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Advanced 3d-Printer for Future

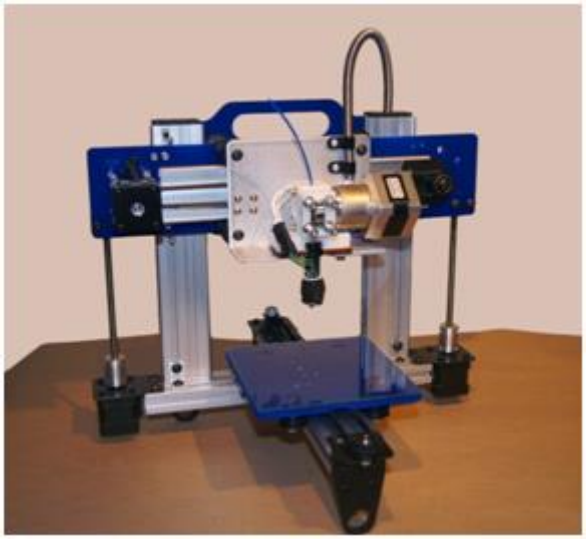
Kartheek Kandhi
Research columnist and Founder and
CEO of 1000KV Technologies
Ameerpet, Hyderabad.

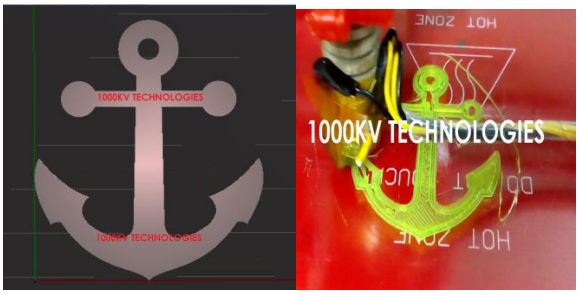
ABSTRACT: ***The aim of this project is designing and implementation of 3D printing designs using X, Y, Z axis CNC machine by using designed input data. The application of science to technology is very evident in this laboratory activity. This session will demonstrate how the application of technological advances can affect us, using the excitement of creating and designed 3-dimensional objects.***

Keyword: ***3D Printer, CNC, thread mechanism,screwing mechanism, 3d object, slicer, pronterface, CAD design, stl 3d files,Y-axis assembly, X-axis assembly, Z-axis assembly, stepper motor, heated bed assembly, extruder, 1000kv technologies, kartheekkandhi.***

INTRODUCTION

3D printing or additive manufacturing, AM is any of various processes used to make a three-dimensional object. In 3D printing, additive processes are used, in which successive layers of material are laid down under computer control.[2] These objects can be of almost any shape or geometry, and are produced from a 3D model or other electronic data source. A 3D printer is a type of industrial robot. The term 3D printing originally referred to a process employing standard and custom inkjet print heads. The technology used by most 3D printers to date especially hobbyist and consumer-oriented models is fused deposition modeling, a special application of plastic extrusion.





3D printing in the term's original sense refers to processes that sequentially deposit material onto a powder bed with inkjet printer heads. More recently the meaning of the term has expanded to encompass a wider variety of techniques such as extrusion and sintering based processes. Technical

