基于技术的智慧养老模式下的适老空间设计研究

RESEARCH ON THE DESIGN OF SUITABLE SPACE FOR OLD AGE UNDER THE TECHNOLOGY BASED INTELLIGENT OLD-AGE MODE

CONTENTS

1 RESEARCH OVERVIEW

Research background of smart endowment

Smart pension research status at home and abroad

Research status of intelligent endowment and space design

1 RESEARCH OVERVIEW

A. By sorting out the current development status of smart pension, this paper puts forward a new perspective of smart pension research from the perspective of space design

B. By sorting out the application of various technologies in the context of smart old-age care, the impact of smart technologies on space is summarized

C. By exploring the impact of technology on space, the key points of space design suitable for old age under the smart pension mode are sorted out

THE RESEARCH BACKGROUND

AGING POPULATION

At present, China has the largest elderly population in the world, accounting for about one-fifth of the total global elderly population.

RISE OF SMART ELDERLY CARE

Leading the way in linking technology to the elderly is the UK 's Trust for Life.

SPACE FOR TECHNOLOGICAL CHANGE

Continuous technological innovation has led to the transformation of production tools and the emergence of a variety of production methods。

THE DEGREE OF COMBINATION OF SMART PENSION AND SPACE IS LOW

The concept of smart elderly care has been put forward for a long time, but most of it is concentrated in the field of product design and service platform, but the application and research in space design are very few.

Key words:

1.1 Wisdom endowment

The concept of smart pension was first proposed by the British Trust for Life, which means to use modern advanced science and technology to provide elderly care services across time and space, breaking the original traditional pension model. The concept of smart pension proposed by the British Life Trust is relatively macro. Smart technologies include Internet technology, life science technology, information technology and other technology categories, which span various disciplines. In China, the National Office for Aging first proposed the concept of "intelligent pension" in 2012. Its core is basically the same as the "smart pension" proposed by the British Life Trust, which uses intelligent means to improve the life of the elderly in their later years.

1.2 Wisdom technology

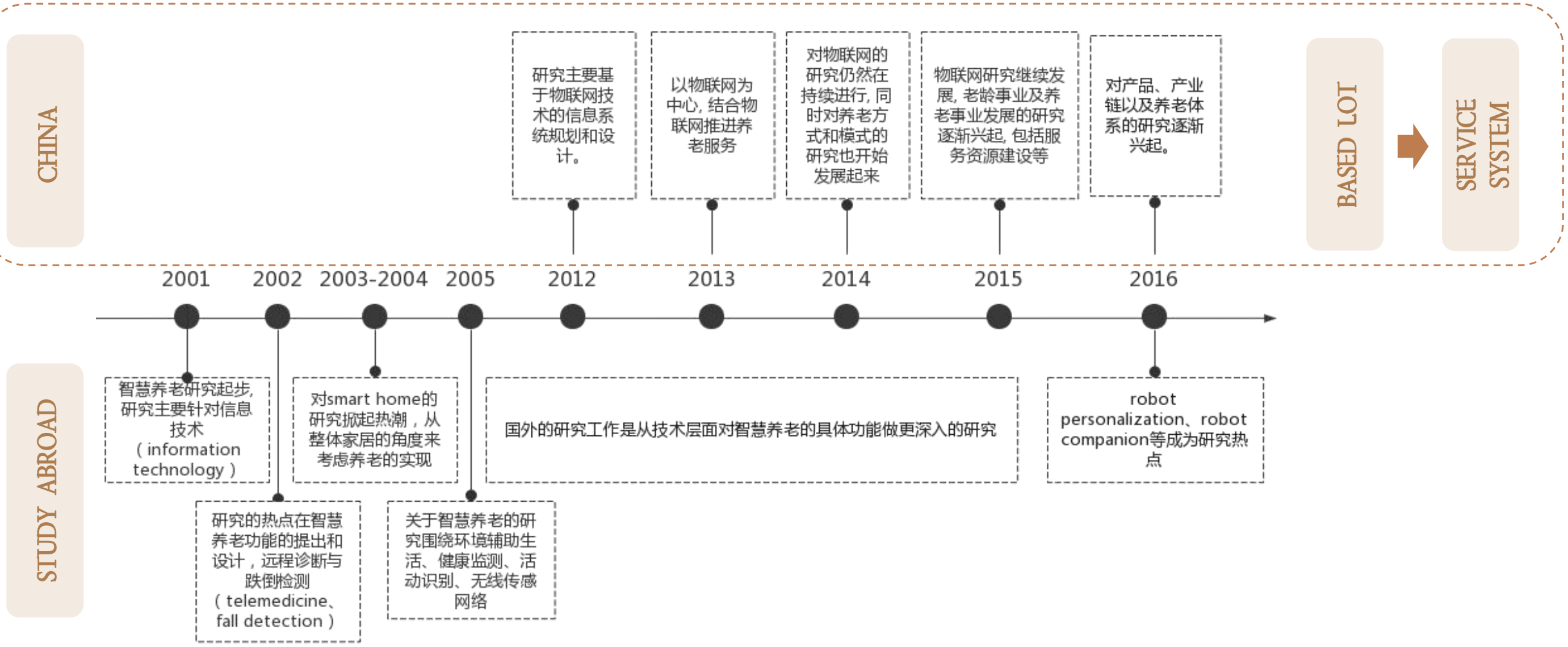
Smart technology, based on its short, fast, massive calculations, can gain a lot of experience at a moment's notice and make decisions that are even more appropriate than human ones. Combined with intelligent technology, computers can help humans make more appropriate decisions. This is of great significance for the elderly with significantly reduced thinking ability, reaction ability and physical function. It can effectively avoid the possibility of the elderly making wrong decisions due to their own ability degradation and reduce the occurrence of tragedy.

1.3 Smart Pension Space

Based on the design of suitable space for old age, intelligent system or equipment is added to make the space intelligent. Different from smart home, smart space for the elderly will be closer to the daily needs of the elderly, whether it is the construction of smart system or the selection of smart equipment, will be easy to operate or even no operation as the standard. The design of intelligent age-appropriate space aims to improve the intelligence of the space and realize the self-regulation of various conditions in the space by intelligent means.

Research status of smart pension at home and abroad

DOMESTIC AND ABOARD RESEARCH STATUS



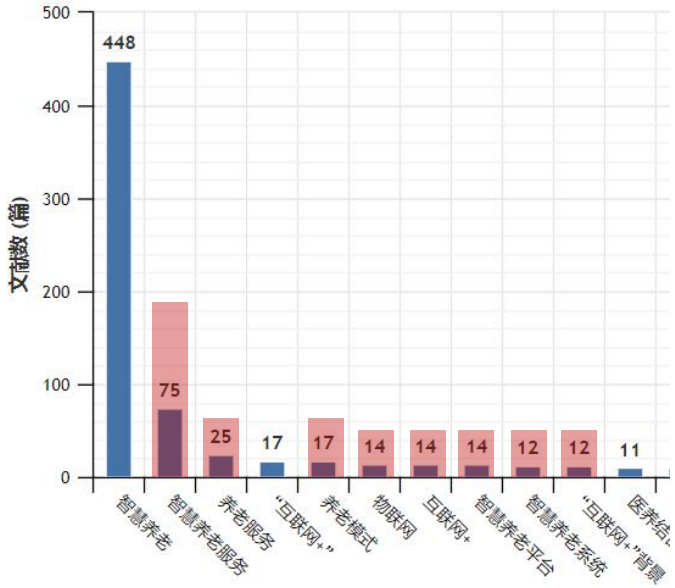
资料来源：赵英,刘任烨,田蜜,胡利佳.智慧养老研究的现状及发展趋势分析——基于文献计量和知识图谱[J].山东财经大学学报,2017,29(02):107-117.

SUMMARY OF DOMESTIC RESEARCH DIRECTION OF SMART ENDOWMENT

Through the retrieval of the topic of the paper, the research status of the topic of "smart pension" in China is explored.The data source was CNKI, and the retrieval condition was: "Article title = Chinese and English extension (Smart pension) (exact matching)". A total of 1079 articles were retrieved, including 741 journals and 113 dissertations.

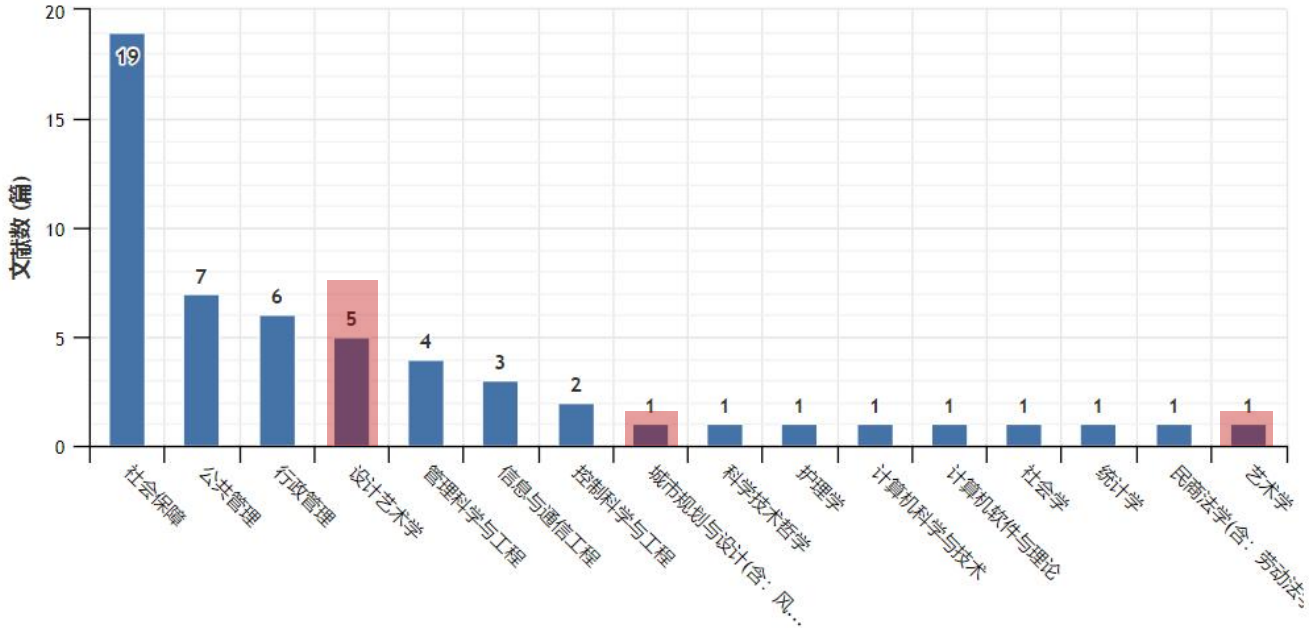
Research Topic:

They mainly focus on smart pension mode, service and platform, but seldom combine with space



Research Subjects:

They mainly focus on social security, public administration and other disciplines, with less research on design and art



RESEARCH ON INTELLIGENT ENDOWMENT IN THE FIELD OF DESIGN

Retrieval design related disciplines for master's thesis, a total of 6 papers, 0 doctoral thesis

[1]孙梦楚.基于杭州萧山的智慧养老产业园区规划研究[D].浙江农林大学,2016. 【Urban and Rural Planning - Urban and Rural Planning】

[2]林晓薇.智慧养老社区景观设计研究[D].上海交通大学,2016. 【Design - Industrial Design】

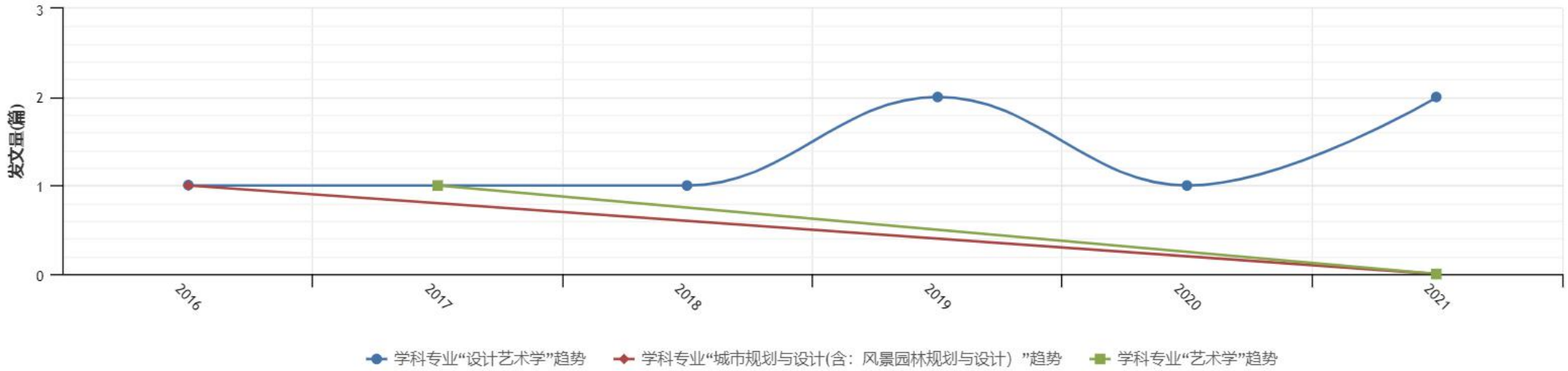
[3]张伊丽.智慧养老云服务产品设计研究[D].东华大学,2018. 【Art Design-Product Design】

[4]夏阳阳.服务设计理念下的社区智慧养老服务系统创新设计研究[D].华东理工大学,2019. 【Design - Industrial Design Theory and Method】

[5]刘也.基于"互联网+"的社区智慧养老体系构建研究[D].天津大学,2019. 【Design - Information, Interaction Design】

[6]李潇.智慧养老视域下老年人社区健身设施设计研究[D].武汉理工大学,2020. 【Design - Industrial Design】

From the above analysis, it can be seen that the research on smart elderly care in the field of design is mostly focused on interaction and product design, and there is less research on smart elderly care and space design.



