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An Earthquake Evacuation Training System Using Virtual Reality

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Abstract of KR20200091594 (A)

The present invention relates to an earthquake evacuation training system, and more particularly, to an earthquake evacuation training system using virtual reality, which allows a screen for an earthquake situation to be output through a VR device, transmits vibration, inclination and the like of the earthquake situation output through the VR device to a vibration-type treadmill to simulate the same earthquake situation, and transmits information on a user's movement on the vibration-type treadmill to a cloud server to be linked to the screen of the VR device, thereby enabling real-like earthquake training in a specific space through virtual reality.

Notice

DESCRIPTION KR20200091594A

11 An Earthquake Evacuation Training System Using Virtual Reality

[0001]

15 The present invention relates to an earthquake evacuation training system, and more specifically, a screen for an earthquake situation is output through a VR device, and the vibration and inclination of the earthquake situation output through the VR device are transmitted to the vibrating treadmill and the same Earthquake evacuation training using virtual reality that enables real-world earthquake training in a specific space through virtual reality by sending information about user movement on the vibrating treadmill to the cloud server and interworking with the VR device screen It's about the system.

[0002]

26 Earthquake refers to a phenomenon in which the earth's internal energy is released to the surface and the earth is cracked and shaken. When a high-intensity earthquake occurs, many lives are lost.

[0003]

32 Earthquakes that have caused great casualties have not occurred in Korea yet, but recent earthquakes have occurred frequently in the Gyeongsang-do region. , and recently, earthquake-prepared facilities and education are increasing.

[0004]

However, education and experience of current earthquakes are made by devices that can experience earthquakes virtually as in the patent document below, and evacuation drills for earthquakes are limited to formal training assuming an earthquake has occurred.

[0005]

Therefore, when an actual earthquake occurs, there is a high possibility that a large number of human casualties may occur due to insufficient countermeasures against the earthquake.

[0006]

(Patent Literature)

[0007]

Registered Patent Publication No. 10-0847310 (2008.07.14. Registration) "Earthquake Experience System"

[0008]

The present invention has been devised to solve the above problems,

[0009]

An object of the present invention is to provide an earthquake evacuation training system using virtual reality that enables realistic earthquake training in real space using a VR device and a vibrating treadmill.

[0010]

An object of the present invention is to provide an earthquake evacuation training system using virtual reality that can increase the effect of earthquake training by enabling various effects caused by earthquakes to be set in real space.

[0011]

An object of the present invention is to provide an earthquake evacuation training system using virtual reality that can generate vibrations like an actual earthquake.

[0012]

81 An object of the present invention is to provide an earthquake evacuation training system using virtual reality that enables movement of a user along a predetermined path to real space in virtual reality.

[0013]

87 An object of the present invention is to provide an earthquake evacuation training system using virtual reality to prevent a user from falling from a vibrating treadmill.

[0014]

92 An object of the present invention is to provide an earthquake evacuation training system using virtual reality that enables stable and accurate earthquake training while moving.

[0015]

98 The present invention is implemented by an embodiment having the following configuration in order to achieve the above object.

[0016]

103 According to an embodiment of the present invention, an earthquake evacuation training system using virtual reality according to the present invention provides a space for a user to walk or run, and includes: a vibration - type treadmill for generating vibration; a VR device that is worn on the user's head and outputs a virtual reality space to the user; It is connected to the vibrating treadmill and VR device through wired/wireless communication to output a three - dimensional screen in which an earthquake occurs in the real space through the VR device, and the vibration of the earthquake output through the VR device and the inclination of the real space according to the vibration type It includes a cloud server that transmits to the treadmill, wherein the cloud server outputs the movement of the user moving along the vibrating treadmill through a VR device so that the user can experience moving in the real space where the earthquake occurred. do.

[0017]

118 According to another embodiment of the present invention, in the earthquake evacuation training system using virtual reality according to the present invention, the cloud server includes a virtual space generator that generates three - dimensional virtual space information about a real space, and the generated virtual

space and an earthquake setting unit for setting by applying a situation in which an earthquake has occurred, wherein the virtual space generating unit includes: a building information model storage module for storing building information of an actual space; a 3D scanning module for generating virtual spatial information about a real space using a 3D scanner; a location information generating module for generating location information about the real space in which the virtual information is generated; It includes; a spatial information storage module for storing the building information, virtual spatial information, and location information in correspondence with each other, wherein the earthquake setting unit includes a space setting module for selecting a space to set an earthquake, and a space setting module for setting the intensity of an earthquake for the selected space The intensity setting module, the inclination control module for setting the degree of inclination of the space according to the set intensity, the vibration control module for setting the vibration of the space according to the set intensity, and the option adjustment module for setting the situation corresponding to each space Including, wherein the option adjustment module includes an article control module for setting a change of goods for each space, a structure control module for setting a change for a structure in each space, and a fire control module for setting a fire according to an earthquake And, characterized in that it comprises a static control module for controlling the blackout.

[0018]

144 According to another embodiment of the present invention, in the earthquake evacuation training system using virtual reality according to the present invention, the vibration - type treadmill is supported on the floor and formed on the main body part and the main body part so that the user can stand up. A rotating part that rotates by a user's walking or running motion, a vertical motion part providing a vertical motion force to the main body part, a horizontal motion part providing horizontal motion force to the body part, and controlling the operation of the vibrating treadmill and a control unit, wherein the horizontal movement unit is characterized in that the main body moves in a direction perpendicular to the rotation direction of the rotating unit.

[0019]

157 According to another embodiment of the present invention, in the earthquake evacuation training system using virtual reality according to the present invention, a plurality of vertical movement units are formed at regular intervals along the bottom of the main body to provide vertical force. a driving cylinder; a support plate fixed to the upper end of the vertical driving cylinder and formed of a plate having an area corresponding to the body part; It is inserted between the support plate and the main body portion, the elastic body is formed to correspond to the position where the

vertical drive cylinder is formed; includes, the horizontal movement unit; a horizontal moving plate moving in a horizontal direction along the bottom plate; a fixing plate fixed to the upper side of the horizontal moving plate and supporting the lower end of the vertical driving cylinder; and a driving means for providing a driving force for moving the horizontal moving plate in a horizontal direction, wherein the driving means includes a horizontal driving cylinder formed at one end of the bottom plate to push or pull the horizontal moving plate in a horizontal direction; An elastic member formed at the other end of the plate to support the horizontal moving plate by elasticity, and a support block for supporting the elastic member, wherein the bottom plate includes a horizontal rail forming a path through which the horizontal moving plate moves, The horizontal rail is characterized in that it is formed in a direction perpendicular to the rotational direction of the rotating part.

[0020]

179 According to another embodiment of the present invention, in the earthquake evacuation training system using virtual reality according to the present invention, the control unit includes a movement detecting unit that detects the movement on the vibrating treadmill and transmits it to the cloud server, and the rotating unit is constant A plurality of sensors are formed so as to be spaced apart from each other to detect a user's contact with the rotating unit, and the movement sensing unit detects information that the user deviates from the center of the rotating unit to both sides according to the information sensed by the sensing sensor. A movement detection module, a movement speed detection module for detecting the user's movement speed according to the rotational speed of the rotating part, and a detection information transmission module for transmitting information detected by the side movement detection module and the movement speed detection module to the cloud server Including, wherein the cloud server is characterized in that the user's movement output to the VR device is linked according to the user's lateral movement and movement speed.