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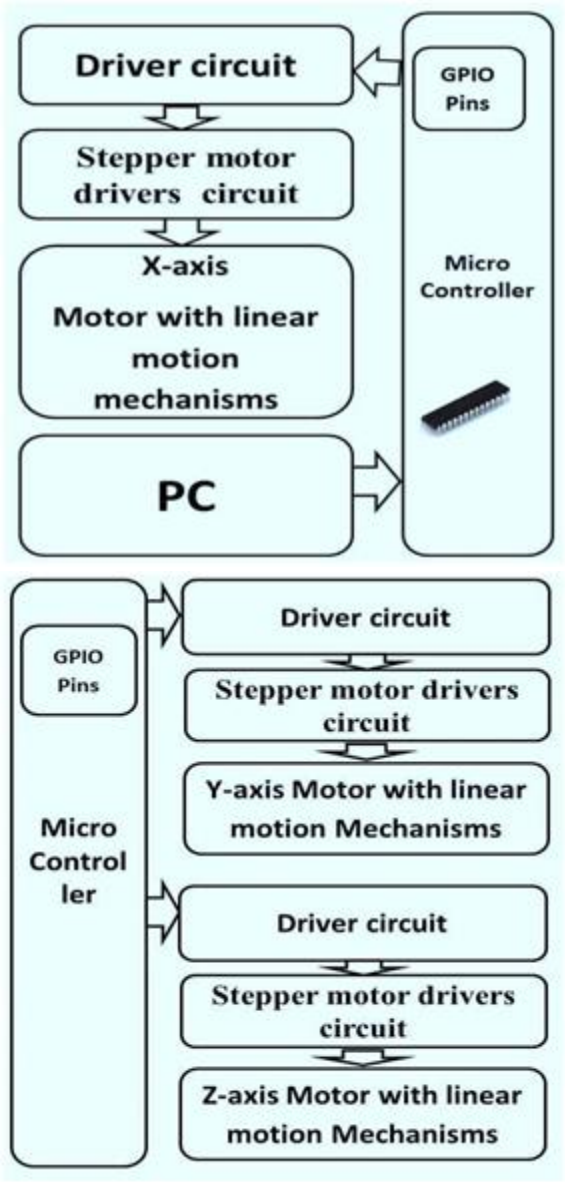
standards generally use the term additive manufacturing for this broader sense.

The aim of this project is designing and implementation of 3D printing designs using X, Y, Z axis CNC machine by using designed input data. The application of science to technology is very evident in this laboratory activity that students Report as one of the highlights of their school year. This session will demonstrate how the application of technological advances can affect us, using the excitement of creating student-designed 3-dimensional objects

BLOCK DIAGRAM



A simple staging device can be created to greatly simplify the process of creating a 3 -D printer in the classroom. This lab integrates engineering with chemistry for an interdisciplinary activity and is based on research being conducted at the University of Illinois in which this process is being used to create very small objects.

BACKGROUND EMBEDDED

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result.

INTRODUCTION TO EMBEDDED SYSTEM

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. A good example is the microwave oven. Almost every household has one, and tens of millions of them are used every day, but very few people realize that a processor and software are involved in the preparation of their lunch or dinner.

This is in direct contrast to the personal computer in the family room. It too is comprised of computer hardware and software and mechanical components (disk drives, for example). However, a personal computer is not designed to perform a specific function rather; it is able to do many different things. Many people use the term general-purpose computer to make this distinction clear. As shipped, a general-purpose computer is a blank slate; the manufacturer does not know what the customer will do wish it. One customer may use it for a network file server another may use it exclusively for playing games, and a third may use it to write the next great American novel.

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Frequently, an embedded system is a component within some larger system. For example, modern cars and trucks contain many embedded systems. One embedded system controls the anti-lock brakes, other monitors and controls the vehicle's emissions, and a third displays information on the dashboard. In some cases, these embedded systems are connected by some sort of a communication network, but that is certainly not a requirement.

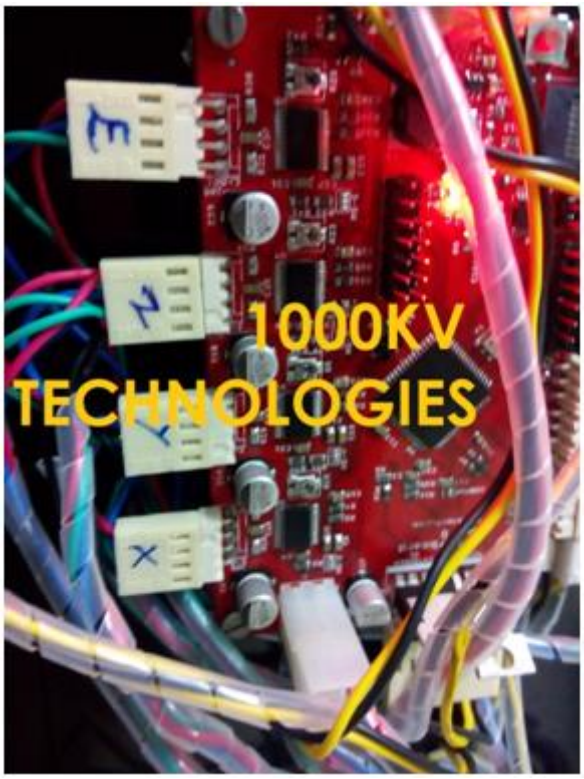
At the possible risk of confusing you, it is important to point out that a general-purpose computer is itself made up of numerous embedded systems. For example, my computer consists of a keyboard, mouse, video card, modem, hard drive, floppy drive, and sound card-each of which is an embedded system. Each of these devices contains a processor and software and is designed to perform a specific function. For example, the modem is designed to send and receive digital data over analog telephone line. That's it and all of the other devices can be summarized in a single sentence as well.

