REAL TIME AUTOMATIC CONTROL SYSTEM OF SPORTING GOODS AND CONTROL METHOD USING THE SAME

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Abstract
Disclosed are a real time automatic control system and more particularly, there are provided a system providing sports suitable for a user by automatically controlling sporting goods by considering health history information and state information of a user in real time while the user is playing sports using the sporting goods, and a control method using the same. For this, there is provided a real time automatic control system of sporting goods that includes: a sensor device outputting condition information including a rating of perceived exertion of a user in real time; a server device storing profile information including health history information and sporting history information of the user; and an exercise intensity setting device setting an optimal exercise intensity by using the condition information and the profile information, and controlling the sporting goods in real time in accordance with the optimal exercise intensity.

START

S310 -- RECEIVE PROFILE INFORMATION OF USER

S315 -- CHECK HEALTH CONDITION OF USER BEFORE PLAYING SPORTS

S320 -- SET INITIAL SPORTING INTENSITY BASED ON PAST SPORTING HISTORY INFORMATION

S330 -- RECEIVE CONDITION INFORMATION INCLUDING RATING OF PERCEIVED EXERTION

S340 -- SET OPTIMAL SPORTING INTENSITY BY USING CONDITION INFORMATION, CURRENT SPORTING INTENSITY, AND PROFILE INFORMATION

S350 -- CONTROL SPORTING GOODS IN ACCORDANCE WITH OPTIMAL SPORTING INTENSITY

S360 -- IS SPORTING TIME REACHED?

NO

YES

END
FIG. 3

START

S310 - RECEIVE PROFILE INFORMATION OF USER

S315 - CHECK HEALTH CONDITION OF USER BEFORE PLAYING SPORTS

S320 - SET INITIAL SPORTING INTENSITY BASED ON PAST SPORTING HISTORY INFORMATION

S330 - RECEIVE CONDITION INFORMATION INCLUDING RATING OF PERCEIVED EXERTION

S340 - SET OPTIMAL SPORTING INTENSITY BY USING CONDITION INFORMATION, CURRENT SPORTING INTENSITY, AND PROFILE INFORMATION

S350 - CONTROL SPORTING GOODS IN ACCORDANCE WITH OPTIMAL SPORTING INTENSITY

S360 - IS SPORTING TIME REACHED?

NO

YES

END
FIG. 4

S340

START

S342

ESTIMATE CURRENT SPORTING INTENSITY

S344

CALCULATE HEART RATE RESERVE

S345

SET OPTIMAL SPORTING INTENSITY BASED ON CURRENT SPORTING INTENSITY, HEART RATE RESERVE, AND PROFILE INFORMATION

END

FIG. 5

S350

START

S352

CHECK CURRENT DRIVING STATE OF SPORTING GOODS

S354

COMPARE DRIVING STATE TO BE SET WITH CURRENT DRIVING STATE

S356

CHANGE DRIVING STATE OF SPORTING GOODS LEVEL BY LEVEL WITH HEART RATE STABILIZATION OF USER

END
REAL TIME AUTOMATIC CONTROL SYSTEM OF SPORTING GOODS AND CONTROL METHOD USING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a real time automatic system of sporting goods and a control method using the same, and more particularly, to a system providing sports suitable for a user by automatically controlling sporting goods by considering health history information and condition information of a user in real time while the user is playing sports by using the sporting goods and a control method using the same.

[0004] 2. Description of the Related Art

[0005] With an increment of modern people’s concern with health, a concern with sports which they can easily play in their daily lives in a home, a fitness club, or the like has also gradually increased. For example, people who play sports (hereinafter, referred to as a ‘user’) entirely rely on a trainer’s advice at the time of playing in the fitness club in order to find exercise intensity suitable for themselves. The trainer has a difficulty in managing all exercise intensities of a lot of users and the exercise intensities are very variable depending on individual conditions.

[0006] Further, it is not easy to find proper exercise intensity with sporting goods without an expert trainer.

SUMMARY OF THE INVENTION

[0007] The present invention is contrived to solve the above-mentioned problems. There is an object of the present invention to provide optimal exercise intensity suitable for a user by comprehensively considering a user’s health condition and physical power level, a user’s condition in playing sports, etc.

