桑榆一隅

This design is based on the concept of "smart elderly care", taking the use of advanced technology to improve the living environment suitable for the elderly and improving the quality of life of the elderly as the research purpose, taking "space" as the entry point,Explore the combination of the "smart elderly care" model and suitable space for the elderly. The space perspective is divided into two parts: from the perspective of space design, the smart old-age care space and the use of space design-related technologies in the smart old-age care space. From the perspective of space design, it is to explore the changes of various services and equipment derived from the smart elderly care model to space design.
Thereby, the suitability of the soft and hard environments in the smart old-age care space can be improved, and the degree of cooperation between the space and the smart old-age care can be improved.

关键词：智慧养老；技术与空间；适老空间设计；智慧养老空间
Keywords: Smart old age care; Technology and Space;
Suitable for the elderly space design; Smart Pension Space

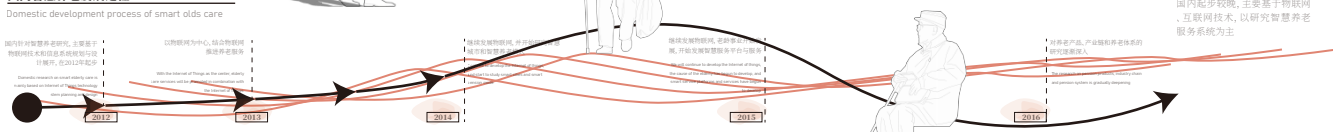
前言 // Introduction

本文基于“智慧养老”概念，把利用先进科技改善适老居住环境、提高老人生活质量作为研究目的，把“空间”作为切入点，探索“智慧养老”模式与适老空间的结合方式。智慧养老对空间的影响主要分为智慧技术对空间的影响、智慧养老服务系统对空间的影响和智能家居对空间的影响三部分。

Based on the concept of "smart endowment", this paper takes the use of advanced science and technology to improve the living environment for the elderly and improve the quality of life of the elderly as the research purpose, and takes "space" as the entry point to explore the combination of "smart endowment" mode and the space for the elderly. The impact of smart pension on space is mainly divided into three parts: the impact of smart technology on space, the impact of smart pension service system on space and the impact of smart home on space.

国内智慧养老发展过程

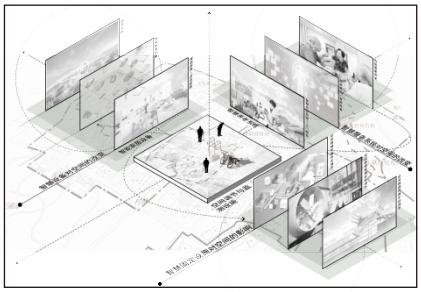
Domestic development process of smart olds care



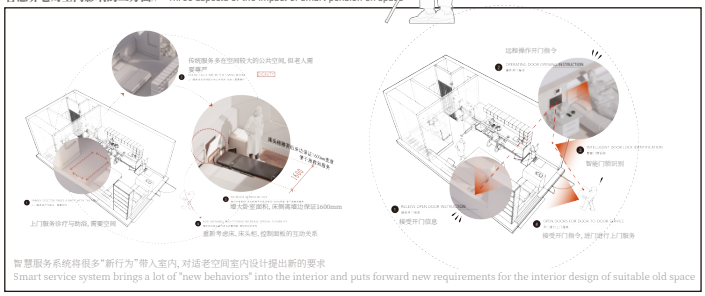
下图资料来源：赵英,刘任烨,田蜜,胡利佳.智慧养老研究的现状及发展趋势分析——基于文献计量和知识图谱[J].山东财经大学学报,2017,29(02):107-117.

