

## Automatic Writing Machine (AWM) for Specially Abled Person

Atharva Naravane<sup>1</sup>, P.G.Chilveri<sup>2</sup>, Maitreyi Patil<sup>3</sup>, Apurv Kulkarni<sup>4</sup>

<sup>1,2,3,4</sup> Dept. of E & TC Engg., Smt. Kashibai Navale College of Engineering, Savitribai Phule  
Pune University, Pune

<sup>1</sup>naravaneatharva1298@gmail.com

<sup>2</sup>pgchilveri@gmail.com

<sup>3</sup>maitreyipatil@gmail.com

<sup>4</sup>apurvk99@gmail.com

### *Abstract*

*The Automatic Writing Machine is a device which helps the physically handicapped people to write, as they face difficulty in physical writing on paper. So this device is designed in such a way that it eliminates the necessity of a person to use his/her hand. The hardware platform used is Raspberry Pi 3B+ and Arduino UNO which is a powerful means for controlling device related real time operations. The mechanism is programmed with speech recognition system(or a computer input). To perform the writing operations, the device will be fitted with a pen. It can also make you draw small and simple sketches.*

**Keywords---** *Raspberry Pi 3B, Arduino Uno, Speech Recognition, writing machine, Automatic Machine, Plotter*

### **I. INTRODUCTION**

Since many years people who could not write that is they're disabled or blind, did not have any means to express their thoughts on a paper. Also, while appearing for exams they had to get a physical writer with them to write their paper while they dictate him/her. Considering these problems we tried to find a solution for this by introducing an automatic writing machine which will write as the person speaks in the microphone. So the main aim of the proposed system is to facilitate the physically challenged people. The device can be used by handicapped people for writing operation. The main aim of developing the proposed system is to facilitate the physically challenged people to write or type. Presently, the physically challenged people need scribe/writer during exams to write their papers.

### **II. LITERATURE SURVEY**

In this survey, we have analysed or studied a few research papers related to this project. We have written the gist of all the papers in the survey, i.e, which technology has been used, which processors or board is used. Also the basic working principle of all the papers has been listed.

This paper [1] uses Android Phone to display text on a monitor from speech input with the help of Bluetooth and Raspberry Pi. This application is quite useful in classrooms and presentations. This system gives ease of giving inputs to blind, deaf and physically handicapped people. Python is used as the programming language to write the code. AMR(Android Meets Robot) Voice Apk software is used for speech to text conversion in android. The speech is converted into text file and the same is sent to raspberry Pi through Bluetooth device which is displayed on the monitor.

Homework composing machine[2] is used for drawing any kind of content and sketching any outline on paper. Homework composing machine works like a CNC machine. This Machine is chipping away at 3 axes (X, Y, Z). This three axis movement is constituted by stepper motors and servo motors. It is

very useful and can be used in everyday life, it is more or less demanding and is exceptionally useful for school and school going children and very helpful for the IT sector.

The purpose of this paper[3] is to demonstrate the implementation of a Voice Command System. A Voice Command System means a system that processes voice as an input, processes the meaning of that input and generates an appropriate voice output. Raspberry Pi is the core of the voice command system as it processes the data. Sound input is given as input to the speech-to-text converter, which converts speech to text. Then that text is broke down and searched for keywords. This system is built around system of keywords where it searches the text for key words to match. Once keywords are matched then it gives the required output.

The proposed system [4] will receive the speech input from the microphone and get stored on the PC. If the match of spoken word is found in the dictionary, the computer will compare the speech signals with dictionary of words stored in it and sends the control signals to robotic arm connected to the arduino to control the servo motor. The three actuators (servo motors) are connected to the robotic arm which is connected to the arduino board. Human arm basically moves in three axes. This movement of human arm is achieved by using three servo motors moving in three different directions. The working of the robotic arm basically involves two parts. The first part consists of receiving the speech signal and converting it into text and other part involves mechanical action of motor to obtain written text.

