CREATION OF 3D MODELS OF HISTORICAL MONUMENTS APPLICATION OF DIGITAL TECHNOLOGIES

Xodjayeva Mavlyuda*

*Associate Professor of Modern Information and Communication Technologies,
International Islamic Academy of UZBEKISTAN
Email id: m.xodjaeva@iiau.uz

ABSTRACT

The article is devoted to the use of modern information and communication technologies in organizing virtual tours to places of interest and monuments, which describes the problems of developing virtual tourism. Also included are software for developing virtual travel experiences such as 3ds Max, Lumion 6.0, Adobe Photoshop, Adobe Premiere Pro and Adobe After Effect. The software complex was developed on the example of the complex "Shaikhovanda Tohur" which is located in the city of Tashkent.

KEYWORDS: *IT, Education, Programming, Development, Scratch, Code.Org, 3ds Max, Lumion 6.0, Adobe Photoshop, Adobe Premiere Pro, Adobe After Effect. Islam, Digital Technology, Lan, Information And Communication Technology Education.*

INTRODUCTION

As you know, today the process of integration and globalization is deepening and covering all areas. The unique treasures of the world treasury of science and culture are presented to the general public. This is especially true for today's young people, and for those who have a deeper knowledge. Education systems also play a role in this process. Digital technologies, especially modern information technologies, especially the widespread use and development of the Internet, are a topical issue today. Such technologies create unique opportunities for our young people to have open and wide access to the global information system, to develop their intelligence and professionalism.

LITERATURE REVIEW

The strategy we used to create the search strings was as follows [2] [21]: • Finding papers about creation of 3d models of historical monuments. • Listing keywords mentioned in primary studies

which we knew about. • Use synonyms word (usage) and sub subjects of digital technology in education such as (creation of 3d models, historical monuments). • Use the Boolean OR to incorporate alternative spellings and synonyms. • Use the Boolean AND to link the major terms from population, intervention, and outcome. The complete search string initially used for the searching of the literature was as follows: digital technology AND historical monuments. It has been highlighted in [5] [18] that there are two main issues on conducting an SLR search which are the sensitivity and specificity of the search. In our preliminary search, when we used the complete search string defined above we retrieved a very high number of articles. For instance, Google scholar, Scopus, ProQuest education, IEEEXplore, Science Direct, Springer Link retrieved more than two hundred results. Therefore, we have deepened our search and used this search string: (Adoption OR Usage) AND (historical monuments OR "3d models") AND (2d, 3d models OR digital technologies). The revised search string has given us a reasonable number of studies and we finally selected relevant empirical studies

ANALYSES AND RESULTS

3D modeling or CAD (Computer-aided design) refers to the creative process of building a model in three dimensions (known as x,y,z) using a dedicated software package like Maya, Houdini, Blender, Cinema 4D, or many others. The major aim of this paper is to present a non-destructive GIS-based method for a frescoes and Icon analysis pat of the cultural heritage [1].

CAD has been used for years in many industries to create a database for manufacturing, to improve the quality of design and communications through documentation. As a result, most brands find that 3D content already exists in their manufacturing process[2].

The first 3D models were created in 1960s. Back then, only those professionals in the field of computer engineering and automation who worked with mathematical models and data analysis were involved in 3D modeling.

A pioneer of 3D graphics is Ivan Sutherland, the creator of Sketchpad. This revolutionary program helped to create the first 3D objects – 3D is what it is today thanks to Sketchpad. Sutherland, along with his colleague David Evans, has opened the first ever department of computer technologies at the University of Utah. They attracted numerous talented professionals from all over the country who helped contribute to the development of the industry. Edwin Catmull, a current head of Pixar Animation Studios and Walt Disney Animation Studios, was one of Sutherland's students [3].

Sutherland and Evans opened the first 3D graphics company in 1969, calling it simply "Evans & Sutherland". Initially, 3D modeling and animation was used mostly on television and in advertisement, but with time, its presence in other areas of life increased greatly.

The proposed methodology is based on the combination of topographic surveys, digital photogrammetry and image processing techniques by means of four control points and one photography of the target at least, that become metric rectified image at any plane defined by the user. It is possible to quantify any physical characteristic of the surface of a frescoe as well as alterations on its surface that produce deviations from flatness. The Bundle adjustment was applied to a 2D reconstruction algorithm instead to a 3D reconstruction algorithm to control frescoe, from the Ramet Monastery[7].

There are many reasons and motives for digital modelling of real world objects, including: virtual reconstruction of historical artifacts icons and frescoes that no longer or only partially exist, digital documentation of pictures for restoration purposes in case of fire, flood, etc.; ability for virtual interaction without the risk of damage; production of e-learning data for educational resources; virtual tourism; virtual museum exhibits; and interactive visualisation of the objects [1].

Conditions are being created for the free and creative work of people, especially young people, through innovative technologies in education and training based on science, technology, digital technologies and artificial intelligence systems.