If an embedded system is designed well, the existence of the processor and software could be completely unnoticed by the user of the device. Such is the case for a microwave oven, VCR, or alarm clock. In some cases, it would even be possible to build an equivalent device that does not contain the processor and software. This could be done by replacing the combination with a custom integrated circuit that performs the same functions in hardware. However, a lot of flexibility is lost when a design is hard-cooled in this way. It is must easier, and cheaper, to change a few lines of software than to redesign a piece of custom hardware.

ATMEGA2560 MICRO CONTROLLER

ATmega2560 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega2560 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about RISC and CISC Architecture) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz.

ATmega2560 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively.



ATmega2560 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD.ATmega16 has various in-built peripherals like USART, ADC, Analog
Comparator, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals.

3D PRINTING

3D printing (or additive manufacturing, AM) is any of various processes used to make a three-dimensional object.[1] In 3D printing, additive processes are used, in which successive layers of material are laid down under computer

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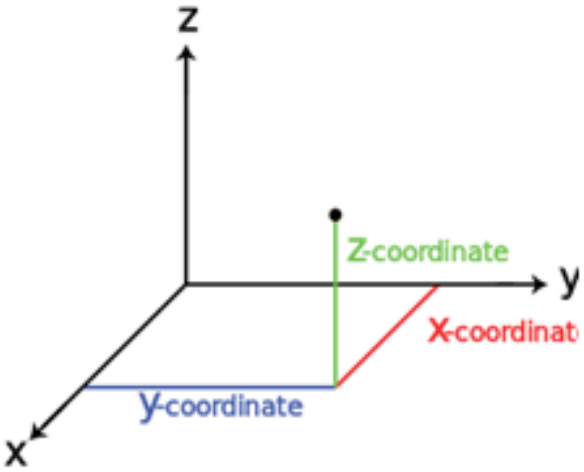
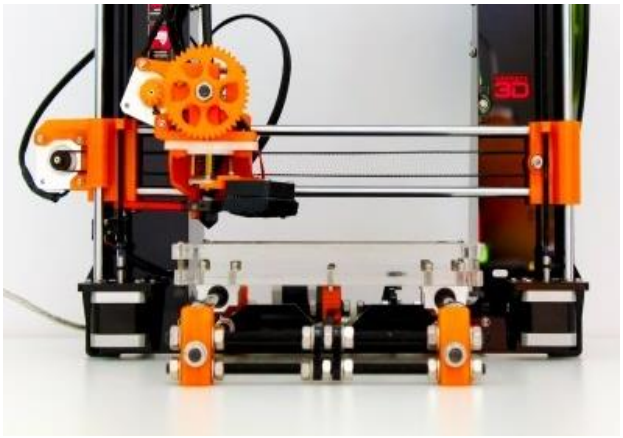
THREE-DIMENSIONAL SPACE



Three-dimensional space is a geometric three-parameter model of the physical universe (without considering time) in which all known matter exists. These three dimensions can be labeled by a combination of three chosen from the terms length,width, height, depth, and breadth. Any three directions can be chosen, provided that they do not all lie in the same plane.

