Automatic Writing Machine

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Abstract: To achieve the highest level of production, time must be used wisely and effectively. Technology and automation become essential tools for a sales organization's success and continuing expansion as the process becomes increasingly complicated and laborious. Nowadays, more and more people utilise robots for work since they are more trustworthy, precise, and adaptable while also needing less human labour. Programmable robots that mimic human arms are called robotic arms. Building a robotic arm that enables people with physical restrictions to write is the goal of our project. The user must type what he says since the mechanism is set up using a speech recognition system. Everything said into the microphone by the patient or other person is set up to be recorded by the robotic arm.

Keywords: Arduino uno, servo motor, stepper motor, expansion board, motor driver, adapter.

1. Introduction

TTS, voice-to-text output, ASR, printers, scanners, and other technologies are available. The primary issue is that it only uses the fonts that the machine is already equipped with. Among them are Georgia, Impact, Calibri, Roman, and more titles. We want a system that can entirely cover a page with material using our own individual handwriting and pen ink. Taking inspiration from wooden CNCs and CNC machines that drill holes with accurate feeds to make designs on wood. Using this technique, we can develop a writing device that performs similarly. Fundamentally, some persons with physical disabilities who are unable to write owing to their disability but can think.

2. Type and Use

A. Polygraph

A polygraph is a duplicating device that uses pens and ink to create a copy of a piece of writing while also creating the original. An Englishman called John Isaac Hawkins invented it initially. In 1803, Hawkins secured a United States patent for his design. This early gadget, called as a polygraph at the time, has no similarity to today's autopens in design or operation.

B. Typewriter

A typewriter is an electromechanical equipment that produces characters similar to those created by moveable type in a printer. A typewriter typically contains an array of keys, each of which produces a distinct single character on the paper through a ribbon with dried ink hit against a type element comparable to those used in movable type letterpress printing on paper. The first commercial typewriters were launched in 1874, although they were not widely used in offices until the mid-1880s. Except for personal handwritten letters, the typewriter swiftly became a vital instrument for virtually all writing. It was commonly used by professional writers, in workplaces, and so on.

C. Telautograph

The telautograph was a forerunner to the contemporary fax machine. It transfers electrical impulses recorded by potentiometers at the sending station to servomechanisms coupled to a pen at the receiving station, replicating a drawing or signature created by the sender at the receiving station. It was the first device of its kind to deliver drawings to a sheet of stationary paper. The telegraph was invented by Elisha Grey, who patented it on July 31, 1888.

D. Autopen

An autopen is a gadget that automatically signs documents. Celebrities accepting autograph requests or politicians signing documents and communications in their official positions may be asked to offer their signatures many times every day. The Robot Pen autopen was developed in the 1930s and went on sale in 1937. As a result, many public figures utilise autopens to have their signature printed on demand and without their knowledge.

E. Axidraw

The AxiDraw project has been in operation since 2014, when Dr. Lindsay Robert Wilson founded it. In the United Kingdom. The AxiDraw is a pen plotter that is simple, contemporary, accurate, and multifunctional. AxiDraw machines are compatible with a wide range of writing tools, including permanent markers and fountain pens. The distinctive writing head extends beyond the machine's base, allowing you to write or draw on practically any flat surface.

3. Research Methodology

Reduce the amount of time you waste by using this tool for writing and drawing. There are several AWM devices. But normally everyone gains from this. We could programme the

Table 1
Result of hardware

S. No.	Parameter	Observed Value
1	Nema 17 stepper motor	4v, 1.2 a/phase
2	MG90S servo motor	+5v, 0.1s/60°
3	A4988 motor driver	35 v & ± 2 a
4	A4988 driver expansion board	12-36V DC
5	Arduino UNO R3 pinout	2kb sram, 32kb flash, 1kb eeprom
6	12V 2A adaptor	1.8 to 5.5 volt
7	FRAME	2.5/3feet

computer to write notes in our handwriting if we did this. We won't waste much time if we just settle down to work. The assignment, as well as a few handwritten notes, may be sketched and written on this device in our own handwriting. We can shorten the process by doing this.

