# 3D PRINTER

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**ABSTRACT**

*3D Printing or Additive manufacturing is a novel method of manufacturing parts directly from a digital model by using layer by layer material build-up approach. This tool-less manufacturing method can produce fully dense metallic parts in a short time, with high precision. Features of additive manufacturing like freedom of part design, part complexity, light-weighting, part consolidation, and design for function are garnering particular interest in metal additive manufacturing for aerospace, oil & gas, marine, and automobile applications. Powder bed fusion, in which each powder bed layer is selectively fused by using an energy source like a laser, is the most promising additive manufacturing technology that can be used for manufacturing small, low volume, complex metallic parts. This review presents an overview of 3D Printing technologies, materials, applications, advantages, disadvantages, challenges, economics,` and applications of 3D metal printing technology.*

## 1. INTRODUCTION

3D printing is additive manufacturing. Which 3D printers print a three-dimensional object created by laying down successive layers of material. It is also known as ADDITIVE MANUFACTURING. 3D printing is achieved using an additive process, where successive layers of material are laid down in different shapes. In it, the filament passes through the extruder to the hot end where the filament is melted in the heated zone of the hotel and comes out from the nozzle and prints the object on the heated bed as per the code or the dimension we have given in the Arduino code.

3D printing is mostly used in the civil industry, for decorative purposes, or as art.ini civil industry it is used to make the models of flats, and it is also used in architecture to show the dummy model. it is used for decorative purposes like a showpiece, etc. We can use various types of material as per our requirement like Plastic, metal, resin

### 1.1 Examples of models which can be printed

### 1.2 Advantages

Flexible Design, Rapid prototyping, Print on demand, Strong and lightweight parts, Fast design, and production, Minimize waste, Cost effect, Ease of access, Environmentally friendly, Advanced health

**1.3 Disadvantages**

Limited material, Restricted build size, Post-processing, Large volumes, Part structure, Reducing manufacturing jobs, Design inaccuracies

## 2. LITERATURE SURVEY

[3]3D printing was known as "rapid prototyping". Chuck Hull, of 3D Systems Corporation, created the first working 3D printer in 1984. Later in the '80s, Selective Laser Sintering (SLS) technology was developed by Dr. Deckard at the University of Texas at Austin during a project sponsored by Defense Advanced Research Projects Agency (DARPA). In the 1990s, the technology was further improved with the development of a method that used ultraviolet light to solidify photopolymer, a viscous liquid material.

In the late 20th century, 3D printers were extremely expensive and could only be used to print a limited number of products. The majority of the printers were owned by scientists and electronics enthusiasts for research and display. Although it was still in limited development, the printing technology was a combination of modeling both science and construction technology, using some of the newest technological advancements of the time. Consequently, 3D printing began to lead a worldwide manufacturing revolution. In the past, the surface design was mainly dependent on the production process. However, developments in the field of 3D printing have allowed for the design of products to no longer be limited by complex shapes or colors.

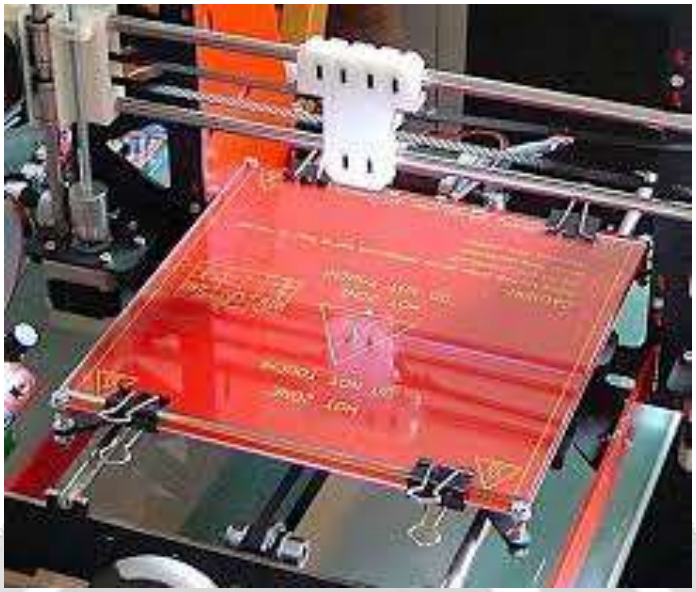
## 3. SYSTEM AND COMPONENTS

**Arduino mega v3**

The ARDUINO MEGA 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins .16 analog inputs,4 UARTs ,a 16 MHz crystal oscillator , a USB connection ,etc.

