

方案

海康威视养老雷达解决方案 守护老人

安全，提升养老院运营效率



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养老行业介绍

全球老龄化时代开启

据官方统计，截至 2021 年末全球超过 65 岁人口已突破 7 亿，约占总人口比例 9%。其中，发达国家地区老龄化形势更为严重。以日本为例，老龄化比例已经达到了 29%，欧洲达到了 20.3%。也就是说，约四个人中就有一个老人，并且老龄化将持续加剧，预计到 2050 年会再翻一倍。

养老院入住排队，护工严重短缺

老龄化带来的直接影响是养老院的建设速度无法满足老龄人口的快速增长。一家养老院的筹备和建设需要的周期很久，尤其是环境条件较好的机构，床位是严重紧缺的，老人甚至需要排队到 2-3 年后才能入住。同时养老院的护工短缺也是一个很大问题。因为护工的处境相对较差，他们通常工作时间长，且强度大，但收入却很低。此外，护工还面临专业性要求高，人员流动性大的问题。在英国，长期护理工作者的岗位空缺达到了 10.5 万人，8.2%的空缺率甚至高于英国平均岗位空缺的两倍。

养老院数字化发展

当前传统的养老院已经无法满足市场需求，在保障老人基本的生命安全情况下，养老院需要更多地关注老人的精神需求。养老院的多样化建设也随之发展，诸如图书馆、电影院、老年大学、活动中心等也成为养老机构的下一目标。

因此，养老院的数字化升级显得格外重要，智能化设备的接入能够极大提升组织的管理和运行效率。如跌倒监测、心率监测等设备能够提供老人更全面的健康监管；人员定位、行为分析可以给予老人更多活动空间和自由度的保障。

方案概述

围绕老人健康管理，我们提供两款雷达产品，在室内场景下守护和监测老人的健康：跌倒检测雷达和辅助护理雷达。



1. 跌倒监测雷达

老年人随着年龄增大，各项生理机能退化严重，很容易发生跌倒等意外事故。跌倒是 65 岁以上老年人伤害死亡的首因。即使在养老院，每年也会有大约 30% 的老人会摔倒。其中，有超过一半的严重事故是因为跌倒后没有被及时发现和处理而造成的。**跌倒监测雷达用于检测老人在室内场景下发生跌倒事故，并发出报警到护士站，缩短救援时间。**

1) 隐私保护

在室内场景，卧室和浴室是老人活动的主要区域。其中，不平整的地面、打滑的地板、潮湿的浴室都容易发生跌倒。此外，尖锐的床角和桌角也很难避免磕碰。这些跌倒对老年人而言，都是非常致命的。针对此类私密空间，传统的视频监控无法满足此类场景。海康跌倒检测雷达方案，采用毫米波雷达云点阵成像技术，捕捉老人跌倒所产生的高度差，结合姿势识别，可有效保障用户隐私，提供高准确率的跌倒判断，为用户带来更加人性化的服务。



