

Automatic writing machine based on Arduino

Ankit V. Satikosre¹, Neema Amish Ukani², Sandeep Sonaskar³ Saurabh S. Chakole⁴

¹ Student, PG Diploma in Industrial Robotics, RTMNU's, Oberoi Centre of Excellence, Nagpur, India

² HoD, Asst. Prof., PG Diploma in Industrial Robotics, RTMNU's Oberoi Center for Excellence, Nagpur, India

^{3,4} Asst. Prof., PG Diploma in Industrial Robotics, RTMNU's Oberoi Center for Excellence, Nagpur, India

Abstract - In the world of growing technology human are depending upon the machine to do their work because robot is versatile accurate and reliable and also reduce human effort, so there is different type of machine they do work like human. So I decided to make a machine which he can write or design using concept of computer numerical control (CNC) machine. Writing machine is very adaptable machine intended serve a wide assortment of requirement for daily & particular graphics and writing. Machine is performed based on the fundamental of this research concern with controlling motor driver shield for pen movement in x and y direction to the rotation of stepper motor using an Arduino Uno microcontroller, the servo motor is utilized for up and down movement of the pen in z axis both of inskape & G-code was utilized for generate drawing to be used by the microcontroller.

Key Words: Arduino Uno, CNC shield board, Servo motor, stepper motor, motor driver, G-code file.

INTRODUCTION

Day to day life we have a tendency to get technology like automatic speech writing machine, TTS, speech to text output, scanners, printers etc. however their basic drawback is it solely writes solely those fonts that the pc already has. That's Roman, Calibri, Arial, Impact, Georgia, etc.

We want a machine which may write the complete matter on a page by the ink of pen in our own personal hand writing. By victimization the ideas like CNC machines, wood CNCs that build the look on wood by giving correct feed to the driller. Similarly, we will use this Technology to create a machine for writing purpose conjointly. Basically, a number of the physically challenged people that are able to suppose however unable to jot down due their inability. so as to beat this problem the automotive vehicle writing machine is intended to sense their thinking employing a brain sensing element and there by reborn to voice by signal victimization the electrical device. This voice signal is going to be set as input to automotive vehicle writing machine that has the power to access the voice and method it.

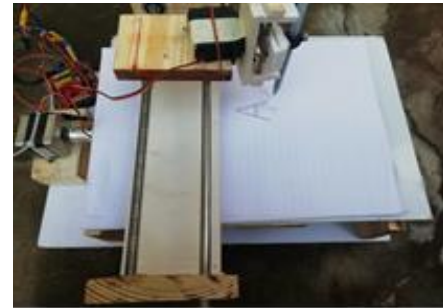


Fig 1: Automatic writing machine (AWM)

LITERATURE REVIEW

GAKKEN a Japanese company that was started within the year 1946 developed the massive mechanical hand. The GAKKEN automotive vehicle writing machine comprises a hand after you stick a pen to its holder can write the characters. an enquiry is to use Associate in Nursing autopen for writing in easiest method. The automotive vehicle author works by having a tough disk for storing an oversized quantity of information and 3 plates that rotate and caught by 2 sliders that then pull the spring loaded hand to draw the need form.

In this section, we summarize the most relevant existing research are - [1] XY Plotter is entirely different from the older CNC Machines. It is capable to write and draw the critical structures with the exact output. [2] Plotters are simple mechatronic systems with two degrees of freedom in the XY plane. Not only the pen plotters, but also cutting plotters, die-cut machines, welding machines or 3D printers use the same basic architecture. [3] Recently it has become important to focus on the requirements of the system and how to take them and analyze them to determine the system infrastructure through which they will be relied upon in the rest of the system building. [4] Text extraction is an important phase in document recognition systems. In order to differentiate text from non-text objects, it is necessary to detect all possible text regions in the document. [5] This low cost drawing bot is an embedded system which Works on the basis of Computer Numerical control. This paper deals with the design, implementation and analysis of a low cost drawing robot for educational purposes. [6]The paper presents an approach to design user friendly and fluid movements of a

CNC machine to perform writing tasks.[7]The Automatic Writing Machine is a device which helps the physically handicapped people to write, as they face difficulty in physical writing on paper. [8] Nowadays more and more individuals are turning to robots to do their work, because robots are more versatile, accurate, and reliable and also reduce human efforts. Aim of our project is to develop a writing machine which helps the students or office workers to write. [8] Parallel Manipulator is one of the trending research topics in the field of robotics. Recently, the 3-RPS parallel manipulator is widely being used for novel applications.

