QLanradar

# AI Care Sensor (TK2)

# Product Manual

FCC ID:2BD97TK2

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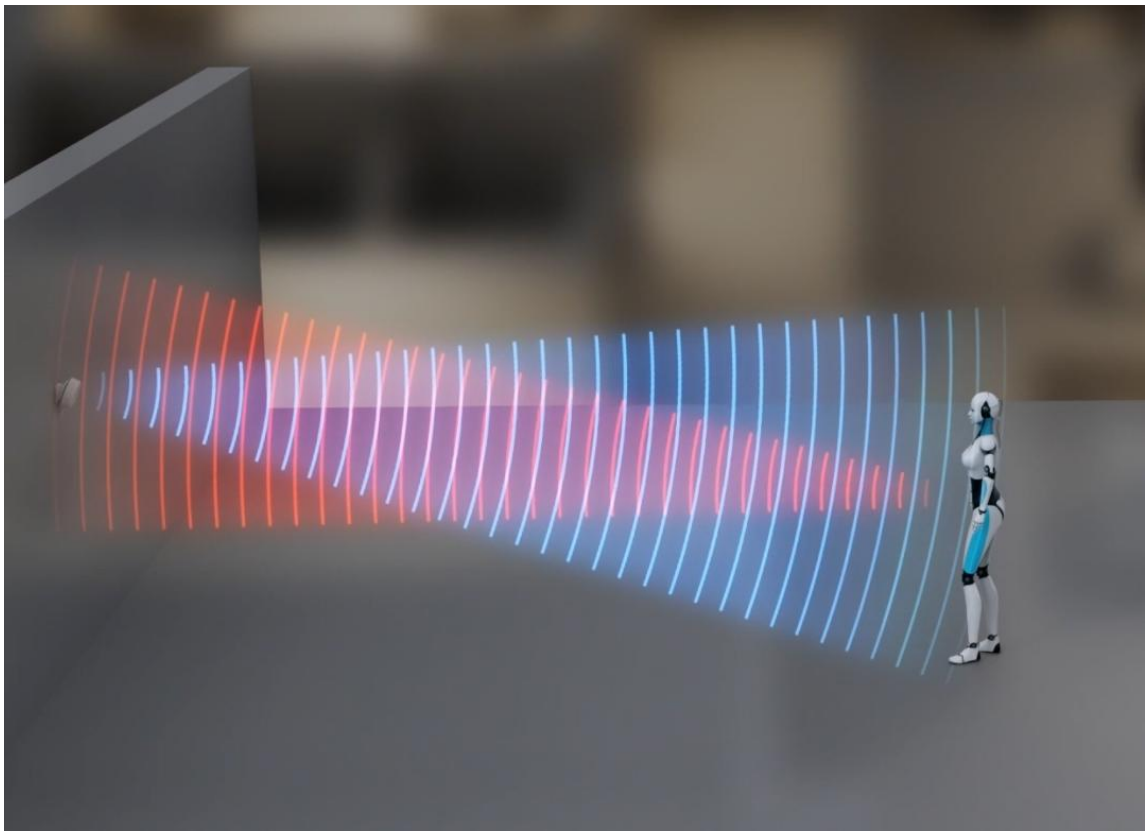
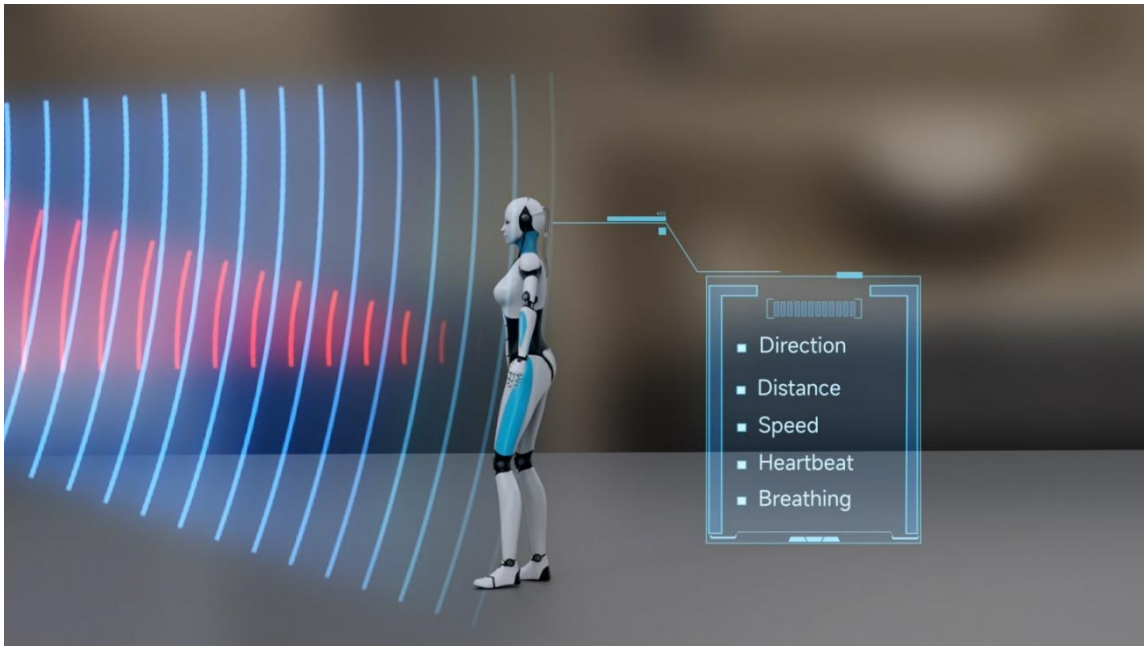
## I. Product Overview

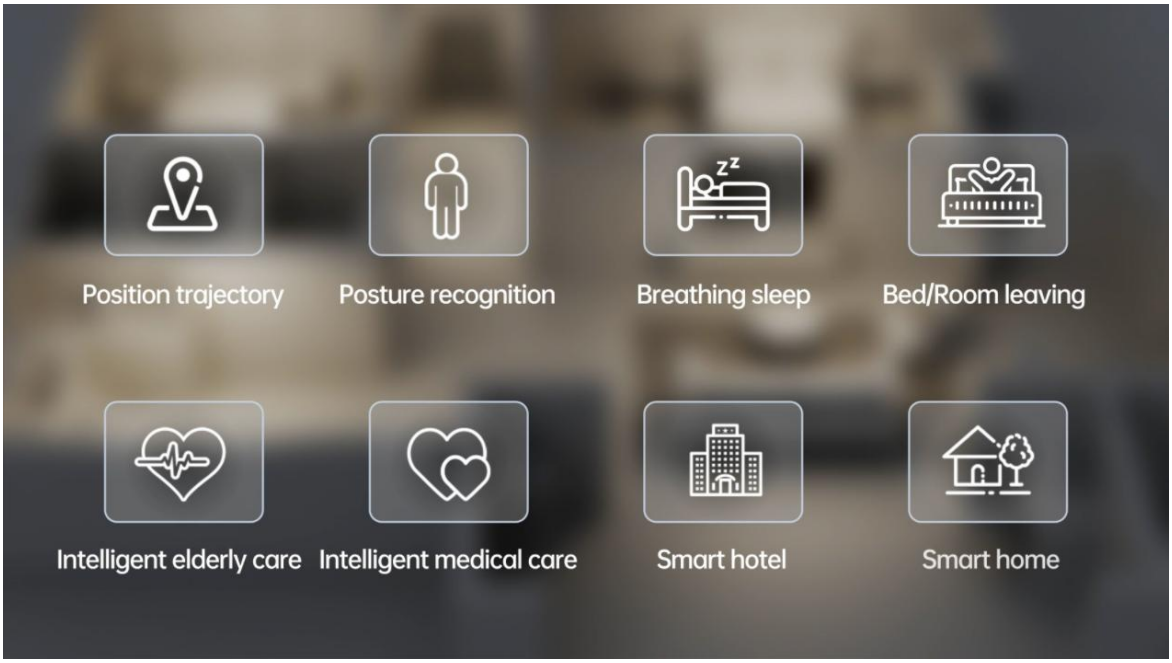
The Tsinglan Technology AI Care Sensor (TK2) is an innovative millimeter-wave radar detection product for indoor scenarios, meticulously crafted by Tsinglan Technology (Shenzhen) Co., Ltd. Within a diverse array of indoor environments, the TK2 millimeter-wave radar excels in providing precise detection of occupants (including their location, respiratory and heart rates, fall detection, and sleep quality assessment), ensuring stability, accuracy, safety, cost-efficiency, and respect for individual privacy.



