1) Project Reference Number: 46S_BE_2072

2) Title of the project: "3D PRINTER USING ARDUINO MEGA,RAMPS 1.4 BOARD"

3) Name of the College & Department: KLS Vishwanathrao Deshpande Institute of Technology, Haliyal(581329)

Department: EEE

2) Name of the students & Guide(s)

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3)Keywords: Additive manufacturing,3D printer,FDM technology,Arduino and Ramps1.4.

4) Introduction / background

3D printing is a form of additive manufacturing technology where a three dimensional object is created by laying down successive layers of material. It is also known as rapid prototyping, is a mechanized method whereby 3D objects are quickly made on a reasonably sized machine connected to a computer containing blueprints for the object. The 3D printing concept of custom manufacturing is exciting to nearly everyone. This revolutionary method for creating 3D models with the use of inkjet technology saves time and cost by eliminating the need to design; print and glue together separate model parts .Now, you can create a complete model in a single process using 3D printing. The basic principles include materials cartridges, flexibility of output, and translation of code into a visible pattern. Additive manufacturing process or 3D printing process is now becoming more popular because of its advantages over conventional processes. A 3D printer is a machine that create objects out of plastic, nylon like many other materials.3D printers now days available are not so portable and also they are very costly. By analysing this problem, we are trying to make a portable 3D printer The cost of this printer will be very less compared to other 3D printers. Making low cost 3D printer with price lower than market.

5) Objectives

- Additive manufacturing process or 3D printing process is now becoming more popular because of its advantages over conventional processes. we are trying to make a portable 3D printer The cost of this printer will be very less compared to other 3D printers.
- Making low cost 3D printer.
- To reduce the size of 3D printer.
- To make accurate printing.
- To solve the problems of bed leveling.
- To control temperature of hot end.

Hardware requirements:

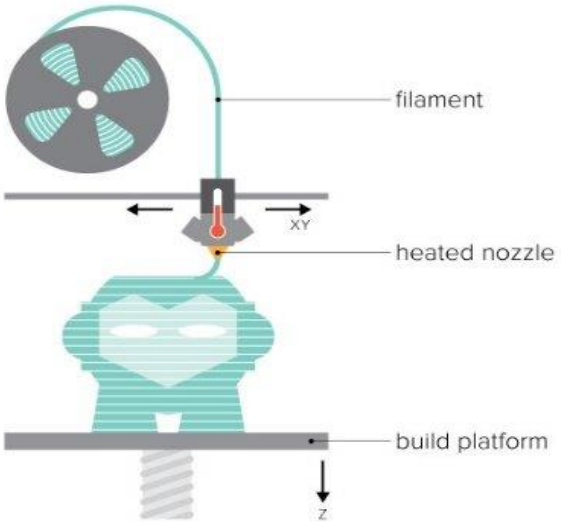
- Arduino MEGA 2560
- Ramps 1.4 Board
- NEMA 17 Stepper Motors and A4988 motor drivers
- MK8 Extruder and 0.4mm Nozzle with heating element
- PLA filament
- Aluminium frame,Teeth pulley,timing belt,m5 rods,lead screw rods
- LCD Display with controller

Software:

