

DanceYipékda: AI-generated Calligraphy for 3D Printing and Projection Mapping with Uyghur Atlas Patterns

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Abstract

Drawing its name from the Uyghur expression for 'dance on silk,' 'DanceYipékda' epitomizes the elegance and fluidity of cultural expression that this installation seeks to embody. This project unites the realms of AI-generated calligraphy, projection mapping, and 3D printing to weave a narrative as intricate as silk itself—reflecting the complexity and beauty of cross-cultural communication. Leveraging cutting-edge AI technologies, the artwork initiates the creative process by generating 2D calligraphic art, which is subsequently transformed into a 3D format, further accentuated with dynamic projection mapping that breathes life and color into the static forms. As a multimedia art installation, 'DanceYipékda' brings to life the ancient tradition of calligraphy, employing technology as a bridge between historical art forms and contemporary artistic expression. It is a dialogue across time, a dance of light and shadow, sparking a transformative conversation on the convergence of art, technology, and society, encouraging viewers to construct a collective understanding that surpasses linguistic and geographical barriers.

CCS Concepts

• **Applied computing** → *Arts and humanities*; • **Human-centered computing** → *Visualization*; • **Software and its engineering** → *Designing software*.

Keywords

Calligraphy Sculpture, AI-generated Content, Multimedia Experience, Cultural Understanding

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1 Introduction: Artist Statement

At the heart of 'DanceYipékda' lies the seamless confluence of art and technology, a symphony of cultural told through modern lexicons. Through the lens of this installation, we endeavor to

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articulate not merely an aesthetic narrative but also a dialogue steeped in the cultural fabric of human connection. The title itself, 'DanceYipékda,' a nod to the rich Uyghur heritage, translates to 'dance on silk,' setting the thematic tone for a flowing interaction between the ephemerality of dance and the permanence of silk, embodied through the medium of calligraphic art.

In an age where technology oscillates between the role of a tool and a companion, we tap into its vast potential to generate calligraphy with AI, art born from the algorithmic mind yet resonating with the warmth of human touch. This synergy of AI with humanist art is sculpted into three-dimensional relics through the precision of 3D printing, challenging the flat surfaces of our perceptions and inviting the senses into a realm of depth and form.

Projection mapping awakens these sculpted forms, casting light upon their contours, weaving stories along their curves, and inviting the viewers into the dance of luminescence across their surfaces. Here, each beam of light, is not merely illumination, but a stroke of narrative, painting emotions and culture in its path.

'DanceYipékda' is a paean to the timeless craft of calligraphy, a tribute that uplifts this ancient art form from the clutches of obsolescence by anchoring it firmly into the present with digital threads. It is an artist's testimony that even in our digital ascent, we do not leave behind the essence of our cultural past; we instead lift it upon technology's shoulders and parade it into the vista of future dialogues.

2 Creation: A Spark for Inspiring Dialogue and Transformation

The technical process involves leveraging AI to generate 2D calligraphy, which is then transformed into 3D models for printing. Touch Designer and Stable Diffusion are employed to add projection mapping light elements, creating layers of meaning and interaction. Detailed technical schematic diagram is shown in Figure 1.

AI-generated Calligraphy: AI is used to generate unique and expressive calligraphy that serves as the foundation for the 3D-printed sculptures. This technique enables the production of complex and fluid calligraphy, surpassing the limitations of manual creation, and is tailored to match the specific artistic vision and stylistic preferences of the creators [3].

3D Printing: The AI-generated 2D calligraphy is transformed into 3D models suitable for printing. This process involves additional refinement and manipulation of the digital models to ensure structural integrity and printability with aesthetics. The choice of 3D printing material depends on considered factors such as weight, durability, and desired aesthetic [1].

AI-generated Medium Frame: Atlas is a commonly used silk fabric in Uyghur community. Figure 2 (a) displayed that current