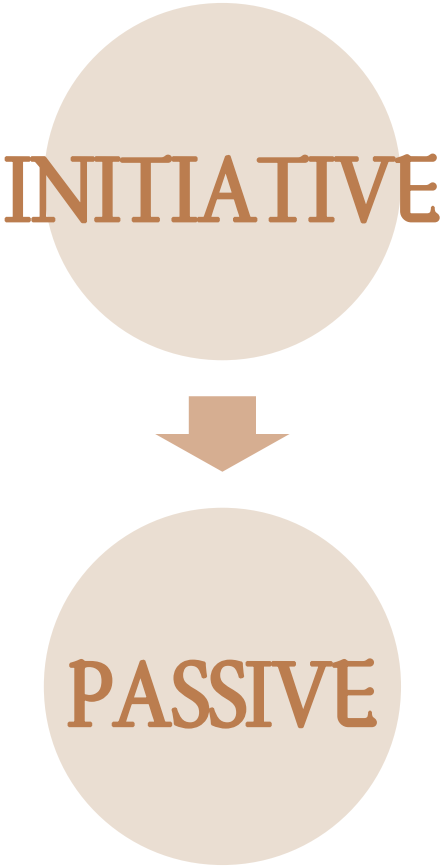
SIMILARITIES AND DIFFERENCES BETWEEN SMART HOME AND SMART PENSION

Smart home is defined as smart home, or home and building automation, also known as "smart home".

Smart home refers to providing a higher quality of life by introducing automated control facilities and auxiliary service systems. As long as the automation and intelligent control of equipment and facilities can be realized, the space can be called smart home. From the perspective of space, smart home has a broader scope than smart old-age care space.

Smart home is more inclined to user's personalized settings and active participation

For the elderly, the addition of the intelligent system should minimize the active participation of the elderly in the space control system



SMART HOME

Smart technology

Living Space

SMART OLD AGE CARE

HOW?

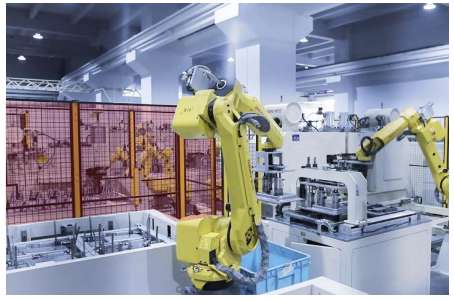
Compared with smart old-age care, smart home pays attention to the combination of technology and space, but does not meet the needs of old-age care

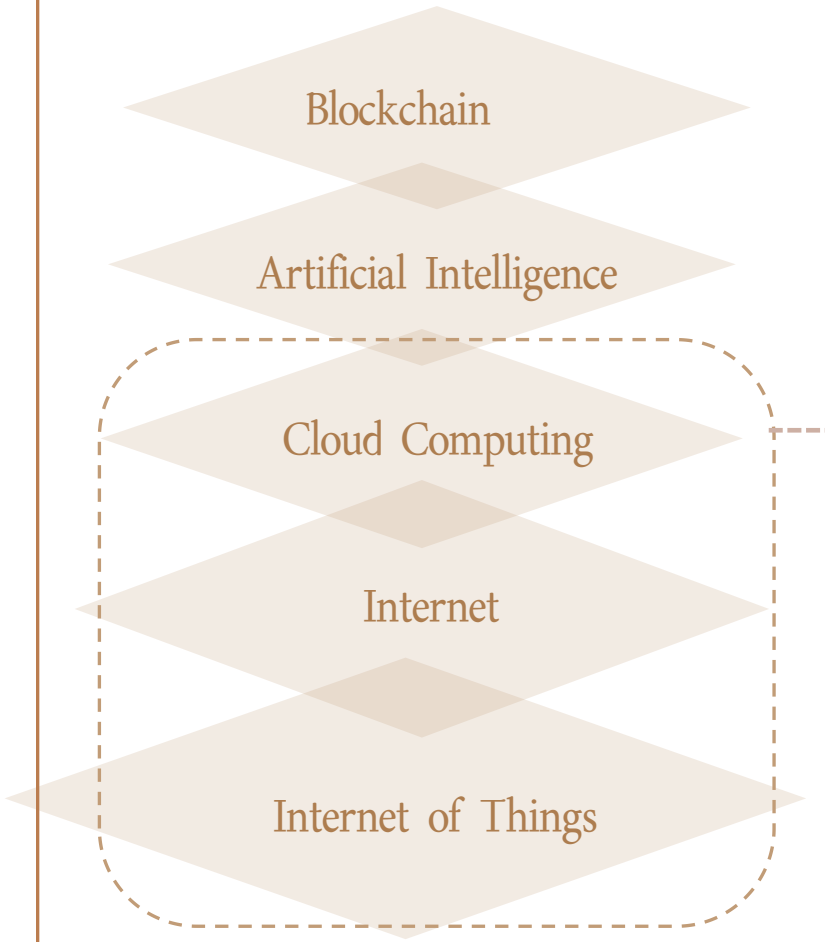
SMART HOME

SMART OLD AGE CARE

Smart technology + Living Space + Pension needs = ?

RESEARCH CONTENT 2

	Visible	Passable	Production Requirements
	Illumination Easy Identification	Compliant with Human Passage - Passage Scale	Breathe - Facade Window Dining - dining space
Traditional Factory WORKERS			
	QR Code - Ground Design	Machine Access - Spatial Scale Slope, ground flatness friction coefficient	Network Signal - Partition Wall Material Charging device - facade design
Smart Factory MACHINE			
Design focus shift	Facade Design Ground Design	Passage space design Ground design	Passage space design Ground design



Elderly care system is more prevalent

Changes in the way space interacts

Smart Elderly Care Service System

The relationship between the Internet and the way space is controlled

IoT terminal equipment and indoor interface design

Provide New Opportunities

研究内容// Analysis of the needs and behaviors of smart elderly people

Traditional needs

SINGLE

COUPLE

HALF A DISABILITY

Relying on the elderly's sense, memory, and judgment to live

Demand Shift

SINGLE

COUPLE

HALF A DISABILITY

Life Safety Requirements

Basic Living Needs

Quality Of Life Needs Layer

Relying on various sensors and professional scene settings, basically no operation is required

With Smart Technology As A Tool

Elderly Care Needs As The Guide

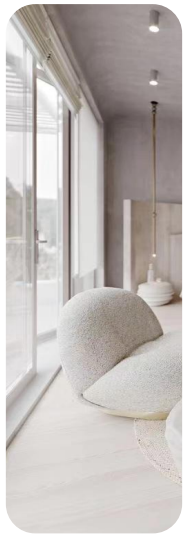
Suitable For The Elderly Space As The Carrier

ASPECTS THAT AFFECT SPACE

Facade Design

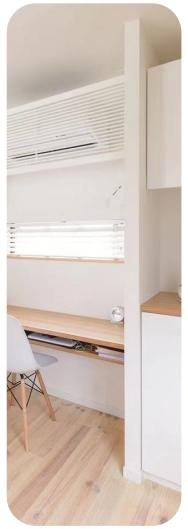
ground design

Canopy Design



Lighting Design

Way To Control



Materials

Air Conditioning

Softcover

Blockchain

Artificial Intelligence

Cloud Computing

Internet

Internet of Things

Wearable

Portable

Fixed

Charging And Placing Method
The Combination Of Charging And Display

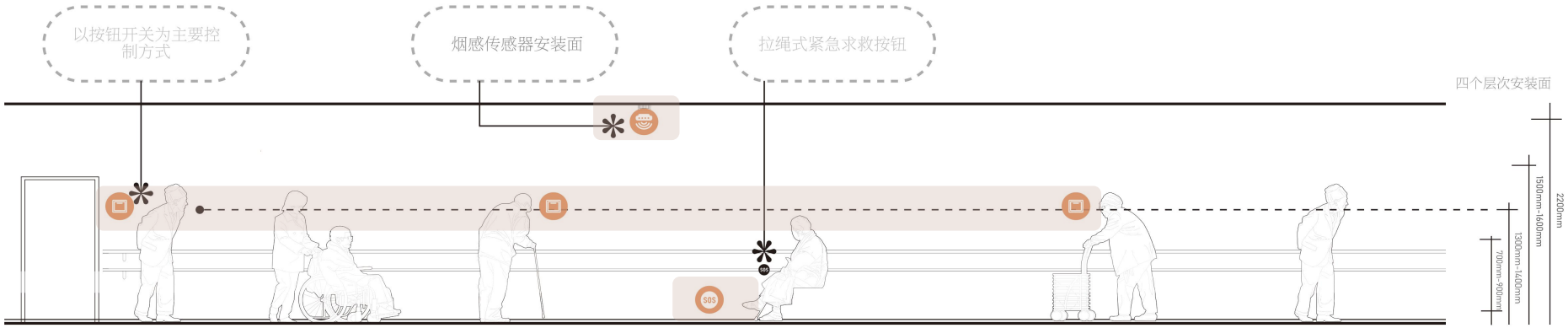
More Equipment,
From Closed Storage - Open Storage

Smart Control Panel, Increasing Viewing Demand

引自：郑世宝.物联网与智慧养老[J].电视技术,2014,38(22):24-27.DOI:10.16280/j.videoe.2014.22.003.

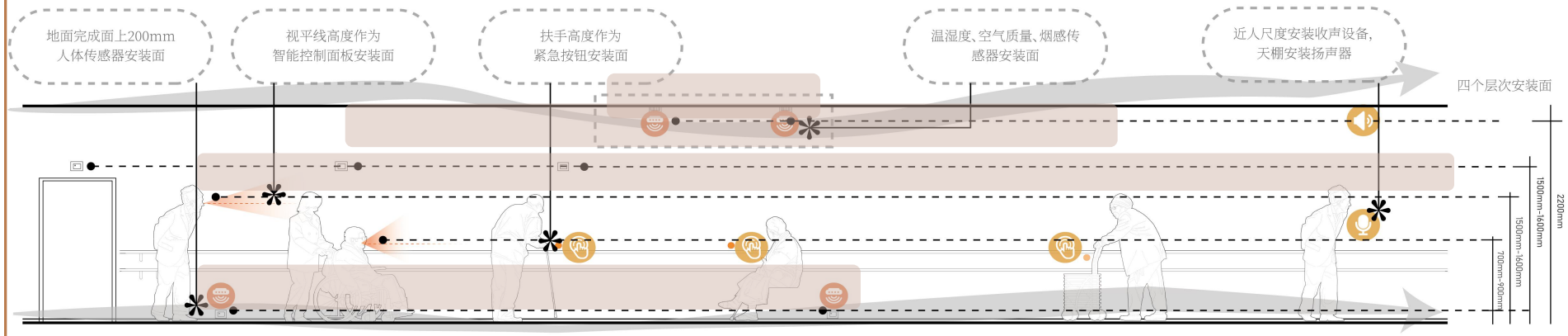
研究内容// Smart Technology Opposite Control Belt Change

A single control belt, the national standard switch installation height is easy to operate 1300mm, the bedside switch is parallel to the head of the bed



The average height of the elderly is 1650cm-1550cm, and the standing eye level is about 1400mm-1500mm

Convert the control belt height setting to take the eye level height as the main reference, the bed side panel is parallel to the long side of the bed and perpendicular to the line of sight



数据来源： The five-yearly "National Physical Fitness Monitoring Bulletin" in 2020

Blockchain

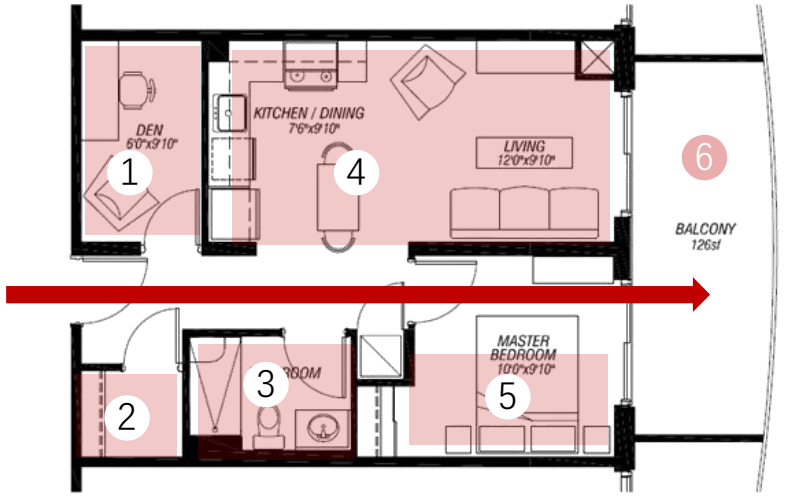
Artificial Intelligence

Cloud Computing

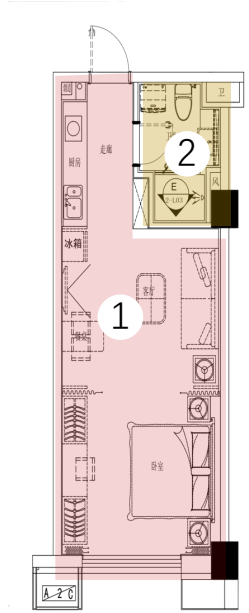
Internet

Internet of Things

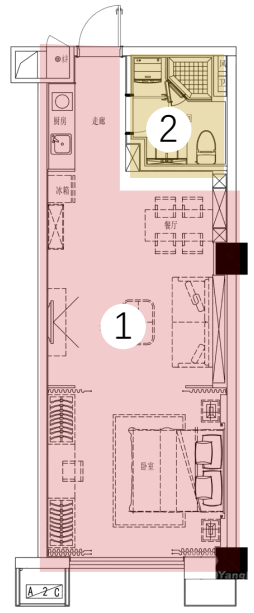
Contactless



Infrared Sensor Monitoring – Spatial Fragmentation



2户型平面图 | 约58m²



B1户型平面图 | 约68m²

Floor pressure sensor – open space, concentrated

Unconscious Contact

Electrophysiological metal patches are installed in places where the elderly often touch

引自：郑世宝.物联网与智慧养老[J].电视技术,2014,38(22):24-27.DOI:10.16280/j.videoe.2014.22.003.

