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DESIGN AND DEVELOPMENT WRITING ROBOT USING SPEECH PROCESSING FOR MEDICAL PRESCRIPTION

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Abstract—**The paper's main goal is to outline the direction and the process for creating swift, fluid movements for a universal robot that can write like a doctor signs a prescription. The majority of consumers and certain pharmacists find it difficult to understand a handwritten prescription from a doctor; this issue can have unfavorable consequences if the prescription is misread Prescriptions can be confusing since doctors often employ Latin and medical phrases that are abbreviated and difficult for the general public to understand. To complete the work, online human signature criteria must first be devised. Robot signatures are then produced as a result of writing robots in compliance with these recommendations. Finally, suggestions for improving robot movement are provided.**

Keywords— **Arduino, Bluetooth Module, LCD, Stepper Motor Driver, Stepper Motors and Servo Motor.**

I. INTRODUCTION

Within the domain of innovation, mechanical autonomy stands nearby discourse handling as a apex accomplishment. The investigation of discourse signals and their processing is typified within the field known as discourse preparing. Computerized frameworks oversee these signals, characterizing discourse preparing as an commendable occurrence of progressed flag communication between people and machines, regularly alluded to as Robotized Discourse Acknowledgment (ASR).

Persistent discourse signals with an broad lexicon can be deciphered through ASR, empowering applications such as changing over discourse into content. When coordinates with ASR, discourse preparing encourages human-robot intuitive. The essential reason of robots is to disentangle errands for people and save time. Modern robots are outlined not as it were to imitate human activities but moreover to perform comparable errands. Analysts are effectively creating mechanical arms that imitate essential human arm capacities, displaying a potential arrangement for people confronting physical challenges.

In our society, numerous people hook with inabilities, either from birth, by choice, or due to sicknesses and mishaps. Composing gets to be a critical challenge for those without arms or members, driving to challenges amid exams. Guardians and companions regularly scramble to discover recorders for understudies with incapacities amid exam periods. This bind can result in feelings of mediocrity, discouragement, and powerlessness for understudies with incapacities.

To address this issue, our proposed venture points to encourage online exams for individuals who are dazzle or have hand impedances. The imagined arrangement includes a speech-processing automated arm outlined to help physically challenged people in recording their answers. The component is modified to translate talked reactions, utilizing a pen-equipped mechanical arm to translate the answers. This cost-effective contraption points to enable people with physical confinements to lock in in composing exercises.

The proposed framework comprises two primary components. The introductory component executes engine activities to capture composed reactions upon accepting a discourse signal and interpreting it into content. Through this innovative approach, we aim to supply an comprehensive and open arrangement for people confronting physical challenges amid examsII. Proposed Algorithm

II. LITERATURE SURVEY

[1], Singh et al. walk through the use of a voice command device enabled by Python, the Natural Language Toolkit, and Raspberry Pi.

Although the device's microphone is useless in noisy areas, blind individuals and home automation applications could make use of it. An Arduino processor-based writing aid for the visually impaired was demonstrated by Milind and Lakshman in [2]

Mel's Cepstral Coefficient, Dynamic Time Wrapping, and MATLAB tools are used.

[3] An Arduino-controlled writing robot that is easy to build and saves people time and effort was suggested by R. Balatharangam et al. It uses servo mechanisms, Neuo fuzzy

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control technology, and Microsoft Visual Basic Studio. It is trial-and-error based and is unable to write curved letters.

Balaganesh et al. presented a low-cost, MATLAB-based robotic arm with writing skills to assist those with disabilities in writing [4].

[5] Sania Khan et al. suggested using an interactive voice recognition technology to conduct the test online. It makes use of a number of methods, including as picture matching through content-based image retrieval, speech synthesis, and speech recognition.

III. RELATED WORKS

We are attempting to implement the concept of a robot writing mechanism for doctors in our suggested system. Prescription medications are given by the physician, whose voice is picked up by a microphone, recognized by an Android smartphone, and sent to the robot mechanism via a Bluetooth module. Once the receiver has received the data, it will transmit it to the micro controller. Following the receipt of data, the robot mechanism will start entering the information onto the writing pad. In this way, robots may write the doctor's prescription without any mistakes or delays in time. The process in this system is controlled by an ATmega328 microcontroller. We have previously embedded the process's program in this microcontroller. This software performs the conversion of human voice to text. Robots can quickly identify the data by utilizing this application, and they will record it on the writing pad. This system may be useful in the medical area in the current digital age.