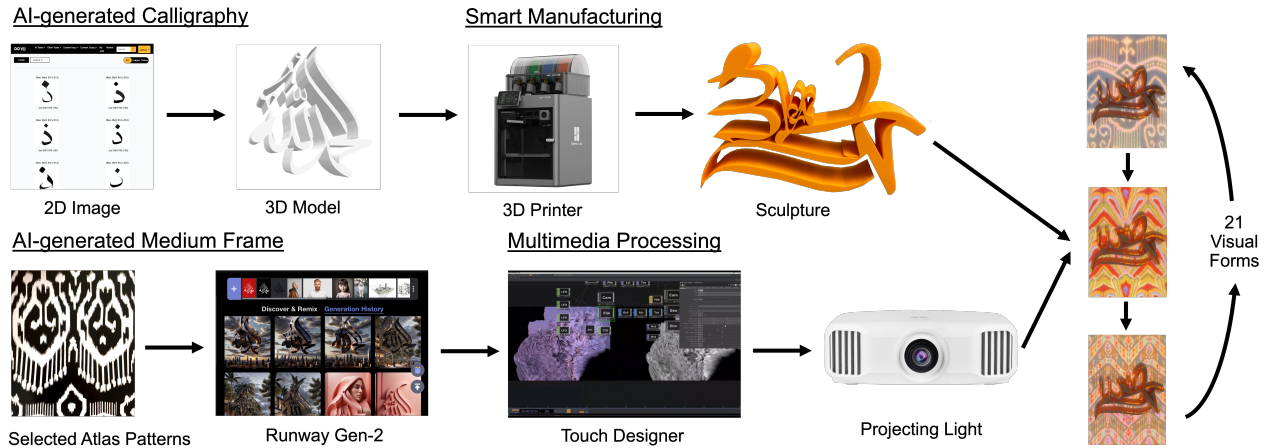
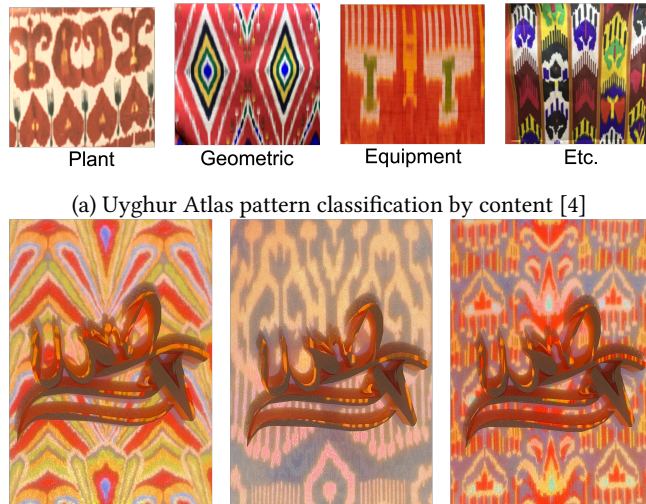


Figure 1: DanceYipékda creation flow chart



(b) DanceYipékda visual results with 3D printed sculpture and projection mapping light effects

Figure 2: Artistic practice for fusing Uyghur tradition with technological elegance in DanceYipékda

pattern of Atlas can be classified with its visual content including plant, geometric, apparatus (comb, earring, stringed instruments, and etc.) [4]. Runway Gen-2 was used to generate the medium frame based on existing patterns to make whole interpolation process with smooth visual experience.

Projection Mapping: Projection mapping technology is used to bathe the 3D-printed sculptures in dynamic light as depicted in Figure 2 (b). This light can be used to create a variety of effects, such as adding color, texture, and animation to the calligraphy. The projected visuals can also be used to tell a story or provide additional information to viewers [2].

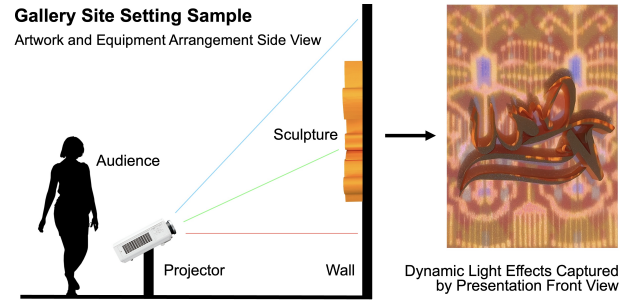


Figure 3: Spatial relationship of artwork and equipment

3 Discussion: Exploring Themes of Memory, Culture, and Society

Transcending its captivating visual presence, "DanceYipékda" embarks on a deeper exploration of themes woven into the very fabric of human experience: memory, culture, and society.

Memory and Cultural Preservation: The artwork serves as a platform for exploring cultural memory. The use of traditional calligraphy evokes a sense of history and heritage. Projecting can showcase the evolution of written languages or to share cultural stories associated with specific symbols.

The Fluidity and Integration of Languages: A central theme of "DanceYipékda" is the interconnectedness of languages. The use of AI-generated calligraphy and the integration of movement reflect the dynamism and fluidity of languages. The artwork challenges the notion of languages as isolated entities and instead highlights their capacity to influence and interact with each other, fostering a vision of languages as a fluid silk in constant exchange.

Building Cross-Cultural Connections: "DanceYipékda" aims to foster cross-cultural connections. The artwork encourages viewers to explore different cultures from a new perspective and enjoy the beauty of human communication.

4 Conclusion

"DanceYipékda" transcends the boundaries of a static art installation by employing multimedia elements. This approach allows viewers to experience the sculptures in a real-world setting while simultaneously engaging with elements that represent the cultural and emotional dimensions associated with the artwork. By prompting discussions about memory, culture, technology, and art, "DanceYipékda" aims to spark dialogues between humanity and the tools we create. For vision, it fosters connections within and across communities, highlighting the transformative power of multimedia in promoting intercultural understanding and appreciation.

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