

# Innovative Design of Wuxi Wedding Embroidery and the Classic Chinese Animation: *The Golden Conch* Based on AIGC

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## ABSTRACT

The preservation and innovation of intangible cultural heritage present significant challenges, while AI technology offers new opportunities for its protection and inheritance. Nevertheless, when AI technology is applied to the integrated design of intangible cultural heritage and classic animation IPs, issues such as misinterpretation of cultural symbols, distortion of traditional patterns, and separation from the original context, referred to as “de-contextualization” problems, are prone to occur. This makes it arduous to achieve the precise integration of the characteristics of intangible cultural heritage and classic art styles. This paper delves into the application of AIGC in the integration of Wuxi Wedding Embroidery patterns and the domestic animation IP *The Golden Conch*. By establishing a multimodal dataset, conducting LoRA model training, and leveraging ComfyUI-assisted generation, an AI-assisted design closed-loop workflow is developed. This workflow encompasses “extraction of intangible cultural heritage cultural genes – construction of a multimodal fusion gene library – cross-media translation and encoding of cultural symbols – generation of the AIGC workflow – implementation of design results and value extension”. This research can offer practical references for the contemporary activation and digital dissemination of intangible cultural heritage patterns, as well as provide ideas and paradigms for the innovative design of classic domestic animation IPs.

**Keywords:** AIGC, Wuxi wedding embroidery, *The golden conch*, Intangible cultural heritage (ICH), Chinese animation IP, AI-aided design, Digital translation of ICH

## INTRODUCTION

Against globalization and modernization, intangible cultural heritage (ICH) faces multiple challenges (Bortolotto & Ubertazzi, 2023). Its inheritance and innovation constitute a core task for the creative transformation and innovative development of China’s outstanding traditional culture (Lazaro Ortiz de Madariaga, 2022). As a national ICH inscribed in China’s fifth batch, Wuxi Wedding Embroidery is plagued by broken craft inheritance, shifting aesthetic preferences and insufficient market development. Its folk connotations and exquisite craftsmanship remain unfamiliar to modern audiences, calling for innovative carriers suited to contemporary communication.

Against such backdrop, AI is increasingly adopted in ICH preservation, especially for high-quality image generation. Rooted in Bayu, Wuxi Wedding Embroidery is closely tied to local wedding customs. Local girls learn embroidery to make dowries for their future marriage, a millennia-old tradition (Jiang, 2023). They embed wishes for marriage and family into embroidery patterns, embodying local people's blessings for happy wedlock. Centered on marriage and lifelong companionship, the classic animation IP *The Golden Conch* depicts the romance between the Conch Maiden and a hardworking young man who overcome hardships for a happy marriage. Its romantic interpretation of sincere love matches the embroidery's wedding theme perfectly (Pu, 1995). Such thematic consistency enables natural cultural integration: the animation provides narrative support for the embroidery's wedding culture, while the embroidery grounds the animation's romance in authentic folk customs.

Originating from Ningchang Ancient Town of Wuxi, Chongqing, the embroidery dates back to the ancient Wuxian Kingdom in the Yao-Shun era. Blending Bayu and Chu cultures, it spreads across Chongqing, Shaanxi and Hubei and bears distinctive southwest regional cultural features. Popular along China's southeast coast and the Yangtze River Basin, *The Golden Conch* shares the same Yangtze cultural circle with Bayu. Their inclusive regional cultures and plain folk customs create natural aesthetic resonance, removing integration barriers and enabling seamless visual combination. The IP helps the embroidery break geographic restrictions, and the embroidery deepens the animation's cultural connotation for mutual empowerment.

Besides, classic domestic animation IP owns cross-age audiences and mature visual communication systems. It builds popular, youth-oriented channels for Wuxi Wedding Embroidery to break ICH's regional and group barriers and reach the general public (Samoylova, 2002).

Accordingly, this study takes Wuxi Wedding Embroidery and *The Golden Conch* as research subjects to explore AIGC's application in their integrated design, form standardized design procedures, tackle cultural fidelity challenges in ICH-IP integration, and deliver replicable practical modes for living heritage inheritance and domestic animation IP innovation.

### **Current Situation and Challenges of Wuxi Wedding Embroidery as an Intangible Cultural Heritage**

Known alternatively as Ba Embroidery or Daning River Embroidery, Wuxi Wedding Embroidery originated in the Guangxu reign of the Qing Dynasty. Evolving from patchwork decoration into a distinctive ornamental system, it was inscribed on China's Fifth National ICH List in 2021. A cultural treasure blending Bayu, Wu and salt civilizations, it stands as a typical folk art of the Yangtze River Basin featuring unique pick-stitch craftsmanship, modular patterns and profound wedding-themed connotations.