[0008] Further, there is another object of the present invention to provide a system and a method for automatically controlling sporting goods in real time depending on optimal exercise intensity.

[0009] The objects of the present invention are not limited to the above-mentioned objects and other undescribed objects will be properly appreciated by those skilled in the art from the following descriptions.

[0010] In order to achieve the above-mentioned objects, according to an aspect of the present invention, there is provided a real time automatic control system of sporting goods that includes: a sensor device outputting condition information including a rating of perceived exertion of a user in real time; a server device storing profile information including health history information and sporting history information of the user; and a exercise intensity setting device setting an optimal exercise intensity by using the condition information and the profile information and controlling the sporting goods in real time in accordance with the optimal exercise intensity.

Further, in order to achieve the above-mentioned objects, according to another aspect of the present invention, there is provided a real time automatic control method of sporting goods that includes: receiving profile information of a user who uses the sporting goods; receiving condition information including a rating of perceived exertion of the user in real time; setting an optimal exercise intensity on the basis of the condition information and the profile information; and controlling the sporting goods in real time in accordance with the optimal exercise intensity.

According to an exemplary embodiment of the present invention, a user can be provided with an optimal exercise intensity considering his/her own health condition and physical power level, etc.

Further, since the user does not require a trainer’s help, the user can play systematic sports even in a home, not a fitness club.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a block diagram showing a configuration of a real time automatic control system of sporting goods according to an exemplary embodiment of the present invention;

[0015] FIG. 2 is a block diagram schematically showing a configuration of an exercise intensity setting device of FIG. 1;

[0016] FIG. 3 is a flowchart of a real time automatic control method of sporting goods according to an exemplary embodiment of the present invention;

[0017] FIG. 4 is a flowchart showing an example of a process for setting an optimal exercise intensity in FIG. 3; and

[0018] FIG. 5 is a flowchart showing one example of a process for controlling sporting goods in FIG. 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Advantages and characteristics of the present invention, and methods for achieving them will be apparent with reference to embodiments described below in detail in addition to the accompanying drawings. However, the present invention is not limited to the exemplary embodiments to be described below but may be implemented in various forms. Therefore, the exemplary embodiments are provided to enable those skilled in the art to thoroughly understand the teaching of the present invention and to completely inform the scope of the present invention and the exemplary embodiment is just defined by the scope of the appended claims. Meanwhile, terms used in the specification are used to explain the embodiments and not to limit the present invention. In the specification, a singular type may also be used as a plural type unless stated specifically.

[0020] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. First of all, we should note that in giving reference numerals to elements of each drawing, like reference numerals refer to like elements even though like elements are shown in different drawings. Further, in describing the present invention, well-known functions or constructions will not be described in detail since they may unnecessarily obscure the understanding of the present invention.

[0021] Hereinafter, a real time automatic control system of sporting goods will be described with reference to FIG. 1. FIG. 1 is a block diagram schematically showing a configu-
ration of a real time automatic control system of sporting goods according to an exemplary embodiment of the present invention.

[0022] The real time automatic control system of sporting goods includes a sensor device 110 outputting condition information including user's rating of perceived exertion in real time, an exercise intensity setting device 120 setting an optimal exercise intensity suitable for a user, a server device 130 storing profile information of the user, etc., as shown in FIG. 1. The server device 130 may provide an exercise intensity before the exercise intensity setting device 120 of the present invention control the sporting goods 140 in real time, that is, when the user first starts the sporting goods 140. The exercise intensity when the user first starts the sporting goods 140 is based on the sporting history information stored in the server device 130.

[0023] The sensor device 110 senses and outputs the user's condition information including the rating of perceived exertion in real time. The condition information includes the rating of perceived exertion, a heart rate stabilization time calculated based on heart rate and a time, a heart rate recovery time, information on an environment of a user who is playing sports, etc. The condition information is outputted in real time because the condition of the user who is playing sports is changed moment by moment.

[0024] The rating of perceived exertion as a criterion for classifying perception of a change while playing sports is expressed by a numerical value for determining an exercise intensity (RPE), expressed by 0 to 10 and 10 shows the most hardest case. The RPE may be inputted from the user. For example, a button for inputting the numerical values into the sporting goods 140 is provided to allow the user who is playing sports to select the numerical values of 0 to 10 or input the numerical values in a voice recognition scheme, etc. Alternately, when the user feels the sports is easy, the user will increase the speed of the using sporting goods 140, i.e., a treadmill within a short time. Alternately, when the user feels the sports is hard, the user will decrease the speed of the treadmill within a short time. The RPE can be acquired on the basis of such a user's action.

