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COMPUTER NUMERICAL ROUTER MACHINE FOR 2D AND 3D DESIGINING BASED ON ARDUINO COMPUTING SYSTEM

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Abstract: CNC is a versatile machine which typically used for cutting, drilling, and milling. CNC router can perform a task of much PCB designing and carpentry Interior and exterior decoration like wood panel, sign board, wooden frame, musical instruments. A CNC router is very similar to the NC machine Instead of routing by hand tolls path are controlled via computer. NC has less flexibility and so it does not work accurately. The time period is also less than CNC machine for better and huge manufacturing it uses is very rarely.

Key words: CNC machine, versatile, cutting, drilling, milling, PCB designing, Route, .flexibility, manufacturing

I. INTRODUCTION

CNC machine stand for computer numeric control .It is used for cutting and designing many materials, such as wood plastics, aluminum and high density foams .CNC is a numeric software and electronic controlled machine instead of a direct human operator. It is effortless and it can work without any human error.

In most cases, CNC machines can use along three directions known as the X, Y and Z axis so it can move or work in three dimensions. The X axis is the front to back direction, which is usually the longest because basically X axis is used for vertical direction. The Y axis is used for horizontal direction which is left and right direction and the Z axis move upward and downward direction. It is not compulsory to use X axis for front to back ,Y axis for horizontal and Z axis for upward it depends to the operator that they gives program to the machine according to that axis can work. CNC machine can do work very fast because they run by a computer without human errors, so it useful in industrial manufacturing

II. THE PROBLEM

Before 1940s metalworking and fabrication is also done by numerical controlled (NC). NC is also an automatic control machining it controlled by set of instruction in the form of numbers, letter and symbol. Program are fed into the punch card which is difficult to modify the program and it has no memory storage so for every design or execution we have to change the program, so time is also consumed.

III. IMPLETATION

Basically CNC machine is a huge and it occupy more space but we make simple and potable CNC machine. Which we can able to move and carry anywhere. For this CNC machine we use text to G-code converter because it automatic change the code as per the required output so for the different designing only we have to change the required input and from this software we send to the GRBL controller from their we can operate and move the axis and operate the CNC machine.

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IV. BLOCK DIAGRAM

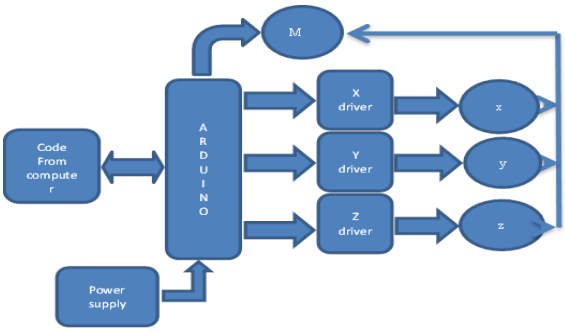

Fig.no-1

V. BLOCK DESCRIPTION:

v. 1: ARDUINO : It is a 28 pin microcontroller IC. It has 14 digital input/output pins of which 6 can be used as PWM (pulse width modulation) it is used to convert digital signal into an analog pulse.6 analog inputs, 2 crystal pin and remaining pin for power, ground, and analog power and ground.

v. 2 CNC SHEILD: In our project CNC shield is very important components it control four stepper motors individually(x, y, z). It use as medium to connect stepper motor and Arduino

v. 3 MOTOR DRIVER: Motor driver acts as an interface between motor and controller. Stepper motor required (12-35) voltage to run but controller circuit works on low current so it is not sufficient to operate stepper motor, so the function of stepper motor is to take low output voltage and then turn it into higher voltage from that voltage the motor works.

v.4 STEPPER MOTOR: Stepper motor works in a bipolar direction that means it rotate clockwise and anticlockwise reverse and forward direction. It is brushless Dc motors that rotate in step by step .it is an electromechanical device it convert electrical power into mechanical power. At the core of the stepper motor rotor has permanent magnet and the poles has coil. When we give electric pules the coil can generate and make magnetic field. The rotor magnet and the field that produce in coil get attract each other so; the motor is rotate in bipolar direction

