212**. Accordingly, in operation S**1005**, the wearable device **100** displays the reproduction stop request guide information **702** on the display **212**.

[0385] If the wearer **101** requests the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** stops reproducing the content in operation S**1007**.

[0386] If the wearer **101** rejects the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** checks if the number of providing the reproduction stop request guide information **702** is identical to the maximum value in operation S**1008**. Referring to FIG. **11**, since the number of providing the reproduction stop request guide information **702** is 3 times at present, the wearable device **100** determines that the number of providing the reproduction stop request guide information **702** is not identical to 5 times, which is the maximum value.

[0387] Accordingly, the wearable device **100** continuously reproduces content to obtain content reproduction time information in operation S**1009** and returns to operation S**1003** to compare the obtained content reproduction time information and the reference information.

[0388] If the content reproduction time information is 4 hours, in operation S**1004**, the wearable device **100** determines to display the reproduction stop request guide information **702** on the display **212**. Accordingly, in operation S**1005**, the wearable device **100** displays the reproduction stop request guide information **702** on the display **212**.

[0389] If the wearer **101** requests the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** stops reproducing the content in operation S**1007**.

[0390] If the wearer **101** rejects the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** checks if the number of providing the reproduction stop request guide information **702** is identical to the maximum value in operation S**1008**. Referring to FIG. **11**, since the number of providing the reproduction stop request guide information **702** is 4 times at present, the wearable device **100** determines that the number of providing the reproduction stop request guide information **702** is not identical to 5 times, which is the maximum value.

[0391] Accordingly, the wearable device **100** continuously reproduces content to obtain content reproduction time information in operation S**1009** and returns to operation S**1003** to compare the obtained content reproduction time information and the reference information.

[0392] If the content reproduction time information is 5 hours, in operation S**1004**, the wearable device **100** determines to display the reproduction stop request guide information **702** on the display **212**. Accordingly, in operation S**1005**, the wearable device **100** displays the reproduction stop request guide information **702** on the display **212**.

[0393] If the wearer **101** requests the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** stops reproducing the content in operation S**1007**.

[0394] If the wearer **101** rejects the content reproduction stop based on the reproduction stop request guide information **702**, the wearable device **100** checks if the number of providing the reproduction stop request guide information **702** is identical to the maximum value in operation S**1008**. Referring to FIG. **11**, since the number of providing the reproduction stop request guide information **702** is 5 times at present, the wearable device **100** determines that the number of providing the reproduction stop request guide information **702** is identical to 5 times, which is the maximum value.

[0395] Accordingly, the wearable device **100** may forcibly stop reproducing the content in operation S**1007** as described above.

[0396] An operation of displaying the reproduction stop request guide information **702** on the display **212**, as shown in the flowchart of FIG. **10**, may be performed a plurality of times like the above-described content reproduction time when the obtained information is a battery consumption amount, a heating temperature, a bloodshot degree of eyes of the wearer **101**, and a degree of dryness of the eyes of the wearer **101** by using the tables of FIGS. **12**, **13**A, **13**B, and **14** through **15**. The number of providing the reproduction stop request guide information **702** mentioned in the above-described flowchart of FIG. **10** indicates the number of times of displaying the reproduction stop request guide information **702**.

[0397] The operation, as shown in the flowchart of FIG. **10**, may be performed by using the tables regarding the reference information as shown in FIGS. **11** through **12**, **13**A, **13**B, and **14** through **15** with respect to respective information or combinations of at least two pieces of information described above with reference to FIGS. **1**B, **1**C-**1**, **1**C-**2**, **1**F, and **1**G. The tables of FIGS. **11**, **12**, **13**A, **13**B, **14**, and **15** are tables regarding one piece of information. In the tables of FIGS. **13**A and **15**, two pieces of reference information are used but are tables regarding one piece of information. That is, FIG. **13**A is the table regarding the heating temperature of FIG. **1**B, and FIG. **15** is the table regarding the degree of dryness of the eyes of the wearer **101** of FIG. **1**C-**1**.

[0398] The combinations of at least two pieces of information may be defined, by way of example, as follows:

[0399] (1) combination of at least two pieces of information among content reproduction related information of the wearable device **100** of FIG. **1**B;

[0400] (2) combination of at least one piece of information among content reproduction related information of the wearable device **100** of FIG. **1**B and at least one piece of information among bio information based on eyes of the wearer **101** of FIG. **1**C-**1**;

[0401] (3) combination of at least one piece of information among content reproduction related information of the wearable device **100** of FIG. **1**B and at least one piece of information among health information of the wearer **101** of FIG. **1**C-**2**;

[0402] (4) combination of at least one piece of information among content reproduction related information of the wearable device **100** of FIG. **1**B and at least one piece of information among peripheral environment information of FIG. **1**F;

[0403] (5) combination of at least two pieces of information among the bio information based on eyes of the wearer **101** of FIG. **1**C-**1**;

[0404] (6) combination of at least one piece of information among the bio information based on eyes of the wearer **101** of FIG. **1**C-**1** and at least one piece of information among the health information of the wearer **101** of FIG. **1**C-**2**;

[0405] (7) combination of at least one piece of information among the bio information based on eyes of the wearer **101** of FIG. **1**C-**1** and at least one piece of information among the peripheral environment information of FIG. **1**F;

[0406] (8) combination of at least two pieces of information among the health information of the wearer **101** of FIG. **1**C-**2**;

[0407] (9) combination of at least one piece of information among the health information of the wearer **101** of FIG. **1**C-**2** and at least one piece of information among the peripheral environment information of FIG. **1**F; and

[0408] (10) combination of at least two pieces of information among the peripheral environment information of FIG. **1**F.

[0409] The health information of the wearer **101** described in the above-described examples may include health information excluding the medical information of FIG. **1**C-**2**. Examples of the combinations of at least two pieces of information are not limited as described above.

[0410] FIG. **16** is a flowchart of determining whether to display the reproduction stop request guide information **702** on the display **212** based on the above-described combinations of two pieces of information. When the flowchart of FIG. **16** is included in operation S**603** of FIG. **6**, in operation S**602** of FIG. **6**, the wearable device **100** may obtain first information and second information.

[0411] In operation S**1601**, the wearable device **100** compares the obtained first information and reference information. The first information may include one of information described in the above-described combinations (1) through (10) of two pieces of information. For example, the first information may be one of content reproduction related information of the wearable device **100** described in FIG. **1**B, but is not limited thereto. When the first information is a content reproduction time, the reference information may be set as a reproduction stop request reference of FIG. **1**B or reference information of FIG. **11**, but is not limited thereto.

[0412] In operation S**1602**, the wearable device **100** compares the obtained second information and the reference information. The second information may include one of the information described in the above-described combinations (1) through (10) of two pieces of information. For example, the second information may be one of the content reproduction related information of the wearable device **100** mentioned in FIG. **1**B, but is not limited thereto. For example, when the second information is a battery consumption amount, the reference information may be set as the reproduction stop request reference of FIG. **1**B or reference information of FIG. **12**, but is not limited thereto.

[0413] Operations S**1601** and S**1602** may be simultaneously performed as shown in FIG. **16**, but are not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may perform operation S**1601** prior to operation S**1602** or may perform operation S**1602** prior to operation S**1601**.

[0414] In operation S**1603**, when it is determined to display the reproduction stop request guide information **702** on the display **212** according to a result of the comparison in operation S**1601** and to display the reproduction stop request guide information **702** on the display **212** according to a result of the comparison in operation S**1602**, the wearable device **100** may determine to display the reproduction stop request guide information **702** on the display **212**.

[0415] However, in operation S**1603**, the wearable device **100** may determine whether to display the reproduction stop request guide information **702** according to previously set priority information of the first information and the second information. For example, when a priority of the first information is higher or greater than that of the second information, the wearable device **100** may determine that the reproduction stop request guide information **702** may be displayed on the display **212** according to a comparison result of the first information and reference information irrespective of a comparison result of the second information and the reference information. Meanwhile, when a priority of the second information is higher or greater than that of the first information, the wearable device **100** may determine that the reproduction stop request guide information **702** may be displayed on the display **212** according to the comparison result of the second information and the reference information irrespective of the comparison result of the first information and the reference information.

[0416] In operation S**1603**, if it is determined to display the reproduction stop request guide information **702** on the display **212** according to the comparison result of at least one of the first information and the second information and the reference information, the wearable device may determine that the reproduction stop request guide information **702** may be displayed on the display **212**.

[0417] A condition for determining whether to display the reproduction stop request guide information **702** on the display **212** based on a plurality of pieces of information may be set in the wearable device **100** in advance, but is not limited thereto in one or more other exemplary embodiments. For example, the above-described condition may be set by the wearer **101** or by an external device (for example, a portable terminal of a parent, a guardian, a supervisor, etc.).

[0418] The above-described condition may include, for example, a first condition that considers both a comparison result based on the first information of operation S**1601** and the second information of operation S**1602**, a second condition that considers a comparison result of information having a higher priority among a comparison result based on the first information and a comparison result based on the second information, a third condition that considers one of the comparison result based on the first information and the comparison result based on the second information, but is not limited thereto in one or more other exemplary embodiments. One comparison result as described in the third condition may include a previously obtained comparison result, but is not limited thereto in one or more other exemplary embodiments.

[0419] When the first information is one of content reproduction related information of the wearable device **100** of FIG. **1**B, the second information may be one of bio information of the wearer **101** of FIGS. **1**C-**1** and **1**C-**2**.

[0420] When the first information is one of the content reproduction related information of the wearable device **100**

of FIG. **1**B, the second information may be one of peripheral environment information of the wearable device **100** of FIG. **1**F.

[0421] When the first information is one of the bio information of the wearer **101** of FIGS. **1**C-**1** and **1**C-**2**, the second information may be one of the bio information of the wearer **101** of FIGS. **1**C-**1** and **1**C-**2**.

[0422] When the first information is one of the bio information of the wearer **101** of FIGS. **1**C-**1** and **1**C-**2**, the second information may be one of the peripheral environment information of the wearable device **100** of FIG. **1**F.

[0423] When the first information is one of the peripheral environment information of the wearable device **100** of FIG. **1**F, the second information may be one of the peripheral environment information of the wearable device **100** of FIG. **1**F.

[0424] FIG. **17** is a flowchart for explaining a method of operating the wearable device **100** according to another exemplary embodiment. FIG. **17** is an example of displaying reproduction stop request guide information regarding content according to content type information.

[0425] Operations of the wearable device **100** in operations S**1701**, S**1703**, S**1705**, and S**1706** of FIG. **17** are similar to operations of the wearable device **100** in operations S**601**, S**602**, S**604**, and S**605** of FIG. **6**, and thus redundant descriptions thereof are omitted below.

[0426] In operation S**1702**, the wearable device **100** detects type information of reproduced content. The type information of the content indicates information informing which category of information is transferred by or corresponds to the content. By way of example, the type information of the content may be determined according to an application reproducing the content. For example, when an application executed by the wearable device **100** is a game application, the type information of the content may be detected as "game". When the application executed by the wearable device **100** is a DMB application, the type information of the content may be detected as "broadcasting". When the application executed by the wearable device **100** is a video player application, the type information of the content may be detected as "movie". When the application executed by the wearable device **100** is an e-book application, the type information of the content may be detected as "e-book".

[0427] The type information of the content may be detected from information regarding an application currently executed by the wearable device **100**. The information regarding the application may include information such as an application name or a category to which the application belongs (for example, game, life, music, video on demand (VOD), e-book, etc.), but is not limited thereto in one or more other exemplary embodiments. The category to which the application belongs may indicate a range to which an application having the same type belongs. The category to which the application belongs may be a keyword allocated to the application having the same type, but is not limited thereto in one or more other exemplary embodiments. The wearable device **100** may detect the type information of the content by using information regarding the category to which the application belongs, but is not limited thereto in one or more other exemplary embodiments.