Wuxi Wedding Embroidery is trapped in multiple inheritance bottlenecks. The traditional apprenticeship system fails to align with modern education, breaking the skill inheritance chain. Its core inheritors average over 65 years old, with young practitioners under 35 accounting for less than 10%,

highlighting severe generational gaps (Liu & Wang, 2023). Meanwhile, its conventional aesthetics diverge sharply from modern demands. Rigidified patterns and application forms poorly adapt to contemporary tastes and diversified application scenarios, steadily reducing its appeal among younger generations. Furthermore, it lacks market transformation and innovative capacity: most existing designs merely duplicate primitive patterns without in-depth integration with classic IPs, and no mature, replicable AIGC-driven innovative design paradigm has been established.

### **Development of Chinese Animation IPs**

Chinese domestic animation forms a system blending national features and contemporary connotations, centered on classic IPs of the China Animation School from Shanghai Animation Film Studio and inheriting the essence of Chinese folk art. However, modern transformation of contemporary domestic animation IPs is hindered by vague cultural cores and superficial innovation; in-depth integration with ICH is required for breakthroughs (Han & Wang, 2025).

Released by Shanghai Animation Film Studio in 1963, the paper-cut animation *The Golden Conch* was directed by Wan Guchan, dubbed the Father of Chinese Paper-cut Animation. Adapted from Ruan Zhangjing's poetic fairy tale and derived from the folk tale Snail Maiden, it combines paper-cut and shadow puppetry with frame-by-frame shooting and stands as a landmark work of the China Animation School (Luo & Wu, 2025). Its consistent core of love and marriage aligns with public expectations for wedlock and underpins its integration with ICH. Differing from the original text focusing on diligence, the animation shapes a folklore-rich romantic story: a fisherman saves and nurtures a golden conch three times. Moved by his diligence, the conch turns into a maiden to live with him. The Sea Goddess arranges three trials to test his loyalty. His faithfulness wins a happy ending, embodying the pursuit of loyal marriage and laying emotional and narrative groundwork for incorporating wedding-related ICH elements (Wu, 2015).

As a pivotal IP rooted in Chinese folk art, modern domestic animation IPs commonly face homogenization and shallow development due to inadequate ICH integration and cannot satisfy contemporary audiences. The animation's marriage plot lacks sufficient foreshadowing. Wedding folk customs could have been embedded when the protagonists first meet for cultural hints (Wu, 2015), yet only daily trivialities are presented, making the sudden marriage plot unnatural and leaving no reasonable scenes for ICH insertion. In addition, folk art is used simplistically: the production overemphasizes paper-cut visuals without combining other folk arts, restricting diversified presentation of ICH and complementary artistic advantages. Its outdated communication modes lack systematic ICH-integrated design and carriers for living heritage. Weak IP-ICH linkage wastes complementary strengths and lands the classic IP in common modernization predicaments of domestic animation.

## AIGC Technology and ICH Cultural and Creative Products




AIGC provides new technical approaches for the modern activation of ICH through powerful visual expression and algorithm adaptation, enabling precise digital translation and innovative communication of ICH elements to break inheritance and audience constraints (Tian & Li, 2023). AIGC exhibits distinct advantages in the integration of ICH and classic IPs. Based on the Stable Diffusion model, LoRA (Low-Rank Adaptation) lightweight fine-tuning effectively learns ICH pattern features and achieves accurate style transfer. The modular ComfyUI workflow simplifies pattern digital collection, style adaptation and innovative reconstruction, supporting batch generation and rapid iteration. It reduces design costs and solves core pain points in cultural and creative development (Tian & Li, 2023).

## CULTURAL SYMBOLS OF WUXI WEDDING EMBROIDERY AND CHINESE ANIMATION IP

### Wuxi Wedding Embroidery

As the core craft of Wuxi Wedding Embroidery, its patterns reflect local folk culture and lifestyles. Based on literature review and inheritor interviews, their classification and features are listed in Table 1 (Zhou et al., 2025).

**Table 1:** Classification and cultural connotation of Wuxi Jiahua patterns.

Pattern Name	Illustration	Pattern Characteristics	Cultural Implication
Floral & Fauna Patterns (Lotus, Carp, Phoenix, etc.)		Natural-source layout, wedding-oriented decorative & narrative design	Blessing for thriving offspring and happy marriage; embodying harmony between human and nature
Geometric Patterns (Cross, Octagonal, Spiral, Water-wave Motifs, etc.)		Symmetric rigorous layout shaped by Taoist cosmology	Pursuit of cosmic order and aesthetic balance
Auspicious Symbols (Blessing motifs, bridal sedan, Immortals of Harmony, twin lions & embroidered ball, etc.)		High-visibility folk icons themed on wedding rituals	Best wishes for happy life and wedding folklore inheritance

### Chinese Animation IP (Image Composition)

*The Golden Conch* adopts flat paper-cut styling for characters and scenes without realistic perspective. Crisp outlines and contrasting color blocks shape its figures, among which the Conch Maiden and fisherman stand out vividly (Table 2).

