Voice Recognised Freehand Drawing Robotic Arm

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Abstract - **The mission of this project is to successfully apply this implementation in all sizes of educational organizations.**

Our corporate promises are;

- **Provide excellent human-machine relationship.**
- **Provide the ability for robots to draw/write study related documents or figures.**
- **Substantial growth in the field of e-learning.**

Our primary objective is to put forth vulnerable changes in educational environment by developing a new masterpiece that not only brings changes in mentioned field but also in the stream of ROBOTICS. Based on the user commands, the arm will be able to draw/write anything the user wishes to. This effort would definitely cause drastic change in e-learning.

Key Words: **ATMEGA, AURDINO ALPHA, UART, WiFi, VR module.**

I. INTRODUCTION

Glances at our surrounding visualize humanoids replacing the home appliances in all their performance aspects. Humans are so dependent on machines that without them they are handcuffed. Robots of this era are so advanced that no tasks are big deals for these weird wired creatures. Our major concentration is on educational field. Obviously every individual either explainer or student would be much happier if their work load gets rid of. This report throws light on developing e-learning by constructing a masterpiece capable of writing. ATMEGA8 being the brain or master of computing system, geared up by three servos driven by a driver circuit. Power supply of 9v is sufficient to charge up entire module.

1.1 Features of ATMEGA8 microcontroller

Fig -1: ATMEGA Board

- High-performance, Low-power AVR® 8-bit Microcontroller
- Up to 16 MIPS Throughput at 16 MHz
- Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
- Data retention: 20 years at 85°C/100 years at 25°C (1)
- On-chip Analog Comparator and many more.

1.2 Easy VR module

Fig -2: Easy VR module

VRbot Module as shown in fig. 2 is designed to easily add versatile voice command functionality to robots.

*VRbot features***:**

- A host of built-in speaker independent (SI) commands for ready to run basic controls
- Supports up to 32 user-defined Speaker Dependent (SD) triggers or commands as well as Voice Passwords.
- SD custom commands can be spoken in ANY language.
- Easy-to-use and simple Graphical User Interface to program Voice Commands
- Languages currently supported for SI commands: English U.S., Italian, Japanese and German.
- More languages available in the near future.
- Module can be used with any host with an UART interface (powered at 3.3V - 5V)
- Simple and robust documented serial protocol to access and program through the host board.

II. PROBLEM STATEMENT

2.1 Prevailing Models:

These machines have found their prominence in every aspects of life from small/easier jobs like lifting tiny objects to most complicated challenges like surgery. Many such models are dominating the outer world. Some of them are Dr. Robot, prosthetic hand, mind controlled robotic arm. They play very crucial role in one's life. Consider Dr. Robot the latest invention in robotics that can penetrate a small hole of human body and can perform surgery by remote access. What if the remote access is denied? What would be the condition of patient? Will he survive?

Another example is a mind controlled robotic arm for paralyzed. This is a MIND BLOWING concept where in a person localized on a wheel chair controls the arm for his/her daily routine. To do so a tiny micro SD card is to be implemented into the brain of person who is localized. That's the reason why it's mind blowing. It might be beneficial in one aspect but hazardous too.

Fig 3: Prosthetic hand

Fig4: mind controlled robotic arm serving paralyzed with a can of juice.

Fig5: surgical robot able to penetrate small hole and perform surgery.

2.2 PROPOSED MODEL:

How would it be if get only benefit rather than mixture?. How would it be if there was a robot obeying your orders and fulfilling your commands by reducing the work load? Our proposed model is a kind of that, able to write anything the user wishes to depending upon the control commands. Thus masterpiece was developed by keeping a fact in mind that robots one day would replace the teachers for sure. Why not this is its beginning?

This module has ATMEGA8 as the brain of computing system, pair of servos contributing for the movements of the arm. This objective would overcome the falls of earlier mentioned models in aspects like easily constructible, feather lite, less expensive and better performance.

Hope our put forth model brings revolutionary changes in educational environment and also in robotics.

Fig6: proposed VR freehand drawing robotic arm.

III. SYSTEM DESIGN

3.1 Hardware Part:

Well-designed electronic hardware is composed of hierarchies of functional modules which inter-communicate via precisely defined interfaces. Computer hardware include the devices that

makes up the computer system. Microcontroller, drive boards used in this model constitutes system hardware.

MAJORLY USED:

MICROCONTROLLER [ATMEGA8]

Pair of servos, drive boards.

Power supply [9V-2A]

EasyVR module

MINORLY USED:

Flexi board, sheet.

Shaft connectors.

Wires, jumpers, cables.

Screws, nuts, washer sets.

Shoulder plate, elbow plate.