[0428] In operation S**1704**, the wearable device **100** compares the obtained information and reference information. The reference information may include reference information set according to a type of the content detected in operation S**1702**. A form of the reference information may be the same as or similar to that described with reference to FIGS. **6** through **10**.

[0429] FIG. **18** is a table of an example for explaining a relationship between a type of content and reference information, according to an exemplary embodiment. The reference information of FIG. **18** is reference information regarding a content reproduction time, but is not limited thereto in one or more other exemplary embodiments. For example, the reference information may be set based on reproduction stop request references and a content type of FIGS. **1**B, **1**C-**1**, **1**C-**2**, and **1**F according to information obtained in operation S**1703**.

[0430] Different reference information may be set according to the content type as shown in FIG. **18**. For example, when the content type is a game, the reference information is 1 hour. When the content type is a movie, the reference information is 2 hours. When the content type is an e-book, the reference information is 3 hours. When the content type is music, the reference information is 4 hours.

[0431] As seen from the reference information set in FIG. **18**, the reference information may be set in consideration of a concentration of the wearer **101** according to a content type. The concentration of the wearer **101** indicates a degree of immersion or attention of the wearer **101** into content reproduced by the wearable device **100**.

[0432] The concentration according to the content type may be set based on an experimental result when the content is reproduced, but is not limited thereto. The concentration of the wearer **101** may be included in metadata of each piece of content, but is not limited thereto in one or more other exemplary embodiments. For example, the concentration of the wearer **101** regarding each piece of content may be managed by a content manager.

[0433] The content manager may be an application for managing information regarding each piece of content that may be reproduced by the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. The information regarding each piece of content may include, for example, capacity of content, a content provider, a concentration of a user regarding the content, etc., but is not limited thereto. For example, when the content is a movie, the information regarding the content may further include information regarding an actor, a shooting location, props, genre, etc.

[0434] The concentration of the wearer **101** may be expressed as level **1**, level **2**, level **3**, and level **4**. If the level **1** is lower than the level **4** in terms of the concentration of the wearer **101**, the game of FIG. **18** may be set as the level **4**, the movie may be set as the level **3**, the e-book may be set as the level **2**, and the music may be set as the level **1**.

[0435] The reference information may be set by further subdividing a type of the same content. For example, referring to the table of FIG. **18**, the reference information of the movie is set as 2 hours irrespective of genre of the movie. However, the reference information may be differently set according to the genre of the movie. For example, the reference information may be differently set according to a horror movie, a romantic movie, and a comedy movie. In this case, the reference information regarding the horror movie may be set as 2 hours, the reference information regarding the romantic movie may be set as 3 hours, and the reference information of the comedy movie may be set as 4 hours.

[0436] The reference information may be differently set based on an application installed in the wearable device **100**. For example, the reference information may be set by units such as a video player application, an album application, a camera application, a digital multimedia broadcasting (DMB) application, a map application, a search application, an application store application, a conference call application, a news and weather application, a schedule application, etc., that are installed in the wearable device **100**.

[0437] The flowchart of FIG. **10** may be modified such that an operation of detecting content type information may be inserted between operations S**1002** and S**1003** and reference information adjusted according to the content type and obtained information may be compared in operation S**1003**.

[0438] FIG. **19** is a flowchart for explaining a method of operating the wearable device **100** according to another exemplary embodiment. The method of FIG. **19** includes an operation of reproducing different content. The different content is content for providing an effect of relieving eye fatigue of the wearer **101**, protecting eyesight, providing healing, etc., as content (for example, game content, movie content, etc.) reproduced by the wearable device **100** is viewed.

[0439] Operations of the wearable device **100** in operations S**1901** through S**1905** of FIG. **19** may be similar to operations of the wearable device **100** in operations S**601** through S**605** of FIG. **6**, and thus redundant descriptions thereof are omitted below.

[0440] After the wearable device **100** stops reproducing content in operation S**1905**, the wearable device **100** provides guide information regarding the different content to the wearer **101** in operation S**1906**. The guide information regarding the different content is guide information for confirming, from the wearer **101**, whether to reproduce the different content. For example, the guide information may include information for selecting whether to reproduce the content for providing the above-described effect to the wearer **101**, but is not limited thereto in one or more other exemplary embodiments.

[0441] For example, the wearable device **100** may display guide information as shown in FIGS. **20** through **23** on the display **212**.

[0442] FIG. **20** is a diagram of an example of displaying, by the wearable device **100**, reproduction stop request guide information **2001** including guide information informing that a degree of dryness of eyes is high, according to an exemplary embodiment. The reproduction stop request guide information **2001** may include text (for example, a degree of dryness) relating to the degree of dryness of eyes, a symbol (for example, an arrow) indicating that the degree of dryness of eyes is high, and a reproduction stop request guide message (for example, the degree of dryness is measured to be higher than usual. Please reproduce content for protecting your eyesight), but is not limited thereto in one or more other exemplary embodiments.

[0443] For example, the wearable device **100** may display a high level or a low level of the degree of dryness of eyes according to a color of the text (for example, the degree of dryness) instead of the symbol. For example, when the degree of dryness of eyes is high, the wearable device **100** may display the text in a red color. The reproduction stop request guide information **2001** may include a reproduction stop request guide message and/or commands in the form of a query, like the reproduction stop request guide information **702** of FIG. **7**.

[0444] FIG. **21** is a diagram of an example of displaying, by the wearable device **100**, reproduction stop request guide information **2101** including guide information based on an eye blink, according to an exemplary embodiment. The reproduction stop request guide information **2101** may include text (for example, a blink) relating to the eye blink, a symbol (for example, an arrow) indicating that the eye blink is low, and a reproduction stop request guide message (for example, the eye blink is measured to be lower than usual. Please reproduce content for relieving your eye fatigue), but is not limited thereto in one or more other exemplary embodiments.

[0445] For example, the wearable device **100** may display high levels and low levels of the eye blink according to a color of the text (for example, the blink) instead of the symbol. In this case, when the eye blink is low, the wearable device **100** may display the text in the red color. The wearable device **100** may display the reproduction stop request guide information **2101** including a reproduction stop request guide message and/or commands in the form of a query, like the reproduction stop request guide information **702** of FIG. **7**.

[0446] FIG. **22** is a diagram of an example of displaying, by the wearable device **100**, reproduction stop request guide information **2201** including guide information based on an eye bloodshot degree, according to an exemplary embodiment. The reproduction stop request guide information **2201** may include text (for example, a bloodshot degree) relating to the eye bloodshot degree, a symbol (for example, an arrow) indicating that the eye bloodshot degree is high, and a reproduction stop request guide message (for example, the eye bloodshot degree is measured to be higher than usual. Please reproduce content for relieving your eye fatigue), but is not limited thereto in one or more other exemplary embodiments.

[0447] For example, the wearable device **100** may display high levels and low levels of the eye bloodshot degree according to a color of the text (for example, the bloodshot degree) instead of the symbol. In this case, when the eye bloodshot degree is high, the wearable device **100** may display the text in the red color. The wearable device **100** may display the reproduction stop request guide information **2201** including a reproduction stop request guide message and/or commands in the form of a query, like the reproduction stop request guide information **702** of FIG. **7**.

[0448] FIG. **23** is a diagram of an example of displaying, by the wearable device **100**, reproduction stop request guide information **2301** including guide information in the form of an icon, according to an exemplary embodiment. An eye icon **2302** is an icon indicating a degree of dryness of eyes. An eye icon **2303** is an icon indicating an eye bloodshot degree. An eye icon **2304** is an icon indicating an eye blink.

[0449] The wearable device **100** may display the eye icons **2302**, **2303**, and **2304** of FIG. **23** instead of the reproduction stop request guide information **2001**, **2101**, and **2201** of FIGS. **20** through **23**. The wearable device **100** may display the reproduction stop request guide information **2001**, **2101**, and **2201** of FIGS. **20** through **23** as reproduction stop request guide information including text (for example, a high eye bloodshot degree, a low eye blink number, and a high eye degree of dryness), but is not limited thereto in one or more other exemplary embodiments.

[0450] In operation S**1907**, if a reproduction request for the different content is received based on the reproduction stop request guide information, the wearable device **100** reproduces the different content (operation S**1908**).

[0451] The different content may include information for influencing health of the wearer **101**. For example, the different content may include at least one of information such as food information for relieving fatigue of the wearer **101**, a recipe of the food information, and a food purchase place (e.g., a restaurant, a grocery store, etc.), but is not limited thereto. For example, the different content may include link information linking an Internet website that provides information relating to the food information. When the link information is provided, if a selection command for the provided link information is input, the information relating to the food information provided from the linked Internet website may be displayed on the display **212**.

[0452] The different content may include content as shown in FIGS. **24** through **29**. Examples of FIGS. **24**, **26**, **27**, **28**, and **29** are with respect to the wearable device **100** configured as shown in FIG. **5**A or **5**B, but are not limited thereto.

[0453] When the wearable device **100** is configured as shown in FIG. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, or **4**, the different content may be reproduced through a region on which the game image **102** is displayed. When the wearable device **100** is configured as shown in FIG. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, or **4**, the wearer **101** may simultaneously view a real world that may be viewed through the wearable device **100** and the different content.

[0454] When the wearable device **100** is configured as shown in FIG. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, or **4**, the different content may be reproduced by another device (for example, a TV, a mobile device, a PC, etc.) whose display is positioned in the real world that may be viewed through the wearable device **100**.

[0455] When the different content is reproduced by the other device, if a reproduction request for the different content is received, the wearable device **100** may transmit a reproduction request signal regarding the different content to the other device. The wearable device **100** and the other device **100** may be connected based on near field wireless communication, wireless communication, or wired communication. The wearable device **100** may control a reproduction operation for the different content by the other device according to a user input through the user input unit **207**. For example, the wearable device **100** may control a reproduction stop for the different content by the other device.

[0456] FIG. **24** is a diagram of an example in which a 2D image is reproduced as another piece of content, according to an exemplary embodiment. The 2D image may include an image including a natural phenomenon such as a tree, a mountain, a river, a field, etc., and a color that is comfortable to a user's eyes and an image including a pattern that is comfortable to the user's eyes, but is not limited thereto in one or more other exemplary embodiments.

[0457] FIG. **25** is a diagram of an example in which sound is reproduced as another piece of content, according to an exemplary embodiment. In FIG. **25**, the wearable device **100** is configured as shown in FIG. **2**A, **2**B, **2**D, **2**E, **2**F, **3** or **4**, but is not limited thereto. For example, the wearable device **100** of FIG. **25** may be configured as shown in FIG. **5**A or **5**B. The reproduced sound includes sound for relieving fatigue of the wearer **101**. For example, the sound may include a sound of nature such as the sound of a stream, a birdcall, music with a slow tempo, and sound for relieving the fatigue of the wearer **101** such as ballad or classics. An intensity of the output sound and output time may be set by the wearer **101** or may be output based on previously set intensity of sound and output time, although it is understood that one or more other exemplary embodiments are not limited thereto.

[0458] FIG. **26** is a diagram of an example in which content that is a mixture of a 2D image and sound are mixed is reproduced as different content, according to an exemplary embodiment. The 2D image may be the same as the image described above with reference to FIG. **24**, and the sound may be the sound described above with reference to FIG. **25**, but are not limited thereto in one or more other exemplary embodiments.

