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# Development of Automatic Writing Machine using Android Interface and Voice

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***Abstract*—***Voice recognition alongside Machine Learning can help achieve greater goals in terms of automatic writing tools made available to the society. Traditional approach to writing scriptures and handwritten theses are far more replaced by machine typed material which is far more accurate and easy to analyze as well as understand. The proposed system also helps provide the same by using voice recognition and some inherent motors which will be controlled as per the voice data received from the user. Machine learning algorithms are way powerful in analyzing such complex data and syncing it further with the motion of the mechanical motors to recreate the human art of writing. It will enable flawless and faster writing material which would be of greater use to one and all and short scripts and notes could be generated right away without even the need of identifying the data in the first place or lifting up the pen in the other.*

***Keywords—Writing Machine, Machine Learning, Voice Recognition, Android Phone, Bluetooth Module, Arduino UNO.***

## I. INTRODUCTION

The proposed system presented in this report is based on the development of automatic writing machine using android interface and voice. Machine is a system that consist of various components which when assembled together perform definite function. As the name suggests, this machine is a combination of mechanical and electronic system which together perform the task of writing. Most of the machines at the present time work on the principle of mechatronics which indirectly results into automation.

From the past few years, automation has increased to a very large extent. Automation is playing an important role in performing day to day life functions. Time and man power are critical constrains for completion of task in large scales in this high society. As we know, students spend most of their valuable time in writing term work and don't get enough time for other activities or else to explore new other things. Also authors, script writers spend plenty of their time in either writing or typing story and dialogue. Most important of all handicap people are unable to write on their own. So, to tackle these problems we are developing a writing machine which works on speech recognition technique.

The objective of this project is to develop a writing machine which can be controlled by voice recognition technique. This machine will be able to decode the input voice commands into the lateral movement of the X-Y slider system. The previous model was based on the two-way process (man-computer-machine) which consume more time. So as to eliminate this problem to some extent the proposed model is combined with artificial intelligence making it one-way process (man-machine).

## II. SETUP

### 2.1 Design Considerations & Calculations:

The main aim was to develop a model which is highly efficient, smooth working, simple in construction & low in cost. Initial consideration was to develop the model according to the A4 (210 x 297 mm) paper size. Considering side shaft motor bracket length and space for the complete motion of the slider with some extra clearance according to the A4 size paper the rod length was decided.

L = length of side shaft motor bracket + spacing between bracket & slider + extra clearance

Hence, length of polished stainless-steel rods = 20 inch

L= 508 mm.

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Another important consideration was the selection of proper material for the model. The required material must be light weight, strong & low in cost. Hence according to our desired criteria, acrylic sheet was selected which is stronger than other plastics and has very good resistant to weather conditions. Conversion of CAD model parts into drawing sheets were done on CORELDRAW for the laser cutting of acrylic sheet.

### 2.1.1 Side shaft motor:

**Table 1**
**Side shaft motor specifications**

| Parameters | Description |
|---|---|
| Speed | 30RPM |
| Voltage | 12V |
| No-load current | 60 mA |
| Full load current | 300 mA |
| Stall torque | 2kgcm |
| Shaft diameter | 6 mm with internal hole |

**Fig 1.Sideshaft motor**

### 2.1.2 Pulley:

**Table 2**
**Pulley specifications**

| Parameters | Description |
|---|---|
| Pitch | 2 mm (GT2 |
| Material | Aluminum Alloy |
| No of teeth | 20 |
| Bore diameter | 5 mm |
| Belt width | 6 mm |
| Overall length | 23 mm |
| Hub diameter | 16 mm |
| Pitch diameter | 12.73 mm |
| Outside diameter | 12.20 mm |

**Fig 2. Belt and Pulleys**

### 2.2 Drive Calculations:

Speed Ratio = i = $\frac{\text{No of teeth on pulley 1}}{\text{No of teeth on pulley 2}} = \frac{20}{20}$ = 1:1
Design Power = $P_d$ = 0.0065 KW
Angular speed = ω = 37.69 r/s
Speed = V = 0.479 m/s
Effective load = $T_e$ = 10.43 N
Approximate center distance = $A_o$ = 371 mm
Pitch of belt = p = 2 mm
No of teeth on pulley = $z_1$ = 20
No of teeth in belt = Nc = 381
No of teeth in mesh = 10
Lap Angle = ɵ = 180º

**Fig 3. Belt-Pulley arrangement**

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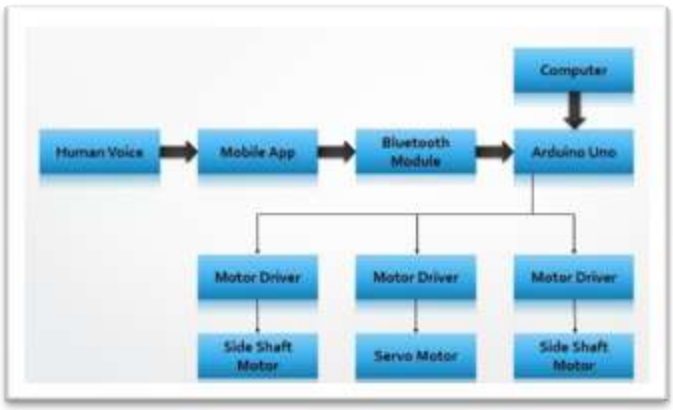
### 2.3 Construction / Working:

A plus shaped machine with independent X-Y sliders having two side shaft motors mounted on their ends and servo motor being fixed on the upper slider for the lifting of the pen. Linear slide bearings are used to support the side shaft motor and timing pulley-belt arrangement while linear bearings are used for smooth and efficient movement of sliders. All motors are battery operated.

