# 3D modeling of geometric-graphic education in digital development

Tashkent State University of Transport

Отабеков Улуғбек Ғайрат ўғли

3D modeling is one of the first steps in creating three-dimensional graphics. The concept of three-dimensional modeling means creating three-dimensional models of objects on a computer.

A person who works with 3D models can be called a 3D artist or 3D modeler. A 3D model can also be rendered as a two-dimensional image or used in a computer simulation of physical phenomena through a process called 3D rendering. 3D models can be created automatically or manually. The manual modeling process of preparing geometric data for 3D computer graphics is similar to the art of sculpture. A 3D model can be created using 3D printing machines, which create 2D layers of the model simultaneously with the 3D material.
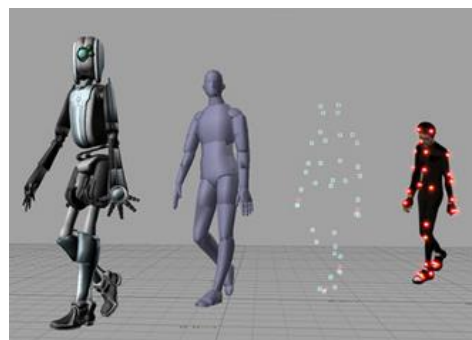
Programming languages or software can be used to develop three-dimensional modeling, or 3D modeling in short. It is more efficient to develop 3D modeling using ready-made software. This makes creating objects faster and easier. Examples of the most common 3D modeling software are Autodesk's "3ds MAX" and "Maya". The capabilities of these softwares are very wide, through which you can develop any 3D models. After the 3D modeling is done, it is necessary to connect it with the program and use programming languages to develop the programs. . C/C++, Java, Python, JavaScript, C# programming languages are among them. In order to convert the finished 3D models into software, it is necessary to write software codes in the translators. This requires a lot of programming code. A number of graphic software have been developed to optimize

these tasks. One of them is the Unity 3D program developed in 2005. Unity 3D is one of the most convenient software for creating 3D software and games. In Unity, you can download ready-made 3D models and combine them by writing scripts in C# or Javascript. Working in Unity 3D is very convenient:

➢ ⬚ the ability to automatically copy and save the necessary materials for the program being created in one directory;

➢ ⬚ script codes are written separately and then combined into objects;

➢ ⬚ ease of viewing the software product being developed and most importantly;

➢ ⬚ possibility to compile the program for many platforms.

There are three popular ways to present a model:

Polygonal modeling—Points in three-dimensional space, called edges, are connected by line segments to form a polygonal mesh. Most 3D models today are made as textured polygonal models because computers can render them so quickly.

Curve modeling – surfaces are defined by weighted curves. The curve follows (but may not interpolate) the points. Increasing the weight for a point makes the curve closer to that point. Curve types include rational B-splines (NURBS), lines, surfaces, and geometric primitives.

Digital sculpting is the use of software that offers the means to push, pull, grind, grip, pinch, or otherwise manipulate a digital object as if it were made of a living substance such as clay.[6] The geometry used in digital sculpting programs to represent the model can vary. Most of the digital sculpting tools on the market use geometrical geometry where objects are related to each other. A surface consists of polygons that can be pushed and pulled onto the surface. The advantage of mesh-based programs is that they sculpt in multiple dimensions on a single model. Finely detailed model surfaces may have very small polygons. The benefit of voxel-based sculpting is that voxels allow complete freedom over shape. During modeling, the topology of the model can be constantly changed as material can be added and

removed, making it easier for the sculptor to consider the placement of polygons on the surface of the model.

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