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EXPLORING INTERIOR SPACE DESIGN IN THE ERA OF INTELLIGENT INTERNET ENVIRONMENTS

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***Abstract*—As per the modernization towards the lifestyle, traditional interior design methods struggle to meet rapidly evolving needs. Nowadays, Integrating Internet thinking about Interior design has emerged as a crucial trend. This approach enhances efficiency, accurately addresses user needs, and drives the development of intelligent interior spaces. Home automation has become a cornerstone of connected living, offering the ability to control various aspects of home with just a touch or voice command. By leveraging Internet thinking, designers can better comprehend user requirements and translate them into practical solutions. Additionally, it fosters innovation, allowing the fusion of modern technology with design to create more intelligent and humanized spaces. This synergy not only boosts the quality and quantity of design products but also enhances user experiences and opens new avenues for industry growth. Smart home products, such as smart lighting and appliances enabled by Internet technology, are becoming integral to interior design.**

***Keywords*—Internet thinking, Interior design**

I. INTRODUCTION

Internet thinking represents a paradigm shift in cognitive and operational approaches influenced by the Internet's development and application [1]. This concept has permeated various sectors, establishing itself as a crucial mode of thinking in modern society. Internet thinking emphasizes information sharing, openness, interaction, and innovation, embodying a user-centred approach that prioritizes rapid response and continuous improvement) [2].

Several key characteristics define Internet thinking. Primarily, it underscores the importance of information sharing and openness, moving away from traditional information hoarding towards collaborative knowledge dissemination [3]. Additionally, it promotes interaction and equality, encouraging proactive engagement and communication rather than passive information reception. Innovation and agility are also central to this mindset, advocating for swift iteration and adaptation to dynamic environments [4]. Furthermore, Internet thinking prioritizes user experience and personalized service, focusing on meeting individual needs and enhancing service quality.

Interior design involves the strategic planning and organization of interior spaces to achieve aesthetic, practical, and functional objectives [5]. The primary aim is to create environments that are visually appealing, comfortable, and functionally compliant. This multifaceted discipline includes elements such as furniture, lighting, colour schemes, and material selection to create enjoyable living or working spaces.

Space planning is a critical aspect of interior design, requiring careful consideration of room function, flow, ventilation, and lighting to optimize space utilization. The layout must balance functionality with spatial harmony and visual comfort. Additionally, the choice and placement of furniture and decorations are vital, contributing to the space's personality while ensuring overall coherence and coordination Colour and lighting play pivotal roles in interior design. Appropriate colour combinations can evoke different atmospheres, while strategic lighting enhances space brightness and comfort. Designers must skilfully use these elements according to room orientation and functional requirements to achieve the desired interior expression.

Material selection is another crucial consideration, affecting not only the aesthetic and tactile qualities of an interior but also its comfort and durability [6]. Modern interior design increasingly incorporates eco-friendly materials and smart home technologies, requiring designers to consider these innovations to enhance space quality and functionality.

Traditional design often employs darker colour palettes, making spaces appear dim and uninviting, particularly in low-light environments. Modern preferences lean toward brighter, more refreshing colours that create lively and comfortable atmospheres. Additionally, vintage furniture and decor, typical of traditional design, often require meticulous maintenance, posing challenges for busy lifestyles.

Moreover, traditional design may not align well with modern functional needs and lifestyles. Its fixed layouts and furniture arrangements can be inflexible, limiting adaptability for multi-functional, efficient living. Consequently, traditional

design's space utilization may fall short of contemporary living requirements.

II. PROPOSED METHODOLOGY

Integrating Internet thinking with interior design has introduced significant innovations and conveniences [7]. This synergy enhances the ability to meet personalized user needs, improves design efficiency, and expands the scope of design services.

Table 1. List of References

Reference	Work Done	Limitations
Crawford (2006)	Defined Internet thinking	Limited to conceptual framework
Carlgren et al. (2016)	Examined characteristics of Internet thinking	Lacks empirical validation
Metzger et al. (2010)	Studied information sharing and openness	Focuses on general information dissemination
Chan et al. (2019)	Investigated innovation and agility in Internet thinking	Limited application in specific fields
Walsh & Godfrey (2000)	Explored user experience and personalized service	Dated perspective on user-centric approaches
Celadyn (2019)	Discussed principles of interior design	Overlooks technological advancements
Erell et al. (2012)	Analyzed space planning in interior design	Focuses on traditional design methods
Yu et al. (2011)	Examined furniture and decoration placement	Limited to aesthetic and functional aspects

Internet thinking emphasizes personalized user needs, influencing interior design to adopt similar approaches Utilizing big data and intelligent algorithms, designers can better understand user preferences and habits, offering tailored design solutions. Online platforms enable users to submit their requirements, allowing designers to create bespoke solutions that match user tastes [7]. Additionally, Internet thinking drives innovation in design tools and technologies. Virtual reality and digital design tools allow for intuitive presentation of design concepts, giving users clearer insights into final outcomes and facilitating efficient design and communication processes. Table 1 represents the literature study done and also there are comparisons between them on the basis of various approaches involved.

