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Degree of Freedom and Synthesis of 3D Printer

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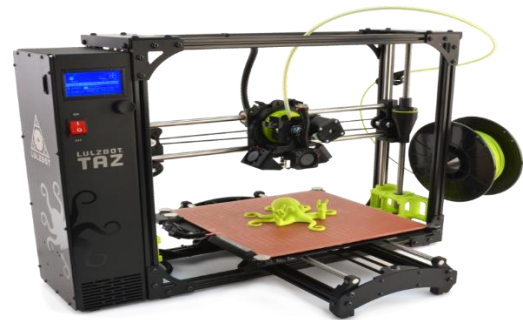
ABSTRACT

In this paper we propose a DOF (degree of freedom) 3D printing system with synthesis. Common 3D printer with only three translational axes. The input model is first segmented such that each part can be printed in direction with less supporting material. We demonstrated that the proposed system could save most of the supporting material compared to existing 2D diection works. Now study of synstheis of 3D printer can give us the exact knowledge and the dimenstional accuracy comparision of the exsisting of previous design.

Keywords : Degree of Freedom, 3D Printing System, FDM Printers

I. INTRODUCTION

The 3D printing technique has been developed rapidly in recent years. it's been wisely utilized in various fields like industry medicine, bioscience, etc. Most of the prevailing 3D printers (e. g fused deposition modelling – FDM printers) can only prints within the vertical direction. However only the models with a tree like structure are often printed directly, while the opposite sorts of models need additional construction during the printing procees which require to be removed in a very post processing step. Such printing scheme involves the waste of printing materials and also the cleanup step also has the infulence on the apperiance of the printed object which needs to be performed very carefully.

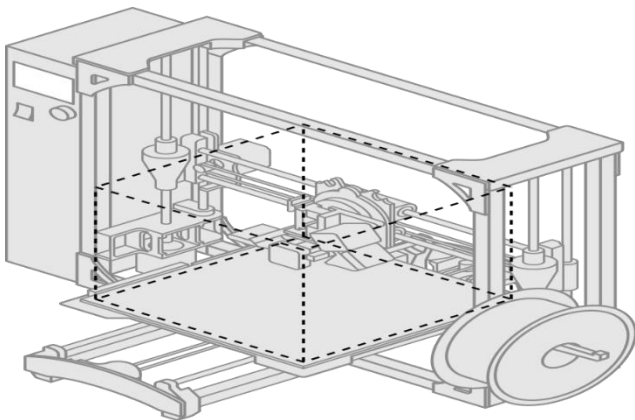


To enhance the flexibleness of the printer ,several multi DOF 3D Printing system are designed. of these multi DOF printers are blindly controlled the printing accuracy depends only on tyhe precision of the system . however if there's a error occurred during the printing procees it's difficult to locate and solve such problem. during this paper ,multi-DOF 3D printing system, which uses a 3 axis system to regulate the printer.

Given a 3D model to be printed, it id first segmented into several components such each component are often printed in its own printable direction with as little as additional support. Then the printing path is planned automatically, by which the components are

printed following the planned order. Once certain components is printed the thing is rotated automatically so the supporting plane for the subsequent component is horizontally aligned. Furthermore, a visible surveillance module is employed to make sure the accuracy of the printing, which helps to correct and calibrate the step of printing and ensures the standard of the printing.

Printing control: This module is intended to regulate the full printing. It includes the printing program planning, the component printing and also the platform rotation parts. The printing program is planned by using the breadth first traversing scheme. during he printing, once a component is printed , the platform is rotated so the bisecting plane between the printed part and also the next part to be printed is horizontal.



2. Degree of movement:
- PART 1- X-AXIS
 - PART 2- Y-AXIS
 - PART 3- Z-AXIS
 - PART 4- BUILT PLATFORM

II. SYNTHESIS OF 3D PRINTER

In general 3D printers are compact and smaller than RP machine. they're ideal to be used in offices. They use less energy and take less space. They are designed for low volume reproduction of real object made from

nylon or other plastics. That also means 3D printers makes smaller parts. Rapid prototyping machines have builds chambers atleast 10 inches on a side a 3d printer has but 8 inches on a side . however a 3d printer isb capable of all the function of rapid prototyping remote sharing of knowledge etc.

Consequently 3d printer are easy to handle and cheap to take care of. 3D printer are less accurate than rapid prototyping machines. due to its simplicity the fabric choices are limited. many alternative material is used for 3D printing. like ABS plastics, PLA polymide (nylon), glass filled polymide, stereo lithography materials (epoxy resins), silver, titanium, steel, wax, photopolymers, and polycarbonate.

A 3D printer is unlike your standard, 2D inkjet printer. On a 3D printer the thing is printed in three dimensions. A 3D model is constructed up layer by layer. Therefore the full process is termed rapid prototyping, or 3D printing.

The resolution of the present printers is around 250 x 250 x 230 (xyz) in ultra-HD resolution. The accuracy is 0.025 mm - 0.05 mm per inch. The model size is up to 737 mm x 1257 mm x 1504 mm.

The biggest drawback for the individual home user continues to be the high cost of 3D printer. Another drawback is that it takes hours or maybe days to print a 3D model (depending on the complexity and determination of the model). Besides above, the professional 3D software and 3D model design is additionally in an exceedingly high cost range.

Alternatively there are already simplified 3D printers for hobbyist which are less expensive. and also the materials it uses is additionally more cost-effective. These 3D printers for home use aren't as accurate as commercial 3D printer.

One of the foremost important applications of 3D printing is within the medical industry. With 3D printing, surgeons can produce patient-specific 3D printed models of patients' body parts or organs. they'll use these models to plan and practice surgeries, potentially saving lives.

3D printing makes it possible to form an element from scratch in mere hours. It allows designers and developers to travel from flat screen to exact, physical part.

Nowadays almost everything from aerospace components to toys are being built with the assistance of 3D printers. 3D printing is additionally used for jewelry and art, architecture, fashion design, art, architecture and interior design.

III. FUTURE WORK

Creating models on the basis of 5 degrees of freedom along with the study of different material used.

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