[0459] FIG. **27** is a diagram of an example in which a 3D image is reproduced as different content, according to an exemplary embodiment. The 3D image may include a duck and drake image used to gaze a long distance and a short distance so as to relax muscles of eyes of the wearer **101**. The image for gazing the long distance and the short distance may be repeatedly reproduced. A repeatedly reproduced number may be set as, for example, 64 times, but is not limited thereto in one or more other exemplary embodiments. The image for gazing the long distance and the short distance may be repeatedly reproduced, thereby helping or adjusting depth perception of the eyes of the wearer **101**.

[0460] FIG. **28** is a diagram of an example in which content that is a mixture of a 3D image and sound is reproduced as different content, according to an exemplary embodiment. The 3D image may be the same as the 3D image described above with reference to FIG. **27**, and the sound may be the same as the sound described above with reference to FIG. **25**, but are not limited thereto in one or more other exemplary embodiments.

[0461] FIG. **29** is a diagram of an example in which an image having a pupil stretching function is reproduced as different content, according to an exemplary embodiment. The pupil stretching function is a mode in which a pupil motion is guided to relax stiffened muscles of eyes. The pupil motion may include at least one of a rectilinear motion of pupils, a diagonal motion, a rotational motion, a random motion, and a distance motion, but is not limited thereto.

[0462] The pupil stretching function may move and display an object **2901** as shown in FIG. **29**. The wearer **101** may perform the pupil motion by moving a focus along the moved object **2901**. The object **2901** may be displayed as a circular shape as shown in FIG. **29**, but is not limited thereto in one or more other exemplary embodiments. For example, the object **2901** may be configured as a rectangular shape, a triangular shape, or a specific symbol shape. By way of example, the object **2901** may be moved to perform the pupil motion in a direction of 12 o'clock->3 o'clock->6 o'clock->9 o'clock and then in a reverse direction. The object **2901** may be moved to repeat the pupil motion a plurality of times.

[0463] The object **2901** may be moved on a rectilinear line up and down or left and right to guide pupils of the wearer **101** to move in a rectilinear direction (the rectilinear motion of the pupils). The object **2901** may be moved in a diagonal direction to guide the pupils of the wearer **101** to move in the diagonal direction (the diagonal motion of the pupils). The object **2901** may be moved to draw a circle so as to guide the pupils of the wearer **101** to perform the rotational motion (the rotational motion of the pupils).

[0464] The object **2901** may be moved in random to guide the random motion of the pupils of the wearer **101**. For example, the wearable device **100** may display a drawing image previously set on the display **212** and move the object

2901 along an outline of the drawing image to guide the random motion of the pupils of the wearer **101**.

[0465] The drawing image displayed on the display **212**, a moving speed of the object **2901**, a size of the object **2901**, a shape, a color, etc., may be set in various ways according to an input of the wearer **101**. The wearable device **100** may recognize the wearer **101** to display the drawing image and the object **2901** according to the drawing image set for the recognized wearer **101**, the moving speed of the object **2901**, the size of the object **2901**, the shape, the color, etc.

[0466] The guide information provided in operation S**1906** may be changed as information for guiding or determining whether to provide a function of relieving the fatigue of the wearer **101**. The function of relieving the fatigue of the wearer **101** may include one of a function of reproducing different content of FIGS. **24** through **29**, an eye patch function or a sleep function of FIG. **30**, or a heating function of FIG. **31**. However, it is understood that the function of relieving the fatigue of the wearer **101** is not limited thereto in one or more other exemplary embodiments.

[0467] For example, the function of relieving the fatigue of the wearer **101** may include a function of inducing the wearer **101** to view a real world in a far distance through the wearable device **101** or to take off the wearable device **101**. For example, the wearable device **100** may reproduce an induction or instruction message through a region in which the game image **102** is reproduced to induce the wearer **101** to view the real world in the far distance through the wearable device **101** or to take off the wearable device **101**.

[0468] When the game image **102** is reproduced, the induction message may be reproduced in such a manner that the induction message may be continuously displayed. According to another exemplary embodiment, the induction message may be intermittently reproduced, for example, as shown in FIG. **8**B or **8**C.

[0469] FIG. **30** is a diagram of an example in which an eye patch function or a sleep function is provided as a function of relieving fatigue of the wearer **101**, according to an exemplary embodiment. The lens **204** may be configured as a material such as smart glass to perform the eye patch function. For example, if power is applied to the lens **204**, the lens **204** may be configured as bonding glass containing a special film in which liquid crystals are sealed between glass such that a transparent status may be changed to an opaque status, but is not limited thereto in one or more other exemplary embodiments.

[0470] The eye patch function may be implemented by using an electrochromic method. The electrochromic method injects a special electrochromic material between glass substrates, applies voltages, and paints the special electrochromic material.

[0471] The sleep function is a function of setting an operation or mode of the wearable device **100** to a sleep mode. The sleep mode corresponds to a status in which the wearable device **100** is not powered off or the operation of the wearable device **100** is stopped. The sleep mode may be referred to as a power saving mode of the wearable device **100**.

[0472] The wearable device **100** providing the eye patch function or the sleep function of FIG. **30** may be configured as shown in FIG. **2**A, **2**B, **2**D, **2**E, **2**F, **3**, **4**, **5**A, or **5**B, but is not limited thereto.

[0473] FIG. **31** is a diagram of an example of the wearable device **100** that may provide a heating function as a function of relieving fatigue of the wearer **101**. The heating function indicates a mode in which a heating unit **3101**, mounted in an inner side surface of the lens frame **201** of the wearable device **100** and an inner side surface of the lens **204** or embedded in inner sides of the lens frame **201** and the lens **204**, generates heat to massage around the eyes.

[0474] The heating unit **3101** may be configured to emit far-infrared radiation as a function of relieving the fatigue of the wearer **101**. The heating unit **3101** may be installed or embedded in a location in which blood dots around the eyes of the wearer **101** may be massaged in the inner sides of the lens frame **201** and the lens **204**, but is not limited thereto in one or more other exemplary embodiments. The lens frame **201** may be configured as shown in the frame **501** of FIG. **5**A or the frame **531** of FIG. **5**B to mount the heating unit **3101**, but is not limited thereto in one or more other exemplary embodiments.

[0475] A structure of the wearable device **100** providing the heating function is not limited as shown in FIG. **31**. For example, the heating function as shown in FIG. **31** may be applied to the wearable device **100** of FIG. **5**A or **5**B described above.

[0476] FIG. **32** is a flowchart for explaining a method of operating the wearable device **100** according to another exemplary embodiment. FIG. **32** is an example of providing guide information to a plurality of pieces of different contents capable of relieving fatigue of the wearer **101**.

[0477] Operations of the wearable device **100** in operations S**3201** through S**3205** of FIG. **32** are similar to those of the wearable device **100** in operations S**1901** through S**1905** of FIG. **19** described above.

[0478] In operation S**3206**, the wearable device **100** provides the guide information to the plurality of pieces of different contents capable of relieving fatigue of the wearer **101**. The wearable device may display the guide information to the plurality of pieces of different contents on the display **212** as shown in FIG. **33**. The screen **3301** of FIG. **33** is an example of displaying information regarding a plurality of pieces of contents in the form of a list. Referring to the screen **3301** of FIG. **33**, the plurality of pieces of contents are C**1** and C**3**. The plurality of pieces of contents may include at least one, for example, content from among those described above with reference to FIGS. **24** through **29**, but is not limited thereto in one or more other exemplary embodiments.

[0479] The wearable device **100** may display the information regarding the plurality of pieces of contents on the display **212** as shown in FIG. **34**. FIG. **34** is a diagram of another example of displaying information regarding a plurality of pieces of different contents, according to an exemplary embodiment. Referring to FIG. **34**, the wearable device **100** displays the information regarding the plurality of pieces of different contents on a single screen and moves and displays information regarding selectable content based on an input of the wearer **101**.

[0480] In FIG. **34**, an input of the wearer **101** may be an input based on the user input unit **207** or an input based on eyes like an eye blink of the wearer **101** or a pupil motion, but is not limited thereto in one or more other exemplary embodiments. For example, the input of the wearer **101** may be a voice signal of the wearer **101** received through the microphone **214** or a gesture of the wearer **101** recognized by the camera **206** or other sensors (e.g., gyroscope).

[0481] The input of the wearer **101** may include an input for moving the information regarding the plurality of pieces of different contents displayed to search for content and an input

of selecting different content. When different content is displayed as shown in FIG. **34**, the wearable device **100** may move the plurality of pieces of different contents displayed according to the input of the wearer **101** in left and right directions or may move the plurality of pieces of different contents in up and down directions.

[0482] The input of the wearer **101** based on the eyes may use an eye image obtained by the bio information obtaining camera **208**, but is not limited thereto. The wearable device **100** may provide the information regarding the plurality of pieces of different contents in the form of at least one of an icon, a representative image indicating a description of different content, and text. For example, the wearable device **100** may provide the information regarding the plurality of pieces of different contents in the form of a combination of the icon and a name of different content.

[0483] In operation S**3208**, if a selection signal regarding different content is received in operation S**3207**, the wearable device **100** reproduces the selected different content.

[0484] In the flowchart of FIG. **32**, the guide information regarding the plurality of pieces of different contents may be modified as guide information regarding a plurality of functions as in the flowchart of FIG. **19**. The plurality of functions includes a function of relieving fatigue of the wearer **101**. The plurality of functions may include at least two among, for example, the respective content reproducing functions of FIGS. **24** through **29** described above, the eye patch function or the sleep function of FIG. **30**, and the heating function and the induction function of FIG. **31** described above.

[0485] FIG. **35** is a flowchart of a method of operating the wearable device **100** further including an operation of continuously reproducing content whose reproduction was stopped in the operation shown in the flowchart of FIG. **19**, according to an exemplary embodiment.

[0486] Operations of the wearable device **100** in operations S**3501** through S**3508** may be performed similarly to operations of the wearable device **100** in operations S**1901** through S**1908**.

[0487] In operation S**3509**, if it is determined that different content has been completely reproduced, the wearable device **100** resumes continuous reproduction of content that was being reproduced before reproducing the different content (i.e. resumes reproduction of content for which reproduction was stopped at S**3504**).

[0488] A continuous reproduction of content may be a reproduction of the content from a point where the reproduction of the content is stopped or a point by a certain section previous to the point where the reproduction of the content is stopped, but is not limited thereto in one or more other exemplary embodiments. When the reproduced content is an image, the certain section may be set as several frames, but is not limited thereto in one or more other exemplary embodiments. For example, when the content is content restored from an image compressed as an intra (I) picture, a predict (P) picture, a bi-direction (B) picture, and the point where the reproduction of the content is stopped is not a point in which the I picture is reproduced, the certain section may be set such that the content may be reproduced from the I picture prior to the point where the reproduction of the content is stopped, but is not limited thereto in one or more other exemplary embodiments. A complete reproduction of different content corresponds to a complete execution of different content.

[0489] FIG. **36** is a flowchart of a method of operating the wearable device **100** further including an operation of stopping reproducing different content according to a reproduction stop request for different content during a reproduction of different content and continuously reproducing the content whose reproduction is stopped (at operation S**3605**) in the operation shown in the flowchart of FIG. **19**, according to an exemplary embodiment.

[0490] Operations of the wearable device **100** in operations S**3601** through S**3608** and operation S**3611** of FIG. **36** may be similar to operations of the wearable device **100** in operations S**1901** through S**1908** of FIG. **19**.

[0491] In operation S**3609**, if the reproduction stop request for different content is received, the wearable device **100** stops reproducing different content in operation S**3610** and resumes, in operation S**3611**, continuous reproduction of the content whose reproduction was previously stopped. A continuous reproduction of the content by the wearable device **100** may be performed in the same or similar manner as operation S**3510** of FIG. **35**.

