A

Project Report On

"DESIGN AND DEVELOPMENT OF AUTOMATED WRITING MACHINE"

Submitted in partial fulfillment of the Requirements for the award of degree of

BACHELOR OF TECHNOLOGY

In

Electrical and Electronics Engineering

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Rajampet, Kadapa (Dist), A.P-516126.

2022-2023

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This is to certify that the project work entitled **"DESIGN AND DEVELOPMENT OF AUTOMATED WRITING MACHINE"** is a bonafied record of work done by

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Bachelor of Technology in the **E.E.E.** during the year **2022-2023.**

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This is to certify that I had examined the concept and here by accord, my approval of it as a project carried out and presented in a manner required for its acceptance in partial fulfillment for the award of Degree of **BACHELOR OF TECHNOLOGY** in **ELECTRICAL AND ELECTRONICS ENGINEERING** for which it has been submitted. This approval does not necessarily endorse every statement made, conclusion drawn as recorded in report, and it only signifies the acceptance of report for the purpose for which it issubmitted.

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ABSTRACT

The progressions in the new modern patterns have led to a mechanical advancement, which is prompting the improvement of Industry 4.0 with exceptionally mechanized ventures through human-machine collaboration. As the interaction gets more perplexing and lumbering, robotization turns out to be more crucial for the development and productivity of a framework. Robotized machines are more exact, adaptable, ideal decrease the likelihood of mistake altogether. Lately, various frameworks were proposed to work as a composing machine that can give yield in predefined text styles. The framework proposed in this paper manages perceiving the text in the record and afterward giving the result in the client's textual style. Utilizing this strategy also, the heaviness of the whole framework is made generally lower than the other financially accessible composing machines.

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LIST OF ABBREVIATIONS

CNC - Computer Numerical Control
OCR - Optical Character Recognition
UGP - Universal G-Code Platform
DRO - Digital Read Out
USB - Universal Serial Bus
AWM - Automated Writing Machine
PWM - Pulse Width Modulation

CHAPTER - 1

INTRODUCTION

Industry 4.0, also known as Brilliant Assembling, is a manufacturing breakthrough that is taking place as the globe transitions into a new era. The Business 4.0 uprising may seem more feasible given how quickly organizations are adopting computerized innovations like modern mechanical technology, 3D printing, AI, optical person recognition, distributed computing, expanded reality, and sensors.

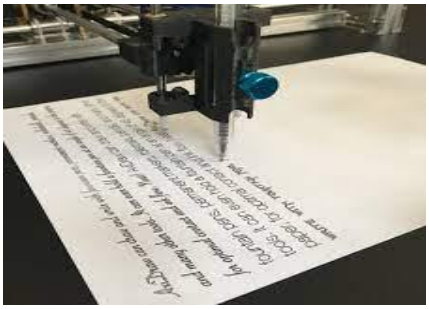


Fig 1 Writing Machine

Humanity is going to robots to accomplish the work and diminish human exertion. Time and labor are the two main basic constraints on completing any projects with a broad scope and efficiency in today's society, which is undergoing rapid development. So, in many of the routinely carried out tasks like welding, painting, gathering, filling holders, authoring, and so forth. Computerization is playing a crucial role in saving a lot of human labor. Considering everything, mechanization can help avoid the time and effort required to compose the keys on a console, which is laborious and necessitates a lot of skills and human activities.

To write only the built-in text styles like Roman, Calibri, Arial, Effect, Georgia, and so on, advances like automated speech to message converters are used. The paper aspires to develop a framework that is prepared for writing on a page with the aid of a pen in the client's unique handwriting or, if necessary, in any of the predefined text styles.

Hence, the concept of CNC machines—PC mathematical control machines—as an intriguing and adaptable kind of delicate computerization is introduced. It was initially developed to regulate the motion and furthermore the functioning of technological devices. A computerized machine can be used to execute ideas like CNC machines in order to write additionally the general equipment arrangement of the proposed framework.

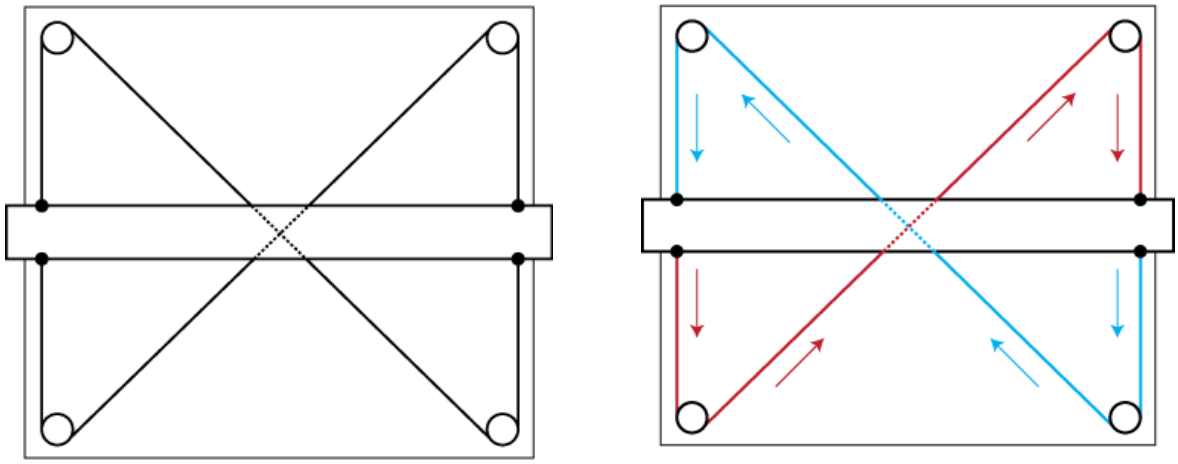
People can read the text on an image and identify the objects in it by looking at it, but PCs require a more co-ordinated comprehension strategy. Computers are used to view the images. Visual Person Acknowledgment includes locating and acknowledging messages contained in sophisticated photographs as well as totally converting these messages to an encoded format that PCs can easily decode. It has been used in a few applications, such as the recognition of license plates captured by cameras or the examination of handwritten records to create electronic copies of them.

OBJECTIVE

The Objective of this project are:

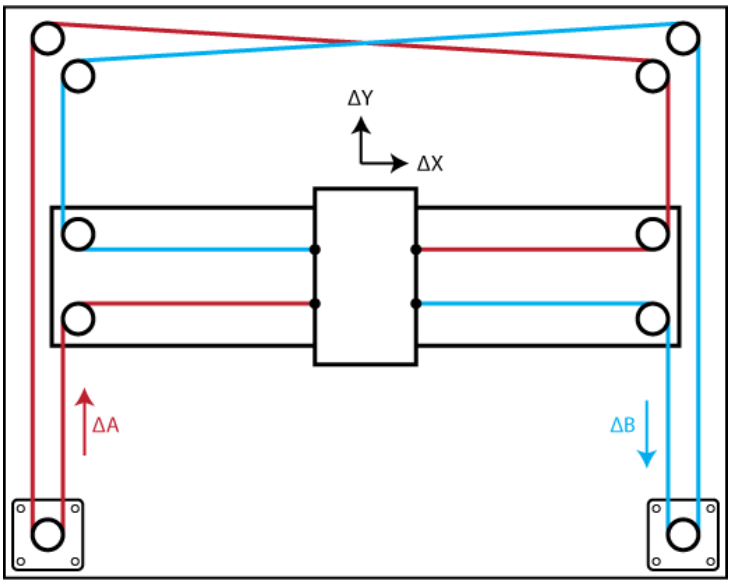
- This Automated writing and drawing device is used to save the wastage of time.
- There are a lot of automated drawing machines are there. But this is useful among all.
- By this we can make the notes in our own handwriting just by giving the input to the machine. We don't needto waste lots of time by sitting in front of the work
- This machine will be able to draw and write the assignments and other hand written notes in our ownhandwriting • By this we can save our time.
- This machine can be used very easily for writing we just need to give the input text and for drawing we need to give the measurement as the input..

Principle of Operation



This is a standard drafting table. The horizontal bar is a straight-edge which can be moved up and down by the user. The criss-cross pattern of the cables stabilizes the bar and keeps it horizontal.

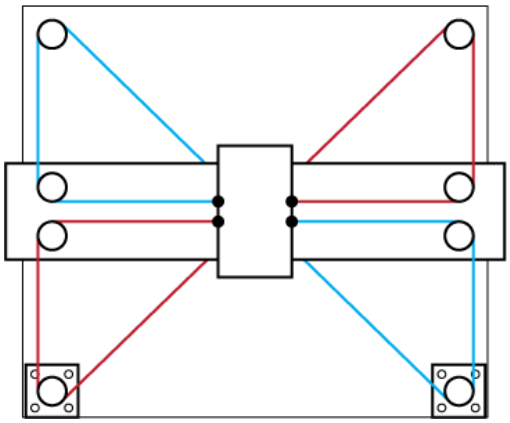
This effect can be seen by following the direction of motion of the two cables which comprise the mechanism. Note that all of the vertical arrows point in the same direction.

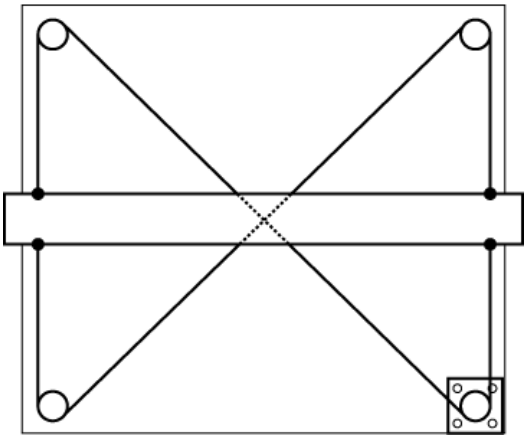


Equations of Motion:

$\Delta X = {}^1/_2(\Delta A + \Delta B), \quad \Delta Y = {}^1/_2(\Delta A - \Delta B)$

$\Delta A = \Delta X + \Delta Y, \quad \Delta B = \Delta X - \Delta Y$





You could imagine attaching a stepper motor to one of the pulleys. Now, the horizontal bar can be moved up and down under computer control. This might be called a single-axis CNC stage.

Mechanism

How might we modify this mechanism to convert it into a two-axis CNC stage? The illustrated mechanism above is one solution. Rotating both motors in the same direction results in horizontal motion. Rotating both motors in opposite directions results in vertical motion.

This reference mechanism is functionally identical to the last figure in the prior section. Two additional pulleys have been added to shift the belt cross-over outside of the working envelope.

Goals

THE GOAL OF THIS PROJECT ARE:

- This machine-controlled writing and drawing device is employed to save lots of the wastage of your time.
- There are heaps of machine-controlled drawing machines. however, this is often helpful among all.
- By this we are able to build the notes in our own handwriting simply by giving the input to the machine. we do not have to be compelled to waste a lot of time by sitting ahead of the work
- This machine is able to draw and write the assignments and different hand written notes in our own handwriting
- By this we are able to save our time.

ALGORITHM

The G-Code file created by the assistance of Inkscape

Software then the process code is employed to send the GCode file to the Arduino controller unit (via USB) then The CNC protect drive send the dominant signals to the stepper motors and servo motor.

BLOCK DIAGRAM

As shown in the block diagram of the automatic writing machine (AWM) it represents the working process of AWM. The laptop or pc is connected with Arduino with help of USB cable and Arduino connected to the motor driver and act as an input. It pass the signal to the motor driver and motor driver give the signal to stepper motor. The stepper motor is place in linear position for moving the direction of X &Y.X movement left to right and Y movement forward and backward direction, servo motor is gives the movement of pen or marker up & down.

CHAPTER-2

EXISTING SYSTEM

Modern Innovations like printers and scanners only write in specified text styles that are present on the PC. It is addressed in a slate show or a power point presentation. The kids describe board shows, an interaction that has been going on for a while, as being tiresome. Power point presentations are used to further improve, as they are more engaging and simpler than chalkboard instruction.

DRAWBACKS: -

The main flaw in this study is that the same method of instruction makes for a monotonous learning environment for both teachers and students. This system causes interest in a student's capacity for observation to decline.

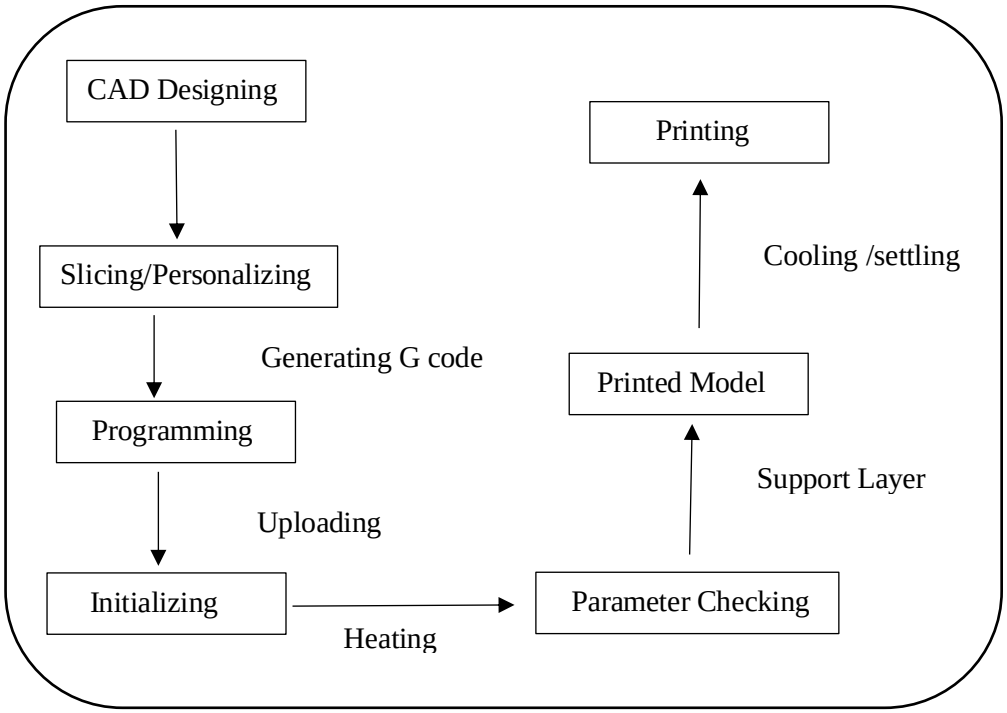


Fig 2 OCR Writing Machine

CHAPTER-3

Literature Survey

POLYGRAPH: -

The first signature duplicating devices called polygraphs, were created by John Isaac Hawkins in the year 1803, and they resemble modern autopens in both appearance and operation. Pen and ink copies of a document were made using the Polygraph.

Fig 3.1 POLYGRAPH

TYPEWRITER: -

In 1874, the first typewriter for business use was released. It was a device that employed a variety of keys to write characters.

Fig 3.2 TYPEWRITER

TELAUTOGRAPH -

Elisha Gray is credited with coming up with it in 1888. It sends electrical impulses produced by the sending end's potentiometer to the receiving end. A pen attached with a servomechanism at the receiver.

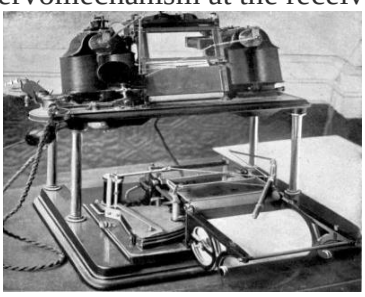


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Fig 3.3 TELAUTOGRAPH

AUTOPEN -

An automatic signature tool is called an autopen, commonly referred to as a signing machine or robot pen. It was created in 1980 and used as a storage device to store signed nature notes.

