AIGC-Enabled Design for the Living Transmission of Intangible Cultural Heritage in Urban Regeneration

Peng Xu[1], Jingyi Shen[1], Taotao Zou[1]
[1]College of Art and Design, Shanghai Polytechnic University, Shanghai 201209, China
Corresponding author: Peng Xu (e-mail: xupeng@sspu.edu.cn)

ABSTRACT This study addresses persistent challenges in translating intangible cultural heritage into urban regeneration, including barriers to cultural interpretation, limited contemporary design expression, and insufficient public participation. It investigates a design methodology through which artificial intelligence generated content can support the living transmission of intangible cultural heritage. By positioning AIGC as an enabling tool for semantic analysis, creative generation, and stakeholder alignment, the study proposes a "cultural extraction-design translation-place-based activation" framework that integrates heritage element identification, design transformation, and community cocreation. Taking the Shanghai municipal intangible cultural heritage item Hualan Dengwu, or Flower-Basket Lantern Dance, as an empirical case, the research develops design outputs covering public-space installations, commercial brand identity, and micro-landscape interventions. Evaluation results indicate that the proposed framework improves design efficiency, expands the diversity of design alternatives, increases residents' willingness to participate, and strengthens cultural legibility and place identity. The study provides an operational methodology for the creative transformation and place-based integration of intangible cultural heritage in urban regeneration.

INDEX TERMS AIGC, urban regeneration, intangible cultural heritage, living transmission, design translation

I. INTRODUCTION

INTANGIBLE cultural heritage is an important component of China's outstanding traditional culture, carrying the nation's historical memory and cultural genes, and serving as a key resource for continuing urban cultural heritage and building social consensus. In recent years, the Party and the State have attached great importance to the protection and development of intangible cultural heritage, explicitly proposing to activate its contemporary value through "creative transformation and innovative development." The "Opinions on Continuously Promoting Urban Renewal Actions" further emphasizes that the systematic protection and inheritance of cultural heritage should be strengthened during the urban renewal process. Against this backdrop, the Shanghai Municipal Planning and Natural Resources Bureau issued the "Working Requirements (Trial) on Setting Up 'Historical Memory' Carriers in Urban Renewal Projects," clearly stating that intangible cultural heritage, along with historical buildings, constitutes the urban cultural context and should be organically integrated into urban renewal construction to enhance the city's cultural identity and soft power. However, although the attention to intangible cultural heritage in urban renewal is increasing, its practical transformation still faces multiple challenges: intangible cultural heritage resources are often characterized by being scattered, implicit, and unstructured, lacking a reusable and scalable element system; the visual language and expression strategies of different projects differ significantly, making it difficult to form a continuous and unified public cultural identity; in addition, the renewal of public spaces involves consultation among multiple stakeholders, and there is a lack of low-threshold communication and co-creation channels, which makes it easy for the culture to remain at the surface decoration level, making it difficult to transform into a participatory and sustainable public cultural process. With the rapid development of generative artificial intelligence (AIGC), the above-mentioned dilemmas are expected to be alleviated. AIGC has the ability of multimodal understanding, rapid generation, and interactive expression, which helps to improve the identification and integration of cultural elements, expand the diversity of design schemes, and potentially bridge the communication gap between professionals and the public, while acknowledging the ongoing need to address technical accessibility for diverse groups, thereby opening up new paths for the contemporary expression and living transmission of intangible cultural heritage in urban

renewal.

II. RESEARCH ON THE RELATIONSHIP BETWEEN AIGC TECHNOLOGY AND INTANGIBLE CULTURAL HERITAGE

The rapid evolution of AIGC technology is profoundly changing the way creative designs are produced. Relying on deep learning algorithms such as generative adversarial networks and diffusion models, AIGC can generate multimodal content such as images, text, and three-dimensional forms based on large-scale data, significantly improving the speed of solution generation and the ability to explore forms, promoting the design process from linear advancement to an iterative mode of "generation-evaluation-regeneration", and making human-machine collaboration gradually become the norm [1]. This technological characteristic provides strong support for the extraction, reconstruction and innovation of cultural content, while also placing higher demands on semantic control and generation quality. At present, research on AIGC empowering intangible cultural heritage has attracted widespread attention in the design community. Yue M [2] focuses on the ridge ornament patterns of Southeast Asian Chinese ancestral halls. Through digital modeling and AIGC generation technology, she translates traditional patterns and applies them to cultural and creative packaging design, demonstrating the practical value of AIGC in pattern innovation. Liu L [3] based on the theory of cultural hierarchy, decomposes Sichuan opera culture into three levels: material, behavior and spirit. Combining the hierarchical analysis method to screen key cultural factors, she constructs a systematic extraction model for cultural and creative design. Bai X [4] takes the clothing of the Bai Ku Yao as an example, uses AIGC to generate innovative patterns and integrates them into traditional furniture design, demonstrating the potential of this technology in improving efficiency and cultural expression diversity. Gao Y [5] expands the expression forms of intangible cultural heritage elements and enhances the contemporary adaptability of cultural and creative products through the generative evolution of Shu embroidery patterns. Wu [6] analyzes the visual symbol system of Huishan clay figurines from the perspective of semiotics and uses AIGC to achieve efficient translation from cultural semantics to visual language. Overall, existing research has fully verified the functional advantages of AIGC in image generation, style transfer and creative expansion, but its application is mostly concentrated in personal consumption fields such as cultural and creative products, packaging, and furniture and "controllable carriers". Research on the inheritance and innovation of intangible cultural heritage in urban renewal scenarios is still relatively lacking. As a long-term accumulation of local culture, intangible cultural heritage can provide a highly recognizable cultural narrative and value basis for urban renewal, and form a perceptible cultural continuity in public spaces, which helps to alleviate common problems such as spatial homogenization and emotional alienation in the renewal process [7]. At the same time, urban renewal also expands the practical field for the living transmission of intangible cultural heritage. The vitality of intangible cultural heritage lies not only in static preservation or occasional performance, but also in whether it can be integrated into daily life and continuously practiced. The public spaces and community interfaces reshaped by urban renewal are places where residents' daily activities are intensive, providing a real carrier for intangible cultural heritage to shift from an object to be "viewed" to a living culture that is "experienceable, participatory, and reproducible". Against this background, this study is committed to introducing AIGC technology into the process of refining, translating and co-creating intangible cultural heritage in the context of urban renewal, aiming to promote the two-way empowerment of living transmission of intangible cultural heritage and culturally oriented urban renewal through the innovation of design methods and processes.

