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MODERN TRENDS IN ARCHITECTURAL ENVIRONMENTAL DESIGN

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This paper explores the development prospects of architectural environmental design, focusing on its evolution, current trends, and future potential. The findings indicate the field is poised for significant advancements driven by innovation and an increasing focus on environmental responsibility. By analyzing key factors such as sustainability, technology, and user-centered design, this paper provides insights into how architectural environmental design can address global challenges while enhancing occupant well-being.

Key words: architectural design, sustainability, technology, user-centered design, innovation, environmental responsibility.

INTRODUCTION

Architectural environmental design has undergone significant transformations over the past few decades, influenced by social changes, digital innovations, and a rising environmental consciousness. This paper examines the present state of architectural environmental design and explores its future trajectories by highlighting critical trends such as sustainability, technological integration, and human-centered approaches. Through an analysis of these developments, we can better anticipate the field's direction and its capacity to tackle global challenges.

PURPOSE

The purpose of this study is to analyze the development prospects of architectural environmental design. Specifically, the paper aims to:

- examine how sustainability shapes architectural design practices;
- explore the impact of emerging technologies on the field;
- discuss the growing emphasis on user-centric design and its implications for occupant well-being.

RESULTS AND DISCUSSION

Sustainable Design

Sustainability has become a cornerstone of modern architectural environmental design. As the world grapples with the effects of climate change, architects and designers increasingly adopt practices that minimize environmental impact and promote resource efficiency. When utilizing natural resources, it is essential to consider future implications, ecological balance, and the potential for sustainable development [1].



Figure 1 presents a photovoltaic storage charging carport solution, which generates electricity on the roof and provides charging stations underneath, meeting the demand for eco-friendly vehicle charging. Although weather variability affects power generation efficiency, this solution remains an excellent example of sustainable design.



Fig. 1. Photovoltaic Storage Charging Carport Solution, Wenzhou, China (Leqing Internet of Things Sensor Industrial Park)

Technological Integration

The integration of advanced technologies is revolutionizing architectural environmental design. Smart technologies, such as IoT (Internet of Things) devices and AI (Artificial Intelligence), enable architects and designers to create buildings that are not only energy-efficient but also responsive to occupants' needs. By leveraging real-time data from IoT sensors and predictive analytics powered by AI, designers can now develop structures that dynamically adapt to environmental conditions and user behavior.

As shown in Figure 2, the terminal building of Beijing Daxing International Airport employs a natural lighting design to significantly reduce reliance on artificial illumination. Its intelligent lighting system automatically adjusts to changing daylight: as natural light dims in the evening, the lamps brighten, achieving high efficiency and energy conservation. Compared to traditional lighting, this system can save approximately two-thirds of electricity consumption, realizing truly smart illumination.

User-Centric Approaches

The shift toward user-centric design reflects a growing recognition of the importance of human well-being in architectural environments. Architects and designers increasingly focus on creating spaces that prioritize the physical, emotional, and psychological needs of occupants. This includes designing for accessibility, promoting mental health through biophilic design, and ensuring spaces are adaptable to diverse user requirements.

For example, daylighting, natural ventilation, and indoor environmental quality in green buildings directly influence residents' physical and mental health and overall living experience [2]. Figure 3 illustrates Chengdu Luhü Ecological City (a natural healing space), which integrates nature into everyday life. Buildings are arranged around a lake, allowing every household to enjoy water views and greenery. The community features meditation gardens, forest trails, and other stress-relief spaces, catering to the needs of vulnerable groups.



Fig. 2. Intelligent lighting system of Beijing Daxing International Airport, Beijing, China



Fig. 3. Luhuhu Ecological City, Chengdu, China (Natural Healing Space)

By blending sustainability, cutting-edge technology, and a human-centered ethos, modern architectural environmental design is evolving into a field capable of addressing our most pressing global challenges while enriching the lives of its occupants.

CONCLUSIONS

Architectural environmental design is increasingly driven by sustainability, technological innovation, and user-centric principles. By combining green practices, smart systems, and occupant-focused solutions, designers can tackle climate change, urbanization, and resource scarcity while creating functional, attractive, and responsible spaces. Continued emphasis on innovation and environmental stewardship will ensure the built environment supports a sustainable and equitable future.

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ШМЕЛЬОВА-НЕСТЕРЕНКО О., ЧЖАО Ке СУЧАСНІ ТЕНДЕНЦІЇ В ДИЗАЙНІ АРХІТЕКТУРНОГО СЕРЕДОВИЩА

У цій статті досліджуються перспективи розвитку дизайну архітектурного середовища, зокрема його еволюція, сучасні тренди та майбутній потенціал. Результати свідчать, що галузь стоїть на порозі суттєвих проривів, зумовлених інноваціями та зростаючою увагою до екологічної відповідальності. Аналіз ключових факторів: сталого розвитку, технологій і орієнтації на користувача, дає змогу зрозуміти, як дизайн архітектурного середовища може вирішувати глобальні виклики та водночас підвищувати добробут мешканців.

Ключові слова: архітектурний дизайн, сталий розвиток, технології, орієнтація на користувача, інновації, екологічна відповідальність.