Blockchain

Artificial Intelligence

Cloud Computing

Internet

Internet of Things

Various window opening positions

In-person operation——
Remote operation

Do not take the human operation scale as a window reference

Reserve operating space in front of the window

Free up space in front of the window

Convenient location

Not affected by operating position

Building facade changes

windows

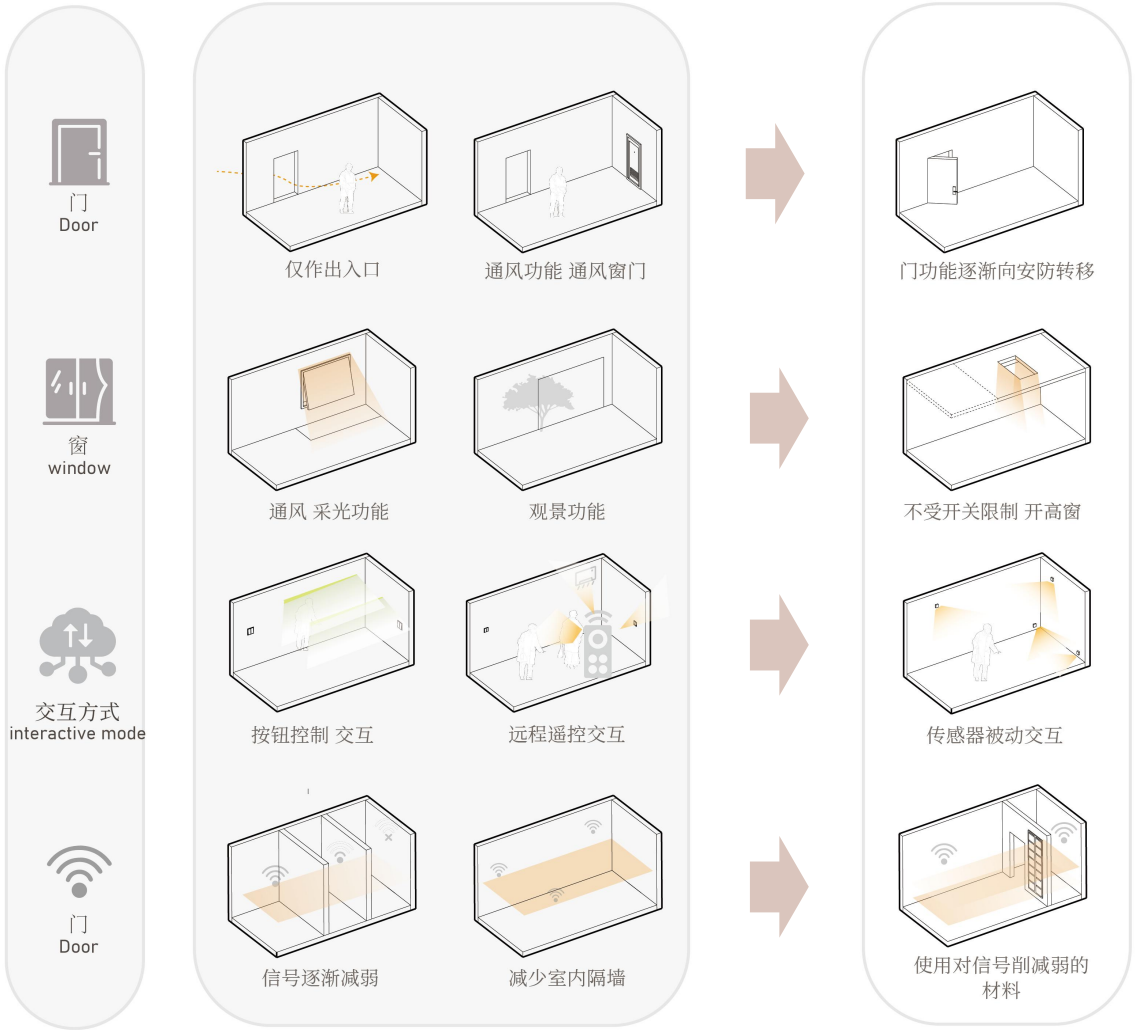
Intelligent adjustment system

Windows aren't the only way to ventilate preserve the integrity of the windows

reserved ventilation window

Panoramic view windows

Summary of the influence of space design angle technology on space



The focus of the entrance gradually turns to security and whole-house control

Window focus shifts from ventilation to viewing, regardless of switch position

From active operational control to passive use and enjoyment

Due to the sensor installation characteristics and network signal requirements, the partition wall is reduced, and the partition wall is mostly made of materials with less signal attenuation.

The composition of the smart elderly care service system

Blockchain

Artificial Intelligence

Cloud Computing

Internet

Internet of Things

Smart Elderly Care Service System

Quickly analyze data to make appropriate decisions

Transmission of information to a central analysis system

Various IoT terminals collect elderly information

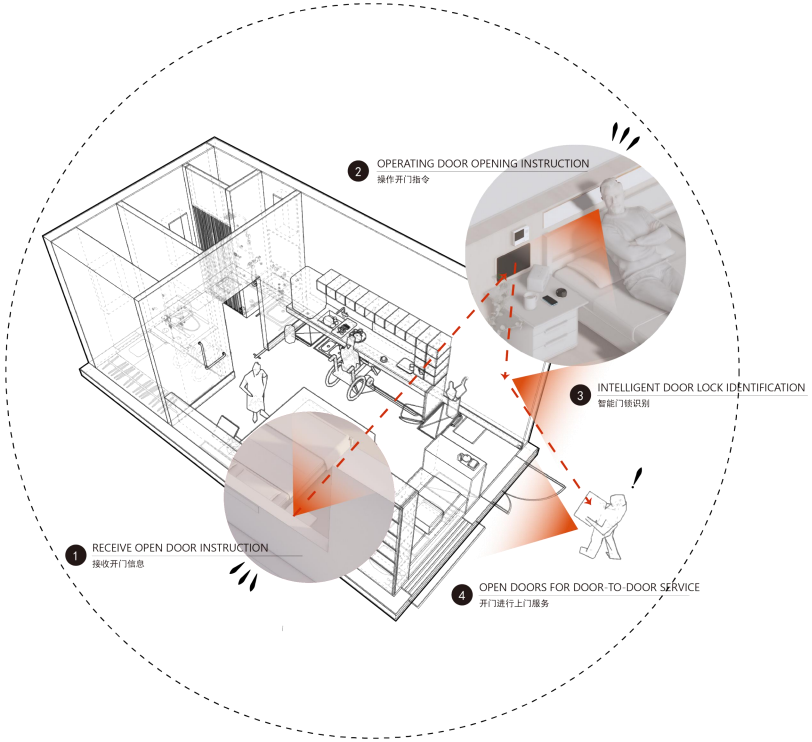
The impact of smart elderly care service system on space

Old-age Service System Service Projects

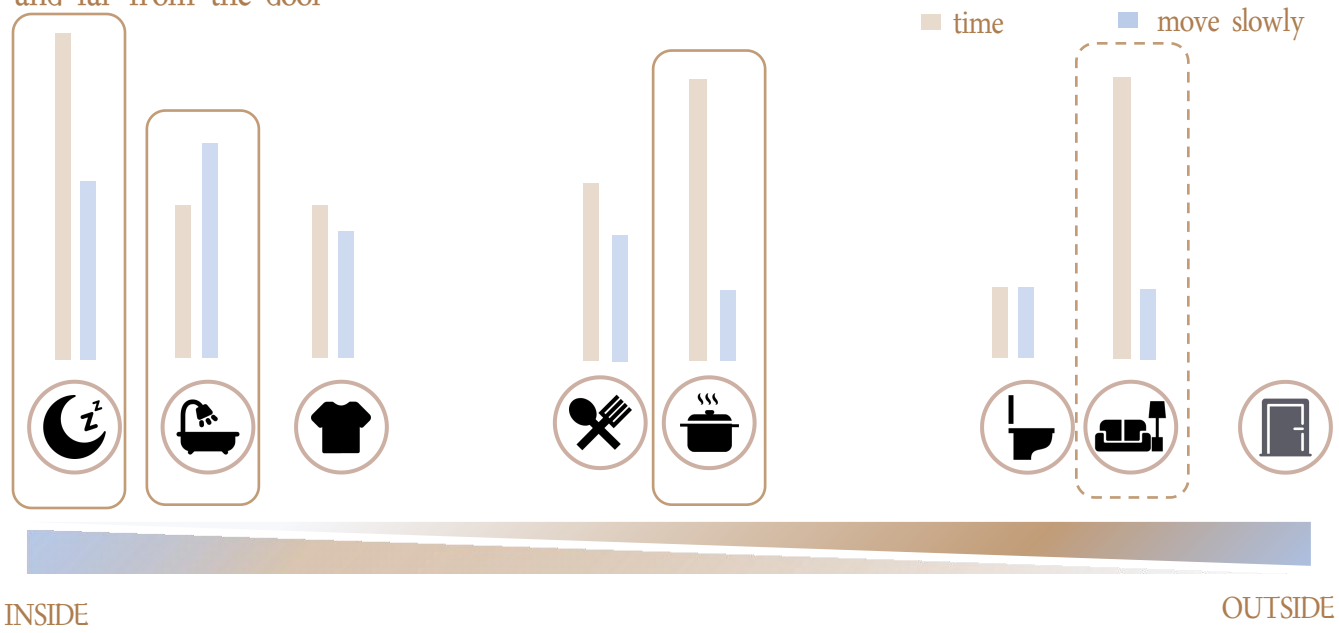
Domestic services	Door-to-door meal delivery, door-to-door bath assistance
Wellness service	Home care, body monitoring, health management
medical service	Online consultation, emergency first aid, medical files

Access control becomes important

Changes in the allocation of space resources



Choose to set up the entry control system when staying for a long time, moving slowly, and far from the door



The impact of smart elderly care service system on space

Old-age Service System Service Projects

Domestic services	Door-to-door meal delivery, door-to-door bath assistance
Wellness service	Home care, body monitoring, health management
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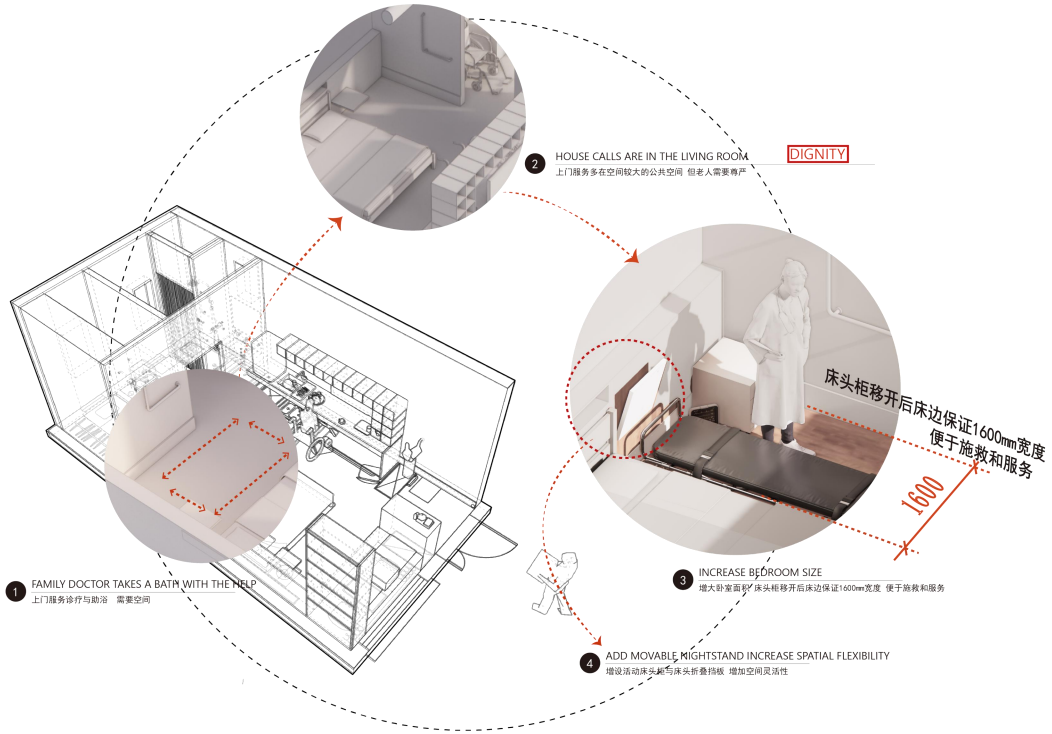
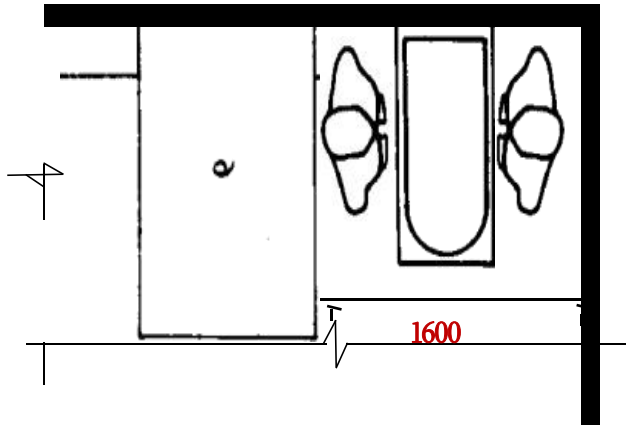
入户控制尤为重要

