

INTELLIGENT SAFETY HARNESS AND MONITORING METHOD THEREOF

Technical Field

The invention relates to the technical field of safety harnesses, in particular to an intelligent safety harness and a monitoring method thereof.

Background Art

Currently, to ensure the safety of operators during high-altitude operations, operators usually need to wear safety harnesses. However, some workers have weak safety awareness and operate improperly, either working without safety harnesses or failing to secure the hooks and buckles correctly even when wearing the safety harnesses. These non-standard practices can easily lead to safety accidents.

Therefore, there is an urgent need to develop an intelligent safety harness that can monitor operators in real time, ensuring standardized use and preventing safety accidents.

Summary of the Invention

The invention aims to solve the technical problems that the intelligence level of the safety harnesses in the prior art is relatively low, and it is impossible to know whether the operator operates in a standardized manner, which is prone to cause safety accidents. In view of the above defects of the prior art, the invention provides an intelligent safety harness and a monitoring method thereof.

The invention adopts the following technical proposal to solve the technical problems:

an intelligent safety harness comprises a harness body, a host, a detection component for measuring height, and a plurality of hooks and buckles; the host and the detection component are respectively arranged on the harness body; the host is electrically connected to the detection component and is used to collect the data of the detection component and transmit the data to a server; the hooks and the buckles are respectively arranged on the harness body; the buckle is provided with a buckle detection device for detecting the status of the buckle; the hook is provided with a hook detection device; the buckle detection device and the hook detection device are respectively in communication connection with the detection component; the detection component comprises a first detection component and a second detection component; the first detection component and the second detection component are electrically connected to the host.

Further, the harness body comprises a first plane and a second plane, and the first plane and the second plane are arranged oppositely; the first detection component is arranged on the first plane and is used to detect the working height of the first plane; the second detection component is located in the second plane and is used to detect the working height of the second plane.

Further, the first detection component comprises a first shell, a data receiving device, an altitude measuring component, a temperature detector, a humidity detector, an operation area detector, a detection communication device, an angular velocity detection device and a plurality of first detectors; the data receiving device, the altitude measuring component, the temperature detector, the humidity detector, the operation area detector, the detection communication device, the angular velocity detection device and the first detectors are respectively arranged in the first shell; the detection communication device is electrically connected to the host; the data receiving device is in communication connection with the buckle detection device and the hook detection device.

Further, the second detection component comprises a second shell, a hook connection indicator light and a plurality of second detectors; the hook connection indicator light and the second detectors are respectively arranged on the second shell; the hook connection indicator light is in communication connection with the hook detection device.

Further, the harness body is provided with a cross part in the first plane, and the cross part is Y-shaped; the first detection component is located at the cross part.

Further, the buckle comprises an upper buckle, a lower buckle and a plurality of leg buckles; the upper buckle, the lower buckle and the leg buckles respectively comprise seat bodies and fasteners, and the seat bodies are engaged with or separated from the fasteners; the upper buckle, the lower buckle and the leg buckles are respectively provided with buckle detection devices, and the buckle detection devices are respectively in communication connection with the data receiving device.

Further, the upper buckle, the lower buckle and a plurality of leg buckles are respectively provided with a first charging interface and a first power supply device for power supply, and the first power supply device is electrically connected to the buckle detection device.

Further, the host is detachably arranged on the harness body and is provided with a housing, an anti-dismantle device, a first communication device, a second communication device, a positioning device, a voice prompt device, an emergency button, a start button, a power supply component, a second charging interface and a plurality of indicator lights; the anti-dismantle device, the first communication device, the second communication device, the positioning device, the voice prompt device and the power supply component are respectively arranged in the housing; the start button, the second charging interface and the indicator lights are fixedly arranged on the housing; the power supply component is electrically connected to the anti-dismantle device, the first communication device, the second communication device, the positioning device, the voice prompt device and the indicator lights; the anti-dismantle device, the first communication device, the second communication device, the positioning device, the voice prompt device and the emergency button are respectively in communication connection with the server.

Further, the harness body is provided with a plurality of fixing rings, and the hooks are provided with latch hooks, which respectively pass through the fixing rings.

Further, the first plane and the second plane are respectively provided with adjustable buckles for adjusting the length of the harness body, and the harness body passes through the adjustable buckles respectively.