国内起步较晚，主要基于物联网、互联网技术，以研究智慧养老服务系统为主

智慧养老对空间影响的三方面// Three aspects of the impact of smart pension on space



智慧养老对空间影响的三方面// Three aspects of the impact of smart pension on space



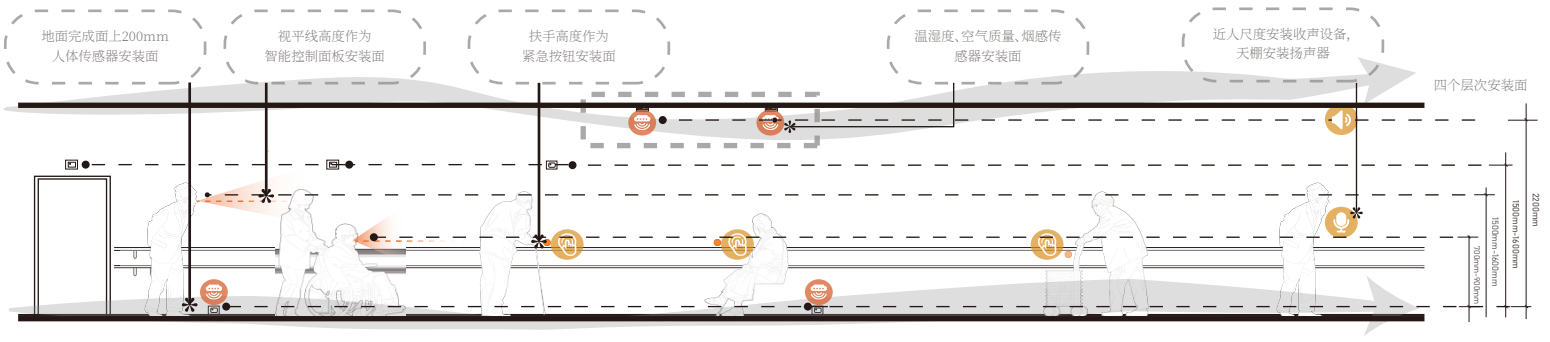
智慧服务系统将很多“新行为”带入室内，对适老空间室内设计提出新的要求
Smart service system brings a lot of "new behaviors" into the interior and puts forward new requirements for the interior design of suitable old space

更多的活动将从适老空间内展开，对室内空间设计提出更高的要求

打破了对时间和空间的限制，对空间进行控制。使老人生活更加便利

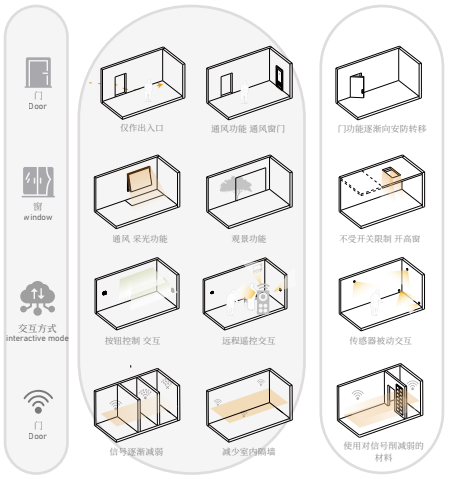
It breaks the limitation of time and space and controls space. Make life more convenient for the elderly

居住模块内立面图



智慧技术对空间物理环境调节及空间交互方式的改变——门、窗、交互方式等空间设计元素的改变

Intelligent technology changes spatial streamline and spatial interaction mode



The function of the door is transferred to security, equipped with fingerprint or facial recognition door lock to prevent the elderly from forgetting the key. Set up intelligent intercom at the door to facilitate the elderly to understand the movement outside the door.

When the window is not restricted by the switch, the high window can be opened for ventilation. When windows are no longer the primary means of ventilation, human-scale windows are more inclined to view.

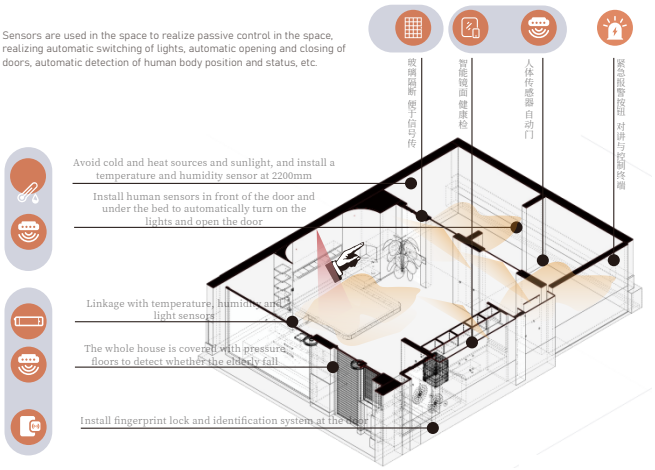
From active interaction to passive interaction, the participation of the elderly in using space is fully reduced.

