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3D PRINTING AND ITS ROLE IN NOWADAYS SOCIETY

As we are living in 21st century that is renowned for its technological progress that never stops. One of the recent developments was a 3D printer. This machine have turned the world upside down and become very popular and nowadays 3D printers are widely used in almost every sphere. Accessories, prostheses, cars, toys, food, and even artificial organs – these are things that can be printed, and it is only beginning. I believe that these technologies will help us build better world.

3D printing is a complicated process that makes real models from digital files. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object.

3D printing is not as difficult as it may seem. To begin with, the only thing that is need computer and 3D printer. You need to create a 3D model. The most spread technique is using a CAD (Computer Aided Design) file. A 3D model is either created from the ground up with 3D modeling software or based on data generated with a 3D scanner. With a 3D scanner you're able to create a digital copy of an object.

The most popular 3D printer technologies boil down to five main techniques [3]:

- *Fused Deposition Modeling (FDM)* is the simplest technique, and is used by extrusion machines. They work by softening a plastic filament and extrude it while precisely moving the extruder back and forth to build the item layer by layer. Polylactic acid (PLA) and Acrylonitrile butadiene styrene (ABS) are the most popular FDM materials, but some contours and curves can be roughly formed, and the final

product can lack the internal strength required. The process is one of the most rapid and required to make basic things such as phone cases or decorations.

- *Binder Jetting* starts out with a powdered base material that is precisely sprayed with a curing agent that selectively hardens it into its final shape. Binder Jetting can create not only metallic objects – like stainless steel and bronze – but silica as well, for making sand casting molds. This technology is slightly difficult than the FDM, but it is worth it.

- *Vat Polymerization* uses stereolithography to solidify a liquid polymer resin by curing it with a beam of ultraviolet light. The light source, often a laser, is precisely aimed with steerable mirrors to where the liquid needs to be hardened into its final shape. The output is good smooth details, which makes possible creation complex thing such as airplane parts and models for complex surgery.

- *Powder Bed Fusion* starts with a powdered raw material that is selectively fused into a solid from a laser's heat. The beam moves back and forth selectively hardening areas that need to be built up. It can be used with nylons and metals, like titanium, steel and copper for complicated items like pump housings, gears and even footwear.

- Directed Energy Deposition focuses a high-energy laser or plasma arc to fuse metals together, building the object by solidifying the metallic raw material a layer at a time. As a result, you will get solid, strong and durable. In spite of its cost, Directed Energy Deposition is one best and the most efficient technology.

There are a lot of things that makes our live easier, including 3D printing. It has occupied different industries and there are some examples:

Thomas Jefferson University and Jefferson Health, a university and health system located in Philadelphia, is at the forefront of healthcare technology. When Dr. Robert Pugliese and Dr. Bon Ku set out to integrate 3D printing into the Jefferson Health Design Lab, they wanted to better prepare their students for the challenges they would face when entering real-world hospital environments [2].

April Jubett's background in scientific illustration and 3D animation paved the way for her work with NASA's Chandra X-ray Observatory, a space-based telescope that orbits our planet collecting information for scientists. She began working on Chandra's communication team fifteen years ago, exploring her strong desire to explain science through creative mediums like 3D printed models. With the help of Ultimaker, April and her team make it possible for inquisitive learners of all ages to hold supernovas right in the palm of their hand [1].

Thus, 3D printing technology is very effective, has a lot of possibilities and can be useful in different spheres or in daily life. Clearly, its accuracy and multiplicity will be developed and improved in future. One of the most profitable and perspective branch of 3D printing is printing of the humans' organs and parts of the body, which can help save lots of people all around the world.

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