THE GRAPHICS- IS OF THE MAIN COMPONENTS OF MULTIMEDIA TECHNOLOGIES

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Annotation
The article deals with one of the main components of multimedia technologies - graphics and its properties, modern technologies for creating 2D and 3D graphics, and graphic effects, the use of graphics in multimedia applications.

Keywords. Multimedia technologies, multimedia teaching aids, electronic educational resources, image, special effects, object design, animation, originality. imagination, visual effects, computer graphics, characters, transmedia, multimedia effect, signal.

Introduction
In the modern world, it is difficult to imagine a world without computer graphics. Computer graphics can be found in any sphere of society. Doctors use graphics in tomography of internal organs, engineers in the process of creating machine parts, architects use graphics in designing buildings, cartoonists in creating new cartoons, and so on. To attract the attention of readers, graphics are used in printed publications: books, magazines, newspapers and media websites. Bright covers of books and magazines, as well as illustrations that help the reader to fully imagine the content of the information read.

The creation of a general theory of multimedia art in recent years has entered a qualitatively new stage of intensive development and influence on the improvement of the educational process of preparing various subjects in terms of specificity, functionality and effective methodology [2].

Computer graphics and animation is one of the most voluminous elements of multimedia technologies, which includes the fundamental knowledge necessary for the formation of a modern specialist in the field of multimedia products. The composition of the subject of multimedia technologies needs to be constantly supplemented, analyzed and expanded due to the rapidly changing composition of the software and hardware complex and the technological re-equipment of the workplace of a specialist in the field of multimedia.

Computer graphics are used for paperwork. These are all kinds of logos of firms, enterprises and organizations. Large-scale computer graphics are used to create advertising, without which it is already difficult to imagine our life. This is an advertisement on television, created in the form of animation, advertising in a newspaper. And the more colorful the advertisement, the more likely it is to attract the attention of the consumer.

The presentation of data on a computer monitor in graphical form was first implemented in the mid-50s for large computers used in scientific and military research. Since then, the graphical way of displaying data has become an integral part of the vast majority of computer systems, especially personal ones. The graphical user interface is currently the standard for software of various classes, starting with operating systems [3].

There is a special area of informatics that studies methods and tools for creating and processing images using software and hardware computing systems - computer graphics. It covers all types and forms of representation of images available for human perception either on a monitor screen or as a copy on an external medium (paper, film, fabric, etc.). Without computer graphics, it is very difficult to imagine not only a computer, but also an ordinary, quite real world.

Data visualization finds application in various fields of human activity. As an example, let's name medicine (computed tomography), scientific research (visualization of the structure of matter, vector fields and other data), modeling of fabrics and clothing. Depending on the method of image formation, computer graphics are usually divided into raster, vector and fractal [1].

Three-dimensional (3D) graphics, which studies the techniques and methods for constructing three-dimensional models of objects in virtual space, is considered a separate subject. As a rule, it combines vector and raster imaging methods. Color gamut features characterize concepts such as black and white and color graphics.

Specialization in certain areas is indicated by the names of some sections: engineering graphics, scientific graphics, Web graphics, computer printing and others. At the junction of computer, television and film technologies, a relatively new field of computer graphics and animation was born and is rapidly developing. A large place in computer graphics is given to entertainment. There was even such a thing as a mechanism for graphical presentation of data - this is the most visual representation of the obtained distribution of research results (Graphics Engine).

Although computer graphics is just a tool, its structure and methods are based on the cutting-edge achievements of fundamental and applied sciences: mathematics, physics, chemistry, biology, statistics, programming, and many others. This remark is

true for both software and hardware tools for creating and processing images on a computer. Therefore, computer graphics is one of the most rapidly developing branches of informatics and in many cases acts as a "locomotive" that pulls the entire computer industry with it [4].

Results and Discussions

Computer graphics is a branch of computer science that deals with the problems of obtaining different images (drawings, drawings, animations) on a computer. Work with computer graphics, the most well-known direction with the use of a personal computer, and not only highly professional specialists, artists and designers are engaged in this work.

Often, any enterprise (company) needs to submit advertisements to newspapers, magazines, to issue an advertising leaflet, booklet or on television. In some cases, firms order such work from special design bureaus or advertising agencies, but most often they manage on their own and with available software. Currently, not a single modern program can do without computer graphics. Work on graphics captures up to 90% of the working time of programming teams that produce programs for public use. The main labor costs in the work of editorial offices and publishing houses are also artistic and design work with graphic programs [2].

The need for the widespread use of graphic software became especially noticeable in connection with the formation of the Internet and, first of all, thanks to the World Wide Web service, which linked several million web pages into a common "web". A page designed without computer graphics has little chance of attracting the attention of consumers.

