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HARDWARE AND SOFTWARE FUNCTIONING OF 3D FASHION HUBS

Purpose. *Justification of the rational composition of 3D hubs to increase the efficiency of the fashion business*
Keywords*: hub, 3D scanning, virtual fitting room, rear projection screen*

Objectives. The development of 3D technologies provides the possibility of a qualitative leap in many fields. The use of these approaches in the fashion industry will contribute to a significant increase in efficiency and an increase in the competitiveness of products [1]. Today, such approaches involve the use of expensive means that require highly qualified personnel. In addition, in addition to software tools, 3D scanners [2], 3D printers [3], and virtual fitting rooms [4] should function in this direction. A separate sewing factory is not able to ensure the functioning of the full equipment of such equipment. At the same time, the creation of separate centers that combine the provision of three-dimensional tools can be relevant.

Methodology. To determine the desired structure of 3D hubs that ensure the efficiency of the fashion industry, a number of interviews and questionnaires were conducted in focus groups, which included specialists from sewing enterprises, the fashion industry, Internet trade, as well as researchers in this field. After a structured process of conducting a systematic literature review, several steps were performed. First, some steps to collect and organize the data, and then some further steps to process and analyze the data. The Scopus database was chosen because only peer-reviewed journals with proven expertise would be considered in this way.

Research results.

The study of the state of the issue revealed the expediency of using software tools for creating three-dimensional clothes for creating digital images.

Such software may include CLO3D Specialized 3D Apparel Design Software. Its features are Realistic simulation of fabrics, integration with Adobe Photoshop for textures, the ability to create animations. Marvelous Designer is popular among video game and movie designers. Features of this program are an intuitive interface, powerful tissue simulation tools, export to various 3D formats. Browzwear VStitcher is aimed at the garment industry. Features:

accurate reproduction of fabric properties, integration with production management systems, the ability to create technical drawings. Optitex offers a comprehensive solution for the fashion industry. Features of this program: 3D design and 2D design, Tools for cutting optimization, Integration with ERP systems. DC Suite (Dressingsim) software specializes in creating virtual fitting rooms. Its features are high accuracy of fit reproduction, availability of tools for mass customization, integration with online stores. General trends in software development: Integration with CAD/CAM systems, integration with CAD/CAM systems, improved realism of tissue simulation, development of tools for collaboration and joint work, optimization for use in virtual and augmented reality.

Three-dimensional technologies involve the use of 3D scanners. The use of these devices involves mass production to improve the fit of clothes [5], individual tailoring, and virtual fitting rooms. 3D scanners create a detailed digital model of the human body. Lasers or structured light are used to measure thousands of points on the body. The impact on the industry is determined by reducing the number of returns due to size discrepancies, saving materials, and improving customer satisfaction. At the same time, the limitations are determined by the high cost of equipment, the need to train staff, and issues of confidentiality of customer data.

Online customization of clothes is a modern trend in the fashion industry, which allows consumers to create unique clothes online. Customers can personalize clothes through online platforms. They can determine the choice of design elements, colors, materials and sizes. The customization process includes choosing a basic model of clothing, using an online configurator for customization, viewing changes in real time, often with 3D visualization, ordering and manufacturing the individual product. Internet customization uses 3D visualization technologies, algorithms to optimize production, integration with order management systems. future trends of these technologies are integration with augmented reality technologies, use of artificial intelligence for recommendations.

The use of 3D printers in the production of clothing is an innovative approach that opens up new opportunities for design and production. 3D printers create clothes by applying material layer by layer, while using special flexible and wear-resistant materials. the use of 3d printers involves the creation of unique design products, the manufacture of accessories, the development of functional sportswear, and the production of shoes. Innovations and experiments include 3D printed fabrics with unique properties, integration of electronic components into clothing, development of "smart" clothing with built-in sensors.

Rear projection screens (Fig.1) are a technology where the image is projected onto a special screen from behind, creating a clear image for viewers

from the front. application in the fashion industry involves fashion shows, in particular, the creation of dynamic backgrounds for catwalks, interactive scenery that changes during the show, virtual catwalks with projection of models. Examples of the use of such devices: Virtual mannequins with the projection of different models of clothing, Interactive mirrors with the possibility of "trying on" clothes, dynamic backgrounds for photo sessions that change in real time.

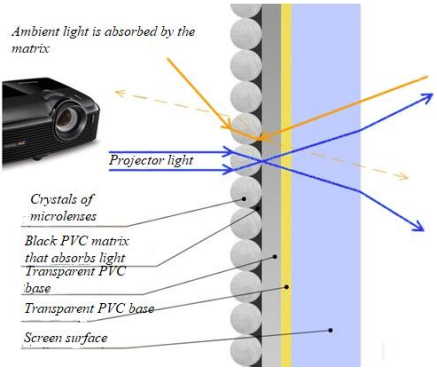

Fig. 1. **Rear projection screen**

Virtual fitting rooms are a technology that allows consumers to "try on" clothes in a digital format, without physical contact with the product. Such fitting includes the following technologies. Augmented Reality (AR): Superimposes digital images of clothing on real-time video of the user. 3D modeling: Creates a three-dimensional model of the user's body to accurately reproduce the fit of clothing. Artificial Intelligence (AI): Analyzes body parameters and recommends sizes.

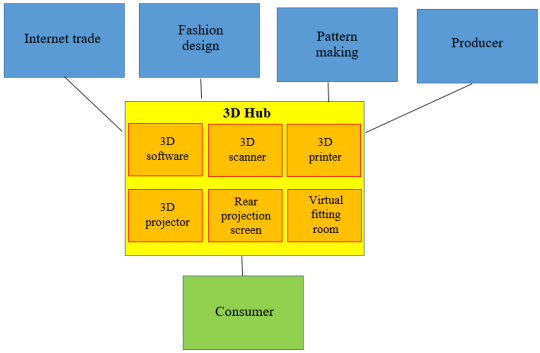

Fig. 2. **Proposed structure of 3D fashion hub**

The complex of proposed solutions can collectively form 3D hubs, which are located in large centers and can serve consumers, manufacturers, representatives of the fashion business and Internet trade (Fig. 2).

Conclusion. The use of three-dimensional technologies in the fashion industry opens up broad perspectives and has the potential to revolutionize the industry. The main areas include the following areas. Virtual fitting has the following advantages. 3D body scanning allows you to create accurate customer avatars, virtual fitting rooms allow you to "try on" clothes online, which can reduce the number of returns and increase customer satisfaction. Digital clothing design provides the following advantages. Designers can create 3D models of clothing without physical prototypes, enabling faster design changes and iterations. Virtual fashion shows can provide the presentation of collections in 3D format without the need for physical shows, the opportunity to reach a wider audience online. Customization and individual production involves 3D printing of accessories and clothing elements, the creation of unique products according to the client's individual measurements, the ability to quickly respond to trends and demand.

These technologies have the potential to make the fashion industry more sustainable, innovative and consumer-centric. To ensure these processes, it is rational to create 3D hubs equipped with the necessary software and hardware.

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