III. DESIGN METHODOLOGY CONSTRUCTION

A. FRAMEWORK OVERVIEW

A three-stage design framework for the living transmission of intangible cultural heritage—"cultural extraction, design translation, and local revitalization"—is constructed to systematically promote the closed-loop transformation of intangible cultural heritage resources from semantic analysis and creative transformation to community co-creation (Figure 1). The "cultural extraction" stage uses multimodal analysis to build a structured cultural gene bank, providing deep semantic support for subsequent design; the "design translation" stage transforms cultural elements into a series of solutions for urban renewal scenarios through semantic control and human-computer collaboration; and the "local revitalization" stage focuses on community cocreation, using visual pre-visualization and interactive negotiation to complete local calibration, promoting consensus among multiple parties and continuous revitalization [8].

B. PHASE 1: CULTURAL EXTRACTION

The core task of the cultural extraction stage is to transform the unstructured, multimodal information in intangible cultural heritage, which contains experiential and tacit knowledge, into a "cultural gene bank" that is semantically clear, structurally sound, and directly accessible to the AIGC system. This bank aims to provide stable, accurate, and reusable semantic input and element support for subsequent generative design, thereby achieving the "designable" transformation of cultural logic, visual language, and spiritual connotations. The theoretical foundation of this stage mainly stems from cultural memory theory and design semantics. Jan Assmann's cultural memory theory points out that the vitality of culture lies not only in the continuation of its material form, but also in the continuity of its narrative structure, ritual logic, and collective spirit over time [9]. This guides the team to prioritize identifying and extracting those symbolic symbols, values, and spiritual beliefs that constitute the core of group identity during resource

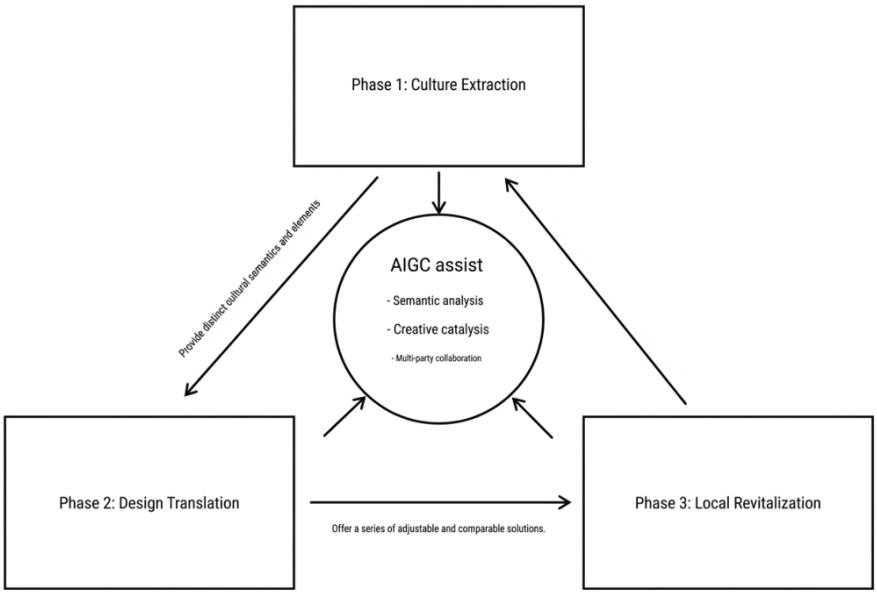

FIGURE 1. Design Framework for AIGC-Enabled Living Transmission of Intangible Cultural Heritage in Urban Regeneration

collection. Design semantics provides a three-dimensional analytical framework of "syntactic form-semantic meaning-pragmatic use," emphasizing that when cultural images are transformed into visual language, their form must possess recognizability, semantic interpretability, and adaptability to use in specific contexts. The former answers "what cultural content" should be extracted, while the latter regulates "how this content is understood and reconstructed by the design system." At the operational level, the cultural extraction process can be summarized in three steps (Figure 2). First, collect multimodal information: the system collects textual data (historical records, local chronicles, oral interviews, etc.), image data (traditional artifacts, craft patterns, spatial compositions, etc.), and audio-visual data (folk performances, ritual records, craft processes, etc.) to form a traceable cultural sample set, laying the data foundation for subsequent semantic recognition. Second, perform intelligent parsing: natural language processing is used to extract keywords, identify sentiment, and cluster semantics in the text, while computer vision is combined to perform image detection, style classification, and feature extraction on images and videos; simultaneously, large language models and generative models are introduced to assist in recognition and semantic completion, improving the efficiency of pattern extraction and the completeness of semantic dimensions [10]. Third, complete semantic modeling and structured archiving: under the collaborative mechanism of "expert annotation—algorithm assistance," candidate elements are semantically annotated, categorized, and hierarchically organized to establish a searchable, reusable, and iterative structured corpus system, providing clear boundaries for subsequent prompt word construction and generation control.

