



## **AUTOMATED DRAWING AND WRITING MACHINE AND HOME AUTOMATION**

***Omkar Govind Borawane<sup>1</sup>, Shreya Mangesh Deshmukh<sup>1</sup>, Mansi Pandurang Malekar<sup>1</sup>, Prof. Gajanan Arsalwad<sup>2</sup>***

<sup>1,2</sup>*Department of Information Technology, Trinity College of Engineering and Research, Pune*

### **ABSTRACT**

Nowadays more and more individuals are turning to robots to do their work, because robots are more versatile, accurate, reliable and also reduce human efforts. Robotic arms are programmed robot with similar function of a human arm. Aim of our project is to develop a robotic arm which helps the physically handicapped person to write and home automation to system speech their commands when we speech lamp on and fan on .The mechanism is programmed with speech recognition system and makes the user to write what he speaks. The robotic arm is programmed to write down the words that patient or individual pronounces to the microphone. To perform the writing operations, the robotic arm will be fitted with a pen. It can also make you draw small sketches. It will be a low cost device that can be programmed to enable the people who are physically challenged to write.

**Keywords** - Arduino Uno (At mega 328),servo motor ,stepper motor , Dc Motor , Motor driver IC L293D,Speech to text

### **1. INTRODUCTION**

We have the technologies like automatic speech writing machine, TTS, speech to text output, printers, scanners, etc. But the basic problem is it only writes only those fonts which the computer already has. That is Roman, Calibri Arial, Impact, Georgia, etc. We want a machine which can write the full matter on a page by the ink of pen in our own personal hand writing. By using the concepts like CNC machines, wooden CNCs which make the design on wood by giving accurate feed to the driller . Similarly, we can use this Technology to make a machine for writing purpose also.

These days in industries from small scale to big companies, machinery designing work has become more complicated. It also requires designs and layouts from PCB to huge machinery parts which need to be drafted in form of real time diagrams (no prints). There is also need of overlaying of texts and auto configuration of drawings in industrial ease. Manually drafting of layouts and designs may compromise its accuracy and also consumes man power. As human efforts are increased it affects the production cycle which results in consumption of more time. Also the machine fulfilling these needs consume high power and is not affordable. Due to extensive requirement of low-cost automated systems in various industries, there is a great surge in the demand of the CNC based machines.

A printed circuit board ASWM (Automated speech writing machine ) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. PCBs can be:

- Single sided (one copper layer)
- Double sided (two copper layers)
- Multilayer (outer and inner layers)

### **Objectives:**

- 1) This Automated writing and drawing device is used to save the wastage of time.
- 2) There are a lot of automated drawing machines are there. But this is useful among all.
- 3) By this we can make the notes in our own handwriting just by giving the input to the machine. We don't need to waste lots of time by sitting in front of the work
- 4) This machine will be able to draw and write the assignments and other hand written notes in our own handwriting

- 5) By this we can save our time.
- 6) This machine can be used very easily for writing we just need to give the input text and for drawing we need to give the measurement as the input.
- 7) By using speech techniques to Control home appliances such Fan and lamp etc.

---

## 2. LITERATURE REVIEW

Paper is to form an efficient and low cost hardware architecture which is able to draw a circuit layout or an image on PCB or any other solid surface using simple algorithm. In this CNC machine, the entire movement control is coordinated by an ARM Cortex M3 based microcontroller, LPC 1769 with software implemented on Oppressor using embedded C. The microcontroller converts G-code into a set of machine language instruction to be sent to the motor driver of the CNC plotter. Processing is implemented here in order to provide a user interface.[1]

Paper about the CNC Machine PCB Plotter which is used to draw circuit layout on PCB. For that first you need to convert the text file or image file into G code using ink space software. Then this G code is applied to processing software. ATmega 328P microcontroller using Arduino Uno is used to control the device. The controller changes the given G code and then translates them into a machine language instruction. These instructions are for the motor drivers to be sent to the motor drivers. Laser resist ablation spray black paint onto copper clad laminate, place into CNC laser plotter. The laser raster-scans the PCB and ablates (vaporizes) the paint where no resist is wanted.[2]

CNC machines these days are found in almost all industries, from a small scale industry to big companies. There are hardly any manufacturing machines that are not acquainted by CNC automation. CNC machine can be very beneficial to the company as it increases the accuracy, flexibility, repeatability and efficiency of the manufacturing product. With ease of use and independence of production process it has ability to use shorter production cycles. The safety of the operator is also maintained using a CNC machine. The CNC automation technique is commonly used to draft real time diagrams, blueprints and to draw complex designs on plane. There is a transient rise in the demand of the CNC machines in various industries due to its extensive applications.[3]