This paper deals with the automatic pen writer with brain sensor[5]. Automatic writing is an ability allowing handicapped people to write words without consciously writing. These words come from the conscious mind of the person. Automatic writing machine is a mechanical hand which is used to write characters as well as words. The pen is used to write whatever the person wishes to indicate to others with the use of brain sensors. The pen writer consists of automatic writing machine, pen, hard disk, voice sensor, brain sensor, battery etc. The automatic pen writer with brain sensor is designed for three main purposes. First to sense the things that come to our mind using brain sensors, second is to convert the mind sense to voice matter. Hence the voice is thereby converted to text using automatic writing pen.

This paper[6] has discussed a new concept that is Automatic Pen Writer using Voice sensor commands. Automatic Writing pen is a mechanical hand which is used to write the words, characters, numbers, etc. from the user commands. Pen is used to write the document stored in the hard disk, user sends input through the voice sensor. Another feature is included that is scanner can scan the font style of user and execute it. The components used required for automatic pen writer is auto writing hand, battery, hard disk, voice sensor, scanner, transmitter, receiver, etc. First the voice of the user is listened, and document is written. In this, a transmitter is connected to commands given by the user and receiver is connected to automatic pen.

This paper[7] presents the design of the low-cost voice recognition based home automation system for the physically challenged people who cannot move their limbs but can speak and listen. The uttered words are fed to the microphone and these words or speech signals are sampled to recognize them and sent further to the Arduino Board. Voice Recognition Module converts the Voice Signal to text output. The recognized text can be stored in module that is connected to an Arduino. This project is capable to recognize the speech and convert the input audio into text, it also enables a user to perform operations by providing voice inputs. Arduino displays the input word on LCD and according to this word action is taken and a signal is fed to relay to control appliances.

The aim of this system [8] is to convert the input speech signals into the text output for the deaf or dumb. This paper presents an approach to extract features by using Mel Frequency Cepstral

Coefficients (MFCC) from the speech signals of isolated spoken word. And, Hidden Markov Method (HMM) is applied to train and test the audio files to get the recognized spoken word. The speech database is created using MATLAB. Then, the original speech signals are preprocessed and these speech samples are extracted to the feature vectors which are used as the observation sequences of the Hidden Markov Method (HMM) recognizer. We have cut short the discussion of this paper as this system holds limited use in the implementation of the project.

This paper [9] illustrates major technological overview of speech to text conversion and also gives gist of the technique developed in each stage of classification of speech to text conversion. Each stage consists of distinct concepts. The future scope for developing technique in human machine interface system in different languages is the conclusion of this paper. It also discusses the various techniques used in each step of a speech recognition system and to analyses an approach for designing an efficient system for speech recognition. In this system an online speech-to-text engine is developed.

The main idea behind this paper[10] is to design and implement a cheap, smaller size, easily operable, easy interface and 3-axis Computer Numerical Control(CNC) plotter machine. The lower cost is achieved using 2 CD drives from old PCs with their stepper motors as the main structure for the hardware. The pen movements are controlled using two stepper motors which are present in the CD drives onto X and Y axis and one on the Z-axis. The proper drawing synchronization is handled by the Arduino UNO board using these three motors during printing/drawing process. The Arduino is programmed with G-code parser from PC that is connected to the Arduino through a USB cable to control the motors movement and synchronization. The plotter machine is implemented and tested by printing different images and texts on papers using a pen. The motors' winding Voltages were displayed on the oscilloscope to investigate the synchronization between the three motors.

This study [11] 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. It is executed through the algorithm and G-code and Java programming. The X-Y plotter is a more simplified system as compared to the CNC machine since CNC is running on 3-axis direction and the programming is more complicated. G-code is the generic name given for a control language for Reprap machines.

This paper[12] will present an affordable model of a plotter machine which is able to write the text which is spoken in the AMR\_Voice App. At first the user needs to convert any text file into G-code using InkSpace software and then feed it to the machine using Processing Software. Arduino UNO is used as the controlling device for this project. The microcontroller converts this G-code into a set of machine language instructions to be sent to the motor driver of the plotter.