The resulting cultural gene library should be designed and usable, and comprise four core sub-libraries to support system translation. The Form and Structure library focuses on the compositional logic, proportional relationships, and component structures of forms, extracting transferable formal rules to provide a basis for the morphological language of spaces and products. The Color and Material library organizes representative color systems, material properties, and craft textures, clarifying their cultural semantics and applicable scope to ensure stylistic consistency and perceptual depth in visual expression. The Imagery and Symbol library gathers highly recognizable totems, patterns, and symbolic symbols, analyzing their implied meanings and symbolic systems to provide semantic support for graphic generation and visual translation. The Narrative and Spirit library extracts the emotional orientation, ritual rhythms, and value systems in intangible cultural heritage practices, constructing deep contexts and semantic logic to avoid translation that merely resembles the form without conveying meaning [11]. These four sub-libraries are coupled together to form a cultural element system with cross-scenario reusability, enhancing the semantic stability and cultural foundation of AIGC-generated content from the source.

C. PHASE TWO: DESIGN TRANSLATION

The goal of the design translation phase is to transform structured cultural elements into implementable spatial expressions and systematic solutions, enabling cultural semantics to achieve a recognizable, interpretable, and usable mapping relationship in specific scenarios. Compared to the intuitive translation that previously relied on individual designer experience, this phase emphasizes a generative design process centered on human-computer collaboration:

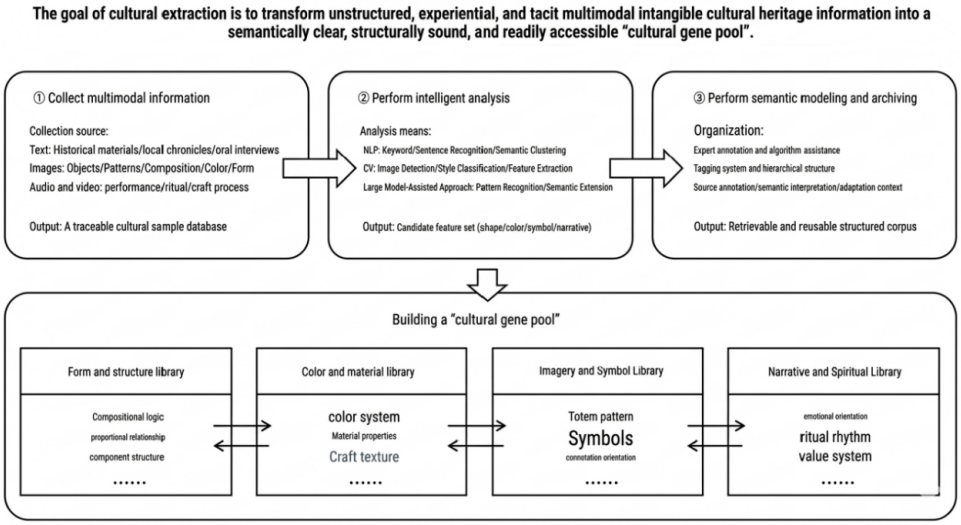

FIGURE 2. Main Process of Cultural Extraction

on the one hand, leveraging AIGC's advantages in solution generation efficiency and formal variation exploration, it rapidly expands conceptual boundaries and covers multiple possible design paths; on the other hand, designers assume the key responsibility of semantic oversight and solution selection, avoiding the generated results from merely symbolic collages or formalistic novelty-seeking, thereby establishing a stable correspondence and verifiable translation rules between cultural expression, scenario adaptation, and update goals. This phase can be summarized into three consecutive steps: problem and need summarization, prompt word writing, and generation, screening, and refinement [12]. In comparison, this study's framework differentiates itself by embedding "urban governance constraints" directly into the algorithmic prompt structure. First, designers need to conduct on-site research and information integration of the urban renewal site, translating the current spatial conditions and residents' demands into a problem structure that can be addressed by the design, while simultaneously clarifying the renewal goals, constraints, and implementation boundaries. The core of this step lies in aligning the use of cultural elements with the real needs of spatial governance, avoiding the compression of cultural expression into "surface decoration" or a symbolic presentation disconnected from the usage context. Next comes the prompt writing stage. Prompts are not simply keyword stuffing, but rather a structured description of the "target object—style characteristics—application scenario," used to define the semantic boundaries and visual direction of the generated content, and to provide an actionable evaluation benchmark for subsequent screening. To improve the controllability and consistency of the generated results, prompts are recommended to include at least four types of information:

(1) Functions and usage scenarios: clearly define the deployment location, target users and usage methods, and propose necessary performance requirements (such as wayfinding recognition, rest areas, nighttime lighting, interactive participation, accessibility, etc.).

(2) Color and texture requirements: specify hue tendency, warm and cool relationship, brightness contrast, material type and surface effect to stabilize the overall style and reduce "style drift" [13].

(3) Composition and organization methods, defining the laws of form generation and spatial organization (such as symmetry/axis, repetition/continuity, unit combination/module splicing, layering/interweaving, density rhythm and scale control, etc.).