Changes in the allocation of space resources



Door-to-door service in public areas



Put more demands on the bedroom

Increased bedside space

Mobile bedside facilities

Summarize:

1、 Changes to Space Design by Fixed Facilities

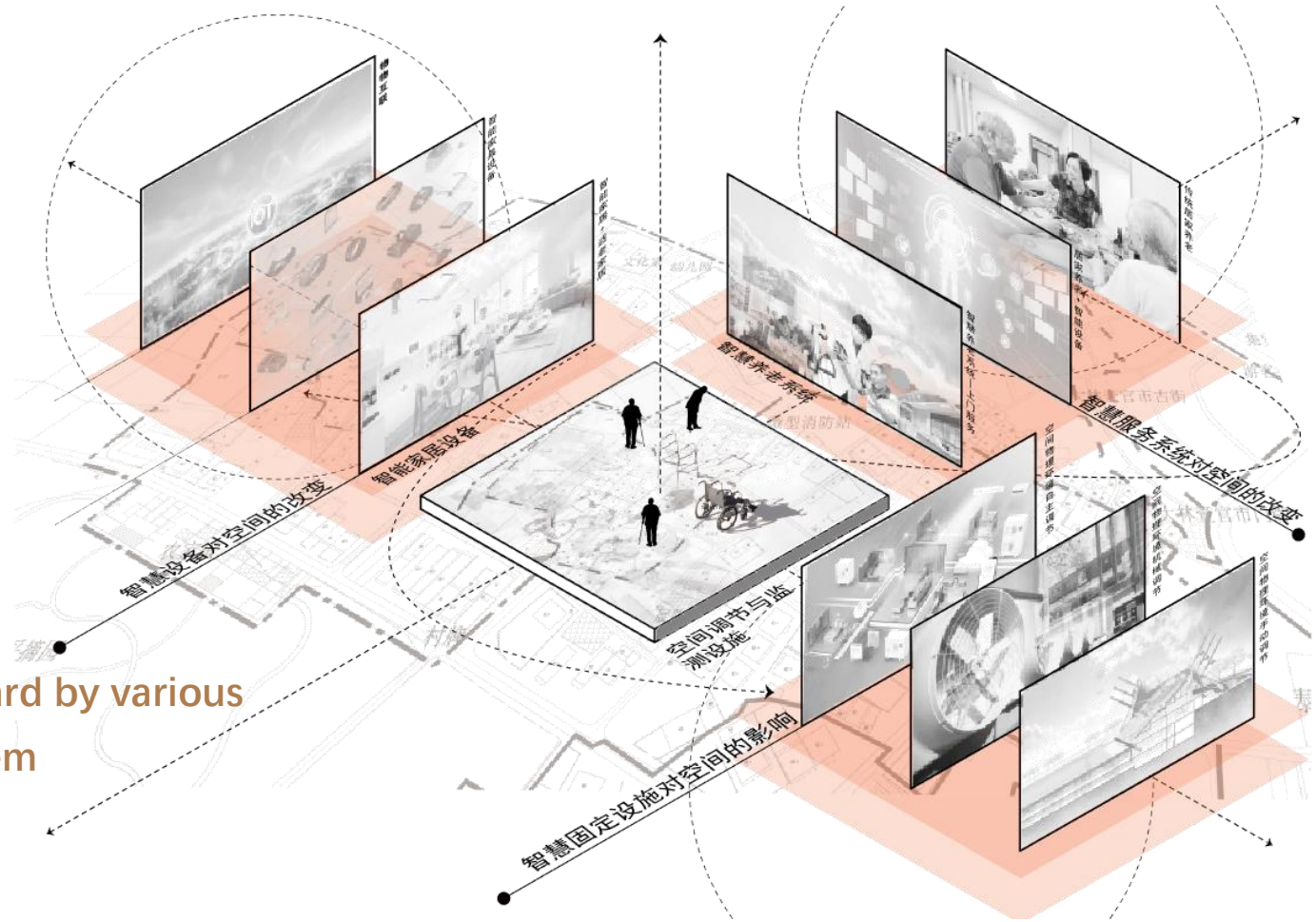
立面设计　天棚设计　环境调节　地面设计　灯光设计

2、 Terminal equipment changes to space design

控制方式　立面设计　材质选择

3、 The new requirements for space put forward by various services of the smart elderly care service system

空间组织　控制方式　立面设计　软装物品



Design application

3

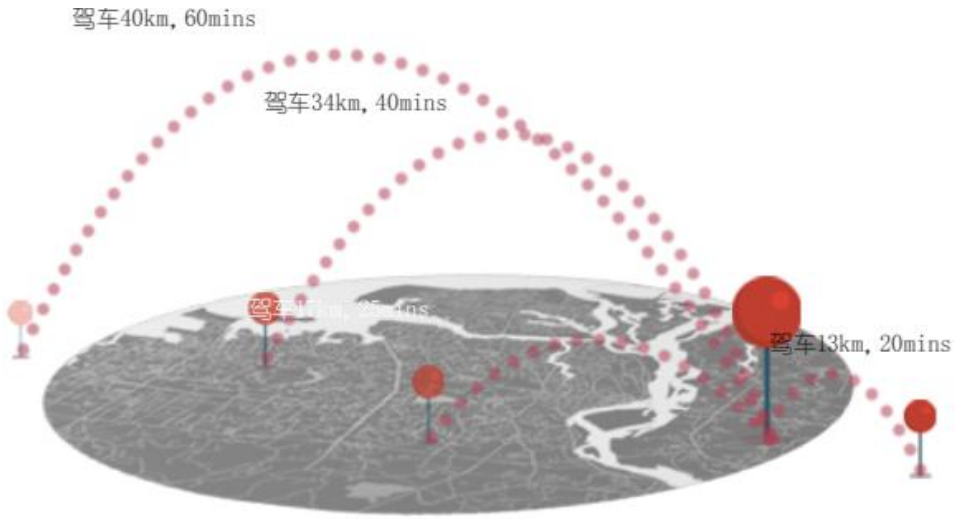
SITE

DOMESTIC AND ABOARD RESEARCH STATUS

Daojun Village, Haikou City, Hainan

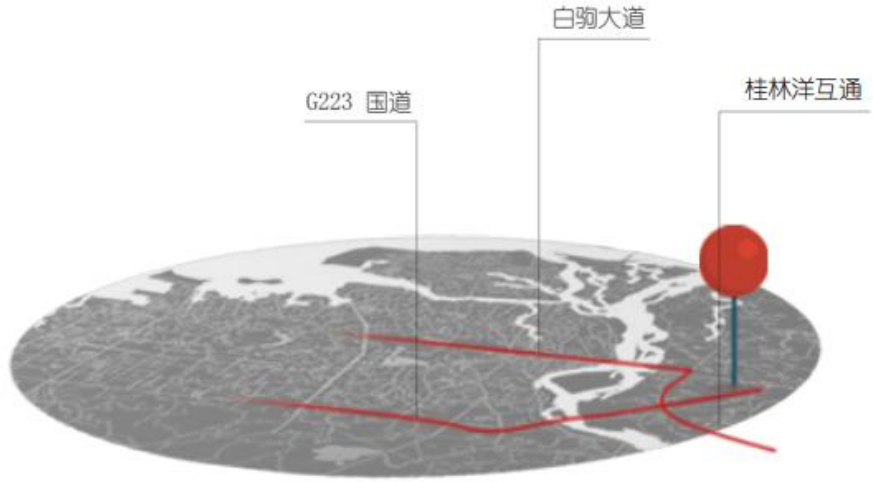
Daojun Village is located in Lingshan Town, Meilan District, Haikou City, only a 15-minute drive from Haikou. There are more than 80 households with more than 500 people in the village, and nearly 1,000 people go out. There are many elderly people in the village, the labor force is insufficient, and the overall income of the village is low. However, the village is rich in products, abundant in vegetation, beautiful in natural scenery, and has two former residences of celebrities, which are humanities and natural resources to be developed.

Geographical analysis map



道郡村距离海口市区仅17分钟车程。距离海口东站34km，四十分钟车程。距离海南美兰国际机场13km，驾车约20分钟。距离海口火车站约40km，驾车一个小时。

Main traffic road analysis map



道郡村周围有很多与市区和其他地区相通的道路。交通十分便捷

Traffic condition assessment:

Daojun Village has convenient transportation and a wide radiation area. It can not only serve the crowds in the urban area of Haikou well, but also can be easily reached by people from other places.

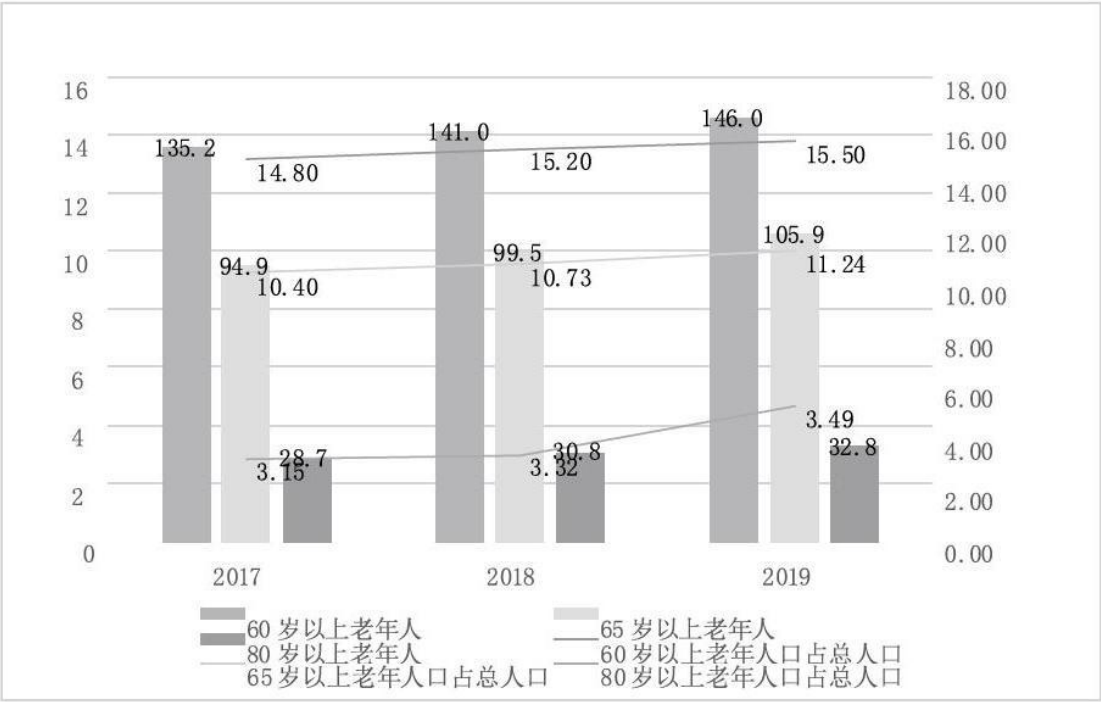


图 1. 2017-2019 年海南省老年人口数据相比图

According to the official survey report, last winter, from October 1, 2017 to April 30, 2018, there were as many as 1.65 million elderly people who went to Hainan for winter, of which 930,000 were over 60 years old, accounting for 56%. The registered population of the entire Hainan Province is only less than 9.3 million. It can be said that the elderly migratory birds who come to spend the winter are equivalent to 10% of the population of Hainan.