The importance of innovative technologies in the education system largely depends on the development of information technology in the big picture. At present, as a result of the development of information technologies in our country, the prospects for the production of national programs are being developed. It is very important to bring up young people in the spirit of patriotism and to bring them up with high knowledge and morals like our ancestors [9].

In this regard, the role of modern virtual technologies in preserving the material and spiritual heritage, as well as their transmission to future generations is invaluable. Software developments based on virtual and augmented reality technologies are proof of our point. Nowadays, when we divide virtual technologies into two groups based on virtual reality, the first ones are appreciated by game developers and sellers. While the former uses virtual reality to achieve the full immersion effect of a game or virtual journey, the latter is prepared to invite customers to "try out" clothing or furniture [11].

Today, virtual reality technologies are spreading to other areas as well. For example, in education, a virtual environment helps to visually explore anatomy, architecture, or ancient civilizations. Virtual and augmented reality of digital technology now helps to better understand material and make learning more interactive. If we talk about the direction of multimedia technology to create three-dimensional graphic images, this direction is also relevant, including applications such as AutoCad, 3DMax, Blender, 4D CINEMA, Blender, Maya. The products of world-famous cinematography companies such as WornerBrothers, Colambo Pictures, Sony Animation, Dream Works are produced in the three-dimensional graphics programs listed above. Currently, the widespread introduction of AutoCAD and 3D MAX programs in the process of creating a graphic model of historical monuments and artistic decorative elements is effective[18].

There is a technology of computer modeling, the purpose of which is to reflect in computer memory the process of understanding the nature around us, the events that take place in it, and changes in society, using modern methods. The use of programming languages in computers has made a serious breakthrough in mathematical modeling.

Different types of process models studied on computers (graphics, diagrams, animations, animations, etc.) can be created on a computer screen. An example of the work being done in this direction is a virtual model of the Minor Mosque in Tashkent (Figure 1).

Figure 1 Minor mosque project

A three-dimensional model of the object was created using the capabilities of 3D MAX software. Like all graphics programs, this program requires a high-quality computer. First of all, digital objects are 3D (three-dimensional) models created in a free space using computer software[21].

Today computer technology is used by 3D editors to create three-dimensional compositions. They have two distinct characteristics. First to properly control the interaction between the surface properties of the object and the light source to show the three-dimensional nature of the object being depicted. The second is that it allows you to create three-dimensional animations. That's why three-dimensional graphics editors are called 3D animators.

The rapid development of digital and information and communication technologies and the updating of its hardware and software, the application of 3D max modeling, three-dimensional image modeling, three-dimensional representation of space and objects, images, drawings and geometric figures Indicates that there are options for creating a 3D model [15].

Three-dimensional graphics are widely used in engineering design, architectural construction, construction of computer models of physical objects. Three-dimensional graphics is one of the most complex and comprehensive areas of computer graphics. Users working with three-dimensional graphics should have knowledge in one of the areas, such as designing, lighting, moving objects and cameras, using sound, applications, and using presentation effects [9].

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Looking back, it was hard to imagine the capabilities of today's computers. At the same time, three or more software developments are being developed in information technology, the visuals of which are astonishing. Modern forms of modeling began to emerge.

When creating a three-dimensional model of an object using the capabilities of the 3D MAX program, this program, like all graphics programs, requires a high-performance computer [17].

This process can be seen in the example of the historical monument of Sheikh Khovand Tokhur, one of the sacred places in Tashkent. Exports and stores the finished object in 3D MAX and imports it into Lumion. In this program, materials are provided to the object and made ready (Figure 2).

Figure 2. General view of Sheikhhovanda Tohur Mosque

The main view of the Shaykhovanda Tohur complex created with the help of the Lmion program (Figure 3)

Figure 3 General view of the Shaykhovanda Tohur complex

The potential of multimedia technologies in the development of virtual models of historical monuments is also unique. Multimedia technologies provide information exchange between the user and the computer using sound (speech, music, noise), graphics (pictures, images, photos, drawings) and animation (videos, cartoons).

It is also gaining ground in a number of areas. The development of multimedia technologies is based on applications that work with objects of three or more sizes. Among various industries, these programs are used in architecture and construction, design and modeling. It was in these applications that only 2 sides of the object were represented, and now concepts such as 3D, 4D Cinema, 5D and even 7D are beginning to emerge. The following large-scale applications have the opportunity to learn more about the object than ever before. Spatial movements on the models, animations are performed in Blender, MAYA programs [21].

The development of the industry is the basis for tourism, as well as virtuality in all areas. In particular, architecture and design are unimaginable without modeling.

When creating three-dimensional models, a three-dimensional model of an object allows the user to have a better idea of the object.