(4) Cultural meaning orientation: The symbol's value connotation and emotional orientation are defined by a clear semantic description, emphasizing the correspondence between meaning and form. The four types of information support each other, enabling prompt words to possess both cultural interpretive capabilities and engineering constraints, thereby improving the usability and feasibility of generated content and providing a unified semantic framework and style control clues for systematic expression across nodes and carriers.

The process then moves to generation, filtering, and refinement. AIGC generates multiple sets of design sketches based on the prompts, providing variations with different compositions, styles, and details to expand the scope of design exploration and accelerate iteration. Designers then perform tiered filtering and correction: the first layer focuses on the accuracy of cultural expression, checking for misinterpretations, misplacements, or semantic weakening; the second layer examines scenario adaptability and functional rationality, excluding schemes with inappropriate scale, unclear organizational logic, or unworkable implementation

conditions; the third layer focuses on stylistic consistency, ensuring a unified visual order and narrative coherence across different nodes and media. If necessary, multiple rounds of iterative "adjusting prompts—regenerating—re-filtering" can be used to gradually converge to a set of semantically stable, stylistically consistent, and feasible solutions [14].

D. PHASE THREE: LOCAL REVITALIZATION

The local revitalization stage aims to promote the design scheme from concept to real-world implementation, and to stimulate the continuous vitality of intangible cultural heritage in daily life through public participation mechanisms. The living transmission of intangible cultural heritage is not the same as the reproduction of symbols or the implantation of forms. Its key lies in whether it can enter the daily life system and the meaning production process. When community members can continuously participate in design, use and dissemination, intangible cultural heritage can be transformed from "culture that is displayed" to "culture that is practiced together". Therefore, this stage no longer understands design as a one-dimensional visual expression, but as a collaborative tool to connect community identity, cultural memory and public space governance. Through the co-creation process, cultural expression and life experience, functional demands and emotional identity are simultaneously incorporated into the scheme formation mechanism, thereby enhancing the sustainability and local roots of contemporary expression.

At this stage, the key value of AIGC is mainly reflected in reducing communication costs, improving comprehensibility, and promoting consultative decision-making. On the one hand, by using AIGC to generate high-fidelity renderings or scene animations, design schemes can be embedded into real scene images, forming an immersive spatial preview. Community residents can intuitively perceive the spatial atmosphere, visual effects, and scale relationships after implementation through a near-first-person visual experience, thereby improving the effectiveness and feasibility of their opinions. On the other hand, relying on AIGC's parameter control and agile interaction advantages, the design team can transform key adjustable variables in the scheme (such as combination methods, forms, colors, and materials) into visual options, allowing residents to adjust, combine, and preview the effects of different configurations in their living scenarios in real time on the simulation platform, thus substantially participating in the design generation [15]. To ensure the effectiveness and feasibility of the co-creation process, a combination of online and offline methods is recommended. Online, interactive platforms can be used for showcasing proposals, selecting preferences, adding comments, and voting on different versions, quickly gathering opinions from multiple groups and forming quantifiable trends. Offline, workshops, scenario-based visits, and group discussions can guide residents to negotiate on issues such as functional experience, cultural expression, and maintenance management, addressing the fragmentation and lack of depth in online feedback. Overall, the output of the local revitalization phase is not merely "a finalized plan," but more importantly, the formation of a sustainable participation mechanism and a cultural co-construction relationship. On the one hand, this improves the acceptance, utilization, and maintenance coordination capabilities of the plan after its implementation, reducing the risk of "built and then idle." On the other hand, the co-creation process strengthens residents' understanding, sense of belonging, and willingness to recreate intangible cultural heritage, enabling it to be embedded in the public life of urban renewal in an experiential, participatory, and sustainable way, thus achieving true revitalization from formal implementation to community roots.

IV. EMPIRICAL CASE ANALYSIS

A. CASE BACKGROUND AND ISSUES

1) Case Overview

To verify the practical effectiveness of the above design method, the case study selected the municipal-level intangible cultural heritage "Flower Basket Lantern Dance" of Caolu Town, Pudong New Area, Shanghai as the empirical object and applied it to the Hengyue Xinduhui neighborhood-type urban renewal project. "Flower Basket Lantern Dance" is a composite folk performing art that integrates dance, music and handicrafts. Its core prop, the "flower basket lantern," is exquisitely crafted, and the performance is lively, cheerful, and full of festive imagery. As a representative local project in the Shanghai intangible cultural heritage system, Flower Basket Lantern Dance not only carries the historical memory and folk aesthetic tradition of Caolu Town, Pudong New Area, but also plays an important social role in connecting neighbors, strengthening group identity, and maintaining local sentiments in long-term community life (Figure 3).