[0021]

197 According to another embodiment of the present invention, in the earthquake evacuation training system using virtual reality according to the present invention, the control unit includes a fall prevention unit for preventing the user from falling, and the fall prevention unit closes the user to the side boundary. A side boundary detection module for detecting The side boundary detection module detects proximity to the side boundary according to the information detected by the detection sensor, or detects the degree of deviation from the center of the main body according to information measured by a motion sensor formed in the VR device The front and rear boundary detection module is characterized in that it detects the

degree of movement of the user from the center of the main body to the front and rear according to the information measured by the motion sensor formed in the VR device.

[0022]

212 According to another embodiment of the present invention, the earthquake evacuation training system using virtual reality according to the present invention moves by accommodating the vibration - type treadmill, and includes a moving device that allows earthquake training to be performed while moving; The moving device includes a guide plate connecting the ground and the moving device to load the vibrating treadmill into the moving device, a moving rail formed on the bottom of the moving device to form a path for the vibrating treadmill to move, and the vibrating treadmill accommodated in the moving device. a fixing protrusion comprising fixing means for fixing, the fixing means being fixed while being inserted into the bottom of the moving device, and protruding upward after passing through the vibration - type treadmill to fix the vibration - type treadmill; a push member formed under the fixing protrusion to push the fixing protrusion upward; a locking member that is formed to protrude from the upper end of the fixing protrusion to the front, and is pushed backward by a vibrating treadmill; Including a blocking member that protrudes forward from one point of the fixing protrusion and is caught on the bottom of the moving device, and the locking member is released as the locking member is pushed to the rear so that the fixing protrusion protrudes upward. It is characterized in that it is automatically fixed together with.

[0023]

233 According to another embodiment of the present invention, in the earthquake evacuation training system using virtual reality according to the present invention, the mobile device includes a sensing unit for detecting information about the movement of the mobile device and transmitting it to a cloud server, The sensing unit includes a vibration sensing module for detecting vibration of the mobile device, a tilt sensing module for detecting a tilt, an acceleration sensing module for detecting an acceleration, and a sensing information transmission module for transmitting the sensed information to a cloud server, wherein the The cloud server includes: a sensing information receiving module for receiving information transmitted from the sensing unit; a vibration control module for adjusting vibration output to the vibrating treadmill according to vibration information sensed by a mobile device; and tilt adjustment for adjusting the inclination It characterized in that it comprises a module and a speed control module for adjusting the rotation speed of the rotating part.

[0024]

249 The present invention can obtain the following effects by the configuration, combination, and use relationship described below with the present embodiment.

[0025]

254 According to the present invention, a screen for an earthquake situation is output through a VR device, and vibrations and inclinations of the earthquake situation output through the VR device are transmitted to the vibrating treadmill to generate the same, and information on user movement on the vibrating treadmill is transmitted to the cloud server and linked to the VR device screen, which has the effect of enabling realistic earthquake training in a specific space through virtual reality.

[0026]

263 The present invention generates three-dimensional information for real space and stores it together with location information, and provides vibration and inclination that may occur when an earthquake occurs in real space, as well as changes in articles and structures, fires, power outages, etc. By setting the situation to be applied to the actual space according to the intensity of the earthquake, there is an effect of increasing the effectiveness of earthquake training.

[0027]

272 The present invention has the effect of generating vibration like an actual earthquake by allowing not only vertical vibration and inclination, but also forward, backward, left, right, and horizontal vibrations to be output through the vibrating treadmill.

[0028]

278 The present invention has the effect of enabling the user to move along a predetermined path to the real space in virtual reality by detecting the user's forward, backward, left, and right movements.

[0029]

284 The present invention has the effect of preventing the user from falling from the vibrating treadmill.

[0030]

289 The present invention has the effect of enabling stable and accurate earthquake

training while moving.

[0031]

294 1 is a configuration diagram of an earthquake evacuation training system using virtual reality according to an embodiment of the present invention. FIG. 2 is a perspective view of the vibrating treadmill of FIG. 5 is a cross - sectional view taken along the line A - A of FIG. 4; FIG. 6 is a plan view of the vibrating treadmill; Configuration diagram of an earthquake evacuation training system using virtual reality according to another embodiment of the present invention FIG. 10 is a plan view showing a state in which the vibrating treadmill of FIG. 11 is a reference diagram for explaining the operating state of the fixing means FIG. 13 is a block diagram showing the configuration of the sensing unit of the moving device of FIG. 9 FIG. 14 is a block diagram showing the configuration of the movement control unit of FIG. 9

[0032]

307 Hereinafter, preferred embodiments of the earthquake evacuation training system using virtual reality according to the present invention will be described in detail with reference to the accompanying drawings.

310 In the following description of the present invention, if it is determined that a detailed description of a well - known function or configuration may unnecessarily obscure the gist of the present invention, the detailed description thereof will be omitted.

313 Throughout the specification, when a part "includes" a certain component, it means that other components may be further included, rather than excluding other components, unless specifically stated to the contrary. "...

316 wealth", "...

317 The term "module" means a unit that processes at least one function or operation, and may be implemented as hardware or software or a combination of hardware and software.

[0034]

323 When an earthquake evacuation training system using virtual reality according to an embodiment of the present invention is described with reference to FIGS. 1 to 8 , the earthquake evacuation training system is equipped with a belt 141 so that a user walks on the belt 141 or A vibration - type treadmill (1) for running and generating vibration; a VR device 5 that the user wears on the head and outputs a virtual reality space to the user; The vibration - type treadmill (1) and the VR device (5) are connected through wired and wireless communication to output a three - dimensional screen in which an earthquake occurs in real space through the VR device (5), and the earthquake output through the VR device (5) and a cloud server (3) that

transmits the vibration of and the inclination of the actual space to the vibration-type treadmill (1).

[0035]

337 The earthquake evacuation training system according to the present invention outputs a three-dimensional screen of the real space through the VR device 5, while the user wearing the VR device 5 uses the vibration-type treadmill 1 on the vibration-type treadmill 1 to be able to move along.

341 At this time, through the VR device 5, not only vibration and inclination of the real space that may appear when an actual earthquake occurs, but also the deformation of the real space structure, movement and damage of goods, etc. are reflected and outputted, and VR Vibration and inclination output through the device 5 are reflected in the vibration-type treadmill 1 and output, so that the user can feel the same situation as an actual earthquake.

347 In addition, the user's movement through the vibrating treadmill 1 is reflected on the screen output through the VR device 5 as it is so that the user can move in a virtual real space, so that evacuation drills in a situation similar to the case of an actual earthquake can be made to be carried out.

