International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 05 Issue 07
March 2018

# Automated Drawing Machine

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**ABSTRACT:**

*Our Project is to Design automated drawing machine with using Arduino unoAT328P and CNC shield, it is capable to design machine mechanical parts and 2d design. This Paper is help to fabrication of automated drawing Machine. In this machine only G codes are used to command or instructions. G codes are language, by using this person Told computer control machine tool. The CNC machine is design given 3d objects in 2d paper. We have also used automated drawing Machine for 3d Printing.*

**Keywords: CNC Shield, Arduino Board, Arduino Drivers, G Codes**

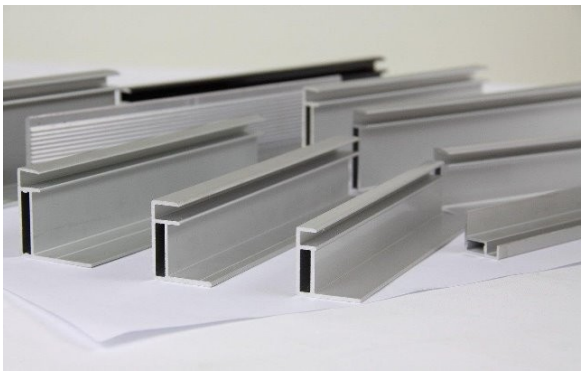
## INTRODUCTION:

A Plotter is a special type of printer that uses a pen to draw images on solid surfaces. In CNC, microprocessor is used which is capable of processing logical instructions interfaced with a computer. The logical instructions are provided by using a computer in the form of code or text or image which is then transformed into a machine language by microprocessor to be executed by the machine. Aautomated drawing machine is a 3D controlled 2D plotting machines which uses a pen to draw text or image on any given solid surface. It can be used for the purposes such as PCB Design, logo design, etc. This project is based on automated drawing machine. With the increasing demand for the use of automated drawing machine in universities and laboratories, a cheap and less complex design is an absolute need. The parts used for the plotter in our project are easily available at a very low price and spare parts are also used. The construction is very simple and robust.

## COMPONENTS USED:

- Aluminum frame
- Arduino Uno 328 p
- Stepper motor
- Servomotor

## ALUMINUM FRAME:



Aluminium and its alloys are vital to the aerospace industry and important in transportation and building industries, such as building facades and window frame. The oxides and sulphates are the most useful compounds of aluminium. Despite its prevalence in the environment, no known form of uses aluminium salts metabolically, but aluminium is well tolerated by plants and animals.Because of these salts' abundance, the potential for a biological rolefor them is of continuing interest, and studies continue.

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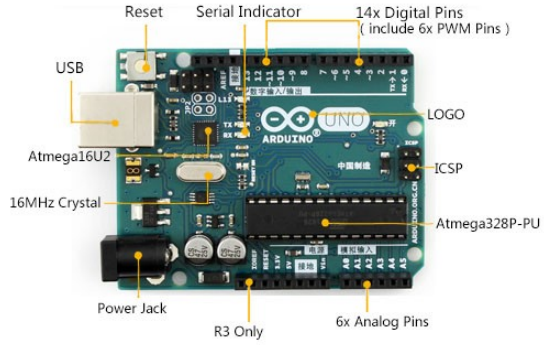
## ARDUINO UNO 328P:

The Arduino Uno is a small microcontroller board based on the ATmega328P which offers control of stepper and servo motors through motor drivers. The Arduino Uno may dump with G codes manually or which generated through Inscape software. The controller converts G codes and send the machine readable instructions to all the components in the sketcher.

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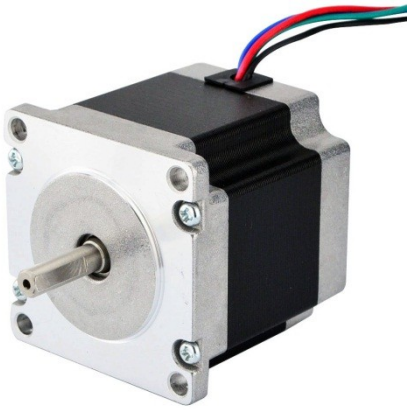
## SERVOMOTOR:

A servo motor shown in figure 4 is used for the movement of sketching pen in up and down inz direction. This will help the CNC 2D sketcher to point the pen in A4 sheet and withdrawingit from the sheet to stop drawing.