2) Analysis of the Dilemma of Inheritance

With the rapid urbanization of Caolu Town in recent years, the inheritance ecology of the Flower Basket Lantern Dance has encountered serious challenges. First, the inheritance chain is broken, the masters of the skills are getting older, and the younger generation lacks the willingness and path to inherit, making it difficult to continue the knowledge of intangible cultural heritage practice; second, the cultural context is missing, the performance space that originally relied on festivals and agricultural society is disintegrating, and modern cities lack the life scenes that can carry its ritual functions and community interaction; third, the cognitive gap is widening, and the residents of emerging cities lack basic knowledge and emotional connection with local intangible cultural heritage, which marginalizes the Flower Basket Lantern Dance into an "unfamiliar local culture" and is detached from the cultural logic of real life. These factors combined have made the cultural vitality and social value of the Flower Basket Lantern Dance gradually decline,

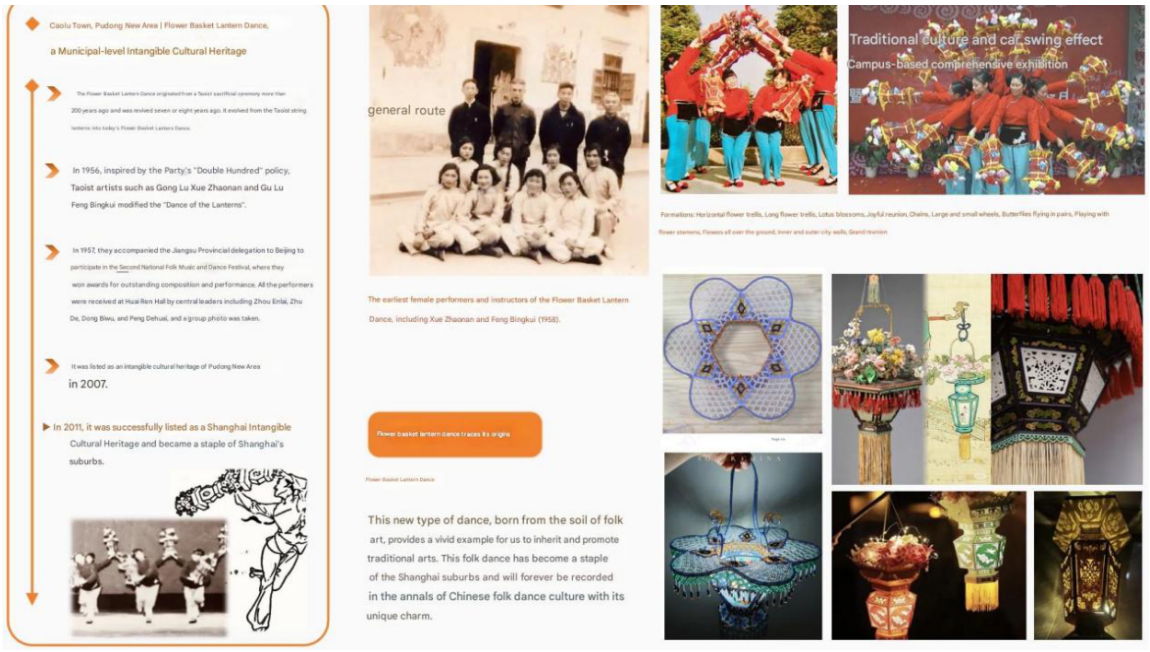

FIGURE 3. Shanghai Municipal-Level Intangible Cultural Heritage "Flower Basket Lantern Dance"

and the current protection practices are mostly limited to superficial display and physical preservation, and have not yet established an effective inheritance mechanism that responds to contemporary expression, public participation and spatial embedding. In this context, integrating intangible cultural heritage into urban renewal is not only a beneficial exploration of living transmission, but also an important tool to enhance the cultural recognition and cohesion of the place.

B. IMPLEMENTATION PROCESS

1) Phase One: Cultural Extraction Practice

To build a "cultural gene bank," the research team conducted a three-month multi-source data collection and intelligent analysis project. At the data collection level, the team systematically gathered three types of data—text, images, and videos—to construct a cultural sample database. Textual materials included local chronicles such as the *Caolu Town Chronicle*, research papers related to the Flower Basket Lantern Dance, and in-depth interviews with five intangible cultural heritage inheritors. Image materials encompassed historical photographs, performance stills, physical survey maps, and decorative patterns. Video materials included performance footage and records of festival activities. These heterogeneous data were organized and archived according to the principles of "traceability, comparability, and verifiability," laying the foundation for subsequent semantic recognition and structured modeling. At the AIGC-assisted parsing level, the team combined natural language processing and computer vision models to intelligently analyze multimodal data, improving the efficiency of element recognition and the completeness of semantic extraction. For text corpora, Deepseek was used to extract high-frequency sentiment and imagery keywords (such as "praying for blessings," "reunion," "celebrating a bountiful harvest," "exquisite," and "lively"), and thematic modeling was used to identify that the narrative focus mainly revolved around "collective collaboration" and "festival rituals." For image and video corpora, image recognition, style classification, and feature extraction methods were used to deconstruct more than 200 images, and the recognition results were further classified into four sub-databases and semantically organized.

(1) Form and structure library: Extract and summarize the spatial rules of the shape and performance formation of the flower basket lantern, and translate the typical forms such as hexagonal frame, central radial composition, and ring layout from appearance features into callable organizational rules and construction logic, forming an operable structural grammar such as unit repetition, hierarchical order, enclosure/opening and closing, and array expansion, so that it can play a direct role in generation and control in subsequent spatial layout, node organization and module combination.

(2) Color and Material Library: Based on color clustering, brightness distribution, and texture feature extraction, representative color systems and texture rules are summarized to support atmosphere creation and style unity in the context of urban renewal. The main focus is on refining the main and auxiliary ratios, warm and cool tendencies, and brightness contrast relationships of bright red and warm yellow. At the same time, the material expression and texture characteristics of paper lamps with soft light diffusion are sorted out to form reusable color and texture parameters, providing a basis for subsequent unified visual tone and detailed texture

expression.