Goals

THE GOAL OF THIS PROJECT ARE:

- This machine-controlled writing and drawing device is employed to save lots of the wastage of your time.
- There are heaps of machine-controlled drawing machines. however, this is often helpful among all.
- By this we are able to build the notes in our own handwriting simply by giving the input to the machine. we do not have to be compelled to waste a lot of time by sitting ahead of the work
- This machine is able to draw and write the assignments and different hand written notes in our own handwriting
- by this we are able to save our time.

ALGORITHM

The G-Code file created by the assistance of Inkscape

Software then the process code is employed to send the GCode file to the Arduino controller unit (via USB) then The CNC protect drive send the dominant signals to the stepper motors and servo motor. Currently the sex chromo some axis that operates as follows by the directions given to the controller unit.

BLOCK DIAGRAM

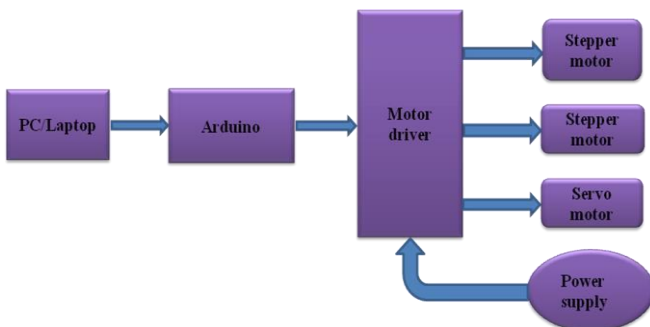


Figure (2): block diagram of AWM

As shown in the block diagram of the automatic writing machine (AWM) it represents the working process of AWM. The laptop or pc is connected with Arduino with help of USB cable and Arduino connected to the motor driver and act as an input. Its pass the signal to the motor driver and motor driver give the signal to stepper motor. The stepper motor is place in linear position for moving the direction of X & Y.X movement left to right and Y movement forward and backward direction, servo motor is gives the movement of pen or marker up & down.

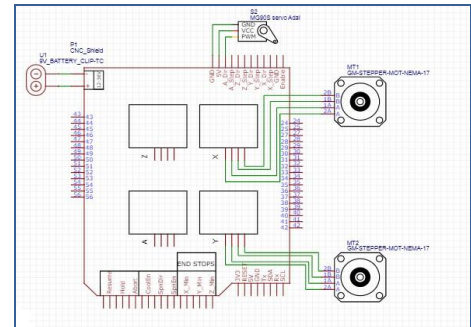


Figure (3): Circuit diagram of AWM

ARDUINO IDE

Arduino is associate ASCII text file physics platform supported easy-to-use hardware and software system. Arduino IDE (Integrated Development Environment) is that the software system for Arduino. It's a text editor sort of a pad of paper with totally different options. it's used for writing code, assembling the code to see if any errors square measure there and uploading the code to the Arduino.

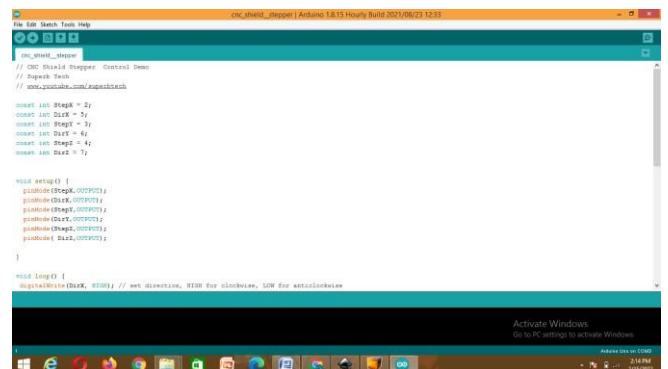


Figure (4): Arduino IDE

ARDUINO UNO

Arduino/Genuino Uno may be a microcontroller board supported the ATmega328P (datasheet). it's fourteen digital input/output pins (of that half dozen may be used as PWM outputs), half dozen analog inputs, a sixteen MHz quartz, a USB association, an influence jack, associate ICSP header and a push button. It contains everything required