This study employed a mixed-methods approach to gain an in-depth understanding of the current application of interior design in outpatient department settings influenced by Internet thinking, as well as the psychology of users. The methodology included on-site field surveys, interviews, and questionnaires to collect comprehensive and accurate data. The on-site field survey involved in-depth interviews with healthcare workers, patients, and related staff in the outpatient department. This method facilitated the collection of first-hand information regarding problems encountered during medical treatment, environmental discomforts, area needing improvement, and overall user experiences and needs. The interviews provided a direct, face-to-face communication platform, enabling a nuanced understanding of user sentiments and requirements, thereby offering a strong foundation for design enhancements. The survey targeted the main users of the outpatient departments in general hospitals across various cities and grades. The respondents included patients, hospital staff, and companions from selected hospitals. Table 2 lists the hospitals where the surveys were conducted:

Table 2. Selection of Hospital Survey Examples

City	Hospital Name
Harbin	The First, second , third and fourth Affiliated Hospital of Harbin Medical University
Chongqing	The First, second Affiliated Hospital of Chongqing Medical University
Dongying	Dongying Shengli Oilfield Central Hospital
	China University of Petroleum (East China) Hospital
Rizhao	Rizhao Central Hospital

The questionnaire method was selected for its broad reach, enabling the simultaneous engagement of numerous respondents and collection of diverse opinions that reflect the broader population. Anonymity facilitated honest and candid responses. The quantitative nature of questionnaire data allowed for statistical analysis, facilitating easy comparison and summary. The interview method provided deeper insights into respondents' views, feelings, and experiences. Interviews allowed for real-time question adjustments based on responses, offering flexibility and targeted data collection. This qualitative approach enriched the understanding of the quantitative data obtained from questionnaires, ensuring a comprehensive analysis.

The combination of these methodologies provided a robust framework for understanding the current application of interior design in outpatient departments under Internet thinking. This approach offered both the breadth and depth needed to capture a holistic view of user experiences and preferences, informing future design improvements and innovations.

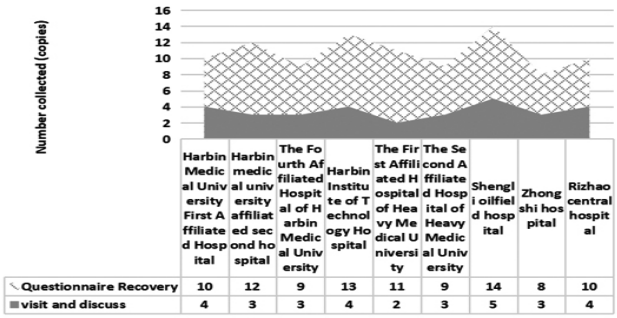

Fig. 1 Outpatient department research statistics results

Analysis of the design of the counseling space

Optimizing intelligent services in the guidance area: the choice and percentage of patient guidance methods in this case are shown in Table 3:

Table 3. Choice and percentage of patient guidance modalities

Mode name	Proportion of
Micro robots around lead the way.	9.09%
Hospital electronic map.	15.15%
Mobile phone navigation.	16.67%
Look at the guide sign.	19.70%
Ask the staff for directions.	39.39%

According to Table 3, it can be seen that 39.39 per cent of patients and their families preferred to ask the staff when they could not find their destination in the hospital, which shows that even though smart devices can replace the staff, face-to-face questioning is still very much needed.

Improvement of self-service operation in the registration area: The proportion of patients choosing the registration method is shown in Table 4:

Table 4. Proportion of patients' choice of registration method

Registration method	Proportion of
Online appointment registration	28.79%
Site registration	71.21%

It can be seen from Table 4: despite the popularity of online booking nowadays in all general hospitals, 71.21% of the patients still chose the mode of on-site booking in the survey.

Strengths of the use case

1. Ability to meet the demand for the number of people on the waiting list: the proportion of the number of people attending departments in general hospitals is shown in Figure 2:

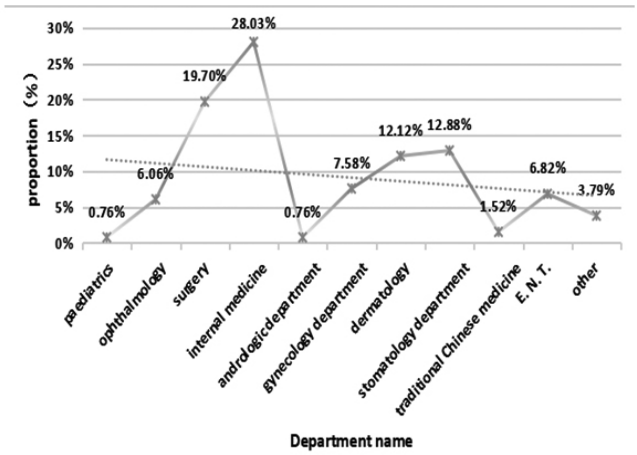

Fig. 2 Proportion of the number of people in medical departments

According to Figure 2, the number of outpatient visits to medical and surgical departments in general hospitals far exceeds that of other departments, so hospitals need to provide more waiting space for medical and surgical departments.

