



# SNS COLLEGE OF TECHNOLOGY

Coimbatore-35  
An Autonomous Institution



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**DEPARTMENT OF AEROSPACE ENGINEERING**

**19ASZ401-3D Printing for Space Components**

**UNIT-IV PRINTING PROCESSES AND BEAM DEPOSITION PROCESS**

**TOPIC: Bio Plotter Concept in Additive Manufacturing**



# Introduction



- Bioprinters are automated robotic devices that work on the basis of different mechanisms.
- 3D printers that can only print cell-free scaffolds but cannot dispense living cells are not considered bioprinters.
- The first commercial 3D bioprinter was prepared in Germany at Freiburg University by Prof. Ralf Mulhaupt's group.
- The evolution of 3D bioprinters is a continuous process that involved the hybridization of new technological approaches to creating new advanced forms of bioprinters.



# Types of Bioprinters



There are different types of bioprinters depending on the technique of bioprinting employed by the machines;

- Inkjet bioprinters
- Extrusion-based bioprinters and
- Laser-based bioprinters.

These bioprinters work on different mechanisms and are generally used for different purposes depending on the type of biomaterials used.



# Components of Bioprinter



## **Bioprinter components:**

- The size of the printers is dictated by the functional specifications depending on the desirable bioprinted tissue or organ construct.
- The number of nozzles or openings also depends on the functional specification of the device.
- Other specific components, like laser sources and temperature controls, are different in different types of bioprinters.

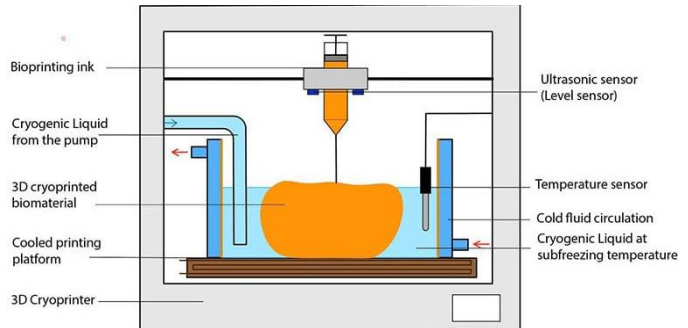
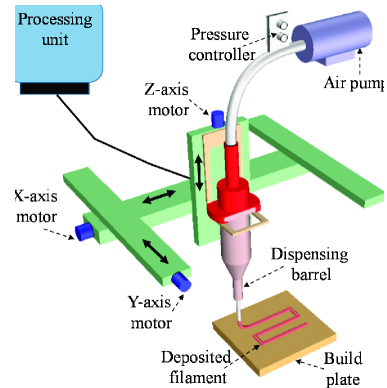


# Parts of Bioprinter



## Different parts of bioprinters :

- Different types of bioprinters have different components.
- Head mount
- Elevator
- Platform
- Reservoirs
- Nozzle





# Parts of Bioprinter



## Head mount

- The head of the printer is attached to a metal plate that runs along the horizontal axis. The motor on the x-axis moves the metal plate side to side to deposit the biomaterial in a horizontal direction.

## Elevator

- The elevator is the metal track running vertically at the back of the machine. It is driven by the z-axis motor that moves the head of the printer in an up and down direction.



# Parts of Bioprinter



## **Platform**

- The platform is a shelf present at the bottom of the machine that provides a space for the organ to rest during the fabrication process.

## **Reservoirs**

- The reservoir is present on the print head that holds the biomaterial that is to be deposited during the printing process.

## **Nozzle**

- The biomaterial in the reservoir present in the print head is forced out through a small nozzle or syringe which is present just above the platform.



# Advantages and Disadvantages



## Advantages

- Highest resolution for an extrusion system
- Use of multiple materials in a single print
- Ideal for research environments and medical (bone) applications

## Disadvantages

- Limited part geometry
- High cost of system
- Small build volume





## Conclusion



- Bioprinting in additive manufacturing has diverse applications, ranging from creating functional tissues for medical purposes to developing organ models for drug testing.
- It's utilized in regenerative medicine, tissue engineering, and pharmaceutical research, enabling the production of customized implants, tissues, and even organs.
- This technology holds promise for advancing medical treatments and reducing the need for organ transplants by providing tailored, biocompatible solutions.



THANK YOU