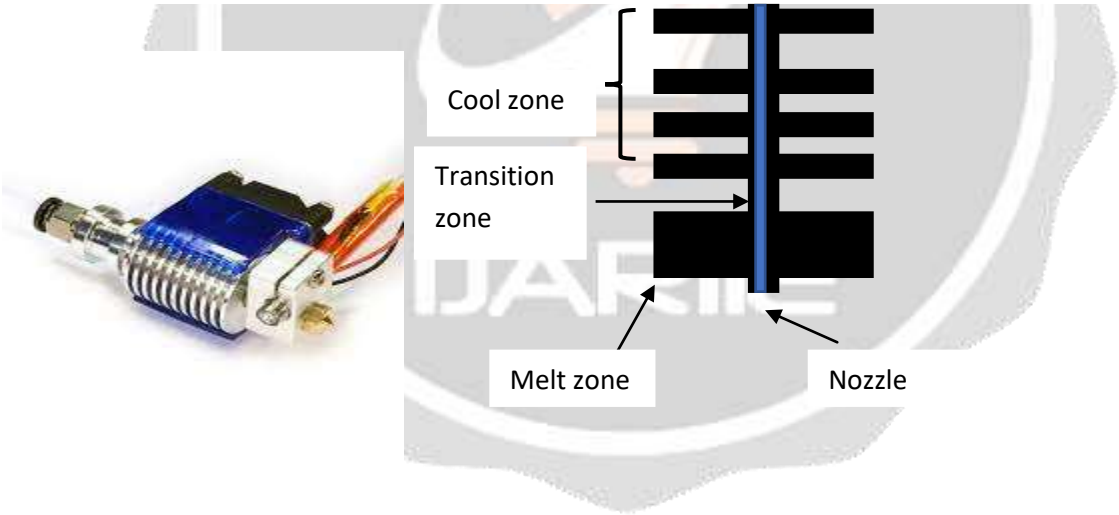
It is used to add codding of an object to be printed in a 3d printer. In this code there are all the dimensions of an object are written in a specific syntax.it is connected to the LCD so that we can control the working of the printer easily.

**Heated bed**



A heated bed is another most important part of a 3d printer. The objects are printed on this heated bed. on this heated bed there is a glass bed or a metal bed also so that we can remove the printed object easily. Heat beds prevent issues like poor adhesion to print bed, poor adhesion between layers, thermal runaway, and warping. the result of using a heated bed can be greater precision and less waste, due to the prevention of early or uneven cooling

**Hot end**




The hot end is the most important part of a 3d printer. the filament passed through the extruder comes to the hot end where there are four parts cooling zone, transition zone, melt zone, and nozzle then in the melt zone, it melts at a specific melting temperature and comes out from the nozzle and prints the object on a heated bed.

**Stepper motor**

An extruder motor is used to load the material i.e., (filament used to print 3d objects) into the hot end. It has a metal gear for the 3d printing extruder and extrusion of filament in all modern 3d printers.

The stepper motor is not only enough to feed filament to the hot end through .parts attach to and then working with the stepper motor driveshaft are required to physically grab the filament and push it along on its path to the hot end.

**LCD**

Lcd stands for liquid crystal display. The LCD is used to control the working of the 3d printer. It is connected to the Arduino with the wires, so the coding for the 3d object in the Arduino is directly run with the use of an LCD.

**Filament**

Filaments are of many types like silicon, wood, copper, plastic, hard plastic, etc. are per the requirement we can use the different types of filament .it is available in different colors and textures also.

**Cooling fan**

A cooling fan Is usually used to cool off the main circuits of the printer like the processor and motor drivers. keeping this component cool is essential for a long life span.it blows cold air right just under the nozzle. It also gives a good finishing to the printed object.

**Software used for printing objects**

We use a 3d printing software named Ultimaker .ultimaker is a software provided through Ultimaker company, in which we can handle the working .in this software we can control or adjust the size of an object as per requirement. we can also give the command to the printer to set the x,y, and z-axis, and to preheat the bed and hot end also.

## 4. CONCLUSIONS

This project task is the 3d printing machine. Through the data analyzed, it can be concluded that 3D printing is increasingly being studied. With all the data collected from different sites, we can use a 3D printer for various purposes. we can make anything on a printer. we use it for business purposes also. we trust that this research paper will inspire others to do work on related subjects. so, for decorative purposes, and working purposes we should think about the 3D printer.

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