Fig 3.4 AUTOPEN

LONG PEN:-

The long pen is an alternative to the autopen, a remote signing tool invented by Margaret at Wood TN in 2004 that enables users to sign documents from a distance using a computer, the internet, and a robotic hand.

AXI DRAW :-

Dr. Lin claims that Robert Wilson presented the axi draw project in 2014. This functions as a flexible pen plotter that is compatable with a number of writing implements, including fountain pens and permanent makers.

Fig 3.5 AXI DRAW

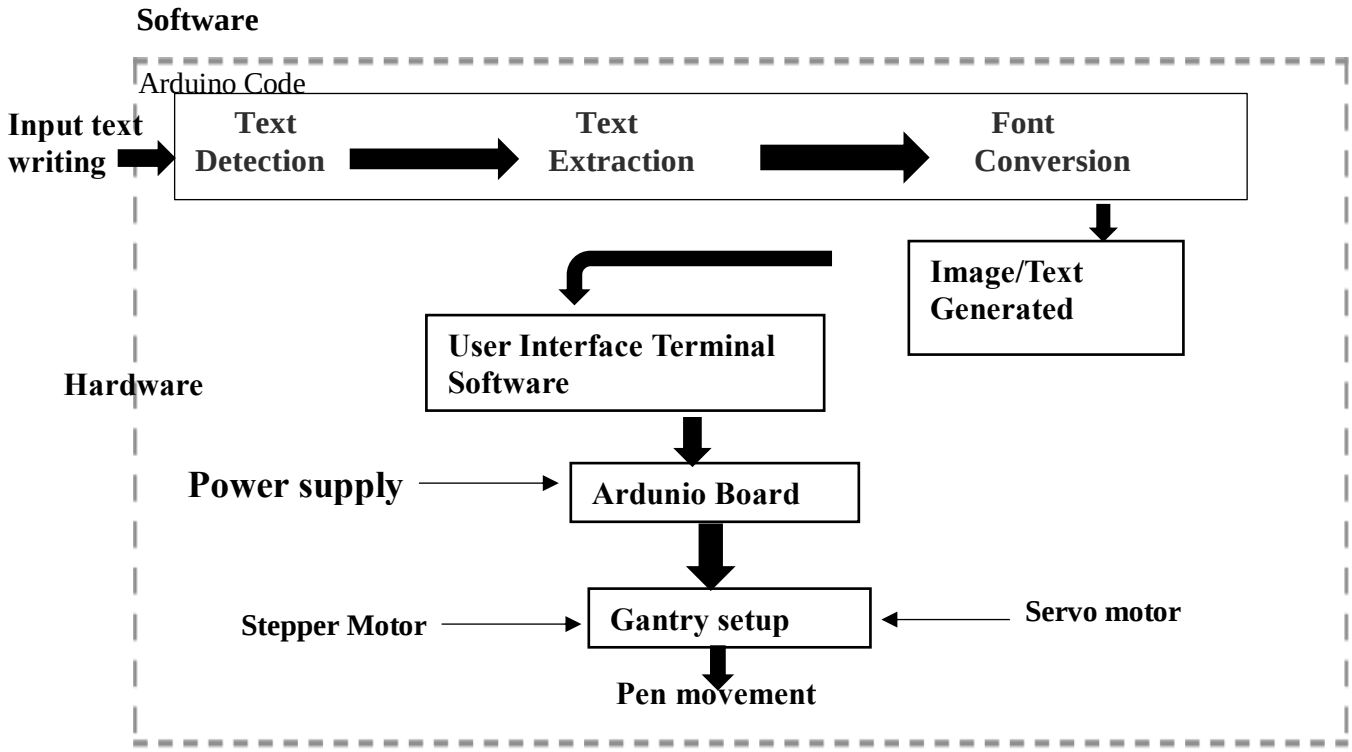
CHAPTER-4

Proposed System

Information is represented via an image of the studied record. The text in the checked report may be written using the client's handwriting or a specified textual style. The upcoming sections will demonstrate how this information picture is handled to achieve the best outcome. By programming the proposed framework, one can automatically form their job to make it simpler.

According to the title, this is a straightforward task using Arduino to create a composing machine at the workplace that can design any pattern and create many textual styles. This framework was implanted, and the PC Mathematical Control machine is what determines how it operates. It makes use of an Arduino development board, which is connected to similar engines, to provide the basic pen development on the paper. On the basis of the information picture that is taken care of in the framework. The Arduino board is coupled with one servo engine and two stepper engines to carry out the pen development and x-y hub gantry development independently. Z-pivot requires the pen that is attached to the structure. The servo engine aids in the pen's upward development so that the nib touches the paper only when something needs to be written and is elevated above when not needed. This z-hub pen movement combined with the x and y pivot development made possible by the stepper engines results in a two-layered sketch on the paper.

The main goal of this project is to finally see the text characters as they have been written down with the aid of a human handwriting arrangement. This is different from other innovations, like OCR to discourse acknowledgment, where the main idea is to read and pre-process the text in order to convert it to a discourse signal in the end.



Block Diagram

CHAPTER-5

Tools Required

Hardware	Description
Processor	Intel Core i7 @ 2.70 GHz
Memory	8.00 GB
Hard Disk Space	256 GB
Device	HP Pavilion
2D CNC Plotter	Other hardware (Arduino UNO, Servo motor, etc)

Table 1. Hardware Requirements

Software	Description
Operating System	Microsoft Windows 10
Inkscape	Graphics application
G-Code	Command to change geometric details, control CNC machine
Programming IDE, Arduino IDE	Python, Embedded C
Browser	Google Chrome, Microsoft Edge

Table 2. Software Requirements

Hardware:-

Stepper Motor:

Stepper can be converted to a computerized beat for pen development using X, Y, and Z heading pivots. A stepper engine is a brushless engine that divides a full turn into several comparable advances. Its ability to convert different driving pressures into a defined rise in shaft position makes it a well-known type of engine. The shaft passes through the right place with each heartbeat. Three stepper engines with lead screws have been used. The lead screw's pivot will be the engine as a result.

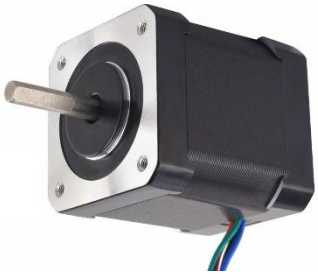


Fig 5.1 Stepper Motor

Specifications:

Step angle	1.8 degrees
Current	1.2 A/Phase
Holding Torque	4.2 Kg-Cm
Detent Torque	2.2N.Cm
Lead Wire	4
Shaft Diameter	5mm

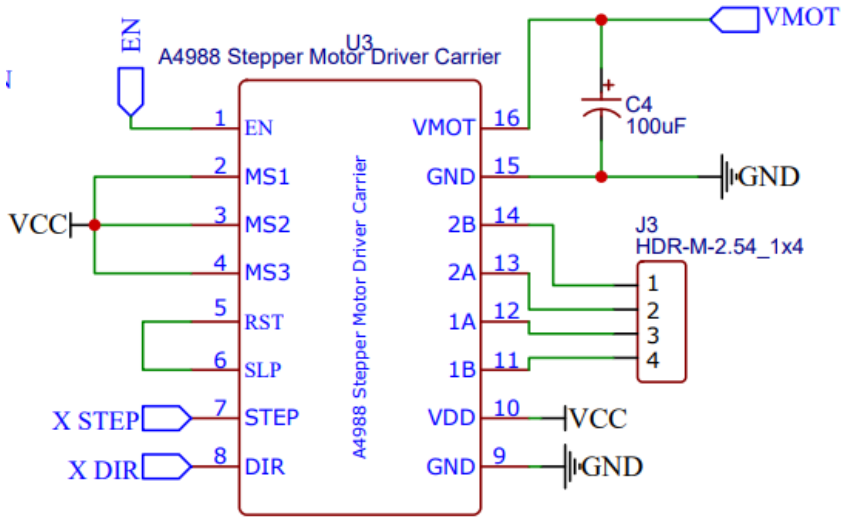


Fig 5.1.1 Pin Diagram of X-Axis Stepper Motor

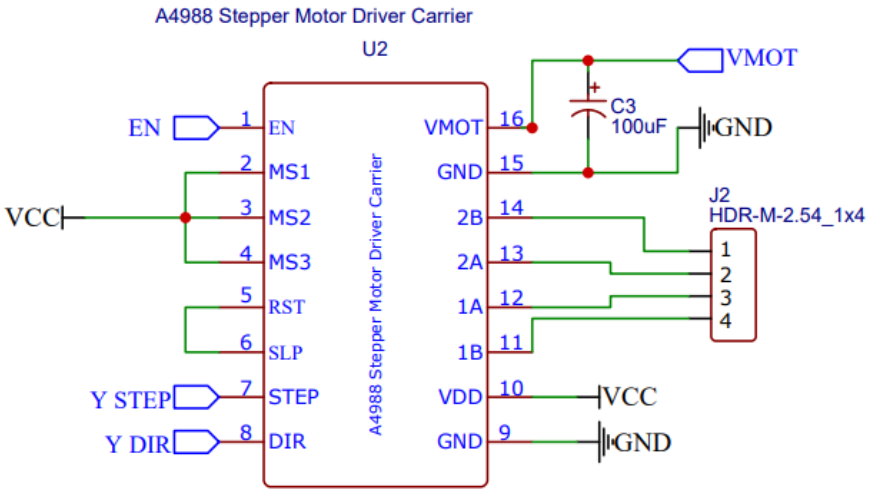


Fig 5.1.2 Pin Diagram of Y-Axis stepper Motor

Servo Motor:

A servo engine is special because it has the ability to receive a control signal that specifies the perfect position for the servo shift and then supply power to the DC engine until the shaft reaches that location.

Fig 5.2 Servo Motor

Specifications:

Weight	55gm
Dimensions	39.5mm*20.5mm*40.7mm
Operating Voltage	4.8 ~ 6.6 V
Gear type	Metal Gear
Temperature range	0- 55 Deg
Servo wire length	30 Cms
Speed	3000 – 5000 rpm
Operating Speed	0.20 sec / 60 Degrees (4.8 V)

Fig 5.2.1 Pin Diagram of Servo Motor

Arduino:

The distinguishing feature of Arduino is that it receives commands or Information from a PC via a USB connection. It is put on a CNC guard, and using a stepper driver, it will transmit additional data from the Arduino to the guard. The Arduino UNO is a microcontroller board that includes all the necessary components to interface the microcontroller with a PC through a USB cable and a power source. With the use of a software, it directs the stepper engine's location. It is an open-source platform with user-friendly hardware and software programming.

These sophisticated and straight forward information/yield pins can connect to many boards, circuits, and microcontrollers with related components to help with programming and combining into various circuits. 5 volts are currently supplied together with a USB interface.

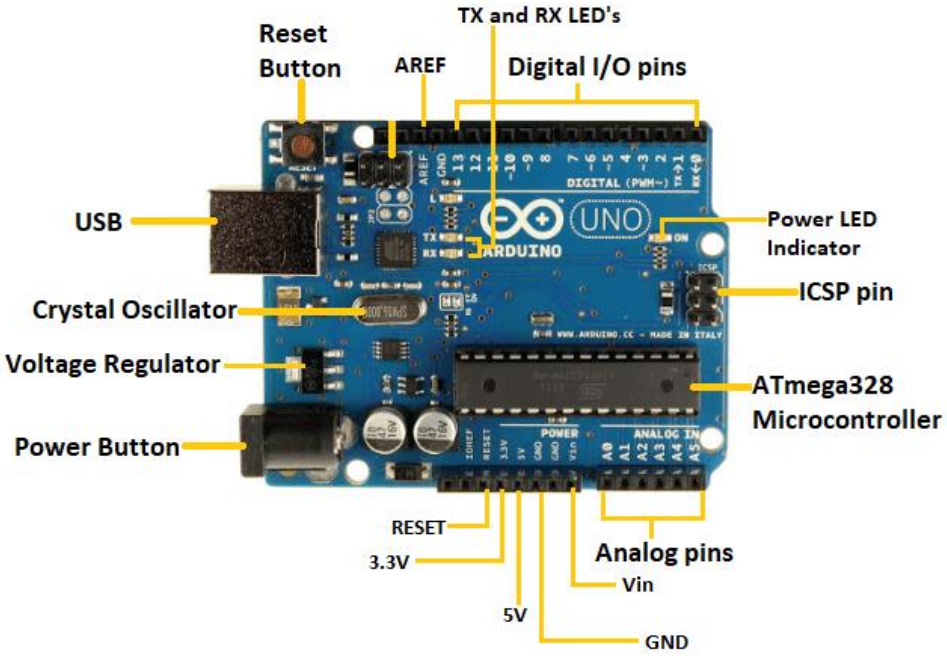


Fig 5.3 Arduino UNO

Specifications:

Micro Controller	ATmega328P
Operating Voltage	5 V
Input Voltage (Limit)	6-20V
Digital I/O Pins	14
Analog Input Pins	6
Clock Speed	16 MHz
DC Current For 3.3V Pin	50mA
DC Current PerI/O Pin	20mA

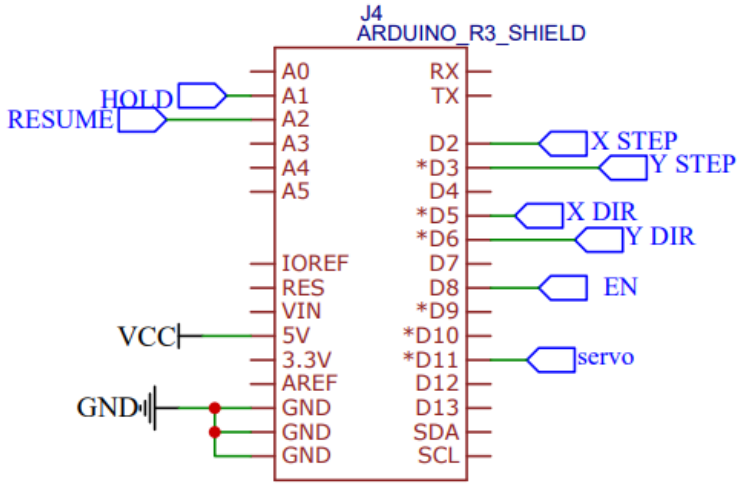


Fig 5.3.1 Pin Diagram for ARDUINO R3_SHEILD

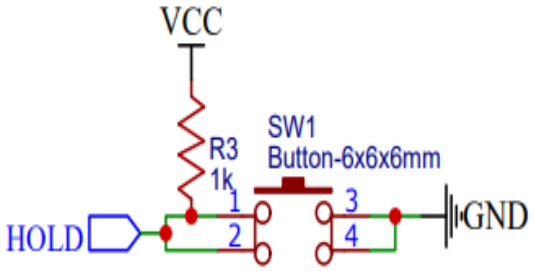


Fig 5.3.2 Pin diagram for HOLD Button

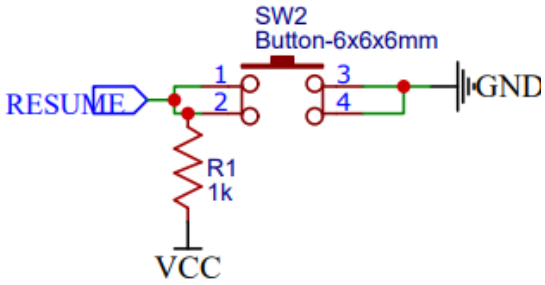


Fig 5.3.3Pin Diagram for RESUME Button

Linear Rods:

Long, thin, straight metal bars known as linear rods are frequently utilized in a variety of applications that call for load-bearing or structural support.