A monitoring method of an intelligent safety harness comprises the following steps:

establish communication connection for the buckle detection device and the hook detection device with the detection component respectively;

obtain detection data through the detection component and acquire status data from the buckle detection device and the hook detection device;

summarize the status data and the detection data to generate summarized data;

retrieve the summarized data via the host and transmit the data to a predefined server;

perform calculations on the server to derive calculation results;

match the calculation results with corresponding voice prompt commands or alarm commands in a preset database;

execute the voice prompt commands or alarm commands through the host.

Further, the monitoring method of the intelligent safety harness comprises the following steps before obtaining the detection data through the detection component and acquiring the status data of the buckle detection device and the hook detection device:

judge whether the buckle is fastened through the preset buckle detection device;

if yes, determine as correct wearing;

if no, determine as incorrect wearing.

The invention has the following beneficial effects: the host can collect the detection data of the detection component and the status data of the hooks and the buckles, the buckle detection device and the hook detection device can detect the status of the hooks and the buckles to determine whether the buckles are buckled and whether the hooks are attached, and transmit the data to a server, and then the server processes the data and feeds back the results to the host for corresponding voice prompts or alarms; the invention can conduct real-time monitoring of the operators and send voice prompts or alarms through the host to enable the operators to use the safety harness properly and avoid the occurrence of safety accidents.

The invention incorporates detection components on the harness body, enabling the measurement of working height and environment for enhanced intelligence, and can determine whether the operators work in a safe environment, thereby improving the safety of the safety harness. Additionally, the first detection component and the second detection component enhance the accuracy of measured data.

Brief Description of the Drawings

FIG. 1 is the overall structure diagram of an intelligent safety harness in an embodiment of the invention.

FIG. 2 is the flowchart illustrating a monitoring method of an intelligent safety harness in an embodiment of the invention.

FIG. 3 is the stereoscopic view of a host in an embodiment of the invention.

FIG. 4 is the stereoscopic view of a hook in an embodiment of the invention.

FIG. 5 is the stereoscopic view of a buckle in an embodiment of the invention.

FIG. 6 is the structural block diagram of a first detection component in an embodiment of the invention.

FIG. 7 is the structural block diagram of a second detection component in an embodiment of the invention.

FIG. 8 is the structural block diagram of a host in an embodiment of the invention.

FIG. 9 is the rear view of an intelligent safety harness in an embodiment of the invention.

Reference signs: harness body 1, host 2, detection module 3, hook 4, buckle 5, buckle detection device 6, hook detection device 7, first detection component 81, second detection component 82, first plane 11, second plane 12, first shell 811, data receiving device 812, altitude measuring component 813, temperature detector 814, humidity detector 815, operation area detector 816, detection communication device 817, angular velocity detection device 818, first detector 819, second shell 821, hook connection indicator 822, second detector 823, cross part 111, upper buckle 51, lower buckle 52, leg buckle 53, seat body 511, fastener 512, first charging interface 514, housing 21, anti-dismantle device 22, first communication device 23, second communication device 24, positioning device 25, voice prompt device 26, emergency button 27, start button 28, power supply component 29, second charging interface 211, indicator light 212, fixing ring 13, latch hook 14, adjustable buckle 15.

Detailed Description of the Invention

In order to make the purpose, technical proposals and advantages of the invention clearer, the invention is further elaborated in detail with reference to the drawings and embodiments. It should be understood that the embodiments described herein are only for interpreting the invention and are not intended to limit the invention.

As shown in FIG. 1, , the invention proposes an intelligent safety harness, which comprises a harness body 1, a host 2, a detection component 3 for measuring height, and a plurality of hooks 4 and buckles 5; the host 2 and the detection component 3 are respectively arranged on the harness body 1; the host 2 is electrically connected to the detection component 3 and is used to collect the data of the detection component 3 and transmit the data to the server; the hooks 4 and the buckles 5 are respectively arranged on the harness body 1; the buckle 5 is equipped with a buckle detection device 6 for detecting the status of the buckle 5; the hook 4 is equipped with a hook detection device 7; the buckle detection device 6 and the hook detection device 7 are respectively in communication connection with the detection component 3; the detection component 3 comprises a first detection component 81 and a second detection component 82; the first detection component 81 and the second detection component 82 are electrically connected to the host 2.

