

# Microcontroller based Two Axis CNC Printer

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**Abstract:** *This paper examines the outline viewpoints and mach inability investigation of low cost CNC machine cum engraver which is fit for 2-axis synchronous operation with less complexity. The lower cost is accomplished by interfacing standard PC with micro controller based CNC framework in an Arduino based embedded system. After the completion of machining, experimental trials to define machining parameters were held. The purpose of the Self-Guided CNC project is to construct a functional CNC type machine capable of tracking lines on and object to guide the armature in cutting the piece correctly. The device would be capable of functioning independent of off-board computers for both operation and determining cutting paths. The goal is not only high-precision cuts but also design and plot.*

**Keywords:** 2 axis; printer; portable; Arduino

## I. INTRODUCTION

With the advancement of technology, demand for Computer Numerical Control (CNC) plotter machines in Educational Institutions and Laboratories is rapidly increasing. Low cost manufacture of Printed Circuit Board (PCB) has become a basic need in electronics laboratories. This project present an affordable model of a CNC plotter machine which is able to draw a circuit layout on PCB or any other solid surface using simple algorithm. The invention of the XY-plotters is to record or plot 2dimensional data on a rectangular coordinate system. The material selection of the mechanism was made considering the

cost and wide range of application such as Servo motor. Servo motors are cost effective and differentiated by the peak torque capability, speed range to compromise the standard and application of the system.

This study emphasizes the fabrication of a XY-plotter by using mechanisms from scanner and microcontroller system (Arduino) to control the moment of XY-axis. Modeling and analysis on XY-plotter is carried out through the computer link with the Arduino software and is executed through the g code algorithms and machine language

## II. WORKING PRINCIPLE

Figure 1.discuss the Block diagram of Input- Output Process, dynamic of a dual drive servo mechanism and develops a n XY gantry model consisting of a 2 motors for y control with another motor sliding the gantry in x direction. The design uses 2 parallel rails for y motion with a bar spanning across the rails which holds the end effectors of the system. On the other hand, the accuracy of plotting is the issue e of concerned on the fabrication of XY plotter.

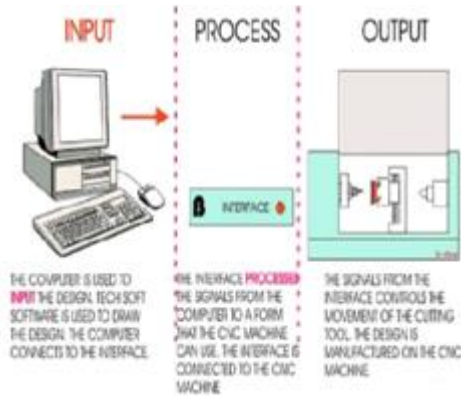


Figure 1. Block diagram of Input- Output Process  
 Figure 2. Shows the flow chart of the Input- Output Process.

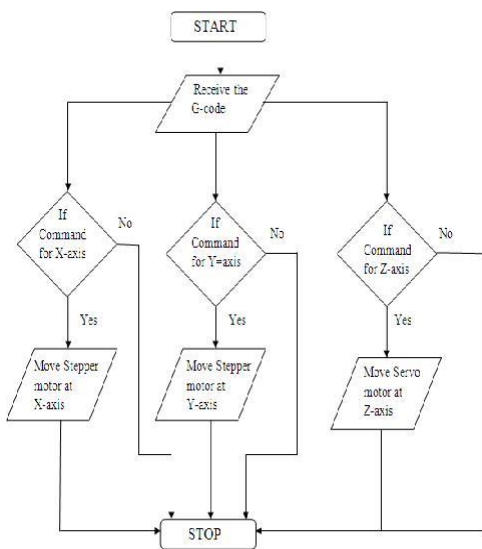


Figure 2. Flow Chart of the Input- Output Process

III. ALGORITHM

1. Initialize
2. Dump the code into the microcontroller.
3. The 12v, 1A DC supply should be given to the driver supply.
4. DC Stepper & Servo Motor turns on and starts running.
5. Process the image to convert it G- code.
6. Open Gctrl processor and select the port to process the image.
7. G-code produced by the ink scape should be given to controller.
8. Stepper and servo motor starts running in both X&Y axis.
9. Stepper and servo motors turn off.

This paper is devoted to plotters in the term of their adjustment methods on the accuracy and moment of plotter. The XY plotter system is a more simplified system comparing to the CNC system since CNC system is running on 3 axis direction and the programming is more complicated never the less, the coding for the CNC system which is the g code. It can be used for the purposes such as PCB design. The construction is very simple and robust.

IV. INPUT - OUTPUT PROCESS

A CNC production facility needs three stages of process.

(i) Computer

The computer is used to draw the design. However, the design is only a picture and the CNC machine cannot use this to manufacture the product. The computer software must also convert the drawing into numbers (coordinates) that the CNC machine can use when it starts to cut and shape the material.

(ii) Interface

A computer cannot be directly connected to a CNC machine. The computer is connected to an interface. This converts the signals from the computer to a form that the CNC machine understands. The signals are in the form of digital signals when they are sent to the CNC machine.

### (iii) CNC Machine

The signals from the interface control the motors on the CNC machine. The signals determine the way the vice moves. The vice moves in three directions X, Y (Horizontally, vertically). The signals also control the speed of the cutting tool.

### V. TEST RESULTS AND DISCUSSION

1. Command successfully got initialized.
2. The image in inkscape got converted to g-code easily.
3. The gctrl code and port selection of the Arduino got selected initially.
4. The G converted code was send to the MCU initially.
5. Motor successfully turn ON as soon as process begins.
6. The cartridge (pen) ran smoothly on the suspended paper.
7. The image which was given and drawn as per the given command.
8. The DC stepper motor ran smoothly in both XY-axis of the limited shaft.
9. The cartridge (pen) which is inserted to the holder ran up and down freely.
10. The commanded G-code image was drawn on the board suspended on the Y-Axis of the motor board.

### VI. CONCLUSION

In this paper an attempt to develop XY plotter to accurately synchronize with the Arduino software system for better response for the moment of XY axis is presented. Difference IDE and different languages have been tried and used to complete this project to meet the objectives. With a lot of new technologies been developing now days, this project serve to provide a good platform for future development for XY plotter system and

even other system. This capstone project is the perfect way to demonstrate our understanding and the application of mechanical electrical engineering knowledge in to solving every day's problem.

After the testing and calibration, a plotter machine was ready to operate. The plotter machine is implemented and designed as planned; therefore, it can plot and write, this plotter machine starts to collect data from programming that is derived from Ink scape software and processing software in the form of G-code. The programs produce the computer file and will then extract the command to run the device. The program was transferred via Arduino and then loaded into the plotter machine to start machining. After calibration and testing, the plotter machine was successfully run.

### VII. REFERENCES

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