[0492] The reproduction stop request for different content received in operation S**3609** may include at least one of an input (for example, an eye blink, a pupil motion, etc.) based on eyes of the wearer **101**, a voice signal of the wearer **101** received through the microphone **214**, gesture information (for example, finger based gesture information) of the wearer **101** obtained by the camera **206**, and an input based on the user input unit **207**, but is not limited thereto in one or more other exemplary embodiments.

[0493] FIG. **37** is a flowchart of a method of operating the wearable device **100** further including an operation of continuously reproducing content whose reproduction is stopped after completely reproducing different content and an operation of stopping reproducing different content according to a reproduction stop request for different content and continuously reproducing the content whose reproduction is stopped in the operation shown in the flowchart of FIG. **19**, according to an exemplary embodiment.

[0494] Operations of the wearable device **100** in operations S**3701** through S**3710** of FIG. **37** may be similar to operations of the wearable device **100** in operations S**3501** through S**3510** of FIG. **35**.

[0495] Operations of the wearable device **100** in operations S**3711** through S**3713** of FIG. **37** may be similar to operations of the wearable device **100** in operations S**3609** through S**3611** of FIG. **36**.

[0496] FIG. **38** is a flowchart of a method of operating the wearable device **100** further including an operation of providing a result of reproducing different content after completely reproducing different content in the operation shown in the flowchart of FIG. **19**, according to an exemplary embodiment.

[0497] Operations of the wearable device **100** in operations S**3801** through S**3809** of FIG. **38** may be similar to operations of the wearable device **100** in operations S**3501** through S**3509** of FIG. **35**.

[0498] In operation S**3809**, if it is determined that different content has been completely reproduced, the wearable device **100** provides the result of reproducing different content. The result of reproducing different content may be provided based on bio information of eyes of the wearer **101**.

[0499] For example, the wearable device **100** detects, via the bio information obtaining camera **208**, the bio information based on the eyes. A method of detecting the bio information based on the eyes may be performed as described above with reference to FIGS. **1C-1** and **1C-2**. The wearable

device **100** may compare the detected bio information based on the eyes and a reproduction stop request reference described above with reference to FIGS. **1**C-**1** and **1**C-**2**, and provide a result of the comparison as a result of reproducing different content.

[0500] The result of reproducing different content may include information informing the wearer **101** of how much the fatigue of the wearer **101** is reduced when different content is provided. The wearable device **100** may provide the result of reproducing different content in the form of at least one of an image, text, audio, and an icon, but is not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may provide an image that may be used to compare an eye image before different content is reproduced and an eye image after different content is reproduced as the result of reproducing different content.

[0501] FIG. **39** is a diagram of an example of a result of providing different content provided by the wearable device **100**, according to an exemplary embodiment. Referring to FIG. **39**, the wearable device **100** may provide a screen **3901** including the result (for example, an eye bloodshot degree has been reduced) of providing different content, but is not limited thereto in one or more other exemplary embodiments.

[0502] FIG. **40** is a flowchart for explaining a method of operating the wearable device **100** according to another exemplary embodiment. FIG. **40** is an example of providing guide information regarding different content and reproducing different content after completely reproducing content by the wearable device **100**.

[0503] Operations of the wearable device **100** in operations S**4001** and S**4002** are similar to operations of the wearable device **100** in operations S**601** and S**602** of FIG. **6**. Operations of the wearable device **100** in operations S**4004** through S**4006** are similar to operations of the wearable device **100** in operations S**1906** through S**1908** of FIG. **19**.

[0504] In operation S**4003**, if content is completely reproduced, the wearable device **100** displays guide information of different content on the display **212**. A complete reproduction of content may include a complete reproduction of content by arriving at a content end point irrespective of a command of the wearer **101** or a complete reproduction of content according to the command of the wearer **101**.

[0505] FIG. **41** is a flowchart for explaining a method of operating the wearable device **100** according to another exemplary embodiment. FIG. **41** is an example of providing guide information of different content while reproducing content and continuously reproducing the content.

[0506] Operations of the wearable device **100** in operations S**4101** and S**4102** are similar to operations of the wearable device **100** in operations S**601** and S**602** of FIG. **6**.

[0507] In operation S**4103**, as a result of comparing information obtained in operation S**4102** and reference information as in operation S**603** of FIG. **6** described above, if it is determined to reproduce different content, the wearable device **100** provides reproduction stop request guide information including guide information of different content. In operation S**4103**, the wearable device **100** may temporarily stop reproducing content and provide the reproduction stop request guide information including guide information of different content.

[0508] FIG. **42** is a diagram of an example of temporarily stopping reproducing of the content and providing guide information (e.g., "please execute different content") of different content, according to an exemplary embodiment. In a situation in which different content is to be reproduced when the wearable device **100** reproduces a movie image **4211** as shown in the screen **4210** of FIG. **42**, the wearable device **100** displays reproduction stop request guide information **4221** including guide information "please reproduce different content" as shown on the screen **4220** instead of the movie image **4211**.

[0509] The reproduction stop request guide information **4221** may be displayed for more than a certain (e.g., predetermined) period of time. The certain period of time may be set as 1 second, but is not limited thereto in one or more other exemplary embodiments. The situation in which different content is to be reproduced is, for example, a situation in which fatigue of the wearer **101** is to be relieved and may be detected by comparing the information obtained in operation S**4102** and reference information (described above with reference to FIGS. **1**B through **1**H).

[0510] In operation S**4103**, the reproduction stop request guide information **4221** including the guide information regarding a reproduction of different content is displayed. Thereafter, in operation S**4104**, the wearable device **100** continuously reproduces a movie image **4231** (see a screen **4230** of FIG. **42**).

[0511] The movie image **4211** and the movie image **4231** of FIG. **42** may be connected images or same images. For example, the movie image **4211** and the movie image **4231** may be frame images of a point at which reproduction of content is stopped before the reproduction stop request guide information **4221** including the guide information of different content is displayed. According to another exemplary embodiment, the movie image **4211** may be the frame image of the point at which reproduction of content is stopped before the reproduction stop request guide information **4221** including the guide information of different content is displayed, and the movie image **4231** may be an image based on a next frame of the frame of the point at which reproduction of content is stopped before the reproduction stop request guide information **4221** including the guide information of different content is displayed, as described with reference to FIG. **8**A above. However, a relationship between the movie image **4211** and the movie image **4231** is not limited as described above. For example, the movie image **4231** may be a frame image previous to a certain section described in operation S**3510** of FIG. **35**.

[0512] The reproduction stop request guide information **4221** displayed in operation S**4203** may be displayed as shown in FIG. **8**B or **8**C described above.

[0513] FIG. **43** is a diagram for explaining an operating system or environment **4300** of the wearable device **100**, according to an exemplary embodiment. FIG. **43** may be referred to as a device relationship diagram or a network configuration diagram for explaining a method of operating the wearable device **100** according to an exemplary embodiment, but is not limited thereto.

[0514] The system **4300** of FIG. **43** includes the wearable device **100**, a smart watch **4310**, a smart phone **4320**, a smart TV **4330**, a server **4340**, a network **4350**, and a content reproduction device (for example, a game machine), but is not limited thereto in one or more other exemplary embodiments.

[0515] For example, the smart watch **4310**, the smart phone **4320**, the smart TV **4330**, and the server **4340** may be included in at least one external device. The smart watch **4310** may be included in an assist device connected to the wearable device **100**. The assist device may correspond to an "appces-

sory." The appcessory is a device connected to a main device (for example, the wearable device **100**) and operating as an application.

[0516] The server **4340** may include a server providing a different content reproducing service and a cloud server of the wearer **101** of the wearable device **100** according to exemplary embodiments by using the wearable device **100** or the wearable device **100** and an external device of the wearable device **100**, but is not limited thereto in one or more other exemplary embodiments. The different content reproducing service refers to a service providing, to the wearer **101**, content (for example, for relieving fatigue of the wearer **101**) that may influence health of the wearer **101**. The system **4300** may further include an external storage device storing PIMS information of the wearer **101** and/or life log information.

[0517] The network **4350** may include a wired or wireless based network. The network **4350** may include a network capable of near field communication or direct communication between the wearable device **100** and the smart watch **4310**, between the wearable device **100** and the smart phone **4320**, and between the wearable device **100** and the smart TV **4330** and a network capable of far field communication between the wearable device **100** and the server **4340**, but is not limited thereto in one or more other exemplary embodiments.

[0518] Near field communication or direct communication may include, for example, Bluetooth communication, Bluetooth low energy (BLE) communication, near field communication (NFC), WLAN (WiFi) communication, Zigbee communication, infrared data association (IrDA) communication, WiFi Direct (WFD) communication, ultra wideband (UWV) communication, Ant+ communication, etc., but is not limited thereto.

[0519] Far field communication may include, for example, communication (for example, direct communication between terminals (device to device (D2D)), communication based on a base station, Internet of things (IoT), machine to machine (M2M), etc.) based on a mobile communication network, wired or wireless Internet, artificial satellite based communication, broadcasting communication, etc., but is not limited thereto.

[0520] The smart watch **4310** may be used to input a user's command for executing different content, but is not limited thereto. For example, the smart watch **4310** may be used to display reproduction stop request guide information including reproduction guide information of different content.

[0521] The smart phone **4320** may be used to input a user's command for reproducing different content, display the reproduction stop request guide information including the reproduction guide information of different content, or reproduce different content, but is not limited thereto in one or more other exemplary embodiments. For example, the smart phone **4320** may provide content such as a game image or a movie image to the wearable device **100**. The smart phone **4320** may correspond to the mobile device **250** of FIGS. **2**D and **2**E described above.

[0522] The smart TV **4330** may be used to display the reproduction stop request guide information including the reproduction guide information of different content, reproduce different content, or provide, to the wearable device **100**, content such as the game image, the movie image, or a broadcasting program.

[0523] The server **4340** may be used to provide information for reproducing different content to at least one of the wearable device **100**, the smart watch **4310**, the smart phone **4320**, the smart TV **4330**, and a content reproduction device **4360**.

[0524] Information provided from the appcessory such as the smart watch **4310** may include health information of the wearer **101**. For example, the health information may include the health information of the wearer **101** sensed by using a bio sensor mounted in the smart watch **4310** such as a sweating sensor, a blood pressure sensor, a pulse sensor, and a blood sugar sensor and an activity measurement information of the wearer **101**. The health information that may be sensed by the smart watch **430** is not limited as described above.

[0525] The system **4300** may include an appcessory in addition to the smart watch **4310**. The appcessory in addition to the smart watch **4310** may include at least one of, for example, devices used as uses such as various types of smart accessories (for example, a smart ring, smart earrings, a smart band, a smart necklace, a smart tie, a smart collar, etc.), various types of smart patches, smart office supplies such as a smart clip, various types of smart body guards (for example, smart knee guards and smart elbow guards), smart shoes, smart gloves, smart clothes, smart hats, smart prosthetic foot, smart prosthetic hands, etc., but is not limited thereto. The system **4300** may include at least one of the above-described appcessories instead of the smart watch **4310**. The system **4300** may include at least one of the smart watch **4310** and the above-described appcessories.

[0526] Information provided from an external device such as the smart phone **4320** or the server **4340** may include personal information of the wearer **101** and/or health information. The personal information may include, for example, personal information such as profile information, life log information of the wearer **101**, PIMS information of the wearer **101**, an age of the wearer **101**, a gender of the wearer **101**, schedule information of the wearer **101**, etc., and/or medical information of a user such as past medical history information of the wearer **101** and present medical history information of the wearer **101**, but is not limited thereto.