There are many elderly people who come to Hainan for winter care from other places

There is a large demand for elderly care in Hainan Province

人群 常住老人

年龄 > 60 岁

停留时间 1月 6月 12月

生态需求

人群 常住中壮年

年龄 30~ 60 岁

停留时间 1月 6月 12月

人群 常住青年、少年儿童

年龄 0~30岁

停留时间 1月 6月 12月

人群 务工返乡人员

年龄 15-55岁

停留时间 1月 6月 12月

人群 “候鸟”老人

年龄 > 60 岁

停留时间 1月 6月 12月

人群 “候鸟”老人陪同人员

年龄 < 60 岁

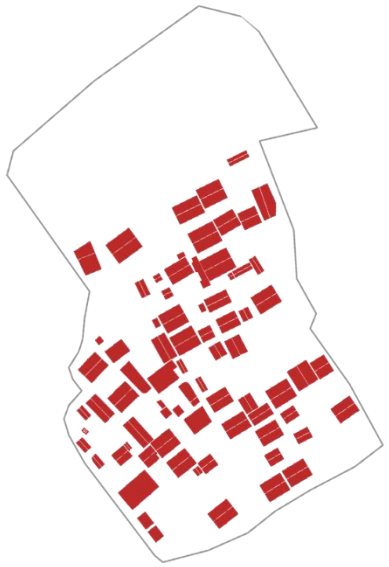
停留时间 1月 6月 12月

Crowd analysis:

The village is mainly dominated by the elderly, the folk customs are simple, and the hollowing is serious.

road analysis

道路杂草丛生，原始路线已无法使用需重新规划



Texture analysis

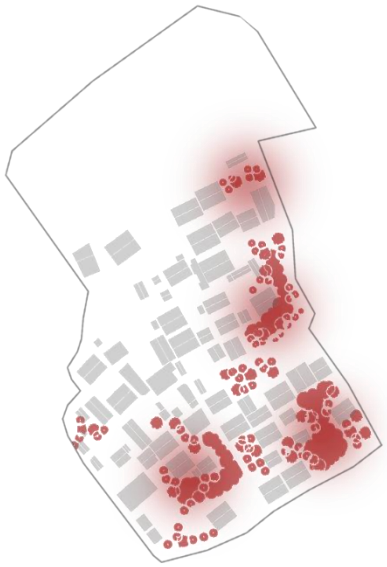
建筑以院落的形式存在，分布比较有规律，有较为规整的结构线。

cultural analysis

道郡村有名人故居、古树等 文化节点。另外还有自己典型的氏族、宗族文化、节日活动 等。文化脉络丰富

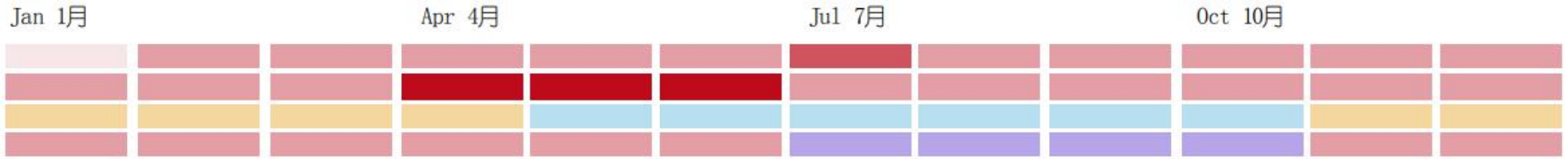
Terrain Analysis

道郡村地形比较平坦，十分适合老年人居住。方便老年人的出行



plant distribution

道郡村植物分布比较集中，植物种类繁多，具有多样性、趣味性、观赏性等特点。



平均气温最低月 17-20℃
多雨季
平均气温最高月 26-29℃
多热带风暴月份
多极端高温月份
少雨季

气候条件评估:

海南属热带季风气候，全年暖热，雨量充沛。这里长夏无冬，年平均气温22~27℃。年光照为1750—2650小时，光照率为50%—60%，光照充足，海南岛入春早，升温快，日温差大，全年无霜冻，冬季温暖，稻可三熟，菜满四季。

建筑满足抗风需求

建筑的保温功能

保证建筑的防潮效果

保持良好通风

SINGLE

COUPLE

HALF A DISABILITY

PEOPLE	local	Outlander
TIME	long-term	long-term
	shourt-term	

short——Smart Pension homestay

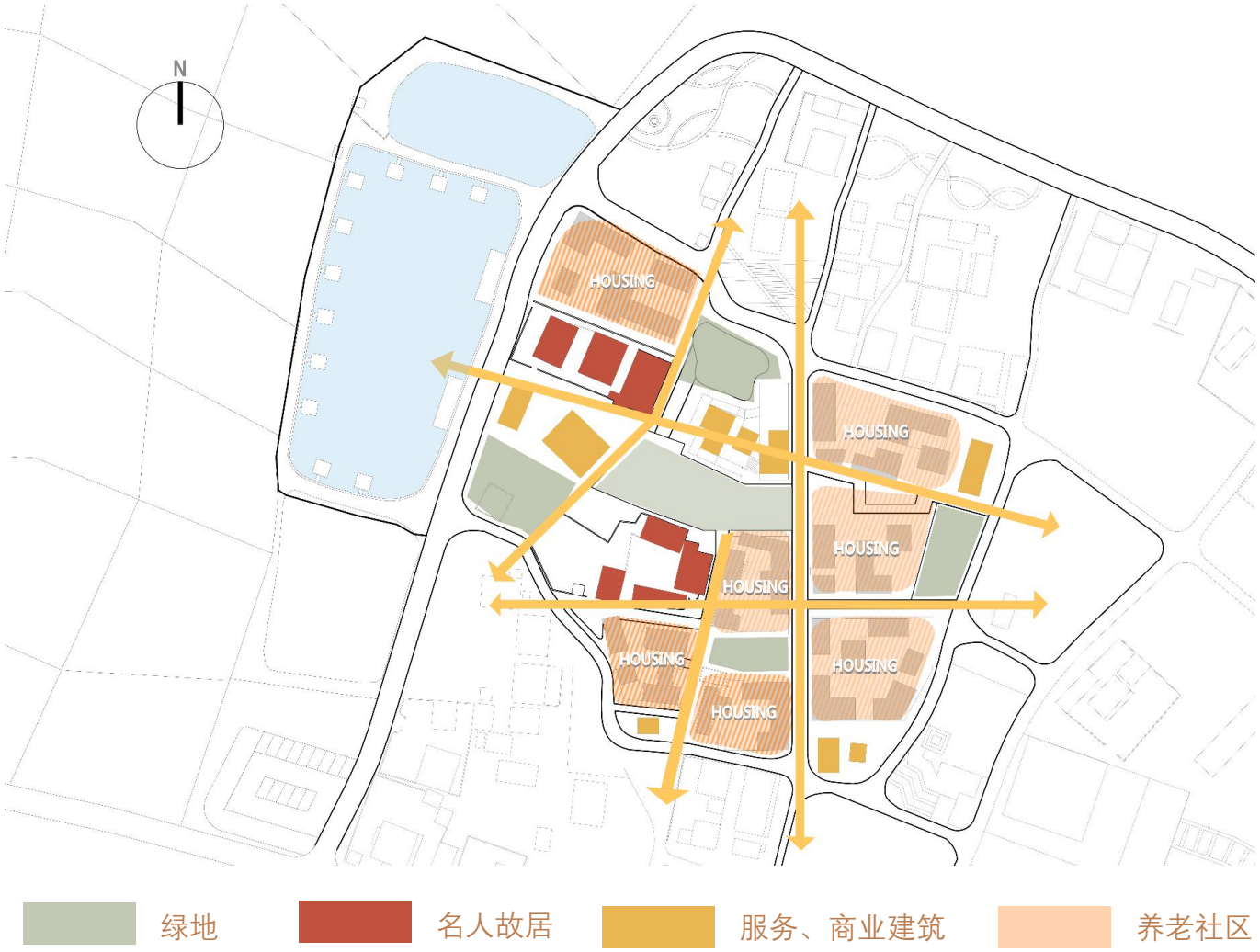
long——Smart retirement community

Divide the demonstration area into parts and design building groups to form courtyards.

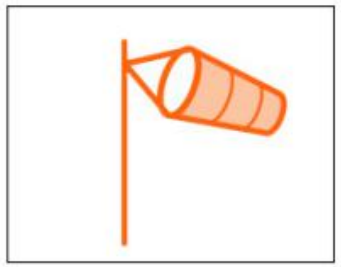
Independent courtyards can be managed independently as homestays. Several courtyard combinations can also be managed as retirement communities

道郡村示范区规划设计

DOMESTIC AND ABOARD RESEARCH STATUS



Re-plan the roads in Dogun Village, and design the roadway on the periphery. The building courtyards are distributed along the peripheral roads to facilitate the operation of fire fighting and ambulances. There are public green spaces within and between the courtyards.



通风问题

ventilation problems

烟囱效应

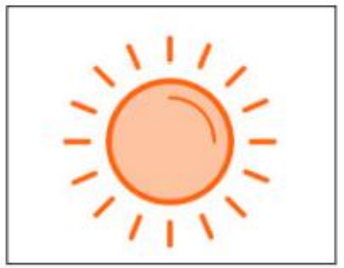
chimney effect

日晒、光照问题

long sun exposure

建筑隔离

Separating the building from the sun



太阳光利用问题

solar energy utilization

光伏板、太阳能电池

Photovoltaic panels

新材料技术

顶棚开口

基于CFD建筑室外风环境数值模拟技术

PHOENICS是 Parabolic Hyperbolic Or Elliptic Numerical Integration Code Series 几个字母的缩写，这意味着只要有流动和传热都可以使用PHOENICS来模拟计算。是世界上第一套计算流体与计算传热学商业软件。

弹性弯曲竹壳结构

竹壳结构不仅可以保证通风与散热，而且竹子这种材料具有较强的弹性。可以做出灵活而又顺滑的曲面。并且用碎屑网格壳进行链接，表面非常平整。如履平地。

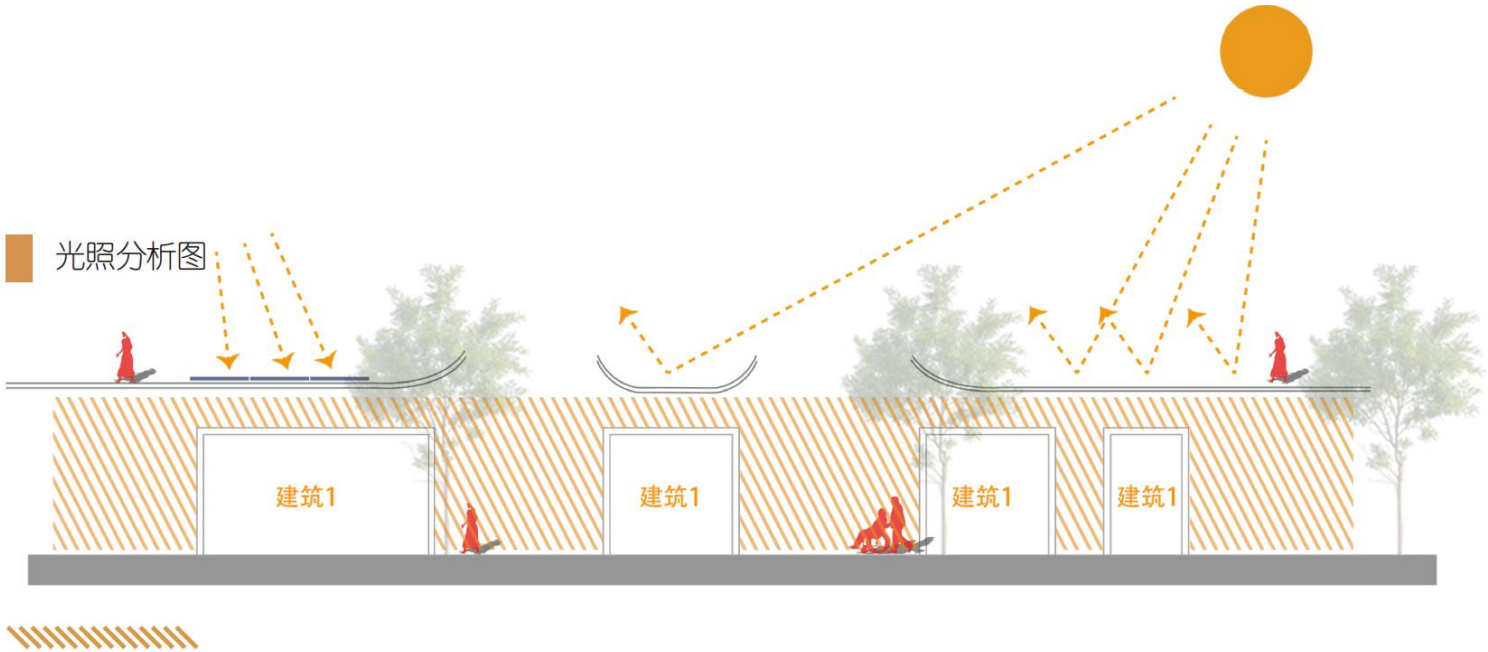
参数化设计

对新建顶棚的表面进行参数化设计。弯曲竹壳结构的搭接方式具有孔洞，通过参数化设计控制其空洞的疏密，以更好的控制场地的通风情况。

钙钛矿薄膜电池技术

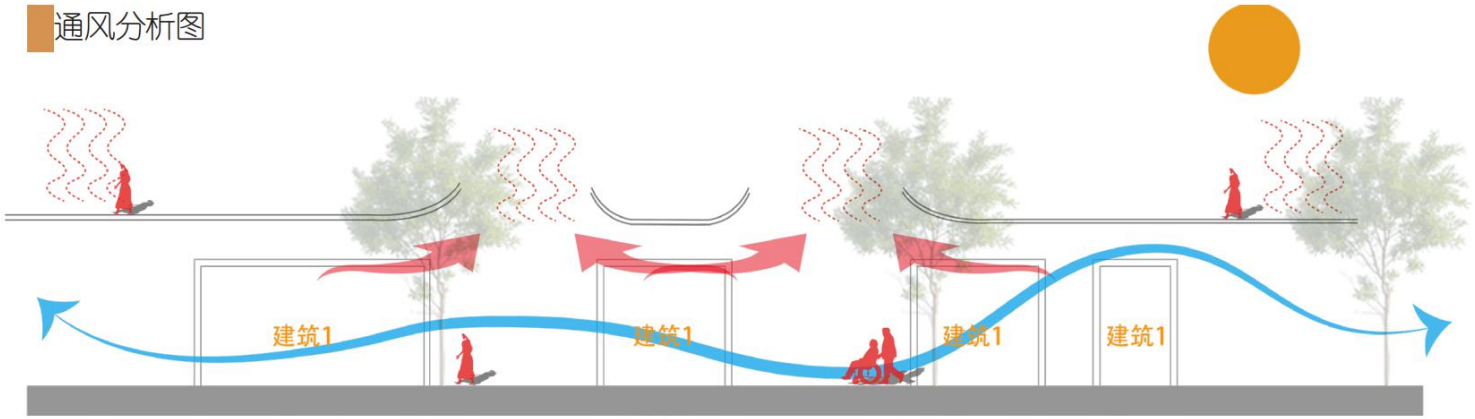
钙钛矿薄膜在光伏领域的应用取得了明显的进步，这主要是由于钙钛矿所具有的载流子迁移率高、扩散长度长、发光峰较窄等特性，此外低廉的成本也是钙钛矿薄膜材料广泛应用的原因之一。

光照分析图



The opening in the middle effectively takes away the rising hot air, and the left and right sides can be ventilated to ensure the freshness and coolness of the air in the space.

