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INTEGRATING UZBEK NATIONAL ORNAMENTATION INTO MODERN 3D FASHION DESIGN USING CLO3D

Abstract

Using the CLO3D software environment, this work investigates the incorporation of Uzbek national ornamentation into contemporary digital fashion design. The goal of the project is to use cutting-edge 3D fashion technology to conserve and recreate Uzbekistan's rich cultural legacy. This study shows how cultural identity may be upgraded and portrayed in digital apparel design by incorporating traditional patterns and motifs into virtual garment surfaces. Digital pattern creation, fabric simulation, texture mapping, and rendering procedures within CLO3D are all part of the technique [1], [2]. The end product is a realistic virtual fashion model that blends traditional decoration with contemporary silhouettes [3]. By reducing material waste and production costs, our effort supports the idea of sustainable design and helps build national-style fashion collections in digital format [4].

Keywords: Uzbek national patterns, 3D fashion, CLO3D, digital garment design, cultural heritage, innovation

Annotatsiya

Ushbu tadqiqot CLO3D dasturiy muhiti yordamida o'zbek milliy naqshlarini zamonaviy raqamli moda dizayniga integratsiya qilishga bag'ishlangan. Tadqiqotning maqsadi – 3D moda texnologiyasi orqali O'zbekistonning boy

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madaniy merosini saqlab qolish va zamonaviy talqinda qayta namoyon etishdir. An'anaviy naqshlar virtual kiyim yuzalariga qo'llanib, madaniy o'zlikni raqamli libos dizaynida ifodalash imkoniyati ko'rsatildi. Natijada milliy ornamentatsiya va zamonaviy siluet uyg'unlashgan 3D model yaratildi.

Kalit so'zlar: o'zbek milliy naqshlari, 3D moda, CLO3D, raqamli kiyim dizayni, madaniy meros, innovatsiya

Аннотация

Данное исследование посвящено интеграции узбекских национальных орнаментов в современный цифровой дизайн моды с использованием программной среды CLO3D. Цель исследования — сохранить и переосмыслить богатое культурное наследие Узбекистана через инновационные технологии 3D-моды. Традиционные узоры были применены к виртуальным поверхностям одежды, что позволило отразить культурную идентичность в цифровом дизайне. В результате создана 3D-модель, сочетающая национальную орнаментацию и современный силуэт.

Ключевые слова: узбекские национальные орнаменты, 3D-мода, CLO3D, цифровой дизайн одежды, культурное наследие, инновации

1. Introduction

A country's culture, customs, and identity have long been reflected in its fashion. In Uzbekistan, the expression of national values and aesthetics is largely dependent on textile art and embellishment [5]. In addition to being used in apparel, decorative arts like silk designs, ikat weaving, and suzani stitching have symbolic implications. For example, flowers, vines, and geometric shapes represent continuity, harmony, and prosperity [6].

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However, the fashion industry is currently fast transitioning to digital. Thanks to 3D software like as CLO3D, designers may create, simulate, and envision clothes without actually manufacturing it [7]. Even though these tools are widely used overseas, traditional Uzbek design concepts are still not fully integrated into digital platforms.

Our study bridges that gap by integrating technology and culture. It aims to create a 3D fashion design that captures the charm of Uzbek ornamentation while adhering to modern design aesthetics and ecological manufacture. The study directly affects Uzbekistan's "Strategy–2030," which places a high priority on innovation, the creative industries, and the preservation of cultural heritage [8].

2. Methods

Using CLO3D software, the study used experimental digital design techniques. There were multiple steps in the workflow:

2.1 Pattern Creation: Inspired by traditional Uzbek silhouettes including long-flowing gowns and fitted waists, a foundation clothing pattern was digitally created in 2D mode [1].

2.2 Ornament Digitization: Using Adobe Illustrator, traditional ornaments were sketched and vectorized before being loaded into CLO3D. The designs, which emphasized natural symmetry and vivid colors, were taken from Atlas and Adras fabrics [9].

2.3 Texture Mapping and Fabric Simulation: To guarantee correct alignment, textures were mapped onto virtual fabric surfaces using modified scale and UV coordinates. The physical characteristics of the fabric were altered to mimic the silk, velvet, and cotton materials commonly found in Uzbek clothing.

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2.4 Lighting and Rendering Configuration:

The purpose of the 3D simulation was to see fabric movement and clothing draping. For the final depiction, realistic lighting and background were set.



Figure 1. CLO3D Render Model

2.5 Validation and Analysis: The composition, pattern placement, color harmony, and proportion of the visual output were examined. To make sure the national elements were evident and culturally accurate, each render was assessed [10].

3. Results

The finished 3D render shows how traditional Uzbek ornamentation is skillfully incorporated into a contemporary fashion design concept [3]. Inspired by traditional Uzbek shapes, the dress's flared skirt and fitted bodice have been updated with digital perfection. Visual rhythm and balance are produced by the symmetrically placed decoration on the bodice and sleeves.

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With light reflection and shadow, the simulated fabric faithfully mimics the texture of silk, giving it a genuine appearance. The model demonstrates that digital clothing can attain great aesthetic accuracy equal to genuine production by capturing movement and drape.

From a cultural standpoint, the findings demonstrate how innovation can coexist with national identity preservation through digital fashion. The incorporation of decoration transforms the design from a basic digital garment into a work of cultural art. Benefits to sustainability are also clear: utilizing CLO3D allows for quick prototyping and removes fabric waste. Designers can save time and money by virtually testing a variety of patterns and designs. This strategy supports environmentally friendly design principles and is consistent with international sustainable development objectives.

4. Discussion

The results of this study show that digital fashion design can effectively function as a platform for the display of national culture. Designers can produce distinctive digital collections that honor history while embracing innovation by fusing the efficiency of contemporary technology with the beauty of classical adornment [7]. Additionally, 3D modeling enhances students' technical and creative abilities by exposing them to industry-level digital tools in fashion education. The quality of fashion education in Uzbekistan might be greatly improved by integrating CLO3D into design curricula, allowing students to explore without costly resources.

In a larger sense, digital fashion also promotes travel and cultural diplomacy.

Global audiences could be reached via 3D displays of Uzbek clothing in virtual museums, internet galleries, or fashion metaverses. These initiatives have the potential to increase Uzbek culture's soft power abroad [9].

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5. Conclusion

This study effectively illustrates how traditional Uzbek decoration can be reinvented in the context of digital fashion. Cultural features can be effectively simulated, visualized, and preserved with the help of the CLO3D platform.

The results demonstrate that technology enriches heritage rather than replaces it. Designers help preserve culture and provide sustainable, cutting-edge goods for the world market by digitizing patterns and clothing.

The study is important because it advances teaching strategies, fosters a sense of patriotism, and advances ecologically conscious design.

The author expresses heartfelt gratitude to the Bukhara Engineering Technological Institute for academic advice and mentors who encouraged the exploration of digital fashion technology. Future work will focus on developing this research into a series of digital fashion lines that include Uzbek ornaments into diverse virtual garment styles. Another goal is to create an online teaching platform in CLO3D that would teach national design concepts to young Uzbek designers. The long-term objective is to develop a Digital Heritage Fashion Archive that will portray Uzbekistan's cultural variety through virtual clothes.

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