By studying all the above papers it was observed that most of the models have been developed using Arduino and G-code. Most of the papers doesn't use speech as the primary input and due to arduino being a microcontroller, its functionality is limited. Moreover it uses C++ as the programming language, thus it cannot run or execute a full scale operating system.

### **III. PROPOSED MODEL**

By studying the above papers, it was evident that arduino, alone is not a fully functional board. Hence we used Raspberry Pi in addition to Arduino as a modification. As the Pi uses python programming language it is easy to use to develop an operating system. It is as good as a mini computer. Also we have used user speech as the primary input. Raspberry Pi is not having a short pulse, and hence it

cannot rotate a stepper motor on a high speed. Also it cannot take the load of multiple motors rotating simultaneously and thus use of Arduino is required.

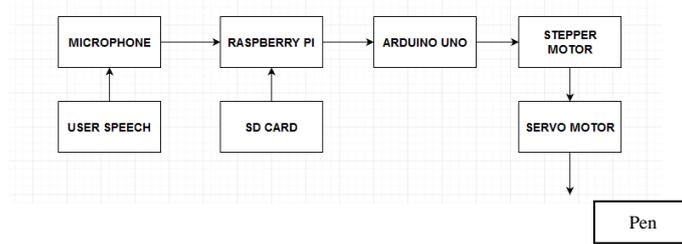


Fig1: Block Diagram

In this project we are going to use ULM2003 motor driver to control the stepper motor from Arduino. Depending upon the stepper motor configuration, step angle varies. Various popular step angles are  $0.72^\circ$ ,  $1.8^\circ$ , etc. We are going to rotate the stepper motor in steps and in limited angular rotation. Hence, we need to provide sequential steps. The combination of full and half step sequence could be used to draw the letters. The speech to text Conversion is performed by Raspberry Pi and the motors are rotated by Arduino.

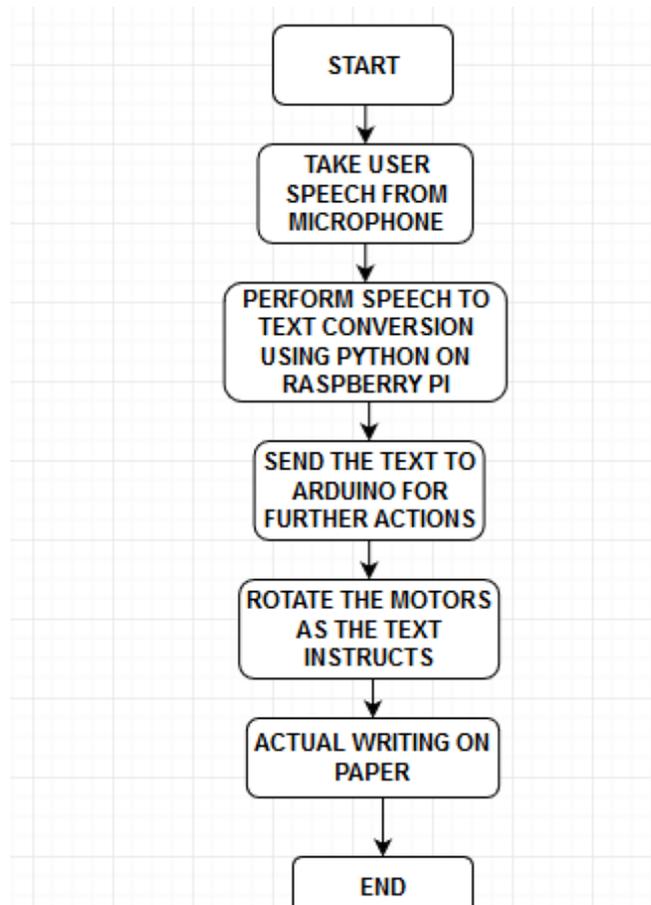


Fig2: Flow Chart

#### IV. CONCLUSION

By studying all the research papers, we came up with a combination of Arduino uno and Raspberry Pi and a different model is designed. Now the main circuit implementation, interfacing of servo and

stepper motors etc will be carried out. Once the model is implemented, it could be useful for future research and improvisation. Automatic Writing Machine is being implemented with Raspberry Pi and Arduino uno. The prime utility is in such applications where the person is physically unable to write. The system is relevant because it converts speech into physical writing with the help of Speech Recognition Raspberry Pi and Arduino uno.