In the embodiment, the host 2 is located on the front of the harness body 1, located on the left chest position after wearing and located above the adjustable buckle; the host 2 can be removed from the harness body 1 and is a moving part for collecting data from the detection

component 3 and transmitting the data to the server. The hooks 4 and the buckles 5 are respectively arranged on the harness body 1, and the hook 4 is provided with a hook detection device 7 to detect whether the hook 4 is buckled, the buckle 5 is provided with a buckle detection device 6 to detect whether the buckle 5 is properly fastened, securely fastened or loosened, and the hook detection device 7 and the buckle detection device 6 are respectively in communication connection with the detection component. In the embodiment, the hook detection device 7 and the buckle detection device 6 are wirelessly connected to the detection component 3 via 2.4GHz wireless communication. The detection device is in wired connection with the host 2 and can send the status data of the hook detection device 7 and the buckle detection device 6 to the host 2. The status of hooks 4 and buckles 5 is detected to determine whether the operator wears the safety harness during high-altitude operation and whether the operator wears the safety harness correctly, avoiding potential safety hazards and enabling real-time monitoring of the operators. The detection component 3 comprises a first detection component 81 and a second detection component 82, and both the first detection component 81 and the second detection component 82 are electrically connected to the host 2 and can transmit data to the host 2 via a data cable.

In an embodiment, the harness body 1 comprises a first plane 11 and a second plane 12, and the first plane 11 and the second plane 12 are arranged oppositely; the first detection component 81 is arranged on the first plane 11 and is used to detect the working height of the first plane 11; the second detection component 82 is located in the second plane 12 and is used to detect the working height of the second plane 12.

Specifically, as shown in FIG. 9, the first plane 11 is the back of the harness body 1; as shown in FIG. 1, the second plane 12 is the front of the harness body 1, and the first detection component 81 is located on the back of the harness body 1 and located at the middle position of the human shoulder after wearing and detects the working height on the back; meanwhile, the first detection component 81 can collect the data of the buckle detection device 6 and the hook detection device 7. The second detection component 82 is located on the front of the harness body and located on the right chest after wearing and can measure the working height on the front of the harness body 1.

As shown in FIG. 3, the first detection component 81 comprises a first shell 811, a data receiving device 812, an altitude measuring component 813, a temperature detector 814, a humidity detector 815, an operation area detector 816, a detection communication device 817, an angular velocity detection device 818 and a plurality of first detectors 819; the data receiving device 812, the altitude measuring component 813, the temperature detector 814, the humidity detector 815, the operation area detector 816, the detection communication device 817, the angular velocity detection device 818 and the first detector 819 are respectively arranged in the first shell 811; the detection communication device 817 is electrically connected to the host 2; the data receiving device 812 is in communication connection with the buckle detection device 6 and the hook detection device 7.

In the specific implementation, the safety harness mainly detects the height of the back thereof through the first detection component 81. Specifically, the data receiving device 812, the altitude measuring component 813, the temperature detector 814, the humidity detector 815, the operation area detector 816, the detection communication device 817, the angular velocity detection device 818 and the first detector 819 are respectively arranged in the first shell 811. The data receiving device 812 is a data receiving module, and the hook detection device 7 and the buckle detection device 6 are matched with the data receiving module through 2.4GHz wireless communication. After matching, the data receiving device 812 receives the status data of the hook detection device 7 and the buckle detection device 6, for example, whether the buckle 5 is fastened; then the data is transmitted to the host 2. In an embodiment, the altitude measuring component 813 is an altimeter, which is used to measure altitude. The temperature detector 814 is a thermometer, which is used to measure the temperature around the safety harness; the humidity detector 815 is a hygrometer, which is used to detect the humidity. The altitude measuring component 813, the temperature detector 814 and the humidity detector 815 are arranged to learn the information about the working environment of the operator, preventing the operator from working in harsh conditions and avoiding accidents.

In an embodiment, the operation area detection device 816 is UWB (Ultra Wide Band), which can divide the high-altitude operation area, conduct real-time position analysis of the operators, and accurately determine whether there are risks in the area where the operators are located, ensuring the safety performance of the high-altitude operators and reducing the accident rate. In another embodiment, the detection communication device 817 is equipped with a 4G communication module, namely the fourth-generation mobile information system, and is in wire connection with the host 2, transmitting data to the host 2 through a data cable. In another embodiment, the angular velocity detection device 818 is a gyroscope, which can detect the angular velocity of the operator to determine whether the operator falls from a height. The first detection device 819 is a laser sensor, which can detect the height. The first detection component 81 can collect the temperature, the humidity, the altitude and the status data of the hook detection device 7 and the buckle detection device 6 in the working environment of the operator. Moreover, the operation area detector 816 can distinguish between the operation area and the rest area.

