# Rapid Prototyping Using 3d Printer

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***Abstract-*** *Advanced by some as the next great emerging technology to enjoy overwhelming market penetration, three dimensional (3D) printing could have significant information implications, notwithstanding limited coverage in the information science literature. 3D printer will definitely shows impact on time consuming. In large scale industries models are prepared directly after they completed their paper work. If there is any fault in paper work then there is wastage of time and money. So we can use 3D printer to obtain prototype model after finishing paper work. So we can consume time and money which we can invest that for further researches.*

***Keywords***- 3D printing; Additive Manufacturing; Subtractive Manufacturing; Arduino Mega 2560; Ramps; Stepper motor; Extruder(0.3mm tip); Filament(PLA/ABS).

## I. INTRODUCTION

3D Printing is a process of making a physical object from a three-dimensional digital model, typically by laying down many successive thin layers of a material. It brings a digital object (its CAD representation) into its physical form by adding layer by layer of materials. The most basic, differentiating principle behind 3D printing is that it is an additive manufacturing process. And this is indeed the key because 3D printing is a radically different manufacturing method based on advanced technology that builds up parts, additively, in layers at the sub mm scale.3D printing is an enabling technology that encourages and drives innovation with unprecedented design freedom while being a tool-less process that reduces prohibitive costs and lead times. Components can be designed specifically to avoid assembly requirements with intricate geometry and complex features created at no extra cost.

3D printing is also emerging as an energy-efficient technology that can provide environmental efficiencies in terms of both the manufacturing process itself, utilizing up to 90% of standard materials, and throughout the products operating life, through lighter and stronger design. 3D printing is a quickly expanding field, with the popularity and uses for 3D printers growing every day. 3D printing can be used to prototype, create replacement parts, and is even versatile enough to print prostheses and medical implants.

## II. LITERATURE SURVEY

Typical manufacturing techniques are known as 'Subtractive Manufacturing' because the process is one of removing material from a preformed block. Processes such as Milling and Cutting are subtractive manufacturing techniques. This type of process creates a lot of waste since; the material that is cut off generally cannot be used for anything else and is simply sent out as scrap. But with the help of a manufacturing method known as 'Additive manufacturing', due to the fact that instead of removing material to create a part, the process adds material in successive patterns to create the desired shape. [1]

We came to know that how SLICING is important in RAPID PROTOTYPING technologies. If we use higher thickness layer for slicing model it will results a stair case effect. This stair case effect can be reduced by using lesser thickness layer which may take more time but it will gives good shape for complex models. Finally from this paper we came to know that slice height optimization is very important in optimization of RP model manufacturing. [2]

## III. BLOCK DIAGRAM

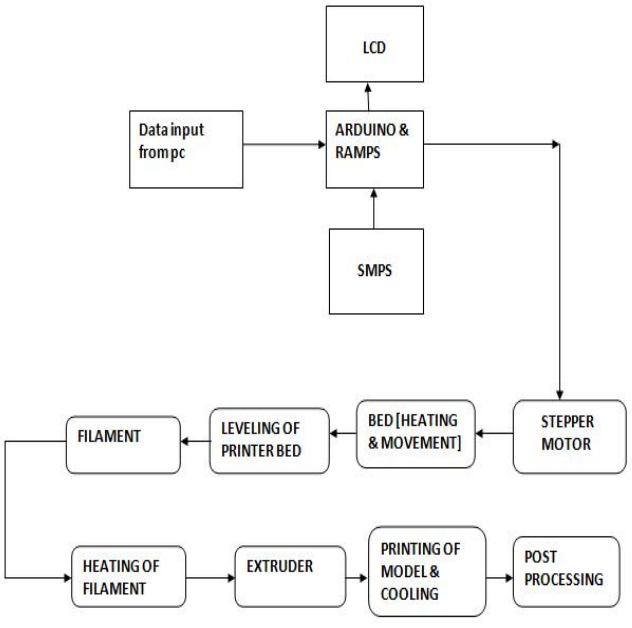


Fig.1: Block diagram of Rapid Prototyping 3D Printer

**Working:**After turning on the power supply input should be given to the printer through memory card or through pc. Later bed and extruder started heating up to the given temperature depending on the material we are using. After bed and extruder get heated, printer starts automatic leveling of bed. Finally printer will print the layout of module and then it will print the actual module layer by layer.

Data input from pc: Obtaining the image input from the slicing software through pc.

**SMPS:** Giving power supply through SMPS to Arduino, Ramps, LCD &other required hardware.

**ARDUINO:** Arduino obtains the information from slicing software and it converts the obtained information into G-codes which will be understood by the printer. [3]

**RAMPS:** (Reprap Arduino Mega Pololu Shield) will act as driver circuitry. [4]

**LCD:** It will display various parameters like temperature, time, speed of extruder, progress of object.

**STEPPER MOTOR**: Stepper motor is used for the movement of x, y, z-axis & extruder. [5]

**BED:** Bed will be heated according to the given temperature so that model can stick to the bed easily while printing.

**LEVELING OF PRINTER BED:** It will level the printer bed with the help of Rack & Pinion mechanism before heating of bed.

**FILAMENT:** In this block stepper motor will insert the filament from the spool into extruder. [6]

**HEATING OF FILAMENT:** In this block filament will be melted in extruder.

**EXTRUDER:** The melted filament will pass through the extruder nozzle which is of size 0.3mm.

**PRINTING OF MODEL & COOLING:** In this block the model will be printed and it will be cooled by the external fan.

**POST PROCCESING:** In this block finishing will takes place with the help of sand paper and we can paint the model if required.

## IV. APPLICATIONS

- Digital images to 3D objects.
- Rapid prototyping.
- Printing of high level complex models.
- Useful in industries.
- Creating a reprap 3d printer.
- Household applications.
- Medical purposes like printing of tissues and organs.

## V. RESULTS

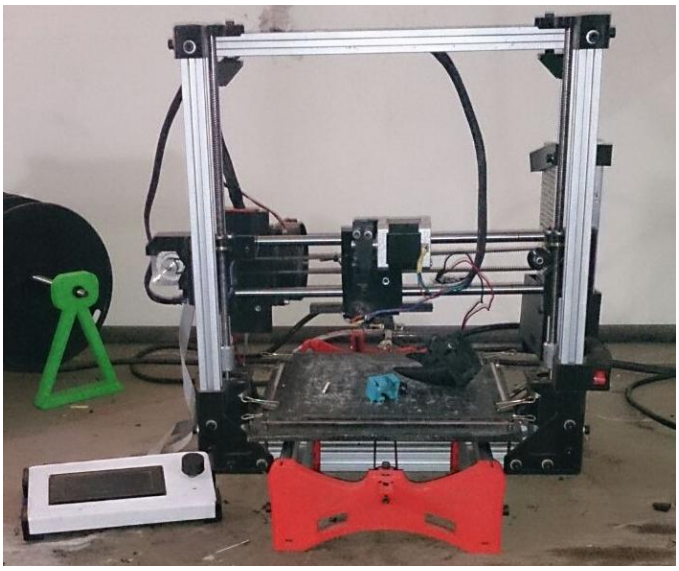

Fig 2: 3D Printer

Fig 3: Printed 3D model

## VI. CONCLUSION

Our printer is capable of accepting files from numerous software's and convert them into 3 dimensional objects, something that just 20 years ago would have been unheard of in a household environment. We would like to continue to work and maximize efficiency and cost, without

sacrificing the resolution that we desire. We also plan to use our printer to produce various parts for itself, for example, housing for the controllers, possible HMI, and all other exposed electronics.

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