1. Robotics: Precision linear motion in the X, Y, and Z axes is provided by linear rods in robotics applications.
2. Manufacturing: In order to support numerous components, including convey or systems, assembly lines, and machining equipment, linear rods are employed in manufacturing processes.

Fig 5.4 Linear Rod - 450mm

Specifications:

Diameter	**12mm**
Length	**450mm**
Tolerance	**-0.005mm to -0.03mm**

Fig 5.5 Linear Rod - 350mm

Specifications:

Diameter	**8mm**
Length	**350mm**
Tolerance	**-0.005mm to -0.03mm**

SOFTWARE

ARDUINO IDE

Arduino is associate ASCII text file physics platform supported easy-to-use hardware and software system. Arduino IDE (Integrated Development Environment) is that the software system for Arduino. It's a text editor sort of a pad of paper with totally different options. It's used forwriting code, assembling the code to see if any errors square measure there and uploading the code to the Arduino.

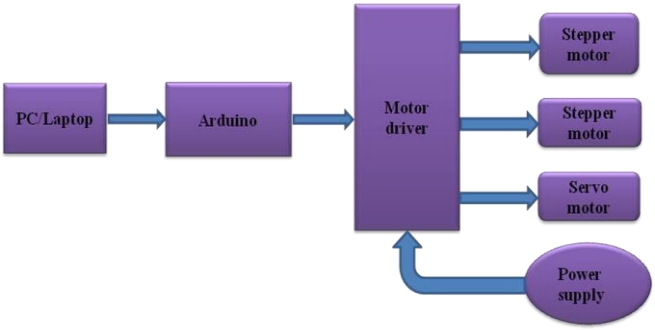


Fig 5.6 : Arduino IDE

Inkscape 0.9.2

To create the plotted figure or text, use Inkscape. With this software, a G-code file of a chosen image or piece of text is made for this project. X, Y, and Z coordinates are part of the widely used numerical control programming language known as G-code..

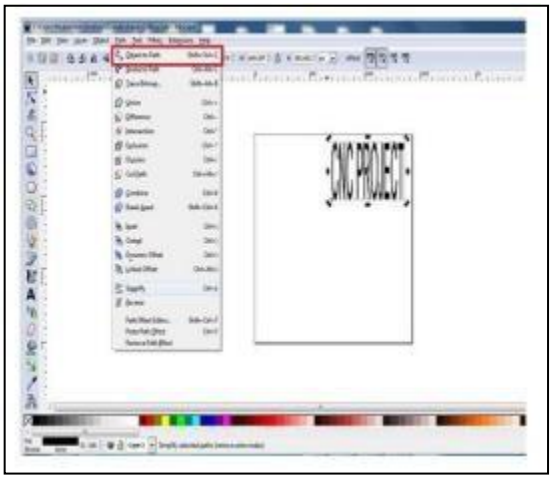


Fig 5.7 Inkscape 0.9.2

Creating G-Code File Using Inkscape

Our project's CNC plotter will operate within a 20cm-by-20cm region. Because the plotter can only draw in the first quadrant, we choose the document attributes of the Inkscape 40cmx40cm (Width Height) document, which is four times the working area of the plotter. As a result, we first kept the axes at the motors' closest end, which is thought of as an origin to quickly change the design. The working area of the CNC plotter with the text typed in the designated area. To save the text's G-code format, select "object to path" from the drop-down window after using the cursor to pick the desired text.

The image file must have a transparent background in order to generate the G-code for it. To generate a transparent picture, drag the image into the choosen area and then choose "trace bitmap" from the drop-down menu. The "Edge detection" option is used to produce black and white images while the scans are set to 8. Using the procedures outlined previously, we added this transparent image to the designated region and then used the "object to path" command to produce the G-code file for the choosen image.

G – CODER: -

"G" is presenting this. G-codes are pre-defining functions linked to Machine Axis Movement. It is a two-digit number, such as G00, G81, or G90. It is possible to place multiple G addresses in a single block. As long as these Functions do not conflict with one another. G02 and G03, which are located together in a single block, are not permitted. The path that must be taken to create a whole design is specified by the g function. positioning with

ExG00- positioning.

G01- Linear interpolation

G02- Clockwise Circular Interpolation

G03- Counter clockwise Circular InterpolationG04- Dwell

CHAPTER - 6

WORKING

First, the system must have the Arduino software installed.

Once the devices are fixed, the programming code will be uploaded to the Arduino Uno board.

The system's sensors identify the user, retrieve user input from stored documents, and then return

the result and allow the user to begin writing on paper.

The speech-independent system is less effective than the sensor. Due to pattern matching's

inability to handle accents, varied delivery speeds, pitch, volume, and intonation, speaker-

independent

speech recognition has been shown to be highly challenging.

The automatic pen also serves the purpose of enabling the user to create a new document that

doesn't already exist on the hard drive or plates.

The new document is kept on the hard drive for subsequent use.

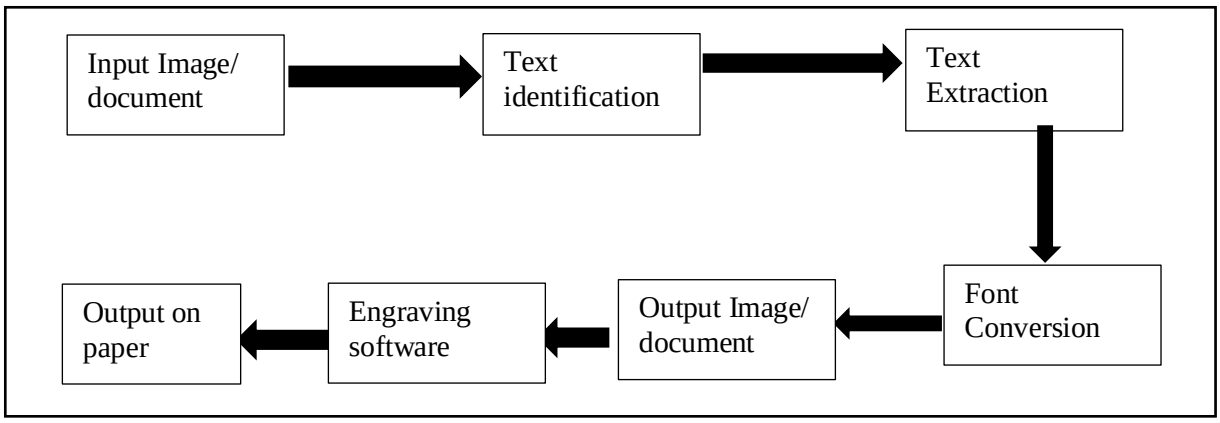
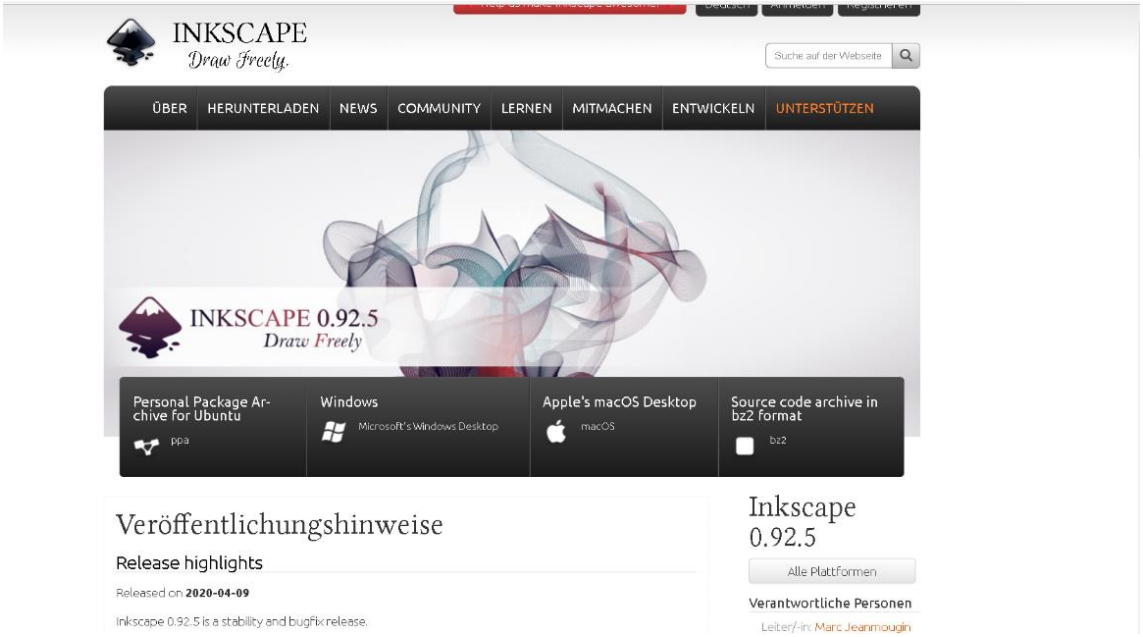
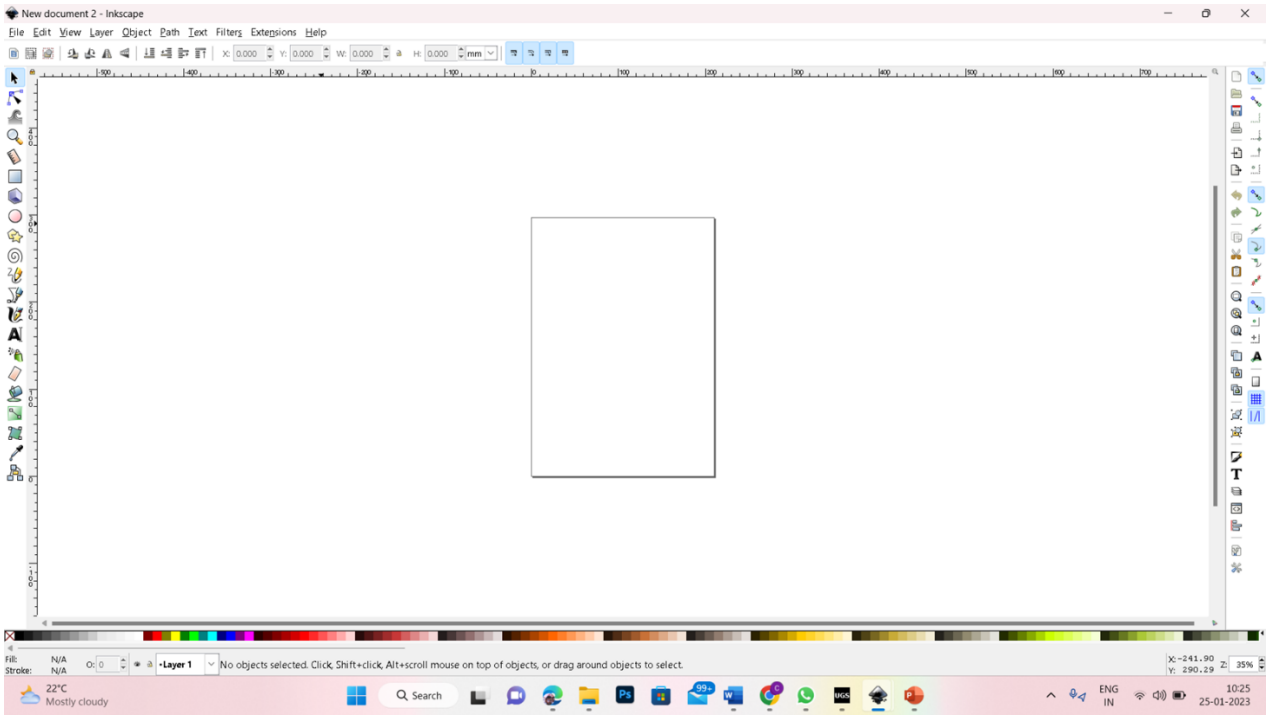


