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Design and Fabrication of Portable 3d Printer

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Abstract*—3D printing technology is used end of 19th century. In the current era this technology is widely used in many industries. Even though 3D printing is expensive people like to go for 3D printing. There are many industries who manufactures 3D printer which uses various rapid prototyping processes. In this paper we are proposing a 3D printer which can be launch as a product at less cost than current 3D printers available in market. This paper gives brief details about 3D printer we are manufacturing. The concept used in forming 3D object is layer by layer formation by means of melting a plastic filament. The filaments are made of material ABS, PLA as well as composite material. The 3D printing process is similar to inkjet printers but instead of single layer by layer, multiple layers are printed to form a 3D shape. This paper also gives details about construction and working of our 3D printer. Once the construction is finished is attached to the microprocessor base controller. This is use for controlling the machine based on program. For program generation 3D model is saved in .STL format, then it is inserted into software. After we load the filament 3D printing starts. Thus we get the good quality product in less cost.*

I. INTRODUCTION

Due to the ever increasing demand for production of small desirable products which cannot be able to perform by the plastic molding because of its small size and design. The principle used in our 3D printer isFused Deposition Modeling (FDM) i.e. With FDM technology parts are build layer by layer from the bottom to top by heating and extruding thermoplastic filament.

Conventional production procedures having some limitations about the design of the product also cost of manufacturing. The cost of production, transportation and maintenance is considerably high. Setting up a conventional production processes takes up a lot of area which is a major problem. They are responsible for hazardous, material wastage, wasting money to recollect the wastage materials. And now a day 3D printer is so costly because the manufacturing cost of the 3D printer is so high.

Our research emphasis on the reduction of the manufacturing cost of the 3D printer. Our area of focus is improve the design of 3D printer and become compact for small components where no need of the big size, to save space

II. OBJECTIVE

- To study the working procedure of each component of a 3D printer and the evolution of 3D printer.
- To design and fabricate a low-cost 3D printer.
- To make it portable and easy to use.
- To develop Eco-Friendly and low maintenance product.

III. LITERATURE REVIEW

VaibhavS.Jadhav, Santosh R.Wankhade, A Review: Fused Deposition Modeling – Rapid Prototyping Process, IRJET, Volume 4, 2017,page no. 523 – 527. In this paper they have shown the details of solid based rapid prototyping process i.e. Fused Deposition Modeling.

Barry Berman, 3D printing: The new Industrial Evolution, Business Horizons, Vol-55, 2012, page no. 155-16. We refer in this overview of 3D printing process having low cost manufacturing.

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Ramya, SaileelaVanapalli,3D Printing Technologies in Various Applications, International Journal of Mechanical Engineering and Technology (IJMET), Volume 7, 2016, page no. 396 – 409. In this we refer the idea of the manufacturing the low volume customize parts.

OjasDandgaval, PranitaBichkar, Rapid Prototyping Technology – Study of Fused Deposition Technique, International Journal of Mechanical Engineering and Production Engineering, Volume 4, 2016, page no. 44 – 47. We take idea about Rapid Prototyping technology and it is focus on Fused Deposition Modelling.

IV. PROBLEM DEFINITION

There are varieties of 3D printers available in the market developed by number of manufacture. But the main problem with all such printers is that they all are costly and are not affordable for low cost manufacturing. Because of this product cost will increases and ultimately manufacturing cost increases.

V. EXISTING METHODOLOGY

In 3D Printing an object is form layer by layer according to the program which is controlby a microcontroller and computer system. The 3D printers available in the market use different rapid prototyping processes that are too costly. Some of them are Stereolithography, Selective Laser Sintering, etc. All these processes use different methods to print the product even materials used are different. SLA uses liquid polymer material while LOM uses sheet metal such materials are difficult to store and handle.

VI. PROPOSED METHODOLOGY

5.1 Problem Identification

Problem with 3D printer is nothing but the cost of manufacturing as well as the design of the 3D printer for small components. Idea is to make most compact 3D printer having low cost.

5.2 Proposing various solution and selecting appropriate solution

Various solution found up-till now is that by modifying size of the 3D printer it may reduce the cost, try the processors which compact and low cost which is efficient to work.

5.3 Design Data

In this we are going to design the 3D printer with taking the design of structure of CAD model given below.

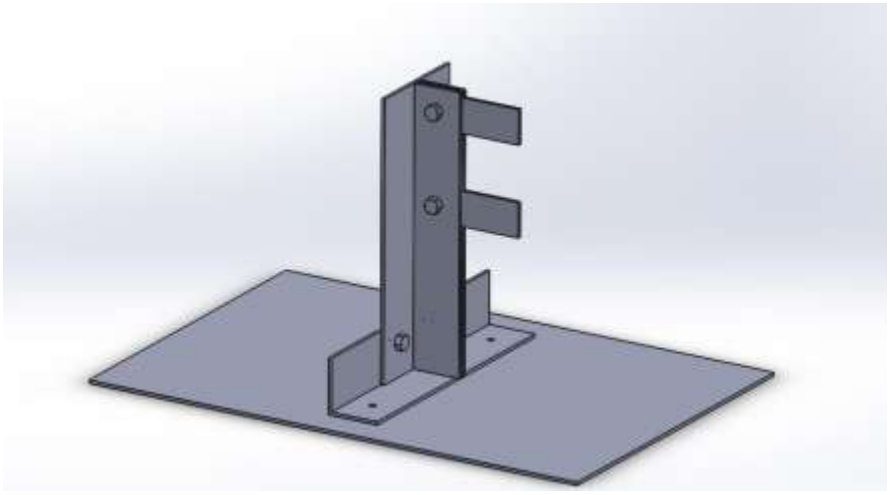

Fig. 1

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VII. CONCLUSION

Hence, we fabricated the portable and low-cost 3D printer by using materials which are easily available and cost effective & succeeded in attaining this goal. We have accomplish the goal of reducing the cost to a significant extent i.e. about 10-15 %. We used Fused Deposition Modeling (FDM) technology in 3D printing. The parts design in 3D design software are imported in the printing software and we have been successful in obtaining the same dimensions same as in the design stage of object. Due to this, the printer can now also be effectively used for even smallscale industry.

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