**Table 2:** Correspondence between core scenes and plot of the golden conch.

Time	Core Scene	Story Description	Photo
00:00-02:15	Blue Sea surface, Coral Fairy Island	Dreamy ocean, young fisherman, rescue golden conch, careful nursing, fishing village	
12:13-14:50	Seaside fishing village	Acquaintance, daily life together, fishing, waiting by shore, singing on waves, three-year peaceful life, fishing village, warmth, serenity, marriage foundation	
14:50-17:12	Meadow	Intimacy among flowers, affectionate couple, journey for beloved	
17:12-25:20	Stormy Sea surface Undersea Fairy Palace	Stormy waves, fishing boat, seabed conch, underwater palace, pearls & corals, Sea Goddess, marriage story	
25:20-34:13	Fairyland, Fishing Village Illusion	Sea Goddess, three trials, gold & jewels, unmoved, magic spell, firm heart, disguise, recognize beloved, unwavering loyalty, marital commitment	
34:13-36:01 (Ending: Wedding Core Scene)	Sea surface, Fishing village cottage (Wedding Core Scene)	human-divine marriage, wearing willow, folk wedding, blooming flowers, rosy glow, festive atmosphere, faithful love, happy ending	

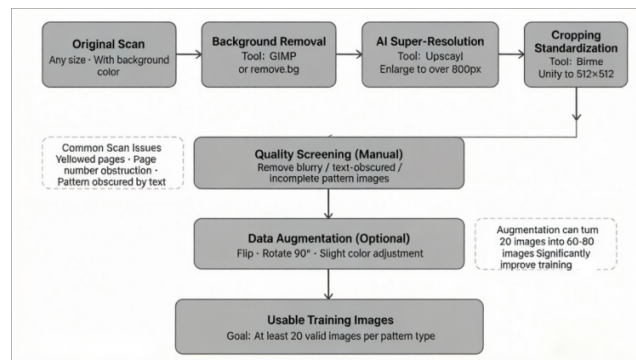
## DESIGN METHODS AND PROCESS

### Research Path

This study uses literature review to consolidate studies on Wuxi Wedding Embroidery, domestic animation IP innovation and AIGC-driven ICH design, clarifying theoretical basis, research constraints and research direction. Semi-structured interviews with 2 municipal inheritors and 5 ICH scholars obtain pattern connotations, craft features and IP artistic traits to improve extraction precision. Semiotic analysis distills core symbols for cultural coding and cross-media translation. A multimodal dataset is established for LoRA training and AIGC workflow development. Repeated generation and dynamic revision yield integrated designs. Expert assessment and audience feedback verify effectiveness to form a full research closed loop.

### Dataset

Drawing on mature dataset construction schemes from existing ICH-AIGC integration studies, this research builds a standardized multimodal fusion dataset to cut data sorting costs at the feature extraction stage (Levin & Belov, 2024). Dataset materials derive from online resources and offline physical collection. All embroidery patterns and animation materials are digitized and normalized to a uniform  $512 \times 512$  pixel resolution for subsequent processing (Fig. 1).



**Figure 1:** Flowchart of preprocessing for Wuxi Jiahua pattern LoRA training dataset.

This study builds a Wuxi Wedding Embroidery ICH database from open online resources and HD shots of inheritor-authorized embroidery samples. It includes 120 classic high-definition images covering core patterns. Per interviewed experts' advice, each image is labeled with historical and symbolic metadata to ensure cultural accuracy and reusability (Table 3).

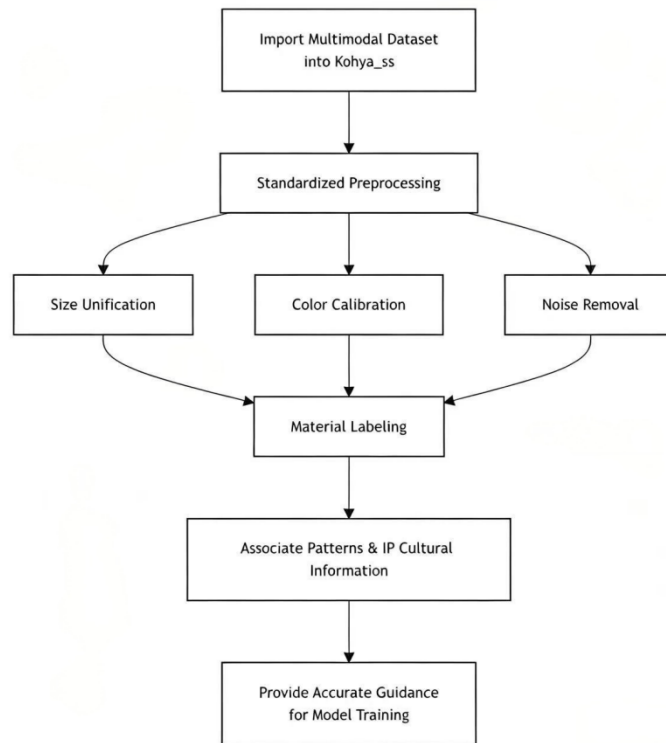
**Table 3: Standardized LoRA Annotations of wedding-themed patterns: Wuxi Wedding Embroidery × The Golden Conch**