The project proposed is setup with combination of G-code and hardware like controller and driver for getting better accuracy and precise attachment can give the maximum efficiency G-code will help the stepper motor exactly where it will go.[4]

In project Udit Pandey and et al used concept of low cost mini CNC plotter machine, which is easily control with computer and suddenly stop and paused by click action on computer. By using this we have make Difficult and Complex Design in paper. This is small machine which is easily Transportable and Assembled everywhere on Requirement of it. Bed Size of this machine is 50X50mm. Stepper Motor will be run on in this criteria of bed size. If we have increase the size or length of lead screw, it will be free to make big size of design in paper. We have used G codes to giving command. G-codes are language to give the command to the machine to move right, left or up and down. On the successful work of this machine we have some change on it and make it commercial used and applying tools for cutting, grinding of soft material etc.[5]

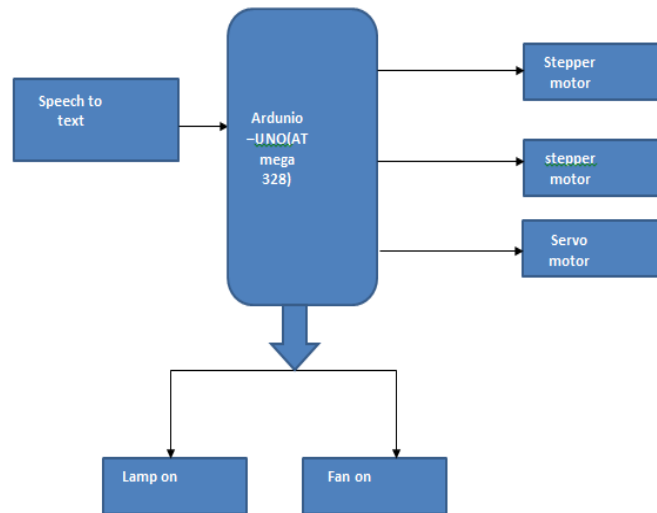
Paper deals with the design of automatic mini CNC machine for PCB drawing and drilling. The Idea behind our project is to design and drill PCB based on low cost CNC system the lower cost is achieved by incorporating features of PC with ATMEGA 328 controller in an Arduino. We have use an G code for whole system operation G code is nothing but 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.[6]

Presents one of the applications performed by Arduinio Uno when sandwiched with Grbl shield which is a high performance open source CNC controller written in optimized C-language. Here in this paper a file with extension .jpeg or .png, or .pdf is imported in open source Aspire software which converts it into .txt or .prt file. Vectors of the imported file are traced accordingly, followed by modeling and manufacturing procedures. Once the simulation of the manufacturing file is visualized in Aspire software then G-code file is generated using post processing operation, this G-code file is saved with .txt extension. The G code file is then browsed in Universal G-code sender software coupled to Grbl shield v0.9j and Arduinio board through a laptop serial port, G-code visualizer option is available on Universal G-code sender software to visualize the manufacturing steps along with the simulation. In this way proprietary control of a controller is eliminated, and CNC machine is made user friendly.[7]

Paper deals with the design of automatic mini CNC machine for PCB drawing and drilling. The Idea behind our project is to design and drill PCB based on low cost CNC system the lower cost is achieved by incorporating features of PC with ATMEGA 328 controller in an Arduino. We have use an G code for whole system operation G code is nothing but 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.[8]