Smart elderly care spaces rely on signal transmission, minimize indoor partition walls, and select materials with weak signal reduction when it is necessary to use partition walls

智慧养老空间中传感器种类及点位位置

Sensor types and point positions in smart pension space

Sensors are used in the space to realize passive control in the space, realizing automatic switching of lights, automatic opening and closing of doors, automatic detection of human body position and status, etc.



室内材料分析

Indoor material analysis

用于床头柜、入户玄关、飘窗休闲区，增加室内层次感

颜色较灰的木饰面板，用于大面积墙面装饰，营造温馨氛围

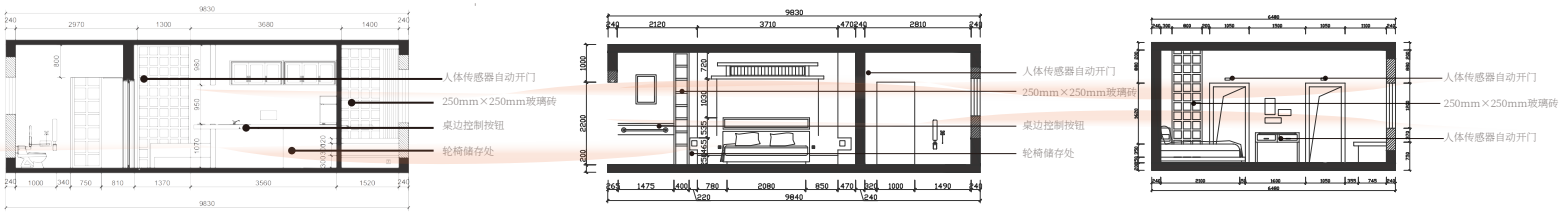
地面使用鱼骨木地板，有一定纹理但不易使老人产生误识

透明木材材料代替玻璃，减弱玻璃的折射感，使老人使用起来更加安全

室内软装材质多采用与室内颜色搭配较为和谐的灰色

智慧养老空间立面图

Interior elevation of living module



床头侧效果图

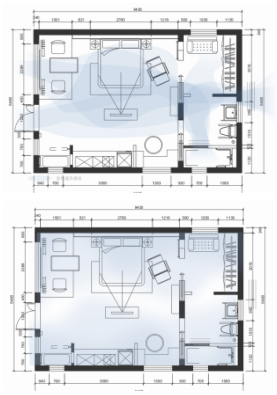
休闲阅读区效果图

智慧技术对空间物理环境调节及空间交互方式的改变

Intelligent technology changes spatial streamline and spatial interaction mode

空间内控制与交互方式改变

Space physical environment adjustment



空间物理环境调节改变

Space physical environment adjustment

传统控制点位位置零散，控制方式多为下意识触摸，基本不需要观看，立面安装点位多为方便接触的高度。智能控制面板安装位置较为集中，需要人们观看，安装位置由从前的便于触摸转换为便于观看的高度。

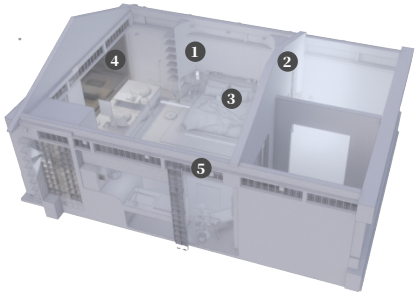
The control mode is mostly subconscious touch, basically do not need to watch, elevation installation point position is mostly convenient for contact height. The installation position of intelligent control panel is more centralized, requiring people to watch. The installation position is changed from easy to touch to easy to watch.