## ACKNOWLEDGEMENT

The designing and implementation work is carried out in the department of Electronics and Telecommunication – SKN College of Engineering, Pune. Authors are very much thankful to Guide, Head of the Department and faculties for the support.

## REFERENCES

- [1] M. Sudhakar, Vandana Khare, D. Vijay Krishna Kanth. "Speech to Text Conversion & display using Raspberry Pi". Department of ECE, CMR College of Engineering & Technology, Hyderabad, India.
- [2] Mr. R. Augustian Isaac, Asst. Professor, Amit Kumar Singh, Prateekhit Tamta and Gaurav Singh.
- [3] "Homework Writing Machine". Department of Science and Technology, SRM Institute of Science and Technology, Ramapuram, Chennai, Tamil Nadu-600089
- [4] Surinder Kaur, Sanchit Sharma, Utkarsh Jain and Arpit Raj. "Voice Command System Using Raspberry Pi". Bharati Vidyapeeth's College of Engineering, New Delhi, India.
- [5] Milind Baviskar, Lakshman Korra, "Arduino Controlled Automated Writing Robotic Arm". National Institute of Electronics and Information Technology, Aurangabad, Maharashtra, India Scientist 'C', National Institute of Electronics and Information Technology, Aurangabad, Maharashtra.
- [6] N.Harini, S. Catherina Dolly, R. Parvadhavardhini International Journal of Engineering Research & Technology (IJERT), "Automatic Writing Machine using Brain Sensor". Department of Electronics and Communication Engineering, Anand Institute of Higher Technology, Anna University, Chennai, India.
- [7] Vidiyala Sri Sai Sudheer Kumar, Valeti Teja Kiran, Rachakonda Gopi Chand, Soniya Nuthalapati, Sowjanya Kesana. "Automatized Pen Writer by utilizing Voice Sensor Commands". UG Scholars, Department of ECE, KKR & KSR Institute of Technology and Sciences, Vinjanampadu, Guntur District, Andhra Pradesh, 522017, India. International Journal of Research in Advent Technology (IJRAT) .
- [8] Kailas Puri, Vivek Ajage, Satyam Mali, Akhil Wasnik, Amey Naik and Guided by Dr. Prof. M.S. Pansse. "Speech to Text Wireless Converter". Department of Electrical Engineering, Veermata Jijabai Technological Institute(VJTI), Mumbai, Maharashtra, India.
- [9] Su Myat, Hla Myo Tun. "Speech to Text Conversion(STT) System Using Hidden Markov Model(HMM)". International Journal of Scientific & Technology Research Volume 4.
- [10] Prof. V.P. Bhope, "A Review on Speech To Text Conversion Methods". Department of E&TC, G.H.R.C.O.E.M Ahmednagar, Savitribai Phule Pune University.
- [11] Aman Ismail Nsayef, Anas Lateef Mahmood. "Microcontroller Based Plotter Machine". Electronics & Communication Eng. Dep., Al- Nahrain University, Baghdad, IRAQ.
- [12] W.M.Ng, F.H.Loo, R. Hamzah, A.Farhana. "Design & Development of XY Plotter Mechanical System Design". Faculty of Mechanical Engineering, University,26300 UMP, Kuantan, Pahang, Malaysia.
- [13] Sheetal N. Patil, Prashant G. Patil. Asst. Professor, "Implementation of Arduino UNO based Two Directional [2D] Plotter".Department of Information Technology, R C Patel Institute of Technology, Shirpur(M.S) India.