**Looking at Computers: Understanding the Parts**

**Web Project 3: 3-D Printing**

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3D printing, also called additive manufacturing, is a process of creating three dimensional solid objects under computer control that are represented in the form of a computer file. The additive process is used to physically make objects, i.e. the material is placed by layers, one after another.

First, the computer model has to be created. This can be done using several methods. Computer-aided design software is the most efficient way because it allows to reduce errors. 3D scanners and digital cameras are also used for creating the 3D models. For printing the STL (STereoLithography) file format is widely used. In order to get a desirable result, the errors must be eliminated before printing. When the file is executed, the process begins and the printer starts laying down the material layer by layer using the 3D model. The final step after an object is created is finishing like a coloring, assembling etc.

The main differences between the printers that are used include a method to place layers and the materials to create them. There are processes that use melting or softening material to produce layers while others cure liquid materials using different technologies.

Today, the 3D printer is becoming cheaper and cheaper, smaller and smaller. In the near future every home might have a 3D printer like every home has a printer now. Let's see the usages of the 3D printing technology in present.

Industrial 3D printers have long been used in prototyping by automotive and aerospace companies. Boeing, an airplane maker, has already produced more than 300 parts using 3D printers, and Ford has built cylinders with 3D printers.

In the medical field, patients around the world are experiencing improved quality of care through 3D printed implants and prosthetics. Even 3D printing pens are helping in orthopedic surgery.

In arts and culture sector, the Smithsonian Museum, the largest museum in the world, has begun 3D scanning and digitization of its collections. And the museum released this data through a website called Smithsonian x 3D, so that we could view the exhibits online and print them via the 3D printers if desired. Smithsonian has about 130 million collections, but only 1% of the collections meet with the public because of the limit of the space. Through this digitization work, 99% of unpublished collections will have the opportunity to meet with the public, and researchers can have accurate data that couldn’t be compared with photographs.

Looking into the future, the most expectable evolution of 3D printers should be alike to the evolution of traditional printers, but in various modifications due to numerous purposes, printing technologies and different consumables. In the next few years, we can expect explosive growth in quantity of 3D printers and 3D printing services, 3D printer will become a common thing in our life. We will see evergrowing demand on digital 3D models: instead of buying some product and pay for delivery people will have option to buy just 3D model or special access code to print it in the nearest 3D service right from sellers’ server using special encrypted 3D printing protocol.

3D printing technology can have a big impact on the toys industry. It can become possible to print missing or broken parts of toys or assembly kits using home 3D printer. Toys can be printed right in a store before children, they even can “take part” in the process. Various based on 3D printing vending machines to sell toys and souvenirs will appear. 3D painting toys, figures and objects in any forms and shapes will be easily accessible in the near future.

Let’s imagine the fusion of the AI technology and 3D printing. We can produce robots like human, animal or somethings. For example, let’s suppose that we need a robot as a housekeeper, we can make a robot with the appearance that we want. It is very happy imagination. No, it will be realized in near future.

3D printing also will play one of the key roles in the exploration of space as it solves at least two big problems, printing bulky objects in space instead of delivering them as well as printing tools and parts in orbit, so staying in space will become safer. In 2018 NASA will launch "Refabricator", a 3D printer and recycler in one unit, capable to recycle printed items back into reusable raw materials.