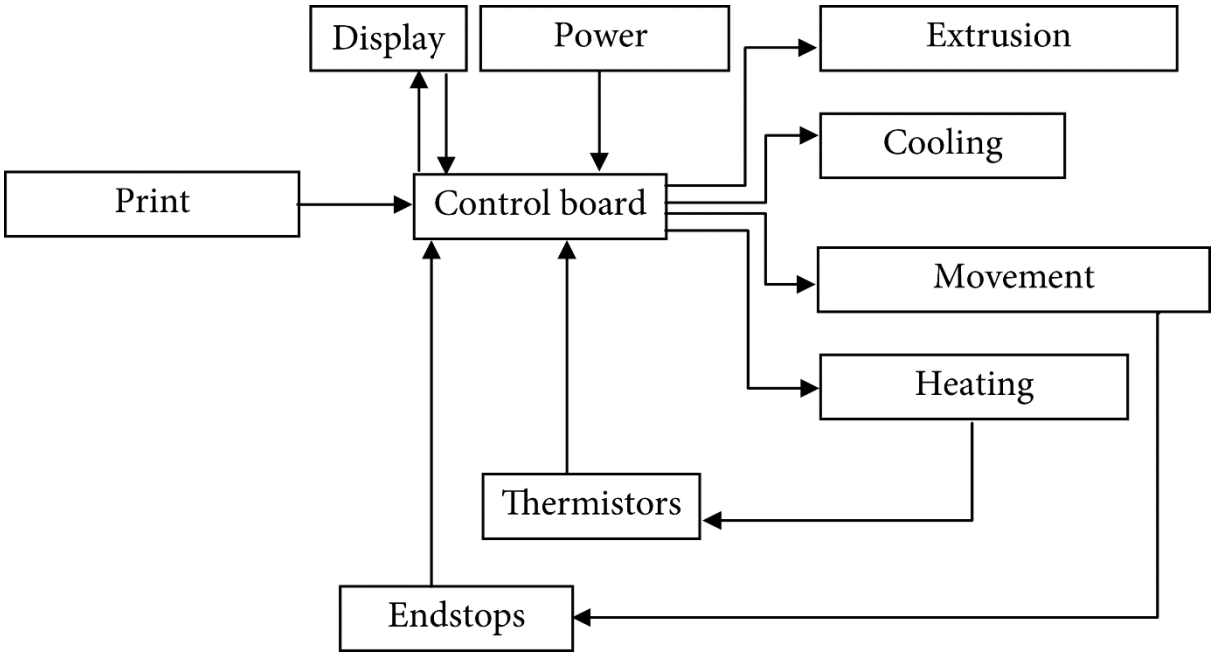
- Arduino IDE
- Marlin firmware
- Slic3r
- Pronterface

6)Methodology:

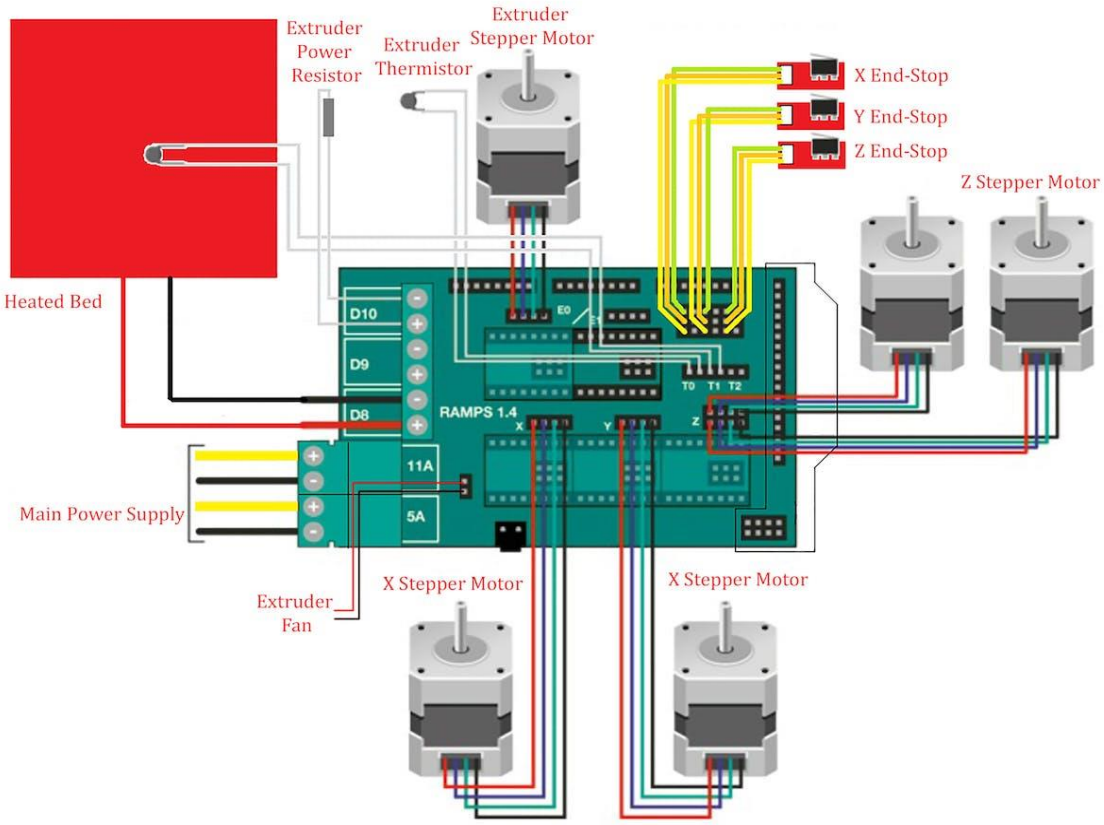
Fused deposition modeling (FDM) is an extrusion-based 3D printing technology. The build materials used in FDM are thermoplastic polymers and come in a filament form. In FDM, a part is manufactured by selectively depositing melted material layer by layer in a path defined by the CAD model. FDM printers are the most commonly Cartesian type of printers. Cartesian refers to the coordinate system used by the printer to move the print head and the build plate. In these printers, there are three rails corresponding to each axis (X, Y, & Z). The Printhead (entire Extruder and nozzle assembly) moves in the X & Y direction whereas the Build platform moves in the Z-direction.