Fig 6.1The flowchart of the overall process in an automated writing machine

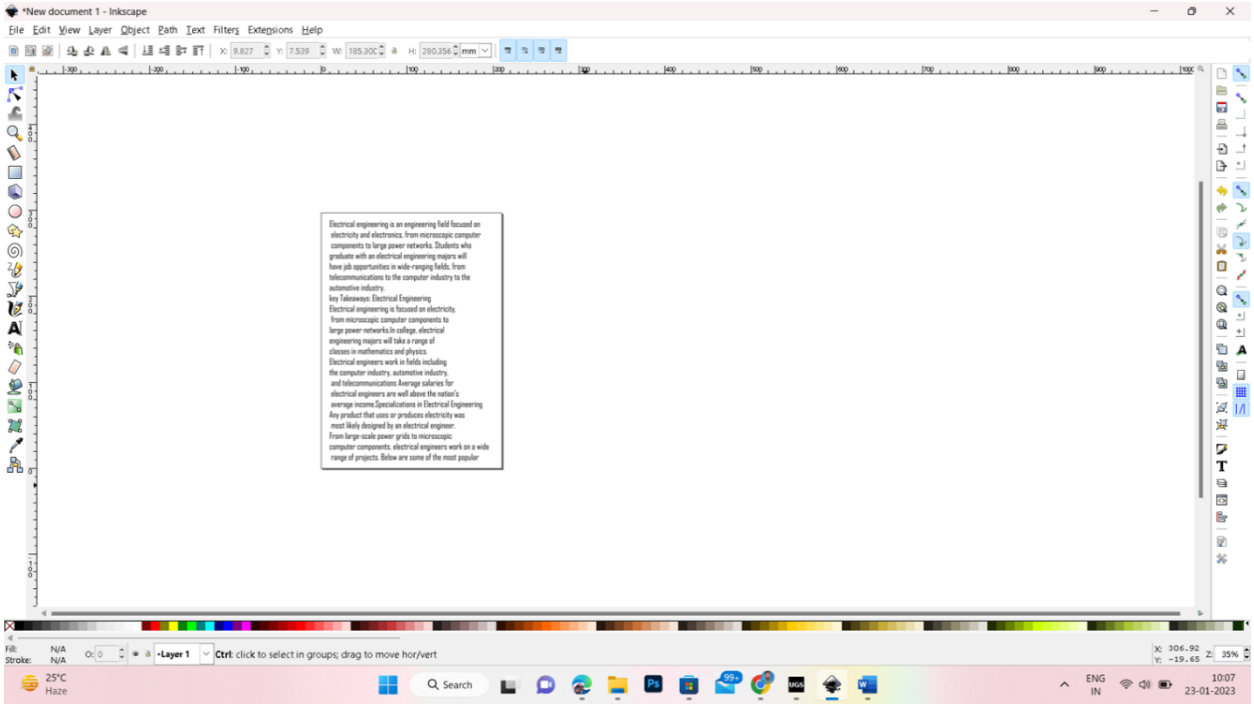
Step 1: Install Inkscape software 0.9.2



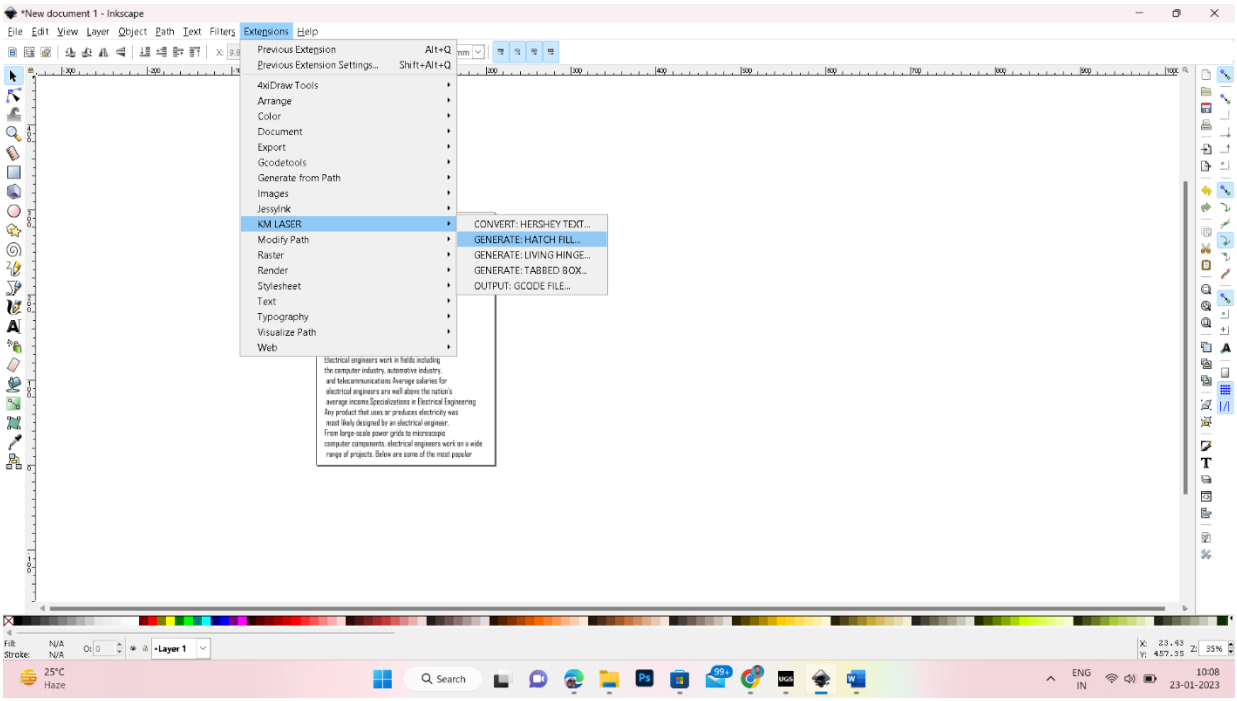
Step 2: Open the Inkscape application



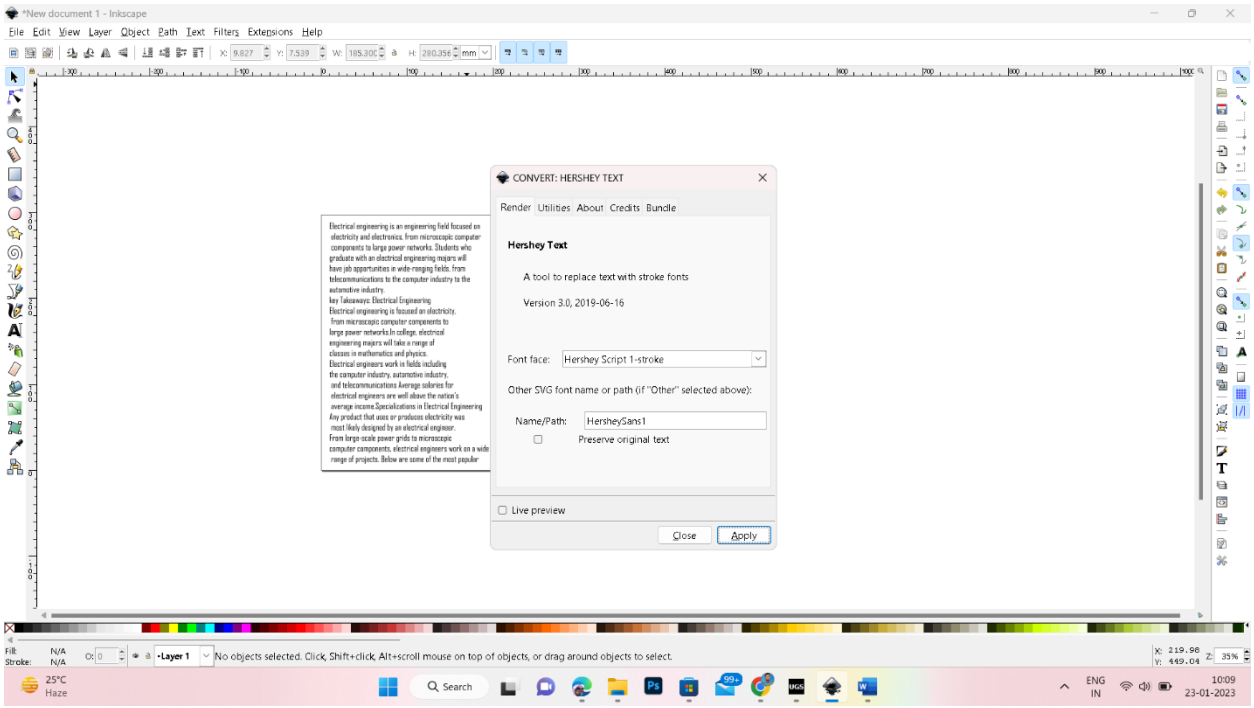
Step 3: After that we can take text option and text



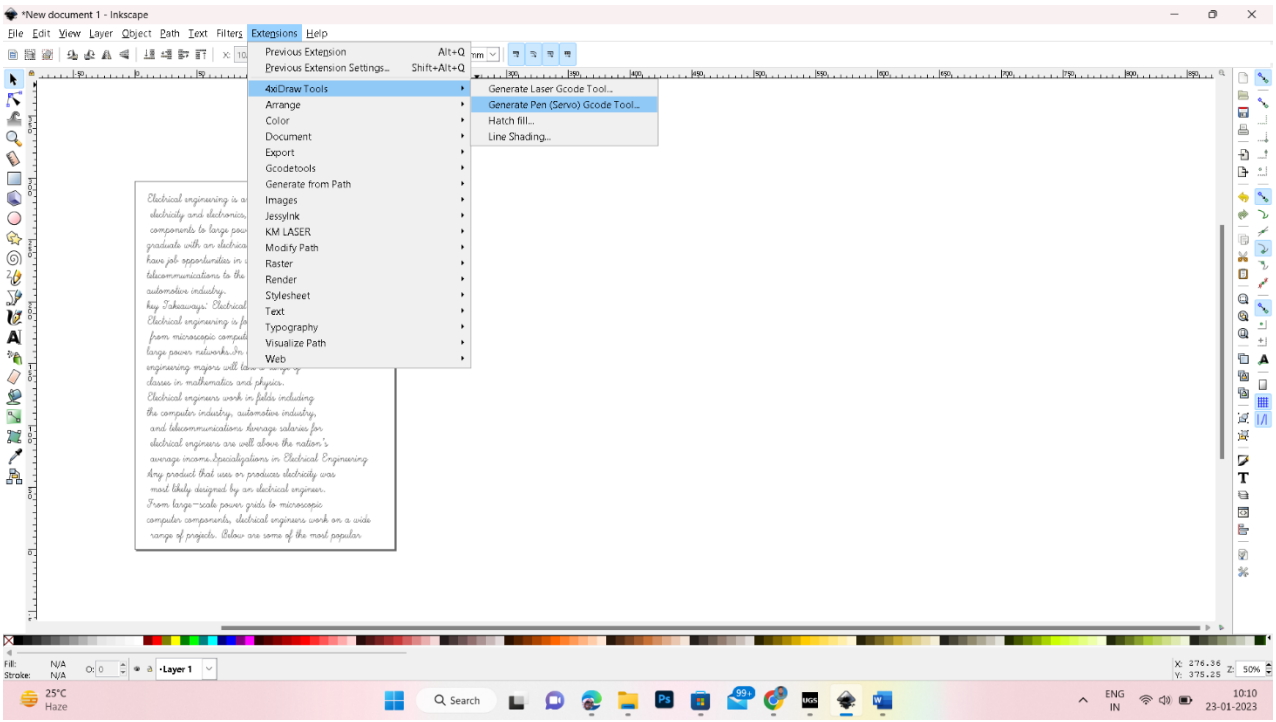
Step 4: We will go to the extension file and we can select “KM laser” in that file.In KM laser we can select “convert Hershey text” (for converting text into different fonts)



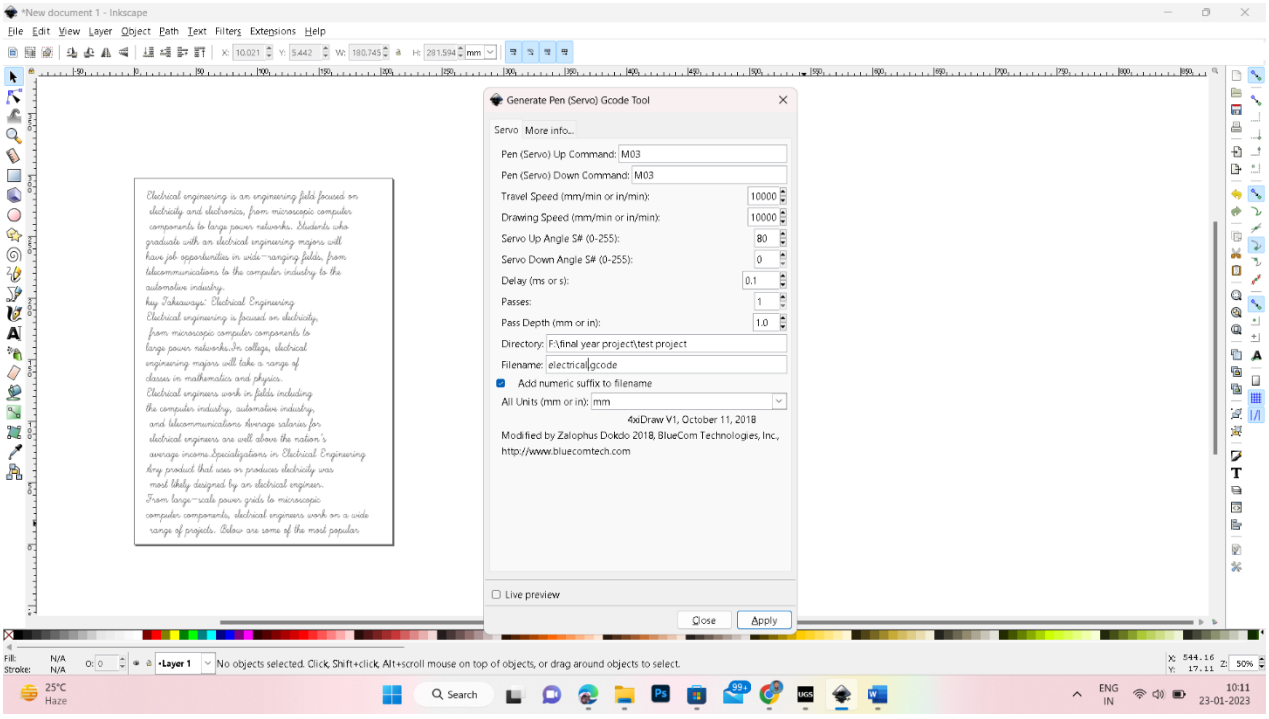
Step 5: After that font has been applied then it is converted in a selected font.



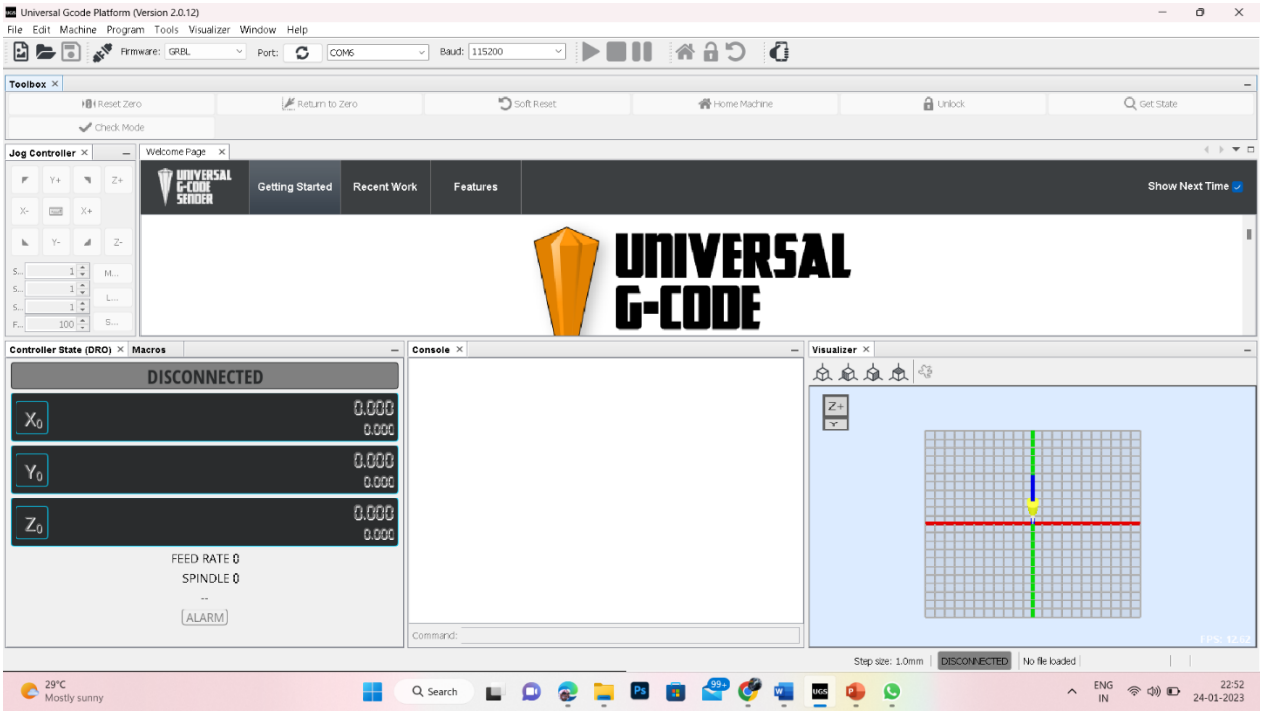
Step 6: We will go to the extension file to select “4xdraw tools” again and select “generate pen GCODE tool”.



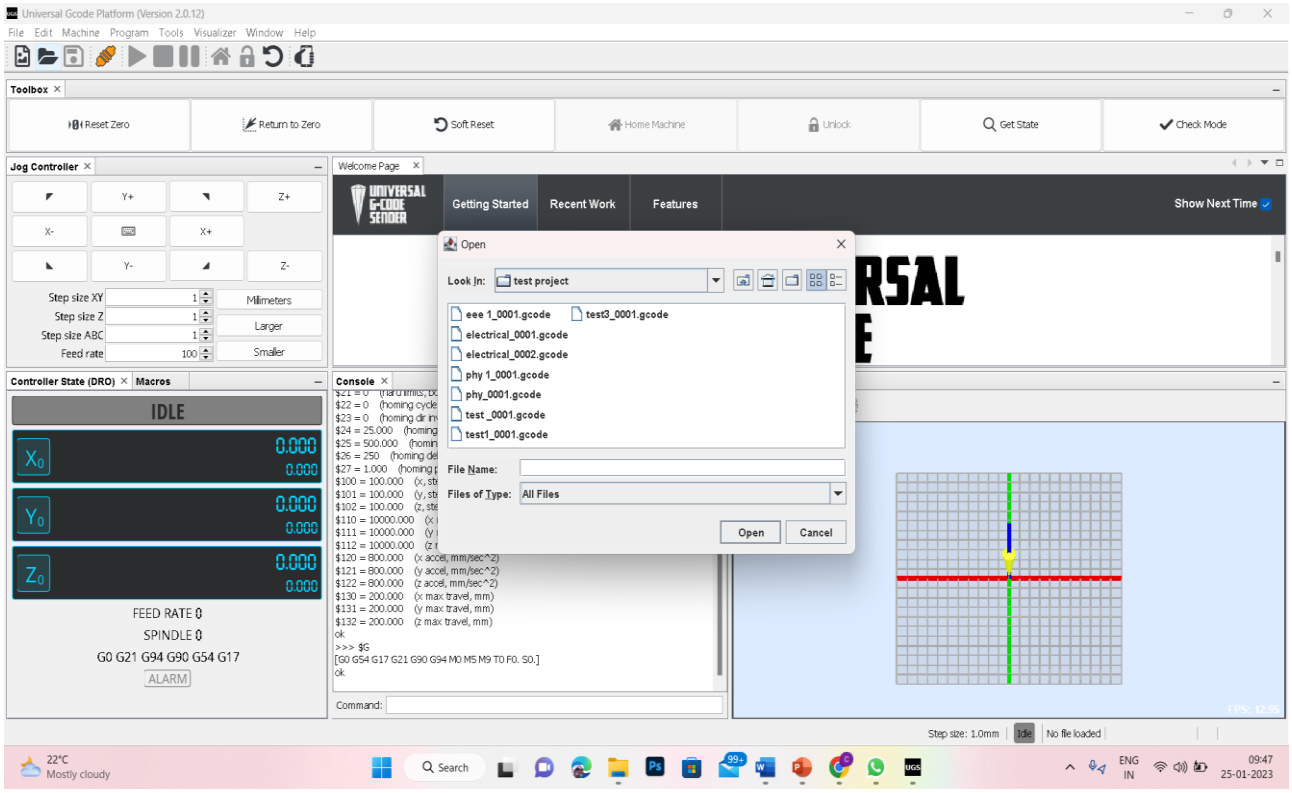
Step 7: We can select pen movement (up and down) travelling speed, servo angles and delay time. In dictionary we can select file location after we can give file name and click on the “apply” option.