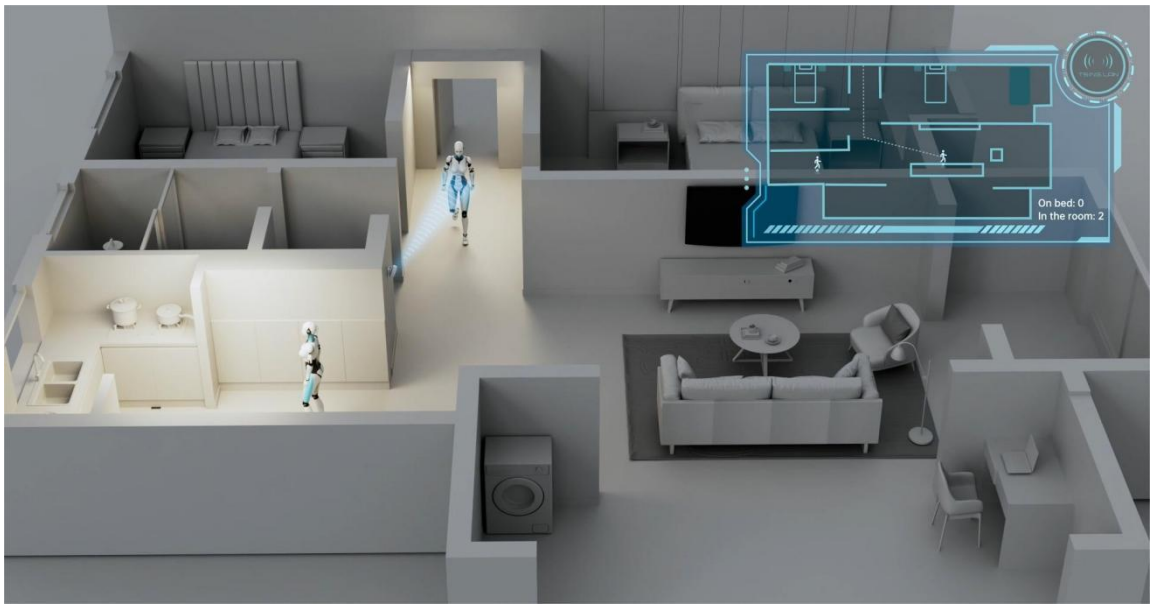


## II. Product Functionality

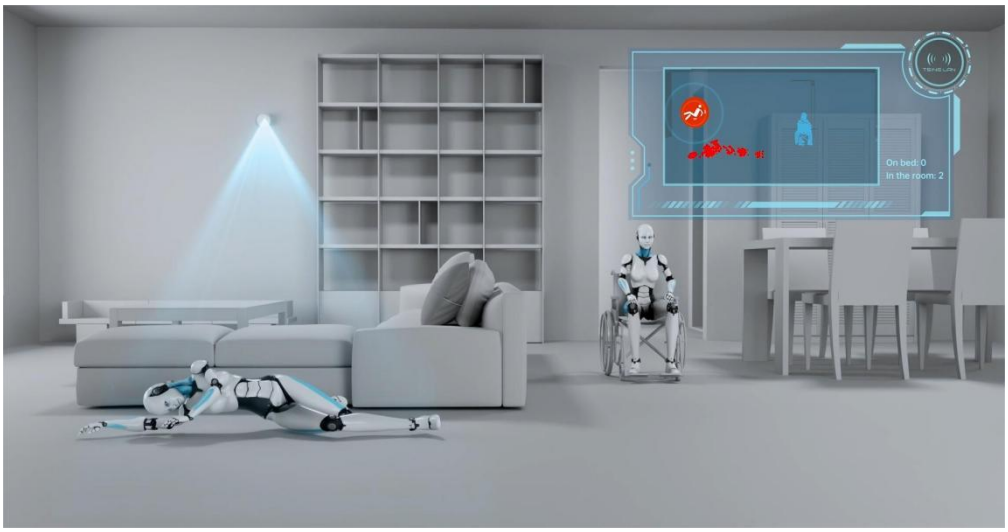
The AI Care Sensor (TK2) offers the following capabilities:

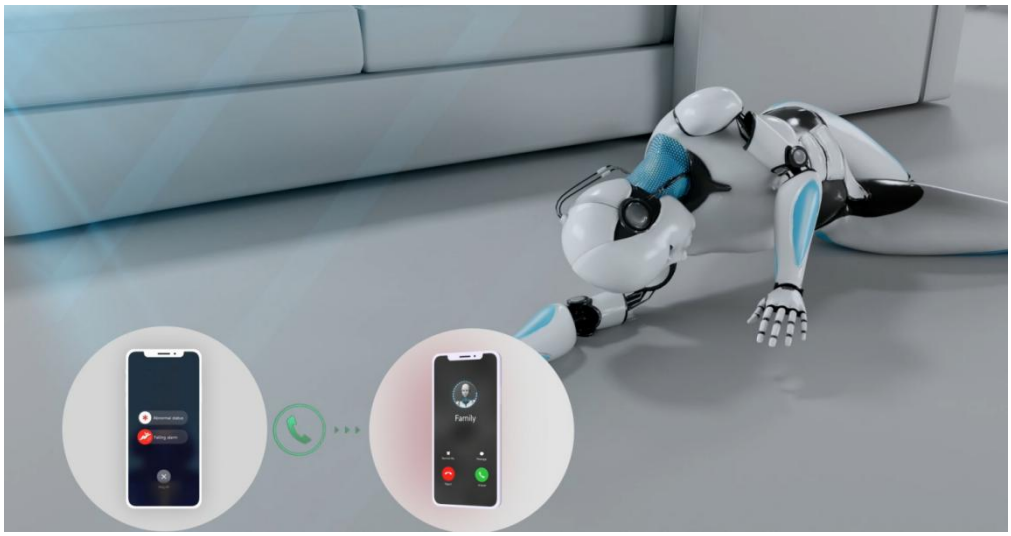



1. Position trajectory recognition: Real-time recording of human movement trajectories through radar and accurately identifies the number of people indoors, tracks and records the entry/exit and location coordinates of personnel in real-time and integrates with smart home devices to achieve functions such as automatic lighting and night lights following people.