As shown in FIG. 4, the second detection component 82 comprises a second shell 821, a hook connection indicator light 822 and a plurality of second detectors 823; the hook connection indicator light 822 and the second detectors 823 are respectively arranged on the second shell 821; the hook connection indicator light 822 is in communication with the hook detection device 7.

In the specific implementation, the second detection component 82 is an auxiliary detection device, which can assist the first detection component 81 in detecting the height of the front of the safety harness. When there is obstruction during high-altitude operations, only the first detection component 81 arranged is prone to the phenomenon of no data measured or

inaccurate measuring results. The second detection component 82 is added on the basis of the first detection component 81 to further measure the working height; moreover, the hook connection indicator light 822 is also arranged to light up after the hook detection device 7 communicates with the hook connection indicator light 822 (i.e. wireless matching connection) and is successfully connected with the hook connection indicator light 822, allowing to know whether the connection is established. In another embodiment, the safety harness may be provided with a differential extension rope, the second detection component 82 is also provided with a differential extension rope connection indicator light and is in communication connection with the differential extension rope. After the connection is establishment, the differential extension rope indicator light is on.

As shown in FIG. 1, the harness body 1 is provided with a cross part 111 in the first plane 11, and the cross part 111 is Y-shaped; the first detection component 81 is located at the cross part 111.

In the specific implementation, a cross part 111 is arranged on the back of the harness body 1 and is in a Y-shaped structure, having a higher binding force. The first detection component 81 is located at the cross part 111, that is, in the middle of the shoulder at the back of the safety harness.

As shown in FIG. 5, the buckle 5 comprises an upper buckle 51, a lower buckle 52 and a plurality of leg buckles 53; the upper buckle 51, the lower buckle 52 and the leg buckles 53 respectively comprise seat bodies 511 and fasteners 512, and the seat bodies 511 are engaged with or separated from the fasteners 512; the upper buckle 51, the lower buckle 52 and the leg buckles 53 are respectively provided with buckle detection devices 6, and the buckle detection devices 6 are respectively in communication connection with the data receiving device 812.

In the specific implementation, the upper buckle 51 is located right above the lower buckle 52 and can fasten the safety harness together with the lower buckle 52. Two leg buckles 53 are arranged, which can be fastened to the left leg and the right leg respectively. A plurality of buckles 5 are arranged to firmly wear the safety harness on the human body.

Specifically, the upper buckle 51, the lower buckle 52 and the leg buckles 53 respectively comprise seat bodies 511 and fasteners 512. When the seat bodies 511 are respectively engaged with the fasteners 512, the safety harness is worn on the human body. The upper buckle 51, the lower buckle 52 and the leg buckles 53 are respectively provided with buckle detection devices 6, which are respectively in communication connection with the data receiving device 812. The buckle detection device 6 can be a contact sensor or a normally closed switch, which can detect whether the buckle 5 has been fastened. In the case of a contact sensor, the buckle detection device 6 is arranged on the seat body 511 or the fastener 512. After the seat body 511 comes into contact with the fastener 512, an induction signal is sent to determine whether the buckle is fastened. In the case of a normally closed switch, the buckle detection device 6 generates and sends an electrical signal to the first detection component 81 after the buckle 5 is unfastened.

As shown in FIG. 1 and FIG. 5, the upper buckle 51, the lower buckle 52 and a plurality

of leg buckles 53 are respectively provided with a first charging interface 514 and a first power supply device for power supply, and the first power supply device is electrically connected to the buckle detection device 6.

In the specific implementation, the upper buckle 51, the lower buckle 52 and the leg buckles 53 are respectively provided with a first charging interface 514 to charge the buckle detection device 6. In an embodiment, the first charging interface 514 is a USB Type-C charging interface and is electrically connected to the first power supply device, charging after being connected to the data cable. The first power supply device is a battery, which can supply power to the buckle detection device 6. Moreover, a battery endurance algorithm is entered in the first power supply device in advance, such as $\text{endurance} = \frac{\text{battery voltage} \times \text{battery capacity}}{\text{motor power}}$; the first power supply device can manage the battery power, enabling the battery to have long battery life, that is, the battery enters a sleep state when not used for a long time.