[0025] The heart rate stabilization time and the heart rate recovery time are calculated depending on a pulse, body temperature, respiration, etc. For example, the speed (or acceleration) of the treadmill is detected to verify an activity state of the user, for example, whether the user is running or not. When the user is running, the heart rate stabilization time can be calculated on the basis of the heart rate of the user and a time at that time. On the contrary, when the user is not running, the heart rate recovery time can be calculated on the basis of the heart rate of the user and the time at that time.

[0026] The information on the environment of the user who is playing sports, which is included in the condition information is information on humidity or temperature. The humidity and temperature as important factors in the sporting environment are used to estimate a current exercise intensity hereafter.

[0027] The sensor device 110 transmits condition information that is outputted in real time to the exercise intensity setting device 120 in real time. As a transmission scheme, a wire/wireless communication scheme may be used, and the wireless communication scheme includes a wireless personal area network (WPAN) or a wireless body area network (WBAN). In particular, the WBAN is characterized to transmit data in the range of several kbps to dozens of Mbps.

[0028] The server device 130 stores profile information including health history information and sporting history information of the user for each user and transmits the profile information of the user according to a request of the exercise intensity setting device 120. The profile information includes the health history information which is information related to user's health and the sporting history information which is information related to sporting activities. The health history information represents sex, age, disease states, physical power level, the degree of obesity, muscle mass, blood pressure, etc., and the sporting history information is the information about a sporting process which the corresponding user performed in the past which includes setting states (e.g., speed, intensity, and time) of the sporting goods 140 while playing sports in the past, an RPE during playing sports in the past, a pulse body temperature, and respiration at that time, etc.

[0029] The server device 130 may output the profile information to the exercise intensity setting device 120 by using the wire/wireless communication scheme.

[0030] The exercise intensity setting device 120 sets an optimal exercise intensity of the user on the basis of the condition information including the RPE of the user and the profile information. Hereinafter, referring to FIG. 2, a configuration of the exercise intensity setting device 120 will be described in detail. As shown in FIG. 2, the exercise intensity setting device 120 includes a first receiver 210, a second receiver 230, an estimator 220, a heart rate reserve calculator 240, an intensity setter 250, a signal generator 260, etc., that receive information from each of the sensor device 110 and the server device 130.

[0031] The first receiver 210 receives the condition information of the user from the sensor device 110. In addition, the first receiver 210 transmits the received condition information to the estimator 220.

[0032] The estimator 220 estimates a current exercise intensity on the basis of the condition information included in the RPE. The estimator 220 estimates the user's current exercise intensity on the basis of the RPE, the heart rate stabilization time, the heart rate recovery time, and the environment information of the user. The current exercise intensity is based on a part of the sporting history of the user who is playing sports and may thus be stored as the sporting history information among the profile information stored in the server device 130. Since the condition information is detected in real time, the current exercise intensity is estimated in real time, thus, the sporting history information may be continuously updated to the server device 130.

[0033] The second receiver 230 requests the profile information of the user who uses the sporting goods 140, and receives the profile information of the user from the server device 130 and transmits it to the heart rate reserve calculator 240. Further, the second receiver 230 may transmit the user's profile information to the intensity setter 250.

[0034] The heart rate reserve calculator 240 calculates a heart rate reserve of the user. The heart rate reserve represents a heart rate suitable for aerobic sports, for example, when the sporting goods 140 are aerobic sporting goods (treadmill, cycle, etc.). The heart rate reserve (HRR) can be calculated on the basis of [Equation 1] as below. HRmax represents the maximum heart rate and age represents the user's age. The user's age is included in the profile information as described above.

\[
HRR = HR_{max}^{0.7} - (208 - (age^{0.7})^{0.7})
\]  