IV. METHODOLOGY

Processing software is utilized to transmit the G-Code file to the microcontroller after the movement-Code file has been generated using the Ink-scape tool. Next, the CNC shield drive communicates with the stepper and servo motors to transmit control signals. The XY axis is now following the instructions of the controller unit. The data is transferred to the controller block when the two codes match. The pulse width signal is supplied to the motor unit for processing by the controller block, which interfaces with the motor driver unit via the DAC. The equipment that produces the output displays and prints the result on paper.

To obtain a physical copy, the process involves manually completing the answer sheet and scanning the question paper. Additionally, the setup includes activating the microphone to capture speech input, and an exception is triggered if no response is detected. The speech-to-text converter processes the spoken input, generating textual content. This text is meticulously transcribed, saved in a Word document, and subsequently emailed to the respective teacher. The interactive Q&A session is bifurcated into two components: the automatic emailing of the student work file to the teacher and the interactive Q&A segment. Before the examination commences, the question paper is utilized as input, and earphones are provided to disabled students. These earphones enable the student to hear the questions being posed during the exam.

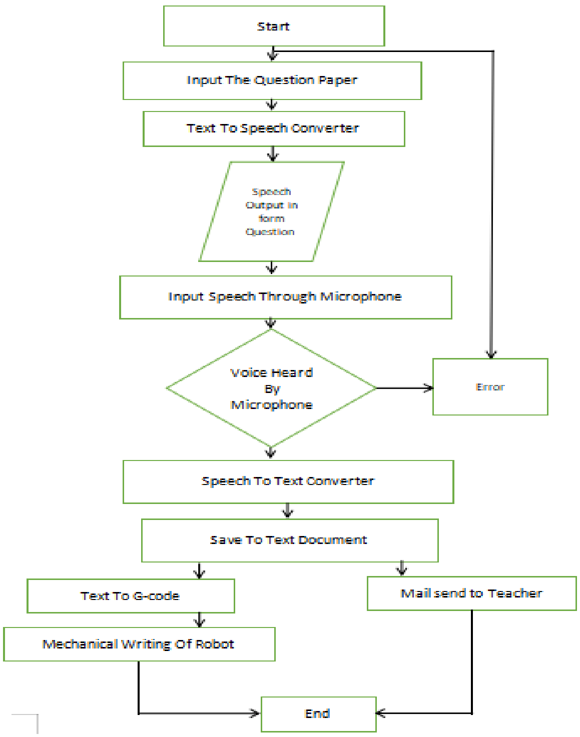

Fig. 1. Flow chart

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Responses to questions are verbalized by the student, and these spoken responses are then transcribed, as depicted in Fig. 3. Python libraries such as Smtplib, win32com.clients, speech recognition, and pyaudio are employed to convert the student's speech into text [6]. The student is prompted to provide responses through the computer's microphone whenever the program is active. The system cross-references the spoken words with a database, akin to a computerized dictionary. If the computer fails to recognize any of the words, the student is prompted to re-enter the speech. The correct word for the input speech is determined once it is identified, and the transformation of speech to text occurs only when an exact match is found. The maximum duration for a response is 60 seconds.

A writing robot is used to generate written prescriptions that are customized for each patient via wireless communication. Using Inkscape software, a movement-code file is created. The G-Code file is then sent to the microcontroller using processing software, and the CNC shield drive is used to provide control signals to the stepper and servo motors. The controller unit gives the XY axis instructions on how to function. The DAC sends the beat width signal to the engine unit, and the code exchanges data with the engine driver unit and regulator block. After processing this signal, the output unit transcribes and displays the outcome on paper.