As shown in FIG. 3 and FIG. 5, the host 2 is detachably arranged on the harness body 1 and is provided with a housing 21, an anti-dismantle device 22, a first communication device 23, a second communication device 24, a positioning device 25, a voice prompt device 26, an emergency button 27, a start button 28, a power supply component 29, a second charging interface 211 and a plurality of indicator lights; the anti-dismantle device 22, the first communication device 23, the second communication device 24, the positioning device 25, the voice prompt device 26 and the power supply component 29 are respectively arranged in the housing 21; the start button 28, the second charging interface 211 and the indicator lights are fixedly arranged on the housing 21; the power supply component 29 is electrically connected to the anti-dismantle device 22, the first communication device 23, the second communication device 24, the positioning device 25, the voice prompt device 26 and the indicator lights; the anti-dismantle device 22, the first communication device 23, the second communication device 24, the positioning device 25, the voice prompt device 26 and the emergency button 27 are respectively in communication connection with the server.

In the specific implementation, the anti-dismantle device 22, the first communication device 23, the second communication device 24, the positioning device 25, the voice prompt device 26 and the power supply component 29 are respectively arranged in the housing 21; a plurality of fixing holes are arranged on the of the housing to fix the host 2 onto the harness body 1 by screw thread connection. After wearing, the host 2 is located on the left chest position and above the adjustable buckle. The host 2 can be removed from the harness body 1 by removing the screws. The host 2 is also provided with the anti-dismantle device 22. Specifically, a contact sensor is arranged on the back of the host 2 and has authorization authority. When the host 2 is disassembled in an unauthorized state, the sensor senses and generates an electrical signal. At this time, the anti-dismantle device 22 locks and disables the host 2. When the host 2 is in the authorized state, the host 2 can be detached from the harness body 1.

The first communication device 23 is a 4G communication module, which communicates

with the server in real time and transmits data to the server; meanwhile, the status data of the hook detection device 7 and the buckle detection device 6 can be obtained in real time. The second communication device 24 is a Lora communication module, namely, Long Range, which can expand the signal bandwidth through spread spectrum modulation to improve the transmission distance and anti-interference capability. In areas without 4G signals, Lora can be used for communication. The positioning device 25 is a GPS module, Global Positioning System, which is capable of locating the operator to obtain the exact position of the operator. The voice prompt device 26 can be a speaker or a buzzer, capable of making voice broadcast or giving alarm for the voice prompts sent by the server. The emergency button 27 is located on the housing 21. After the emergency button 27 is pressed, a distress signal is sent to the server or an alarm is sounded to rescue the operator in time. The start button 28 is electrically connected to the first communication device 23, the second communication device 24, the positioning device 25, the voice prompt device 26, the emergency button 27, the start button 28, the power supply component 29 and the indicator light respectively. After the start button 28 is pressed, the first communication device 23, the second communication device 24, the positioning device 25, the voice prompt device 26, the emergency button 27, the start button 28, the power supply component 29 and the indicator light can be activated. The power supply component 29 is a battery, which is used for power supply. Similarly, the host 2 is equipped with a battery power-saving management system and a battery life algorithm. When not used for a long time, the host 2 enter a sleep state to achieve long battery life. The host 2 is in wired connection with the first detection component 81 and the second detection component 82, collects the data of the first detection component 81 and the second detection component 82 through the data cable and supplies power to the first detection component 81 and the second detection simultaneously. The second charging interface 211 can be a USB Type-C charging interface and is capable of charging the power supply component 29. The indicator light 212 comprises a power indicator light, a working indicator light and a signal strength indicator light, wherein the battery indicator light can indicate the power by changing the color of the light; the working indicator light can enable the operator to know whether the host 2 operates normally by turning on or off; a plurality of signal strength indicator lights are arranged and are electrically connected to the first communication device 23 and the second communication device 24; the signal strength is indicated by the number of lights on; if four signal strength indicator lights are arranged, all four indicator lights are on when the signal is strong; when the signal is weak, one or two indicator lights are on, which is convenient for the operator to know the signal strength in this area, avoiding the disconnection between host 2 and the server.

As shown in FIG. 1 and FIG. 4, the harness body 1 is provided with a plurality of fixing rings 13, and the hooks 4 are provided with latch hooks 14, which respectively pass through the fixing rings 13.