[Equation 1]
Alternately, the HRR may be calculated as a section having a predetermined range. For example, when a training heart rate (THR) is maintained in the range of 55 to 75%, basal fat oxidation is high. Accordingly, the range of 55 to 75% of the training heart rate (THR) may be set as the HRR. 75% of the training heart rate (THR) is shown in \[ \text{Equation 2} \] as below and in addition, 55% of the THR can be acquired in the same manner. \( \text{HR}_{\text{max}} \) represents the maximum heart rate and \( \text{HR}_{\text{rest}} \) is a resting heart rate.

\[
\text{THR}_{55\%} = \text{HR}_{\text{rest}} + 0.75(\text{HR}_{\text{max}} - \text{HR}_{\text{rest}})
\]

The intensity setter 250 sets the optimal exercise intensity suitable for the user on the basis of the HRR, the current exercise intensity, and the profile information. An embodiment of setting the optimal exercise intensity will be described below. An ideal exercise intensity is retrieved according to the calculated HRR and the user's optimal exercise intensity may be set by comparing the current exercise intensity with the ideal exercise intensity. Profile information of a current user including sex, current diseases from which the user suffers, age, etc. should be considered to set the optimal exercise intensity. The optimal exercise intensity may be set as an accurate value or a predetermined range.

The signal generator 260 generates a control signal for controlling the sporting goods 140 to operate the sporting goods 140 according to the optimal exercise intensity. For example, if the sporting goods 140 are the treadmill, the speed, slope, set-up modes (e.g., interval mode, climbing mode, etc.), of the treadmill may be controlled. Alternately, if the sporting goods 140 are the cycle, the slope, rolling resistance, etc. may be controlled. The sporting goods 140 may be controlled level by level. For example, when the speed of the treadmill which is being driven is at 4 km/h, while the speed of the treadmill according to the optimal exercise intensity should be 8 km/h, the speed of the treadmill may be controlled to increase level by level by 1 km/h for a predetermined time to thereby reach 8 km/h.

Hereinafter, referring to FIG. 3, a real-time automatic control method of sporting goods according to an exemplary embodiment of the present invention will be described. FIG. 3 is a flowchart schematically showing a method of controlling sporting goods by using an exercise intensity setting device.

The exercise intensity setting device 120 receives profile information of a user who uses sporting goods 140 from a server device 130 in a wire/wireless communication scheme (S310). The profile information includes a health history (age, sex, diseases, blood pressure, a usual heart rate, the degree of obesity, etc.) and a sporting history (the intensity, duration, etc. of sports which the user played in the past) of the user. The profile information is stored for each user and when a request is received from the exercise intensity setting device 120, the profile information of the corresponding user may be retrieved and transmitted.

The exercise intensity setting device 120 sets the past exercise intensity as an initial exercise intensity on the basis of past sporting history information among the profile information of the user (S320). First, the user uses the sporting goods 140 according to the past sporting history information.

Before setting the exercise intensity on the basis of the past sporting history (S320), the exercise intensity setting device 120 may check a health condition of the user before playing sports in advance (S315). The checked health condition may be used to set the initial exercise intensity. For example, the exercise intensity setting device 120 may set the exercise intensity depending on the health condition of the user checked before playing sports as the user's initial exercise intensity among the past sporting history information of the user. Alternately, the checked health condition of the user may be used to set the optimal exercise intensity of the user and it will be described below.

Thereafter, a pulse, body temperature, respiration, an RPE, environment information of a sporting space, etc. of the user who is playing sports are detected through a sensor device 110 in real time. The detected pulse, body temperature, respiration, etc. may be processed and outputted as condition information by the sensor device 110. For example, a heart rate and a time are checked and they may be calculated and processed as a heart rate stabilization time, a heart rate recovery time, etc., and the environment information may be processed depending on temperature or humidity of the sporting space.

The exercise intensity setting device 120 receives the condition information including the RPE from the sensor device 110 through, for example, a WiBAN (S330). The condition information including the RPE is received in real time until playing sports is ended. The received condition information includes, the RPE, the heart rate stabilization time, the heart rate recovery time, the environment information.

The heart rate stabilization time and the heart rate recovery time are calculated depending on a pulse, body temperature, respiration, etc. For example, the speed (or acceleration) of the treadmill is detected, such that the heart rate stabilization time and the heart rate recovery time may depend on an activity state of the user, for example, whether the user is running or not. The sensor device 110 recognizes the user's activity state. When the user is running according to the recognition result, the heart rate stabilization time can be calculated on the basis of the heart rate and the time at that time. On the contrary, when the user is not running, the heart rate recovery time can be calculated on the basis of the heart rate of the user and the time at that time.