Using models and algorithms, the created object will look like the original. Additional effects on the model will depend on the inner world and imagination of the designer. 3D effect models of travel routes will help to attract more tourists. The development of the multimedia industry can be seen in the example of these applications. We can also see the capabilities of 3D MAX in the example of LUMION 6.0, which can work in sync with this program. LUMION 6.0 is a great practical utility for the rendering part of a modeled object.

A number of computer applications play a key role in creating models of not only travel routes, but also any objects. Modeling is the visualization of an object in computer memory so that complete information about the object can be obtained [15].

Modelling accuracy depends on requirements such as level of detail; a sample of live survey data will be utilised as ground truths to evaluate the accuracy of the mapped parametric data both as individual models and integrated models. Mapped detail behind the surface of the structure, which is based on historic detail, will be compared for accuracy with existing survey data of the surveyed structure where detail is available from previously carried out destructive surveys and openings of buildings [19].

There is a growing interest in historical monuments and their visits. It is no exaggeration to say that the creation of 3D models of historical monuments and their introduction in travel itinerary will increase the interest in them. Visual models of historical monuments in our country can be created using 3D Max and other modern software (Figure 4).
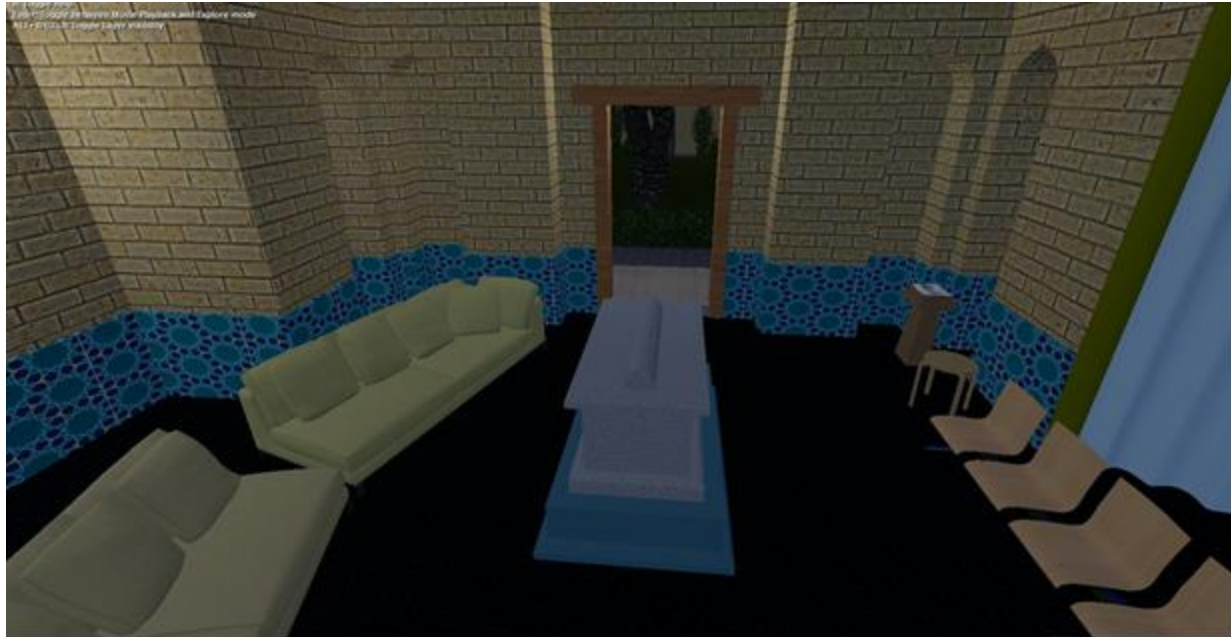
Figure 4. Sheykhovanda Tohur "complex interior

CONCLUSION

In the age of digital technology, especially virtual technology, people need to be constantly on the move. Constant physical exertion can lead to physical and mental exhaustion. The developed software helps a person to have a spiritual rest. The user can organize a virtual tour of the house, place of work, or otherwise to the site. The user will also have a basic understanding of step sets. The presentation of the studied processes and events through computer technology, the creation of models of sacred sites based on virtual reality and its presentation to the general public are important as they increase users' interest in historical monuments.

Today, with the help of such virtual reality, it is possible to visit other countries and attractions, museums and even sunken ships.

The use of digital technologies in various fields plays an important role in shaping the worldview of young people:

- The fact that the majority of the population of the country uses the opportunities of the Internet in the field of Internet and information technology;

- The ability to more accurately represent the image of a real object in the elements of multimedia design of historical monuments and monuments through graphic programs;

- The deep penetration of multimedia in all areas of information technology;

- That the state pays attention to measures aimed at understanding national identity and deepening the assimilation of religious values.

The implementation of the above goals and objectives will ensure the effectiveness of digital technologies, educational innovations, the positive impact on the worldview of young people, the

revival of historical thinking of young people, the consolidation of national identity and values in the minds of our people, especially in youth.

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