(3) Imagery and Symbol Library: Using a "text-semantic" mapping as the organizational framework, this library integrates auspicious patterns such as peonies and lotuses and analyzes their symbolic meanings. It also extracts dynamic images such as "convergence" and "rotation" from performance movements, as well as festive semantic tags such as "reunion" and "prayer," forming a visual vocabulary that is both recognizable and interpretable. This sub-library further clarifies the applicable contexts and combination constraints of the symbols, providing a semantically stable basis for calling up environmental graphics, signage, and brand image.

(4) Narrative and spiritual repository: Summarize the collective rhythm and collaborative spirit embodied in the dance vocabulary, and combine the key contents of cultural continuation, local memory and emotional connection in the inheritors' narratives to extract and form a set of narrative clues and spiritual semantics that can drive contextualized expression, providing a deep semantic foundation for subsequent spatial narrative strategies, participation mechanism design and co-creation process construction.

Subsequently, the team performed semantic annotation, tagging, and structured coding on the extracted elements, ultimately forming a "cultural gene bank" with modular calling capabilities, clear semantics, and strong reusability. Each type of element is accompanied by its source, semantic annotations, and adaptation suggestions to ensure that it can be efficiently deployed in different scenarios and has the potential for cross-project migration.

2) Phase Two: Design Translation Practice

In the "Design Translation" practice, through AIGC-assisted generation and human-machine collaborative optimization strategies, the abstract "cultural gene pool" elements are systematically transformed into a series of design solutions that combine scene adaptability and cultural expressiveness. The first step was to conduct a site survey, focusing on identifying the current problems, core needs, and renewal goals of Hengyue Xinduhui, and clarifying the boundaries of the application, transformation, and expression of intangible cultural heritage in the real-world context. The survey found that residents and businesses had largely consistent needs regarding improving public facilities, enhancing the site's recognizability, and creating a festive atmosphere. Based on this, the team selected key forms, colors, and imagery elements that matched the above requirements from the existing "Flower Basket Lantern Dance Cultural Gene Bank," and transformed them into a structured prompt word system that can be understood and executed by AIGC. The prompt words follow the framework of "target object - style characteristics - application scenario," and embed multiple pieces of information such as color and material preferences, cultural semantic orientation, and specific functional constraints to ensure that the generated content has semantic clarity, stylistic consistency, and practical guidance. Subsequently, various generative tools such as Jimeng AI, Nano Banana, and Stable Diffusion were used to generate concepts in batches, covering a variety of scenarios including public space structures, commercial interface visual systems, and micro-facilities renovation, in order to quickly explore the possibilities and combinations of cultural elements on different carriers. Finally, the process moves to a human-machine collaborative selection and refinement stage. Designers conduct multiple rounds of layered evaluation and categorization of the massive number of generated sketches, focusing on the accuracy of their cultural expression, their suitability for the scenario, and their feasibility. This process specifically incorporates the professional opinions of intangible cultural heritage inheritors to verify the appropriateness of the use of cultural semantics and symbols. After determining the preferred direction, the solutions are further refined and improved. Through the above process, a final design solution covering three types of application scenarios is formed:

(1) Public space creation: Extracting core morphological genes such as "hexagonal frame", "interlaced woven texture" and "central light source", the modular public facility "flower basket lantern pavilion" was generated. The design uses hexagons as the basic unit, supports flexible disassembly and combination, and can be adapted to various spatial forms such as rest pavilions and temporary performance stages. The scheme not only transforms the visual aesthetics of the flower basket lantern, but also strengthens the festive atmosphere and cultural cohesion of the public space through structural design and light and shadow interaction (Figure 4).

(2) In terms of commercial interface visual optimization: The main visual image is "radiating pattern of blooming/blooming". The "firework" brand visual identity system is generated around the main color of "warm red and golden yellow". It is applied to the main visual, shop signs and internal wayfinding modules of Hengyue Farmers Market (Figure 5). The visual language of the flower basket lamp is transformed into a brand image with tension, enhancing the cultural identity and spatial memory of the place, and improving the visual experience and commercial appeal of the interface.

(3) In terms of micro-facilities renovation: The "flower basket" pattern was abstracted and parameterized, and transformed into a visual pattern for use in details such as air conditioner outdoor units, roller shutters, and floor paving (Figure 6). This achieved visual optimization of everyday details at a lower cost, allowing intangible cultural heritage to naturally permeate the community fabric and subtly enhance the cultural quality and aesthetic atmosphere of the overall environment.

3) Phase Three: Local Revitalization Practices

This phase aims to stimulate public participation, build cultural consensus, and promote the integration of generated solutions into daily life scenarios. The focus is on testing and refining the scenario adaptability, implementation feasi-

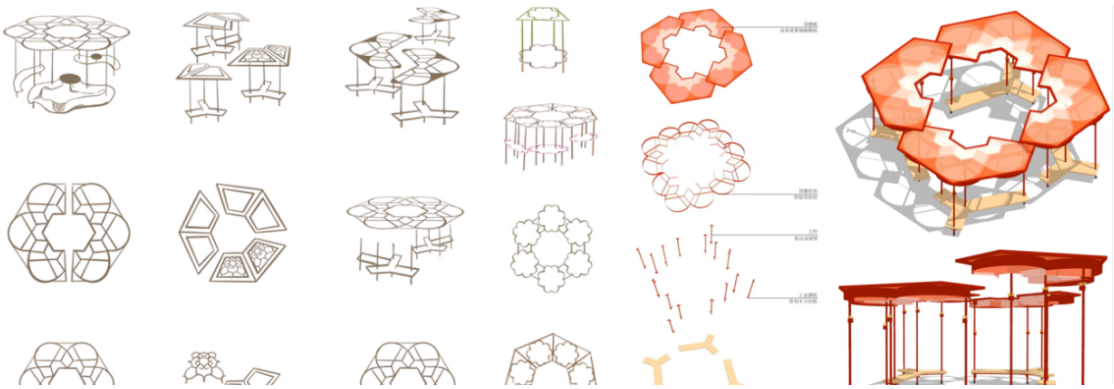

FIGURE 4. Rendering of the "Flower Basket Lantern Pavilion" Generated by Stable Diffusion