Step 8: Next open UGP (universal G-Code platform) version 2.0.12. we can connect Arduino connection whether it is Connect or not.



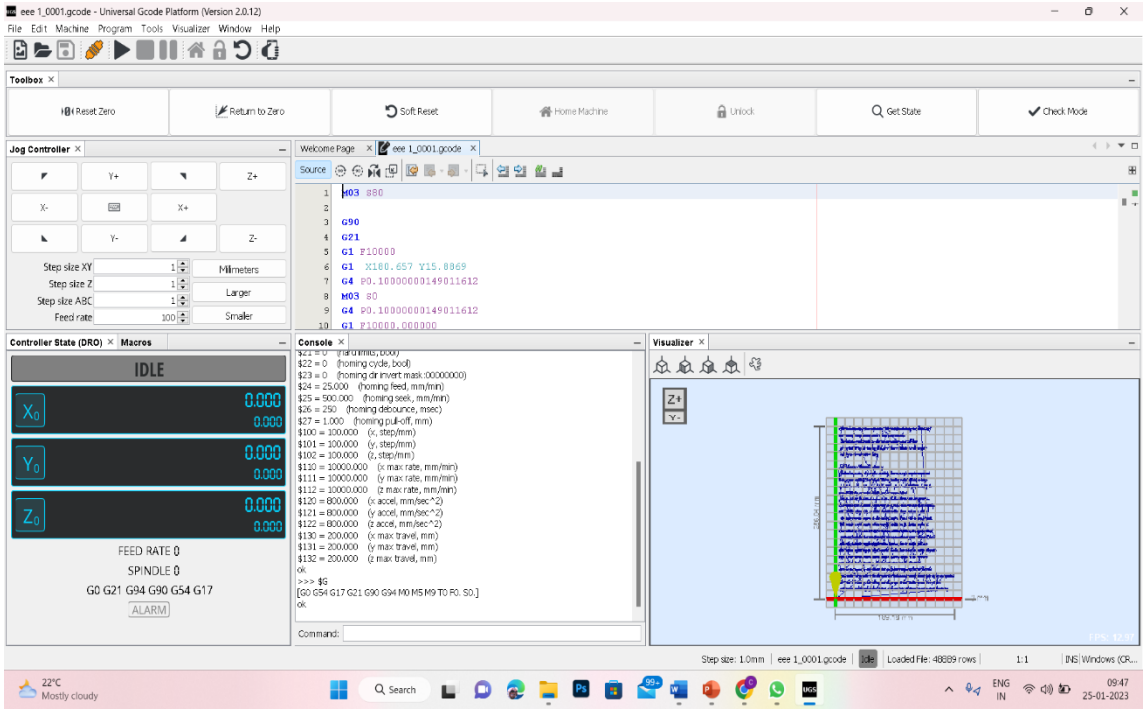
Step 9: Click on the connect or disconnect option. It is connected open file we can select file already which is saved in the inkscape after that we can select the file and open it. The automatically the source will display.



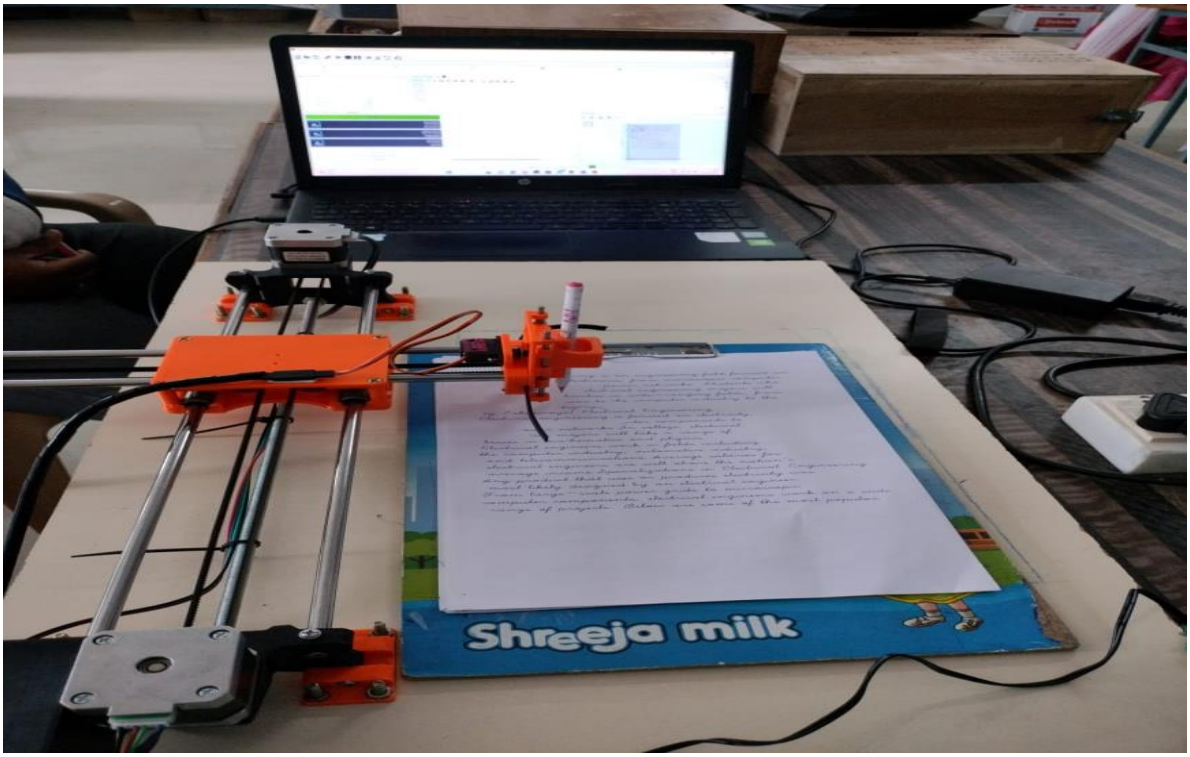
Step 10: In control state (DRO). We can set x-axis, y-axis and z-axis are zero. After we can run it. Before starting the pen movement in console we have to give commands for pen up and down

Pen up=M03 S80

Pen down=M05 S10



Step 11: After that it shows the pen movement how much speed it goes on x, y, and z-axis**.**