2) 非接触式

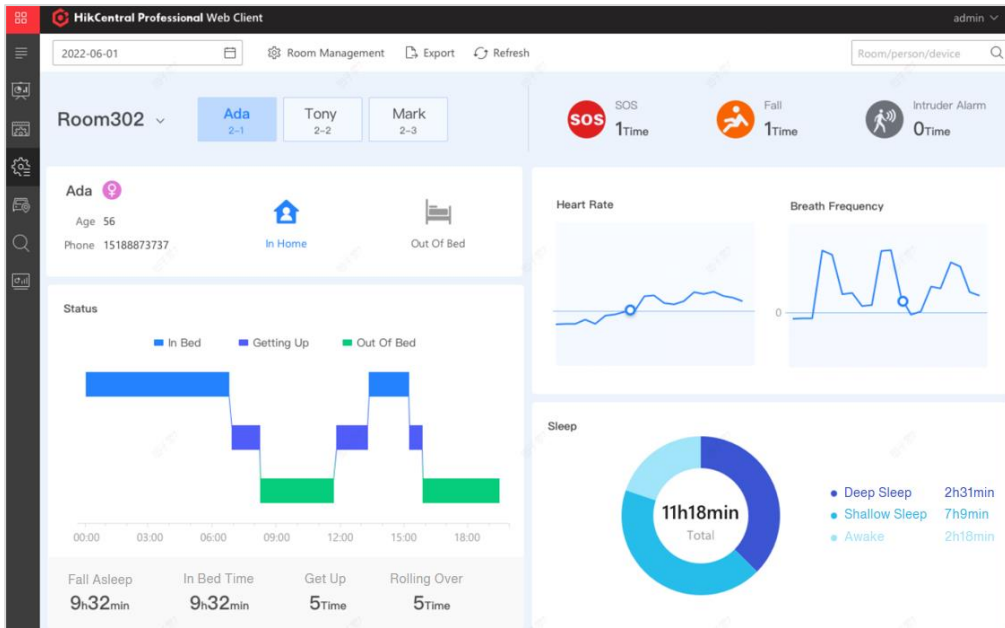
老人在发生严重跌倒的情况下，通常无法主动呼叫或求助。雷达可主动发现并识别人员变化，判断为跌倒后会发送报警到护士中心，极大地缩短了事故发生到发现的时间，避免因延迟救援而造成的二次伤害。

3) 数据支持与第三方平台对接

HCP 平台可以统一管理雷达设备，同时第三方平台支持通过 OpenAPI 获取跌倒报警数据。

辅助护理雷达

养老院作为老人长期生活居住的场所，需要提供 24 小时全天候的护理和监管，即使在夜间休息期间，老人的突发状况也不间断。仅靠人工巡视和看护的方式不仅耗费大量的人工成本，效率也较低。**基于此类问题，智能化的辅助护理设备可在一定程度上替代护工，提供有效的安全监管。**