通风分析图



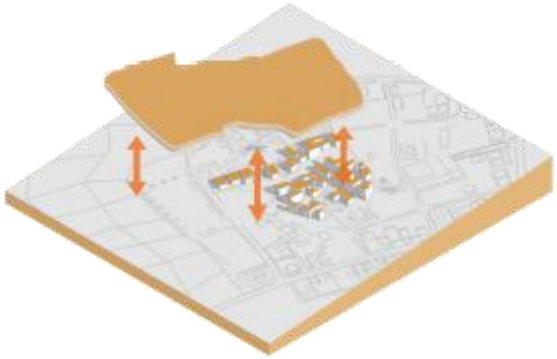
The canopy makes the roof of the building not directly exposed to sunlight and avoids direct sunlight, which can effectively reduce the indoor temperature.

I

道郡村示范区面积 23299.5 ㎡，包括两个名人故居，普通民居若干，风水塘一个。

II

将原建筑顶棚进行连接，形成整体性顶棚。

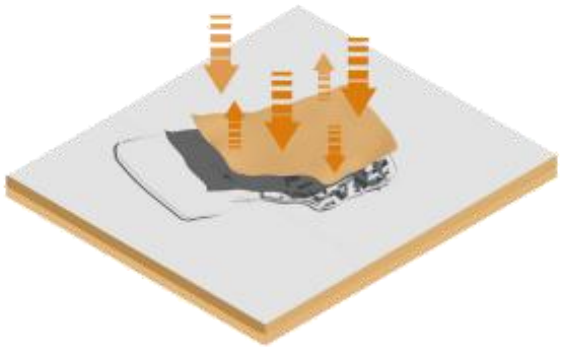


III

根据场地地形，与建筑走向，决定将顶棚进行曲率设计，增加起伏与层次感。

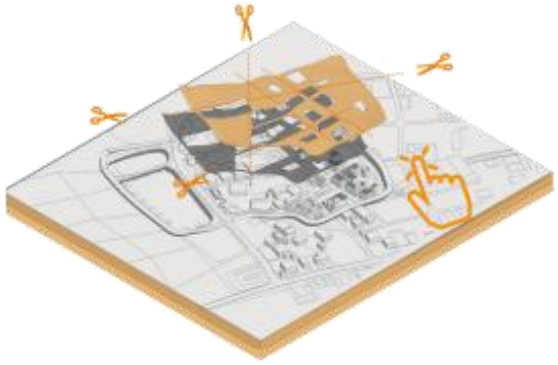
V

根据建筑高低和与地面接触的关系将屋顶进行部分的隆起和沉降。



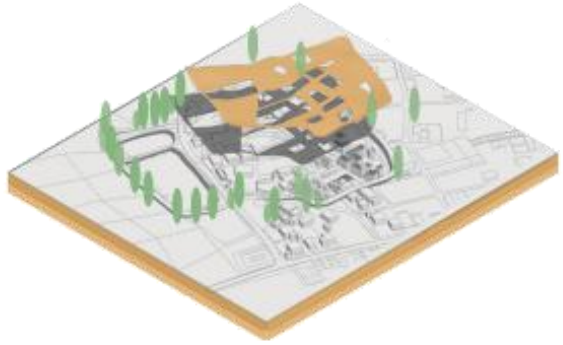
VI

在公共绿地和院落中庭部分开洞，保证采光的同时，让绿地的自然感更强。



VII

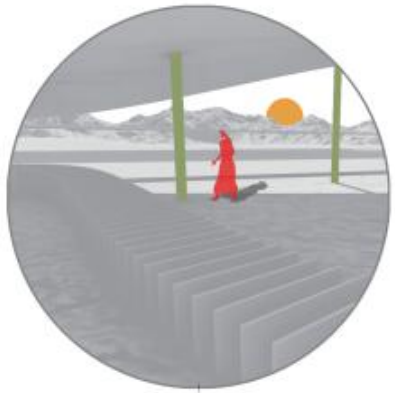
屋顶有社交功能区，在坡度较陡的部分设置光伏板，坡度较缓的部分设置功能区与通行步道。