to support the microcontroller; merely connect it to a laptop with a USB cable or power it with a AC-to-DC adapter or battery to urge started you'll be able to tinker together with your UNO while not militant an excessive amount of regarding doing one thing wrong, worst case state of affairs you'll be able to replace the chip for some greenbacks and begin another time0.



Figure (5): Arduino Uno board.

CNC SHEILD & MOTOR DRIVER

- CNC shield: This growth board as a driver growth board may be used for engraving machines, 3D printers, CNC. It's a complete of 4 slots, will drive four A4988 stepper motor. Every road stepper motors solely would like 2 IO ports. In alternative words, six IO ports may be well managed 3 stepper motors.
- A4988 motor driver: The A4988 may be a complete micro stepping motor driver with inherent translator or straightforward operation. it's designed to work bipolar stepper motors in full-, half-, quarter-, eighth-, and sixteenthstep modes, with Associate in Nursing output drive capability of up to thirty-five V and ± 2 A.

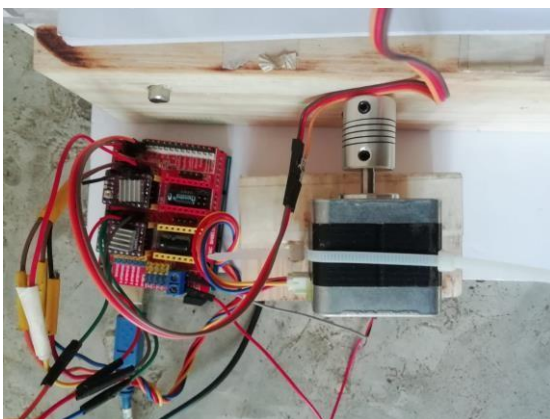


Figure (6): CNC shield board and a4988 motor driver

SERVO MOTOR

A servomotor is a actuator or linear actuator that permits for precise management of angular or linear position, rate and acceleration. It consists of an

appropriate motor coupled to a detector for position feedback. Servomotors square measure utilized in applications like AI, CNC machinery or machinecontrolled producing.



Figure (6): Servo motor

STEPPER MOTOR

The stepper motor is a magnetic attraction device that converts digital pulses into mechanical shaft rotation. Benefits of step motors area unit low price, high liableness high torsion at low speeds and an easy, rugged construction that operates in nearly any atmosphere.



Figure (7): Stepper motor

INKSCAPE SOFTWARE (0.92)

Inkscape could be a Free and open supply vector graphics editor for GNU/Linux, Windows and MacOS X. It offers an upscale set of options and is wide used for each inventive and technical illustration like cartoons, clip art, logos, typography, schematization and flowcharting. It uses vector graphics to permit for sharp printouts and renderings at unlimited resolution and isn't absolute to a set range of pixels like formation graphics. Inkscape uses the standardized SVG file format as its main format, that is supported by several different applications together with internet browsers.

It will import and export numerous file formats, together with SVG, AI, EPS, PDF, PS and PNG. it's a comprehensive feature set, an easy interface, multi-lingual support and is

meant to be extensible; users will customize Inkscape's practicality with add-ons.

The Inkscape project includes a growing international user community, and lots of learning materials exist to assist get you started together with your creations. Facilitate and support is provided by the community, and their square measure innumerable ways that for you to urge concerned if you would like to assist improve the Inkscape project.