[0036]

354 In particular, the vibration-type treadmill 1 of the present invention can output both vertical and horizontal vibrations similar to an actual earthquake, while also outputting horizontal vibrations in all directions in front, back, left and right, so that the vibration of an actual earthquake and It is possible to output very similar vibrations.

[0037]

362 In addition, the vibration-type treadmill 1 provides a detection sensor 141a on the belt 141 to detect the user's forward, backward, left, and right direction movement moving on the vibration-type treadmill 1, and through this, the user's movement can be reflected on the screen of the VR device 5 and prevent the user from falling from the vibrating treadmill 1 without a separate device.

[0038]

370 For reference, hereinafter, the directions A, B, C, D, E, and F of FIG. 2 will be defined and described as front, rear, left, right, up and down directions.

[0040]

375 The vibrating treadmill 1 (hereinafter referred to as a 'treadmill') is supported on the floor and has a configuration so that a user can walk or run on the upper part, so that vibration and inclination that may occur during an earthquake can be output, In order to output the vibration similar to the actual earthquake, it is possible to output the vibration in the vertical, front, back, left, right, and horizontal directions.

380 The treadmill 1 may be formed of a belt 141 rotating in one direction, and a user's movement may be detected by a detection sensor 141a formed on the belt 141 .

382 The treadmill 1 may include a vertical motion unit 11 , a horizontal motion unit 12 , a body unit 13 , a rotation unit 14 , and a control unit 15 .

[0041]

387 The vertical movement unit 11 is configured to allow vertical movement of the treadmill 1 to generate vertical vibration or inclination.

389 To this end, the vertical movement unit 11 may include a vertical drive cylinder 111 , an elastic body 112 , and a support plate 113 .

[0042]

394 The vertical driving cylinder 111 is configured to provide a kinetic force in a vertical direction, and provides a force for moving the main body 13 up and down.

396 The vertical driving cylinder 111 may be formed in a plurality of spaced apart from the lower portion of the main body 13 at regular intervals. this will happen

398 In addition, the vertical driving cylinder 111 may generate a vertical vibration in the main body 13 through an instantaneous vertical movement.

400 The operation of the vertical driving cylinder 111 is controlled by the control unit 15 , and the control unit 15 operates the vertical driving cylinder 111 according to the earthquake information set by the cloud server 3 .

403 In addition, an elastic body 112 is inserted between the vertical drive cylinder 111 and the main body 13 to effectively generate vibration, and a support plate 113 between the vertical drive cylinder 111 and the elastic body 112 .) to be formed.

[0043]

409 The support plate 113 is a horizontal plate inserted between the upper end of the vertical driving cylinder 111 and the elastic body 112 , and a plurality of elastic bodies 112 and the vertical driving cylinder 111 are formed above and below one support plate 113 . to be supported on the side.

413 Accordingly, the support plate 113 can stably transmit the vibration generated by the instantaneous driving of the vertical driving cylinder 111 to the entire body 13 .

[0044]

418 The elastic body 112 is inserted between the support plate 113 and the main body 13 , and may be formed at a position corresponding to each of the plurality of vertical driving cylinders 111 .

421 The elastic body 112 generates vertical motion by its elasticity when vibration is generated by the vertical driving cylinder 111 , and this vertical motion is transmitted to the main body 13 so that effective vibration can be generated.

[0045]

427 The horizontal movement unit 12 is configured to generate a horizontal motion in the treadmill 1 , and more precisely, provides a horizontal motion to the main body 13 .

429 In particular, the horizontal movement unit 12 allows the main body 13 to move in all directions in the front, back, left, and right directions.

431 To this end, the horizontal movement unit 12 allows the main body 13 to move in a direction perpendicular to the rotation direction of the rotating unit 14 .

433 In other words, in the present invention, by controlling the speed and direction of the rotating unit 14, the vibration in the front - rear direction can be transmitted to the user, and the vibration in the left - right direction can be transmitted to the user through the horizontal movement unit 12. By doing so, vibration in all directions through the treadmill 1 can be generated.

438 To this end, the horizontal movement unit 12 may include a bottom plate 121 , a horizontal movement plate 122 , a fixed plate 123 , and a driving means 124 as shown in FIG. 3 .

[0046]

444 The bottom plate 121 is a plate supported on the floor, and the horizontal moving plate 122 moves along the bottom plate 121, and through this, the fixed plate 123 coupled to the horizontal moving plate 122 moves in the left and right direction. make it move

448 A horizontal rail 121a which is recessed in the left and right direction is formed on the bottom plate 121, and a rail insertion member 122a to be described later of the horizontal moving plate 122 is inserted into the horizontal rail 121a in the left and right direction. to be able to move

452 As shown in FIG. 5 , a plurality of the horizontal rails 121a may be formed at regular intervals to ensure stable movement of the horizontal moving plate 122 .

[0047]

457 The horizontal moving plate 122 is supported by the bottom plate 121 and is

configured to move in the left and right directions, and the fixed plate 123 is coupled to the upper portion thereof to move together.

460 The horizontal moving plate 122 vibrates in the left and right directions according to the operation of the driving means 124, a horizontal driving cylinder 124a to be described later of the driving means 124 is formed on one side, and an elastic member (to be described later) on the other side (124b) to bind.

464 In addition, a rail insertion member 122a is protruded from the lower portion of the horizontal moving plate 122 to be inserted into the horizontal rail 121a to move.

[0048]

469 The fixed plate 123 is coupled to the upper portion of the horizontal moving plate 122 to move together, and a plurality of vertical driving cylinders 111 are fixed to the upper portion of the fixed plate 123 .

472 Accordingly, by the fixed plate 123 moving together with the horizontal moving plate 122, the upper body part 13 can also vibrate in the left and right horizontal directions.

[0049]

478 The driving means 124 is configured to generate left and right horizontal vibrations, so that the horizontal driving cylinder 124a and the elastic member 124b are formed on both sides of the horizontal moving plate 122 for effective vibration generation. And, the elastic member (124b) is supported by the support block (124c) fixed to the bottom plate (121).

[0050]

486 The horizontal driving cylinder 124a is coupled to one side of the horizontal moving plate 122 to generate a driving force in the left and right horizontal directions, and to generate vibration through instantaneous driving.

489 The horizontal driving cylinders 124a are installed to be fixed to the bottom plate 121, and a plurality of them may be formed as shown in FIG.

[0051]

494 The elastic member 124b is coupled to the other side of the horizontal moving plate 122 to vibrate, and is supported by a support block 124c.

496 Accordingly, the elastic member 124b vibrates in the left and right horizontal directions according to the instantaneous operation of the horizontal driving cylinder 124a, so that the vibration is transmitted to the main body 13 .

[0052]

502 The support block 124c is fixed on the bottom plate 121 to support the elastic member 124b.

[0053]

507 The main body 13 is supported on the floor so that the user can stand up. The rotating part 14 is accommodated on the inside, and the vertical movement part 11 and the horizontal movement part 12 are formed on the lower side and move upward. The handle portion 131 is formed on both sides so that the user can grip it when necessary.

