

# 3D Printer and 3D Printing

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## Abstract:

The present advancement in technology development have led us to build phenomenal tools to work with but with the introduction of 3D printing or additive manufacturing as some people may call it. The invention of 3D printer have made ease for use to express our imagination into a solid figure without any work to be done from the user except to make a computer aided designing (CAD). With time development on 3D printer have turned from basic to expert level integration, the device which was invented to fulfill one purpose is now filling up shoes in multiple fields like defense, manufacturing industry, educational sector and in some field of medication.

**Keyword:** technology, 3D printer, 3D printing, introduction, development, printer, printing.

## Introduction:

The 3D printing technology have boosted in the past few years, the development is still ongoing for further use. The idea of evolving the an existing technology is very interesting as by modifying few existing parts can provide a new and effective machine which can out pass the existing technology. The 3D printing technology was discovered back in 1986 but started getting active from approximately five to ten years ago; the year gap helps the technology to adapt the recent needs of the market or the user. Now 3D printers can be seen in industries to even with students of collages, from research laboratories to medical laboratories, the use of 3D printer have no extent or limitation of boundary. With developing technology developers have provided us a way to even print metal tools or parts out of 3D printer, some countries are working on different materials to be printed with. To get more efficient some printer companies have provided with multiple options with design, size, and verity of printing material, form speed to accuracy to different color filament printing at the same time to reduce time consumption.

## Literature review:

Ferdinando Auricchio (2017) [1],the paper states, what is 3D printing or additive manufacturing? It is basically making an object with 3D or with its 3 dimensions by creating layers; it extrudes the object by making layer on top of layers. The additive manufacturing or more efficiently called 3D Printing or the 3D printer was invented for the soul propose of prototyping and test the design of the product [1].now instead of prototyping the technology have developed so fast that is used in industry rather than making small parts to test and design new things, that might be present around you. They provide speed in production and provide accuracy a regular system that requires human interference can provide accuracy but cannot provide the speed required. The application of additive manufacturing or 3D printing is not limited, as with new generation new need arriver and to fulfill that need company comes up with multiple techniques to stay on top of the marketing sector, the provide the user with multiple verity of products which contain in different size to printing speed and multi-nozzle technique. When discussing the field of use we can justify that it can be used in industries, it can be used in the medical sector as it can help in the development of customizable implants, artificial legs and hands and fingers or and other prosthetics, medical artifacts like skeleton, eyes, muscles, or any part the user wants to be printed, it can be used medicine development phase [1]. It can be used in architecture process as the design of the building can me 3D printed for better understanding of the model, another use of the 3D Printing is in food industry as the can print 3d printed custom parts to fit their machine for custom use of products [1]. A surprising use of a 3D printer is that NASA has sent a 3D

printer to their space station, the only reason to send a printer to space is that, they don't need to send additional ships to with tools and spare parts that astronaut might need to repair, as they can build or print 3D printed parts or tools to work with, and NASA is working on a 3D printer that can print food for astronaut so that they don't need to send the food supply ship more frequently [1].

Heidi Kaartinen, Johan Wenngren, Erlend Bjørk (2018) [2] this paper provides us the knowledge of the basic process of 3D printing, on one view it look like 2D drawing stacked on top of other to obtain some certain object. The main process is somewhat similar as it develops a layer after layer procedures which then leave us with a final output. The machine works on a code generated on the computer which is base on triangulating the image. With many companies providing 3D Printers or giving the freedom to print on their printers with some minimal cost, so they also except different forms of 3D CAD designing files, as different software have the code generator inbuilt for some the company have to regenerate to fulfill the customer needs. Most common format supported is stereo lithography or you may see .stl at the end of the file. With the file generated the user can now select the phase in which the user wants it object as the advancement in technology helped us to develop our object in three different materials which are plastic, metal and ceramic. With the help of different material we can build stronger parts that can be used for heavy duty working, making tools, gears, spare parts, or toys for kids, models for studying, project work, and making model building for presentation work. With all the new offerings the 3D printer's world is providing to us it is also coming up with high end processing software that can help designing precise 3D models or designs and have an inbuilt function to print 3D models when connected to a printer. The software like fusion 360 and solid works have the capacity to let the user work on a high resolution project and lets the user print on any printer by just providing the length, width and height the software itself works the project in parts and explain how it is going to print and gives us the output.