CHAPTER-7

CODE

```
M03 S80

G90
G21
G1 F10000
G1  X31.929 Y223.3807
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X31.7068 Y223.161
G1  X31.9481 Y222.9007
G1  X32.1703 Y223.1007
G1  X31.929 Y223.3807
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X27.5659 Y222.2606
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X28.2841 Y222.0186
G1  X28.8874 Y222.0377
G1  X29.3636 Y222.3806
G1  X29.5478 Y222.9807
G1  X29.5287 Y223.4791
G1  X29.243 Y223.803
G1  X28.7667 Y223.9236
G1  X28.4048 Y223.803
G1  X28.0047 Y223.6823
G1  X28.2841 Y225.4032
G1  X28.5254 Y225.6
G1  X29.7256 Y225.581
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X27.0332 Y230.0353
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X26.7157 Y230.3556
G1  X26.9316 Y230.5957
G1  X27.2364 Y230.275
G1  X27.0522 Y229.8349
G1  X26.7538 Y229.3739
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X25.452 Y232.7775
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X25.0774 Y232.9553
G1  X24.7535 Y232.8982
G1  X24.436 Y232.6569
G1  X24.3147 Y232.3584
G1  X24.436 Y231.9774
G1  X24.7345 Y231.6155
G1  X24.9948 Y231.2535
G1  X25.1536 Y230.8979
G1  X25.1345 Y230.5753
G1  X24.8932 Y230.275
G1  X24.5567 Y230.0753
G1  X24.2747 Y229.9953
G1  X23.9147 Y230.1556
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X22.0141 Y232.4727
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
```

```
G1  X22.3742 Y232.7775
G1  X22.5742 Y232.9172
G1  X22.3742 Y231.8377
G1  X22.2142 Y230.8535
G1  X22.1938 Y230.3753
G1  X22.1938 Y230.1753
G1  X22.3742 Y230.8154
G1  X22.6542 Y231.4377
G1  X22.8942 Y232.0727
G1  X23.1914 Y232.5743
G1  X23.3565 Y232.7775
G1  X23.5724 Y232.8728
G1  X23.8328 Y232.8537
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X21.4325 Y232.714
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X20.734 Y232.7585
G1  X20.2317 Y232.5362
G1  X19.8716 Y231.8949
G1  X19.7316 Y231.0757
G1  X19.7316 Y230.435
G1  X19.7916 Y230.1156
G1  X20.172 Y230.4953
G1  X20.7149 Y231.2535
G1  X21.0515 Y231.8187
G1  X21.3118 Y232.3584
G1  X21.4325 Y232.6378
G1  X21.1531 Y231.3932
G1  X21.0134 Y230.7773
G1  X20.9689 Y230.435
G1  X20.9308 Y230.0953
G1  X21.3309 Y230.3556
G1  X22.0294 Y231.1964
G1  X22.3342 Y231.6155
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X17.8901 Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X18.3305 Y231.6536
G1  X18.8734 Y232.1933
G1  X19.0703 Y232.4727
G1  X19.1274 Y232.7775
G1  X19.0131 Y232.8982
G1  X18.7528 Y232.9172
G1  X18.3305 Y232.6378
G1  X18.0098 Y232.1743
G1  X17.8301 Y231.4948
G1  X17.7501 Y230.9551
G1  X17.8501 Y230.5156
G1  X18.0701 Y230.1956
G1  X18.2702 Y229.9953
G1  X18.9496 Y230.6947
G1  X19.3878 Y231.1964
G1  X19.6926 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X15.7467 Y232.5362
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X15.807 Y232.5553
G1  X16.1067 Y232.7775
G1  X16.3068 Y232.9172
G1  X16.1067 Y231.7933
G1  X15.9867 Y230.7773
G1  X16.0467 Y230.1556
G1  X16.5468 Y230.6947
G1  X16.9684 Y231.3551
G1  X17.2669 Y231.9139
G1  X17.6669 Y232.8156
G1  X17.4637 Y231.8758
G1  X17.2859 Y230.5353
G1  X17.1272 Y229.6552
G1  X16.9494 Y229.2533
```

```
G1  X16.7081 Y229.0374
G1  X16.3468 Y228.9167
G1  X15.6864 Y228.9739
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X16.8478 Y225.3397
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X17.3494 Y225.581
G1  X17.8892 Y225.6635
G1  X18.2638 Y225.4794
G1  X18.3654 Y225.0031
G1  X18.1876 Y224.438
G1  X17.705 Y223.8601
G1  X17.1272 Y223.321
G1  X16.5671 Y222.8607
G1  X17.1081 Y222.8607
G1  X18.0479 Y222.9007
G1  X18.3083 Y222.881
G1  X18.448 Y222.9007
G1  X18.7274 Y223.0804
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X21.5658 Y225.7016
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X20.8673 Y225.4222
G1  X20.4482 Y224.819
G1  X20.2641 Y224.2221
G1  X20.3276 Y223.5426
G1  X20.5879 Y223.0004
G1  X21.1658 Y222.8607
G1  X21.8897 Y223.1407
G1  X22.3659 Y223.7204
G1  X22.5691 Y224.4634
G1  X22.5056 Y225.1809
G1  X22.2072 Y225.6
G1  X21.8643 Y225.7016
G1  X21.5658 Y225.7016
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X24.3471 Y225.3397
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X24.8488 Y225.581
G1  X25.3885 Y225.6635
G1  X25.7632 Y225.4794
G1  X25.8648 Y225.0031
G1  X25.687 Y224.438
G1  X25.2044 Y223.8601
G1  X24.6265 Y223.321
G1  X24.0665 Y222.8607
G1  X24.6075 Y222.8607
G1  X25.5473 Y222.9007
G1  X25.8076 Y222.881
G1  X25.9473 Y222.9007
G1  X26.2267 Y223.0804
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X32.4751 Y232.714
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X31.7766 Y232.7585
G1  X31.2743 Y232.5362
G1  X30.9143 Y231.8949
G1  X30.7743 Y231.0757
G1  X30.7743 Y230.435
G1  X30.8343 Y230.1156
```

```
G1  X31.2146 Y230.4953
G1  X31.7576 Y231.2535
G1  X32.0941 Y231.8187
G1  X32.3545 Y232.3584
G1  X32.4751 Y232.6378
G1  X32.1957 Y231.3932
G1  X32.056 Y230.7773
G1  X32.0116 Y230.435
G1  X31.9735 Y230.0953
G1  X32.3735 Y230.3556
G1  X33.072 Y231.1964
G1  X33.3768 Y231.6155
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X33.3568 Y232.4981
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X33.7369 Y232.8156
G1  X33.9166 Y232.9363
G1  X33.8169 Y232.4537
G1  X33.6969 Y231.6155
G1  X33.5768 Y231.0376
G1  X33.4968 Y230.4953
G1  X33.4568 Y230.1556
G1  X33.4772 Y230.0553
G1  X33.4568 Y230.475
G1  X33.8772 Y231.0567
G1  X34.196 Y231.6726
G1  X34.5579 Y232.1933
G1  X34.9389 Y232.6378
G1  X35.1358 Y232.8728
G1  X35.2374 Y232.8728
G1  X35.2945 Y232.4537
G1  X35.1358 Y231.6726
G1  X34.9961 Y231.0757
G1  X34.8754 Y230.6153
G1  X34.7738 Y230.0353
G1  X35.1358 Y230.3353
G1  X35.6565 Y230.8725
G1  X35.9359 Y231.2726
G1  X36.2153 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X39.2379 Y234.7968
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X38.7553 Y234.7968
G1  X38.3171 Y234.5365
G1  X38.0568 Y234.0983
G1  X37.9171 Y233.4951
G1  X37.8155 Y232.7585
G1  X37.7583 Y232.3584
G1  X37.4535 Y231.7742
G1  X37.0344 Y231.0376
G1  X36.635 Y230.475
G1  X36.2153 Y230.0953
G1  X36.1353 Y230.8344
G1  X36.2353 Y231.7171
G1  X36.4756 Y232.2759
G1  X36.6756 Y232.5553
G1  X36.9773 Y232.714
G1  X37.2948 Y232.7966
G1  X37.6123 Y232.7585
G1  X37.7583 Y232.5934
G1  X37.6758 Y231.8568
G1  X37.5932 Y230.9741
G1  X37.4154 Y230.0553
G1  X37.8726 Y230.4153
G1  X38.4124 Y231.0757
G1  X38.8378 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X40.9994 Y232.4537
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X41.3194 Y232.7585
```

```
G1  X41.4794 Y232.8347
G1  X41.1991 Y231.1583
G1  X41.0787 Y230.5753
G1  X41.0787 Y230.0953
G1  X41.5588 Y230.5156
G1  X41.9366 Y230.936
G1  X42.4764 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X44.1147 Y232.7775
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X43.74 Y232.9553
G1  X43.4162 Y232.8982
G1  X43.0987 Y232.6569
G1  X42.9774 Y232.3584
G1  X43.0987 Y231.9774
G1  X43.3971 Y231.6155
G1  X43.6575 Y231.2535
G1  X43.8162 Y230.8979
G1  X43.7972 Y230.5753
G1  X43.5559 Y230.275
G1  X43.2193 Y230.0753
G1  X42.9374 Y229.9953
G1  X42.5773 Y230.1556
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X41.6388 Y234.0539
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X41.6388 Y233.7173
G1  X41.5791 Y233.6538
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X46.8969 Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X47.3373 Y231.6536
G1  X47.8802 Y232.1933
G1  X48.0771 Y232.4727
G1  X48.1342 Y232.7775
G1  X48.0199 Y232.8982
G1  X47.7596 Y232.9172
G1  X47.3373 Y232.6378
G1  X47.0166 Y232.1743
G1  X46.8369 Y231.4948
G1  X46.7569 Y230.9551
G1  X46.8569 Y230.5156
G1  X47.0769 Y230.1956
G1  X47.277 Y229.9953
G1  X47.9564 Y230.6947
G1  X48.3946 Y231.1964
G1  X48.6994 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X49.0988 Y232.5172
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X49.4169 Y232.7775
G1  X49.6773 Y232.9172
G1  X50.598 Y230.0553
G1  X50.9155 Y230.235
G1  X51.1187 Y230.475
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
```

```
G1 F10000
G1  X51.4362 Y231.0757
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X51.4962 Y231.1138
G1  X51.6763 Y231.7361
G1  X52.0966 Y232.314
G1  X52.4776 Y232.714
G1  X52.6935 Y232.8728
G1  X52.7951 Y232.314
G1  X52.7761 Y231.7361
G1  X52.6364 Y231.1138
G1  X52.4395 Y230.5753
G1  X52.1982 Y230.235
G1  X51.8763 Y230.1156
G1  X51.6166 Y230.1556
G1  X51.4562 Y230.275
G1  X51.2959 Y230.5353
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X51.1562 Y232.5362
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X51.6559 Y232.8982
G1  X51.1365 Y229.4952
G1  X50.9765 Y228.9929
G1  X50.3758 Y228.5738
G1  X51.4962 Y229.1771
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X48.8988 Y230.1156
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X49.1985 Y230.1556
G1  X49.3598 Y230.2953
G1  X49.5757 Y230.5753
G1  X50.3186 Y231.7552
G1  X50.7568 Y232.5743
G1  X50.979 Y232.7775
G1  X51.2965 Y232.8347
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X53.2977 Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X53.7381 Y231.6536
G1  X54.281 Y232.1933
G1  X54.4779 Y232.4727
G1  X54.535 Y232.7775
G1  X54.4207 Y232.8982
G1  X54.1604 Y232.9172
G1  X53.7381 Y232.6378
G1  X53.4174 Y232.1743
G1  X53.2377 Y231.4948
G1  X53.1577 Y230.9551
G1  X53.2577 Y230.5156
G1  X53.4777 Y230.1956
G1  X53.6778 Y229.9953
G1  X54.3572 Y230.6947
G1  X54.7954 Y231.1964
G1  X55.1002 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X56.6369 Y232.7775
G4
P0.10000000149011612
M03 S0
G4
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P0.10000000149011612
G1 F15000.000000
G1  X56.3765 Y232.9172
G1  X55.9574 Y232.8347
G1  X55.4996 Y232.333
G1  X108.3576
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X110.5573
Y232.4537
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X110.8773
Y232.7585
G1  X111.0373
Y232.8347
G1  X110.757 Y231.1583
G1  X110.6366
Y230.5753
G1  X110.6366
Y230.0953
G1  X111.1167
Y230.5156
G1  X111.4945 Y230.936
G1  X112.0343
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X112.3549
Y230.0353
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X112.435 Y230.0353
G1  X112.7963
Y230.2153
G1  X113.1328
Y230.5957
G1  X113.4376
Y231.1583
G1  X113.5964
Y231.7361
G1  X113.5583
Y232.2949
G1  X113.3741
Y232.5934
G1  X113.2344
Y232.8728
G1  X112.635 Y232.5934
G1  X112.2552
Y232.0981
G1  X111.9952
Y231.5329
G1  X111.9552
Y231.0376
G1  X112.0352
Y230.5353
G1  X112.1549
Y230.2953
G1  X112.3549
Y230.0353
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X113.9955
Y232.4981
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X114.3755
Y232.8156
G1  X114.5552
Y232.9363
G1  X114.4555
Y232.4537
G1  X114.3355
Y231.6155
G1  X114.2155
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Y231.0376
G1  X114.1355
Y230.4953
G1  X114.0955
Y230.1556
G1  X114.1158
Y230.0553
G1  X114.0955 Y230.475
G1  X114.5158
Y231.0567
G1  X114.8346
Y231.6726
G1  X115.1966
Y232.1933
G1  X115.5776
Y232.6378
G1  X115.7744
Y232.8728
G1  X115.876 Y232.8728
G1  X115.9332
Y232.4537
G1  X115.7744
Y231.6726
G1  X115.6347
Y231.0757
G1  X115.5141
Y230.6153
G1  X115.4125
Y230.0353
G1  X115.7744
Y230.3353
G1  X116.2951
Y230.8725
G1  X116.5745
Y231.2726
G1  X116.8539
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X119.0345
Y232.4537
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X119.3546
Y232.7585
G1  X119.5146
Y232.8347
G1  X119.2342
Y231.1583
G1  X119.1139
Y230.5753
G1  X119.1139
Y230.0953
G1  X119.5939
Y230.5156
G1  X119.9718 Y230.936
G1  X120.5115
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X120.4725
Y232.4981
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X120.8525
Y232.8156
G1  X121.0322
Y232.9363
G1  X120.9325
Y232.4537
G1  X120.8125
Y231.6155
G1  X120.6925
Y231.0376
G1  X120.6125
Y230.4953
G1  X120.5725
Y230.1556
G1  X120.5928
Y230.0553
G1  X120.5725 Y230.475
G1  X120.9929
Y231.0567
G1  X121.3116
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Y231.6726
G1  X121.6736
Y232.1933
G1  X122.0546
Y232.6378
G1  X122.2514
Y232.8728
G1  X122.353 Y232.8728
G1  X122.4102
Y232.4537
G1  X122.2514
Y231.6726
G1  X122.1117
Y231.0757
G1  X121.9911
Y230.6153
G1  X121.8895
Y230.0353
G1  X122.2514
Y230.3353
G1  X122.7721
Y230.8725
G1  X123.0515
Y231.2726
G1  X123.3309
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X125.4112
Y232.4727
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X125.7712
Y232.7775
G1  X125.9712
Y232.9172
G1  X125.7712
Y231.8377
G1  X125.6112
Y230.8535
G1  X125.5909
Y230.3753
G1  X125.5909
Y230.1753
G1  X125.7712
Y230.8154
G1  X126.0513
Y231.4377
G1  X126.2913
Y232.0727
G1  X126.5885
Y232.5743
G1  X126.7536
Y232.7775
G1  X126.9695
Y232.8728
G1  X127.2298
Y232.8537
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X128.4528
Y232.4981
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X128.4732
Y232.4981
G1  X128.7335
Y232.7775
G1  X129.0132
Y232.9172
G1  X129.0732
Y230.7582
G1  X129.1336
Y230.2153
G1  X129.4333
Y230.5753
G1  X129.7508
Y231.1583
G1  X130.0365
Y231.8377
G1  X130.1508
Y232.2124
G1  X130.2334
Y232.9172
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G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X130.6534
Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X131.0938
Y231.6536
G1  X131.6367
Y232.1933
G1  X131.8336
Y232.4727
G1  X131.8907
Y232.7775
G1  X131.7764
Y232.8982
G1  X131.5161
Y232.9172
G1  X131.0938
Y232.6378
G1  X130.7731
Y232.1743
G1  X130.5934
Y231.4948
G1  X130.5134
Y230.9551
G1  X130.6134
Y230.5156
G1  X130.8334
Y230.1956
G1  X131.0335
Y229.9953
G1  X131.7129
Y230.6947
G1  X132.1511
Y231.1964
G1  X132.4559
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X132.4549
Y232.4981
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X132.835 Y232.8156
G1  X133.0147
Y232.9363
G1  X132.915 Y232.4537
G1  X132.795 Y231.6155
G1  X132.6749
Y231.0376
G1  X132.5949
Y230.4953
G1  X132.5549
Y230.1556
G1  X132.5753
Y230.0553
G1  X132.5549 Y230.475
G1  X132.9753
Y231.0567
G1  X133.2941
Y231.6726
G1  X133.656 Y232.1933
G1  X134.037 Y232.6378
G1  X134.2339
Y232.8728
G1  X134.3355
Y232.8728
G1  X134.3926
Y232.4537
G1  X134.2339
Y231.6726
G1  X134.0942
Y231.0757
G1  X133.9735
Y230.6153
G1  X133.8719
Y230.0353
G1  X134.2339
Y230.3353
G1  X134.7546
Y230.8725
G1  X135.034 Y231.2726
G1  X135.3134
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Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X135.0137
Y232.5362
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X135.4334
Y232.8347
G1  X135.5534
Y232.9172
G1  X135.3734
Y232.1171
G1  X135.2934
Y231.3551
G1  X135.2334
Y230.8979
G1  X135.2334 Y230.315
G1  X135.2334
Y230.0953
G1  X135.5737
Y230.4153
G1  X136.0309
Y231.0186
G1  X136.3357
Y231.5774
G1  X136.6532
Y232.2124
G1  X136.9326
Y232.8537
G1  X136.7358
Y232.0536
G1  X136.5707
Y231.2345
G1  X136.4754
Y230.5557
G1  X136.431 Y230.0753
G1  X136.9136 Y230.475
G1  X137.3708
Y231.0376
G1  X137.8343
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X137.8353
Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X138.2756
Y231.6536
G1  X138.8186
Y232.1933
G1  X139.0154
Y232.4727
G1  X139.0726
Y232.7775
G1  X138.9583
Y232.8982
G1  X138.6979
Y232.9172
G1  X138.2756
Y232.6378
G1  X137.955 Y232.1743
G1  X137.7753
Y231.4948
G1  X137.6953
Y230.9551
G1  X137.7953
Y230.5156
G1  X138.0153
Y230.1956
G1  X138.2153
Y229.9953
G1  X138.8948
Y230.6947
G1  X139.3329
Y231.1964
G1  X139.6377
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
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G1 F10000
G1  X141.3141
Y232.7775
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X140.9395
Y232.9553
G1  X140.6156
Y232.8982
G1  X140.2981
Y232.6569
G1  X140.1768
Y232.3584
G1  X140.2981
Y231.9774
G1  X140.5966
Y231.6155
G1  X140.8569
Y231.2535
G1  X141.0157
Y230.8979
G1  X140.9966
Y230.5753
G1  X140.7553 Y230.275
G1  X140.4188
Y230.0753
G1  X140.1368
Y229.9953
G1  X139.7768
Y230.1556
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X146.1757
Y232.5362
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X146.236 Y232.5553
G1  X146.5357
Y232.7775
G1  X146.7357
Y232.9172
G1  X146.5357
Y231.7933
G1  X146.4157
Y230.7773
G1  X146.4757
Y230.1556
G1  X146.9758
Y230.6947
G1  X147.3974
Y231.3551
G1  X147.6959
Y231.9139
G1  X148.0959
Y232.8156
G1  X147.8927
Y231.8758
G1  X147.7149
Y230.5353
G1  X147.5562
Y229.6552
G1  X147.3784
Y229.2533
G1  X147.1371
Y229.0374
G1  X146.7758
Y228.9167
G1  X146.1154
Y228.9739
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X145.6766
Y234.8349
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X145.1368
Y234.7778
G1  X144.6364
Y234.3587
G1  X144.3964
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Y233.8126
G1  X144.0964
Y231.1964
G1  X144.0164
Y230.6153
G1  X143.976 Y230.2953
G1  X144.0564
Y230.0353
G1  X144.4567
Y230.0953
G1  X145.0987
Y230.5353
G1  X145.4162
Y231.2345
G1  X145.5559
Y231.8568
G1  X145.575 Y232.3965
G1  X145.5369
Y232.8347
G1  X144.9971
Y232.2949
G1  X144.4364
Y231.4948
G1  X144.0364 Y230.635
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X150.8798
Y233.2157
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X150.8594
Y232.8347
G1  X150.3997
Y232.7966
G1  X150.8594
Y232.8537
G1  X151.7027
Y232.8728
G1  X150.8594
Y232.8537
G1  X150.7394
Y231.7552
G1  X150.6194
Y231.0186
G1  X150.4994
Y230.5753
G1  X150.3591
Y230.0353
G1  X150.8194
Y230.4153
G1  X151.3979
Y231.0567
G1  X151.817 Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X154.4024
Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X154.8428
Y231.6536
G1  X155.3857
Y232.1933
G1  X155.5826
Y232.4727
G1  X155.6397
Y232.7775
G1  X155.5254
Y232.8982
G1  X155.2651
Y232.9172
G1  X154.8428
Y232.6378
G1  X154.5221
Y232.1743
G1  X154.3424
Y231.4948
G1  X154.2624
Y230.9551
G1  X154.3624
Y230.5156
G1  X154.5824
Y230.1956
G1  X154.7825
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Y229.9953
G1  X155.4619
Y230.6947
G1  X155.9001
Y231.1964
G1  X156.2049
Y231.6345
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X158.3042
Y232.5362
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X158.3645
Y232.5553
G1  X158.6642
Y232.7775
G1  X158.8643
Y232.9172
G1  X158.6642
Y231.7933
G1  X158.5442
Y230.7773
G1  X158.6042
Y230.1556
G1  X159.1043
Y230.6947
G1  X159.5259
Y231.3551
G1  X159.8244
Y231.9139
G1  X160.2244
Y232.8156
G1  X160.0212
Y231.8758
G1  X159.8434
Y230.5353
G1  X159.6847
Y229.6552
G1  X159.5069
Y229.2533
G1  X159.2656
Y229.0374
G1  X158.9043
Y228.9167
G1  X158.2439
Y228.9739
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X160.4476
Y231.3742
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X160.888 Y231.6536
G1  X161.4309
Y232.1933
G1  X161.6278
Y232.4727
G1  X161.6849
Y232.7775
G1  X161.5706
Y232.8982
G1  X161.3103
Y232.9172
G1  X160.888 Y232.6378
G1  X160.5673
Y232.1743
G1  X160.3876
Y231.4948
G1  X160.3076
Y230.9551
G1  X160.4076
Y230.5156
G1  X160.6276
Y230.1956
G1  X160.8277
Y229.9953
G1  X161.5071
Y230.6947
G1  X161.9453
Y231.1964
G1  X162.2501
Y231.6345
G4