The scope of computer graphics is not limited to artistic effects. In absolutely all branches of science, technology, medicine, in commercial and managerial activities, computer-built schemes, graphs, diagrams are used, designed to visually display various information. Designers, creating the latest models of cars and aircraft, use three-dimensional graphic objects in order to represent the final look of the product. Architects create a three-dimensional image of the building on the monitor screen, and this allows them to see how it will be in reality and how it will fit into the landscape. Consider the main areas of application of computer graphics:

- Scientific graphics. The first computers were used only to solve scientific and industrial problems. In order to better understand the results obtained, they were processed graphically, built graphs, diagrams, drawings of calculated structures. The first graphics on the machine were obtained in symbolic printing mode. Later, special devices appeared - graph plotters (plotters) designed to draw drawings and

graphs with an ink pen on paper. Modern scientific computer graphics makes it possible to implement computational experiments with a visual representation of their results [4].

- Business graphics is a field of computer graphics specialized in the visual representation of various performance indicators of institutions. Planned indicators, reporting documentation, statistical summaries - these are the objects for which illustrative materials are created using business graphics. Business graphics software is included in spreadsheets.

- Design graphics is used in the work of design engineers, architects, inventors of new technology. This type of computer graphics is considered an integral element of CAD (design automation systems). By means of design graphics, it is possible to obtain both flat images (projections, sections) and spatial 3D- images.

- Illustrative graphics are freehand drawing and drawing on a computer screen. The illustrative graphics packages are general purpose application software.

- Artistic and advertising graphics - famous in television. With the help of a computer, commercials, cartoons, computer games, video lessons, video presentations are created. Graphics packages for these purposes require large computer resources in terms of speed and memory. A characteristic feature of these graphics packages is the ability to create realistic images and "moving pictures". Obtaining drawings of three-dimensional objects, their rotations, approximations, removals, deformations is associated with a large amount of calculations. The transfer of the illumination of an object depending on the position of the light source, on the location of the shadows, on the texture of the surface, requires calculations that provide for the laws of optics.

- Computer animation - moving images on a computer screen. The designer creates on the screen drawings of the initial and final positions of moving objects, all intermediate states are calculated and depicted by the computer, performing calculations based on the mathematical description of this type of movement. The resulting drawings, displayed alternately on the screen with a certain frequency, create the illusion of movement [3].

- Multimedia is the combination of a high-quality image on a computer screen with sound. Multimedia systems have become widespread in the field of teaching, advertising, and entertainment.

There are three types of computer graphics. These are raster graphics, vector graphics, three-dimensional graphics and fractal graphics. They differ in the principles of image formation when displayed on a monitor screen or when printed on paper.

In raster graphics, the main (smallest) element of the image is a dot. If the image is on-screen, then this point is called a pixel. Each pixel of a bitmap has properties: placement and color. The image looks better if it has more pixels and their sizes are not large. Large amounts of data is the main problem when using bitmaps. For each point of the line in the raster graphics, one or more memory cells are allocated. Accordingly, the longer the raster line, the more memory it takes. [4]

Intensive work with large images such as a magazine page requires computers with exceptionally large amounts of RAM. The second disadvantage of raster images is that they cannot be enlarged to see details. Since the image is made up of dots, zooming in on the image only makes the dots bigger and more mosaic-like. Almost no additional elements can be seen when the bitmap is enlarged. Moreover, increasing the dots of the raster visually distorts the picture and makes it rough. This effect is called pixelization. [3]

Raster graphics are used in the development of electronic (multimedia) and printing publications. Illustrations made using raster graphics are rarely created manually using computer programs. Most often, scanned illustrations prepared by artists or photographs are used for this purpose. Recently, digital photo and video cameras have been widely used to enter raster images into a computer.

In vector graphics, the main element of the image is a line (straight or curve). Of course, lines also exist in raster graphics, but there they are considered as a combination of points. In the vector memory occupied by the line, it does not depend on the size of the line, since the line is represented as a formula, or rather, as several parameters. [4]

Line is an elementary object of vector graphics. Everything in a vector illustration is made up of lines. The simplest objects are combined into more complex ones, for example, a quadrilateral object can be considered as four connected lines. Like all objects, lines have properties. These properties include: the shape of the line, its thickness, color, character of the line (solid, dotted, etc.). Closed lines have a fill property. The inner area of a closed contour can be filled with color, texture, map. The simplest line, if it is not closed, has two vertices, which are called nodes. Nodes also have properties that determine how a line's vertex looks and how two lines fit together. [3]

Vector graphics software is designed primarily for creating illustrations and, to a lesser extent, for processing them. Such tools are widely used in advertising agencies, design bureaus, editorial offices and publishing houses. Design work based on the use of fonts and simple geometric elements is much easier to solve using vector graphics. More

common graphic programs designed for processing vector images are Adobe Illustrator and CorelDRAW.

A fractal is a drawing consisting of elements similar to each other. The main advantage of fractal graphics is that only algorithms and formulas are stored in the fractal image file. [2]

Software tools for working with fractal graphics are provided for automatic generation of images by precise calculations. Creating a fractal artistic composition is not about drawing or decorating, but about programming. Fractal graphics, like vector graphics, are calculated, but differ from it in that no objects are stored in the computer's memory. The image is built according to an equation (or according to a system of equations), so you don't need to store anything other than a formula. By changing the coefficients in the equation, you can get a completely different picture. The ability of fractal graphics to simulate images of wildlife in a computational way is often used to automatically generate unusual illustrations. Fractal graphics are sometimes used to create printed or electronic documents, more often they are used in entertainment programs.