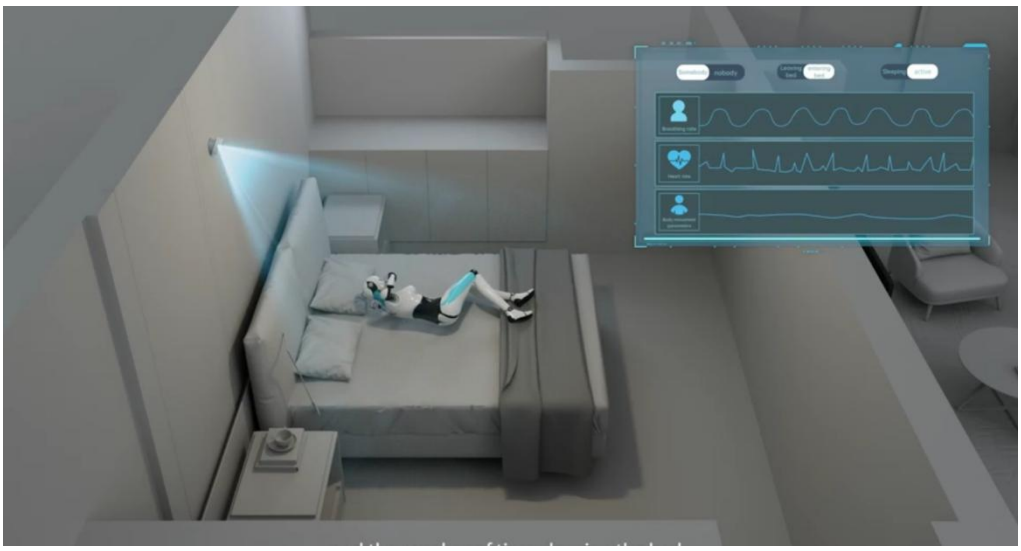


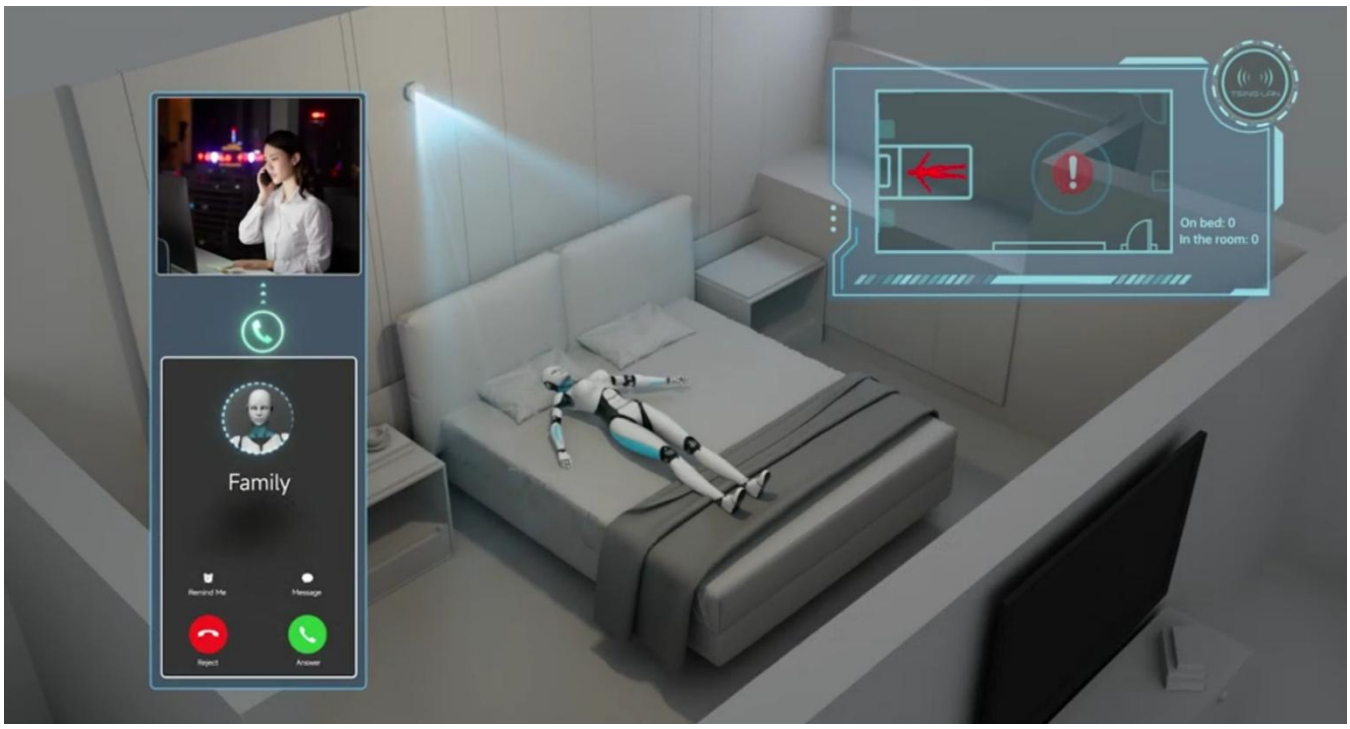

2. Posture recognition: Through point cloud imaging analysis technology,it can detect the falling posture of single or multiple and automatically send voice prompt alerts and make phone calls. Through two way voice communication. it allows caregivers to quickly understand the situation. Furthermore, the Tsinglan radar can also automatically alert through gesture recognition to ealizing automatic alarm.



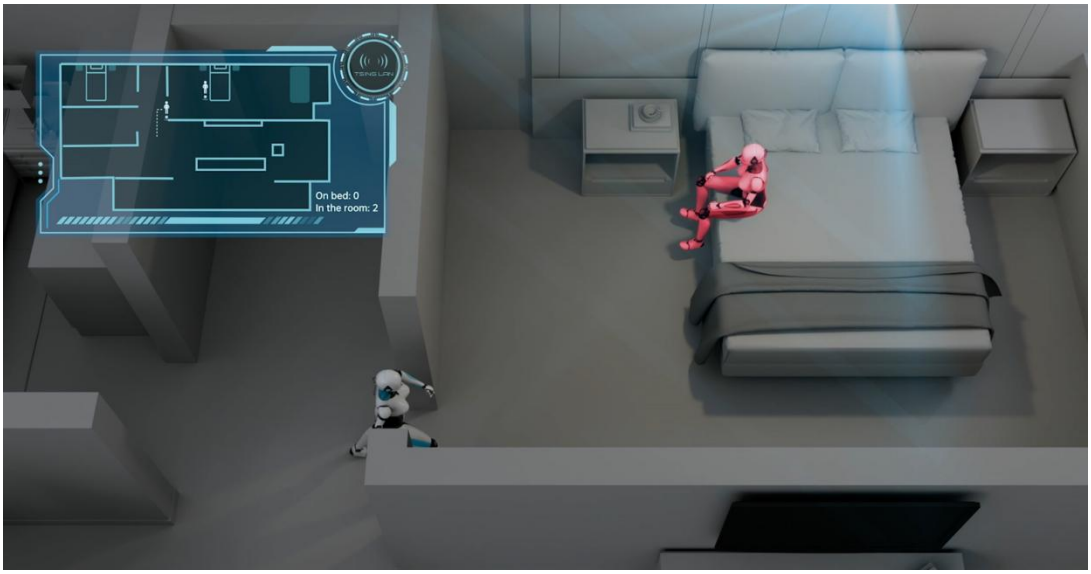



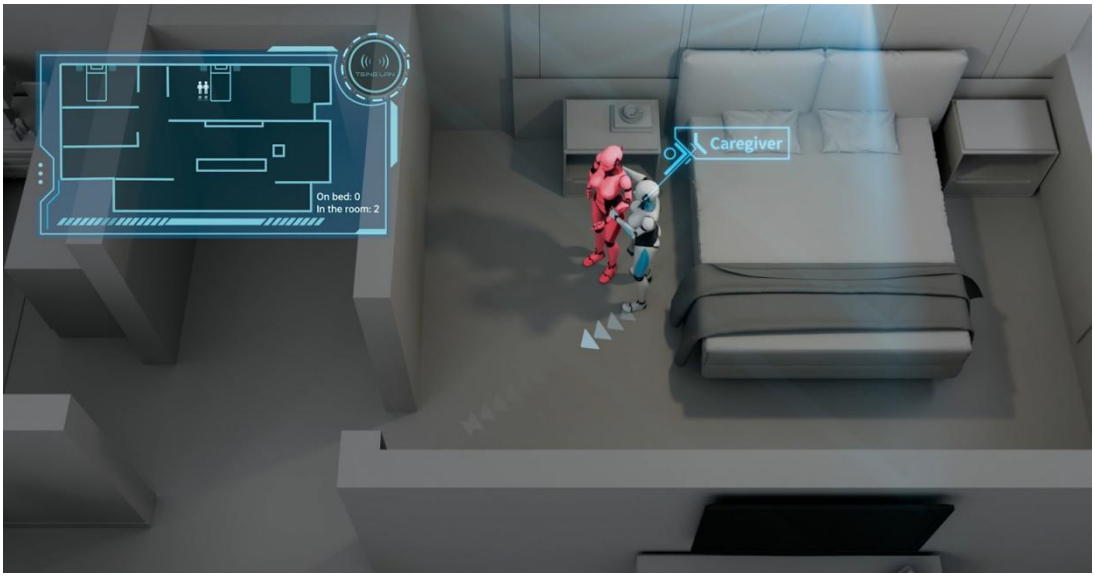

3. Breathing sleep monitoring: Through breathing and heart rate monitoring technology, it determines the respiratory and heart rate levels of individuals in bed while recording sleep time, turning over and the number of times leaving the bed. It determines deep sleep, light sleep and awake times, analyzes the quality of sleep and gives a score. And within the monitoring bed range, records abnormal breathing rates. If a person in bed has a breathing stoppage for more than 10 minutes, a voice prompt alert is given.