Image No.	Pattern Category	Pattern Subcategory	Color System	Folk Custom Meaning	LoRA Training Annotation	Source Document	Image Quality	Material Type	Collection Date	Notes
WX_AUS_001	Auspicious Symbols	Double Happiness Pattern	Color Cross-stitch	double happiness character, auspicious symbol, weddings, new marriage, joy, wedding dresses, decoration	wuxi_jiahu embroidery, double happiness symbol, xi character pattern, cross-stitch folk art, wedding ceremonial decoration, red color palette, flat chinese calligraphic motif, bridal auspicious symbol	Wuxi Wedding Flower Atlas P115	5	Document Scanning	2025-01-15	Core symbol of wedding scenes
WX_AUS_002	Auspicious Symbols	Wedding Sedan Chair Pattern	Color Cross-stitch	wedding sedan chair pattern, traditional wedding procession, delicate patterns, Wuxi Wedding Flower embroidery, narrative patterns	wuxi_jiahu embroidery, wedding sedan chair motif, narrative folk pattern, cross-stitch style, wedding procession symbolism, red festive palette, detailed folk illustration, chinese traditional wedding art	Wuxi Wedding Flower Atlas P108	4	Document Scanning	2025-01-15	Most narrative, directly corresponding to wedding scenes

## LoRA Model Training

Centered on cultural fidelity, efficient generation and dynamic optimization, the proposed AIGC workflow adopts Stable Diffusion as the base model with LoRA fine-tuning (Gokaslan et al., 2024) and Midjourney, forming a closed loop: material import → model training → parameter configuration → generation optimization → result export (Table 4).

**Table 4:** Flowchart of standardized preprocessing for dataset.



Training parameters for integrated modeling of Wuxi Wedding Embroidery patterns and *The Golden Conch* paper-cut style are listed in Table 4. Total training lasts around one hour to secure generative precision (Table 5).

**Table 5:** Core LoRA training parameters for integrated styling of Wuxi wedding embroidery and the golden conch paper-cut art.

Text Encoder LR	LR Scheduler	LR Restart Cycles	Persistent DataLoader Workers	Noise Offset	LoCon Conv Dim	Conv Alpha	Approx Training Time
0.0002	cosine_with_restarts	1	2	0.1	4	0.1	1h

Dataset Size	Resolution	Batch Size	Max Epochs	Save Every N Epochs	Network Dim	Network Alpha	Clip skip	LR	UNetLR
200	512x512	2	8	2	64	2	1	0.0002	0.0002

To avoid overfitting and underfitting, Dataset Size = 200 and Max Epochs = 8 balance sample adequacy and training efficiency. Targeting stylistic fusion and lightweight training, Network Dim = 64 and Network Alpha = 2 reconcile style transfer and generalization. Learning rate is set to 0.0002 for precise alignment of cultural features. Remaining parameters are refined via comparative tests to boost training stability and detail, striking an optimal balance between content fidelity and efficiency.

## RESULT ANALYSIS

Using the established AIGC workflow, this study completes innovative integrated design of Wuxi Wedding Embroidery and *The Golden Conch* and outputs character costume works (Fig. 2).



**Figure 2:** Renderings of integrated costume design.

## CONCLUSION

This research expands generative AI in ICH-domestic animation IP integration and proposes an AIGC design paradigm for heritage-motif and classic IP fusion, offering new insights into digital ICH preservation and innovation. It delivers practical solutions for living inheritance of Wuxi Wedding Embroidery and modern renewal of *The Golden Conch* IP, inspiring cultural and creative industries.

Future research shall optimize model parameters and datasets to improve generation quality and diversity, deepen cultural interpretation and interdisciplinary collaboration among inheritors, designers and AI engineers for sustainable heritage preservation and communication. Further application expansion and industrial transformation can realize dual promotion of cultural and commercial values of ICH.

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