Conversion of human voice to text is done through AMR voice App. These text signals are sent to the Arduino UNO via Bluetooth module. Arduino UNO receives the text signals and suitably it gives the desired motion to the motor drivers and later to the side shaft and servo motors. Side shaft motor with the help of the timing pulley and belt ensures that the pen covers the entire surface to be written on, while the servo motor controls the lifting of the pen. The motor drivers drive the side shaft and servo motors and accordingly achieves the desired text to be written with help of X-Y slider arrangement.



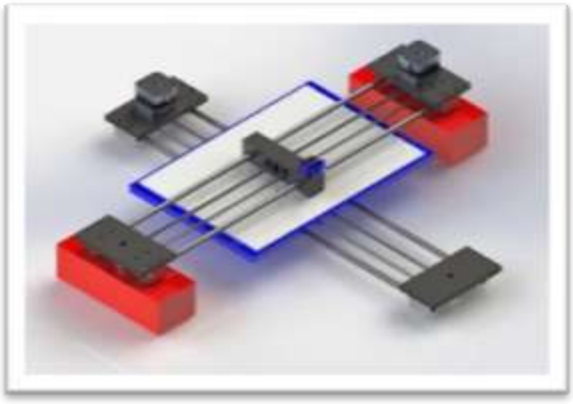



**Fig 4. Block Diagram Fig 5. CAD Model of Writing Machine**

### 2.4 Objective:

1) To help handicapped people, so that they can write on their own.
2) To provide ease for authors, script writers as they spend plenty of their time in writing.
3) To make sure that students get more time to explore new ideas.
4) To be useful for handwritten invitations.
5) To eliminate human errors in writing to some extent and ensure precision.

## III. ANALOGUE CIRCUITS AND COMPONENTS:

Electrical design of the writing machine -

1) Arduino Uno
2) Side shaft motor
3) Metal Gear Servo Motor Mg90s
4) L293D Motor Driver
5) End Switches
6) Bluetooth Module
7) Android phone

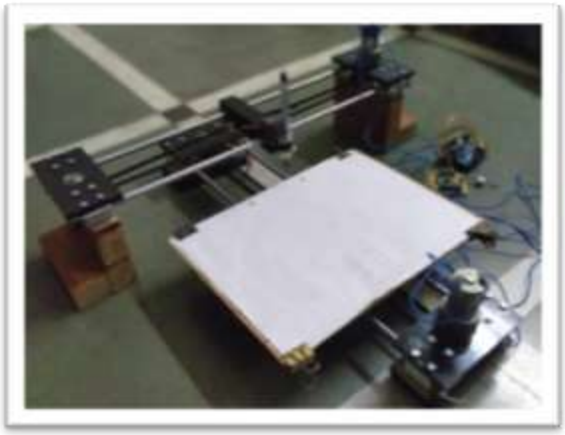


**Fig 6. Actual Model of Writing Machine**

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### 3.1 Arduino Uno:

A set of instructions are sent to the Arduino UNO which help to achieve the desired output. Arduino UNO is preferred because it is inexpensive, simple to use, extensible, open source and more accessible compared to other micro-controllers. Arduino UNO R3 is used to ensure faster transfer rates and more memory to save the codes of every alphabetical letter.


**Fig 7. Arduino Uno Microcontroller**

### 3.2 L293D Motor Driver:

When the Arduino UNO receives the text signals suitably it gives the desired motion to the motor drivers. The project model consists of three motors i.e. two side shaft motors and the servo motor. The motor drivers will drive side shaft and servo motors and accordingly achieve the desired text with the help of X-Y slider arrangement.

**Fig 8. L293D Motor Driver**

### 3.3 Bluetooth Module:

The microcontroller Arduino UNO is connected to the Google text-to-speech app by Bluetooth module HC-05 wirelessly. The voice converted text signals by the app are sent to the Arduino UNO through the Bluetooth module.

**Fig 9. Bluetooth Module**

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## IV. CONCLUSION

Development of automatic writing machine using android interface and voice has brought ease in writing. The boring and time-consuming task of writing is now been made interesting. This machine brings precision to our desired work. Our written work on paper with the help of writing machines is free of errors, cancellations.

By the implementation of artificial intelligence this machine is been brought into the era of machine learning leading it to enhancement of writing machines. Automation due to artificial intelligence takes the relationship of man and machine to a next level bringing simplicity, ease in work etc. in human life.

This will help the department of education, administration, municipal, judicial, police, drama etc. to a great extent. Students would be able to use their precious time in other useful stuff rather than wasting it in writing. The same goes with script writers, authors, clerks etc. Mainly handicapped people would now be able to write on their own.

### 4.1 Advantages:

Compared with other previous models of writing machine, the main advantages are as follows:

1) increased efficiency & smooth working;

2) improved system balance;

3) stability improvement;

4) precise & portable system;

5) comparatively lower cost.

### 4.2 Disadvantages:

The disadvantages are as follows:

1) slightly bulky;

2) belt slipping may lead to interruption in working;

3) mistake in voice feed or spelling errors by the app cannot be rectified by the machine.

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