In the specific implementation, the harness body 1 is provided with two fixing rings 13 located on the left and right sides respectively. In an embodiment, the fixing rings 13 are a D-

shaped ring, and the latch hooks 14 of the hooks 4 run through the D-shaped rings respectively. When not in use, the hooks 4 can be hung on the D-shaped rings for carrying.

As shown in FIG. 1, the first plane 11 and the second plane 12 are respectively provided with adjustable buckles for adjusting the length of the harness body 1, and the harness body 1 passes through the adjustable buckles respectively.

In the specific implementation, adjustable buckles are respectively arranged on the back and front of the harness body 1, are hollowed-out and have a plurality of crossbars in the middle, and the harness body 1 passes through the adjustable buckles and is arranged around the crossbars. The length of the harness body 1 can be adjusted by pulling and adjusting the harness body 1 to meet the use requirements of different working environments or different operators.

As shown in FIG. 2, the invention proposes a monitoring method of an intelligent safety harness, comprising the following steps:

S1: establish communication connection for the buckle detection device 6 and the hook detection device 7 with the detection component 3 respectively;

S2: obtain detection data through the detection component 3 and acquire status data from the buckle detection device 6 and the hook detection device 7;

S3: summarize the status data and the detection data to generate summarized data;

S4: retrieve the summarized data via the host 2 and transmit the data to a predefined server;

S5: perform calculations on the server to derive calculation results;

S6: match the calculation results with corresponding voice prompt commands or alarm commands in a preset database;

S7: execute the voice prompt commands or alarm commands through the host 2.

In the embodiment, a 2.4ghz wireless transmission module is arranged in the data receiving device 812 of the detection component 3 and can achieve short-distance wireless transmission. The communication connections with the detection component 3 are respectively established for the buckle detection device 6 and the hook detection device 7 through 2.4ghz wireless transmission module. After the establishment is completed, the data receiving device 812 is capable of receiving the status data of the hook detection device 7 and the buckle detection device 6. Then, the status data and detection data are summarized to obtain the summarized data; as the first detection component 81 is in wired connection with the host 2, the summarized data are transmitted to the host 2 through the data cable after the status data and detection data are summarized; the host 2 communicates with the server through the first communication device 23 or the second communication device 24 and sends the summarized data to the server. After the server performs the calculation and obtains the calculation results. If the obtained status data of the buckle detection device 6 is “not fastened” and the status data of the hook detection device 7 is also “not fastened”, the calculation result is incorrect wearing. Then, based on the calculation result, the voice prompt commands or alarm commands are matched in the preset database and fed back to the host 2. Finally, the host 2 executes the voice prompt commands or alarm commands. In an embodiment, when the preset database indicates

incorrect wearing, an alarm is given for three seconds. After receiving the alarm command, the host 2 gives a three-second alarm. The alarm can be given in time to prevent the occurrence of safety accidents.

In an embodiment, the monitoring method of the intelligent safety harness comprises the following steps before obtaining the detection data through the detection component 3 and acquiring the status data of the buckle detection device 6 and the hook detection device 7:

- judge whether the buckle 5 is fastened through the preset buckle detection device 6;
- if yes, determine as correct wearing;
- if no, determine as incorrect wearing.

In the specific implementation, the detection component 3 is used to detect the working height of the operator and obtain detection data. Meanwhile, the buckle detection device 6 determines whether the buckle 5 is fastened or locked tightly. If the buckle 5 is fastened, determine as correct wearing. If the buckle 5 is not fastened, determine as incorrect wearing. Then send the results to the detection component 3.

It should be noted that the terms “comprise” and “consist of” herein or any other variations thereof are intended to cover non-exclusive inclusion, so that a process, device, article or method comprising a series of elements not only includes those elements but may also include other elements not explicitly listed or inherent to such process, device, article or method. Without further limitation, an element defined by the phrase “comprising a...” does not preclude the existence of additional identical elements in the process, device, article or method that includes such elements.

The above embodiments are merely preferred embodiments of the invention and do not limit the scope of the invention. Any equivalent structures or process transformations derived from the specification and drawings of the invention whether directly or indirectly applied in other related technical fields, shall similarly fall within the protection scope of the invention.