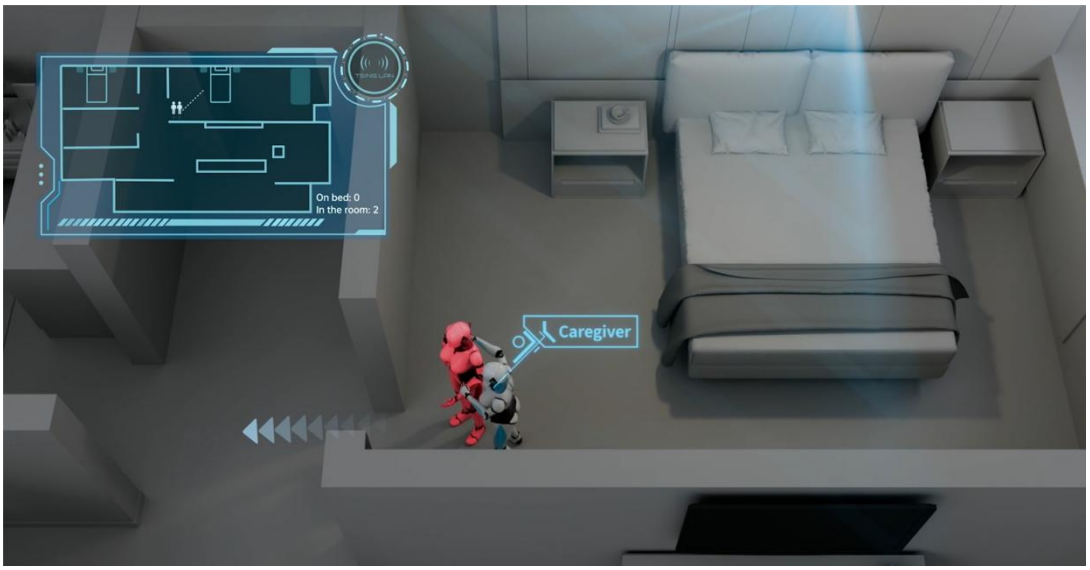




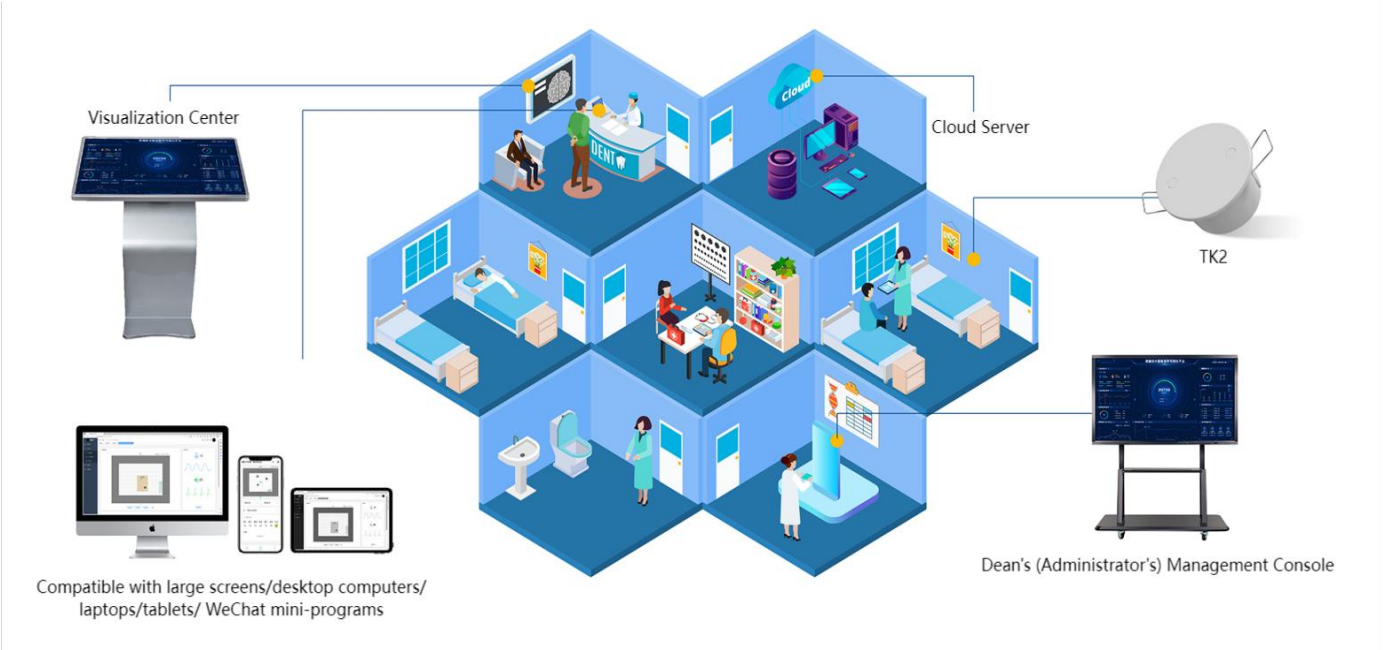

4. Bed / Room leaving monitoring: Through position tracking technology,Number of people detected: 0-3. It provides timely reminders of whether individuals in bed have left their beds and the status of leaving the room. It provides timely assistance and care for elderly individuals with dementia and disabled individuals.




## III. Device Networking Instructions




1. The networking of the device includes the device itself, a cloud-based server, a client WeChat mini-program (from now on referred to as "the mini-program"), and a web-based operational maintenance terminal (after this referred to as "the web portal").

2. Upon receiving signals, the device performs algorithmic computations and transmits the information to the cloud platform.

3. The cloud platform relays the information to the mini-program "Tsinglan Radar" and the web portal at "http://www.tsinglanst.com."

4. The mini-program offers functionalities such as device settings, device management, data management, and alarm information management.

5. The web portal provides additional features, including device settings, device management, data management, alarm information management, and enterprise user management.

Please note that the device requires the web portal and WeChat mini-program for full operational use.

## Ⅳ. Description of Application Scenarios

This product is primarily designed for deployment in hospitals, nursing homes, and home healthcare settings. It can be installed not only in areas where traditional cameras are found but also in spaces where privacy is of greater concern, such as washrooms, bedrooms, and bathrooms.

Application Context of the Product

Capabilities of a Single TK2 Device Within a Maximum Detection Area of 24 ㎡

The TK2 device can only activate its functions within the designated detection zone. These functions include:

**1. Fall Detection**

In the detection area, if a patient or elderly person falls and does not get up for more than 30 seconds (this duration can be set as needed), an alert will be sent to the management personnel through automatic phone calls and alarm voice messages via a web interface. This ensures timely discovery and handling of fall incidents, thereby reducing the liability and losses caused by falls.

**2. Presence Detection**

The system verifies whether a patient or older adult is in the room and pinpoints their exact location. This reduces the frequency of room checks by caregivers, particularly at night, thereby minimizing disturbances.

**3. Respiration/Heart Rate Monitoring**

Within the vicinity of a monitored bed, the device can remotely display the patient's or elder's respiration and heart rate (measured in beats/breaths per minute). In case of abnormal rates or pauses in breathing or heartbeats, caregivers are promptly alerted, avoiding the inconvenience and skin damage associated with long-term connected monitoring devices.

**4. Bed Entry/Exit Detection**

If a patient or elderly person leaves the bed area, the system can identify this within 1-3 seconds and provide alerts via a web interface or phone calls (which require back-end setup). This reduces the risks associated with patients or elderly people leaving the bed without authorization and clearly delineates responsibilities.

**5. Room Entry/Exit Detection**

If a patient or senior exits the room, the system can recognize it within 5-120 seconds and provide prompts on the web portal, minimizing risks related to unsupervised room departures.

**6. Sleep Quality Monitoring**

The device monitors the sleep patterns of patients or the elderly in the care bed area from 8:00 PM to 8:00 AM the following day. A sleep quality report for the individual is generated at 8:00 AM, summarizing the previous night's data.

**7. Large Screen Display**

The large-screen dashboard provides a comprehensive display of data, including the number of devices, distribution of elder data, fall data distribution, chronic respiratory management distribution, number/frequency of apnoea episodes, sleep quality distribution, alarm occurrences, focal points for fall risk attention, and comprehensive risk concerns.

The display on an individual device interface includes personal information, location, notes of caution, sleep details, respiratory status, heart rate, night-time bed exits, fall history, and health trend analysis.

## V: TK2 Specification Parameters

| **Hardware and Environmental Parameters** | **Specification Values** |
|---|---|
| Dimensions | Diameter x Height – 80 x 52 mm (cylindrical, embedded diameter of 66 mm) |
| Total Weight | 135g |
| Operating Temperature | -10℃ - 45℃ |
| Storage Temperature | -20℃ - 85℃ |
| Operating Humidity | 5% - 95% |
| Storage Humidity | 5% - 95% |
| Installation | Ceiling-embedded installation |
| Protection Rating | IP54 (after embedding) |
| Power Supply | AC100-240V~50/60Hz |
| Power Consumption | ≤ 3.0W |
| Communication Interface | 2.4GHz Wi-Fi |
| **Radar Specifications** | **Specification Values** |
| Operating Frequency | 60.5 ~ 62.5GHz |
| Pitch Angle | 120° |
| Horizontal Angle | 140° |
| Bandwidth | 2GHz |
| Modulation | Frequency Modulated Continuous Wave (FMCW) |
| Transmission Power | 11dBm |
| Antenna Configuration | 4T4R |
| **Fall Detection Parameters** | **Specification Values** |
| Multiple-Person Fall Detection | Support falls for 0-3 people. |
| Detection Area | Ceiling-mounted: 2 meters on each short side, 3 meters on each long side |
| Alarm Methods | Voice prompts via WeChat Mini Program, web portal voice broadcast, and telephone notification. |
| **Respiration and Heart Rate Parameters** | **Specification Values** |
| Person Limit | Accurate detection for only one person within the care bed area<br>In multiple-person scenarios, the numerical output is available, but |

| | |
|---|---|
| | accuracy diminishes, and events are not reported |
| Detection Area | Area of 2 x 2 meters directly below the radar |
| Detection Distance | Less than 3.5 meters from the radar to the person |
| Respiration and Heart Rate | Supports single-person detection of respiration and heart rate, alerts for too high/low/paused breathing or heart rate |
| Sleep Report | Includes the number of times out of bed at night, light and deep sleep analysis, apnoea analysis, etc. |
| **Location Tracking Parameters** | **Specification Values** |
| Person Limit | Supports 0-3 people |
| Detection Area | Ceiling-mounted: 2 meters on each short side, 3 meters on each long side |
| Location Detection | Supports indoor location tracking with accuracy within a 50 cm deviation |
| Bed Entry/Exit Detection | Notifications for bed entry/exit within 1-3 seconds support long-duration absence from bed telephone alerts. |
| Room Entry/Exit Detection | Notifications for room entry/exit within 5-120 seconds |

