3D Printing

Printing ideas into 3D reality

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Abstract*— 3D printing is any of various processes for making a three-dimensional object of almost any shape from a 3D model or other electronic data source.

I. Introduction

3D printing is the process of making three dimensional solid objects from digital designs. The object is made through primarily additive processes layering the material through a printer-head. Hence the process is also known as additive manufacturing.

II. The Process

A. Creating a Model

First, one has to create a virtual(digital) model of the desired object. This can be made in CAD(Computer Aided Design) using a 3D modeling program(for an entirely new object) or a 3D scanner(to copy an existing object). To create the digital file for the printer, the software slices the model into hundreds of layers.

B. Physical Printing

The prepared digital file is loaded into the 3D printer. It reads every slice(2D image) and successively lays down each layer by depositing the building material. The building material is usually mouldable eg. rubber, polymers, metals, fibres etc. It blends each layer into he adjacent layers, thus creating the final 3D object.

The process is classified as 'additive' manufacturing, because as opposed to industrial 'subtractive' manufacturing – which cut or machine the required objects from an initial complete block of material – 3D printing keeps adding the raw material in fluid form till the object is fully formed.

III. Applications

The flexibility of the 3D printing technology to print almost any object form a variety of materials makes it useful in an assortment of fields ranging from personal and industrial use to the medical field and food processing. To name just a few of the innumerable possibilities:

- Scale Models
- Personal use objects
- Prosthetic body parts and organs
- Foodstuffs
- Construction and Houses
- On-spaceflight manufacturing

Several companies are making efforts to develop affordable 3D printers for home and desktop use. Much of this work has been driven by and targeted at DIY enthusiast/early adopter communities, with additional ties to the academic and hacker communities.