[0527] The smart phone **4320** and the smart TV **4340** may be replaced with various types of devices, for example, a portable device, a home Internet appliance, a mobile device, etc.

[0528] The portable device may include a notebook, a smart board, a tablet, a PC, a handheld device, a handheld computer, a media player, an e-book terminal, a personal digital assistant (PDA), etc., but is not limited thereto.

[0529] The home Internet appliance may include a home device performing M2M or IoT such as the smart TV, the PC, a desktop PC, a refrigerator, a washing machine, an illumination device, etc., but is not limited thereto.

[0530] The mobile device my include a device such a vehicle performing M2M or IoT, but is not limited thereto.

[0531] The content reproduction device **4360** may transmit information regarding reproduced content (for example, the game image) to the wearable device **100** and control a content reproduction operation according to a user input through the wearable device **100**, like the content reproduction device **270** of FIG. **2**F.

[0532] Information that may be provided based on an application installed in the wearable device **100** may include, for example, peripheral environment information (e.g., weather provided by a weather center), but is not limited thereto in one or more other exemplary embodiments. The peripheral envi-

ronment information provided by the wearable device **100** may be used to detect a situation in which fatigue of the wearer **101** is to be relieved.

[0533] FIG. **44** is a flowchart for explaining a method of operating the system **4300** according to an exemplary embodiment. FIG. **44** is an example of determining whether to stop reproducing content by the wearable device **100**, displaying the reproduction stop request guide information **702** regarding the content through an external device (for example, the smart watch **4310** and the smart phone **4320**), and, if a reproduction stop request for the content is received through the external device, stopping reproducing the content by the wearable device **100**.

[0534] In FIG. **44**, the external device may include at least one of the smart watch **4310** and the smart phone **4320**, but is not limited thereto. Hereinafter, the external device will be described as the smart phone **4320**, but the following description may also apply to the smart watch **4310**.

[0535] The smart phone **4320** may be a smart phone of the wearer **101** of the wearable device **100**, a smart phone of a parent of the wearer **101**, or a smart phone of an acquaintance of the wearer **101** or a person around the wearer **101**, but is not limited thereto. A location around the wearer **101** may be a closed space (for example, a room or home) or an open space (or a region) within a certain (e.g., predetermined) range (for example, 5 m) with respect to the wearer **101**, but is not limited thereto. When the smart phone **4320** is the smart phone of the parent of the wearer **101**, the wearable device **100** may control a content reproduction stop function by a smart phone **3220** of the parent.

[0536] A connection between the wearable device **100** and the smart phone **4320** of FIG. **44** may be performed when content is reproduced by the wearable device **100**, but may be performed when information for displaying reproduction stop request guide information regarding content is transmitted in operation S**4404**. The connection may be based on near field wireless communication, far field wireless communication, or wired communication, but is not limited thereto.

[0537] In operation S**4401**, the wearable device **100** reproduces content. The wearable device **100** may reproduce content by executing an application installed in the wearable device **100** as described above with reference to FIG. **1**A, but is not limited thereto.

[0538] For example, in operation S**4401**, the wearable device **100** may receive and display, on the display **212**, information regarding content reproduced by the smart phone **4320**, the smart TV **4330**, or the content reproduction device **4360**. In the case of the wearable device **100** illustrated in FIG. **5**B, in operation S**4401**, the wearable device **100** may view content displayed on the display **251** of the smart phone **4320** (the mobile device **250** of FIG. **5**B) through the lenses **532** and **533**.

[0539] In operation S**4402**, the wearable device **100** obtains information. The information may be obtained by the wearable device **100** as described in operation S**602** of FIG. **6**.

[0540] In operation S**4403**, the wearable device **100** determines whether to stop reproducing content by using the obtained information and reference information. Whether to stop reproducing the content may be determined as described in operation S**603** of FIG. **6**. As a result of the determination, if a situation in which reproduction of the content is to be stopped is detected, the wearable device **100** transmits the information for displaying the reproduction stop request guide information regarding the content to the smart phone **4320**.

[0541] The situation in which reproduction of the content is to be stopped is a situation (for example, in which fatigue of the wearer **101** is to be relieved) that influences health of the wearer **101** by viewing the reproduced content by the wearable device **100** as described above with reference to FIG. **6**. The information for displaying the reproduction stop request guide information transmitted to the smart phone **4320** may be determined according to a method of displaying the reproduction stop request guide information, but is not limited thereto in one or more other exemplary embodiments. For example, the information for displaying the reproduction stop request guide information may include information as described in the reproduction stop request guide information **702** of FIG. **7**.

[0542] In operation S**4405**, the smart phone **4320** displays the reproduction stop request guide information regarding the content based on the received information for displaying the reproduction stop request guide information. The reproduction stop request guide information may be displayed as shown in one of FIGS. **7**, **8**B, and **8**C described above, but is not limited thereto in one or more other exemplary embodiments.

[0543] For example, the reproduction stop request guide information may be displayed by using a status bar region or notification region of the smart phone **4320**. When the status bar region may be used to display the reproduction stop request guide information, the smart phone **4320** may change the received information for displaying the reproduction stop request guide information in such a manner that the reproduction stop request guide information may be displayed on the status bar region of the smart phone **4320**. According to another exemplary embodiment, the wearable device **100** may transmit the information in a form to be displayed on the status bar.

[0544] When the reproduction stop request guide information is displayed, the smart phone **4320** may reproduce information regarding content different from the content reproduced by the wearable device **100**. The information regarding the different content reproduced by the smart phone may include information regarding content related to the health of the wearer **101** previously stored in the smart phone **4320**, but is not limited thereto in one or more other exemplary embodiments. For example, information regarding content selected by a user of the smart phone **4320** may be included.

[0545] When the reproduction stop request guide information is displayed as shown in FIG. **8**C, the smart phone **4320** may not use another device but may display the reproduction stop request guide information **702** on a display region independent from a region on which currently reproduced content is displayed.

[0546] Since the reproduction stop request guide information **702** is displayed, the user of the smart phone **4320** may perceive the situation in which the fatigue of the wearer **101** of the wearable device **100** needs to be relieved.

[0547] If a content reproduction stop request is received based on the reproduction stop request guide information displayed on the smart phone **4320** in operation S**4406**, the smart phone **4320** transmits the received content reproduction stop request signal to the wearable device **100** in operation S**4407**. The smart phone **4320** may receive the content reproduction stop request based on at least one of a voice input of

the user, a gesture input of the user, and a touch input based on the information displayed on the smart phone **4320**, but is not limited thereto in one or more other exemplary embodiments.

[0548] In operation S**4408**, the wearable device **100** stops reproducing the content.

[0549] FIG. **44** may be modified to further include operations S**1906** through S**1908** of FIG. **19** after operation S**4408**, may be modified to further include operations S**3206** through S**3208** of FIG. **32** after operation S**4408**, may be modified to further include operations S**3506** through S**3510** of FIG. **35** after operation S**4408**, may be modified to further include operations S**3606** through S**3611** of FIG. **36** after operation S**4408**, may be modified to further include operations S**3706** through S**3713** of FIG. **37** after operation S**4408**, and/or may be modified to further include operations S**3806** through S**3810** of FIG. **38** after operation S**4408**.

[0550] When a function related to different content is applied to the flowchart of FIG. **44**, the different content may be reproduced by the smart phone **4320** or the smart TV **4330**. When the different content is reproduced by the smart phone **4320** or the smart TV **4330**, the wearable device **100** may view the different content through a display of the smart phone **4320** or the smart TV **4330** positioned in a real world that may be viewed through the wearable device **100**, but is not limited thereto. For example, the smart phone **4320** or the smart TV **4330** may be connected to the wearable device **100** by wire or wirelessly to transmit information regarding reproduced different content to the wearable device **100**. Accordingly, the wearable device **100** may display different content based on the received information regarding the different content.

[0551] When the function related to the different content is applied to the flowchart of FIG. **44**, information regarding the different content may be transmitted to the wearable device **100** from one of the smart phone **4320**, the smart TV **4330**, and the server **4340**, and the wearable device **100** may reproduce the different content based on the received information regarding the different content to relieve the fatigue of the wearer **101**. Reproduction of the different content may be understood as an operation to perform a function of relieving the fatigue of the wearer **101**, as described above with reference to FIGS. **19** through **32**.

[0552] FIG. **45** is a flowchart for explaining a method of operating the system **4300** according to another exemplary embodiment. FIG. **45** is an example of determining whether to stop reproducing content by the smart phone **4320** based on information obtained by the wearable device **100** and controlling a content reproduction operation of the wearable device **100** based on a result of the determination. FIG. **45** may be applied between the wearable device **100** and the smart phone TV **4330** and between the wearable device **100** and the server **4340**.

[0553] Operations S**4501**, S**4502**, and S**4505** through S**4508** of FIG. **45** may be performed similarly to operations S**4401**, S**4402**, and S**4405** through S**4408** of FIG. **44** described above.

[0554] In operation S**4503**, the wearable device **100** transmits information obtained in operation S**4502** to the smart phone **4320**. The smart phone **4320** compares the information received from the wearable device **100** and reference information described above with reference to FIGS. **1**B through **1**G and determines whether to stop reproducing the content.

[0555] As a result of the determination, if a situation in which reproduction of the content is to be stopped is detected, in operation S**4504**, the smart phone **4320** displays content reproduction stop request guide information.

[0556] FIG. **45** may be modified to further include operations S**1906** through S**1908** of FIG. **19** after operation S**4508**, may be modified to further include operations S**3206** through S**3208** of FIG. **32** after operation S**4508**, may be modified to further include operations S**3506** through S**3510** of FIG. **35** after operation S**4508**, may be modified to further include operations S**3606** through S**3611** of FIG. **36** after operation S**4508**, may be modified to further include operations S**3706** through S**3713** of FIG. **37** after operation S**4508**, and/or may be modified to further include operations S**3806** through S**3810** of FIG. **38** after operation S**4508**. A function related to reproduction of different content may be applied to the flowchart of FIG. **45** as described above with reference to FIG. **44**.

[0557] FIG. **46** is a flowchart for explaining a method of operating the system **4300** according to another exemplary embodiment. FIG. **46** is an example in which the wearable device **100** displays content reproduction stop request guide information based on information provided by the smart watch **4310**.

[0558] Operations S**4601**, S**4604**, and S**4607** of FIG. **46** may be performed similarly to operations S**4401**, S**4403**, and S**4408** of FIG. **44** described above.

[0559] In operation S**4602**, the smart watch **4310** may obtain health information such as a sweating amount of the wearer **101**, a blood pressure, a pulse, a blood sugar, etc., by using a bio sensor mounted in the smart watch **4310** or may obtain information regarding an activity of the wearer **101** by using an activity measurement function as described with reference to FIG. **43**.

[0560] In operation S**4603**, the smart watch **4310** transmits the obtained information to the wearable device **100**. Accordingly, in operation S**4604**, the wearable device **100** determines whether to stop reproducing content. Whether to stop reproducing the content may be determined by comparing reproduction stop request guide information described above with reference to the health information of FIG. **1**C-**2** and the information received from the smart watch **4310**.

[0561] As a result of the determination, if a situation in which reproduction of the content is to be stopped is detected, in operation S**4605**, the wearable device **100** displays content reproduction stop request guide information. The content reproduction stop request guide information may be displayed as shown in one of FIGS. **7**, **8**B, and **8**C, but is not limited thereto.

[0562] In operation S**4606**, if a content reproduction stop request is received based on the displayed content reproduction stop request guide information, the wearable device **100** stops reproducing the content.