1) 在床体征&体动监测

老人在床期间，雷达可以监测心率、呼吸频率，并且记录翻身、起身等体动数据，这些数据都会直观地显示在平台端。长期的身体指标数据可用于辅助判断老人的健康状况。

2) 睡眠监测

护理雷达通过自有算法分析并记录老人的睡眠质量（深睡、浅睡、清醒），养老院可查看异常睡眠报告，实现精细化看护。

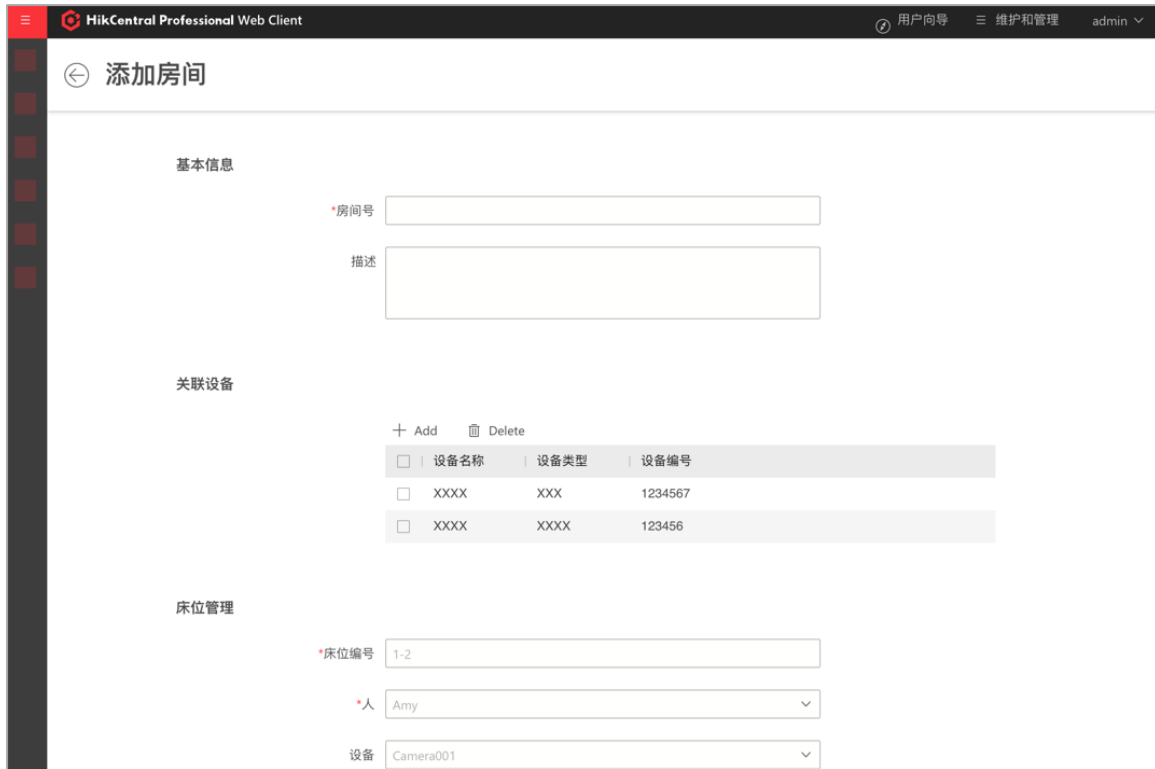
3) 异常离床报警

实时监测老人当前在床状态，夜间是否回房，早上是否起床等情况，护工不必频繁巡房查看老人状态，提高管理效率。同时雷达能够提供异常状态报警，例如老人晚间起夜或离床时间过久，可能是因为在厕所昏睡或跌倒；早上超时未起床，可能是因为身体不适或昏迷等情况，检测到这些异常情况后，雷达将实时发出报警提醒护工查看情况，在老人发生意外早期就可以提供救助。

4) 单人/多人管理

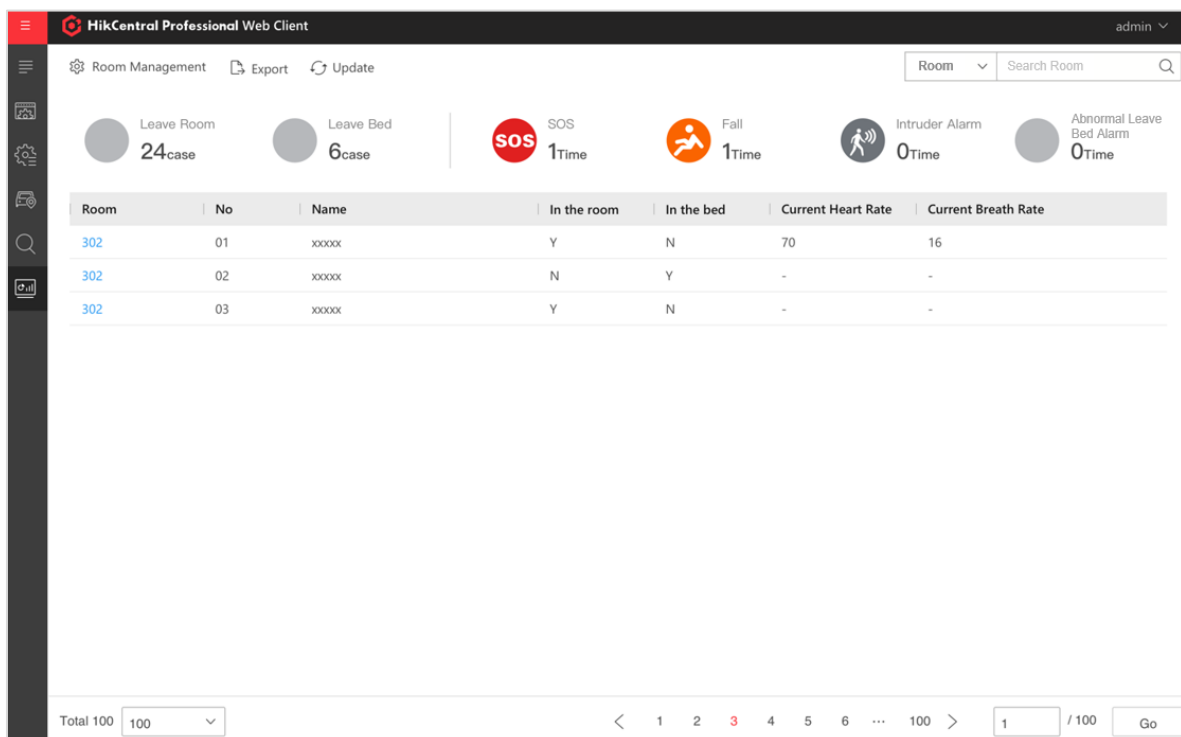
除单人管理以外，可支持多人管理。将辅助护理雷达与床位绑定，在平台内可直观了解到各个床位对应老人的身体和睡眠指标以及房间内发生的跌倒报警、紧急求救等，实现养老院精细化管理运营。平台可支持导出相关体征和睡眠数据，供第三方专业机构用于辅助了解和分析病情。