In physics and mathematics, sequence of n numbers can be understood as a location in n-dimensional space. When n = 3, the set of all such locations is called three-dimensional Euclidean space. It is commonly represented by the symbol $\mathbb{R}^3$. This space is only one example of a great variety of spaces in three dimensions called 3-manifolds.



HEATING ELEMENT

Now that Smoothie can read the temperature, it needs a way to heat things and maintain a desired temperature. This is the heating element. On a hot end, that is usually a resistor or a cartridge heater, on a heated bed, that is usually a PCB plate designed to have the right resistance, or adaption.

Because of its resistance, when power is applied to a heater, it consumes energy to generate heat.

These heating elements need to be connected to Smoothie board on a port that allows Smoothie to turn them ON or OFF as needed. This is done by the use of MOSFET that takes a digital input signal, and depending on its value, lets current pass or not.

Smoothie has up to 6 MOSFET controls (6 on 5X, 4 on 4X and 2 on 3X). You have to connect your PSU to the power input connector for those FETs, and connect your power consuming element (be it heating element, spindle, etc…) to the power outputs of those same FETs. Essentially Smoothie connects/disconnects the element (connected to the mosfetconnector) from the PSU (connected to the power input connector) as

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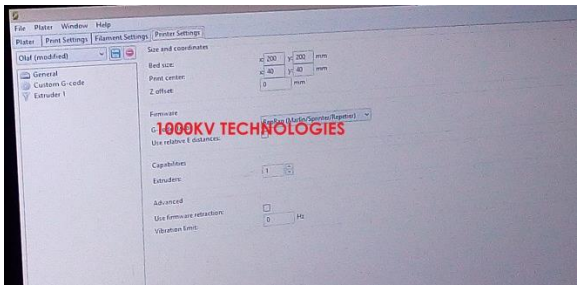
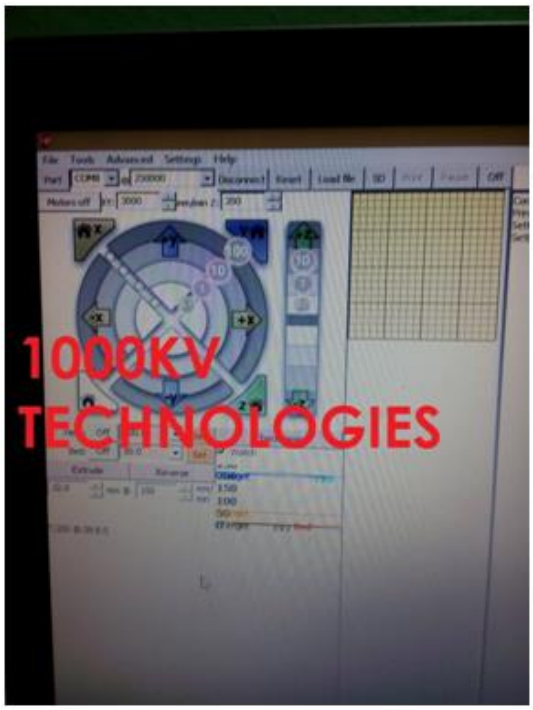
needed to maintain temperature or as requested by G-codes.

POWER SYPPLY:

USING SOFTWARES:

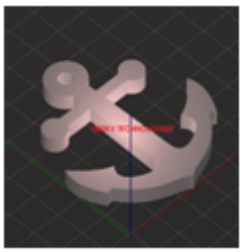


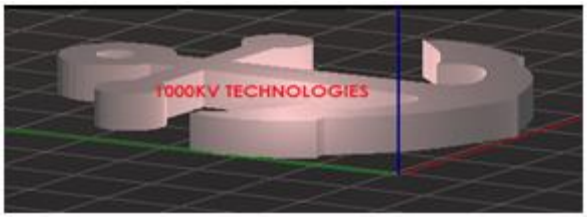


Application

- Industrial Uses
- Rapid Prototyping
- Rapid Manufacturing
- Mass Customization
- Mass Production
- Domestic and hobbyist uses
- Clothing
- 3D Bio-printing
- 3D Printing For Implant And Medical Device
- 3D Printing Services