Three-dimensional graphics are able to convey the depicted objects as realistically as possible. Moreover, they are created from scratch with the help of specialized programs. It is the results of the work of three-dimensional graphics that fans of resource-intensive computer games and various cartoons created by this technology can observe. The demonstration process takes a lot of time and effort and the necessary knowledge. With a sufficiently clear study, some objects may look as realistic as possible and be indistinguishable from a photograph or video. Initially, the user creates a frame of the future object in the application using the simplest lines, and then covers it with various material effects. In the programs of this direction, there are many blanks, for example, leather or fabric. After that, the image is as detailed as possible, corners are smoothed, hairs are drawn and much more. Such an object can be viewed from any side by simply rotating the image. To give it life, the effects of wind blowing, shadows and gravity are created. Moving objects have the function of setting the speed and trajectory. [5]

Three-dimensional graphics is widely used in engineering programming, computer modeling of physical objects and processes, animation, cinematography and computer games. Any image on the monitor, by virtue of its plane, becomes a raster, since the monitor is a matrix, it consists of columns and rows. Three-dimensional graphics exist only in our imagination, since what we see on the monitor is a projection of a three-dimensional figure, we create the space ourselves. So, visualization of graphics is only

raster and vector, and the visualization method is only a raster (a set of pixels), and the way the image is specified depends on the number of these pixels.

Since the 40s of the XX century, computer graphics has gone through a difficult path in its development: from electronic abstractions to complex compositions created using three-dimensional graphics. At the initial stages, the formation of computer graphics was associated with the development of technical means and especially displays. Computers and visual capabilities have changed the methods used to create and distribute images. But powerful computer systems that are used on such a large scale in our time do not exist so long ago [4].

Taking into account the existing trends in teaching computer graphics, it is conditionally possible to note the main groups of software that correspond to the areas of training of specialists:

• For technical and construction specialties - AutoCAD, ArCon, Arhi CAD;

• For pedagogical specialties - Corel Draw!, Corel Painter, Adobe Photoshop, Adobe Illustrator, Adobe Page Maker, 3D Studio MAX, 3D Studio Viz Canvas, Flash.

Computer programs for creating and editing two-dimensional vector objects and three-dimensional modeling have become more widespread in the educational process. The most common programs are Corel Draw, Adobe Photoshop and 3D Studio MAX. Recently, in the learning process, Flash technologies have been actively used in the development of educational computer programs, interactive encyclopedias, and Web pages. The use of computer technologies in the future professional activity of a student cannot be imagined without computer graphics [3].

Conclusions

The transition to new educational standards changes the approach to the development of professional competencies. This highlights such a component of qualification characteristics as creative qualities, when students become able to generate and implement new original ideas, solve non-standard tasks. Therefore, one of the most important requirements in teaching students should be the development of an important component of creative activity - spatial imagination. When developing multimedia content, it is important to use an integrated approach that integrates various means of interaction with students using new methods in the learning process. The Moodle system, which provides remote interaction that is relevant to learners, is used with the success of multimedia technology. The system provides the teacher with an extensive toolkit for providing educational and methodological materials for the course, conducting theoretical and practical classes, organizing the educational activities of students, both individual and group. In multimedia technologies, video

lessons with computer graphics are considered to be a promising element of modern technologies. In addition, one more important property of interactive educational content can be singled out: it greatly facilitates the work of the teacher, allows him to focus on solving creative problems and scientific activities. The conducted research is not exhaustive and it should be continued, supplementing existing developments as curricula change and multimedia tools improve. It is possible to further deepen research by identifying psychological characteristics that influence the development of spatial imagination [3].

It can be concluded that computer graphics are currently being widely used in educational processes as part of multimedia technologies. We cannot imagine without graphics in the processes of developing logos and advertising, in medicine, on television and in other industries. Therefore, computer graphics is one of the most rapidly developing branches of computer science. Training in computer graphics should take place on the basis of the unity of education and upbringing, creative activity, a combination of practical work with the development of people's ability to perceive and understand works of art. Computer graphics is a field of computer science that studies how images are formed and processed using a computer and special computer programs.

Working with computer graphics is one of the most well-known areas of using a personal computer, and not only professional artists and designers are engaged in this activity. In every company, from time to time there is a need to submit advertisements to newspapers and magazines, to issue an advertising leaflet or booklet. Sometimes companies order such work from special design bureaus or advertising agencies, but often they manage on their own and with available software. Nowadays, no modern program can do without computer graphics.

The main tasks of computer graphics are:
• Representation of the image in computer graphics;
• Preparation of the image for visualization;
• Creating an image;
• Implementation of actions with the image.

As a result of the work done, we learned about the role of computer graphics in the educational process, considered the main types of computer graphics.

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