- 设备关联：添加房间、床位、设备，并进行关联。跌倒雷达、紧急按钮等与房间直接关联，辅助护理雷达与床位关联。



5) 养老院人员预览

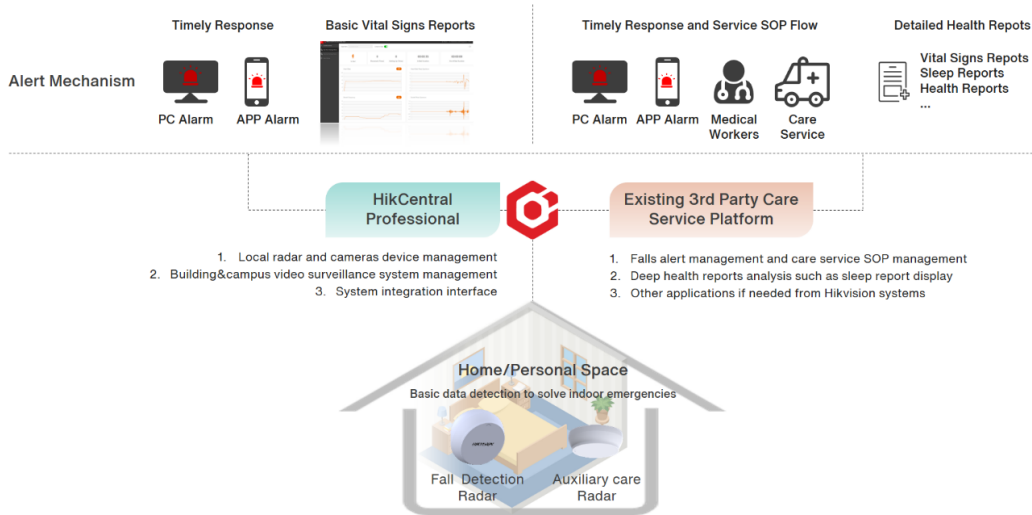
通过列表展示养老院全员的在床情况，便于护士人员快速排查老人异常未归的风险，极大地提高巡房效率。



同时，通过查看在床老人的实时心率和呼吸频率，可提早发现老人身体情况的异常。

系统拓扑图

- 雷达支持接入 HCP 的 PC 端及 APP 端，在发生跌倒及异常离床等事件后触发报警。
- 对于一些有自己运营平台的养老院，还可通过 OpenAPI 将雷达接入其自有平台，进行设备管理及报警的整合。



核心产品


1. 跌倒检测雷达

Product Specifications

 DS-TDSB00-EKT/4m	Working Frequency	60 to 64 GHz	Horizontal & Vertical FoV	-45° to 45°, -45° to 45°
	Modulation Wave	FMCW	Communication Mode	Wi-Fi, RS-485 interface
	Frequency Span	2 GHz	Working Voltage	9 to 12 VDC
	Detection Range	0.1 to 4 m	Working Electric Current	≤ 200 mA @ 12 VDC
	Data Cycle	70 ms	Weight	133 g