512 In addition, the main body 13 includes a center sensor 132 in its center so that the user sets a reference position and deviates from the center can be detected.

[0054]

517 The handle 131 is configured to protrude upward on both sides of the main body 13 so as to be gripped, and the user evacuates through the VR device 5 along the actual space where the earthquake occurred, and if necessary, the handle It supports the part 131 and makes it possible to conduct earthquake evacuation drills.

521 However, the handle portion 131 can be gripped only when there is a structure that can be supported in the actual space output through the VR device 5, so that the effect of earthquake experience and evacuation training can be enhanced.

524 To this end, a contact sensor 131a may be formed on the handle portion 131 as shown in FIG. 6 , and a warning is issued when the handle portion 131 is touched even though there is no supportable structure. to be generated so as to block support to the handle portion 131 .

[0055]

531 The center sensor 132 is formed at the center of the main body 13 to detect a user, and allows the user to set an initial position at the center of the main body 13 .

533 The center sensor 132 may be used when the user's movement is sensed using the motion sensor 51 formed in the VR device 5, and the user is positioned on the center sensor 132 to the initial position After setting, it is possible to track the user's movement according to the moving direction and speed of the VR device 5 .

[0056]

540 The rotating unit 14 is formed to rotate in the front - rear direction on the main body 13 so that the user can walk or run, and the belt 141 rotating in the front - rear

direction, the belt support shaft 142 for supporting the belt) may be included.

543 Accordingly, the user walks or runs on the belt 141, and accordingly, the belt 141 is wound around the belt support shaft 142 in the front - rear direction to rotate.

545 The speed at which the belt 141 moves in the front - rear direction is transmitted to the cloud server 3 so that the user output through the VR device 5 can also move at the same speed.

548 In addition, the rotating part 14 may instantaneously drive the belt support shaft 142 to the front or rear side so that the vibration in the front and rear directions is transmitted to the user through the belt 141 .

551 In addition, as shown in FIG. 6, the detection sensors 141a may be formed on the belt 141 at regular intervals, through which the user detects movement in the left and right direction, and the VR device 5 Interlock with the user output through the

[0057]

557 The control unit 15 is configured to control the operation of the treadmill 1 , and may include an operation control unit 151 , a movement sensing unit 152 , a fall prevention unit 153 , and a contact sensing unit 154 . .

[0058]

563 The operation control unit 151 is configured to control the operation of the treadmill 1 according to an earthquake, and receives information about the earthquake from the cloud server 3 to operate the treadmill 1 .

566 The operation control unit 151 may receive information set according to the actual space output through the VR device 5, the earthquake situation set for the space, and the intensity, and the tilt module 151a, the vertical vibration module (151b), a horizontal vibration module 151c, a belt driving module 151d, and an operation stop module 151e.

[0059]

574 The inclination module 151a is configured to incline the main body 13, and by operating the vertical driving cylinder 111 on one side to lift the main body 13, the inclination can occur.

[0060]

580 The vertical vibration module 151b is configured to generate vibration in the vertical direction in the main body 13, and to instantaneously drive the vertical driving cylinder 111, and by instantaneous driving of the vertical driving cylinder 111 By vibrating the elastic body 112, it is possible to generate more effective vibration.

[0061]

587 The horizontal vibration module 151c is configured to generate left and right horizontal vibrations in the main body 13, and instantaneously drives the horizontal driving cylinder 124a, so that the horizontal moving plate 122 moves left and right. To move in the horizontal direction, and to enable effective generation of vibration according to the vibration of the elastic member (124b).

[0062]

595 The belt driving module (151d) is configured to generate a front - rear horizontal vibration in the main body part 13, and the belt support shaft 142 is instantaneously driven to the front or rear so that the belt 141 vibrates in the front - rear direction. make it happen

[0063]

602 The operation stop module 151e is configured so that when an obstacle occurs on the screen output through the VR device 5 and prevents the user from moving, this situation can be actually applied to the treadmill 1, and the rotating part 14 It blocks the rotation of the user so that the user's movement is restricted.

606 Therefore, the user can evacuate avoiding obstacles only by moving to the side, and it makes it possible to conduct training more like a real situation.

[0064]

611 The movement detecting unit 152 is configured to detect a user's movement on the treadmill 1 and transmit it to the cloud server 3, and a lateral movement detection module 152a for detecting lateral movement, a movement speed for detecting movement speed It may include a detection module 152b and a detection information transmission module 152c for transmitting the sensed information.

[0065]

619 The side movement detection module 152a is configured to detect the extent to which the user moves to the left and right on the treadmill 1, and is preferably based on information detected by the detection sensor 141a formed on the belt 141. Accordingly, it is possible to detect movement in the lateral direction.

623 In addition, the side movement detection module 152a may detect a movement in the lateral direction by the motion sensor 51 formed in the VR device 5, and detects the center position detected by the center sensor 132. By measuring the degree of

movement of the VR device 5 as a reference, the movement in the lateral direction may be detected.

[0066]

631 The movement speed detection module 152b is configured to detect the movement speed at which the user moves, and may sense the rotation speed of the belt 141 .

633 In addition, the movement speed detecting module 152b may also use a movement sensor 51 such as an acceleration or gyro sensor formed in the VR device 5 to detect the user's movement speed.

[0067]

639 The detection information transmission module 152c is configured to transmit information detected by the side movement detection module 152a and the movement speed detection module 152b to the cloud server 3, and according to the transmitted information, the VR device 5) so that the user output to it can move in conjunction.

[0068]

647 The fall prevention unit 153 is configured to prevent the user from falling from the treadmill 1, and detects in advance that the user approaches the side or front and rear boundaries to prevent the user from falling.

650 Since the user moves on the treadmill 1 while wearing the VR device 5, the risk of falling is very high.

652 Even if the structure is installed along the perimeter of the treadmill 1, there is a problem that the structure frequently collides with the structure. Even in this case, it is not possible to effectively restrict movement without user inconvenience.

655 Accordingly, the fall prevention unit 153 can effectively prevent the user from falling without a separate device by detecting proximity in advance and outputting a warning through the screen of the VR device 5 or a separate sound.

658 To this end, the fall prevention unit 153 may include a side boundary detection module 153a, a front and rear boundary detection module 153b, and a warning output module 153c.

[0069]

664 The side boundary detection module 153a is configured to detect that the user approaches the side of the treadmill 1, more precisely, the side of the belt 141, and a plurality of detection sensors 141a formed on the belt 141) To detect that the user is recognized by the detection sensor (141a) adjacent to the middle side end.

668 In addition, the side boundary detection module 153a can detect proximity to the side of the belt 141 even by the motion sensor 51 formed in the VR device 5 , and the distance from the center sensor 132 . Depending on the proximity, a warning may be output by detecting the proximity.

[0070]

675 The front/rear boundary detection module 153b is configured to detect that the user approaches the front or rear boundary of the treadmill 1, and is detected from the center sensor 132 by the motion sensor 51 formed in the VR device 5. Proximity can be detected by measuring the distance to the front or rear.

