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# APPLICATION DEVELOPMENT OF 3D PRINTING TECHNOLOGY USING SLA TECHNIQUE

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***Abstract*:In the past, industrial rapid prototyping demands a significant investment. Beyond purchase costs, it required skilled technicians. Today, industrial 3D printers are often housed in model shops, printing laboratories, or jobs are outsourced to industrial service bureaus. For these reasons, industrial 3D printing is often limited to priority projects and final presentation models, rather than being fully integrated into the workflow of individual designers. Advancements in 3D printing continue to change the way we approach prototyping and production as the technology becomes more accessible and affordable than ever. These changes in technology create major opportunities for designers and engineers to rapidly iterate and improve upon their designs. This paper portrays the advancement procedure of a 3D printer with self-composed printed PCB and Firmware that can be utilized for printing of electronic models and different electronic structures.**

***Keywords*:3D Printing, SLA Technique, Laser, the Galvonometersand Resin Tank.**

## 1. INTRODUCTION

Today, 3D printing and additive manufacturing (AM) describe numerous individual processes, which vary in their method of layer manufacturing, material, and machine technology used. As patents began to expire at the end of the 2000s, the introduction of desktop 3D printing widened access to the technology, with fused deposition modeling (FDM) first gaining adoption in desktop platforms. While this affordable extrusion-based technology aided the widespread use of 3D printing, the quality of these parts has limited the use of these machines, since repeatable, high-precision results are crucial for professional applications.

SLA soon followed FDM to the desktop. SLA brought the promise of high resolution 3D printing previously limited to industrial systems in a much smaller and more affordable setup, with a wide range of print materials. These capabilities made 3D printing accessible for a variety of custom applications, including engineering, product design and manufacturing or the dental and jewelry industries.

SLA belongs to a family of additive manufacturing technologies known as vat photo polymerization. These machines are all built around the same principle, using a light source—UV laser or projector—to cure liquid resin into hardened plastic. The main physical differentiation lies in the arrangement of the core components, such as the light source, the build platform, and the resin tank.

A decent heading of improvement in this field are open-source ventures, which are produced on account of web-based social networking and which permit as far as possible the expenses of development of such gear. Recently, the introduction of desktop 3D printing has widened access to this technology. Fused Deposition Modeling was the first to gain adoption in desktop platforms, although SLA was the first invented 3D printing technology. While this affordable extrusion-based technology aided the widespread use of 3D printing, the quality of parts and printer reliability has limited the use of these machines, as repeatable, high-quality results are crucial to success. The introduction of desktop stereo lithography (SLA) 3D Printing in the Form 1+ offers the quality of industrial 3D Printing in an affordable, accessible desktop package. With SLA, professional designers and engineers can print high-quality objects on their desktop, reducing iteration cycles from days or weeks to hours.

The paper is organized as follows: Introduction of the paper is in Section I. Section II informs about the related work. Section III & IV gives the detailing of the proposed work, its basic & result. Section V concludes the paper.

## 2. LITERATURE SURVEY

L. Novakova-Marcincinova, [1] The paper exhibits point by point data in accordance with progressed and regular material used to manufacture the items utilizing melded affidavit demonstrating strategies for quick prototypes.

Ujwal Bhatia [2]. This paper gives orderly data about audits in the 3D printing field inconsideration of scholastic research production and furthermore giving the review of the endeavors taken into improvement. In fast prototyping strategies, condition of materials at first can be strong, fluid or significantly powder in state.

## 3. SLAPROPOSED SYSTEM

Stereo lithography is a light-based process that builds individual layers of a model with liquid polymer, hardened by a laser beam. The laser is directed and controlled by two galvanometers. After each layer, the resin tank peels away to release the hardened material. The build platform then moves up from 25 to 200 microns, depending on the chosen layer height, to prepare for the process of solidifying the next layer. The part appears to be built upside down, which is called inverse stereo lithography.

In a word, the means of the printing procedure are:

1. The Laser assembly contains a blue 405 nm laser. Custom circuitry activates the laser in timed bursts, generating the energy to turn the photopolymer from liquid to solid.
2. The Galvonometers is a control hardware which sweeps the laser repeatedly across the build platform hundreds to thousands of times per second with sub millimeter accuracy.
3. The Resin Tank is an optically transparent window. Sitting at the bottom of the tank is a layer of clear, non-stick silicone, which allows the laser beam to pass into the tank of resin. The non-stick surface serves as a substrate for the liquid resin to cure against, allowing for the gentle detachment of newly-formed layers.

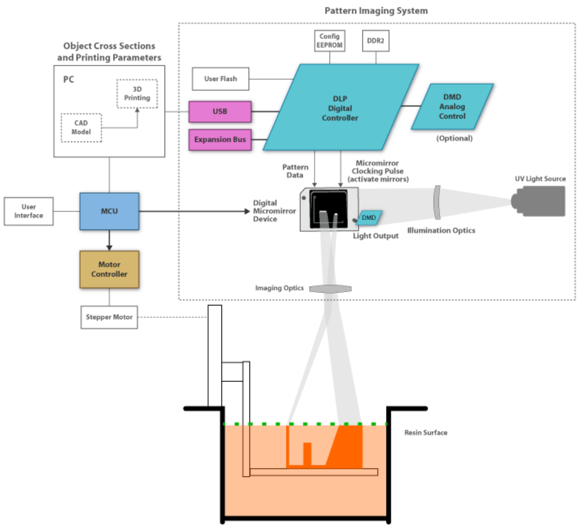


**Fig.1.** Functionality Block diagram

### 3.1 Right-side up SLA

Right-side up SLA machines are built around a large tank containing the liquid photopolymer (resin), and the build platform. The UV laser focuses onto the surface of the resin, tracing a cross-section of the 3D model. The build platform then descends a distance equal to the thickness of a single layer, and a resin-filled blade sweeps across the vat to recoat it with fresh material. The process builds consecutive layers on top of the others until the part is finished.

### 3.2 Inverted SLA

As the name suggests, in inverted stereolithography, the process is turned upside down. This method uses a tank with transparent bottom and non-stick surface, which serves as a substrate for the liquid resin to cure against, allowing for the gentle detachment of newly-formed layers. A build platform is lowered into a resin tank, leaving space equal to the layer height in between the build platform.The UV laser points at two mirror galvanometers, which direct the light to the correct coordinates on a series of mirrors, focusing the light upward through the bottom of the vat and curing a layer of photopolymer resin against the bottom of the tank. A combination of vertical build platform and horizontal tank movement then separates the cured layer from the bottom of the tank, and the build platform moves up to let fresh resin flow beneath. The process repeats until the print is complete.

## CONCLUSION

3D Printing innovation could alter and re-shape the world. It will give organizations a quick and simple assembling in any size or scale constrained just by their creative thoughts. 3D printing, then again, can empower quick, solid, and repeatable methods for creating tailor-made items which can at present be made modestly because of robotization of procedures. Automatic home adjustment upgrades the nature of the print with less human intrusion.

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