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CNC PEN PLOTTER USING ARDUINO

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Abstract
The idea behind this project is to make a CNC machine which can draw images or pictures on surfaces which can be paper or anything. It uses three stepper motors as linear actuators on each axis X , Y & Z. While printing, the proper synchronization of this entire three axis i.e., stepper motors, is the most challenging task. At present the data to draw is given programmatically i.e., hardcoded in program in binary format. A bit touches the surface & prints the pixel for logic 1 and lifts up in air for logic 0 & actuator changes its position for next commands execution. As in the future plan, it can access the G-Code directly from supporting software like in scale. Presented plotter is a two-dimensional (2D) plotter.
Keywords:- Arduino board, Stepper Driver, CNC shield, stepper motor, computer G codes.

Introduction
- The concept of this paper is to create an The implementation of this technique eliminates the human interaction with photo chemical method and replaces the use of such hazardous chemical methods with a computerized mechanic system
- when it comes down to normal students, hobbyists, engineers, mass production of PCBs is not what they expect

Descriptions*:*
The idea behind this project is to make a CNC machine which can draw images or pictures on surfaces which can be paper or anything. It uses three stepper motors as linear actuators on each axis X , Y & Z. While printing, the proper synchronization of this entire three axis i.e., stepper motors, is the most challenging task. At present the data to draw is given programmatically i.e., hardcoded in program in binary format. A bit touches the surface & prints the pixel for logic 1 and lifts up in air for logic 0 & actuator changes its position for next commands execution. As in the future plan, it can access the G-Code directly from supporting software like in scale. Presented plotter is a two-dimensional (2D) plotter.

Literature Review
Yogendra Tyagi, Vadansh Chaturvedi and Jyoti Vimal have conducted an experiment on drilling of mild steel, and applied the Taguchi methods for determining the optimum parameters condition for the machining process using the Taguchi methods and analysis of variance. The workpiece used is mild steel (100mm×76mm×12mm) and the tool used is HSS with a point angle of 118° and diameter of 10 mm.
Timur Canel, A. Ugur Kaya, Bekir Celik studied laser drilling on PVC material in order to increase the quality of the cavity. Taguchi optimization methods were used to obtain the optimum parameters. The material used in the experimental setup is PVC samples with dimensions of 5mm×85mm×4.5mm. Surelite Continuum Laser is used to form the cavities. The input parameters are wavelength, fluence and frequency and the output response are aspect ratio, circularity and heat affected zone. Taguchi L9 orthogonal array is used to find the signal to noise ratio.

Components used:

The components used are

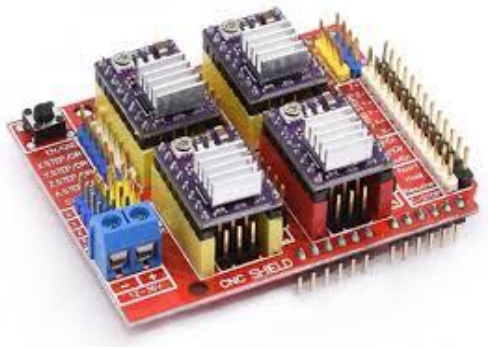
1. CNC MOTORS
2. STEPPER MOTORS
3. SERVO MOTOR
4. MICRO CONTROLLER
5. MOTOR DRIVERS AND CNC SHIELD
6. HEAT SINKS
7. ARDUINO UNO BOARD

ARDUINO UNO:

Arduino UNO is a development board which contains microcontroller in the board itself. It is an open-source software. In the electronics platform, arduinois easy to use hardware and software. The Arduino boards can read inputs so that they can understand and give as some of the outcomes like light on a sensor, a finger on a button, activating a motor, turning on an LED, publishing something manually in online etc,. that are all given as output to us. The most of the applications on everyday life, ardunio is a par

MOTOR DRIVERS AND CNC SHIELD

We have to drive three motors (two stepper motors and a single servo motor), for this, we have used a CNC shield. The CNC Shield V3 for Arduino is an Arduino compatible board that modifies the Arduino to a CNC controller. Using an open-source firmware it can control up to 4 Stepper motors using DRV8825 or A4988 stepper motor drivers making it easy to get your CNC projects up and running in a few hours.