We want a machine that can type out a whole document on a page using our own unique handwriting and pen ink. Similar to that, we'll employ this technique to build a writing machine. In essence, some physically challenged persons are able to think but are unable to sit down because of their limitations. The automated writing machine is designed to sense their thoughts using a brain sensing component and then reincarnated to speech by just using the electrical gadget in order to solve this problem.

The following justifications are given as to why we decided to programme Arduino:
1) Simple to use.
2) Inexpensive.
3) Simple to programmer.

Microprocessor is another excellent Arduino component. Additionally, it has memory capacity and multitasking. In comparison to the Arduino Uno, programming a microprocessor is far more difficult. The following components are utilised in the device: Stepper Motor 1, Stepper Motor 2, Metal Gear Servo, Expansion Board A4988, Battery, and Aurdino UNO R3. Stepper Motors 1 and 2 are widely found in CNC machines, hard drives, and linear actuators. As a result, it is also linked to expansion board A4988. Metal Gear Servo MG90S is a metal gear micro servo motor. As a result, it is linked to expansion board A4988. The Aurdino uno R3 is also linked to the expansion board A4988. The battery is attached to Expansion Board A4988.

A CNC writing machine is an automated writing device that can type any sort of text and make any type of design on paper. Three axes (the x, y, and z axes) are required to operate a CNC writing machine. The x and y axes collaborate to produce a 2D picture on plain paper. Because the axes are offset by 90 degrees, every point on the flat surface is identified by a specific value of x - y. Using the z-axis, the pen is lifted and lowered onto plain paper. The computer creates the appropriate coordinates for the drawing, sends them as G-code to the microcontroller through the USB interface, and the microcontroller interprets these coordinates.

This chapter describes the fundamental principles that underpin the project's conception and execution. This also provides a brief summary of how the hardware and software work in general. Electronic hardware is made up of interconnected electronic components that process incoming and locally stored data using analogue. In our project, Input is

a programme written in Arduino. As a result, on the expansion board, we connected the metal gear servo motor and two stepper motors. According to the extension board's specifications, four motors can be attached. The expansion board is then inserted into aurdino uno. A pen is attached to the metal gear servo, so when we enter some data into the Ben-Box programme, the pen will begin writing automatically and provide feedback.

4. Literature Review

A machine that automatically writes your assignment, drawing, or other writing job is known as an automated writing machine. This AWM machine assists with homework or other assignments by reducing the amount of labour required and saving time. In daily life, we have a propensity to acquire technology such as speech to text output, scanners, printers, etc., but there is a fundamental issue in that it writes slowly those typefaces that the computer already possesses.
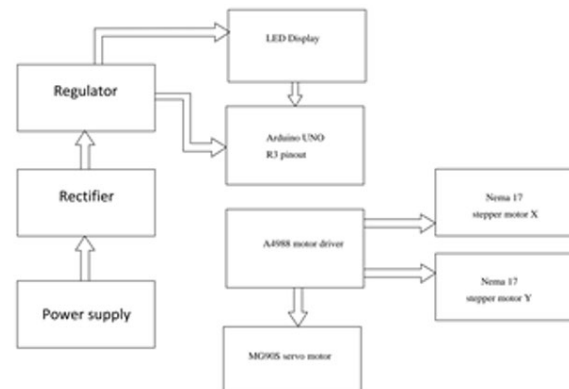

Fig. 1. Block diagram

The Automatic Writing Machine is divided into three parts: the mechanical portion, the electrical section, and the control section. A pen holder is coupled to a linear stepper motor in the mechanical part, which ensures accurate and exact movement of the pen on the paper. An Arduino microcontroller, a motor driver, and a few sensors make up the electronic part. The stepper motor is controlled by the motor driver circuit through an Arduino. The control section is in charge of controlling the stepper motor and sensor control signals.

The Automatic Writing Machine's circuit comprises of an Arduino board, a Stepper motor driver, and a few sensors. The sensors monitor the pen's location and alert the Arduino board, which regulates the stepper motor movement to achieve continuous writing. The Stepper motor driver communicates with the Arduino board to operate the Stepper motor, which moves the pen over the page. A 12V-2A power source supplies

electricity to the Stepper motor driver, Arduino board, and sensors in the system.

