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Digital Modeling and Its Role in Designing and Applying 3D Functional sculpture models

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Abstract:

Digital technology is one of the most significant factors influencing the evolution of the arts, providing new tools and techniques that enhance and develop the creative process. Among these innovative techniques is digital modeling, which is employed in sculpture to create highly accurate and realistic three-dimensional artworks. Sculptors have increasingly turned to digital technology to enhance their sculptural designs, reflecting its impact on both the conceptual and practical aspects of their work. By utilizing computer technology and modeling techniques, sculptors can advance their creative processes effectively. This research aims to highlight one of the most important modeling methods in the digital age, which can transform a sculptor's creative ideas into tangible forms within the digital virtual space, ultimately resulting in products that engage human sensory perceptions and have a physical, concrete existence. The study seeks to demonstrate the potential contributions that innovative computer-based techniques can offer to sculptors, exploring the materials and digital modeling techniques that can be tailored to serve their artistic needs. The findings reveal that digital modeling can be used to produce functional sculptures with intricate details that are challenging to achieve through traditional methods, showcasing the variety of materials available for sculptural creation.

Research Background: The sculptor's creative process necessitates careful design to align with production conditions, prompting simplification to enhance manufacturability. Light utilitarian products demand flexible design, balancing aesthetic appeal and consumer enjoyment without limiting creativity. Advances in technology allow contemporary artists to leverage digital tools, resulting in intricate and unrestricted sculptural designs that reflect modernity rather than focusing solely on traditional construction methods.

Statement of the Problem: The research problem is articulated as follows: - The constraints encountered by sculpture designers hinder their creative expression and concentration on conceptualization, necessitating the adaptation of digital technologies to streamline the production of 3D Functional sculpture models with enhanced precision and efficiency.

Research objectives: -The researcher aims to show the extent of the contribution that innovative computer-based technologies can bring to the sculpture designer. - Identifying the materials and techniques of digital modeling and adapting them to serve the sculpture designer.

Importance of the research: -The importance of the research lies in providing the sculpture designer with modern means and techniques that contribute to the advancement of sculptural models of a functional nature. -Highlighting the importance of the relationship between digital modeling and the art of sculpture and its impact on the design and implementation of functional sculpture models.

Research methodology: The research relies on the descriptive analytical approach to identify everything related to digital modeling from raw materials and manufacturing techniques - the experimental approach to ensure the technical and implementation suitability of this technology.

Research results: - The utilization of digital modeling facilitates the creation of functional sculptural models that exhibit intricate sculptural details, which are challenging to achieve through conventional methodologies, particularly due to the diverse array of materials employed. - The employment of digital sculpture applications significantly enhances the artist's comfort and ease in the sculptural creation process, thereby conserving energy during the creative endeavor and allowing the designer to allocate more cognitive resources to ideation. - Digital sculpture affords the capacity to modify designs with remarkable ease while

concurrently preserving all iterations prior to alterations. - Additive manufacturing methodologies predicated on liquid materials demonstrate superior printing quality compared to those reliant on solid substrates, as they are more adept at accommodating models characterized by fine details. - Additive manufacturing is recognized as an environmentally sustainable technology, as it operates without generating waste from the utilized materials. - The elevated cost of the product is attributable to the substantial expenses associated with machinery and materials, particularly when juxtaposed with the costs incurred in traditional manufacturing practices. - The limited availability of metal powder fabrication techniques, alongside the prohibitive costs associated with metal products, presents a significant challenge.

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