[0071]

682 The warning output module 153c is configured to generate a warning to the user when detection information is generated by the side boundary detection module 153a and the front and rear boundary detection module 153b, and a warning is displayed on the screen of the VR device 5 can be output, or a separate warning sound can be output.

[0072]

690 The touch sensing unit 154 detects that the user touches the handle unit 131 and allows the user to contact only when there is a structure that can actually be supported on the screen output through the VR device 5 . As a configuration, it may include a contact information receiving module 154a, a contact information transmitting module 154b, and a warning information receiving module 154c.

[0073]

698 The contact information receiving module 154a is configured to receive a signal that the user is in contact with the handle 131, and receives a signal detected by the contact sensor 131a.

[0074]

704 The contact information transmission module 154b is configured to transmit a contact signal received by the contact information reception module 154a to the cloud server 3, and allows it to be determined whether there is a supportable structure.

[0075]

710 The warning information receiving module 154c is a structure that the user can support on the screen output through the VR device 5 as a result of the determination by the cloud server 3 by the signal transmitted by the contact information transmission module 154b If this does not exist, it receives warning information about it so that a warning can be output through the screen or a separate sound.

716 Therefore, the warning information receiving module 154c can block the user from coming into contact with the handle 131, so that training can be performed according to the actual situation.

[0077]

722 The cloud server 3 refers to a server space on the Internet that stores data, software, etc., and stores three-dimensional information about the real space, information reflecting earthquakes for each space, and the like, and this information is stored in the VR device 5) and the treadmill (1), the user's motion information wearing the VR device (5) and moving on the treadmill (1) can be received and reflected on the screen output through the VR device (5) let it be

728 Therefore, the cloud server 3 can perform earthquake response training for real space anywhere, and conducts evaluation of the training so that repetitive and effective training can be performed.

731 To this end, the cloud server 3 includes a virtual space generator 31, an earthquake setting unit 32, an earthquake execution unit 33, an earthquake experience unit 34, and an experience evaluation unit, as shown in FIG. 35) may be included.

[0078]

737 The virtual space generator 31 is configured to generate three-dimensional screen information about the real space, and can obtain three-dimensional information about the real space using a 3D scanner, and can retrieve building information about the real space. By storing the virtual spatial information and building information in the cloud server 3 together with the location information for the space, an earthquake screen for the real space is created, and the earthquake for the space of the user's location or the user's desired location enable training to be carried out.

744 To this end, the virtual space generation unit 31 may include an architectural information model storage module 311 , a 3D scanning module 312 , a location information generation module 313 , and a spatial information storage module 314 .

[0079]

750 The building information model storage module 311 is configured to retrieve and store building information for an actual space, so that information on various

facilities such as structures, drawings, and articles in the space where earthquake training is performed is applied and reflected on the earthquake screen can do.

[0080]

757 The 3D scanning module 312 is configured to generate 3D information by scanning a real space through a 3D scanner or the like, and generates 3D screen information that can be output through the VR device 5 .

[0081]

763 The location information generation module 313 generates location information of a space in which 3D information is generated by the 3D scanning module 312 .

[0082]

768 The spatial information storage module 314 is configured to store the three - dimensional screen information and building information generated by the 3D scanning module 312 in the cloud server 3 together with the location information of the corresponding space. By storing the location information along with the dimension screen information and building information, earthquake screens can be set for each actual space location and earthquake experiences can be made.

[0083]

777 The earthquake setting unit 32 is configured to set an earthquake screen for each space in which three - dimensional screen information, building information, and location information are stored. , fire, blackout, etc. are also reflected and set, and the degree of each change can be adjusted and set according to the intensity of the earthquake. Accordingly, the earthquake setting unit 32 may include a space setting module 321 , a strength setting module 322 , a tilt control module 323 , a vibration control module 324 , and an option adjustment module 325 . .

[0084]

787 The space setting module 321 is configured to select a space in which an earthquake is set, and allows the virtual space generator 31 to select one of the real spaces in which building information, 3D screen information, and location information are stored.

[0085]

794 The intensity setting module 322 is configured to set the intensity of an earthquake, and may set the intensity according to various criteria, and may classify a general earthquake intensity into a certain range.

797 Accordingly, appropriate changes can be set and stored according to the set intensity.

[0086]

802 The inclination control module 323 is configured to set the inclination of the actual space output through the VR device 5, and adjusts the inclination degree by intensity, and the treadmill 1 is also inclined according to the set inclination degree. will lose

[0087]

809 The vibration control module 324 is configured to set the vibration of the real space output through the VR device 5, so that the vibration in vertical and horizontal directions is set according to the intensity, and the set vibration is also set through the treadmill 1 is output

[0088]

816 The option adjustment module 325 is a configuration that sets a situation in which components existing on the actual screen output through the VR device 5 change according to earthquakes, and includes an article control module 325a and a structure control module 325b. , a fire control module 325c, and a power outage control module 325d.

821 Accordingly, through the item control module 325a, changes such as falling or breaking of items existing in the space can be set, and the wall, ceiling, floor, etc. forming the space through the structure control module 325b Changes in the structure can be set, and through the fire control module 325c and the power outage control module 325d, the degree of fire, power outage, etc. that may occur in a space according to an earthquake can be adjusted and set.

[0089]

830 The earthquake execution unit 33 is configured to output an earthquake effect according to the information set by the earthquake setting unit 32, so that the earthquake effect for the actual space of the user's location or the user's desired location can be output, Earthquake intensity, option information, etc. are selected so that they can be output through the VR device 5 and the treadmill 1 .

835 To this end, the earthquake execution unit 33 includes a location information setting

module 331, a space selection module 332, an intensity selection module 333, an option information selection module 334, a VR output module 335, and a treadmill interlocking. module 336 .

[0090]

842 The location information setting module 331 is configured to set location information of a space in which an earthquake is to be executed, so that the user's location is received or the user selects a desired location so that the space for the location is selected as the space where the earthquake is to be performed. can

[0091]

849 The space selection module 332 is configured to select a specific space at a selected location, and since a plurality of spaces may exist even in the same location, a specific space in which an earthquake is to be performed can be selected at the user's location or at the user's desired location.

[0092]

856 The intensity selection module 333 is configured to select the intensity of an earthquake, so that the intensity of the earthquake to be executed in a specific space can be selected, and the vibration, inclination, options, etc. of the earthquake for the selected intensity can be executed.

[0093]

863 The option information selection module 334 is configured to select the type, degree, etc. of an executed option, and allows, for example, to change settings for changes in goods or structures, fires, power outages, and the like.

[0094]

869 The VR output module 335 is configured to output a three - dimensional screen through the VR device 5 with a selected intensity and option for a selected location and space, and vibrations and inclinations occur in the real space, and Changes in goods, structures, etc. are made to cause fire, power outage, etc.

[0095]

876 The treadmill interlocking module 336 is configured so that the effect of earthquake on the real space output through the VR output module 335 can be output in

conjunction with the treadmill 1, and vibration and inclination caused by earthquakes (1) so that it can be output in the same way.

