ARDUINO BASED CNC DRAWING MACHINE

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ABSTRACT:

Arduino based mostly CNC Drawing Machine could also be a machine that works supported the rule of Computer Numerical management (CNC). With the advancement of technology, demand for Computer Numerical management (CNC) plotter machines in academic establishments and Laboratories is rapidly raising. Computer Numeric management Machines square measure an important a fragment of the production industry. Robotic arms square measure programmed mechanism with similar perform of a person's arm.

INTRODUCTION:

Fast-growing development of technology and producing has contributed terribly much within the human development. During this project, industrial demand like sensible and high preciseness quality has helped us produce the project and every one of those will be achieved through machines that are management led by computer like computer numerical control machine (CNC). This project includes an X-Y plotter that pulls or writes a 2-dimensional information on an rectangular co-ordinate system which contains the materials by value and big selection of applications like servo motor and stepper motor, which may be differentiated through their peak force capability, cost, speed vary for the betterment of system. There are 2 stepper motors for movement within the X-Y direction and servo motor for the movement of pen holder. The management language to manage the CNC machine is G code. It's operated that tells the machine to manoeuvre to numerous points at desired speed. The software named (Inkscape) is used to convert matter content into G-code and via UGS (Universal G-code Sender) the info is fed to Microcontroller. The Microcontroller feeds text content reborn into G-code to CNC machine. G-code is supported by the half programmer to specify the co-ordinates of the aim that are emotional and providing the normal vector to the surfaced at desired purpose. Arduino Nano with Atmega328 controls the overall motion of the motors. Consistent with the directions from the controller are sent to the motor drivers to perform specific task that was given by the user.

LITERATURE REVIEW:

During literature survey we found various research papers in which we found various methods which are been used to provide strong impact force to the work piece and our aim is to take that review for using as a guidance to make “Arduino Based CNC Drawing Machine”.

Vedprakash, Saurabh Sharma, Ashwani Kumar, Priya Kumari , Shyam Lal, International Journal of Advance Research in Science and Engineering, Volume No.06, Special Issue No.(02), December 2017, www.ijarse.com[1]

The literature study is mainly focussed on the machine stability, structural analysis in static and dynamic loading, machine control unit and software feasibility of the machine. The suggested work by the researchers has successfully got the result in reducing the weight of the machine, increase in natural frequencies, reduction in deformation and increase in software adaptability. This study will help the researchers in further improvement of the design and development of different parameters of the machine.

M. Aditi ,S. Karpagam, B. Nandini, B. S. Murugan, International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 ETEDM - 2019 Conference Proceedings Special Issue – 2019[2]

It has been a great pleasure for me to work on this exciting and challenging project. This project proved good for me as it provided practical knowledge of not only programming in java to some extent Web Application and firebase Server, but also about all handling procedure related with "AUTOMATIC WRITING AND DRAWING MACHINE". It also provides knowledge about the latest technology used in developing web enabled application technology that will be great demand in future. This will provide better opportunities and guidance in future in developing projects independently.

Sara Raad Qasim, Haider Mohammad, Mustafa Falah International Journal of Computer Applications (0975 – 8887) Volume 178 – No. 48, September 2019[3]

In this project, Small drawing machine or mini CNC was built. It is a digital electromechanical machine with digital control through a piece of wood and low cost components. Two main axes (x & y) and a vertical axis (z) were used to draw image or figure with a specific dimension and speed. This project design was success prototype design since it can draw any figure or image easily and in a short time as compared to human drawing time.