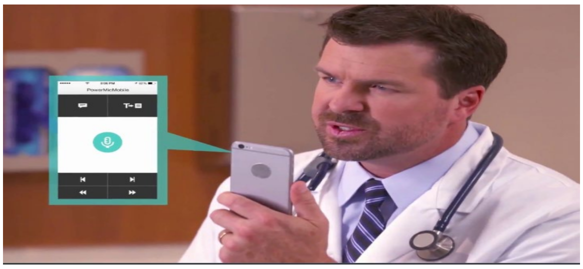

Fig. 2. Transmitter section

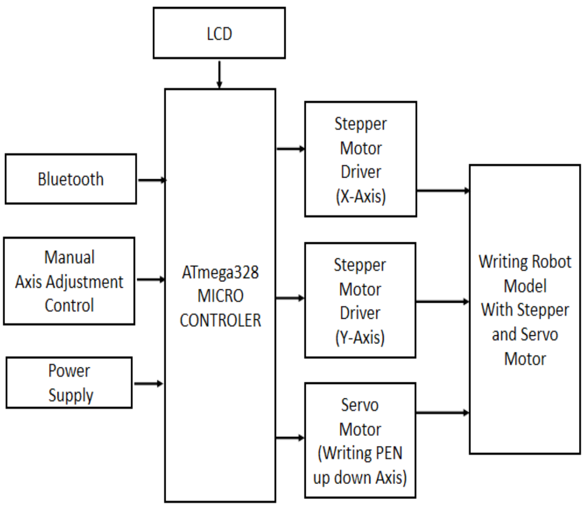

Fig. 3. Architecture diagram

An adaptable tool for building computers with improved capabilities for detecting and controlling the real environment is the Arduino. It performs as a simple microcontroller board and offers a better programming environment specifically designed for the board. With smooth wireless serial connections in mind, the HC-05 Bluetooth SPP (Serial Port Protocol) module was created. It is compatible with Bluetooth V2.0+EDR standards, has a 3Mbps data rate, and uses a CSR Bluecore 04-External single-chip Bluetooth system. It operates in the 2.4GHz radio frequency. Its performance is improved by the use of CMOS technology and the Adaptive Frequency Hopping Feature, guaranteeing user-friendly interactions.

Liquid Crystal Displays (LCDs) result from the combination of crystals and liquids. Unlike materials with a distinct melting point, LCDs exhibit a temperature range where molecules possess a degree of mobility akin to liquids yet maintain a crystalline arrangement. In contrast to traditional melting points, this characteristic allows LCDs to retain their structure within a specific temperature span.

Stepper motors respond to commands by moving a designated number of steps through incremental rotations before coming to a halt. Due to their intrinsic nature, stepper motors find frequent use in cost-effective open-loop position control systems. Open-loop control negates the need for feedback mechanisms regarding the motor's position, eliminating the necessity for expensive sensors like optical encoders. Position calculation is facilitated by counting the number of input step pulses.

It is a straightforward drive mechanism for unipolar stepper motors with five and six wires. While the depiction focuses on a single coil, the same configuration applies to the additional coils. In unipolar motors, current flows unidirectionally within a specific coil section, denoting the term "unipolar." Unlike bipolar stepper motors, unipolar ones lack a center tap, simplifying construction but necessitating additional components.

Gears and belts play a pivotal role in altering the speed and torque of rotary motion transmitted between shafts. Gear sets are commonly employed when shafts are in close proximity, while belts and pulleys (or sheaves) connect shafts when a greater distance separates them. These mechanisms contribute to the efficient transmission of motion and power within various application

V. RESULTS AND DISCUSSIONS

A. **Pros:**

- Accuracy
- Optimized character axis
- Low lag
- Low expense

B. **Applications:**

- Medical

- Handicapped writing
- Industrial data

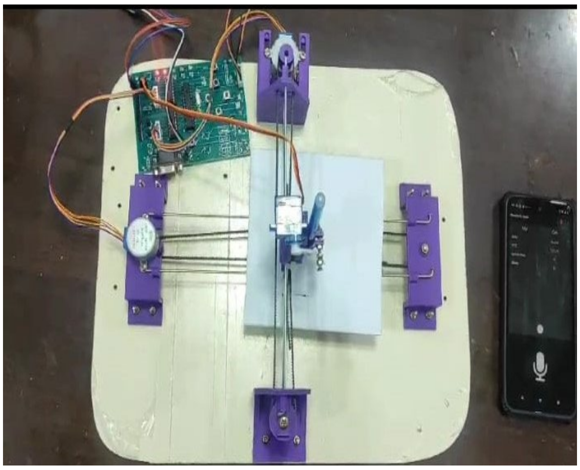

Fig. 4. Final Output

VI. CONCLUSION AND FUTURE WORK

Writing prescriptions is a vital duty for medical practitioners; writing the wrong prescription can have deadly results, including death. We are approaching a concept to solve this issue as a result of this effect. Our approach for creating a robot that can write prescriptions without errors is presented in this publication. By doing this, prescription writing errors related to drug errors will be less common. In order for patients and pharmacists to understand the prescription written down, our approach to this project is to find a robot that can write down a medical prescription exactly as a doctor says it on a mobile app. The patients can now take the appropriate medication, and the pharmacist can administer the appropriate medication.

We intend to incorporate equations into this proposed work in the future so that it can be applied to a variety of tests. The audio input can run for longer if the right modifications are made, and the students may revisit the solutions to the questions to review and correct any errors. The word blunder rate can be moved along. The answers that were mailed might be more secure.

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