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DESIGN AND FABRICATION OF HANDWRITING MACHINE

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ABSTRACT

The invention of the X-Y plotters is to recording or plotting two dimensional data on a rectangular coordinate system. This study emphasizes the fabrication of a XY plotter by using mechanism from scanner and microcontroller system (Arduino) to control the movement of XY axis. Modeling and analysis on X-Y plotter is carried out through the computer linked with the arduino software.

Keywords: plotters, ARDUINO, G-Code

INTRODUCTION

In the present study, the X-Y plotter is designed to recording and plotting twodimensional data on a rectangular coordinate system . The material selection of the mechanism was made considering the cost and wide range of applications such as servo motor. Servo motor can be differentiated through the cost, peak torque capability, speed range to compromise the standard and application of the system. Park, et al. discuss the dynamics of a dual-drive servo mechanism and develops an XY gantry model consisting of two motors for Y control with another motor sliding the gantry in the X direction. The design uses two parallel rails for Y-motion with a bar spanning across the rails which holds the end effectors of the system. In the other hand, the accuracy of plotting is the main issue to be concerned on the fabrication of X-Y plotter. Few papers have been devoted to plotters in term of their adjustment methods on the accuracy and movement of plotter. The X-Y plotter system is a more simplified system comparing to the CNC

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system since CNC system is running on 3 axis direction and the programming is more complicated. Nevertheless, the coding for the CNC system which is the G-Code programming can be modified and simplify it to the 2 axis coding movemen . GCode is the generic name for a control language for Reprap machines. It is a function to tell the machine to move to various points at the desired speed, control the spindle speed, and turn on and off various coolants. In this X-Y plotter system, G-Code is employed by the part programmer to specifying the coordinates of the point to be moved and giving the normal vector to the surface at that point. For the core system, Arduino system is most familiar by the inventor and mainly used in most of the electronic components because of is compatibility of the system with the hardware. Meanwhile, low cost and easily controlled function of the Arduino system contributed on simplifying the building circuit of the microcontroller in the X-Y plotter.

METHODOLOGY

First step to start building this cnc machine is to disassemble two dvd/cd drives and take off them the stepper motors. Use the screwdriver to open them and take off them the rails. Next step is to choose our base for the x-y plotter. Finally we will need to find something to attach the one of the stepper-rails vertically to our construction the Y axis of our CNC machine. Attach it on your surface, in this part you will need some screws and nuts. The X axis is attached to two plastic parts and it was cut it to fit the construction. Ensure to put the Y axis straight to x-y plotter base and the X axis vertically in this (90 degrees). On that surface the servo motor (Z axis) will be attached to the pen base. Pen t must be able to move up and down with the aid of servo motor. Now it will have to attach a hard surface on Y axis. On this, it will put the paper piece to print the texts or images that we programmed The printing area is 4x4cm. For steppers motors wiring, it will find a 'testing' code for x and y axis. If the steppers doesn't work properly, the correction can be obtained by working combination by changing the cables between them and the L293D ICs. To make g code files that are compatible with this X-Y plotter, the Java Programming is used. Java is a general-purpose computer programming language that is concurrent, class-based, object-

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oriented, and specifically designed to have as few implementation dependencies as possible. Java code can run on all platforms that support Java without the essential for recompilation. Java applications are typically compiled to byte code that can run on any Java virtual machine (JVM) regardless of computer architecture. The language derives much of its syntax from C and C++, but it has fewer low-level facilities than either of them. The gray scale image is moved, and delete the color one behind it. Move the grey image to the correct place again and click from Path menu "Object to path". To export as gcode, go to file menu, click save as and select. gcode. Click ok on next window. Use the gctrl.pde app to print the gcode file on the Arduino X-Y plotter. G-code is a language in which people tell computerized machine tools how to make something. The "how" is defined by instructions on where to move, how fast to move, and what path to move. The most common situation is that, within a machine tool, a cutting tool is moved according to these instructions through a toolpath and cuts away material to leave only the finished workpiece.

RESULT AND DISCUSSION

The fabrication of the hardware is still in the progress. The pen holder is waited to mount by using the spring loaded method. The pen loader is 3D printed using FDM machine. Part of the programming for the plotter is on-going. The plotter movement in x and y direction is controlled using motor coupled with gear to move the position left and right and forwards and backwards. We use two L293D motor controller chip to control the DC motor. The The overall assembly of the XY Plotter fabrication is by using DVD drives. As a result, the fabrication of XY Plotter is working. Figure 3 is the printing product of XY plotter. The stepper motor hold several advantages compared to the DC motor. It can be controlled at a low cost and obtain high torque at startup and low speeds. The construction of the motor is simple and able to operate in an open loop control system. The rotation angle of the motor is proportional to the input pulse and the motor has full torque at standstill. The washer also plays an important role in stabilizing the apparatus. Stepper motor produces a lot of vibration, thus affecting the writing/ plotting. Rubber soles or dampers are

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installed at the chassis to reduce vibration. The use of Inkscape as the G-code generator enables the users to draw and trace their image before converting into G-code file. The file is then attached to processing software, run in Java language. The processing language enables user to specify the speed of the stepper, setting the (0,0) location, go home setting, and to abandon plotting. The command is sent automatically after the G-code is loaded.

CONCLUSION

In this study, it was attempted to develop X-Y plotter that accurately synchronize with the Arduino software system for better response on the movement of X and Y axis. Difference IDE and difference languages have been tried and used to complete this project to meet the objectives. With a lot of new technologies being developed nowadays, this project serves to provide a good platform for future development for XY plotter system and even other system [37]. This capstone project is the perfect way to demonstrate our understanding and the application of mechanical engineering knowledge into solving every day's problem for the benefit for **mankind.**

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