## STEPPER MOTOR:

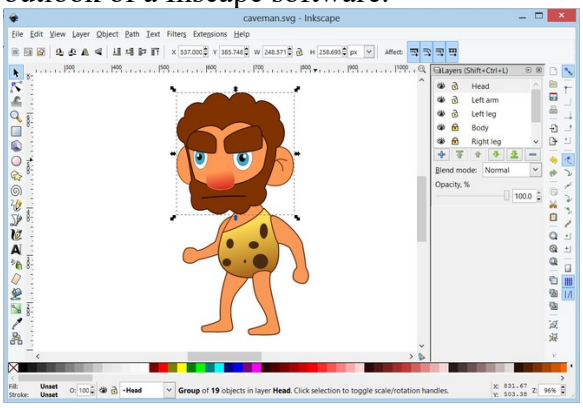


Stepper can be converted digital pulse in to a movement of pen with respect to axis X, Y, Z direction. A stepper motor is a brushless motor that divides a full rotation into a number of equal steps, the stepper motor is known by its property to convert a number of impulses into a defined increment in the shaft position. Each pulses move the shaft through a fixed angle. We have used 3 stepper motors with lead screw. Motor output will be in the form of rotation of lead screw with respect to X, Y, Z Axis. Input current supplied is 12 volts through SMPS.

## DESIGN PROCEDURE

The basic idea for the design of mini CNC machine can be understand from the work which deals with the development of a prototype CNC machine, controlled by a PC interfaced with low cost embedded microcontroller and LABVIEW. The proposed mini CNC 2D sketcher needsthree axes movements of a sketching unit which comprises a sketching pen or pencil. These movements in X and Y axis can be obtained by two stepper motor for precise control over sketching pen for building drawing. The up and down movement of sketching pen in Z axis direction can be controlled by a servo motor. While printing or drawing,

the proper synchronization of all the three axes through stepper motors and servo motor is most exigent task. These movements can be achieved through the G Code which can be programmed manually or generated through software like Inkscape .The proposed mini CNC 2D sketcher has the option of dumping the G Codes into the microcontroller by any one method**.** An open source graphics editing software, Inkscape can be used create or edit vector graphics such as simple sketch, rough line diagrams, logos and difficult paintings. This software converts the loaded image into G codes for the required 2D diagram in to Gerber file which consist of required G code program to be dumped into the microcontroller. The other major advantage of using this software is that the created rough sketch can be further manipulated with due transformations, such as moving, rotating, scaling and skewing as per the need of a customer who needs a building drawing. The outlook of a Inscape software.




**WORKING:**

- Controlled by G-code.
- These are number values and co-ordinates
- G-Code is generated by the computer software
- Then G code is uploaded on the Microcontroller of the CNC machine.
- Then the controller outputs commands to motor and accessories that can repetitively

And extremely accurately cut, design or draw.

**MINI CNC 2D SKETCHER:**

In the development of the proposed CNC 2D sketcher shown in figure 7 is intended for all the basic functions of CNC machine like automatic, precise, and consistent motion control.The automatic sketch pen movement for building drawing or sketch is obtained by processing G code through the microcontroller.The three axes pen movements can be precisely.

Automatically positioned along their lengths of travel by a servo motor and two stepper motors.The motor drivers are used to process the machine language obtained from Microcontroller and in turn run the motors in clockwise or anticlockwise directions so as to achieve the desired pen movement.

An A4 sheet is clamped or pasted using cello tape at the edges of the proposed CNC 2D sketcher table. Then the program in the form G code can be dumped manually or through the generation from Inscape software corresponds to the desired building plan, elevation and other views. Once the G code is dumped into the microcontroller ATmega328P, it process and send the instructions to respective components so as to achieve the desired building drawing.

**LIMITATION:**

The machine runs in a slow pace and generates excess heat which causes the heat sink to be heated quickly. A slight error may remain on the image file after it has been plotted due to one side of the Y-axis fixed to the moving mechanism and the other end is free to move. The Z-axis is not very rigid so it causes slight vibration.

**FUTURE SCOPE:**

The pen of the machine can be replaced by a laser to make it work like a laser engraving or cutting machine. Engraving machine can be used on wood. The pen can also be replaced with a powerful drill so that it can be used for both milling and drilling purposes. The servo can be replaced with a stepper motor and the pen with a 3-D pen to make it a 3-D printer which can print objects with dimensions. By extrapolation of the axes, the working area of the machine can be extended keeping the algorithm unaltered.

**CONCLUSION:**

In this paper we have used concept of low cost automated drawing machine, which is easily control with computer and suddenly stop and paused by click action on computer. By using this we have make Difficult and Complex Design in paper. This is small machine which is easily Transportable and Assembled everywhere on Requirement of it. Bed Size of this machine is 50X50mm. Stepper Motor will be run on in this criteria of bed size. If we have increase the size or length of lead screw, it will be free to make big size of design in paper. We have used G codes to giving command. G-codes are language to give the command to the machine to move right, left or up and down. On the successful work of this machine we have some change on it and make it commercial used and applying tools for cutting, grinding of soft material etc.

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