[0096]

883 The earthquake experience unit 34 allows a user wearing the VR device 5 to move on the treadmill 1 and to perform earthquake training in an actual space output through the VR device 5 .

886 The earthquake experience unit 34 can change the viewpoint of the screen output through the VR device 5 according to the movement of the VR device 5, and set the initial position of the user so that the user's movement in the forward, backward, left, and right directions The screen output through the VR device 5 is also linked to output, and the effects such as obstacles and supportable structures on the screen output through the VR device 5 can be applied to the treadmill 1 as well. .

892 To this end, the earthquake experience unit 34 includes a viewpoint change module 341 , an initial position setting module 342 , a motion interlocking module 343 , a contact possibility determination module 344 , and an obstacle contact recognition module 345 . can do.

[0097]

899 The viewpoint changing module 341 is configured to change the viewpoint of the screen output through the VR device 5 according to the movement of the VR device 5, and is By changing the viewpoint according to the information sensed by the system, the user can feel as if he or she is moving in an actual space.

[0098]

906 The initial position setting module 342 is configured to set the user's reference position at the position where the earthquake experience for a specific space will start, and by allowing the user to position the center sensor 132 on the body part 13 The experience can be started from the center, and the movement of the user is determined from the center so that movement along the actual space can be made.

[0099]

914 The motion interlocking module 343 is configured so that the motion of the user on the treadmill 1 can be output in conjunction with the screen output through the VR device 5, and the user detected by the motion detecting unit 152 to be applied to the screen output through the VR device (5).

918 Accordingly, the user can move along the three - dimensional real space output through the VR device 5 .

[0100]

923 The contact possibility determination module 344 is configured to determine whether there is a structure to be supported around the user when information that the user has touched the handle 131 is detected by the contact detection unit 154. When there is no structure to be formed, information about this is transmitted to the treadmill 1 so that a warning can be output.

928 Accordingly, the user can hold the handle portion 131 only when there is a structure to be supported in the actual space.

[0101]

933 The obstacle contact recognition module 345 is configured to recognize when the user touches an obstacle on the screen output through the VR device 5 and transmit it to the treadmill 1, and when the user gets caught in the obstacle, the operation is stopped By stopping the rotation of the rotating part 14 of the treadmill 1 through the module 151e, the user can no longer proceed forward.

938 Therefore, the obstacle contact recognition module 345 can apply the effect of the obstacle to the user, and the user can move forward again only when the user avoids the obstacle and moves to the side.

[0102]

944 The experience evaluation unit 35 is configured to evaluate the earthquake training for the actual space by the earthquake experience unit 34 and apply the evaluation result to the next training, and provides a guide for the earthquake training, and accordingly It is necessary to judge whether or not to perform the training, and during the next training, based on the evaluation result, the guide information is revised so that effective training can be achieved.

950 To this end, the experience evaluation unit 35 includes a guide information providing module 351 , a matching degree calculation module 352 , an obstacle contact calculation module 353 , an evaluation information output module 354 , and an evaluation reflection guide module 355 . may include

[0103]

957 The guide information providing module 351 is configured to output information guiding the user during earthquake training for an actual space output through the VR device 5 through the VR device 5, for example, the direction of movement, A route and an appropriate speed may be output on the screen of the VR device 5 .

[0104]

964 The degree of agreement calculation module 352 is configured to calculate the degree of agreement by comparing the guide information output by the guide information providing module 351 with the information actually moved by the user. The higher the score, the higher the evaluation result.

[0105]

971 The obstacle contact calculation module 353 is configured to calculate the degree of the user's contact with the obstacle during earthquake training, and the more frequent contact with the obstacle is made, the more points are deducted.

[0106]

977 The evaluation information output module 354 is configured to output the evaluation result according to the information calculated by the coincidence degree calculation module 352 and the obstacle contact calculation module 353 through the VR device 5 screen, and a certain score and It is possible to provide the user with detailed information such as the route actually moved together, the speed, and whether or not there is an obstacle contact.

[0107]

986 The evaluation reflection guide module 355 is configured to provide guidance based on the previous evaluation results during the next earthquake training, and through the screen output through the VR device 5, the parts that did not match and were lacking in the previous evaluation were corrected. Reflect it so that guidance can be provided.

[0109]

994 The VR device 5 is configured to output a three-dimensional screen to the user while the user wears it on the head, so that the screen to which the earthquake is applied is output in the real space.

997 The user performs earthquake training by moving on the treadmill 1 while wearing the VR device 5 on the head, and the user's movement is detected and linked to the screen output through the VR device 5 .

1000 At this time, the user's movement may be detected by the treadmill 1 itself as described above, but may be detected through the motion sensor 51 such as an acceleration sensor or a gyro sensor formed in the VR device 5. .

1003 At this time, the initial position of the user may be detected by the center sensor

132 in order to accurately detect the user's movement, and the user's movement may be detected according to the moving direction and speed of the VR device 5 from the initial position. can do.

[0111]

1010 When an earthquake evacuation training system using virtual reality according to another embodiment of the present invention is described with reference to FIGS. 9 to 14 , the earthquake evacuation training system is the same vibration type treadmill (1) and cloud server (3) as in one embodiment. , including a VR device (5), and to further include a moving device (7) capable of loading and moving the treadmill (1).

1016 Therefore, seismic training is not limited to a specific place, so that it can be performed while moving along the moving device (7).

1018 To this end, the moving device 7 easily accommodates the vibrating type treadmill 1 and allows it to be stably fixed, and the treadmill 1 to perform the same seismic training as when the moving device 7 is stopped even during movement. Vibration, tilt, etc. can be adjusted.

[0112]

1025 The description of the vibrating treadmill 1, the cloud server 3, and the VR device 5 is the same as in one embodiment, except that the bottom plate 121 of the treadmill 1 has a rail guide member 121b protruding. It is formed so that the treadmill 1 can be moved and accommodated along the moving rail 712 formed on the bottom 7a of the moving device 7 .

1030 In addition, the support bar 121c is formed on the bottom plate 121 in the front - rear direction, and the treadmill 1 can be fixed by being caught by the fixing means 713 to be described later of the moving device 7 .

[0113]

1036 The moving device 7 is configured to accommodate and move the treadmill 1 and perform earthquake training, and a truck having a certain indoor space may be applied.

1039 A treadmill installation part 71 is formed in the moving device 7 so that the treadmill 1 can be accommodated and installed easily and stably, and the movement of the moving device 7 is sensed through the sensing unit 72 . Thus, it is reflected in the operation of the treadmill 1 so that the same seismic experience as the set information can be made while moving.

[0114]

1047 The treadmill installation unit 71 is configured to allow the treadmill 1 to be installed in the moving device 7 , and may include a guide plate 711 , a moving rail 712 , and a fixing means 713 .

[0115]

1053 The guide plate 711 is a plate connecting the moving device 7 and the floor, and allows the treadmill 1 to be accommodated in the moving device 7 along the guide plate 711 .

[0116]

1059 The moving rail 712 is configured to be recessed to a predetermined depth along the bottom of the moving device 7 , and the rail guide member 121b of the bottom plate 121 is inserted and moved.