被动式物理环境调节

Passive physical environment regulation

设计中使用毛细管空调进行空间物理环境调节，调节室内的温度、湿度、空气质量等。设计中使用毛细管空调进行空间物理环境调节，调节室内的温度、湿度、空气质量等。设计中使用毛细管空调进行空间物理环境调节，调节室内的温度、湿度、空气质量等。

In the design, capillary air conditioners are used to adjust the physical environment of the space to adjust the indoor temperature, humidity, air quality, etc. In the design, capillary air conditioners are used to adjust the physical environment of the space to adjust the indoor temperature, humidity, air quality, etc. In the design, capillary air conditioners are used to adjust the physical environment of the space to adjust the indoor temperature, humidity, air quality, etc.



1 温度传感器 Temperature sensor

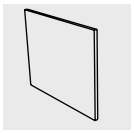
1 湿度传感器 Humidity sensor

2 噪声传感器 Noise sensor

4 电动窗帘电机 Electric curtains

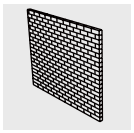
5 毛细管空调 Capillary air conditioning

3 空气质量传感器 Air quality sensor

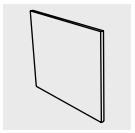


套内墙面饰面 Cover inner wall finish

毛细管管道铺设 Capillary pipe laying



建筑结构 Building structure



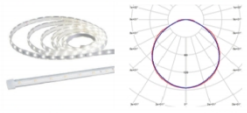
外墙保温层 External wall insulation

Indoor temperature control adopts capillary air conditioning system to ensure constant temperature, constant humidity, constant cleanliness and constant oxygen in the aged care space. Because the capillary air conditioner needs to adjust the air through the wall, the wood veneer that can provide a more balanced temperature is selected for the facade decoration of this design.

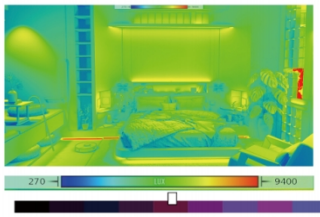
室内灯光设计

interior lighting design

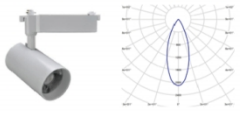
NVC LED R2835A42P
Cezanne low voltage light belt
4.8W/m 42P L 1000mm 3000K



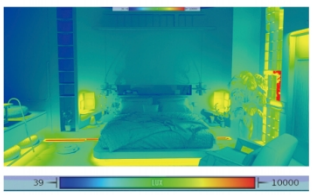
Product number	70081476
P	3.0w
Φ	432 lm
Light efficiency	144.0 lm/W
Color	3259k



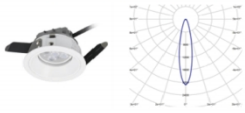
NVC LED R2835A42P
Cezanne low voltage light belt
4.8W/m 42P L 1000mm 3000K



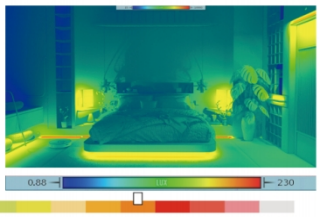
Product number	70074818
P	9.0w
Φ	810lm
Light efficiency	90.0 lm/W
Color	3259k



NVC LED R2835A42P
Cezanne low voltage light belt
4.8W/m 42P L 1000mm 3000K



Product number	70081476
P	9.0w
Φ	450lm
Light efficiency	50.0 lm/W
Color	3259k



0.10 0.20 0.30 0.50 0.75 1.00 1.50 2.25 3.38 5.08 7.62 11.4 17.1 25.8 38.7 58.1 87.3 131.0 196.0 295.0 443.0 666.0 1000.0 1967.0 3872.0 7621.0 15000.0

室内材料选择

interior materials select

According to relevant research, glass, wood and synthetic materials have the least attenuation of network signals. In interior design, partition walls should be minimized, soft partitions should be used on necessary partition walls, or materials with weak attenuation should be used.

The right side of the bed is adjacent to the cloakroom, and the partition wall of the cloakroom is changed to a frosted glass effect material, which increases the sense of space permeability and weakens the blocking degree of the signal.

Use transparent wood material instead of glass to reduce the refraction of glass and make it safer for the elderly to use. At the same time, it has the same texture as the wood grain, which matches the overall style.