Antor Mahamudul Hashan , Abdullah Haidari , Srishti Saha and Titas Paul , Journal of Mechanical, Civil and Industrial Engineering ISSN:2710-1436Journal Homepage:www.alkindipublisher.com/index.php/jmcie[4]

This article discussed the design, implementation, and analysis of a three-axis drawing robot for educational purposes. This system can be used as a learning tool for university students, helping them understand the numerical control computer and CAD. The output generated by the drawing robot is very similar to the given input and the response time is the same for every trial. The accuracy can be improved by installing an appropriate mechanical system. This drawing robot needs to be stable during the drawing process because any simple vibration can cause errors. This system can be directly implemented on raspberry pi platforms. As a result, it can eliminate the Arduino board and PC from the system design and this can significantly reduce the cost of the system. In addition, the pen can be replaced with a laser to work as a laser engraving machine, and then it can be used to paint on wood. However, there are future plans to scale the drawing robot in terms of size, use more powerful motors, strengthen the frame, and sketch the design from a distance using a Bluetooth module with this system.

Manish Patil, Prof. Hredeya Mishra, IJIRST – International Journal for Innovative Research in Science & Technology| Volume 4 | Issue 6 | November 2017 ISSN (online): 2349-6010[5]

Based primarily on the nature of the machine

tool design practice, requirements for the knowledge-centric frame-work with integration of process and knowledge are analyzed in consideration of the design objects, the D&D process, the knowledge-centric demand and its implementing and monitoring demand. Then, the framework of knowledge-centric CNC machine tool D&D process management used in the CNC machine tool industry is proposed, which includes the modelling, simulation and its execution and takes the knowledge into consideration. The design process of KVC1050N Vertical machining center is also studied as an example to demonstrate the feasibility and availability of the proposed framework. The results of this study significantly contribute to efforts to achieve knowledge and process integration in CNC machine tool D&D. In a word, ongoing efforts are being taken to make the framework more practical in the industrial application. Thus, this solution can serve machine tool companies in this important industry sector by increasing machine tool development capabilities, improving work efficiency and ultimately reducing development cycle time and costs.

Thiri Kywe , Thae Thae Ei Aung , Hnin Ngwe Yee Pwint © IJCIRAS | ISSN (O) - 2581-5334 August 2019 | Vol. 2 Issue. 3[6]

The machine is easy to control, able to suddenly stop and pause with a click action on computer, handle with a low power supply and produce a high quantity of picture. The machine can perform more exactly with the more simple pictures. The hardware of the machine is compact and it is able to be used private productions. It is easily transportable and assembled everywhere in a short time.

Venkata Krishna Pabolu et al. / (IJCSE) International Journal on Computer Science and Engineering Vol. 02, No. 08, 2010, 2567-2570[7]

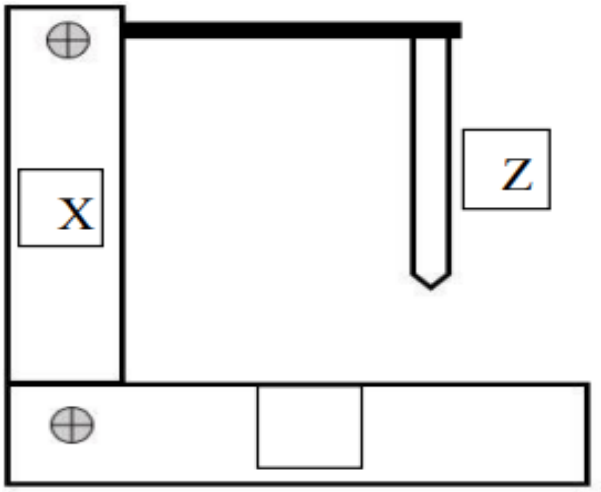
In this paper the design and realization of a microcontroller based embedded three dimensional CNC machine was presented. Detailed descriptions of different modules along with technical details of their implementations have been given. The realized prototype CNC machine was using a sketch instead of plasma cutter. In this system we used visual C# as a language on NET platform instead of using any RTOS which is very costlier and not user friendly and also with such systems it is not possible to implement on any general PC, where user has to purchase the operating system. This CNC eliminates the rigidness associated with traditional CAD/CAM systems. The designed system is user -friendly one which give accurate results and also flexible to users.