# Function Detailed Explanation

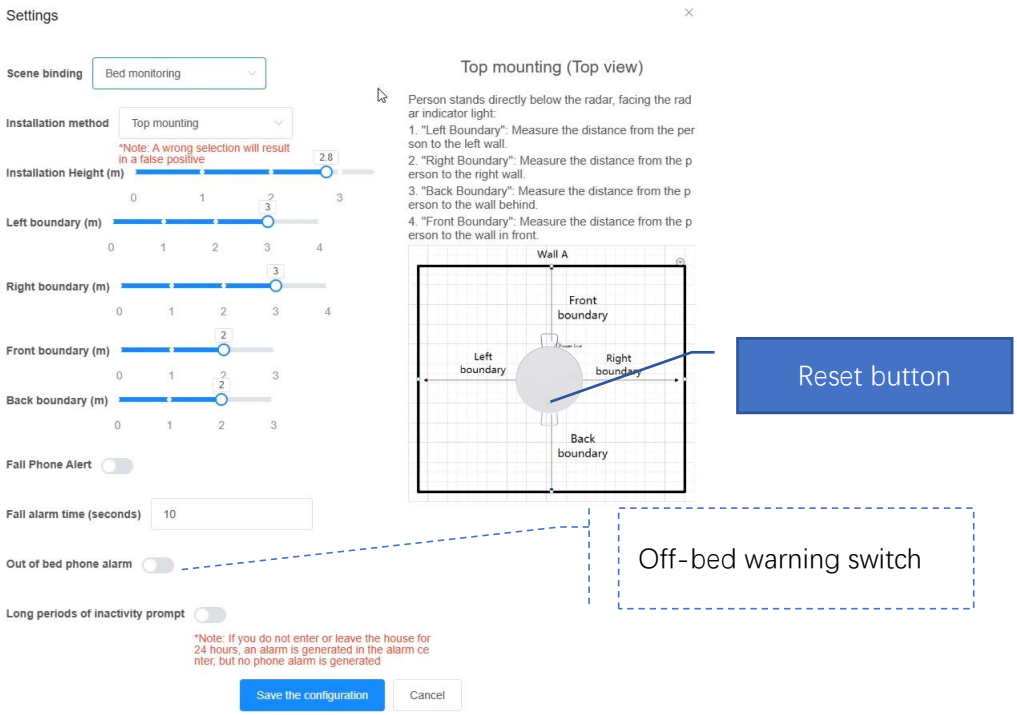
## 1. Position detection/alerts for entering and leaving beds and rooms

When installed correctly, it can be detected under a good network environment and within the detection range:

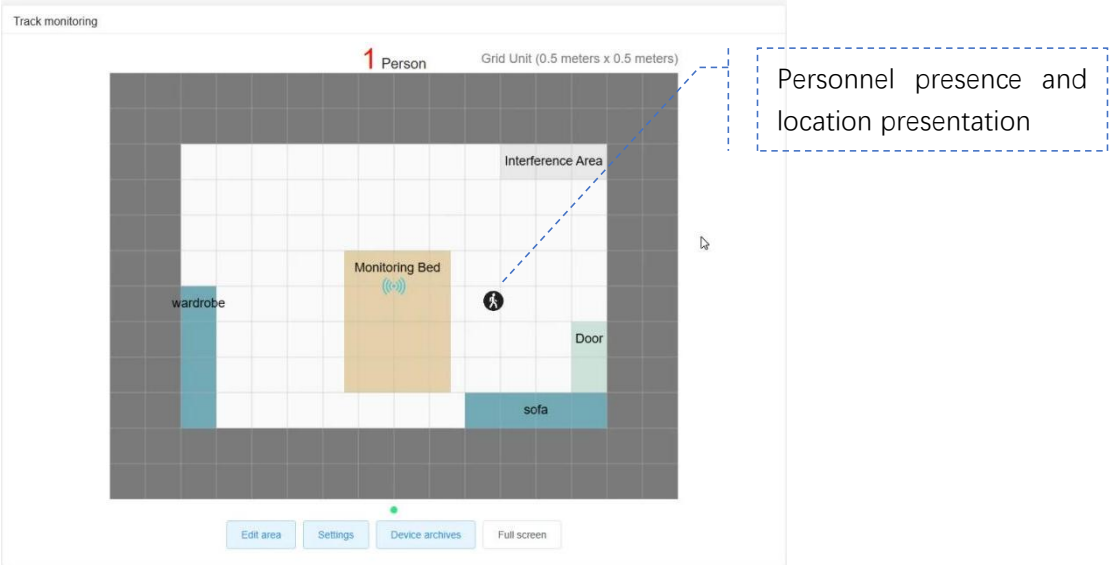
① Accurately detect the presence of a human body and display it on the web page and the applet;

② Identify the relative position of the person and display it on the web page and the applet;

③ After the bed area is defined, when the person enters/leaves the bed, the event of leaving/leaving the bed for too long can be recorded on the applet and web page, and through the background settings, the phone can be actively dialed to the mobile phone of the administrator as a reminder;




④ Once the door range is delineated, if a person enters/leaves the detection area, the departure event can be recorded on the applet and web side.




☞ Attention! When defining the area, it is essential to be as accurate as possible. If the demarcated area exceeds the actual room size, it may lead to the detection of false targets; if the defined area is smaller than the actual room size, detection will not be possible in the non-designated areas.

☞ Attention! This product supports an installation height of 2-3 meters. Installing it too high or too low will result in inaccurate person detection.

☞ Attention! This product should not be installed on sidewalls.

☞ Attention! There may be a deviation of up to 50cm in a person's relative position.

☞ Attention! When the radar's line of sight is blocked by sofas, beds, cabinets, walls, thick glass, or thick wood panels, the obstructed area will not be able to detect human presence.

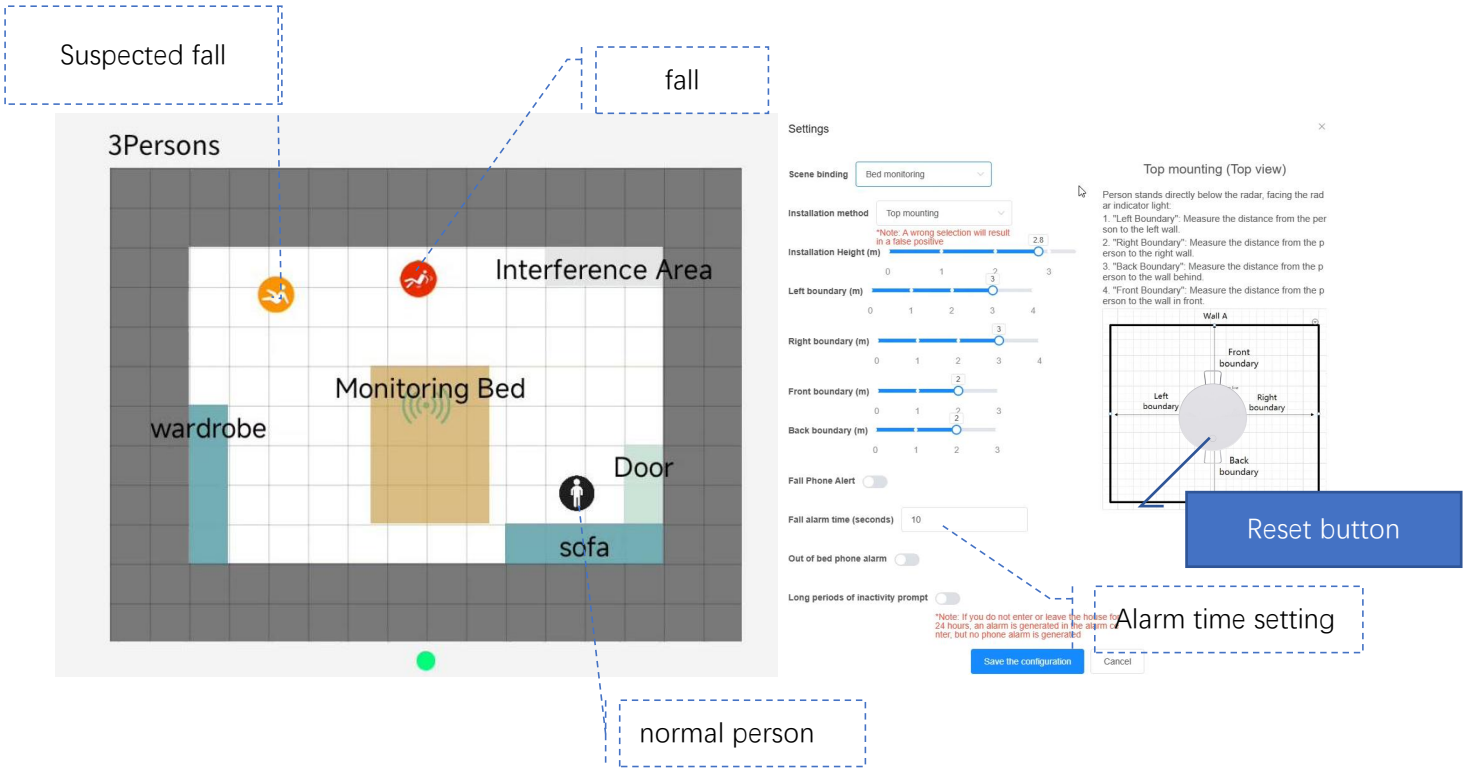
☞ Attention! When multiple people simultaneously enter or exit a door or bed, event reporting may be inaccurate."