入口部分设计高耸顶棚，营造场地的欢迎氛围。呈现场地的包容与接纳的特质。在顶棚下设计休息区，可以作为候鸟老人下大巴后的临时休息区，进行临时的休息和等待。

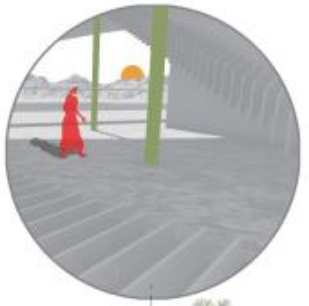
等待前广场

在顶棚下设计休息区，可以作为候鸟老人下大巴后的临时休息区，进行临时的休息和等待。



顶棚下休息区

顶棚下座椅区



Design of No. 1 Courtyard

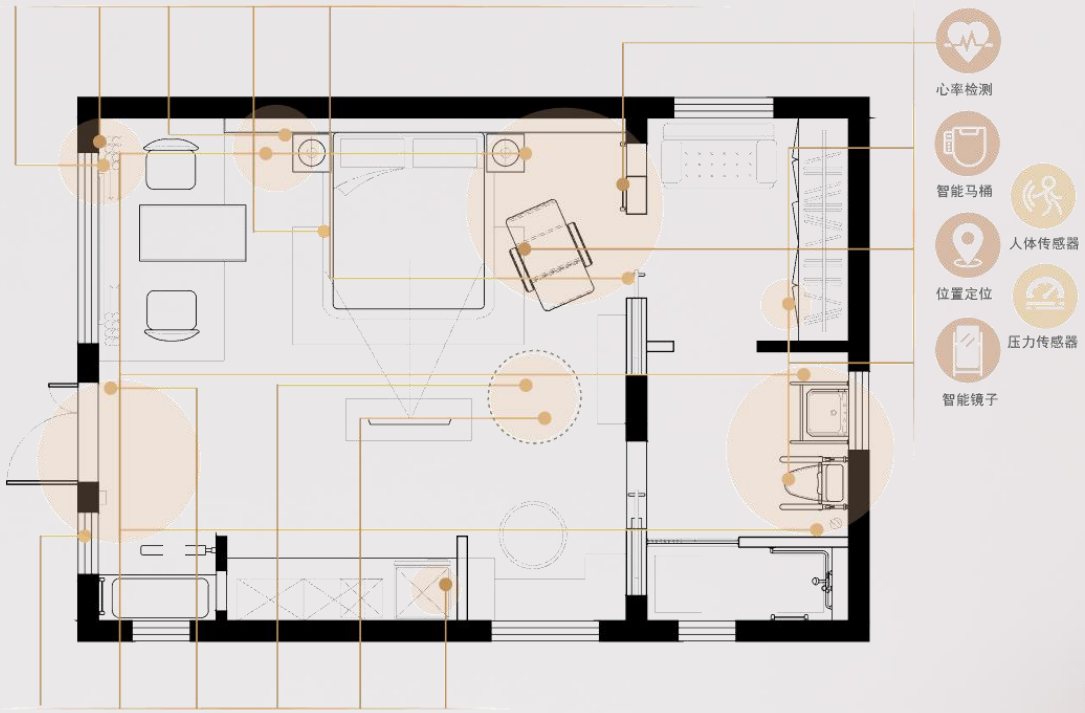
DOMESTIC AND ABOARD RESEARCH STATUS

火山石民居

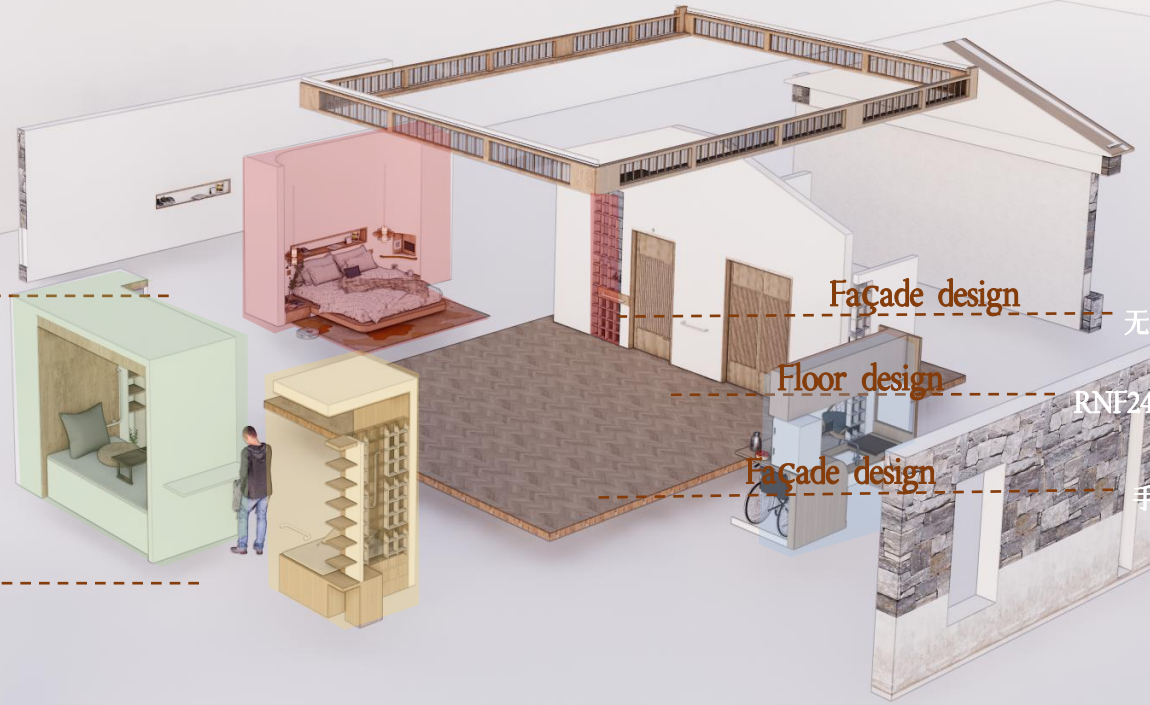
Interior Design of No. 1 Courtyard

DAO JUN VILLAGE NO.1 COURTYARD INTERIOR PLAN

智能窗帘 智能窗户 床头总控 灯光控制 自动平开门 雨量传感器 阳光传感器 压力传感器 人体传感器



人员识别 紧急按钮 水浸报警 烟感报警 空气监测 感应橱柜开关 人体传感器



sleep module

床侧人体传感器

床头控制系统

灯光模式

Leisure Reading Module

入口控制面板

entry module

智能门锁

entry module

Façade design

无接触电生理监测

Floor design

RNF2401压力地板

Façade design

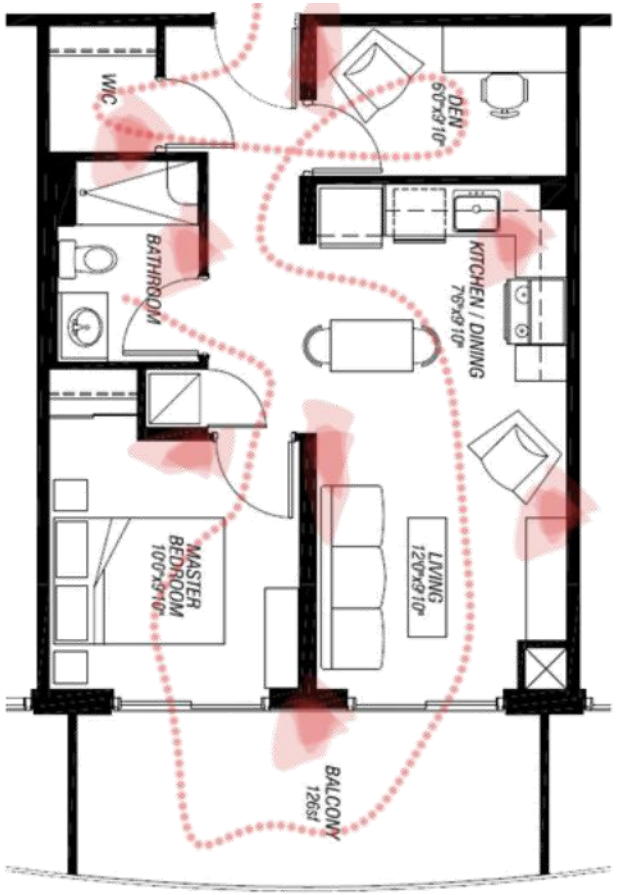
手势开关

Indoor Physical Environment Regulation Transformation

DOMESTIC AND ABOARD RESEARCH STATUS

Scattered and numerous control points

And all are active control points

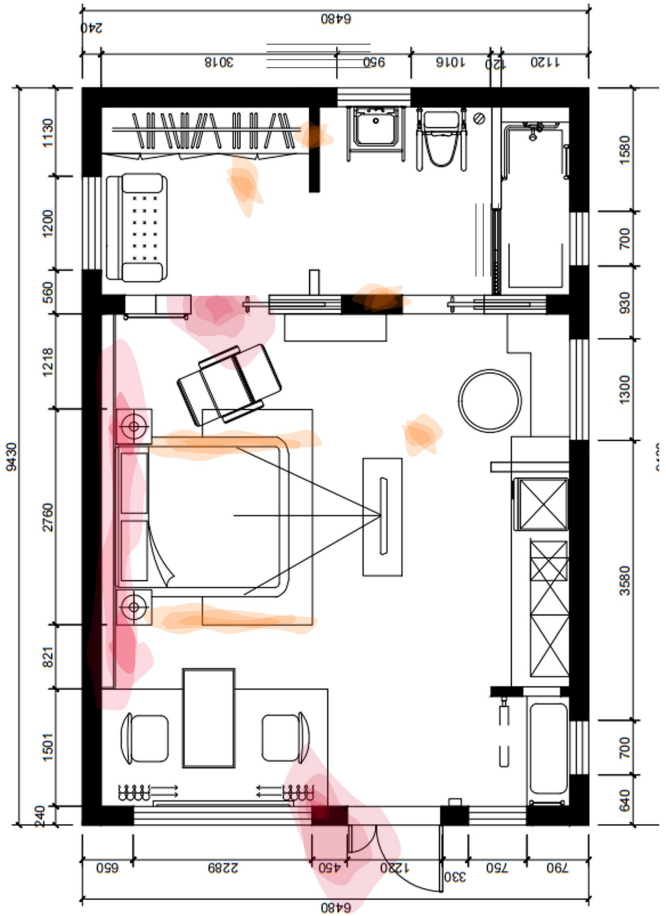


trinity ravine towers老年公寓

约 567sf 53㎡

Active control points are concentrated and the number is small

Orange is the sensor point, passive control space



约 54㎡

Centralized - scattered

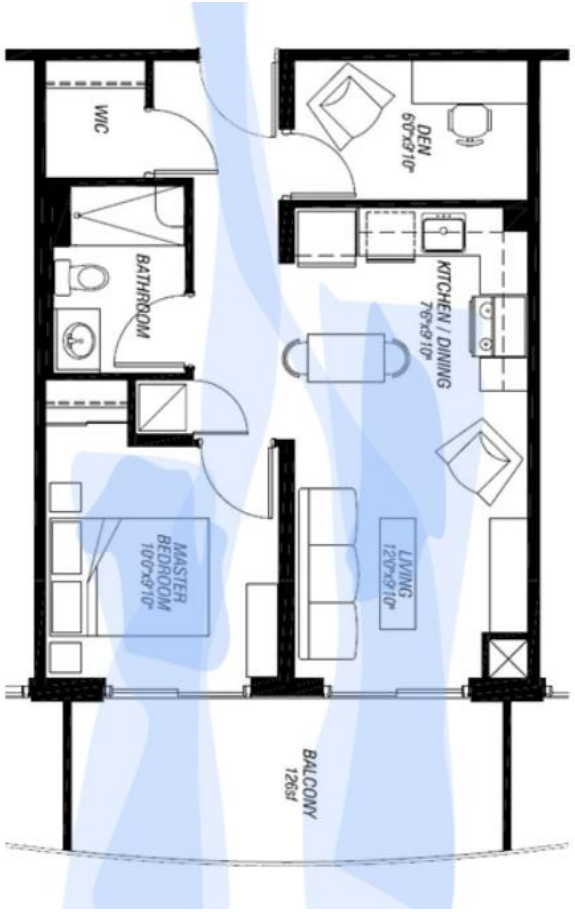
Active - Passive

Indoor Physical Environment Regulation Transformation

DOMESTIC AND ABOARD RESEARCH STATUS

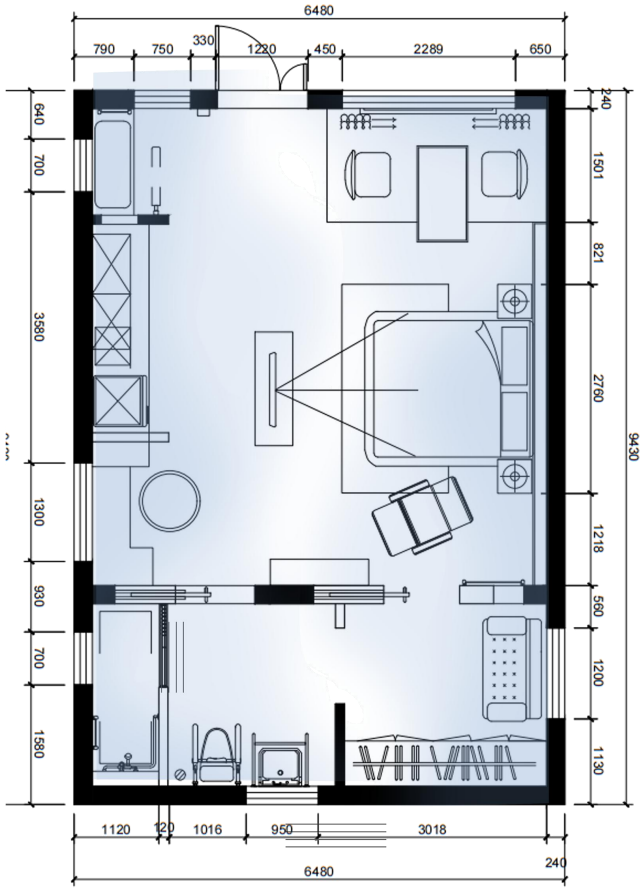
rely on windows

Airflow, temperature and humidity uneven



reduce reliance on windows

Air temperature and humidity uniform



1、Avoid confusion of wind direction and airflow

2、Energy saving and environmental protection

3. The temperature and humidity of the space are balanced

Capillary Air Conditioning System

DOMESTIC AND ABOARD RESEARCH STATUS

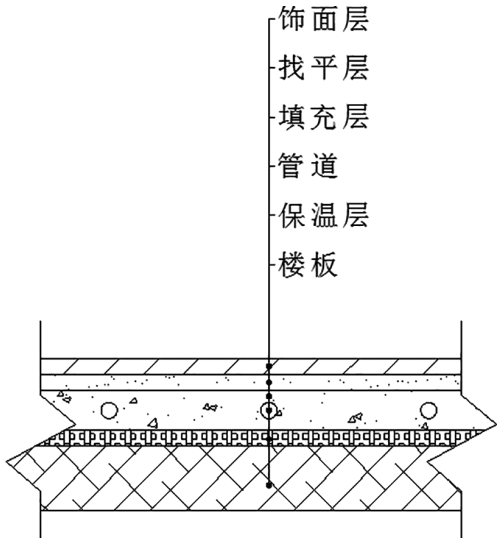
Capillary air conditioners originated in Switzerland, in the context of two severe energy crises in Europe in the 1970s

Constant Temperature

constant humidity

constant static

constant clean



INTERIOR DESIGN>MATERIALS SELECT

DOMESTIC AND ABOARD RESEARCH STATUS

Thermal conductivity and stability of different materials[1]

wood

供回水平均	室内空气	管间距/mm					
温度/℃	温度/℃	30		50		80	
		向上供热量/(W/m^2)	向下供热量/(W/m^2)	向上供热量/(W/m^2)	向下供热量/(W/m^2)	向上供热量/(W/m^2)	向下供热量/(W/m^2)
30	16	66.11	19.18	65.12	20.21	61.74	17.86
45	16	114.52	32.49	110.99	34.63	106.76	30.42

Brick

供回水平均	室内空气	管间距/mm					
温度/℃	温度/℃	30		50		80	
		向上供热量/(W/m^2)	向下供热量/(W/m^2)	向上供热量/(W/m^2)	向下供热量/(W/m^2)	向上供热量/(W/m^2)	向下供热量/(W/m^2)
30	16	100.43	19.07	96.55	19.93	91.69	17.54
45	16	173.63	32.45	168.92	34.19	158.22	29.57

Through experimental research, it is found that the stability and thermal conductivity of wood veneer are better than that of floor tiles, crushed stone and bean stone concrete.

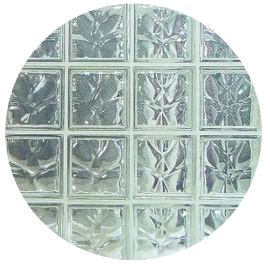
Penetration loss values for different obstacles

障碍物	范例	穿透损耗(dB)	最大允许数量
木材	分区	5	5
塑料	内墙	5	5
合成材料	分区	5	5
玻璃	窗户	5	5
薄砖墙	内墙和外墙	10	2
大理石	内墙	10	2
混凝土	外墙	14	1
钢筋混凝土	楼板和外墙	17	1
金属	防火门	20	1

Choose a material that is less attenuating to the signal

Wood floor

Wood facade



glass

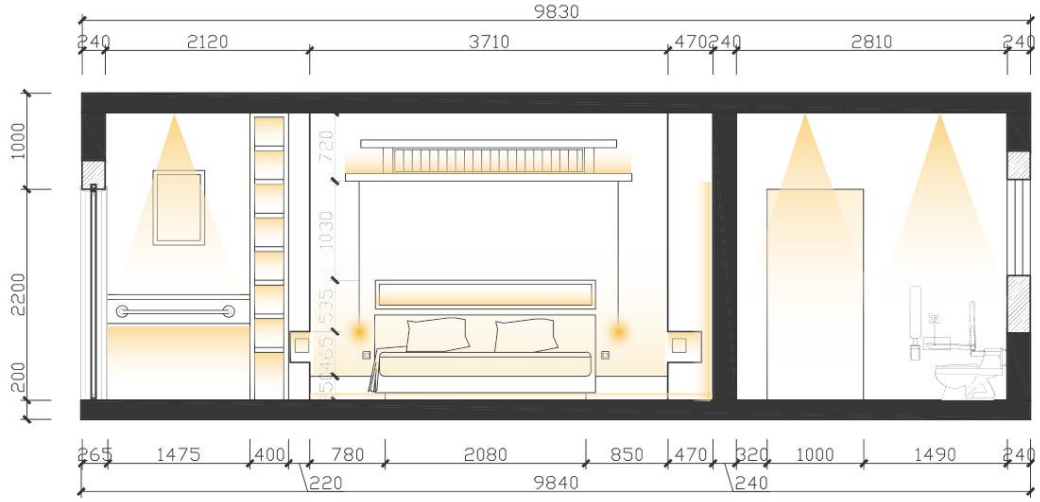
latex paint

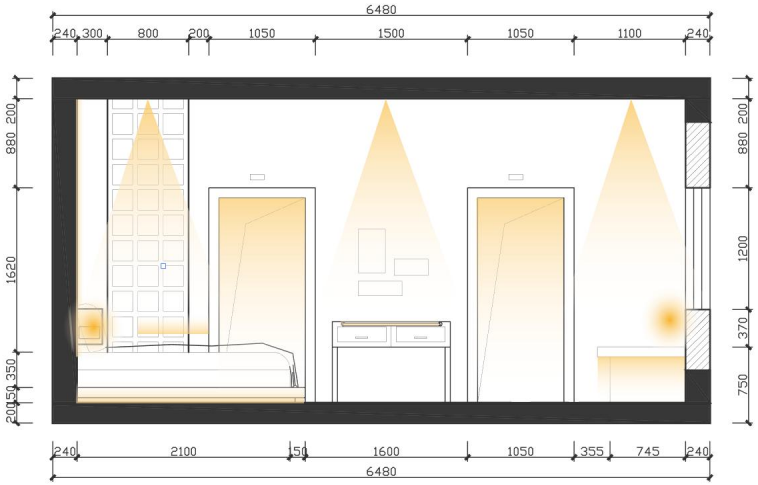
[1]罗新梅,王霁月,麻宏强,古家安,丁瑞祥,朱烈忠,陈海亮.毛细管辐射供暖地板材料对表面传热的影响规律[J].暖通空调,2021,51(S1):63-68.

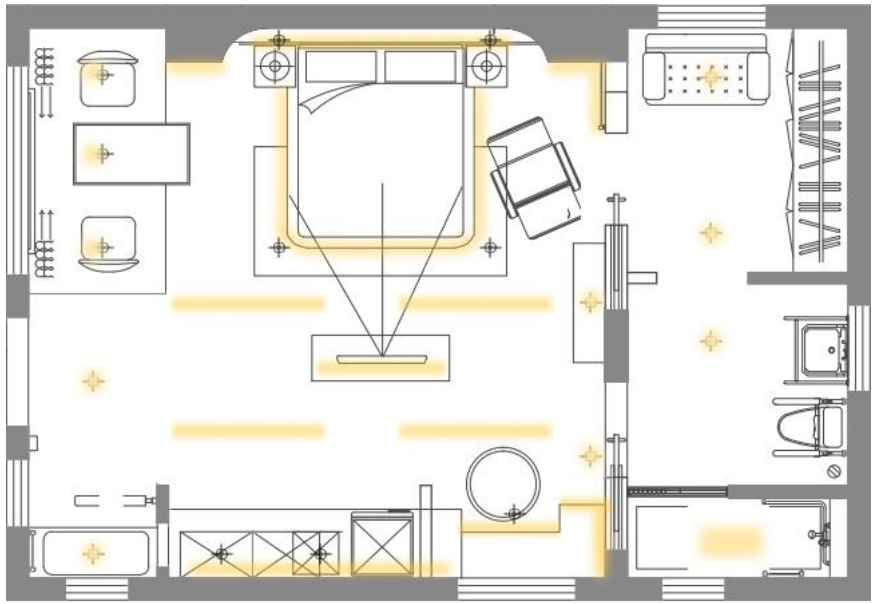
[2] 龚璐.墙体对WiFi信号传播影响研究[J].中国新通信,2020,22(17):55-56.