辅助护理雷达

Product Specifications

 DS-TDSB00-EKH/2m	Working Frequency	60 to 64 GHz	Horizontal & Vertical FoV	-45° to 45°, -45° to 45°
	Modulation Wave	FMCW	Breath/Heart Rate Resolution	0.08 Hz
	Frequency Span	3.5 GHz	Data Cycle	200 ms
	Detection Range	0.1 to 2.7 m	Communication Mode	Wi-Fi, RS-485 interface
	Weight	125 g	Working Voltage & Electric Current	9 to 12 VDC, ≤ 200 mA @ 12 VDC

SOLUTION

Hikvision Radar-based Elder Care Solution- Protecting the safety of the elderly and improving the operation efficiency of nursing homes



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Introduction to the Elderly Care Industry

1. The era of global aging has begun

According to official statistics, by the end of 2021, the global population over the age of 65 has exceeded 700 million, accounting for about 9% of the total population. Among them, the aging situation in developed countries and regions is more serious. In Japan, for example, the proportion of aging has reached 29%, and in Europe, it has reached 20.3%. It means that about one in four people is the elderly, and aging population will continue to increase, the elderly population is likely to double by 2050.

2. Nursing home beds and nursing staff are in short supply

The direct impact of aging is that the construction speed of nursing homes cannot meet the rapid growth of the elderly population. The preparation and construction of a nursing home takes a long time, especially in institutions with better environmental conditions, beds are seriously scarce, and the elderly even need to queue up until 2-3 years later to move in.

At the same time, the shortage of nursing staff in nursing homes is also a big issue. Because caregivers are in a relatively poor situation, they usually have to work long hours, but with low incomes. In addition, caregivers often need very professional skills and there is often a high turnover rate. In the UK, job vacancies for long-term care workers reached 105,000, and the 8.2% vacancy rate was even more than double of the average job vacancy in the UK.

3. Digital development of nursing homes

At present, the traditional nursing home has been unable to meet the market demand, in the case of ensuring the basic life safety of the elderly, the nursing home needs to pay more attention to the spiritual needs of the elderly. The construction of nursing home has also developed, such as libraries, movie theaters, universities for the elderly, activity centers also become the next target of nursing homes.

Therefore, the digital upgrading of nursing homes is particularly important, and the access of intelligent equipment can greatly improve the management and operation efficiency of the organization. Devices such as fall monitoring and heart rate monitoring can provide more health supervision for the elderly. Personnel positioning and behavior analysis can give the elderly more space for activities and freedom.

Solution Overview

Around the elderly health management, we offer two radar products to guard and detect the health of the elderly in the indoor scenarios: Fall Detection Radar and Auxiliary Care Radar.



1. Fall Detection Radar

With the increase of age, the physiological functions of the elderly are seriously degraded, and it is easy to fall or have other accidents. Falls are the leading cause of injury death among the elderly over the age of 65. Even in nursing homes, about 30 percent of the elderly fall every year. Among them, more than half of serious accidents are caused by not being detected and dealt with in time after a fall. The Fall Detection Radar is used to detect the fall accident of the elderly in the indoor scene, and send an alarm to the nurse station to shorten the rescue time.

1) No privacy disclosure

In the interior scene, bedrooms and bathrooms are the main areas for elderly people's activities. Among them, uneven floors, slippery floors, and wet bathrooms are prone to fall down. In addition, sharp bed corners and table corners are also difficult to avoid bumps. These falls are very fatal for the elderly. For such private spaces, traditional video monitoring cannot meet such scenarios. Hikvision Fall Detection Radar solution uses millimeter wave radar cloud dot matrix imaging technology and captures the height difference caused by the fall of the elderly, combined with posture recognition, can effectively protect user privacy, provide high accuracy of fall judgment, and bring more humanized services to users.