---

## 3. PROPOSED SYSTEM

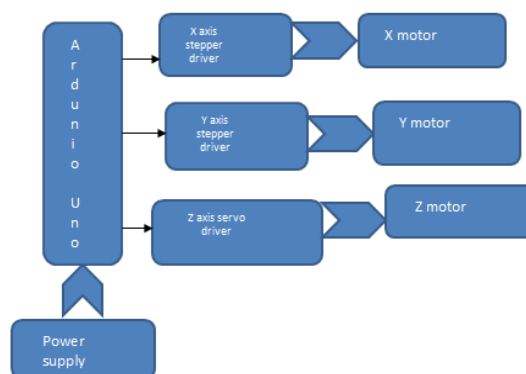


**Fig 3.1 System Architecture.**

#### 4. WORKING PRINCIPLE

We know there are many areas in human life which require write the matter by ink on a paper in their own handwriting. For example Departments like Administration, Judicial, Municipal, Police, etc. having clerks for writing the matter manually. For eliminating this heavy work we are going to introduce an automatic writing machine. CNC Machines are Computerized Numerical Control Machines which are used to draw anything or design any mechanical part according to the design program fed into their controller unit. Controller unit can be either computer or microcontroller. CNC machines have stepper and servo motors to draw the design as per the fed program. After researching on CNC machines, I decided to build my own CNC machine using locally available materials. There are so many CNC machines in the world, some of which are much technical and complex to make or even operate them properly. For this reason, I decided to make a CNC Plotter Machine based on Arduino which is by far the simplest to make. This DIY Arduino CNC Machine can draw most of the basic shapes, texts and even cartoons. It's operation is similar to the way a human hand writes. It's faster and more accurate compared to the way a human being can write or draw. we have design system such as home automation based system is design the our system has to Provides speech to text conversion we have used to speech to control home appliances. such as fan off and lamp on off control to achieves.

##### A) HARDWARE IMPLEMENTATION:



**Fig 3.2 Hardware design**

##### 1) Ardunio Uno



**Fig3.3 .Arduinio Uno ATmega328p**

The Arduino Uno is a microcontroller board based on the ATmega328 microcontroller. It reaches close to 1MIPS per MHZ throughput. The arduino's ultimate goal is to boost processing speed. It contains 14 digital input/output pins (including 6 PWM outputs), 6 analogue inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Its operating voltage ranges from 1.8 to 5.5 volts. It comes with everything you need to get started with the microcontroller; simply plug it into a computer with a USB wire or power it with an AC-to-DC adapter or battery. The Uno is unique among previous Arduino boards in that it does not have the FTDI USB-to-serial driver chip. Rather, it includes As a USB-to-serial converter, the Atmega328U2 was coded.

## 2) DC MOTOR :

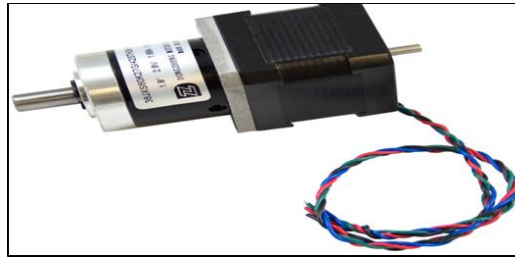


**Fig3.4 DC motor**

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

## 3) STEPPER MOTOR:



**Fig 3.5 Stepper motor Sg90**

A stepper motor or step motor or stepping motor is a brushless DC electric motor that divides a full rotation into a number of equal steps. The motor's position can then be commanded to move and hold at one of these steps without any position sensor for feedback (an open-loop controller), as long as the motor is carefully sized to the application in respect to torque and speed. Switched reluctance motors are very large stepping motors with a reduced pole count, and generally are closed-loop commutated.

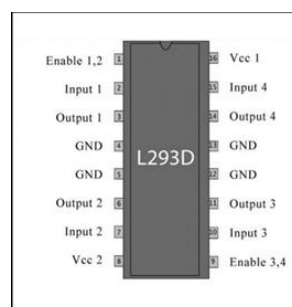
#### 4) SERVO MOTOR:



**Fig 3.6 Servo motor**

A servo motor is an electromechanical device that produces torque and velocity based on the supplied current and voltage. A servo motor works as part of a closed loop system providing torque and velocity as commanded from a servo controller utilizing a feedback device to close the loop.

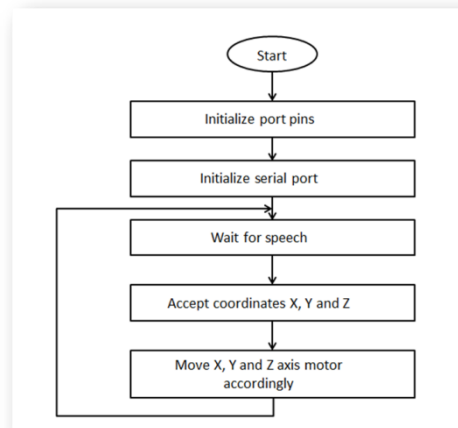
#### 5) MOTOR DRIVER CIRCUIT:



**Fig3.7 Motor driver IC**

The L293 and L293D devices are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo- Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. The L293 and L293D are characterized for operation from 0°C to 70°C.