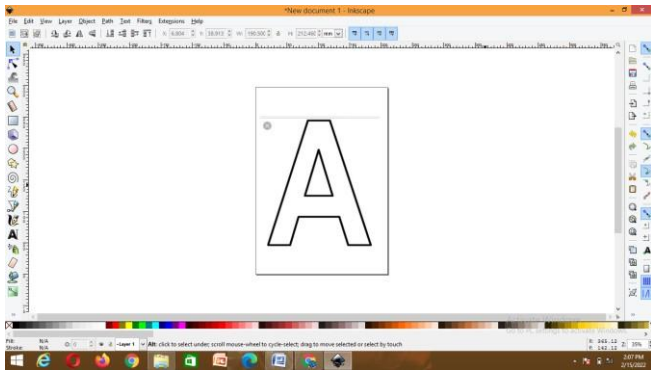


Figure (8): Inkscape software 0.92

UGS (universal g-code sender) software

Universal G-code Sender, a lot of ordinarily referred to as UGS, is free CNC controller software system. The "Universal" comes from it being compatible with many completely different computer code choices like GRBL, Tiny G, Smoothie ware, and G2core. Control software system is that the communication between your CNC machine and laptop. Having management from your laptop has benefits like a lot of oversight of the machine and a period of time read of the tool path. It eliminates the requirement to export info to Associate in Nursing drive then load it into

The machine, permitting you to visualize immediate results once dynamic settings. Some machines have integrated management software system, however it's common that CNC users choose between alternative software system choices, with UGS being a well-liked selection. There area unit 2 versions: Classic and Platform, the latter of that is newer and comes in numerous builds. in step with user's opinions, Platform is best as a result of it offers advanced options while not sacrificing quality. It additionally appears to be the popular selection between the 2. As such, we'll be that specialize in UGS Platform throughout this text.

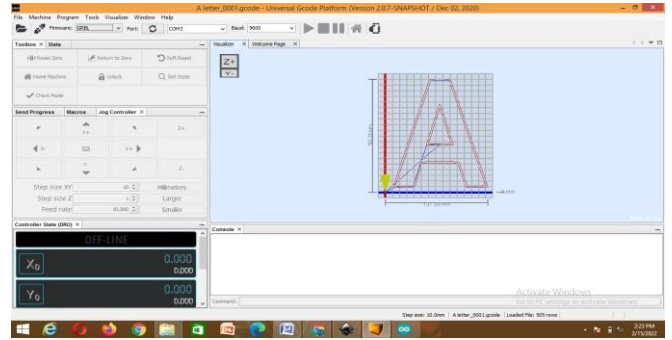


Figure (9): UGS (universal g-code software) software

Table I. Cost of Components

| S.no | Cost estimation of project | | |
|------|-------------------------------|----------------|----------------|
| | Name of material | Number of unit | Cost (Approx.) |
| 1 | NEMA 17 Stepper motor | 2 | 700 |
| 2 | Arduino Uno | | 400 |
| 3 | CNC shield board | | 200 |
| 4 | A4988 motor driver | 2 | 300 |
| 5 | Mg995s metal gear servo motor | | 250 |
| 6 | 12V Adapter | | 100 |
| 7 | 8mmx300mm Threaded rod | 2 | 400 |
| 8 | 8mmx300mm smooth rod | 4 | 400 |
| 9 | Bearing 8mm dia | 4 | 160 |
| 10 | Linear coupling bearing | 2 | 300 |
| 11 | Miscellaneous | | 350 |
| | Total | | 3560 |

Figure (10): Cost Estimation table

CONCLUSION AND FUTURE SCOPE

- It has been an excellent pleasure on behalf of me to figure on this exciting and difficult project. This project well-tried smart on behalf of me because it provided sensible information of not solely programming in java to some extent net Application and base Server, however additionally regarding all handling procedure connected with "AUTOMATIC WRITING MACHINE". It additionally provides

information regarding the newest technology employed in developing net enabled application technology which will be nice demand in future. This can offer higher opportunities and steering in future in developing comes severally.