1. Fall detection

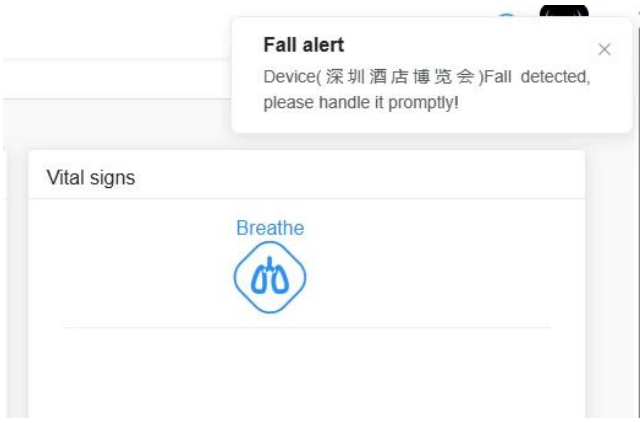
When installed correctly, it can be detected under a good network environment and within the detection range:

① When 1-3 people are present simultaneously, someone falls.

② When someone falls, it will be recognized as a "suspected fall" within 1-5 seconds and "fall" after 30 seconds (a longer time can be set according to the need) after "suspected fall."




③ After being recognized as a fall, it will continue to announce "device name + someone has fallen, please deal with it quickly" on the web side and record it in the alarm center. The alarm will continue until the administrator finishes handling the alarm on the website/applet.




④ Identified as a fall, it will continue to issue a "beep-beep-beep" sound for 5-15 seconds in the applet. If you set up a telephone alarm, it will automatically dial the bound person's phone. It will prompt: "Alarm notification, your device + device name + monitoring anomalies after connecting, please deal with it as quickly as possible!"

☞ Attention! When setting the radar detection area, if the demarcated area extends beyond the wall by more than 50cm, false alarms may occur; if the demarcated area is smaller than the actual room size, falls cannot be detected in the non-designated areas.

☞ Attention! This product supports a ceiling height of 2-3 meters when installed on the ceiling. Installing it too high or too low will result in inaccurate fall measurements.

☞ Attention! This product does not support side mounting.

☞ **Attention! If the set height of the radar in the back-end differs by 5cm or more from the actual**

**installation height, it will lead to serious false alarms or missed detection! Precise measurement with a distance or tape measure is required when setting the height.**

☞ Attention! Fall events cannot be triggered if an area is defined as a door.

☞ Attention! If a person sits or lies half-down on the ground after falling, it may not be judged as a fall.

☞ Attention! Bunk beds may cause limitations in radar detection near the bed, leading to false triggering of fall events.

☞ Attention! When the radar is installed on the ceiling, if the installation location is ≤50cm away from the wall, or if the tilt angle is greater than 3° (shown at the bottom of the 'Device Monitoring' page on the web interface and the 'Function Properties' page on the mini-program), it may produce more false alarms or missed detection! The radar installation location should be by the recommended positions in the 'Installation Manual.'

☞ Attention! In the detection area, behaviors such as doing push-ups or yoga on the floor, children playing on the ground, or someone squatting and moving water in a basin may be considered falls.

☞ Attention! When the radar's line of sight is blocked by sofas, beds, cabinets, walls, thick glass, or wooden boards, the obstructed area may not be considered a fall.

☞ Attention! The movement of curtains in the wind has a small probability of being judged as a fall.

☞ Attention! Pets jumping from high places or walking past people have a small probability of being judged as a fall.

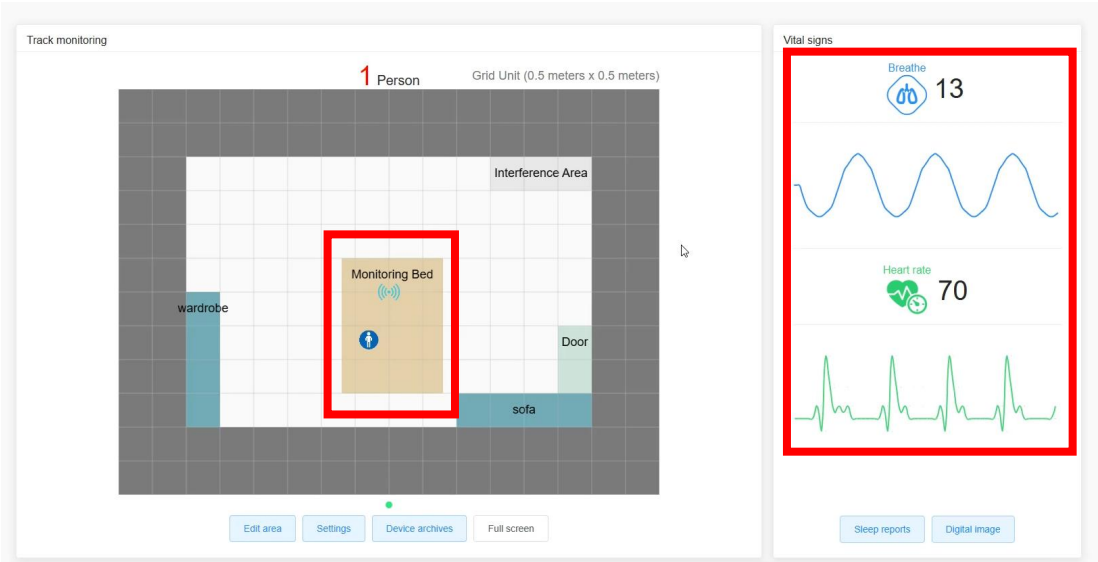
☞ Attention! Flowing or moving water on the ground has a small probability of being judged as a fall.

☞ Attention! When other people or sources of interference (such as oscillating fans, swinging plants, other people, large pets) are within 1.5 meters of a fall, it may not be judged as a fall."

## 2. Respiration/heart-rate/sleep quality detection

When correctly installed, it can be detected within the range of the monitoring bed:

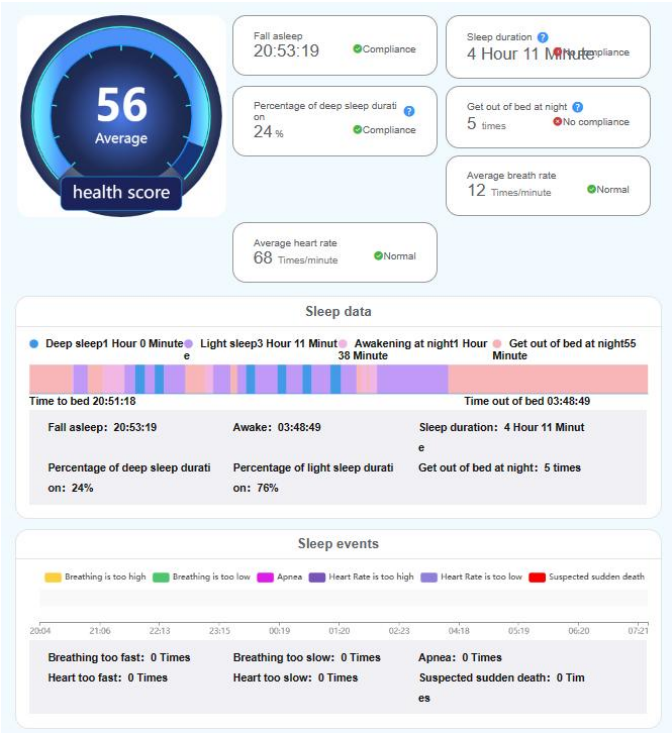
① real-time values of respiration and heart rate (beats/minute) and display them on the web terminal and applet.