FIGURE 5. "Huahuo" Themed Brand Visual Identity Generated by Nano Banana

bility, and subsequent sustainable operation conditions of the solutions in real urban spaces. First, we create an immersive experience to enhance participation and feedback quality. Using AIGC-generated high-fidelity renderings and dynamic preview animations, we embed the "Flower Basket Lantern Pavilion" and "Fireworks" brand visual systems into existing photos and typical perspective images of Hengyue Xinduhui, creating a near-completed, scenario-based presentation. This is then simultaneously displayed on community screens, bulletin boards, and online channels. This near-first-person spatial preview helps residents intuitively assess spatial scale, visual atmosphere, and usage, transforming abstract concepts into tangible, comparable, and discussable objects. While the digital divide remains a challenge, particularly for elderly groups, this visual approach simplifies the interpretation of complex design concepts, although specialized guidance is still required to navigate the interactive interface, increases engagement and willingness to express opinions, and shifts public feedback from general attitudes to targeted suggestions. Secondly, an interactive platform is established to guide personalized co-creation. Based on AIGC's controllable generation and parametric configuration capabilities, key adjustable variables in the design—module combination methods, graphic density and rhythm, color matching, material texture, and cross-temporal atmosphere—are translated into operable parameter options (slider/button). Residents can upload photos of their shop fronts, streetscapes, or public nodes to generate and compare different design versions in real time, shifting from "viewing designs" to "trying out designs." The platform also features functions such as "favorites," "comments," "feedback," and "version comparison" to collect public preferences and suggestions in a structured manner. This ensures that the contemporary expression of the "Flower Basket Lantern Dance" maintains overall stylistic consistency while responding to different site conditions and individual aesthetic differences. Finally, feedback from multiple sources was integrated to drive the refinement and finalization of the solution. Workshops were organized to

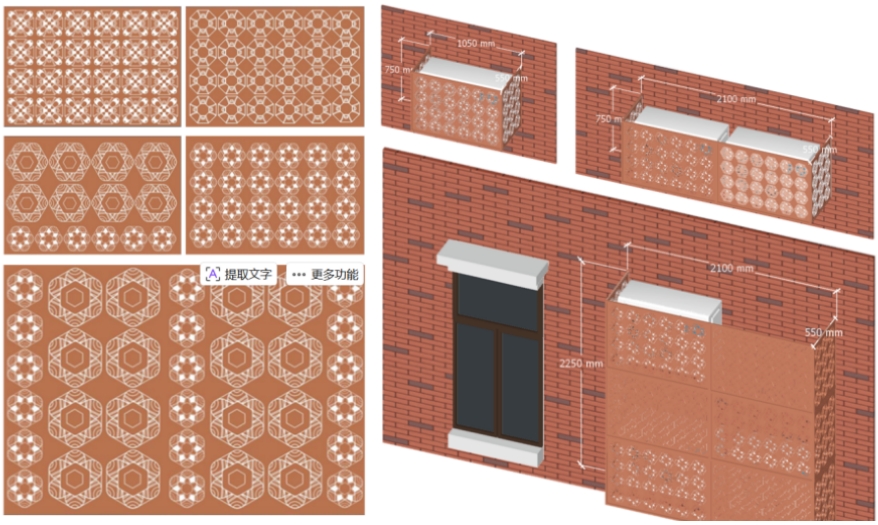

FIGURE 6. A Series of Pattern Designs for Air-Conditioner Covers Generated by Nano Banana

facilitate discussions among residents and businesses on issues such as practicality, maintainability, and construction and operating costs, focusing on identifying potential risks that could lead to "difficult-to-use" or "lack of maintenance." Open version voting, opinion summarization, and questionnaire feedback transformed scattered life experiences, usage habits, and cultural preferences into actionable optimization criteria. Through multiple iterations of "demonstration—co-creation—evaluation—revision," a localized solution that combines professional quality, feasibility, and community acceptance was gradually formed (Figure 7), establishing a clear collaborative foundation and action path for subsequent implementation, co-management, and sustainable operation.

V. DESIGN EVALUATION

The final design won the Excellence Award at the 2025 Shanghai "15-Minute Community Life Circle · Neighborhood Vibrancy" Design Competition for the Hengyue Xinduhui Project. Before the design was implemented, the team evaluated and reflected on the design process and its interim results:

In terms of design efficiency and process optimization, the construction of the cultural gene pool significantly improved the efficiency of early resource retrieval and scheme initiation. Compared to the traditional work method that relies on designer experience and the organization of scattered materials, the structured intangible cultural heritage element database provides reusable semantic input and visual resources for the design process, reducing the time costs of repeated collection, repeated interpretation, and cross-round communication. The results show that the working time in the concept scheme stage can be reduced by about 40%. To ensure logical rigor, this preliminary data was derived from a pilot comparative test where two groups of designers with similar skill levels (3-5 years of experience) were assigned tasks of comparable complexity. While variables like individual intuition cannot be fully isolated, the standardized use of the cultural gene bank significantly minimized the "search-and-interpret" time lag found in the traditional workflow. At the same time, with the help of the batch generation capability of the AIGC model, the team can obtain multiple sets of high-density concept sketches and expression variations in a short period of time, significantly expanding the breadth and depth of scheme exploration, compressing the conception and selection process that originally required several weeks to complete into a few days, and improving the iteration response speed and content coverage capability. It should be noted that the efficiency gain does not mean that the role of the designer is weakened, but rather places higher demands on the designer: not only must they have a deeper understanding of the problem and the ability to structure and summarize, but they must also clarify the generation direction, establish evaluation criteria, and assume the responsibility of semantic verification and risk control. Otherwise, the generation efficiency may turn into the accumulation of "scheme noise", causing increased screening costs or decision-making indecision, resulting in the dilemma of "fast output - slow finalization". In terms of social benefits and public feedback, AIGC's involvement provided a more intuitive visual language for participation, though the 'low-barrier' nature is relative and contingent upon technical support for non-professional participants, effectively stimulating the willingness of community residents to participate, thereby enhancing the local identity and public visibility of intangible cultural heritage. Surveys show that over 90% of respondents believed the update plan improved the cultural atmosphere and recognizability of the venue, and deepened their understanding of the value of local intangible cultural heritage. In this process, intangible

FIGURE 7. Multi-Angle Renderings Generated by Jimeng AI

cultural heritage, through its integration with daily life scenarios, has had its cultural semantics reinterpreted and disseminated within the new social structure. Simultaneously, data collected from a social survey of 120 local residents (comprising 45% long-term elderly residents, 35% young professionals, and 20% local business owners) showed that 95% of participants believed that AIGC's interactive co-creation interface enhanced their confidence and experience in participating in public design, especially stimulating higher participation and cultural expression enthusiasm among younger groups. However, it is important to be wary of the double-edged nature of high-fidelity rendering, which often reinforces the public's immediate judgment of whether the visual effect is "good" or not, to some extent weakening the depth of discussion on implicit conditions such as functionality, durability, and maintenance costs. Therefore, it is necessary to strengthen offline workshops or topical guidance to supplement the depth of negotiation on functionality, maintenance, and co-management. In terms of economic value and sustainable transformation, the highly recognizable "fireworks" visual identity system has promoted the branding and dissemination of intangible cultural heritage in commercial settings. The improved interface quality and spatial memory of farmers' markets have enhanced their appeal to young consumers, and a preliminary synergistic effect of "cultural content—spatial scene—social dissemination" has been formed. Meanwhile, some merchants have spontaneously extended related graphic and color language to packaging and promotional materials, demonstrating the re-creative power and diffusion potential

of intangible cultural heritage elements in a commercial context. This indicates that cultural assets possess a realistic path and operable means for transformation into a scene-based economy and cultural and creative value. However, caution is still needed from a sustainability perspective: First, the popularity of dissemination and consumption is volatile. Without continuous operation, content updates, and maintenance investment, brand expression may show characteristics of significant short-term impact and long-term decline. Second, the high-frequency use of symbols in the commercial field may lead to the simplification or even dilution of cultural semantics, resulting in a tendency of "strong symbols but weak connotations." Therefore, it is necessary to establish application norms and boundary management (such as usage rules, style control, and appropriate authorization mechanisms) in the future to ensure that the diffusion process does not disrupt the overall narrative consistency and to maintain a verifiable balance between commercial transformation and cultural respect.

VI. CONCLUSION

Urban renewal is not only about improving spatial functions and environmental quality, but also a crucial process for the continuation and reconstruction of cultural memory and identity. Integrating intangible cultural heritage (ICH) into urban renewal helps cultural elements to be seen, understood, and continuously practiced in the daily use of public spaces, thereby achieving a two-way empowerment of ICH's living transmission and the city's intrinsic development. Based on this, this study proposes an AIGC-enabled design methodology for the living transmission of ICH. Through a three-stage linkage of "cultural extraction—design translation—local revitalization," it constructs a closed-loop process from cultural semantic recognition and creative design transformation to community value co-creation. This aims to promote ICH as a strategic resource for the coordinated evolution of spatial renewal, cultural identity, and community governance, providing a reference method and path for its innovative transformation and local integration in urban renewal. Despite the preliminary results achieved in this research, several limitations remain. First, the cross-case applicability of the methodology needs further verification. Current empirical analyses focus on single cases, which is insufficient to comprehensively demonstrate the broad applicability of this design method. Future research should combine different regions and types of intangible cultural heritage projects to conduct systematic comparisons and practical adjustments, further verifying and optimizing the framework's adaptability and scalability. Second, the long-term performance evaluation of living heritage transmission is still insufficient. The research mainly focuses on short-term design practices and initial feedback, lacking long-term tracking of the sustainability of intangible cultural heritage, the stability of public participation mechanisms, and the long-term effectiveness of intangible cultural heritage value transformation. Future research should establish a dynamic, multi-dimensional evaluation system, conducting comprehensive assessments combining quantitative and qualitative methods from social, cultural, and economic dimensions, thereby promoting the evolution of AIGC-enabled living heritage transmission practices towards a deeper and more sustainable direction.

AUTHOR CONTRIBUTIONS

Conceptualization – Xu Peng and Shen Jingyi; methodology – Zou Taotao; investigation – Zou Taotao; writing-original draft preparation – Xu Peng and Shen Jingyi. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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