The Automatic Writing Machine's control logic comprises of an Arduino programme that handles the stepper motor movement and position sensors. To operate the stepper motor, the software uses the G-Code programming language.

5. Details of Implementation

A. Stepper Motor

Stepper motor is a type of motor that is specifically designed to move in small, precise steps. It's typically used in applications that require accurate positioning or control. The motor's rotation is controlled by an electronic pulse, which determines the number of steps that the motor can move. Stepper motors come in various sizes and shapes, and different types of stepper motors have different levels of accuracy and torque.

B. Servo Motor

A servo motor is another type of electric motor used in applications requiring precise control of position, velocity, or torque. It usually consists of a motor, a control circuit, and a feedback device that gives the control circuit positional feedback. This enables the actuator to move to a desired location depending on feedback. Servo motors are widely employed in a broad range of systems that demand precise and accurate control, such as robotics and automation.

C. Motor Driver

A stepper motor driver is an electrical device used to power a stepper motor. It usually does nothing on its own and must be used in conjunction with a controller since stepper motors require voltages and/or currents that the controller cannot produce. As a result, we'll need to use a stepper motor driver. This electrical device will turn our controller movement instructions into a sequence in which the stepper motor's winding is switched on or off while still supplying enough power to it. Motors require a lot of current, whereas the controller circuit just requires a little. In order to operate a motor, motor drivers must convert a low current control signal into a higher current signal.

D. Expansion Board

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E. Arduino Uno

The Arduino Uno is a well-known microcontroller board that is used in a variety of electrical applications. It has an ATmega328P microcontroller with a diverse set of input/output pins that can be programmed in a variety of programming languages, including C++. This board is simple to use and programme, and it may be used as the main control unit in a variety of electronics projects, such as miniature robots and home automation systems.

F. Software Overview

A software overview is a summary or evaluation of computer software that is intended to be instructive or promotional. It usually includes information about the software's features, capabilities, system requirements, and compatibility with other systems. A software overview can assist consumers in determining if a certain software package is appropriate for their needs.

G. Drawbot_Image_To_Gcode_V2

This code produces gcode for drawbots, polarography, and other vertical drawing machines. It takes an original image, manipulates it, and creates a drawing path that resembles the original image in some ways. This code was created particularly to deal with several Coptic markers. The code was designed to be widely updated in order to produce various and distinctive drawing styles. If you have a URL to a picture on your clipboard, the code will download it. This makes it simple and straightforward to discover appropriate photographs. If you have a URL to a website in your clipboard, the code will crash and burn spectacularly.

H. Inkscape

Inkscape is a popular open-source vector graphics editor for creating and editing vector pictures. It is comparable to other graphics software such as Adobe Illustrator, but the main distinction is that Inkscape is free and can be used on a variety of systems such as Windows, Mac, and Linux. The software supports a variety of vector file formats, including SVG, AI, and EPS, making it popular among graphic designers, web developers, and other vector graphics professionals.

I. UGS Platform64

The Universal Gcode Sender Platform (UGS Platform) is the next version of Universal Gcode Sender. It is developed on top of the Netbeans Platform, allowing us to take use of its sophisticated modular design. This platform enables the addition of new features without sacrificing code quality or being hampered by a custom framework. Because the Classic GUI is utilised as a library, fundamental functionalities are shared by both interfaces.

6. Conclusion

Stepper motor control, electrical control, and mechanical control with sensors were all used to deploy and run the Automatic Writing Machine effectively. The system could create brief documents quickly, precisely, affordably, and with a high degree of dependability. Future work may be done to

enhance the writing resolution, paper size, accuracy, and debugging capabilities due to its potential. It also includes information on the most recent technology utilised in constructing web-enabled application technologies, which will be in high demand in the future. This will give greater possibilities and advice in building initiatives autonomously in the future. Working on this intriguing and complex project has been a real pleasure for us. This project was beneficial to us since it taught us not only how to programme in Python and work with embedded systems, but also how to handle all of the "Automated Writing Machine" handling methods. It also includes information on the most recent technology utilised in constructing web-enabled application technologies, which will be in high demand in the future. This will give greater possibilities and advice in building initiatives autonomously in the future.

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