- The house composition machine may be a useful unit for composing reason. The overwhelming majority of the individual does not understand this instrument home composition machine will be build and straightforward entangled composition method and it will build it additional roaring.
- In future within the event that we have a tendency to able to interface this machine to the fast composition speed like Xerox then it'll be additional roaring and can have the capability to additional range of pages in an exceedingly temporary span.
- It'll terribly helpful machine to Specially Abled Person.
- In future it'll perform painting task to home wall, buildings sites and etc.
- The pen of the machine will be replaced by a optical maser to create it work sort of a optical maser engraving or cutting machine. Engraving machine will be used on wood. The pen may also get replaced with a strong drill in order that it will be used for each edge and drilling functions. The servo will be replaced with a stepper motor and also the pen with a 3D pen to create it a 3D printer which may print objects with dimensions. By extrapolation of the axes, the operating space of the machine will be extended keeping the algorithmic program unedited.

References

1. Thiyagarajan, "Modern Design and Implementation of XY Plotter," 2018 Second International Conference on Inventive Communication and Computational Technologies (ICICCT), 2018, pp. 1651-1654, doi: 10.1109/ICICCT.2018.8473093.
2. Š. Chamraz and R. Balogh, "Control of the mechatronic systems using an integer arithmetics," 2014 23rd International Conference on Robotics in Alpe-AdriaDanube Region (RAAD), 2014, pp. 1-6, doi: 10.1109/RAAD.2014.7002269.
3. M. S. Osman, N. Z. Alabwaini, T. B. Jaber and T. Alrawashdeh, "Generate use case from the requirements written in a natural language using machine learning," 2019 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT), 2019, pp. 748-751, doi: 10.1109/JEEIT.2019.8717428.
4. U. Munir and M. Öztürk, "Automatic Character Extraction from Handwritten Scanned Documents to Build Large Scale Database," 2019 Scientific Meeting on Electrical Electronics & Biomedical Engineering and Computer Science (EBBT) 2019, pp. 1-4, doi: 10.1109/EBBT.2019.8741984.
5. Rajesh Kannan Megalingam, Shreerajesh Raagul, Sonu Dileep, Sarveswara Reddy Sathi, Bhanu Teja Pula, Suraj Vishnu "Design, Implementation and Analysis of Low Cost Drawing Bot for Educational Purpose" ISSN: 13118080 (printed version); ISSN: 1314-3395 (on-line version), January 9, 2018
6. Apoorv Chaudhary, Ankit Mhatre, Anantkumar Sharma, Amey Tiwramkar, "Design and Development of CNC Writing and Drawing Machine" VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 4 (2021) ISSN(Online): 2581-7280
7. Atharva Naravane, P.G. Chilveri, Maitreyi Patil, Apurv Kulkarni "Automatic Writing Machine (AWM) for Especially Abled Person" International Journal of Future Generation Communication and Networking Vol. 13, No. 2s, (2020), pp. 07-11
8. Sonali Dhanwade¹, Reshma Magar², Asmita Deshmukh³ "KC Draw Using Arduino" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 23950056 Volume: 06 Issue: 04 Apr 2019 www.irjet.net pISSN: 2395-0072
9. S. Tamils Elvan, K. Yogesh waran, K. Pradeep and E. Udaya kumar, "Development of Artificial Intelligence based assessment writing Robot for disable people," 2020 7th International Conference on Smart Structures and Systems (ICSSS), 2020, pp. 1-6, doi: 10.1109/ICSSS49621.2020.9202067.
10. K. Miatliuk, A. Wolniakowski, M. Diaz, M. A. Ferrer and J. J. Quintana, "Universal robot employment to mimic human writing," 2019 20th International Carpathian Control Conference (ICCC), 2019, pp. 1-5, doi: 10.1109/CarpathianCC.2019.8766027.
11. H. V. Vairagade, V. Gurve, N. A. Ukani, S. Sonaskar and S. S. Chakole, "Design and Fabrication of 3-RPS Robot - Rack and Pinion Mechanism," 2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA), 2021, pp. 992-998, doi: 10.1109/ICIRCA51532.2021.9544519.