2. Ability to divert the attention of waiting patients: the statistics of chaperones' intention to accompany time are shown in Figure 3:

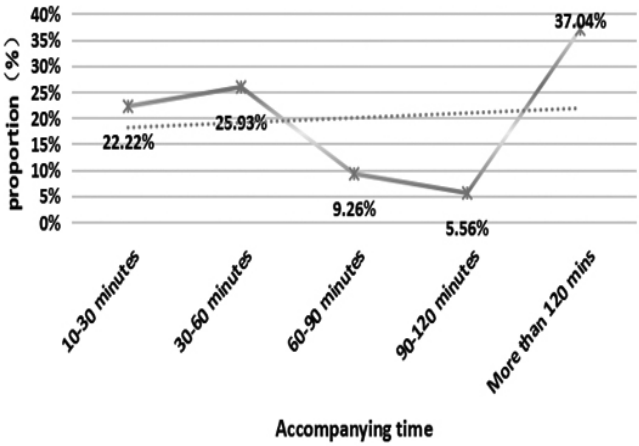

Fig. 3 Statistics of Accompanying Time Intention of Accompanying Personnel

According to Fig 3: 37.04% of the chaperones chose an acceptable waiting time of two hours or more, which indicates their acceptance of long waiting times at the hospital.

3. Upgrading the seating function in the waiting area: the tendency of patients and accompanying staff to move around while waiting is shown in Table 5.

Table 5. Activity tendency of patients and chaperones while waiting

Activity name	Proportion of
Listen to music, watch movies and play games.	57.41%
Understand the medical common sense displayed in the hospital.	46.30%
Read books, magazines and newspapers.	33.33%
Enjoy the exhibition provided by the hospital.	22.22%
Have tea and chat with others.	22.22%
Sit still and wait.	1.85%
Other	1.85%

It can be seen from Table 5: those who tend to listen to music, watch films and play online games while waiting for medical treatment account for the largest proportion of activity items, about 57.41%. Those who wished to learn about general medical knowledge accounted for 46.3%, and those who tended to sit still and wait accounted for the least.

III. RESULTS AND DISCUSSION

Improving spatial permeability: the clinic interface permeability intention is shown in Table 6:

Table 6. Clinic interface permeability intention

Patient's intention		Doctor's intention	
Permeability	Proportion of	Permeability	Proportion of
Semi permeable	50.76%	Semi permeable	51.02%
Completely closed	43.18%	Completely closed	24.49%
Completely permeable	6.06%	Completely permeable	24.49%

1. According to Table 5: 43.18% of patients and 24.49% of healthcare workers preferred complete separation of internal and external views during the visit. Whereas 50.76% of patients and 51.02% of health care providers preferred semi-permeable spatial interface. Only 6.06% of patients and 24.49% of doctors in the survey wanted the consultation room to be completely permeable.

2. To meet the diversified use of demand: medical staff clinic home needs as shown in Figure 4:

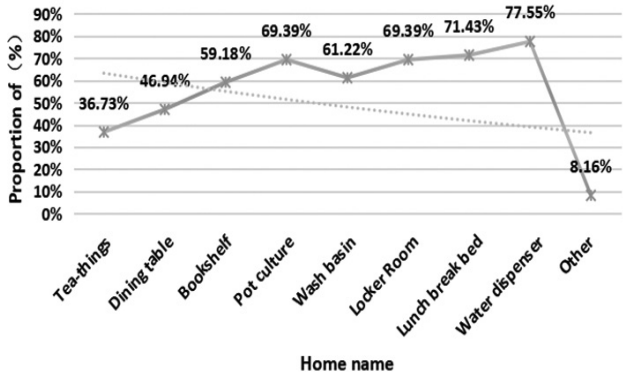

Fig. 4 Home demand of medical staff's consulting room

According to Fig 4, it can be seen that: 77.55% of the medical staff want the department to be equipped with water dispensers; 71.43% of the medical staff want the department to be equipped with lunch beds, and it is found in the statistics that the medical staff have a higher degree of appeal to the demand for green plants and bookshelves, which account for 69.39% and 59.18% respectively.

IV. CONCLUSION & FUTURE SCOPE

Guided by Internet thinking, the interior design industry is evolving towards digitalisation, personalisation, and intelligence. The integration of emerging technologies such as the Internet of Things (IoT), big data, and artificial intelligence (AI) promises to make interior design more attuned to people's lives and better equipped to meet the demand for improved living environments.

Looking ahead, the interior design industry will increasingly integrate with IoT and AI technologies to achieve more intelligent, personalised, and humanised design solutions. Designers will prioritize creating environments that enhance user interaction, comfort, and satisfaction. Effective communication and collaboration with users will be essential, enabling designers to craft solutions that truly resonate with their clients' needs and preferences.

In conclusion, the convergence of Internet thinking and advanced technologies is set to revolutionize the interior design industry. This transformation will not only elevate the quality and functionality of living spaces but also enrich the overall user experience, heralding a bright future for interior design.

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