

2014, when less than 24 frames are drawn for one second of the film. In this case, the movement becomes not entirely smooth, but this allowed imitating the stop-motion technology (this is how traditional puppet cartoons were filmed), as if the animators were really moving real people from Lego and filming it on camera.

**Conclusion.** Technologies for creating animation change and are tested every year. The development of 3D animation from 1995 to 2021 has almost reached its peak. But the viewer perceives an animated film not only as a combination of technical capabilities, he begins to follow the plot from the very first seconds. Thus, the synthesis of high technical performance as well as the director's intention is important. In the last years of the present time, a person is more interested in films in which there is a combination of 3D and 2D graphics, and not just a photorealistic picture.

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**ANIMATION OF VIRTUAL DIGITAL SUPREMACIC SCULPTURES  
IN THE FRAMEWORK OF ANNUAL PROJECT PRACTICE  
OF STUDENTS STUDYING AT THE DESIGN DEPARTMENT  
VSU NAMED AFTER P.M. MASHEROV**

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Keywords: Digital sculpture, animation of sculpture, Unovis, Vitebsk Art School, Suprematism, art and graphic faculty of VSU named after P.M. Masherov.

**Introduction.** The chronicle of the Vitebsk Art School begins at the turn of 1918, when the Vitebsk People's Art School was opened in the city. The name of the educational institution has changed several times – Vitebsk Free State Art Workshops; Artistic and Practical Institute; Vitebsk Art College, which was transformed into Vitebsk Art College in the mid-1930s. Since 1949 it has been the Vitebsk art-graphic pedagogical school.

On September 1, 1959, on the basis of the Vitebsk art-graphic pedagogical school, by order No. 115 of July 18, 1959, the Ministry of Education of the BSSR organized the Art-graphic faculty [1]. Almost 100 years have passed since the organization of the first art classes, when the organizers of the educational process at the KhGF again turned to the systems and ideas proposed by the first teachers of the VNHU. In 2006, the new major "Design (subject-spatial environment)" was opened at the faculty. Just 4 years after the emergence of the major, the new department "Department of Design" is being formed under the direction of V.V. Kulenenko [2].

The relevance of the study lies in the reflection of the practice of creating digital animated sculptures that exists only at the KhGF Vitebsk State University named after P.M. Masherov, which is a unique component in the training of young specialists in the art profile in the Republic of Belarus.

The purpose of the study is to describe the process of creating a digital animated sculpture and to identify the relationship of this process with the philosophical ideas laid down by the founders of VNHU at the beginning of the twentieth century.

**Material and methods.** The material of the research was educational and creative works of students of the design department of the graphic arts faculty of the V.M. Masherov VSU. The method of continuous survey, method of analogies, systemic and historical approach were used.

**Findings and their discussion.** Today, the department is actively involved in the life of not only the faculty, but also the social life of the city. In 2013, the department for the first time implemented a project to create a virtual tour of Vitebsk. In contrast to the traditional approach to the implementation of a remote city tour, virtual installations and small architectural forms were included in the project. The fundamental principles and basic ideas of the composition, which served as the Suprematist works of the members of the art association "UNOVIS" (Figure 1).



Figure 1. Panorama of st. Kirov with placed digital sculptures (2013)

The first implementation of the project served as a starting point, and in the following years the development of these small architectural forms formed the basis of the summer project practice of 4-year students of the specialty "Design (subject-spatial environment)".

As part of the summer practice, students need to complete a number of tasks related to the study of the heritage of the art association "UNOVIS". The result of all the work is the animation of two volumetric virtual compositions, consistent with the general concept of Suprematism. To achieve the set task, work within the practice is divided into stages:

1. Collection and analysis of information about one of the representatives of the UNOVIS association and his artistic and philosophical heritage.

2. Formation of the main conceptual idea of the object. At this stage, the design concept is an important component. The design concept consists in creat-

ing a kinetic object capable of evoking interest and emotional reaction of the viewer, as well as carrying a high aesthetic function.

3. Sketching. Creation of sketches on paper of several graphic options, which depicts the basic principles of the formation and interaction of the viewer with the object.

4. Preparation of a design solution. The work of students is carried out in a virtual environment, but a prerequisite is the exact intended binding to the urban landscape. One of the tasks of the work is the obligatory volumetric–spatial solution of the object.

5. Generalization and refinement of design details.

6. Visualization and animation of a virtual object.

**Conclusion.** The wide area of activity of "Unovists" and their artistic heritage allow today to realize the creative potential of modern students on the ideas that were laid within the walls of the "Vitebsk People's Art School" by K. Malevich and his followers. Students not only process these works into a visual project, but also as pioneers of Suprematism, have the opportunity to substantiate them on various discussion platforms (conferences, open defenses of the project, reports, articles).

Volumetric–spatial animation of virtual objects is an important aspect of the student's formation of an idea of the space and dynamics of a suprematist non–objective composition. The non–objectiveness of Suprematism for KS Malevich was a natural conclusion from the objective world, a new aspect that opened the artist to nature, space, and the universe. Suprematist forms "fly", are in a state of weightlessness [3].

As Malevich wrote in his article "On harmony, the creation of a thing and the power of rhythm over the artist": "I am art – first of all, freely, wherever I want – I will fly, in front of me everyone is equal, if only in this equality I found my aesthetic, moral, religious, historical or other content and meaning. " [4, p.229]. The dynamics of virtual suprematist objects should fully comply with the main provisions of Malevich, while organically fit into the modern urban environment (Figure 2).



Figure 2. V. Guzov, Digital sculpture in an urban environment

At the end of the practice, students make a detailed analysis and create a theoretical basis for the work done. In a practice note, they describe not only the technological part of the practice, but also the very concept of design, which ultimately consolidates their knowledge of Suprematism as an elegant concept of the interaction of creativity and creator.

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## **DESIGN ARCHITECTURAL LAYOUTS PREPARED WITH USING 3D PRINTING**

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Keywords: 3D printing, layers, fused deposition modeling, stereolithography, polyjet.

3D printing has revolutionized structural prototyping, design and the creation of new creative objects. Making architectural models is an important task for any design or architectural bureau. Depending on the quality of the design of the future project, the impression of clients and potential investors is created. Creating a design using traditional methods is a complex, time consuming and costly process. With the help of 3D printing, it is possible to significantly reduce the time of design production, improve the quality and make it as close as possible to the original. At the same time, most of the design work is performed on a computer using modern 3D modeling software.

3D printing has several advantages:

- Creation of accessible architectural models.
- Saving time.
- Easy updating of 3D architectural models.
- 3D printing of accurate and striking architectural models.

Purpose of the work: studying the principles of operation of various types of 3D printers, determining the main features and technologies for manufacturing products using 3D printing.