The exercise intensity setting device 120 sets an optimal exercise intensity of the user on the basis of the received condition information including the RPE of the user and the profile information (S340). An embodiment of setting the optimal exercise intensity will be described with reference to FIG. 4.

An estimator 220 of the exercise intensity setting device 120 estimates a current exercise intensity of the user on the basis of the received condition information including the RPE (S342). The current exercise intensity is estimated depending on the RPE, the heart rate stabilization time, the heart rate recovery time, the environment information, etc. For example, when the RPE is high and the heart rate stabilization time or the heart rate recovery time is long, the current exercise intensity is strong. On the contrary, when the RPE is low and the heart rate stabilization time or the heart rate recovery time is short, the current exercise intensity is weak. Further, in the case of the environment information, i.e., temperature, or humidity, when the temperature and the humidity are high, the current exercise intensity will be estimated to be strong. Since the condition information is received in real time, the current exercise intensity may be estimated in real time. The current exercise intensity estimated in real time is arranged for each sporting duration time to be stored in the server device 130. The stored current exercise intensity may be used as the sporting history information of the user for
setting the optimal exercise intensity when the user uses the same sporting goods afterwards.

[0048] A heart rate reserve calculator 240 of the exercise intensity setting device 120 calculates a heart rate reserve which is a heart rate suitable for aerobic sports, for example, when the user uses a treadmill or a cycle which is aerobic sporting goods S344. The heart rate reserve may be calculated as a predetermined value or a predetermined range. The heart rate reserve is calculated according to [Equation 1] or [Equation 2] described above.

[0049] An intensity setter 250 of the exercise intensity setting device 120 sets the optimal exercise intensity according to the heart rate reserve, the current exercise intensity, and the profile information (S346). The profile information, i.e., health information (disease, age, etc.) may be considered to set the optimal exercise intensity. Alternately, a health condition (pulse, respiration, and blood pressure), etc. of the user is first checked before the user starts playing sports (S315) and the checked health condition may be used to set the optimal exercise intensity. Since even the user who has a good health condition may have a bad health condition at the time of playing sports due to cumulative fatigue, etc., the current health condition of the user is checked to reflect such a situation.

[0050] Although checking the health condition before using the sporting goods 140 (S315) is performed after receiving the profile information in FIG. 3 (S310), the present invention is not limited thereto.

[0051] The exercise intensity setting device 120 controls the sporting goods 140 to be driven according to the current exercise intensity (S350). For example, when the current exercise intensity of the user who uses the treadmill corresponds to the optimal exercise intensity value or range, the user is determined to properly play sports. Therefore, the speed of the treadmill needs not to be increased or decreased. However, if the optimal exercise intensity is 7 and an exercise intensity which the user feels is 4, the speed of the treadmill should be increased. Alternately, if the optimal exercise intensity is 7 and the current exercise intensity which the user feels is 9, the speed of the treadmill should be decreased.

[0052] Driving states of the sporting goods 140 may be controlled level by level at the time of controlling the sporting goods 140. FIG. 5 shows one example of a control method. For ease of description, a case in which the sporting goods 140 are the treadmill will be described. The signal generator 260 generates a control signal for driving the speed of the treadmill at 8 km/h according to the optimal exercise intensity. The control signal is inputted into a control device. The control device checks a current driving states of the sporting goods 140 (S362) and compares a driving state to be set with the checked current driving state (S364). Although the treadmill is driven at 4 km/h, the speed of the treadmill to be driven afterwards is 8 km/h, thus, a difference therebetween is approximately 4 km/h. The control device controls the speed of the treadmill to be increased level by level (for example, the speed increases by 1 km/h) by considering the speed difference to thereby reach 8 km/h (S366). A time of increasing the speed level by level may be based on the real time user's condition information (e.g., a time when the heart rate is stabilized). For example, when the heart rate of the user is stabilized at the speed of 5 km/h after the speed of the treadmill is increased to 5 km/h from 4 km/h, the speed of the treadmill is increased to 6 km/h again. By such a method, the sporting goods 140 are controlled level by level.