VI. CIRCUIT DIAGRAM

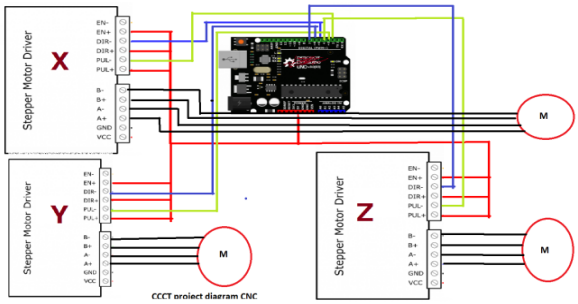

Fig.no-2

VII. PIN DISCRIPTION:

V11.1 ARDUINO UNO ATmega328: It is a 28 pin controller IC. In this project we are using total 6 digital pin from Arduino pin no, 2-5 for X-axis, 3-6 for Y-axis and 4-7 pin for Y-axis.

V11.2 MOTOR DRIVER: The pin no 2 and 5 is used for motor driver from the Arduino. It generates low pulse to unlock the motor for automatic movement as well it unlocks to prevent from heat when high pulse is generated from Arduino. Pin no 2, 4 & 6 is used for high pulse to lock the motor and direction. From Arduino input 5 volt is given to the stepper motor driver IC to operate. Pin no 2-4-6 are interconnected into the motor driver X, Y Z axis movement. Motor driver pin 7, 8, 9 &10 are connected to the stepper motor.

Y Axis motor driver: The pin no 3 and 6 used for motor driver from the Arduino. Pin no 7, 8, 9 &10 are connected to stepper motor.

Z Axis motor driver: The pin no 7and 4 used for motor driver from the Arduino. To operate driver IC 5 volt is given to the pin no 2.Pin no 7, 8, 9 & 10 are connected to stepper motor.

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V11.3 STEPPER MOTOR: The entire 4 pin 7, 8, 9& 10 which came from motor driver is for clockwise and anticlockwise direction. Basically stepper motor required 12 to 35 to operate from that 4 pin it gets required voltage and it start working.

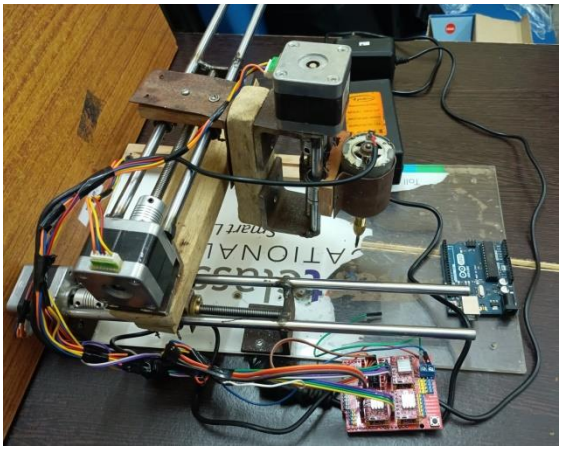

Fig.no-3

VIII. CONCLUSION

Computerize numeric router for 2D and 3D designing base on Arduino is a programmable control machine which is controlled by computer. It is use for designing materials, such as wood plastics, aluminum and high density foam. Compare to the NC machine it is far better with more flexibility and working period is also more with less chance for error. As we worked on this Project we found that with the use of this machine, the work will become accurate, less error, effortless with more production especially in industries.

IX. FUTURE SCOPE

Computerize numeric machine router is a programmable control device that is directly control by computer .It is control by computer so less chance of error and fault .In CNC router we use controller ,CNC shield, driver. In CNC we use Arduino instead of this we can also use Raspberry pi, Nod mcu etc. We also make CNC which can control by wireless system like Bluetooth, Wi-Fi. For make wireless we have to connect Bluetooth module to the controller so operator can control by computer directly.

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