EXAMPLE MODEL GRAPHIC DESIGN:





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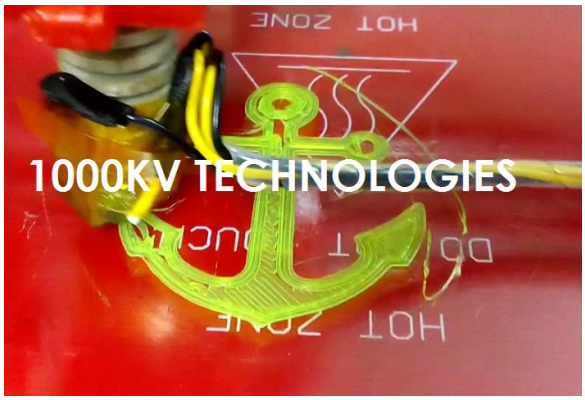
- These files are graphical files in CAD.
- After convertion graphical files code will genarates

- Genarated codes will convert as output by using softwares.



SAMPLE CODE:

```
; layer_height = 0.5
; perimeters = 3
; top_solid_layers = 3
; bottom_solid_layers = 3
; fill_density = 0.4
; perimeter_speed = 20
; infill_speed = 60
; travel_speed = 130
; nozzle_diameter = 0.6
; filament_diameter = 2.95
; extrusion_multiplier = 1
; perimeters extrusion width = 0.60mm
; infill extrusion width = 0.63mm
; solid infill extrusion width = 0.63mm
; top infill extrusion width = 0.63mm
; first layer extrusion width = 0.60mm
G21 ; set units to millimeters
M107
M190 S2 ; wait for bed temperature to be reached
M104 S200 ; set temperature
G28 ;HOME ALL AXES
M109 S200 ; wait for temperature to be reached
G90 ; use absolute coordinates
G92 E0
M82 ; use absolute distances for extrusion
G1 F1800.000 E-1.00000
G92 E0
G1 Z0.500 F7800.000
G1 X13.737 Y17.723 F7800.000
G1 E1.00000 F1800.000
```

ADVANTAGE

- Higher flexibility.
- Increased productivity.
- Consistent quality.
- Reduced scrap rate.
- Reliable operation

FUTURE

Future applications for 3D printing might include creating open-source scientific equipment to create open source labs. Science-based applications like reconstructing fossils in paleontology. Replicating ancient and priceless artifacts in archaeology.Reconstructing bones and body parts in forensic pathology. Reconstructing heavily damaged

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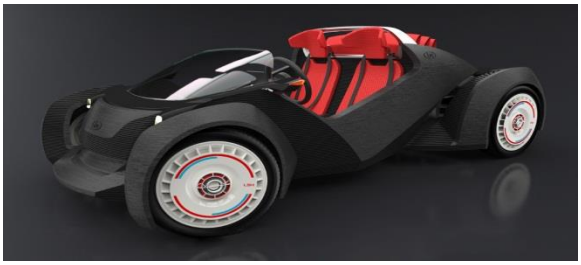
evidence acquired from crime scene investigations. The technology currently being researched for building construction.

WORLD'S FIRST 3D-PRINTED CAR



3D PRINTER PRINTING HOUSE

CONCLUSION

This project design 3D Printing technology could revolutionize and re-shape the world. Advances in 3D printing technology can significantly change and improve the way we manufacture products and produce goods worldwide. If the last industrial revolution brought us mass production and the advent of economies of scale - the digital 3D printing revolution could bring mass manufacturing back a full circle - to an era of mass personalization, and a return to individual craftsmanship.

About author:

Kartheek .Kandhi

Research columnist, Founder &CEO,
1000KV TECHNOLOGIES,

Flat no:A2, 2nd floor
9030 844 866, 9030 844 877,
ECE /EEE /EIE /MECHANICAL /MECHATRANIC /ROBOTICS /BIOMEDICAL /DIPLOMA PROJECTS
1000kilovolts@gmail.com
Hyderabad.