DESIGN DESCRIPTION

The design site is located in Daojun Village, Haikou City, Hainan Province. This topic is an actual topic in the 7th 4×4 Chinese and foreign universities' Belt and Road experimental teaching in 2021. The purpose is to fully tap the village potential of Daojun Village, identify the location of the village, and continue to create blood for the village.

Through the analysis of the overall population characteristics of Hainan Province, it is found that Hainan Province has a large group of elderly people and has a huge demand for elderly care. Starting from the needs, the reconstruction design of Daojun Village in Haikou City is positioned as the design of the retirement community. At the same time, with the rapid development of modern science and technology in recent years, the concept of smart old-age care has developed rapidly in my country, and the application of smart old-age care has greatly improved the quality of life of the elderly in their later years. However, through a review of the research status at home and abroad, it is found that there are few studies on the concept of smart elderly care and suitable space for the elderly, and most of the domestic research focuses on smart elderly care service platforms and systems. The importance of elderly care space to the elderly is self-evident, so in this design, the focus will be on the combination of smart elderly care and modern smart technology with suitable space for the elderly to create a smart elderly care community.

The title of the final graduation thesis is "Research on the Design of Suitable Space for the Elderly under the Technology-Based Smart Elderly Care Model", and the title of the graduation project is "Sangyu One Corner" Smart Elderly Care Community Design. In the research of the paper, the impact of smart technology on space is sorted out, and the design criteria of smart old-age space after the intervention of smart technology is summarized, and it is applied and verified in design practice.

The functions of the smart elderly living module in Daojun Village are mainly based on basic life, guiding the elderly to go to public areas for activities, improving the community relationship between the elderly, and promoting the activities of the elderly. The main functions are sleep module, toilet module, leisure reading module, cloakroom module and simple meal operation module.

In terms of indoor safety design, the RNF2401 pressure floor is mainly selected. The pressure sensor is used to detect the position of the elderly in the room, and at the same time, it can detect whether the elderly fall, so as to deal with the danger in time. Set emergency pull rope buttons on the wall of the bathroom, shower room, simple meal operation wall and bedside wall.

In terms of indoor control system design, set up intelligent control panels in the positions where the elderly stay for a long time, move slowly and are far from the door, such as: bedroom bedside, kitchen, toilet and toilet, and complete the control of the entrance door, lighting and electrical appliances. operation, and at the same time set the emergency alarm system. Taking the bedside control panel as an example, due to the emergence of intelligent control panels, people's demand for viewing panels has increased. Therefore, the wall at the head of the bed is bent to the side of the bed, so that the old man can see the panel from the side of his face when he lies down, without getting up. Set the control panel in an alcove to avoid direct sunlight affecting the viewing effect. The smart panel should be able to control lights, entrance doors and various electrical appliances in the room in multiple ways.

In terms of ventilation and temperature regulation design, capillary radiation air conditioners suitable for the climate characteristics of Hainan Province are used to adjust the indoor temperature and humidity and air cleanliness, which can achieve the effect of uniform temperature and humidity throughout the room, and is very environmentally friendly and green. According to relevant research, it is found that wood has better thermal conductivity and stronger stability than other stone materials and concrete. Therefore, in the selection of interior materials, wood is often chosen as the façade and floor decoration.

In terms of lighting design, the design without main lights is used to realize the scene-based indoor lighting. The daily night mode is mainly designed, and soft lamps such as spotlights, downlights, and hidden light strips are used to meet the overall illumination of 300lux; the sleep mode, three hours before going to bed, detects the state of the elderly according to the pressure sensor on the bed. Turn off the downlights and spotlights, and only turn on the hidden light strips to ensure that the overall illuminance is below 10lux to promote sleep; in the wake-up mode, the sensor on the side of the bed detects the elderly getting out of bed, and slowly lights up the inside of the armrest and the bed. Hidden linear lights on the side, and wall washer lights above the bathroom door.

Through the above design methods, the intelligent technology and the suitable space for the elderly are integrated. From the old people living in the space through their own judgment and operation power, it has changed to serving the elderly by sensors and professional scenes. The transformation of the elderly from active control of space to passive enjoyment of space has been completed, and the danger of the elderly due to functional degradation in various aspects and wrong decisions caused by the elderly is reduced as much as possible.