[0053] As another example, the time to increase the speed level by level may be checked by the heart rate recovery time when the heart rate is recovered to a normal range.

[0054] A series of steps (S362 to S366) of controlling the driving states of the sporting goods 140 may be performed according to the level by level control signal generated by the signal generator 260. Alternately, when the signal generator 260 generates a control signal for increasing the speed of the treadmill to 8 km/h and an additional device (i.e., control device (not shown)) installed in the sporting goods 140 receiving the control signal may control the speeds of the sporting goods 140 level by level.

[0055] A change of the driving states of the sporting goods 140 caused by controlling the sporting goods 140 may be notified to the user by a visual or vocal method. For example, when the current exercise intensity of the user who is playing sports is excessively high, a warning sound or a warning message for notifying it may be provided. Alternately, a message or a voice indicating a gradual decrease of the speed of the treadmill may be provided. An output device (not shown) providing the voice or message may be additionally installed in the sporting goods 140.

[0056] A series of steps (S310 to S350) of controlling the sporting goods 140 in real time are performed during the sporting time and when the sporting time ends, the steps are terminated (S360). The sporting time may be a time depending on an exercise intensity set when the user starts playing sports or a time inputted by the user.

[0057] As yet another embodiment of the present invention, the exercise intensity setting device 120 may be driven by being integrated with the service device 130 as one device.

[0058] Further, the automatic control system of the sporting goods according to the present invention may be configured to be integrated with the sporting goods 140 or configured as a device separated from the sporting goods 140.

[0059] While certain embodiments have been described above, it will be understood to those skilled in the art that the embodiments described are by way of example only. Accordingly, the embodiments described herein are provided by way of example only and should not be construed as being limited. While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

What is claimed is:

1. A real time automatic control system of sporting goods, comprising:
   a sensor device outputting condition information including:
   a rating of perceived exertion of a user in real time;
   a server device storing profile information including health
   history information and sporting history information of the
   user; and
   an exercise intensity setting device setting an optimal exercise
   intensity by using the condition information and the profile
   information and controlling the sporting goods in real time in accordance with the optimal exercise intensity.

2. The real time automatic control system of sporting goods
   according to claim 1, wherein the sporting goods is an aerobic sporting goods.
3. The real time automatic control system of sporting goods according to claim 1, wherein the condition information further includes at least one of a heart rate stabilization time of the user, a heart rate recovery time of the user, information on an environment of the user.

4. The real time automatic control system of sporting goods according to claim 1, wherein the exercise intensity setting device includes:
   - an estimator estimating a current exercise intensity of the user in accordance with the condition information;
   - a heart rate reserve calculator calculating a heart rate reserve of the user;
   - an intensity setting setting the optimal exercise intensity on the basis of the current exercise intensity, the heart rate reserve, and the profile information; and
   - a signal generator generating a signal for controlling the exercise intensity in accordance with the optimal exercise intensity.

5. The real time automatic control system of sporting goods according to claim 4, wherein the service device stores the condition information and the current exercise intensity.

6. A real time automatic control method of sporting goods, comprising:
   - receiving profile information of a user who uses the sporting goods;
   - receiving condition information including a rating of perceived exertion of the user in real time;
   - setting an optimal exercise intensity on the basis of the condition information and the profile information; and
   - controlling the sporting goods in real time in accordance with the optimal exercise intensity.

7. The real time automatic control method of sporting goods according to claim 6, wherein the setting includes:
   - estimating a current exercise intensity of the user in accordance with the condition information; and
   - setting the optimal exercise intensity on the basis of the current exercise intensity and the profile information.

8. The real time automatic control method of sporting goods according to claim 7, wherein the estimating a current exercise intensity estimates the current exercise intensity on the basis of a heart rate stabilization time of the user, a heart rate recovery time of the user, information on an environment of the user.

9. The real time automatic control method of sporting goods according to claim 8, further comprising recognizing an activity state of the user,
   - wherein the heart rate stabilization time or the heart rate recovery time is calculated depending on the activity state of the user.

10. The real time automatic control method of sporting goods according to claim 6, wherein the controlling controls driving states of the sporting goods, level by level on the basis of the real time condition information of the user.