②Whether it exceeds or falls below the threshold (respiratory threshold is eight beats/24 beats, heartbeat threshold is 50 beats/90 beats). If the test data exceeds the threshold, it will be recorded on the website and the applet.

Red indicates a high/low threshold, and blue/green is normal.

③Sleep Quality: By collecting information on breathing, heartbeat, and being out of bed from 8 pm to 8 am, a sleep quality report is generated at 8 am the next day. The report includes sleep score, sleep efficiency, duration of sleep, time and proportion of deep sleep, time and proportion of light sleep, number of times out of bed, number of apnoea, number and time of over/under respiration, number and time of over/under heartbeat.



④ Digital Portrait: Horizontally compares the trends of various body metrics within a month and provides a simple assessment. The more data available, the more accurate the digital portrait becomes.

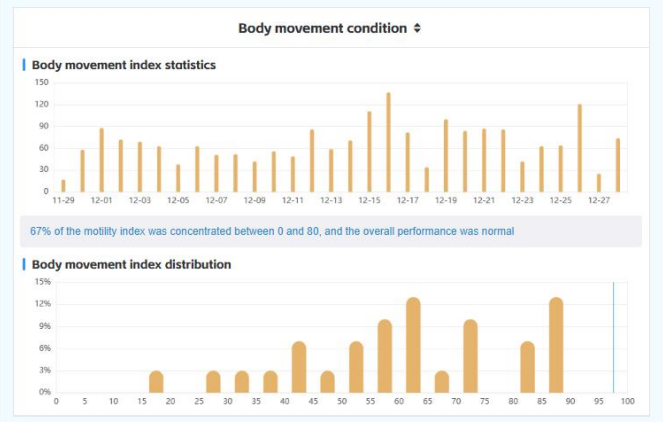
Vital signs
Breathe
13
Heart rate
70
Sleep reports
Digital image
Data Profiling

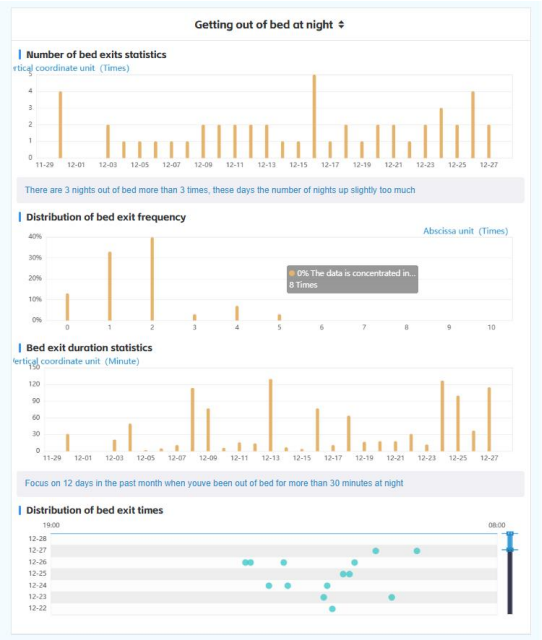
Sleep condition
Sleep duration statistics
Sleep duration is somewhat erratic overall, but it's not something to worry about too much
Sleep duration distribution
Abscissa unit (Hour)
0% The data is concentrated in...
7 Hour 50 Minute
90% of sleep time is concentrated outside of 6-9 hours, too long or too short sleep time is not conducive to physical and mental health
Sleep efficiency statistics
Sleep efficiency is a little erratic overall, but it's not a big deal, okay

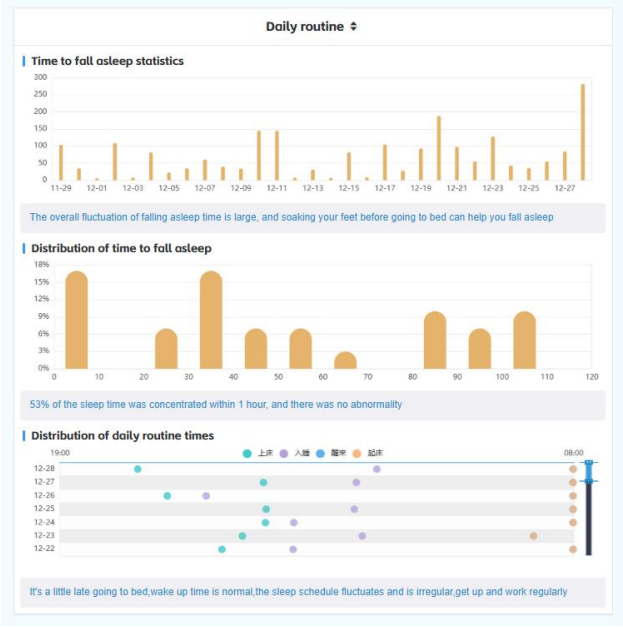
Sleep efficiency distribution
Vertical coordinate unit (%)
Abscissa unit (%)
The sleep efficiency is concentrated between 60% and 100%, and the overall performance is normal
Deep sleep percentage statistics
The proportion of deep sleep is somewhat erratic overall, but not a problem
Deep sleep percentage distribution
Vertical coordinate unit (%)
Abscissa unit (%)
57% of deep sleep is concentrated in less than 20%, your deep sleep is less, sleep is not too stable

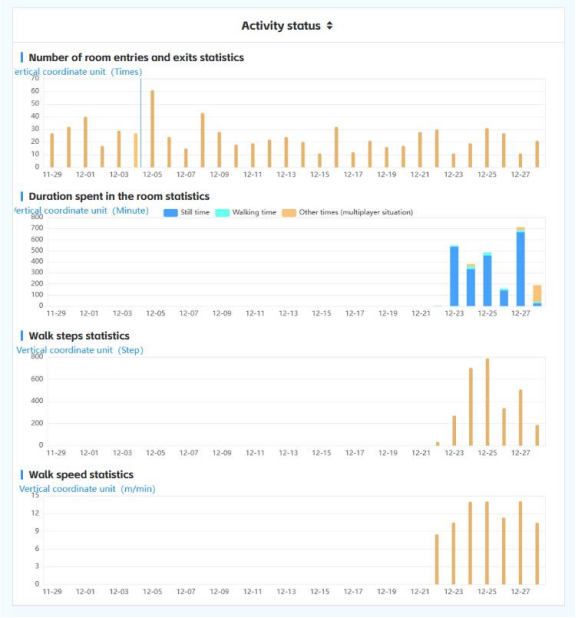
Breathing rate condition
AHI (Apnea-Hypopnea Index) index statistics
AHI (Apnea-Hypopnea Index) index distribution
0% The data is concentrated in...
5-10
There was no anomaly in the AHI index over the past month
Breath rate distribution
Abscissa unit (Times/minute)
96% of the respiratory rate is concentrated between 12 and 23, with no abnormalities

Heart rate condition
Heart rate anomaly statistics
Vertical coordinate unit (Times)
No abnormal heart rate in the past month
Heart rate distribution
Abscissa unit (Times/minute)
100% of heart rates were concentrated between 60 and 75, with no abnormalities



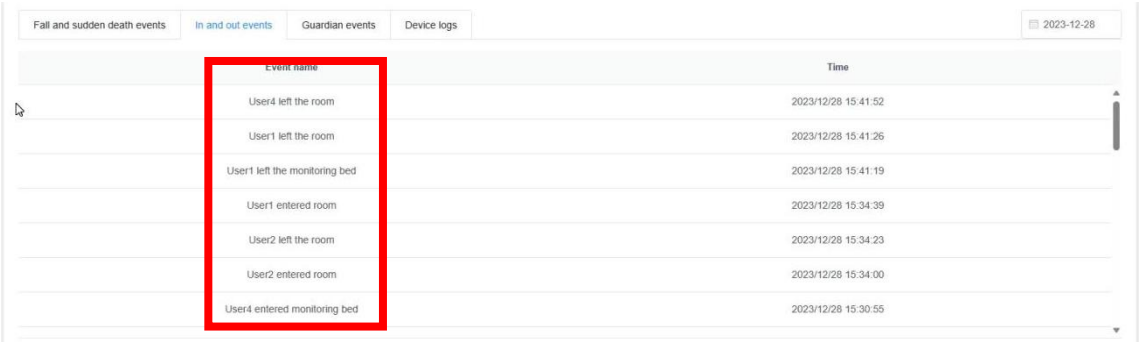




⑤ Apnoea: If breathing stops for more than 20 seconds, it will be detected as "apnoea," the related events will be recorded on the websites and applet.

⑥ Leaving the bed: within the range of 8 pm to 8 am, if the person has left the bed, the number and time of leaving the bed will be recorded.



☞ Attention! When more than one person is in the detection range, or if there are other sources of interference (such as large pets, running fans, flowing water), the accuracy of breathing and heart rate detection may be compromised. The sleep report may show issues such as abnormally high or low breathing, heart rates, or inaccurate apnoea detection.