## 5. WORKING FLOW OF DESIGN SYSTEM:



**Fig 4.1 . Flow of working module**

- The speech to text in the digital format appears serially at the receive pins of the Arduino and is then used for the further process.
- Once the text is received at the serial port of Arduino, the code checks for the Alphabet and
- The motor control movement is decided based on the matching of the text incoming with the 26 letters of the English Alphabet.

## 6. CONCLUSION

This setup of hardware with a combination of G-code gives better accuracy and reduces the work load. G code make easy to find the information of locations of all stepper motor moving, as the status of our moving motor are directly seen on computer hence we can start or stop the machine whenever we are needed. Making a small machine brings a flexibility to do work.

The advantages of our system are the cost of the hardware used is minimum, the man power required can be controlled, Can produce the desired number of replicas of the layout onto the copper board, Efficiency in reproducing the exact replicas compared to its predecessors is high. The proposed system is a ASWM (Automated speech writing machine) with which we can practically trace and plot or write text a layout from and onto a ASWM. In our system we can track a layout and plot it directly on to a copper board. For this we use the aid of a robotic arm.

The proposed system is a ASWM(Automated speech writing machine) speech based on the Arduino platform. It is a writer with a rotating, extendable arm. The main advantages of this system by using speech concept to control home appliances Fan on, lamp on are giving to commands according appliances work we have Achieves both work and improves system performance.

## REFERENCES

- [1] A S Patil, S R Kakade, M B Lad, D D Saste, D N Homkar, "CNC MACHINE PCB PLOTTER", International Journal of Advance Engineering and Research Development Volume 5, Issue 03, March -2018 @IJAERD-2018, All rights Reserved 1676 Scientific Journal of Impact Factor (SJIF): 5.71 e-ISSN (O): 2348-4470 p-ISSN (P): 2348-6406
- [2] Anjali K M, 2niveditha P S, 3p Shyama, 4 Sreeja Sreedharan V, 5 Susmi P S, "PCB Plotter And Retracer", International Journal of Industrial Electronics and Electrical Engineering, ISSN: 2347-6982 Volume-4, Issue-5, May.-2016 PCB Plotter and Retracer 104
- [3] Neethu Anie Saji "An ARM Based CNC Plotter", International Journal for Research in Engineering Application & Management (IJREAM) ISSN : 2454-9150 Vol-04, Issue-03, June 2018 434
- [4] Poonam Revankar, Shrey Kharde, Hitesh Mangaonkar, Nakul Pawar, Ameya Jadhav, "Wireless CNC Plotter", IOSR Journal of Engineering (IOSRJEN) www.iosrjen.org ISSN (e): 2250-3021, ISSN (p): 2278-8719 Volume 4, PP 09-11 International Conference on Innovative and Advanced Technologies in Engineering (March-2018) 9 Page
- [5] Tarun Kanti Pal, Dipak Kumar Mandal, Sk. Ebadattulla, Pallab Kumar Basak, Sourav Kumar Bhunia, Anirban Roy, Diptendu Senapati, "Modeling of Portable CNC Plotter Machine /3D Printer", International Journal of Research and Scientific Innovation (IJRSI) | Volume V, Issue III, March 2018 Page 73

- 
- [6] Udit Pandey<sup>1</sup> , Swapnil Raj Sharma, “Model and Fabrication of CNC Plotter Machine”, International Journal of Advanced Research in Computer and Communication Engineering Vol. 6, Issue 6, June 2017 IJARCCCE.2017
  - [7] Kajal J.Madekar<sup>1</sup>, Kranti R. Nanaware<sup>2</sup>, Pooja R. Phadtare, Vikas S. Mane, “Automatic mini CNC machine for PCB drawing and drilling”, International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 02 | Feb-2016, Page 1106
  - [8] Akshay R Sonawane<sup>1</sup> , Arun Bhiva Rane<sup>2</sup> , D. S. S. Sudhakar, “Development Of A3-Axis CNC Milling Machine With An Open Source Controller”, IJRET: International Journal of Research in Engineering and Technology Volume: 06 Issue: 08, Aug-2017
  - [9] Puja Girhe Shubham Yenkar Arpita Chirde, “Arduino Based Cost Effective CNC Plotter Machine”, International Journal of Emerging Technologies in Engineering Research (IJETER) Volume 6, Issue 2, February (2018) EverScience Publications 6
  - [10] Prof. Muhammad Asad, Saad. S.S. Ali, Ghulam Dastgeer, “Wireless Base CNC Mini Plotter Three Axis Control Machine”, International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 07 | July-2018 Page 774