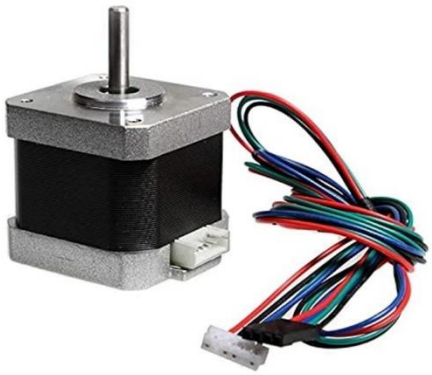


SERVO MOTOR

- The only function of the servo motor of the Z-axis is to produce minimal linear actuation of the pen along the positive and negative Z-axis
- G91 (use relative positioning) G1 Z10 (move z-axis up by 10 mm) (Irrespective of initial position)

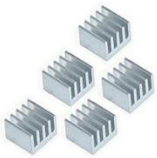
STEPPER MOTOR

- Both X and Y axes are independently controlled by NEMA 17 stepper motors so we used two stepper motors in this project.
- Following is an illustration of the motor (identical to the one used in the project)



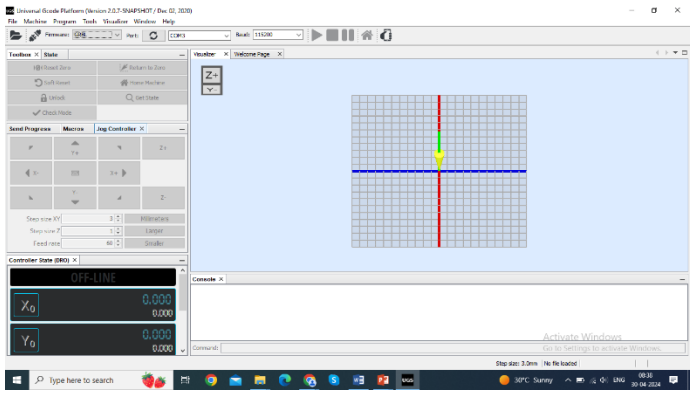
HEAT SINK

A heat sink is a passive heat exchanger that transfers the heat dissipated from the device to fluid medium, thereby allowing the device to work properly and efficiently without any issues created by the rise.



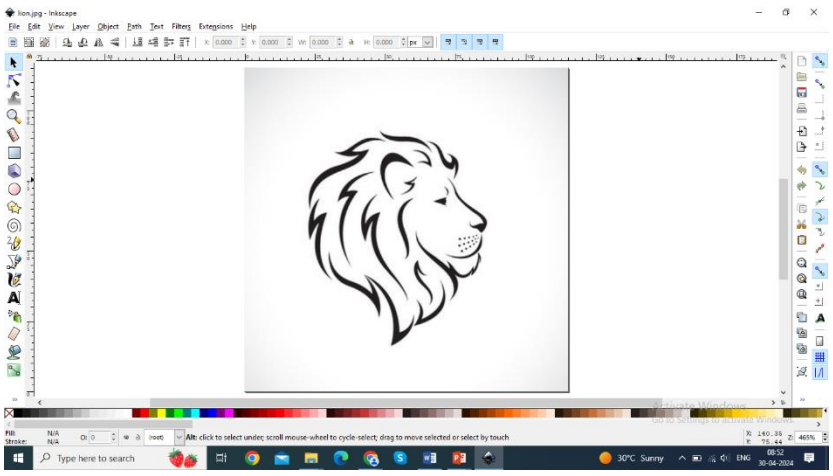
UGS PLATFORM

- Universal G-code Sender is a Java based GRBL compatible cross platform G-Code sender. Use this program to run a GRBL controlled CNC machine.



INKSCAPE SOFTWARE:-

- Inkscape is an open-source, SVG-based vector graphics editor that uses the W3C standard Scalable Vector Graphics (SVG) file format.
- Inkscape is a free and opensource vector graphics editor.
- Inkscape's main goal is to create a powerful and convenient drawing tool fully compliant with the SVG standard.



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