1062 Accordingly, the treadmill 1 can be easily accommodated in the moving device 7 , and the moving rail 712 can also be formed on the guide plate 711 .

[0117]

1067 The fixing means 713 is configured to fix the treadmill 1 accommodated in the moving device 7 along the moving rail 712. When the treadmill 1 moves to the end of the moving rail 712, it is automatically fixed and moved. make sure not to

1070 The fixing means 713 is fixed by preventing the support bar 121c formed on the bottom plate 121 of the treadmill 1 from moving forward again by being caught, and for this purpose, as shown in FIG. 713a), a push member 713b, a locking member 713c, and a blocking member 713d may be included.

1074 As shown in FIG. 10 , a pair of the fixing means 713 may be formed on the front and rear sides of the treadmill 1 .

[0118]

1079 The fixing protrusion 713a is fixed while being inserted into the bottom 7a of the moving device 7 and protrudes upward after passing through the support bar 121c to fix the support bar 121c.

1082 A locking member 713c is formed to protrude forwardly from the upper end of the fixing protrusion 713a, and a blocking member 713d is formed to protrude forward at a point adjacent to the lower side of the bottom 7a.

1085 In addition, a push member 713b is coupled to the lower end of the fixing protrusion 713a to generate a force for pushing the fixing protrusion 713a upward.

1087 Accordingly, the fixing protrusion 713a maintains a state in which the blocking

member 713d is caught by the bottom 7a of the moving device 7 and is fixed, and as the treadmill 1 moves, the support bar 121c is engaged with the engaging member. When the (713c) is pushed, the fixing protrusion (713a) moves to the rear side so that the blocking member (713d) is deviated from the bottom of the moving device (7), and the fixing protrusion (713a) is pushed by the push member (713b) and protrudes upward.

1094 Then, the support bar 121c passing through the fixing protrusion 713a is caught by the fixing protrusion 713a protruding upward and is fixed without being pushed forward again.

[0119]

1100 The push member 713b is formed under the fixing protrusion 713a to provide an elastic force for pushing the fixing protrusion upward. make it become

1102 Accordingly, when the fixing protrusion 713a is pushed to the rear by the support bar 121c, the push member 713b pushes the fixing protrusion 713a upward to protrude.

[0120]

1108 The locking member 713c is configured to protrude from the upper end of the fixing protrusion 713a to the front side, and to be fixed in a state protruding upward from the bottom of the moving device 7, and by the support bar 121c. pushed to the side

[0121]

1114 The blocking member 713d is configured to protrude forward from one point of the fixing protrusion 713a to be caught under the bottom 7a of the moving device 7, and as shown in FIG. 12(a), the locking member 713c) to protrude upward.

1117 And as shown in FIG. 12(b), when the locking member 713c is pushed to the support bar 121c and the fixing protrusion 713a moves to the rear side, the blocking member 713d moves to the bottom 7a of the moving device 7) and the fixing protrusion 713a can protrude upward, and as shown in FIG. 12(c), after the support bar 121c passes the fixing protrusion 713a, the fixing protrusion protrudes upward (713a), it is possible to maintain a fixed state.

1123 Accordingly, as long as the treadmill 1 is moved to the end of the moving rail 712 , the treadmill 1 can be maintained in a fixed state without a separate operation.

[0122]

1128 The sensing unit 72 is configured to detect the movement of the moving device 7, and as shown in FIG. 13, a vibration sensing module 721 for detecting vibration, a

tilt sensing module 722 for detecting a tilt, and acceleration It may include an acceleration sensing module 723 that detects , and a sensing information transmission module 724 that transmits the sensed information to the cloud server 3 .

1134 Therefore, the vibration, inclination, and speed output to the treadmill 1 can be changed according to the vibration, inclination, and acceleration of the mobile device 7, so that even during the movement of the mobile device 7, the vibration of the earthquake originally set for a specific space , the same user experience as the inclination can be made.

[0123]

1142 Accordingly, the cloud server 3 includes a movement control unit 36 to change the vibration, inclination, etc. of the earthquake according to the information sensed by the sensing unit 72 .

1145 To this end, the movement control unit 36 may include a sensing information receiving module 361, a vibration control module 362, a tilt control module 363, and a speed control module 364 as shown in FIG. have.

[0124]

1151 The sensing information receiving module 361 is configured to receive information transmitted by the sensing information transmitting module 724, and the vibration, tilt, and belt 141 of the earthquake according to the vibration, inclination, and acceleration of the mobile device 7) so that the speed can be changed.

[0125]

1158 The vibration control module 362 is configured to change the vibration output to the treadmill 1 according to the vibration of the moving device 7, and more precisely, to control the vibration in the left and right horizontal directions by the horizontal drive cylinder 124a. do.

1162 The cloud server 3 sets vibration according to the earthquake intensity for a specific space. When vibration occurs in the mobile device 7 , excessive vibration is generated in the treadmill 1 in addition to the set vibration.

1165 Accordingly, the vibration control module 362 reduces the vibration output to the treadmill 1 as much as the vibration generated by the moving device 7 so that the same vibration of the earthquake as when stopped during movement can be felt.

[0126]

1171 The tilt control module 363 is configured to output the same tilt as when stopped

while moving in the same way as the vibration control module 362, and moves according to the result measured by the tilt sensing module 722 It allows the inclination of the treadmill 1 to be changed by reflecting the inclination of the device 7 .

[0127]

1179 The speed control module 364 is configured to adjust the vibration in the front - rear direction generated by the rotating unit 14, and since the vibration in the front - rear direction is generated according to the acceleration of the moving device 7, it is applied to the moving device 7 By reducing the driving of the rotating part 14 by the acceleration caused by the acceleration, the same vibration in the front - rear direction as when stopped during movement can be generated.

[0129]

1188 In the above, the applicant has described various embodiments of the present invention, but these embodiments are only one embodiment that implements the technical idea of the present invention, and any changes or modifications are not allowed as long as the technical idea of the present invention is implemented. should be construed as falling within the scope of

[0130]

1196 1: Vibration - type treadmill 11: vertical movement part 111: vertical drive cylinder 112: elastic body 113: support plate 12: horizontal movement part 121: bottom plate 121a: horizontal rail 121b: rail guide member 121c: support bar 122: horizontal movement plate 122a: rail insert member 123: Fixed plate 124: driving means 124a: horizontal driving cylinder 124b: elastic member 124c: support block 13: body part 131: handle part 131a: contact sensor 132: center sensor 14: rotating part 141: belt 141a: detection sensor 142: belt support shaft 15 : Control unit 151: Operation control unit 152: Movement sensing unit 153: Fall prevention unit 154: Contact sensing unit 3: Cloud server 31: Virtual space generation unit 32: Earthquake setting unit 33: Earthquake execution unit 34: Earthquake experience unit 35: Experience Evaluation unit 36: movement control unit 5: VR device 51: motion sensor 7: moving device 7a: floor 71: treadmill installation unit 711: guide plate 712: moving rail 713: fixing means 713a: fixing protrusion 713b: push member 713c: caught Member 713d: blocking member 72: sensing unit 721: vibration sensing module 722: tilt sensing module 723: acceleration sensing module 724: sensing information transmission module

Notice

CLAIMS KR20200091594A

1.