[0563] FIG. **46** may be applied between the wearable device **100** and the smart phone **4320**. When FIG. **46** is applied between the wearable device **100** and the smart phone **4320**, the information obtained in operation S**4602** may include at least one of medical information of the wearer **101** described above with reference to FIG. **1**C-**2**, peripheral environment information described above with reference to FIG. **1**F, and personal information of the wearer **101** described above with reference to FIG. **1**G, but is not limited thereto.

[0564] FIG. **46** may be applied between the wearable device **100** and the server **4340**. When FIG. **46** is applied between the wearable device **100** and the server **4340**, the information obtained in operation S**4602** may include at least one of the medical information of the wearer **101** described

above with reference to FIG. **1**C-**2**, the peripheral environment information described above with reference to FIG. **1**F, and the personal information of the wearer **101** described above with reference to FIG. **1**G, but is not limited thereto.

[0565] Operation S**4603** of FIG. **46** may be modified such that the information obtained by the smart watch **4310** is transmitted when a transmission of information is requested by the wearable device **100**.

[0566] FIG. **46** may be modified to further include operations S**1906** through S**1908** of FIG. **19** after operation S**4607**, may be modified to further include operations S**3206** through S**3208** of FIG. **32** after operation S**4607**, may be modified to further include operations S**3506** through S**3510** of FIG. **35** after operation S**4607**, may be modified to further include operations S**3606** through S**3611** of FIG. **36** after operation S**4607**, may be modified to further include operations S**3706** through S**3713** of FIG. **37** after operation S**4607**, and/or may be modified to further include operations S**3806** through S**3810** of FIG. **38** after operation S**4607**. A function related to reproduction of different content may be applied to the flowchart of FIG. **46** as described above with reference to FIG. **44**.

[0567] FIG. **47** is a flowchart for explaining a method of operating the system **4300** according to another exemplary embodiment. FIG. **47** is an example of displaying content reproduction stop request guide information by using information obtained by the wearable device **100** and information obtained by an external device (for example, the smart watch **4310** and the smart phone **4320**).

[0568] Operations S**4701** and S**4702** of FIG. **47** may be performed similarly to operations S**4401** and S**4402** of FIG. **44** described above. Operations S**4703** and S**4704** of FIG. **47** may be performed similarly to operations S**4602** and S**4603** of FIG. **46** described above. Operations S**4706** through S**4708** of FIG. **47** may be performed similarly to operations S**4605** through S**4607** of FIG. **46** described above.

[0569] In operation S**4705**, the wearable device **100** may compare the information obtained by the wearable device **100** and information transmitted from the smart watch **4310** or the smart phone **4320** and reference information for a reproduction stop request described above with reference to FIGS. **1**B through **1**H to determine whether to stop reproducing content reproduced by the wearable device **100**.

[0570] For example, the information obtained in operation S**4702** may be one of content reproduction related information of the wearable device **100** described above with reference to FIG. **1**B, bio information based on eyes described above with reference to FIG. **1**C-**1**, and peripheral environment information described above with reference to FIG. **1**F, and the information transmitted in operation S**4704** may be one of health information described above with reference to FIG. **1**C-**2**, the peripheral environment information described above with reference to FIG. **1**F, and personal information described above with reference to FIG. **1**G but are not limited thereto.

[0571] In operation S**4705**, the wearable device **100** may determine whether to stop reproducing the content in the same or similar manner as determining whether to display the reproduction stop request guide information by using a plurality of pieces of information as described above with reference to FIG. **16**.

[0572] FIG. **47** may be applied between the wearable device **100** and the server **4340**. When FIG. **47** is applied between the wearable device **100** and the server **4340**, the server **4340** may provide, to the wearable device **100**, at least one of medical information described above with reference to FIG. **1**C-**2**, the peripheral environment information described above with reference to FIG. **1**F, and the personal information described above with reference to FIG. **1**G, but the provided information is not limited thereto in one or more other exemplary embodiments.

[0573] FIG. **47** may be modified to further include operations S**1906** through S**1908** of FIG. **19** after operation S**4708**, may be modified to further include operations S**3206** through S**3208** of FIG. **32** after operation S**4708**, may be modified to further include operations S**3506** through S**3510** of FIG. **35** after operation S**4708**, may be modified to further include operations S**3606** through S**3611** of FIG. **36** after operation S**4708**, may be modified to further include operations S**3706** through S**3713** of FIG. **37** after operation S**4708**, and/or may be modified to further include operations S**3806** through S**3810** of FIG. **38** after operation S**4708**. A function related to reproduction of different content may be applied to the flowchart of FIG. **47** as described with reference to FIG. **44**.

[0574] FIG. **48** is a block diagram of the wearable device **100** according to an exemplary embodiment. Referring to FIG. **48**, the wearable device **100** may include an information obtaining unit **4810** (e.g., information obtainer), a control unit **4820** (e.g., controller), a display **4830**, and a user input unit **4840** (e.g., user input device or user inputter). However, it is understood that the wearable device **100** may be implemented with more elements or fewer elements than the above-described elements.

[0575] For example, the wearable device **100** according to an exemplary embodiment may include an information obtaining unit **4910** (e.g., information obtainer), a control unit **4920** (e.g., controller), a user interface unit **4930** (e.g., user interface device or user interface), a sensor unit **4940** (e.g., sensor), a memory **4950**, an image processing unit **4960** (e.g., image processor), an audio output unit **4970** (e.g., audio output device or audio outputter), an audio input unit **4975** (e.g., audio input device or audio inputter), a camera **4980**, and a communication unit **4990** (e.g., communicator, communication device, or communication module) as shown in FIG. **49**, but is not limited thereto in one or more other exemplary embodiments. For example, the wearable device **100** may further include a battery. The wearable device **100** of FIG. **48** may not include the information obtaining unit **4810**, but may include the communication unit **4990**. The wearable device **100** of FIG. **48** may not include the display **4830**.

[0576] The information obtaining unit **4810**, the control unit **4820**, the display **4830**, and the user input unit **4840** of FIG. **48** may be configured to be identical or similar to the information obtaining unit **4910**, the control unit **4920**, a display **4931** and a user input unit **4932** that are included in the user interface unit **4930**.

[0577] The information obtaining unit **4910** may obtain information generated from the content reproduced by the wearable device **100**. The information may be obtained by using a method as described above with reference to FIGS. **1**A through **1**H.

[0578] The information obtaining unit **4910** includes a first information obtaining unit **4911** (e.g., first information obtainer), a second information obtaining unit **4912** (e.g., second information obtainer), a third information obtaining unit **4913** (e.g., third information obtainer), and a fourth information obtaining unit **4913** (e.g., fourth information obtainer), but is not limited thereto in one or more other exemplary embodiments.

[0579] The first information obtaining unit **4911** may obtain content reproduction related information of the wearable device **100** according to a method described above with reference to FIG. **1**B. The second information obtaining unit **4912** may obtain bio information of the wearer **101** according to a method described above with reference to FIGS. **1**C-**1** and **1**C-**2**. The third information obtaining unit **4913** may obtain peripheral environment information of the wearable device **100** according to a method described above with reference to FIG. **1**F. The fourth information obtaining unit **4914** may obtain personal information of the wearer **101** according to a method described above with reference to FIG. **1**G.

[0580] The elements may be different according to the information obtained by the first through fourth information obtaining units **4911** through **4914**.

[0581] For example, when information regarding a content reproduction time is obtained by the first information obtaining unit **4911**, the first information obtaining unit **4911** may be configured as a timer connected to a wearable sensor **4941** and a control unit **4920** or a timer connected to the control unit **4920**. When the first information obtaining unit **4911** includes the timer connected to a wearable sensor **4941** and a control unit **4920**, if the first information obtaining unit **4911** receives a signal sensed by the wearable sensor **4941** and a signal informing the content reproduction time from the control unit **4920**, the first information obtaining unit **4911** may measure time, obtain content reproduction time information, and provide the obtained content reproduction time information to the control unit **4920**.

[0582] When information regarding a battery consumption amount is obtained by the first information obtaining unit **4911**, the first information obtaining unit **4911** may include an element for detecting battery remains (i.e., remaining battery life) based on a battery discharge voltage or discharge current. When the first information obtaining unit **4911** includes the element for detecting battery remains, the first information obtaining unit **4911** may provide the detected battery remains to the control unit **4920**.

[0583] When information regarding a heating temperature is obtained by the first information obtaining unit **4911**, the first information obtaining unit **4911** may be configured as a temperature sensor or the temperature sensor or the timer. When the first information obtaining unit **4911** is configured as the temperature sensor or the timer, the first information obtaining unit **4911** may obtain information regarding a time during which a temperature detected by the temperature sensor remains at a specific temperature (for example, 49 degrees) and may provide the obtained information to the control unit **4920**.

[0584] The first information obtaining unit **4911** may be configured to obtain one piece of information among information of the wearable device **100** of FIG. **1**B, at least two or more pieces of information, or all pieces of information.

[0585] When the bio information based on eyes of the wearer **101** of FIG. **1**C-**1** is obtained by the second information obtaining unit **4912**, the second information obtaining unit **4912** may be configured as the bio information obtaining camera **208**. When the health information of the wearer **101** of FIG. **1**C-**2** is obtained by the second information obtaining unit **4912**, the second information obtaining unit **4912** may be configured as an element connected to the communication unit **4990** and receiving the health information of the wearer **101** from an external device and transmitting the health information to the control unit **4920**, or may be configured as an element receiving a sensing value of the bio sensor **4943** and transmitting the sensing value to the control unit **4920**.

[0586] The second information obtaining unit **4912** may be configured to obtain one piece of information among the information of FIGS. **1**C-**1** and **1**C-**2**, or may be configured to obtain at least two or more pieces of information or all pieces of information. The information obtained by the second information obtaining unit **4912** is provided to the control unit **4920**.

[0587] When the peripheral environment information of FIG. **1**F is obtained by the third information obtaining unit **4913**, the third information obtaining unit **4913** may be configured as an element connected to an environment sensor **4942** and transmitting a sensing value of the environment sensor **4942** to the control unit **4920**. The third information obtaining unit **4913** may be configured to obtain one piece of information among the peripheral environment information of FIG. **1**F, or may be configured to obtain at least two or more pieces of information or all pieces of information. The information obtained by the third information obtaining unit **4913** is provided to the control unit **4920**.

[0588] When the personal information of FIG. **1**G is obtained by the fourth information obtaining unit **4914**, the fourth information obtaining unit **4914** may be configured as an element reading personal information from the memory **4950** and transmitting the personal information to the control unit **4920**, an element receiving personal information input through the user input unit **4932** and transmitting the personal information to the control unit **4920**, and/or an element transmitting personal information received from an external device through the communication unit **4990** to the control unit **4920**.

[0589] The fourth information obtaining unit **4914** may be configured to obtain one piece of information among the personal information of FIG. **1**G, or may be configured to obtain at least two or more pieces of information or all pieces of information. The information obtained by the fourth information obtaining unit **4914** is provided to the control unit **4920**.

[0590] The control unit **4920** may compare the information obtained by the information obtaining unit **4910** and reproduction stop request guide information described above with reference to FIGS. **1**B through **1**H to determine whether to stop reproducing content reproduced by the wearable device **100**. As a result of the determination, if a situation in which reproduction of the content is to be stopped is detected, the control unit **4920** displays, on the display **4931**, reproduction stop request guide information regarding content. The reproduction stop request guide information may be displayed as shown in any of FIGS. **7**, **8**B, and **8**C. The situation may be a situation in which fatigue of the wearer **101** is to be relieved as described in the above-described exemplary embodiments.

[0591] If a reproduction stop request for the content is received through the user input unit **4932** based on the reproduction stop request guide information displayed on the display **4931**, the control unit **4920** stops reproducing the content by the wearable device **100**.