Soohyun Kim and Hansil Kim (2016) [3] this paper provides us with information that the writer was working on for the construction of the 3D printer with fiber laser and which might have the space volume of up to 10 liters. As some may call 3D printer is the future for manufacturing and development, in some case it may be possible with the technology we have and the development we provide them, one day we might have the things and we can use 3D printer for construction work, human artificial tissue surgery which can be printed by the printer. the printer the writer was working on works on the building on the process which uses polymer powder and laser to construct the object.

Elizabeth Matias, Bharat Rao (2015) [4] this paper gives light on the history of the 3D printer; the first 3D printer was invented by Charles Chuck Hull back in 1986 which was stereo lithography machine. After the invention came up a lot of new patents on the printer, the printer was developed just for prototyping of the production parts, but how knew that one day it will be used as a main construction machine in industries. With 3D printer the cost of the cost of manufacturing is also reduced as only one worker is required rather than multiple workers, and present state thanks to automation human interference with machines in production is getting minimal. The user of a 3d printer should know the past of the 3D printing technology and the printer and should also know what changes the user can make it work better. With better understanding of the field we can work well in it. So for basic understanding of the printer the user should have a basic understanding of

the software structure, understanding what is going on internally in the printer will help the user to make better object and printer with precise dimension to reduce wastage of the printing material. the user need a clear cut information of the structural assembly or the hardware structure, when in case the user is printing the and the printing stops due to gears getting jammed, so the user must be able to resolve the problem by himself and continue the work. The user should be well known about the materials which can be used to make object from the same printer; with different sets of printer we can print different types of printing material, like plastic, metals and ceramic. And how strong object is need will be dependent on the user. The most important information which is needed to be clear that for what reasons the user needs a printer's might come in a wide price range starting from \$300 to \$3000, for industrial level we need a high end specification printer which can print at high speed and with high accuracy, with multiple tools embedded and the ability to print multiple object at the same time, but at the beginner level we have to choose at what fits our budget the best as it is not going to provide us with any income as the higher level printer might give out some of the investment as the work on a regular basis.

Ildikó Papp, Róbert Tornai, Marianna Zichar,(2015) [5] this paper gives an overview on how 3d printing can help in education sector, our movie are usually in 2D and when 3D movies came we got a better review o the movies we can understand depth of the character and other small details that can be watched. So the same case might happen with the students at kinder garden teachers can make different animals to teach with help of 3D printer because it might reduce the cost of buying again and again, at higher education students should be taught how to draw in cad software so they can express their imagination into real object with the help of printer, creating imagination into reality can be fun for learning, if we consider for students who might be getting serious about their studies and future will mostly use the printer to make real time usable project that they will or can use in their day to day life, machining parts to fit their house hold machine like stopper for the fridge, handle for the garage door, paper weight as an artifact or show piece. After all that conclude we can find that we need to involve 3D printing technology to the education sector as it provide knowledge to all age section.

A. Abilgazyev, T. Kulzhan, N. Raissov, Md. Hazrat Ali, Match W.L.KO, N. Mir-Nasiri (2015) [6] this paper gives us the review that a printer with multiple nozzles can help in increasing production speed and quantity of manufacturing, as one nozzle printer cannot provide us speed, to attain speed we might need and alternative, so a printer with multiple nozzles is required. Multiple nozzles can be used in many process of printing like stereo lithography apparatus or SLA, selective laser sintering or SLS, fused filament fabrication or FFF and laminated object manufacturing or LOM; these are some processes that use multi nozzle process. In multi nozzle printer multiple nozzles are aligned on a straight path for an example let nozzles be aligned at the x axis than the motion will be provided to the y axis. In this way we can make multiple squares at a time rather than making one square at a time in single nozzle printer. The use of this printer can be in industries only for their speed production; this process can help in the production of multiple parts at the same time. The extruder of the printer works with the help of a gear and a support bearing which is kept against one another so that when the material is brought near the gears then the material is dragged into the extruder and deposited on the surface. The ROVA 3D printer uses five nozzles with five individual motors and can print with different color at the same time for getting a better result.

**Conclusion:**

After going through all the information provided we came to a point where we can justify that we can see the future of the 3D printers in industries, and in any other sector of work even if it is education, research and development, medical technology and in our day to day life. It might make our living easy but will also require a trained user, might give us the ease to build tools at home for our use but we first need to design the tools on the computer aided software. but in other ways this technology has a very larg field to evolve into and lead to a great future.

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