Interior lighting design

DOMESTIC AND ABOARD RESEARCH STATUS







Sopt light

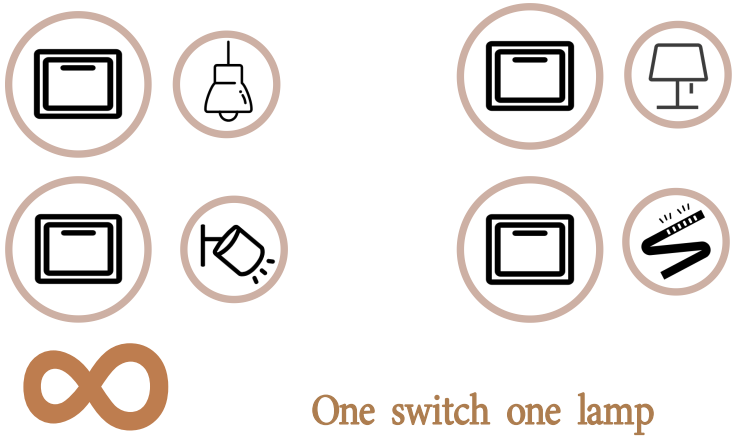
Line light

Panel light

Interior lighting design>> Lighting design similarities and differences

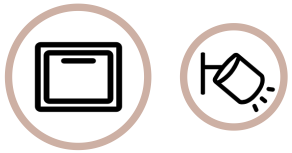
DOMESTIC AND ABOARD RESEARCH STATUS

Traditional lighting design



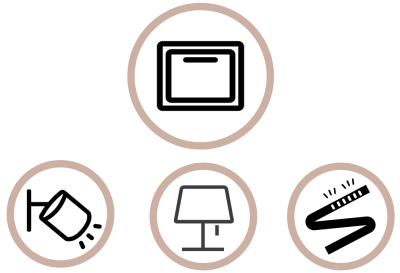
One switch one lamp

No main light

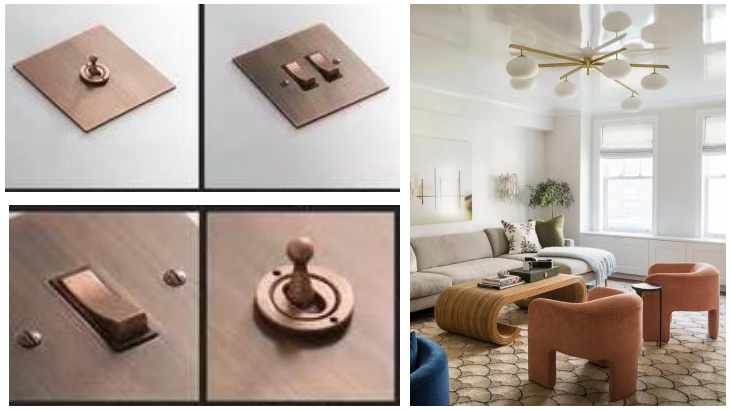


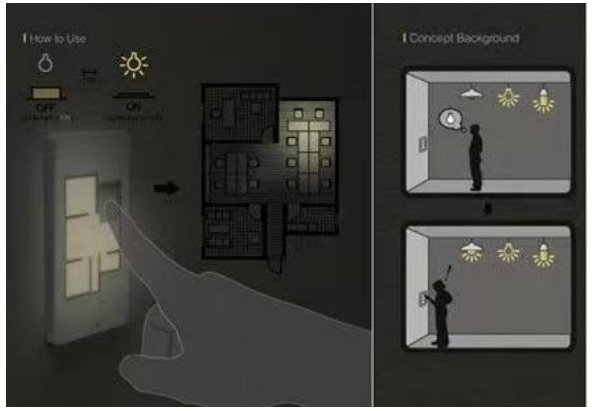
One switch one class of lamp

Smart space lighting design



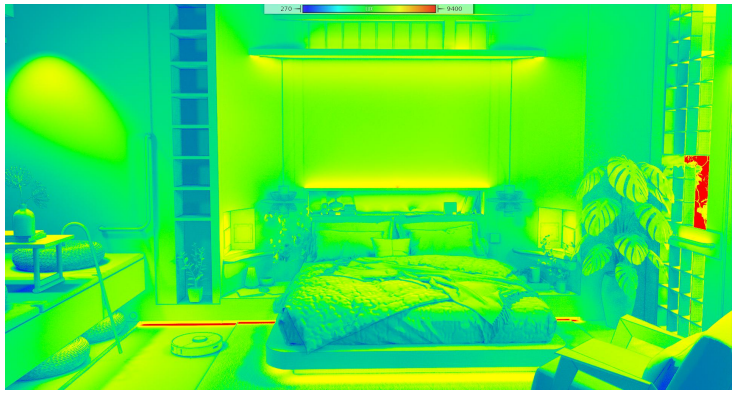
One switch one lighting mode





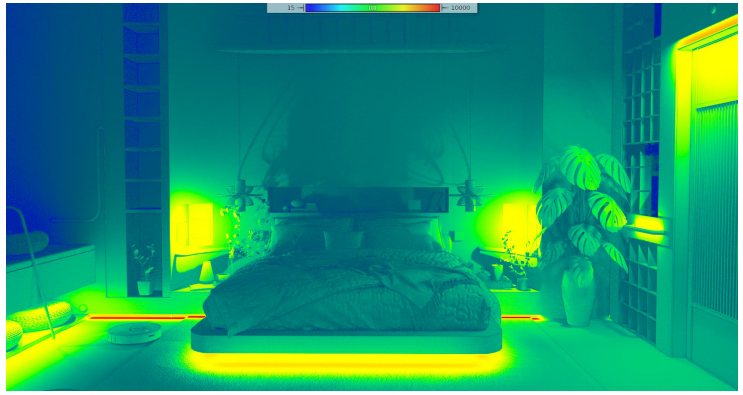
Interior lighting design>> lighting scene design

Night mode



Sleep mode

Go to toilet

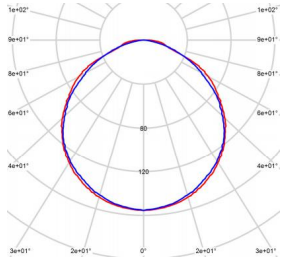


Night mode150-300lux reading and working place 600lux, sleep mode about 10lux, when go to toilet at the middle night have to under 1 lux [1]。

[1] Brown, Timothy M., George C. Brainard, Christian Cajochen, Charles A. Czeisler, John P. Hanifin, Steven W. Lockley, Robert J. Lucas et al. "Recommendations for daytime, evening, and nighttime indoor light exposure to best support physiology, sleep, and wakefulness in healthy adults." PLoS Biology 20, no. 3 (2022): e3001571.

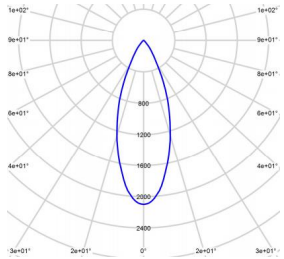
Interior lighting design>>MAIN LIGHTS

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



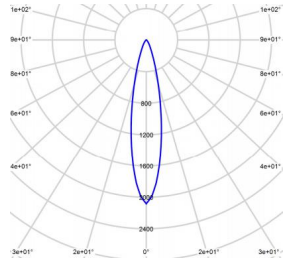
Product number	70081476
P	3.0w
Φ	432 lm
Light efficiency	144.0 lm/W
Color	3259k

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

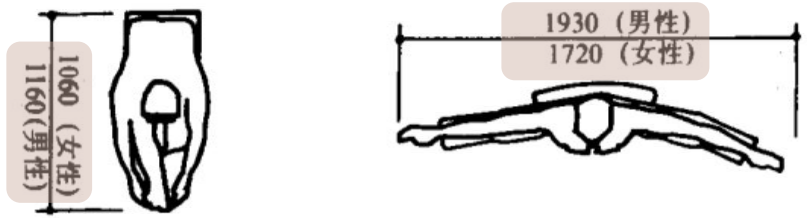
注：以上灯具数据均来自雷士照明官网，使用DIAlux进行灯光数据模拟

Interior Design>>Bedside Control Module Design

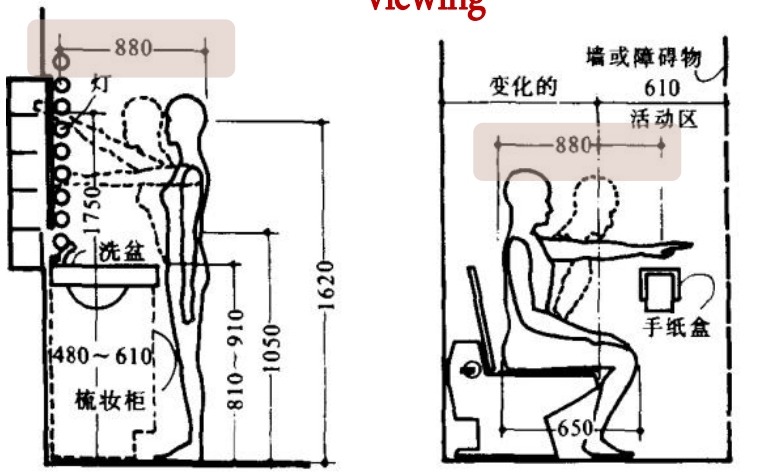
DOMESTIC AND ABOARD RESEARCH STATUS

Line of sight parallel to panel - difficult to see

Line of sight perpendicular to panel - easy viewing



单臂臂展尺度

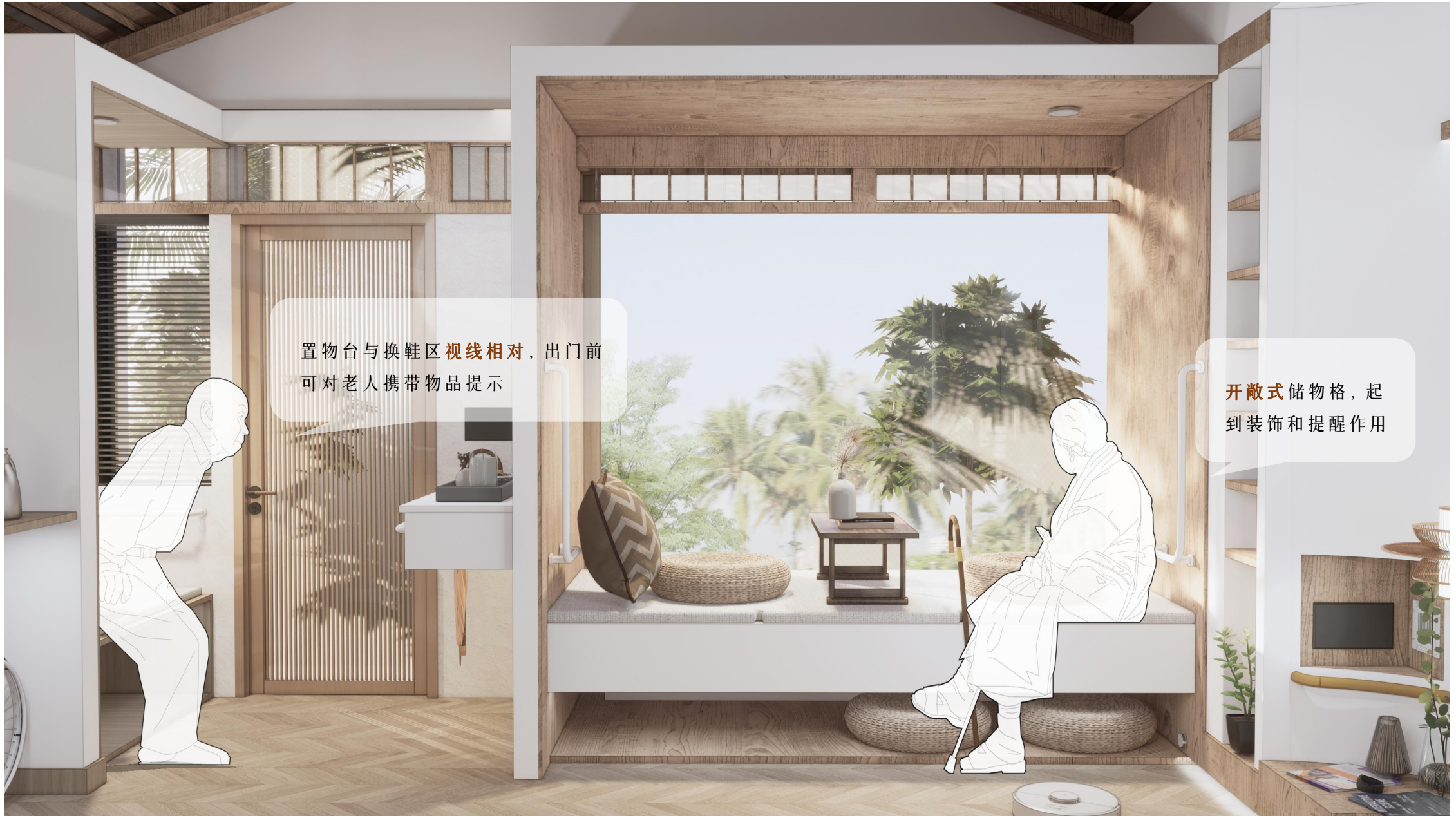


单臂操作半径


再也不用起身开关灯了，侧头
可视控制面板，
设置与床头正对的壁龛，老人
无需起身，侧头即可控制


轻触台面侧边按钮，就可以打开顶柜取物，顶柜设置电动下拉栏，真是方便！
我的拐杖也有座位呢！


玄关处设置开敞储物格
轮椅收纳与墙体、简餐操作面齐平，
避免摆放不当绊倒老人
开敞式鞋柜


置物台与换鞋区视线相对，出门前
可对老人携带物品提示
开敞式储物格，起
到装饰和提醒作用


扶手下安装电生理
检测器
人走过，门自动开启

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