[0592] The control unit **4920** controls a general operation of the wearable device **100**. The control unit **4920** may be referred to as a processor controlling an operation of the wearable device **100**. The control unit **4920** may control the elements **4910** and **4930** through **4990** of FIG. **49** by executing a program stored in the memory **4950**.

[0593] The control unit **4920** may operate based on at least one of the flowcharts of FIGS. **6**, **9**, **10**, **16**, **17**, **19**, **32**, **35** through **38**, **40**, **41**, and **44** through **47** and a flowchart of FIG. **50** that will be described below.

[0594] The user interface unit **4930** includes the display **4931** and the user input unit **4932**.

[0595] The display **4931** may be configured as one of the displays **212**, **311**, **413**, **414**, **502**, and **503** described above with reference to FIGS. **2**A, **2**B, **2**D through **2**F, **3**, **4**, and **5**A. The display **4931** may be configured as at least one of a liquid crystal display (LCD), a thin film transistor LCD (TFT-LCD), an organic light emitting diode (OLED), a 3D display, an electrophoretic display (EPD), or may be configured as an optical waveguide (for example, a prism) as described above with reference to FIGS. **2**A through **4**, but is not limited thereto in one or more other exemplary embodiments.

[0596] The user input unit **4932** may be configured as one of the user input units **207**, **306**, **408**, **504**, and **535** described above with reference to FIGS. **2**A, **2**B, **2**D through **2**F, **3**, **4**, **5**A, and **5**B. Input information of a user that may be input through the user input unit **4932** may include at least one of touch based input information, movement based input information, and vision based input information, but is not limited thereto in one or more other exemplary embodiments.

[0597] The sensor unit **4940** includes the wearable sensor **4941**, the environment sensor **4942**, the bio sensor **4943**, a proximity sensor **4944**, an operation detection sensor **4945**, a location sensor **4946**, a gyroscope sensor **4947**, an acceleration sensor **4948**, and a geomagnetic sensor **4949**, but is not limited thereto in one or more other exemplary embodiments.

[0598] The wearable sensor **4941** may include the sensor **210** of FIG. **2**A. The environment sensor **4942** may include the sensor **209** of FIG. **2**A. The environment sensor **4942** may include a sensor capable of sensing peripheral environment information. The bio sensor **4943** may include sensors capable of sensing the health information of the wearer **101** mentioned in FIG. **1**C-**2**.

[0599] The proximity sensor **4944** may sense whether a part of body such as a hand of the wearer **101** approaches the wearable device **100**. The operation detection sensor **4945** may sense an activity of the wearer **101**. The location sensor **4946** may detect a location of the wearable device **100**. For example, the location sensor **4945** may be configured as a global positioning system (GPS) receiver. The gyroscope sensor **4947** may measure an azimuth of the wearable device **100**. The acceleration sensor **4948** may measure an inclination and acceleration of the wearable device **100** with respect to a ground surface. The geomagnetic sensor **4949** may detect azimuth orientations of cardinal points with respect to the wearable device **100**.

[0600] The sensor unit **4940** may further include a pressure sensor (for example, a touch sensor, a piezoelectric sensor, a physical button, etc.), a status sensor (for example, an earphone terminal, a digital multimedia broadcasting (DMB) antenna, a standard terminal (for example, a terminal capable of recognizing whether charging is performed, a terminal capable of recognizing whether to connect to an external device, and a terminal capable of recognizing whether to connect to a dock), a time sensor, a stress sensor, an emotion sensor, etc.

[0601] The memory **4950** may include a user interface (UI) module **4951**, a notification module **4952**, and an application module **4953**. The notification module **4952** may include a guide module providing content reproduction stop request guide information described above with reference to the above-described exemplary embodiments, guide information regarding different content, etc.

[0602] The memory **4950** may store a program for processing and controlling the control unit **4920**. The program stored in the memory **4950** may include a content reproduction stop application influencing health of the wearer **101** according to an exemplary embodiment, an application reproducing different content, and an application providing a different function. The memory **4950** may store information for executing the above-described applications. For example, the memory **4950** may store reproduction stop request reference information mentioned in FIGS. **1**B through **1**H.

[0603] The memory **4950** may include at least one storage medium from among a flash memory-type storage medium, a hard disk-type storage medium, a multimedia card micro-type storage medium, card-type memories (e.g., an SD card, an XD memory, etc.), Random Access Memory (RAM), Static Random Access Memory (SRAM), Read-Only Memory (ROM), Electrically Erasable Programmable Read-Only Memory (EEPROM), Programmable Read-Only Memory (PROM), a magnetic memory, a magnetic disc, and an optical disc.

[0604] The wearable device **100** may be configured to use a web storage performing a storage function of the memory **4950** on the Internet or the server **4340**.

[0605] The programs stored in the memory **4950** may classify a plurality of modules according to functions thereof. For example, the programs stored in the memory **4950** may be classified as the UI module **4951**, the notification module **4952**, the application module **4953**, etc., but are not limited thereto.

[0606] The UI module **4951** may provide, to the control unit **4920**, the content reproduction stop request guide information described above with reference to the above-described exemplary embodiments, guide information regarding different content, guide information regarding a different function, etc. The UI module **4951** may provide, to the control unit **4920**, a UI, a GUI, etc., specialized for the applications installed in the wearable device **100**.

[0607] The notification module **4952** may generate a signal for notifying providing of the UI for the content reproduction stop request guide information described above with reference to the above-described exemplary embodiments or the guide information or notifying receiving of information from external devices (at least one of **4310** through **4340**), but is not limited thereto.

[0608] The notification module **4952** may output a notification signal in the form of a video signal through the display **4931** and in the form of an audio signal through the audio output unit **4970**, but is not limited thereto in one or more other exemplary embodiments.

[0609] The application module **4953** may include applications described above with reference to FIG. **1**A set in the wearable device **100** and the above-described applications, but is not limited thereto in one or more other exemplary embodiments.

[0610] The image processing unit **4960** may process an image that is to be displayed on the display **4931**. The image processing unit **4960** may include a function of restoring a compressed image. The image processing unit **4960** may be controlled by the control unit **4920** to include a function of

editing a content frame and a reproduction stop request guide information frame described above with reference to FIG. **8**A.

[0611] The audio output unit **4970** may be configured as any of the sound output units **215**, **216**, **314**, **416**, **417**, and **505** described above with reference to FIGS. **2**A, **2**B, **2**D, **2**F, **3**, **4**, and **5**A, and **5**B, but is not limited thereto.

[0612] The audio output unit **4970** may output audio data received from the communication unit **4990** or stored in the memory **4950**. The audio output unit **4970** may output a sound signal related to a function (for example, notification sound) performed by the wearable device **100**. A speaker, a buzzer, etc., may be included in the audio output unit **4970**, but are not limited thereto.

[0613] The audio input unit **4975** receives an audio signal input from the outside of the wearable device **100**, converts the received audio signal into an electric audio signal, and transmits the electric audio signal to the control unit **4920**. The audio input unit **4975** may be configured as a microphone.

[0614] The audio signal input from the outside may receive a voice signal of the wearer **101** of the external devices (at least one of **4310** through **4340**) of the wearable device **100** or the wearable device **100** or a peripheral sound signal of the wearable device **100**. The audio input unit **4975** may use various noise removal algorithms for removing noise generated during a process of receiving an external sound signal.

[0615] The camera **4980** may obtain an image frame such as a still image or a moving image in a conference call mode or a capture mode. The camera **4980** may capture an image of a finger gesture of the wearer **101** or an image of a real world that may be viewed by the wearer **101** and transmit the image to the control unit **4920**. The image captured by the camera **4980** may be transmitted to and processed by the control unit **4920** or the image processing unit **4960**. The image frame captured by the camera **4980** may be stored in the memory **4950** or may be transmitted to the outside through the communication unit **4990**.

[0616] The communication unit **4990** may include one or more elements for communication between the wearable device **100** and at least one external device (at least one of **4310** through **4340**). For example, the communication unit **4990** may include a near field communication device **4991**, a mobile communication device **4992**, and a broadcasting receiver **4993**, but is not limited thereto in one or more other exemplary embodiments.

[0617] The near field communication device **4991** may include a Bluetooth communication unit, a Bluetooth low energy (BLE) communication unit, a near field communication (NFC), a WLAN (WiFi) communication unit, a Zigbee communication unit, an infrared data association (IrDA) communication unit, a WiFi Direct (WFD) communication unit, an ultra wideband (UWB) communication unit, an Ant+ communication unit, etc., but is not limited thereto.

[0618] The mobile communication device **4992** transmits and receives a wireless signal to and from at least one of a base station, an external device, and a server on a mobile communication network. In this regard, the wireless signal may include a voice call signal, a video call signal, or data of various forms according to transmission and reception of text/multimedia messages. The mobile communication device **4992** may include communication (for example, device to device (D2D), communication based on the base station, IoT communication, M2M, etc.) based on a mobile communication network, wired or wireless Internet, artificial satellite based communication, broadcasting communication, etc., described above with reference to FIG. **43**, but is not limited thereto.

[0619] The broadcasting receiver **4993** receives a broadcasting signal and/or information related to broadcasting from the outside through a broadcasting channel. The broadcasting channel may include at least one of a satellite channel, a terrestrial channel, and a radio channel, but is not limited thereto.

[0620] The wearable device **100** shown in FIGS. **2**B, **2**D through **2**F, **3**, **4**, **5**A, and **5**B may be configured as shown in FIG. **48** or **49**, but is not limited thereto.

[0621] FIG. **50** is a flowchart for explaining a method of operating the system **4300** according to another exemplary embodiment. FIG. **50** is an example in which content is reproduced by the content reproduction device **4360**, the reproduced content is displayed by the wearable device **100**, and different content is reproduced by the smart TV **4330**.

[0622] In operation S**5001**, the content is reproduced by the content reproduction device **4360**. The content reproduction device **4360** may reproduce the content according to a user input through an exclusive user input unit (for example, the user input unit **271** of FIG. **2**G), but is not limited thereto in one or more other exemplary embodiments. For example, the content reproduction device **4360** may reproduce the content according to a user input through the user input unit **207**, a user input through the smart phone **4320**, and a user input through the smart TV **4330**.

[0623] In operation S**5002**, the content reproduction device **4360** may transmit information regarding the reproduced content to the wearable device **100**. The information regarding the content may include an image and audio constituting the content, but is not limited thereto. For example, the information regarding the content may include reproduction format information of the image and the audio constituting the content.

[0624] In operation S**5003**, the wearable device **100** outputs the received image and the audio regarding the content. The image may be output through the display **212**. The audio may be output through the audio output units **215** and **216**, but is not limited thereto in one or more other exemplary embodiments. For example, when the wearable device **100** is configured as shown in FIG. **2**E, the audio may be output through the wearable earphone **260**.

[0625] In operation S**5004**, the wearable device **100** determines whether to stop reproducing the content while outputting the image and the audio regarding the content. Operation S**5004** may be performed like operation S**4403** of FIG. **44**.

[0626] As a result of the determination in operation S**5004**, if reproduction of the content is stopped, in operation S**5005**, the wearable device **100** displays content reproduction stop request guide information. Operation S**5005** may be performed like operation S**4605** of FIG. **46**.

[0627] In operation S**5006**, if a content reproduction stop request is received based on the content reproduction stop request guide information displayed through the display **212** of the wearable device **100**, in operation S**5007**, the wearable device **100** transmits a content reproduction stop request signal to the content reproduction device **4360**. Accordingly, in operation S**5008**, the content reproduction device **4360** stops reproducing the content. Since the reproduction of the content is stopped by the content reproduction device **4360**, output of the image and the audio regarding the content is stopped by

the wearable device **100**. Since the output of the image and the audio regarding the content is stopped, in operation S**5009**, the wearable device **100** displays guide information regarding different content on the display **212**.