2) Non-contact

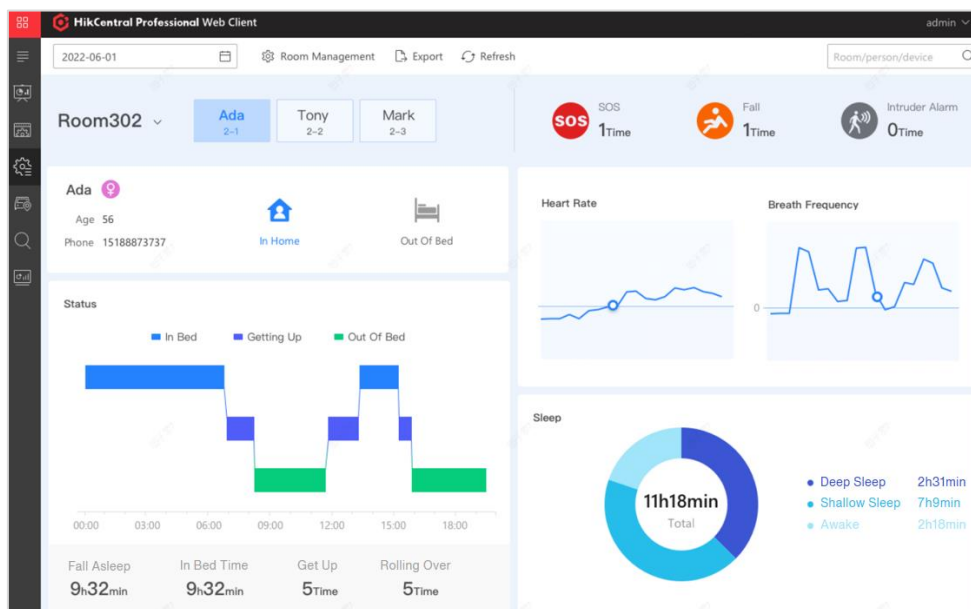
In the event of a serious fall, the elderly are usually unable to call or ask for help. The radar can actively detect and identify personnel changes, and will send an alarm to the nurse center after the fall, which greatly shortens the time from accident to discovery and avoids secondary injuries caused by delayed rescue.

3) Integration with third-party platforms

HikCentral Professional provides holistic management including device management, data analysis, and real-time alarm notifications. At the same time, data can be integrated with 3rd party platforms through OpenAPI.

2. Auxiliary Care Radar

Nursing homes, as the place where the elderly live for a long time, need to provide 24-hour caring and supervision, and even during the night, the emergencies of the elderly are uninterrupted. Manual inspection is labor-intensive and inefficient. **Based on such problems, intelligent auxiliary nursing equipment can reduce costs and provide effective safety supervision.**



1) In bed signs & body movement detection

When the elderly are in bed, the radar can detect the heart rate, breathing rate, and record physical movement data such as rolling over and getting up, which will be clearly displayed on the platform. Long-term physical vital signs data can be used to assist in judging the health status of the elderly.

2) Sleep detection

The Auxiliary Care Radar can analyze and record the sleep quality of the elderly (deep sleep, light sleep, and awake) through its own algorithm, and the nursing home can view abnormal sleep reports to achieve refined nursing.

3) Abnormal leave bed alarm

Real-time monitoring of the status of the elderly, including whether to return to the room at night, whether to get up on time in the morning, etc. Caregivers do not have to frequently inspect the room to check the status of the elderly which will greatly improve management efficiency. At the same time, the radar can provide an abnormal status alarm, such as the elderly getting up at night or leaving the bed for too long

because of a come or a fall. Or maybe they didn't get up at the right time because they weren't feeling well. After detecting these abnormalities, the radar will send out a real-time alarm to remind the nurse to check the situation, providing assistance as soon as possible after an accident.

4) Single/multiple-person room management

In addition to the single room mode, the multi-room mode is also supported. Each bed corresponds to a radar, and the body and sleep indicators corresponding to the elderly in each bed can be clearly displayed in the platform, as well as the fall alarm and emergency rescue that occur in the room, so as to realize the refined management and operation of the nursing home. The platform enables the export of relevant signs and sleep data for use by third-party professional organizations.

5) Nursing home staff preview

The status of the elderly in bed is displayed in a list, which is convenient for nurses to identify issues at a early stage, greatly improving the efficiency of room inspection. At the same time, by looking at the real-time heart rate and breathing rate of the elderly in bed, caregivers can detect abnormalities in the physical condition of the elderly early.