14 A vibration-type treadmill that provides a space for a user to walk or run and generate vibrations; a VR device that is worn on the user's head and outputs a virtual reality space to the user; It is connected to the vibrating treadmill and VR device through wired/wireless communication to output a three-dimensional screen in which an earthquake occurs in the real space through the VR device, and the vibration of the earthquake output through the VR device and the inclination of the real space according to the vibration type It includes a cloud server that transmits to the treadmill, wherein the cloud server outputs the movement of the user moving along the vibrating treadmill through a VR device so that the user can experience moving in the real space where the earthquake occurred. Earthquake evacuation training system using virtual reality.

2.

28 According to claim 1, wherein the cloud server comprises a virtual space generator for generating three-dimensional virtual space information about the real space, and an earthquake setting unit for setting by applying a situation in which an earthquake occurs to the generated virtual space, The virtual space generating unit includes: an architecture information model storage module for storing building information of the real space; a 3D scanning module for generating virtual spatial information about a real space using a 3D scanner; a location information generating module for generating location information about the real space in which the virtual information is generated; It includes; a spatial information storage module for storing the building information, virtual spatial information, and location information in correspondence

with each other, wherein the earthquake setting unit includes a spatial setting module for selecting a space to set an earthquake, and an earthquake intensity for the selected space Intensity setting module, the tilt control module for setting the degree of inclination of the space according to the set intensity, the vibration control module for setting the vibration of the space according to the set intensity, and option adjustment for setting the situation corresponding to each space A module including a module, wherein the option adjustment module includes: an article control module for setting a change of an article for each space; a structure control module for setting a change for a structure in each space; and a fire for setting fire occurrence according to an earthquake Earthquake evacuation training system using virtual reality, characterized in that it comprises a control module and a power outage control module for adjusting the power outage.

3.

53 According to claim 1, wherein the vibratory treadmill is supported on the floor and the user can stand on the main body portion, formed on the main body portion to rotate by a user walking or running, and a vertical direction to the main body portion A vertical motion unit for providing a motion force of a vertical motion unit, a horizontal motion unit for providing a horizontal motion force to the main body part, and a control unit for controlling an operation of the vibrating treadmill, wherein the horizontal motion unit is perpendicular to the rotation direction of the rotating part of the main body part Earthquake evacuation training system using virtual reality, characterized in that it moves in the direction.

4.

65 According to claim 3, wherein the vertical movement portion is formed along the bottom of the body portion at regular intervals a plurality of vertical drive cylinders to provide a vertical force; a support plate fixed to the upper end of the vertical driving cylinder and formed of a plate having an area corresponding to the body part; It is inserted between the support plate and the body portion, the elastic body is formed to correspond to the position where the vertical drive cylinder is formed; includes, the horizontal movement unit, the bottom plate supported on the floor; a horizontal moving plate moving in a horizontal direction along the bottom plate; a fixing plate fixed to the upper side of the horizontal moving plate and supporting the lower end of the vertical driving cylinder; and a driving means for providing a driving force for moving the horizontal moving plate in a horizontal direction, wherein the driving means includes: a horizontal driving cylinder formed at one end of the bottom plate to push or pull the horizontal moving plate in a horizontal direction; An elastic member formed at the other end of the bottom plate to support the horizontal movable plate by elasticity, and a support block for supporting the elastic member, wherein the bottom plate includes

a horizontal rail forming a path through which the horizontal movable plate moves, , An earthquake evacuation training system using virtual reality, characterized in that the horizontal rail is formed in a direction perpendicular to the rotational direction of the rotating part.

5.

87 According to claim 3, wherein the control unit comprises a movement detecting unit for detecting the movement on the vibrating treadmill and transmitting it to the cloud server, the rotating unit is formed in plurality so as to be spaced apart from each other by a detection sensor to detect the user's contact with the rotating unit. Including, wherein the movement detection unit, a side movement detection module for detecting information that the user deviates from the center of the rotating part to both sides according to the information sensed by the detection sensor, and detecting the user's movement speed according to the rotation speed of the rotating part and a detection information transmission module for transmitting the information sensed by the side movement detection module and the movement speed detection module to a cloud server, wherein the cloud server is a VR device according to the user's lateral movement and movement speed Earthquake evacuation training system using virtual reality, characterized in that to link the movement of the user output to the.

6.

103 The method according to claim 5, wherein the control unit includes a fall prevention unit for preventing the user from falling, and the fall prevention unit includes a side boundary detection module for detecting that the user approaches a side boundary, and a front and rear boundary for detecting proximity to the boundary. A front - rear boundary detection module and a warning output module that outputs a warning through a VR device screen or a separate warning sound when the user approaches the side or front - rear boundary, wherein the side boundary detection module responds to the information detected by the detection sensor Accordingly, the proximity of the side boundary is detected or the degree of deviation from the center of the main body is detected according to information measured by a motion sensor formed in the VR device, and the front and rear boundary detection module is a motion sensor formed in the VR device. Earthquake evacuation training system using virtual reality, characterized in that it detects the degree of movement of the user forward and backward from the center of the main body according to the measured information.

7.

121 According to claim 2, wherein the earthquake evacuation training system using the

virtual reality is moved by accommodating the vibration - type treadmill, including a moving device that allows the earthquake training can be carried out while moving; A guide plate connecting the devices to load the vibrating treadmill into the moving device, a moving rail formed on the bottom of the moving device to form a path for the vibrating treadmill to move, and fixing means for fixing the vibrating treadmill accommodated in the moving device and the fixing means includes a fixing protrusion which is fixed in a state inserted into the bottom of the moving device and protrudes upward after passing through the vibrating treadmill to fix the vibrating type treadmill; a push member formed under the fixing protrusion to push the fixing protrusion upward; a locking member that is formed to protrude from the upper end of the fixing protrusion to the front, and is pushed backward by a vibrating treadmill; Including a blocking member that protrudes forward from one point of the fixing protrusion and is caught on the bottom of the moving device, and the locking member is released as the locking member is pushed to the rear so that the fixing protrusion protrudes upward. Earthquake evacuation training system using virtual reality, characterized in that it is automatically fixed together with.

8.

141 The mobile device according to claim 7, wherein the mobile device includes a sensing unit that detects information about the movement of the mobile device and transmits it to a cloud server, wherein the sensing unit includes: a vibration sensing module for detecting vibration of the mobile device; A tilt sensing module, an acceleration sensing module for detecting acceleration, and a sensing information transmitting module for transmitting the sensed information to a cloud server, wherein the cloud server is a sensing information receiving module for receiving information transmitted from the sensing unit and a vibration control module for adjusting the vibration output to the vibrating treadmill according to the vibration information sensed by the moving device, a tilt control module for adjusting the tilt, and a speed control module for adjusting the rotational speed of the rotating part Earthquake evacuation training system using virtual reality.