[0628] In operation S**5010**, if a reproduction request for different content is received based on guide information of the different content displayed on the display **212**, the wearable device **100** transmits, to the smart TV **4330**, a reproduction request signal for the different content.

[0629] In operation S**5011**, the different content whose reproduction is requested in operation S**5010** may indicate that content is to be reproduced by a smart TV. The wearable device **100** may have information regarding a reproduction device for the different content, to perform operation S**5011** according to the reproduction request for the different content received in operation S**5010**. For example, when plural different content exists, the wearable device **100** may have information regarding a reproduction device regarding the plurality of pieces of different contents. When the reproduction device for the different content whose reproduction is requested in operation S**5010** is the smart phone **4320**, in operation S**5011**, the wearable device **100** may transmit the reproduction request signal for the different content to the smart phone **4320**. When the reproduction device for the different content whose reproduction is requested in operation S**5010** is a PC, in operation S**5011**, the wearable device **100** may transmit the reproduction request signal for the different content to the PC.

[0630] In operation S**5012**, the smart TV **4330** displays the different content thereon according to the reproduction request for the wearable device **100**. Accordingly, the wearer **101** of the wearable device **100** may view the different content through the smart TV **4330** positioned in a real world that may be viewed through the wearable device **100**. Operation S**5012** may be modified such that information regarding content reproduced by the smart TV **4330** is transmitted to the wearable device **100**, and an image and audio regarding the content are output by the wearable device **100**.

[0631] A service reproducing different content as described in the above-described exemplary embodiments may be a service (for example, a service providing a function of relieving fatigue of the wearer **101**) that may influence a health state of the wearer **101**.

[0632] One or more exemplary embodiments may also be embodied as programmed commands to be executed in various computer means, and then may be recorded to a computer-readable recording medium. The computer-readable recording medium may include one or more of the programmed commands, data files, data structures, or the like. The programmed commands recorded to the computer-readable recording medium may be particularly designed or configured for one or more embodiments of the present disclosure or may be well known to one of ordinary skill in the art. Examples of the computer-readable recording medium include magnetic media including hard disks, magnetic tapes, and floppy disks, optical media including CD-ROMs and DVDs, magneto-optical media including floptical disks, and a hardware apparatus designed to store and execute the programmed commands in ROM, RAM, a flash memory, and the like. Examples of the programmed commands include not only machine codes generated by a compiler but also include great codes to be executed in a computer by using an interpreter. Furthermore, it is understood that one or more of the above-described elements may be implemented as hardware (e.g., circuitry, at least one processor, memory, data lines, etc.), software, or a combination of hardware and software.

[0633] It should be understood that exemplary embodiments described therein should be considered in a descriptive sense only and not for purposes of limitation. Descriptions of features or aspects within each exemplary embodiment should typically be considered as available for other similar features or aspects in other exemplary embodiments.

[0634] While one or more exemplary embodiments have been described with reference to the figures, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope as defined by the following claims.

1. A wearable device comprising:
- a display configured to display content;
- a user input unit configured to receive a command of a wearer; and
- a controller configured to:
- when the content is reproduced in a state in which the wearable device is worn, output, through the display and based on content reproduction related information of the wearable device, information informing the wearer that stopping reproduction of the content is requestable, and
- control to stop the reproduction of the content in response to a reproduction stop request for the content, received through the user input unit in response to the output information,
- wherein the content reproduction related information corresponds to information influential on a health of the wearer when the content is reproduced in the state in which the wearable device is worn.

2. The wearable device of claim **1**, wherein the content reproduction related information of the wearable device comprises at least one of:
- a reproduction time of the content in the state in which the wearable device is worn;
- a battery consumption amount of at least one of the wearable device and a device reproducing the content after starting the reproduction of the content in the state in which the wearable device is worn; and
- a heating temperature of the wearable device after starting the reproduction of the content in the state in which the wearable device is worn.

3. The wearable device of claim **1**, further comprising:
- a first information obtainer configured to obtain the content reproduction related information of the wearable device in connection with the reproduction of the content; and
- a second information obtainer configured to obtain bio information of the wearer in connection with the reproduction of the content,
- wherein the controller is configured to output, through the display and based on the obtained content reproduction related information of the wearable device and the obtained bio information of the wearer, the information informing the wearer that stopping reproduction of the content is requestable.

4. The wearable device of claim **1**, further comprising:
- a third information obtainer configured to obtain peripheral environment information of the wearable device in connection with the reproduction of the content,
- wherein the controller is configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained peripheral environment information of the wearable

device, the information informing the wearer that stopping reproduction of the content is requestable.

5. The wearable device of claim **1**, further comprising:

a fourth information obtainer configured to obtain personal information of the wearer in connection with the reproduction of the content,

wherein the controller is configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained personal information of the wearer, the information informing the wearer that stopping reproduction of the content is requestable.

6. The wearable device of claim **1**, wherein the controller is configured to continuously reproduce the content through the display when a reproduction stop rejection for the content is received through the user input unit in response to the output information informing the wearer that stopping reproduction of the content is requestable.

7. The wearable device of claim **1**, wherein the controller is configured to output, through the display, the information in a display form in which:

the information is overlapped with the content;

a frame of the information is inserted between frames of the content; or

the information is displayed on a display region different from a display region on which the content is reproduced.

8. The wearable device of claim **1**, wherein the controller is configured to control the wearable device such that different content is viewable using the wearable device when the reproduction of the content is stopped in response to the reproduction stop request for the content.

9. The wearable device of claim **8**, wherein the controller is configured to output, through the display, information regarding a plurality of different pieces of contents, and to control the wearable device to allow viewing of content selected from among the plurality of different pieces of contents when a selection signal is received in response to the output information regarding the plurality of different pieces of contents.

10. The wearable device of claim **1**, wherein the controller is configured to output, through the display, the information by applying different reference information to the content reproduction related information of the wearable device according to a type of the content.

11. The wearable device of claim **1**, wherein the controller is configured to output the information informing the wearer that stopping reproduction of the content is requestable based on a comparison between the content reproduction related information and predetermined content reproduction stop request reference information.

12. A method of operating a wearable device, the method comprising:

reproducing content through a display of the wearable device;

obtaining content reproduction related information of the wearable device, the content reproduction related information corresponding to information influential on a health of a wearer when the content is reproduced in a state in which the wearable device is worn;

outputting, through the display and based on the obtained content reproduction related information, information informing the wearer that stopping reproduction of the content is requestable; and

controlling the wearable device to stop the reproduction of the content in response to a reproduction stop request for the content, received through a user input in response to the output information.

13. The method of claim **12**, wherein the content reproduction related information of the wearable device comprises at least one of:

a reproduction time of the content in the status in which the wearable device is worn;

a battery consumption amount of at least one of the wearable device and a device reproducing the content after starting the reproduction of the content in the status in which the wearable device is worn; and

a heating temperature of the wearable device after starting the reproduction of the content in the status in which the wearable device is worn.

14. The method of claim **12**, further comprising:

obtaining the content reproduction related information of the wearable device in connection with the reproduction of the content; and

obtaining bio information of the wearer in connection with the reproduction of the content,

wherein the outputting the information informing the wearer comprises outputting, through the display and based on the obtained content reproduction related information of the wearable device and the obtained bio information of the wearer, the information informing the wearer.

15. The method of claim **12**, further comprising:

obtaining peripheral environment information of the wearable device in connection with the reproduction of the content,

wherein the outputting the information informing the wearer comprises outputting, through the display and based on the content reproduction related information of the wearable device and the obtained peripheral environment information of the wearable device, the information informing the wearer.

16. The method of claim **12**, further comprising:

obtaining personal information of the wearer in connection with the reproduction of the content,

wherein the outputting the information comprises outputting, through the display and based on the content reproduction related information of the wearable device and the obtained personal information of the wearer, the information informing the wearer.

17. The method of claim **12**, further comprising:

receiving, by the wearable device, a continuous reproduction request for the content in response to the output, the information informing the wearer; and

continuously reproducing the content in response to the received continuous reproduction request for the content.

18. The method of claim **12**, wherein the outputting the information informing the wearer comprises outputting, through the display, the information informing the wearer in a display form in which:

the information is overlapped with the content;

a frame of the information informing the wearer is inserted between frames of the content on the display; or

the information informing the wearer is displayed on a display region different from a display region on which the content is reproduced.

19. The method of claim **12**, further comprising reproducing, by the wearable device, different content when the reproduction of the content is stopped in response to the reproduction stop request for the content.

20. The method of claim **19**, wherein the reproducing the different content comprises:

outputting, through the display, information regarding a plurality of different pieces of contents;

receiving a selection signal based on the output information regarding the plurality of different pieces of contents; and

providing content selected from among the plurality of different pieces of contents in response to the received selection signal.

21. The method of claim **12**, wherein the outputting the information informing the wearer comprises outputting, through the display, the information informing the wearer by applying different reference information to the content reproduction related information of the wearable device according to a type of the content.

22. A non-transitory computer-readable recording medium having recorded thereon a program executable by a computer for performing the method of claim **12**.

23. A wearable device comprising:

a display configured to display content;

a user input unit configured to receive a command of a wearer; and

a controller configured to, when the content is reproduced in a state in which the wearable device is worn, output, through the display and based on content reproduction related information of the wearable device, information regarding stopping reproduction or viewing of the content,

wherein the content reproduction related information corresponds to information influential on a health of the wearer.

24. The wearable device of claim **23**, wherein the content reproduction related information of the wearable device comprises at least one of:

a reproduction time of the content in the state in which the wearable device is worn;

a battery consumption amount of at least one of the wearable device and a device reproducing the content after starting the reproduction of the content in the state in which the wearable device is worn; and

a heating temperature of the wearable device after starting the reproduction of the content in the state in which the wearable device is worn.

25. The wearable device of claim **23**, further comprising:

a first information obtainer configured to obtain the content reproduction related information of the wearable device in connection with the reproduction of the content; and

a second information obtainer configured to obtain bio information of the wearer in connection with the reproduction of the content,

wherein the controller is configured to output, through the display and based on the obtained content reproduction related information of the wearable device and the obtained bio information of the wearer, the information regarding stopping reproduction or viewing of the content.

26. The wearable device of claim **23**, further comprising:

a third information obtainer configured to obtain peripheral environment information of the wearable device in connection with the reproduction of the content,

wherein the controller is configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained peripheral environment information of the wearable device, the information regarding stopping reproduction or viewing of the content.

27. The wearable device of claim **23**, further comprising:

a fourth information obtainer configured to obtain personal information of the wearer in connection with the reproduction of the content,

wherein the controller is configured to output, through the display and based on the content reproduction related information of the wearable device and the obtained personal information of the wearer, the information regarding stopping reproduction or viewing of the content.

28. The wearable device of claim **23**, wherein the controller is configured to continuously reproduce the content through the display when a reproduction stop rejection for the content is received through the user input unit in response to the output information.

29. The wearable device of claim **23**, wherein the controller is configured to output, through the display, the information in a display form in which:

the information is overlapped with the content;

a frame of the information is inserted between frames of the content; or

the information is displayed on a display region different from a display region on which the content is reproduced.

30. The wearable device of claim **23**, wherein the controller is configured to control the wearable device such that different content is viewable using the wearable device when the reproduction of the content is stopped in response to a reproduction stop request for the content input by the wearer in response to the output information.

31-32. (canceled)

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