R.Ginting , S. Hadiyoso and S.Aulia ,International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 17 (2017) pp. 6553-6558 © Research India Publications. http://www.ripublication.com[8]

The CNC router machine was successfully built using ATmega328p and IC4988 microcontrollers combined with 3 Nema 17 stepper motors, with 20x20cm cross-sectional area and using 500 Watt Spindle Air Cooled drill type. The CNC machine can be used for cutting, engraving and marking on wood to form 2D or 3D objects with 98.5% carving accuracy and 100% depth accuracy. The process of synchronizing the 3 stepper motors was controlled using GRBL library and Universal G code Sender Software.

DESIGN OF CNC MACHINE:

There are 3 movements of using 3 CD ROMs. The horizontal movement(X) i.e. forward & backward movement is provided by the lower CD Rom. The 2nd CD Rom is mounted between the 2 columns which provide side movements(Y) i.e. left and right hand side movements. The spindle which is mounted on the 3rd CD Rom provides vertical movement (Z) for feed of tool.

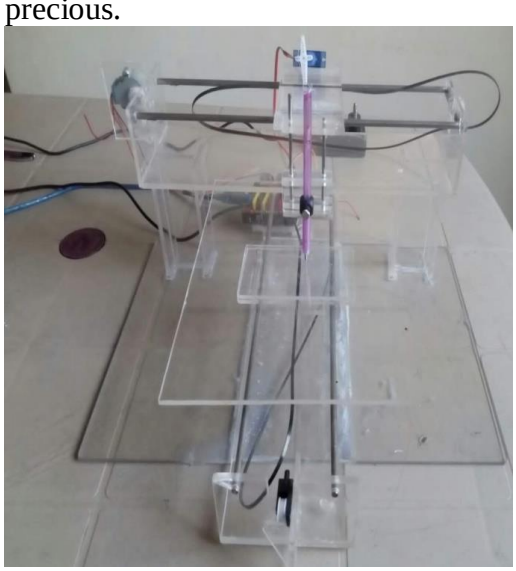


METHODOLOGY:

We have supply the current in Arduino with USB DATA cable to transfer Data from Computer to Arduino Board [1], Here we have used 3 Stepper Drivers to supply the G codes in Sequence to the stepper motors. Arduino will be mounted on CNC shield. CNC shield will be distributing the Current in the command of Arduino. CNC shield will be converting the command of G codes in digital pulse by Stepper motor. In X direction Stepper motor will be move left and Right ,Y direction stepper motor will be move in front and back direction, Z direction Stepper motor will be move in Up and down[2]. We have made much difficult design via using this machine. The accuracy of this machines result is very high. So we have used in industry to reduce the cost of design printing and maintain accuracy level. Drafting and Scaling of CNC Plotter machine is very precious.

WORKING:

We have supply the current in Arduino with USB DATA cable to transfer Data from Computer to Arduino Board [1], Here we have used 3 Stepper Drivers to supply the G codes in Sequence to the stepper motors. Arduino will be mounted on CNC shield. CNC shield will be distributing the Current in the command of Arduino. CNC shield will be converting the command of G codes in digital pulse by Stepper motor. In X direction Stepper motor will be move left and Right ,Y direction stepper motor will be move in front and back direction, Z direction Stepper motor will be move in Up and down[2]. We have make many difficult design via using this machine. The accuracy of these machines results is very high. So we have used in industry to reduce the cost of design printing and maintain accuracy level. Drafting and Scaling of CNC Plotter machine is very precious.



CONCLUSION:

In this paper we have presented the concept of a low cost three-axis mini CNC plotter. The existing CNC machines are of high cost, difficult to maintain and requires highly skilled operators. Our CNC plotter overcomes these problems. It is of low cost and easy to control and there is no need of highly skilled operators. It can be used for long hours at a stretch which is not possible in existing ones. It is hoped to extend this work for future development.

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.

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[6] Thiri Kywe1 , Thae Thae Ei Aung2 , Hnin Ngwe Yee Pwint3 © IJCIRAS | ISSN (O) - 2581-5334 August 2019 | Vol. 2 Issue.

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