Claims

1. An intelligent safety harness, characterized by comprising a harness body, a detection component for measuring height, and a plurality of hooks and buckles;

the host and the detection component are respectively arranged on the harness body;

the host is electrically connected to the detection component and is used to collect the data of the detection component and transmit the data to a server;

the hooks and the buckles are respectively arranged on the harness body;

the buckle is provided with a buckle detection device for detecting the status of the buckle;

the hook is provided with a hook detection device;

the buckle detection device and the hook detection device are respectively in communication connection with the detection component;

the detection component comprises a first detection component and a second detection component; the first detection component and the second detection component are electrically connected to the host.

2. The intelligent safety harness according to claim 1, characterized in that the harness body comprises a first plane and a second plane, and the first plane and the second plane are arranged oppositely;

the first detection component is arranged on the first plane and is used to detect the working height of the first plane;

the second detection component is located in the second plane and is used to detect the working height of the second plane.

3. The intelligent safety harness according to claim 2, characterized in that the first detection component comprises a first shell, a data receiving device, an altitude measuring component, a temperature detector, a humidity detector, an operation area detector, a detection communication device, an angular velocity detection device and a plurality of first detectors;

the data receiving device, the altitude measuring component, the temperature detector, the humidity detector, the operation area detector, the detection communication device, the angular velocity detection device and the first detectors are respectively arranged in the first shell;

the detection communication device is electrically connected to the host; the data receiving device is in communication connection with the buckle detection device and the hook detection device.

4. The intelligent safety harness according to claim 1, characterized in that the second detection component comprises a second shell, a hook connection indicator light and a plurality of second detectors; the hook connection indicator light and the second detectors are respectively arranged on the second shell; the hook connection indicator light is in communication connection with the hook detection device.

5. The intelligent safety harness according to claim 2, characterized in that the harness body is provided with a cross part in the first plane, and the cross part is Y-shaped;

the first detection component is located at the cross part.

6. The intelligent safety harness according to claim 3, characterized in that the buckle comprises an upper buckle, a lower buckle and a plurality of leg buckles;

the upper buckle, the lower buckle and the leg buckles respectively comprise seat bodies and fasteners, and the seat bodies are engaged with or separated from the fasteners;

the upper buckle, the lower buckle and the leg buckles are respectively provided with buckle detection devices, and the buckle detection devices are respectively in communication connection with the data receiving device.

7. The intelligent safety harness according to claim 6, characterized in that the upper buckle, the lower buckle and a plurality of leg buckles are respectively provided with a first charging interface and a first power supply device for power supply, and the first power supply device is electrically connected to the buckle detection device.

8. The intelligent safety harness according to claim 1, characterized in that the host is detachably arranged on the harness body and is provided with a housing, an anti-dismantle device, a first communication device, a second communication device, a positioning device, a voice prompt device, an emergency button, a start button, a power supply component, a second charging interface and a plurality of indicator lights;

the anti-dismantle device, the first communication device, the second communication device, the positioning device, the voice prompt device and the power supply component are respectively arranged in the housing;

the start button, the second charging interface and the indicator lights are fixedly arranged on the housing;

the power supply component is electrically connected to the anti-dismantle device, the first communication device, the second communication device, the positioning device, the voice prompt device and the indicator lights;

the anti-dismantle device, the first communication device, the second communication device, the positioning device, the voice prompt device and the emergency button are respectively in communication connection with the server.

9. The intelligent safety harness according to claim 1, characterized in that the harness body is provided with a plurality of fixing rings, and the hooks are provided with latch hooks, which respectively pass through the fixing rings.

10. The intelligent safety harness according to claim 2, characterized in that the first plane and the second plane are respectively provided with adjustable buckles for adjusting the length of the harness body, and the harness body passes through the adjustable buckles respectively.

11. A monitoring method of an intelligent safety harness, characterized by comprising the following steps:

establish communication connection for the buckle detection device and the hook detection device with the detection component respectively;

obtain detection data through the detection component and acquire status data from the

buckle detection device and the hook detection device;

summarize the status data and the detection data to generate summarized data;

retrieve the summarized data via the host and transmit the data to a predefined server;

perform calculations on the server to derive calculation results;

match the calculation results with corresponding voice prompt commands or alarm commands in a preset database;

execute the voice prompt commands or alarm commands through the host.

12. The monitoring method of the intelligent safety harness according to claim 11, characterized by comprising the following steps before obtaining the detection data through the detection component and acquiring the status data of the buckle detection device and the hook detection device:

judge whether the buckle is fastened through the preset buckle detection device;

if yes, determine as correct wearing;

if no, determine as incorrect wearing.