☞ Attention! Suppose a continuously running fan is present within the care bed area. In that case, it may lead to the failure of sleep detection, and the sleep report may show issues such as abnormally high or low breathing and heart rates or inaccurate detection of apnoea.

☞ Attention! Changes such as a fan stopping or curtains ceasing to sway may trigger false 'weak vital signs' alarms.

☞ Attention! The assessment results from the digital portrait should not be taken as medical conclusions.

☞ Attention! Individuals must sleep on the care bed, and the duration should be between 8 pm and 8 am, with over 3 hours spent on the bed, to generate a sleep report; sleeping on a regular bed will not produce a sleep report.

☞ Attention! This product supports a ceiling height of 2-3 meters when installed on the ceiling. Installing it too high or too low will result in inaccurate breathing and heart rate detection.

☞ Attention! This product does not support side mounting.

☞ Attention! The accuracy of breathing and heart rate detection varies from person to person.

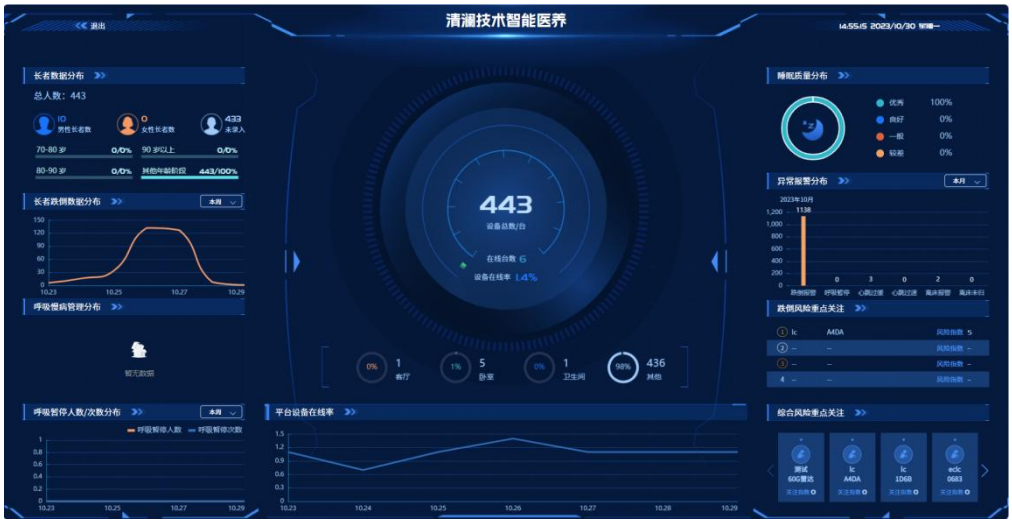
☞ Attention! It is normal for a person to experience a small amount of apnoea or have high/low breathing rates during sleep.

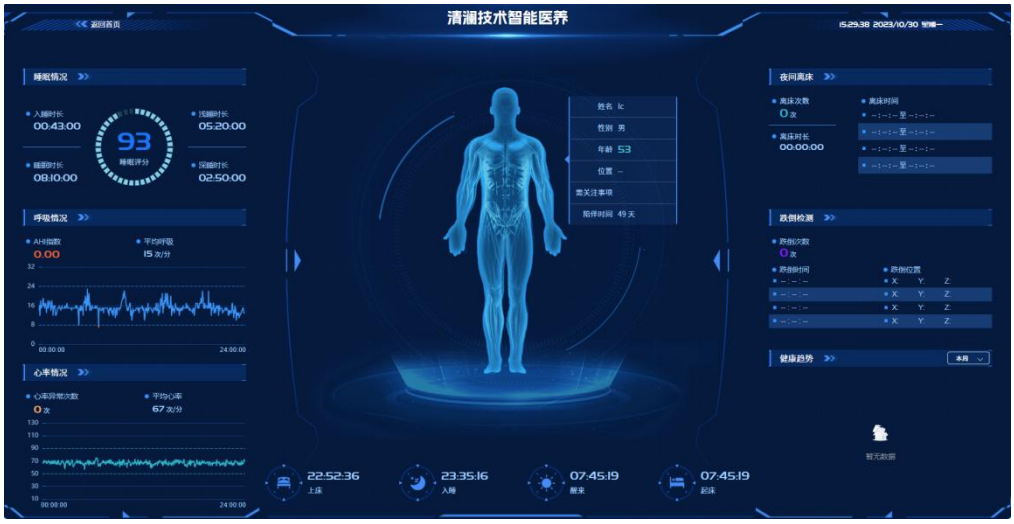
☞ Attention! Failure to install the product according to the 'Installation and Usage Instructions' may lead to inaccurate measurements.

☞ Attention! Accurate measurements can only be taken when a person is lying on the bed. Sitting or standing positions will result in inaccurate measurements.

4、Large Screen Display

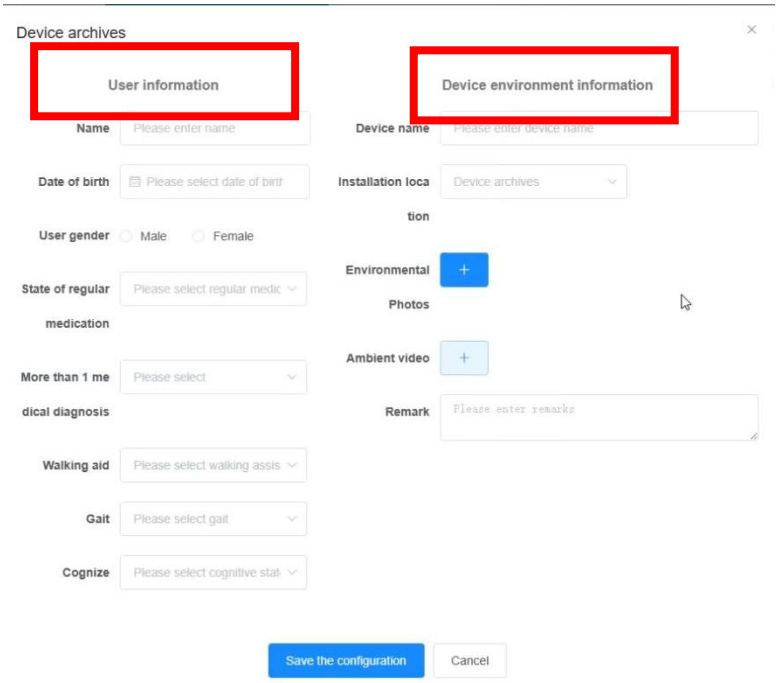
Click on the large screen in the back-end interface to access.






☞ Attention! Sleep status, breathing status, heart rate status, and other such data are shown for the previous day and are not in real-time.

☞ Attention! Personal basic information must be manually entered in the device profile section.



### VI: Product Packaging and Exterior Description

The product's packaging box contains one TK2 millimeter-wave device and one wiring terminal, as illustrated below:

## VII: Product Certification Standards Explanation

| | |
|---|---|
| The TK2 upholds certification standards that adhere to rigorous quality and safety criteria. | FCC |

## VIII: Limitation of Liability

This product is not designed as a medical device or for law enforcement use; it is intended as a health-assistive electronic consumer good. Therefore, the company is not responsible for any medical incidents arising from its use. The following statements are to be noted:

1. This device employs advanced millimeter-wave radar technology combined with AI algorithms for detection, offering superior accuracy. However, the detection results can be affected by external factors, which may reduce accuracy. While the company is committed to continuous improvement and technological innovation to enhance product performance, it assumes no financial, administrative, or other forms of liability.

2. Factors affecting the detection results of this device as a screening tool include, but are not limited to, the installation location, obstructions, interference, whether the user is within the coverage area, device settings, network signal stability, and the natural aging of electronic components. The company bears no responsibility for any economic, administrative, or other liabilities resulting from false positives or failures to alert promptly.

## IX: Warranty Policy

We firmly believe that high quality, systematic, comprehensive, and timely services are the foundation for business development. Through years of continuous exploration and ambition, we have established a customer-centric service philosophy, with quality as the lifeblood of our company. Aiming to create a leading service company domestically, we've adopted a quality policy emphasizing standardized management systems, stringent process control, guaranteed product quality, and customer satisfaction. Upholding the principle of "customer first," we have established an excellent sales service system to provide our customers with superior pre-sale, in-sale, and after-sale services:

1. We will provide relevant technical training and documentation per customer requirements.

2. There is a one-year free warranty period. During this year, it will be replaced if the equipment suffers non-man-made damage (such as dropping, vigorous shaking, moisture exposure, and extreme temperatures). After one year, maintenance costs will be charged based on the equipment's condition unless otherwise stipulated by the contract.

3. We guarantee phone guidance within 24 hours for you to troubleshoot simple equipment issues on your own.

4. Complimentary software upgrades are included.