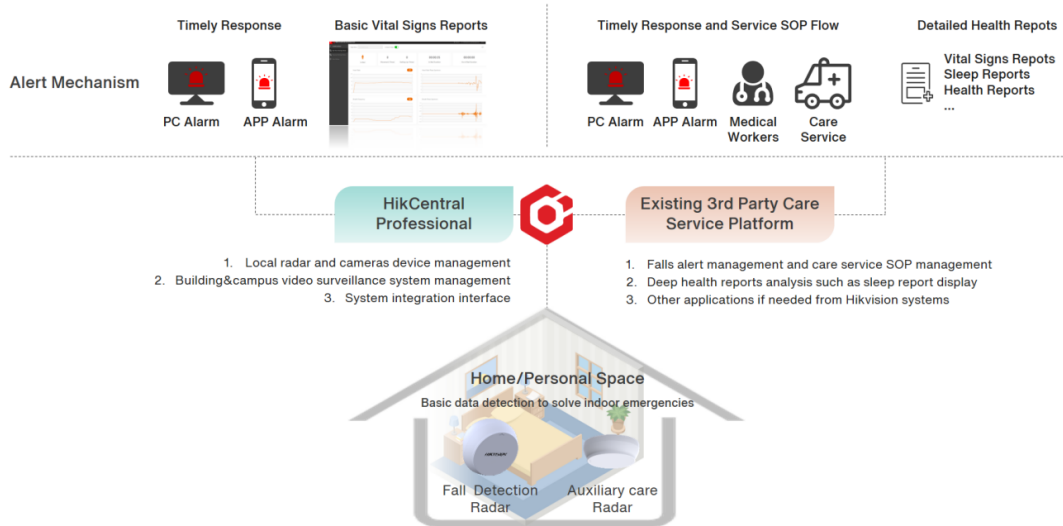
The screenshot displays the HikCentral Professional Web Client interface. At the top, there are navigation options: Room Management, Export, and Update. A search bar for rooms is also present. Below the navigation, there are several status indicators: Leave Room (24 case), Leave Bed (6 case), SOS (1 Time), Fall (1 Time), Intruder Alarm (0 Time), and Abnormal Leave Bed Alarm (0 Time). The main area features a table with the following data:

Room	No	Name	In the room	In the bed	Current Heart Rate	Current Breath Rate
302	01	xxxxxx	Y	N	70	16
302	02	xxxxxx	N	Y	-	-
302	03	xxxxxx	Y	N	-	-

At the bottom, there is a pagination control showing 'Total 100' and a page number '1' out of '100'.

3. System topology


- 1) The radar supports access to the PC terminal and APP terminal of HikCentral Professional, and triggers an alarm after events such as falls and abnormal bed leaving.
- 2) For some nursing homes with their own operating platforms, they can also connect the radar to their own platforms through OpenAPI for equipment management and alarm integration.



Core Products


1. Fall Detection Radar

Product Specifications

 DS-TDSB00-EKT/4m	Working Frequency	60 to 64 GHz	Horizontal & Vertical FoV	-45° to 45°, -45° to 45°
	Modulation Wave	FMCW	Communication Mode	Wi-Fi, RS-485 interface
	Frequency Span	2 GHz	Working Voltage	9 to 12 VDC
	Detection Range	0.1 to 4 m	Working Electric Current	≤ 200 mA @ 12 VDC
	Data Cycle	70 ms	Weight	133 g

2. Auxiliary Care Radar

Product Specifications

 DS-TDSB00-EKH/2m	Working Frequency	60 to 64 GHz	Horizontal & Vertical FoV	-45° to 45°, -45° to 45°
	Modulation Wave	FMCW	Breath/Heart Rate Resolution	0.08 Hz
	Frequency Span	3.5 GHz	Data Cycle	200 ms
	Detection Range	0.1 to 2.7 m	Communication Mode	Wi-Fi, RS-485 interface
	Weight	125 g	Working Voltage & Electric Current	9 to 12 VDC, ≤ 200 mA @ 12 VDC