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P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X163.99 Y232.714
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X163.2915
Y232.7585
G1  X162.7892
Y232.5362
G1  X162.4291
Y231.8949
G1  X162.2891
Y231.0757
G1  X162.2891 Y230.435
G1  X162.3491
Y230.1156
G1  X162.7295
Y230.4953
G1  X163.2724
Y231.2535
G1  X163.609 Y231.8187
G1  X163.8693
Y232.3584
G1  X163.99 Y232.6378
G1  X163.7106
Y231.3932
G1  X163.5709
Y230.7773
G1  X163.5264 Y230.435
G1  X163.4883
Y230.0953
G1  X163.8884
Y230.3556
G1  X164.5869
Y231.1964
G1  X164.8917
Y231.6155
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X164.5716
Y232.4727
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X164.9317
Y232.7775
G1  X165.1317
Y232.9172
G1  X164.9317
Y231.8377
G1  X164.7717
Y230.8535
G1  X164.7513
Y230.3753
G1  X164.7513
Y230.1753
G1  X164.9317
Y230.8154
G1  X165.2117
Y231.4377
G1  X165.4517
Y232.0727
G1  X165.7489
Y232.5743
G1  X165.914 Y232.7775
G1  X166.1299
Y232.8728
G1  X166.3903
Y232.8537
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X162.5876
Y238.7357
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X163.0279
Y239.0151
G1  X163.5709
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Y239.5549
G1  X163.7677
Y239.8343
G1  X163.8249
Y240.1391
G1  X163.7106
Y240.2597
G1  X163.4502
Y240.2788
G1  X163.0279
Y239.9994
G1  X162.7073
Y239.5358
G1  X162.5276
Y238.8564
G1  X162.4476
Y238.3166
G1  X162.5476
Y237.8772
G1  X162.7676
Y237.5571
G1  X162.9676
Y237.3568
G1  X163.6471
Y238.0563
G1  X164.0852
Y238.5579
G1  X164.39 Y238.9961
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P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X163.7893
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G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X164.3491
Y240.2788
G1  X164.4291
Y240.2153
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Y237.6568
G1  X164.4491
Y237.4968
G1  X164.8288
Y237.9769
G1  X165.1266
Y238.5579
G1  X165.3679
Y239.1993
G1  X165.4886
Y239.4596
G1  X165.7489
Y240.2788
G1  X165.5902 Y240.12
G1  X165.6473
Y237.9769
G1  X165.6918
Y237.5368
G1  X166.0474
Y237.9369
G1  X166.3712
Y238.5389
G1  X166.6316
Y239.1548
G1  X166.7713
Y239.6374
G1  X166.8284
Y240.1391
G1  X166.7903
Y240.2788
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X164.6323
Y245.9703
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X165.0726
Y246.2497
G1  X165.6156
Y246.7895
G1  X165.8124
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Y247.0689
G1  X165.8696
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G1  X165.7553
Y247.4943
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Y247.5134
G1  X165.0726 Y247.234
G1  X164.752 Y246.7704
G1  X164.5723 Y246.091
G1  X164.4923
Y245.5512
G1  X164.5923
Y245.1118
G1  X164.8123
Y244.7918
G1  X165.0123
Y244.5914
G1  X165.6918
Y245.2909
G1  X166.1299
Y245.7925
G1  X166.4347
Y246.2307
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X164.9933 Y249.393
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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Y249.4501
G1  X164.2313
Y249.2723
G1  X163.8331
Y248.7897
G1  X163.6928
Y248.1928
G1  X163.2527
Y245.2909
G1  X163.193 Y244.6314
G1  X163.6731
Y245.0515
G1  X164.2948
Y245.7925
G1  X164.6123
Y246.2307
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X162.5739
Y249.4311
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X162.0342
Y249.3739
G1  X161.5338
Y248.9548
G1  X161.2938
Y248.4087
G1  X160.9937
Y245.7925
G1  X160.9137
Y245.2115
G1  X160.8734
Y244.8915
G1  X160.9537
Y244.6314
G1  X161.3541
Y244.6914
G1  X161.9961
Y245.1315
G1  X162.3136
Y245.8306
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Y246.4529
G1  X162.4723
Y246.9927
G1  X162.4342
Y247.4308
G1  X161.8945
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G1  X161.3338 Y246.091
G1  X160.9337
Y245.2312
G4
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P0.10000000149011612
G1 F10000
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Y247.0498
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X159.8358
Y247.3546
G1  X159.9958
Y247.4308
G1  X159.7155
Y245.7544
G1  X159.5951
Y245.1715
G1  X159.5951
Y244.6914
G1  X160.0752
Y245.1118
G1  X160.453 Y245.5322
G1  X160.9928
Y246.2307
G4
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M03 S80
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P0.10000000149011612
G1 F10000
G1  X159.3735
Y247.3737
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X158.675 Y247.4943
G1  X158.3575 Y247.253
G1  X158.2362
Y246.9546
G1  X158.3575
Y246.5736
G1  X158.656 Y246.2116
G1  X158.9163
Y245.8497
G1  X159.0751
Y245.4941
G1  X159.056 Y245.1715
G1  X158.8147
Y244.8711
G1  X158.4782
Y244.6714
G1  X158.1962
Y244.5914
G1  X157.8362
Y244.7518
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X157.3542
Y247.3737
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X156.6557
Y247.4943
G1  X156.3382 Y247.253
G1  X156.2169
Y246.9546
G1  X156.3382
Y246.5736
G1  X156.6367
Y246.2116
G1  X156.897 Y245.8497
G1  X157.0558
Y245.4941
G1  X157.0367
Y245.1715
G1  X156.7954
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G1  X156.4589
Y244.6714
G1  X156.1769
Y244.5914
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Y244.7518
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X154.7952
Y247.3102
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X154.0967
Y247.3546
G1  X153.5944
Y247.1324
G1  X153.2343 Y246.491
G1  X153.0943
Y245.6719
G1  X153.0943
Y245.0312
G1  X153.1543
Y244.7118
G1  X153.5347
Y245.0915
G1  X154.0776
Y245.8497
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Y246.4148
G1  X154.6745
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G1  X154.3761
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Y245.0312
G1  X154.2935
Y244.6914
G1  X154.6936
Y244.9518
G1  X155.3921
Y245.7925
G1  X155.6969
Y246.2116
G4
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X151.2328
Y245.6719
G4
P0.10000000149011612
M03 S0
G4
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G1 F15000.000000
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G1  X151.4728
Y246.3323
G1  X151.8932
Y246.9101
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Y247.3102
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Y247.4689
G1  X152.5917
Y246.9101
G1  X152.5727
Y246.3323
G1 F10000
G1  X45.5053 Y240.0756
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X44.3045 Y239.8978
G1  X43.9445 Y239.2564
G1  X43.8045 Y238.4373
G1  X43.8045 Y237.7965
G1  X43.8645 Y237.4771
G1  X44.2448 Y237.8569
G1  X44.7878 Y238.6151
G1  X45.1243 Y239.1802
G1  X45.3847 Y239.72
G1  X45.5053 Y239.9994
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G1  X45.0862 Y238.1388
G1  X45.0418 Y237.7965
G1  X45.0037 Y237.4568
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G1  X46.1022 Y238.5579
G1  X46.407 Y238.977
G4
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X41.8033 Y242.1584
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X41.3207 Y242.1584
G1  X40.8825 Y241.898
G1  X40.6222 Y241.4599
G1  X40.4825 Y240.8566
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G1  X40.3237 Y239.72
G1  X40.0189 Y239.1358
G1  X39.5998 Y238.3992
G1  X39.2004 Y237.8365
G1  X38.7807 Y237.4568
G1  X38.7007 Y238.196
G1  X38.8007 Y239.0786
G1  X39.041 Y239.6374
G1  X39.241 Y239.9168
G1  X39.5427 Y240.0756
G1  X39.8602 Y240.1581
G1  X40.1777 Y240.12
G1  X40.3237 Y239.9549
G1  X40.2412 Y239.2183
G1  X40.1586 Y238.3357
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G1  X40.438 Y237.7769
G1  X40.9778 Y238.4373
G1  X41.4032 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X36.9592 Y238.7357
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X37.3995 Y239.0151
G1  X37.9425 Y239.5549
G1  X38.1393 Y239.8343
G1  X38.1965 Y240.1391
G1  X38.0822 Y240.2597
G1  X37.8218 Y240.2788
G1  X37.3995 Y239.9994
G1  X37.0789 Y239.5358
G1  X36.8992 Y238.8564
G1  X36.8192 Y238.3166
G1  X36.9192 Y237.8772
G1  X37.1392 Y237.5571
G1  X37.3392 Y237.3568
G1  X38.0187 Y238.0563
G1  X38.4568 Y238.5579
G1  X38.7616 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X35.9803 Y242.1965
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X35.5612 Y242.1965
G1  X35.1802 Y242.0187
G1  X34.7579 Y241.4599
G1  X34.6583 Y240.8376
G1  X34.5382 Y240.0756
G1  X34.4182 Y239.1548
G1  X34.3179 Y238.4182
G1  X34.1585 Y237.5171
G1  X34.4782 Y238.2595
G1  X34.9383 Y239.0596
G1  X35.3961 Y239.72
G1  X35.7581 Y240.0946
G1  X35.9168 Y240.1391
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G1  X35.6374 Y238.2595
G1  X35.5358 Y237.8169
G1  X35.4787 Y237.3768
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G1  X36.9201 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X33.9737 Y240.1391
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X33.7134 Y240.2788
G1  X33.2943 Y240.1962
G1  X32.8364 Y239.6946
G1  X32.6561 Y239.2945
G1  X32.4961 Y238.8754
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G1  X32.6561 Y237.5965
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G1  X33.3959 Y237.7572
G1  X33.8975 Y238.2976
G1  X34.4182 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X31.5544 Y240.0756
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X30.3536 Y239.8978
G1  X29.9935 Y239.2564
G1  X29.8535 Y238.4373
G1  X29.8535 Y237.7965
G1  X29.9135 Y237.4771
G1  X30.2939 Y237.8569
G1  X30.8368 Y238.6151
G1  X31.1734 Y239.1802
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G1  X31.5544 Y239.9994
G1  X31.275 Y238.7548
G1  X31.1353 Y238.1388
G1  X31.0908 Y237.7965
G1  X31.0527 Y237.4568
G1  X31.4528 Y237.7172
G1  X32.1513 Y238.5579
G1  X32.4561 Y238.977
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P0.10000000149011612
M03 S80
G4
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G1 F10000
G1  X28.012 Y238.7357
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X28.9953 Y239.5549
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G1  X29.135 Y240.2597
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G1  X28.1317 Y239.5358
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G1  X27.872 Y238.3166
G1  X27.972 Y237.8772
G1  X28.192 Y237.5571
G1  X28.3921 Y237.3568
G1  X29.0715 Y238.0563
G1  X29.5097 Y238.5579
G1  X29.8145 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X26.2115 Y239.8343
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
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G1  X26.7716 Y240.2788
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G1  X26.4115 Y238.215
G1  X26.3912 Y237.7369
G1  X26.3912 Y237.5368
G1  X26.5715 Y238.1769
G1  X26.8516 Y238.7992
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G1  X27.5539 Y240.1391
G1  X27.7698 Y240.2343
G1  X28.0301 Y240.2153
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X24.5503 Y242.1584
G4
P0.10000000149011612
M03 S0
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G1 F15000.000000
G1  X24.0677 Y242.1584
G1  X23.6296 Y241.898
G1  X23.3692 Y241.4599
G1  X23.2295 Y240.8566
G1  X23.1279 Y240.12
G1  X23.0708 Y239.72
G1  X22.766 Y239.1358
G1  X22.3469 Y238.3992
G1  X21.9475 Y237.8365
G1  X21.5277 Y237.4568
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G1  X22.6072 Y240.1581
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G1  X23.0708 Y239.9549
G1  X22.9882 Y239.2183
G1  X22.9057 Y238.3357
G1  X22.7279 Y237.4168
G1  X23.1851 Y237.7769
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G1  X24.1503 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
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G1 F10000
G1  X18.6693 Y239.8597
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X19.229 Y240.2978
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G1  X18.8893 Y238.3992
G1  X18.8093 Y237.8569
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G1  X19.8704 Y239.5549
G1  X20.2514 Y239.9994
G1  X20.4482 Y240.2343
G1  X20.5498 Y240.2343
G1  X20.607 Y239.8152
G1  X20.4482 Y239.0342
G1  X20.3085 Y238.4373
G1  X20.1879 Y237.9769
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G1  X20.4482 Y237.6968
G1  X20.9689 Y238.2341
G1  X21.2483 Y238.6341
G1  X21.5277 Y238.9961
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X17.7876 Y240.0756
G4
P0.10000000149011612
M03 S0
G4
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G1  X16.0867 Y237.7965
G1  X16.1467 Y237.4771
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G1  X17.4066 Y239.1802
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G1  X18.3845 Y238.5579
G1  X18.6893 Y238.977
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M03 S80
G4
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G1 F10000
G1  X16.1867 Y244.6714
G4
P0.10000000149011612
M03 S0
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P0.10000000149011612
G1 F15000.000000
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G1  X17.0256 Y244.8115
G1  X17.3685 Y245.1315
G1  X19.4068 Y248.8151
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G1  X17.6288 Y248.5548
G1  X17.2288 Y248.1103
G1  X17.0891 Y247.6912
G1  X17.0446 Y247.1895
G4
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X19.4894 Y248.8342
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
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G1  X18.1241 Y246.4148
G1  X19.4068 Y246.4148
G1  X19.4259 Y245.4306
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G1  X20.2895 Y244.8711
G4
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M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X20.6298 Y247.1133
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P0.10000000149011612
M03 S0
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P0.10000000149011612
G1 F15000.000000
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G1  X21.0299 Y246.7323
G1  X20.8899 Y245.8941
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G1  X23.293 Y247.234
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G1  X23.7121 Y247.3737
G1  X23.5089 Y246.3513
G1  X23.3121 Y245.5131
G1  X23.2105 Y244.9918
G1  X23.1914 Y244.6314
G1  X23.7502 Y245.1118
```

```
G1  X24.2074 Y245.6719
G1  X24.6075 Y246.2307
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X26.3283 Y247.3102
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X25.6298 Y247.3546
G1  X25.1275 Y247.1324
G1  X24.7675 Y246.491
G1  X24.6275 Y245.6719
G1  X24.6275 Y245.0312
G1  X24.6875 Y244.7118
G1  X25.0678 Y245.0915
G1  X25.6108 Y245.8497
G1  X25.9473 Y246.4148
G1  X26.2077 Y246.9546
G1  X26.3283 Y247.234
G1  X26.0489 Y245.9894
G1  X25.9092 Y245.3734
G1  X25.8648 Y245.0312
G1  X25.8267 Y244.6914
G1  X26.2267 Y244.9518
G1  X26.9252 Y245.7925
G1  X27.23 Y246.2116
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X27.7901 Y247.0943
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X28.2079 Y247.3737
G1  X28.4683 Y247.4118
G1  X28.989 Y247.3546
G1  X29.3509 Y247.3546
G1  X27.4701 Y244.6514
G1  X27.8714 Y244.8115
G1  X28.3921 Y244.7714
G1  X28.9318 Y244.6714
G1  X29.1477 Y244.6314
G1  X29.4081 Y244.8311
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X30.0526 Y244.6314
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X30.1326 Y244.6314
G1  X30.4939 Y244.8115
G1  X30.8305 Y245.1918
G1  X31.1353 Y245.7544
G1  X31.294 Y246.3323
G1  X31.2559 Y246.8911
G1  X31.0718 Y247.1895
G1  X30.9321 Y247.4689
G1  X30.3326 Y247.1895
G1  X29.9529 Y246.6942
G1  X29.6929 Y246.1291
G1  X29.6529 Y245.6338
G1  X29.7329 Y245.1315

G1  X29.8526 Y244.8915
G1  X30.0526 Y244.6314
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X31.6931 Y247.0943
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X32.0732 Y247.4118
G1  X32.2529 Y247.5324
```

```
G1  X32.1532 Y247.0498
G1  X32.0332 Y246.2116
G1  X31.9131 Y245.6338
G1  X31.8331 Y245.0915
G1  X31.7931 Y244.7518
G1  X31.8135 Y244.6514
G1  X31.7931 Y245.0712
G1  X32.2135 Y245.6528
G1  X32.5323 Y246.2688
G1  X32.8942 Y246.7895
G1  X33.2752 Y247.234
G1  X33.4721 Y247.4689
G1  X33.5737 Y247.4689
G1  X33.6308 Y247.0498
G1  X33.4721 Y246.2688
G1  X33.3324 Y245.6719
G1  X33.2117 Y245.2115
G1  X33.1101 Y244.6314
G1  X33.4721 Y244.9315
G1  X33.9928 Y245.4687
G1  X34.2722 Y245.8687
G1  X34.5516 Y246.2307
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X35.7708 Y244.6314
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X35.4533 Y244.9518
G1  X35.6692 Y245.1918
G1  X35.974 Y244.8711
G1  X35.7898 Y244.4311
G1  X35.4914 Y243.9701
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X39.6722 Y247.8118
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X39.6519 Y247.4308
G1  X39.1922 Y247.3927
G1  X39.6519 Y247.4499
G1  X40.4952 Y247.4689
G1  X39.6519 Y247.4499
G1  X39.5319 Y246.3513
G1  X39.4119 Y245.6147
G1  X39.2918 Y245.1715
G1  X39.1515 Y244.6314
G1  X39.6119 Y245.0115
G1  X40.1904 Y245.6528
G1  X40.6095 Y246.2307
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X43.1949 Y245.9703
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X43.6352 Y246.2497
G1  X44.1782 Y246.7895
G1  X44.375 Y247.0689
G1  X44.4322 Y247.3737
G1  X44.3179 Y247.4943
G1  X44.0575 Y247.5134
G1  X43.6352 Y247.234
G1  X43.3146 Y246.7704
G1  X43.1349 Y246.091
G1  X43.0549 Y245.5512
G1  X43.1549 Y245.1118
G1  X43.3749 Y244.7918
G1  X43.5749 Y244.5914
G1  X44.2544 Y245.2909
G1  X44.6925 Y245.7925
G1  X44.9973 Y246.2307
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
```

```
G1  X47.0966 Y247.1133
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X47.597 Y247.4943
G1  X47.4967 Y246.7323
G1  X47.3567 Y245.8941
G1  X47.2567 Y245.1715
G1  X47.197 Y244.8115
G1  X47.597 Y245.6909
G1  X47.9971 Y246.472
G1  X48.3755 Y247.0308
G1  X48.6994 Y247.3737
G1  X48.8581 Y247.4308
G1  X48.9597 Y247.3102
G1  X48.8137 Y246.6942
G1  X48.5978 Y245.6147
G1  X48.42 Y244.6714
G1  X48.6168 Y245.329
G1  X48.9597 Y246.0084
G1  X49.4169 Y246.7323
G1  X49.7598 Y247.234
G1  X50.0392 Y247.4499
G1  X50.1789 Y247.3737
G1  X49.9757 Y246.3513
G1  X49.7789 Y245.5131
G1  X49.6773 Y244.9918
G1  X49.6582 Y244.6314
G1  X50.217 Y245.1118
G1  X50.6742 Y245.6719
G1  X51.0743 Y246.2307
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X42.216 Y249.4311
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
```

```
G1 F15000.000000
G1  X41.7969 Y249.4311
G1  X41.4159 Y249.2533
G1  X40.9936 Y248.6945
G1  X40.894 Y248.0722
G1  X40.7739 Y247.3102
G1  X40.6539 Y246.3894
G1  X40.5536 Y245.6528
G1  X40.3942 Y244.7518
G1  X40.7139 Y245.4941
G1  X41.174 Y246.2942
G1  X41.6318 Y246.9546
G1  X41.9938 Y247.3292
G1  X42.1525 Y247.3737
G1  X42.216 Y247.0308
G1  X42.0319 Y246.2307
G1  X41.8731 Y245.4941
G1  X41.7715 Y245.0515
G1  X41.7144 Y244.6114
G1  X42.2922 Y245.1118
G1  X42.8764 Y245.7925
G1  X43.1558 Y246.2307
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1  X160.1552 Y248.65
G4
P0.10000000149011612
M03 S0
G4
P0.10000000149011612
G1 F15000.000000
G1  X160.1552
Y248.3135
G1  X160.0955 Y248.25
G4
P0.10000000149011612
M03 S80
G4
P0.10000000149011612
G1 F10000
G1 X0 Y0
```

