3D SCANNING AS A MODERN WAY TO CREATE THREE-DIMENSIONAL VIRTUAL MODEL (3D-СКАНУВАННЯ ЯК СУЧАСНИЙ СПОСІБ СТВОРЕННЯ ТРИВИМІРНИХ ВІРТУАЛЬНИХ МОДЕЛЕЙ)

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Розглянуто основні поняття 3D-сканування, представлено його головні методи та принципи роботи.

In the late 1960s, the first 3D scanning technology was developed. 3D scanning is a technology for creating high-precision 3D models of real-world objects. In order to perform 3D scanning, you need a 3D scanner, which is a powerful tool for the professionals in such industries and spheres as: automotive, aeronautics, dental, jewelry, as well as video games, special effects, and animation movies.

The main 3D scanning technologies rely on different physical principles and can be classified into the following:

− Laser triangulation 3D scanning technology projects a laser beam on the surface and measures the deformation of the laser ray.

− Structured light 3D scanning technology measures the deformation of a light pattern on the surface to 3D scan the shape of the surface.

− Photogrammetry, also called 3D scan from photographs, reconstructs in 3D a subject from 2D captures with computer vision and computational geometry algorithms.

− Contact-based 3D scanning technology relies on the sampling of several points on the surface, measured by the deformation of a probe.

− Laser pulse (also called time of flight) 3D scanning technology is based on the time of flight of a laser beam. The laser beam is projected on a surface and collected on a sensor. The time of travel of the laser between its emission and reception gives the surface's geometrical information.

There are two scanning methods – contact and non-contact. A contact 3D scanner works like this: a special probe is used to circle an object and a special program builds a three-dimensional model. This method is extremely accurate, but scanning can damage the object. The non-contact method scans an object by reflecting radiation or comparing images, so it is divided into two subtypes: active and passive. 3D scanning is the best way to build the most accurate 3D model of complex objects, which has found the application in many industries and spheres.