7)Flow Chart:

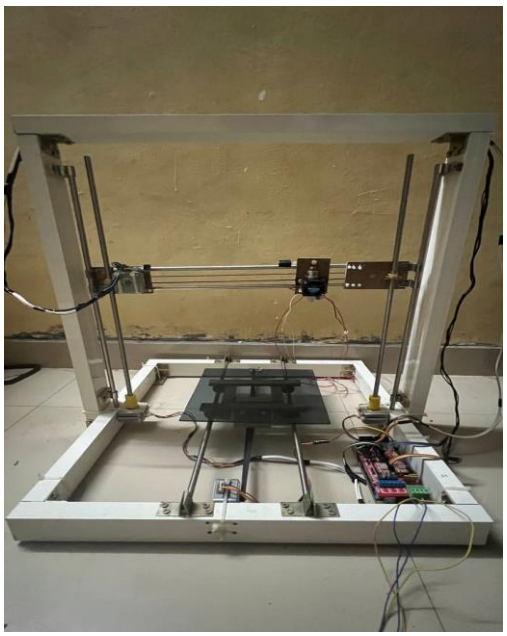


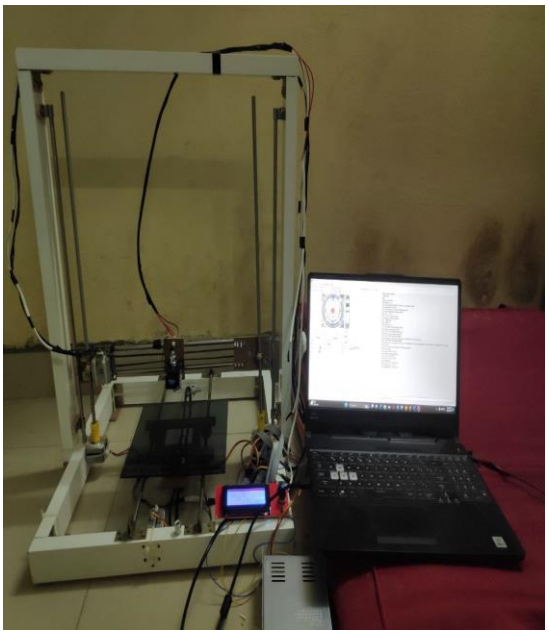
8)Circuit Diagram:



9)Results and Conclusions

We have successfully Built the model with all components accordingly below we have shown the fabricated model.First image of fabricated model and secpnd is of Pronterface interface. Also we have got the movements and printable ready. We can also control temperature of hotend.





10)Scope for future work .

3D printing is a new and promising technology, and as with all developing fields the Scope for improvement and advancement are definitely infinite.

Its various application includes:

- Aerospace: NASA engineers drew on ingenuity and advanced technology. About 70 of the parts that make up the rover were built digitally, directly from computer designs, in the heated chamber of a production-grade Stratasys 3D Printer.
- Automobile industry: One of Ducati's key challenges is to reduce time-to-market for new products by reducing the design cycle. To help meet this challenge, the entire design process is validated using FDM prototyping systems from Fortus. FDM (fused deposition modeling) enables Ducati to build both concept models and functional prototypes from ABS, polycarbonate and poly-phenylsulfone.
- Consumer products: Consumer electronics: Poly-Jet technology can produce models with exceptionally thin walls — 0.6mm or less — ideal for small devices densely packed with minute components. Smooth finish and realistic colors make these models virtually indistinguishable from the end product.
- Medical industry: 3D Printer Creates Multi-Material Respirator. Design reality, a UK based design consultancy, uses the Objet260 Connex1 multi-material 3D printer; to prototype gas mask respirators for the UK Ministry of Defence and US Fire Services reducing a 5-6 day prototyping process to just hours.