CHAPTER - 8

Table I. Cost of Components

S.no	Cost estimation of project		
	Name of material	Number of unit	Cost (Approx.)
1	NEMA 17 Stepper motor	2	700
2	Arduino Uno		400
3	CNC shield board		200
4	A4988 motor driver	2	300
5	Mg995s metal gear servo motor		250
6	12V Adapter		100
7	8mmx300mm Threaded rod	2	400
8	8mmx300mm smooth rod	4	400
9	Bearing 8mm dia	4	160
10	Linear coupling bearing	2	300
11	Miscellaneous		350
	Total		3560

Advantages

1. CNC machines can be utilized constantly, 24 hours a day, with the exception of infrequent maintenance shutdowns.

2. Designs are modified for CNC machines so that hundreds or even thousands of copies can be manufactured of them. Each manufactured item will be very identical to the others.

3. Unlike manual machines, processing machines, and other devices that require professional architects, CNC machines can be managed by those who are less talented or qualified.

4. The CNC machines may be updated by making the product that powers them better.

5. "Virtual programming" enables instruction on how to operate CNC equipment.
The administrator can control the CNC machine using this gadget, which resembles a computer game, on the PC's display.

6. Modern strategy the architect can replicate the design of their ideas through programming. It is imperative that a model or models be created. Time and money are put aside in this.

7. One person can manage several CNC machines due to the fact that customized CNC machines can often be passed on to operate without assistance from anybody else. Only the cutting instruments occasionally need to be replaced.

Disadvantages

As a result of the machine's sluggish performance and excessive heat output, the intensity sink warms up quickly. After the image record has been plotted, a little error might still be present due to the fact that one side of the Y-hub is locked to the moving system while the other end is free to move. Since the Z-hub isn't extremely rigid, it causes a slight vibration.

Applications

1. Brijesh Sondarva's Little CNC/3D Printer, for starters
2. Jonahmarrs' Small CNC Froth Shaper
3. Me zain's Small Arduino CNC
4. CD/DVD Bipolar Engine Driver by Samiran without Microcontroller
5. CNC Plasma Cutting byivanirons | CNC Step Pad Project | CNC Programming
6. Brijesh Sondarya’s L293D driver board for CNC

CHAPTER -9

Result:-

This research suggests a different type of computerized composition device that incorporates optical person recognition. The text will be extracted from the information image using the source code, and it will then be converted to one of the predefined text styles stored on the computer or to the client's handwriting. The removed text totally switched over to the client's text style in the info image, which is a bit of a checked record in the predefined text style "Arial."

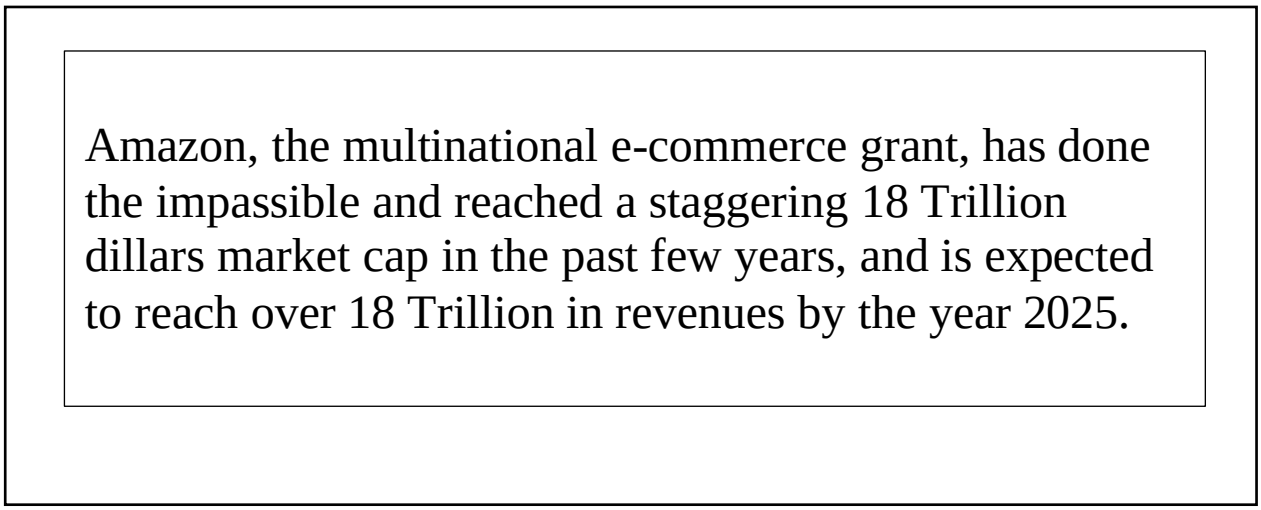


Fig 8.1 Input

A web application is used to help with the textual style change. In this case, the client's sequential information is transferred, and this textual style is worked to.

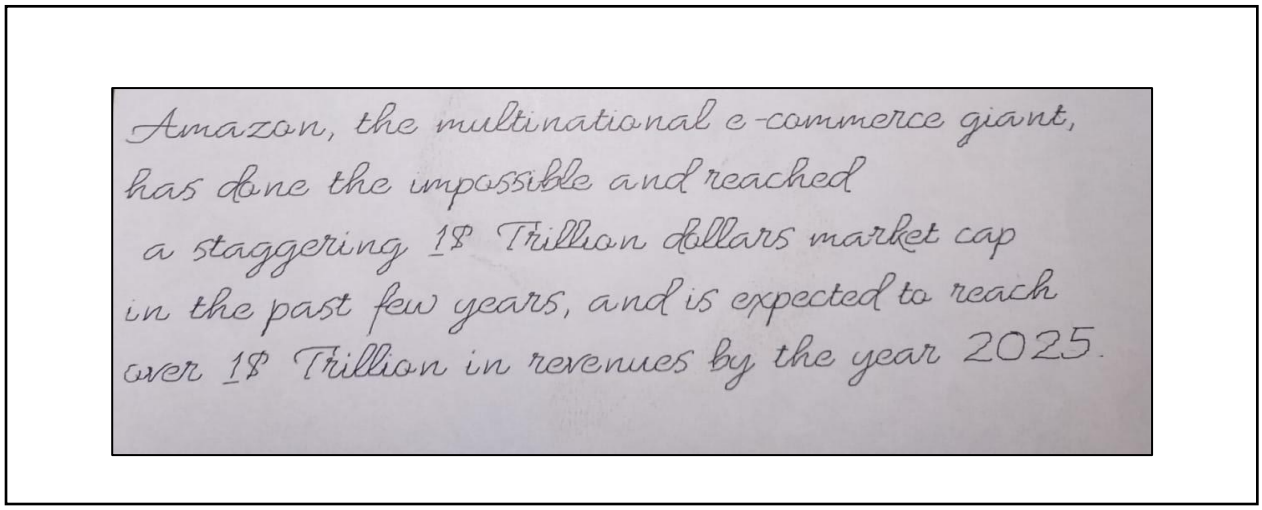
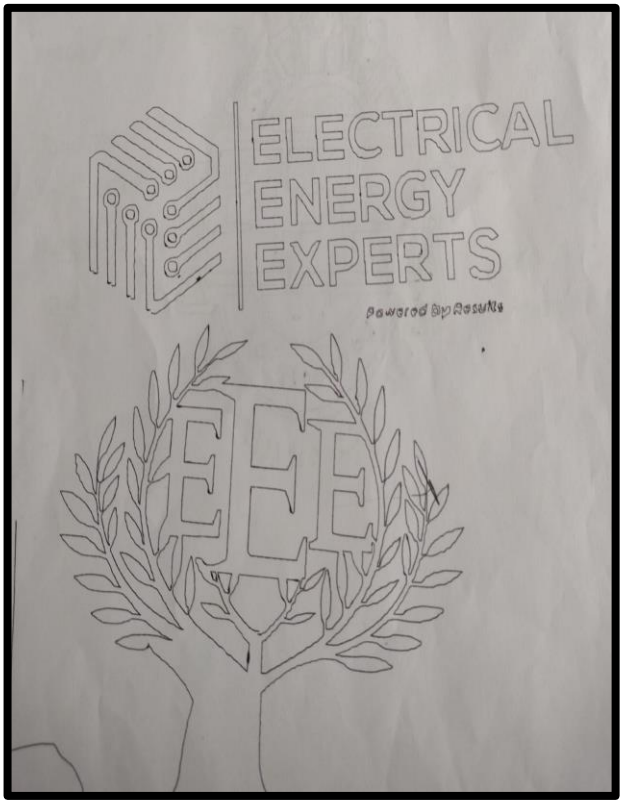


Fig 8.2 Output



Input in predefined Image **Output Image**

The cost of creation is where this framework's primary advantage lies. In order to do an analysis, two comparably priced frameworks are taken into consideration.

Comparison of the proposed system with others

Parameters	**Existing Method**	**Proposed Method**
Cost (Rupees)	8090	6003
Converter	OCR	CNC
Font Converter	Possible	Possible
Weight(KGS)	1	0.88
Speed (WPM)	5-10	5-15
Origin	INDIA	INDIA

It's also important to keep in mind the accuracy of the optical person. Depending on whatever textual style is used, CNC of text in preset textual styles is generally above 95% more accurate than human penmanship. Depending on how sloppy or perfect the person's penmanship is, the CNC's accuracy in the event of human penmanship recognition will vary. The machine's composing speed, which is 13 wpm, is nearly identical to that of the average human (words each moment). One of the project's limitations is that, due to the laser fetching programming used, the final product could only be inscribed in block letters. Maybe, this problem could be solved by using other programming.

Conclusion:-

Humans are increasingly using robots to complete tasks in order to save time, resources, and produce goods that are effective. The fundamental issue with currently available technology, such as speech-to-text converters, printers, and scanners, is that they can only write in computer-predefined typefaces. The suggested system functions as an automatic writing device that may produce text in any specified font or according to the user's handwriting. Software and hardware integration produces a mechanical system that, with minimal human interference, creates an automated writing machine that is user-friendly and economical while also requiring less manual labour and time. In conclusion, the automatic writing machine will be able to help with the problems we face every day and so raise our quality of life.

FUTURE SCOPE

The suggested framework can be used as a benchmark for the majority of upcoming improvements. One such improvement might be to compose more quickly than is now possible. Also, the inclusion of voice-to-message modules in the general framework proposal will benefit people with a range of abilities. Creating a constant framework, where the client can submit the message to be created remotely and the device must be prepared to record it on paper, could be another modification.. By incorporating the use of the web and cloud administrations into the cycle, this can be achieved. A relative who's phone battery may have died and the phone may have turned off might be informed using this unique application. The optical person recognition of the suggested framework isn't currently as accurate for outdated penmanship as it is for established penmanship styles. Consequently, by achieving superior text recognition, the system may be made to read professional advice, which can then be completely translated into the client's language using a language interpretation model.

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