3.2 Proposed Structure:

The figure7 depicts block diagram of proposed model consisting an ATMEGA8 microcontroller with above specified features, a power drive board driving the servos charged by 9v supply and an USB-UART converter.
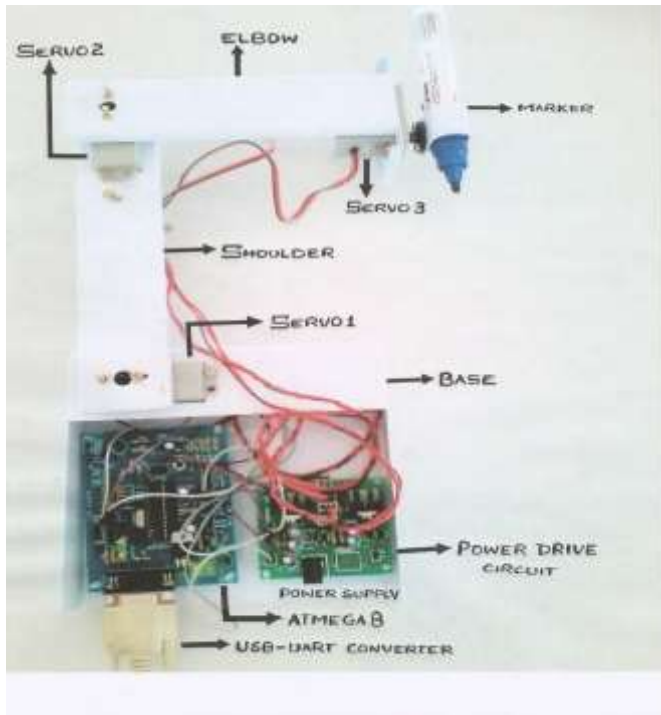

Fig7: Block Diagram of VR freehand drawing robotic arm.

The input to the arm is sent in the form of characters via USB-UART converter. Both controller and driver are interfaced to servo motors that contribute for the arm movements. EasyVR module is interfaced to the microcontroller providing versatile voice command functionality to robots.

3.3 Software Part:

Software is any set of machine-readable instructions that directs a computer's processor to perform specific operations. For a system to perform effectively there must be a guide and software does that job. Set of instructions are written in particular language and compiled to check for any errors.

Arduino ALPHA comes with large number of tutorials which allow users to get familiar with the applications. The program stands as a complete pack for programmers that use C++ and other programming languages. It provides the users with access to the tools for writing, building and debugging their codes.

3.4 Flowchart:

- In accordance to the flowchart depicted besides is how our model functions. Initially the arm is geared up by the supply.
- Predefined character is spelt out to the microcontroller interfaced to the speaker dependent voice recognition module.
- If the character is recognized by the VR module then the arm gets activated else wait for the command.
- If the character recognized by module is matched with the predefined one, servo gets triggered and contributes for the movement of arm to draw the pattern based on the character else the action is aborted.
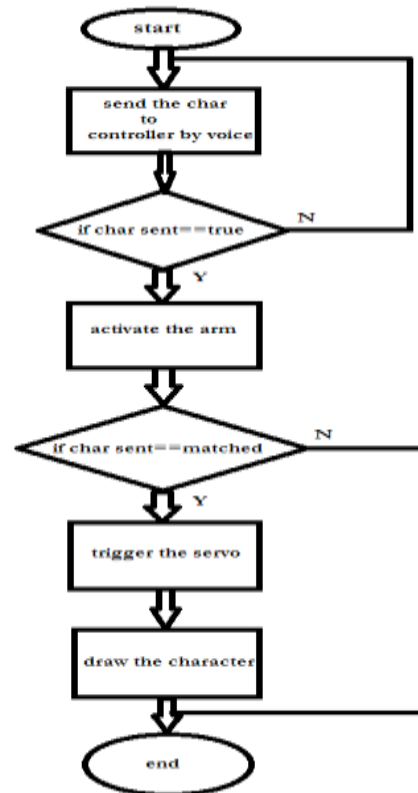

Fig8: flowchart of the program

IV. SYSTEM IMPLEMENTATION

4.1 PSEUDOCODE:

Pseudo code is an outline of a program that is expressed in a formally-styled natural language as compared to a programming language. It provides a detailed template for the programmers that help writing codes in the next step in a particular programming language.it can neither be compiled nor executed.it has no standard syntax rule.

Begin

Input T1, T2, inclination, r

Input angle base, angle elbow

If char sent== matched

Servo pen.write (180);

else

Servo pen.write (90);

write msg

end

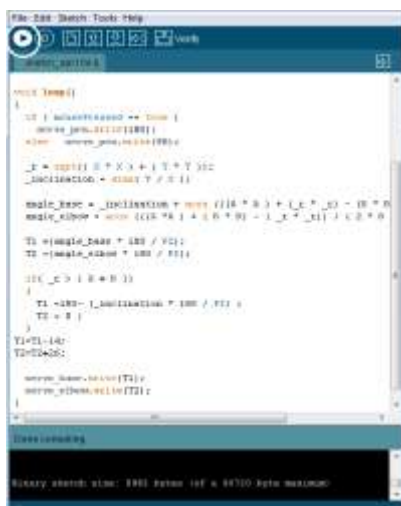### 4.2 Arduino Alpha [Tool used]:

Fig9: Arduino software

Fig10: Code compiling window

FEATURES

- Code completion/intellisense

- Supports multiple .pde/.ino files in a single project

- Same examples and code as the Arduino Ide

- Easy 10 minute set-up, uses existing Arduino installations and configuration

- Optional usb/Wi-Fi debugger with trace/break and update of variables on a running mcu

- Open any Arduino sketch and click "Build" or "Start" to compile and/or upload

- See errors as you type, automatically underlined code errors with suggestions

- Also includes embedded web site development tools (for Wi-Fi hardware like the Arduino Yun)

- If it works in the Arduino Ide it should work with Visual Micro

- Documentation and examples explorer, supported by a wiki and dedicated forum

V. APPLICATIONS

Extensively implemented in distance education by providing a mic at both communication ends.

VI. RESULTS AND DISCUSSIONS

In the beginning stages selection of the arm was suitable for our purpose was a big challenge since we had to look for parameters like torque, compliance and selectiveness. Somehow we ended up with a model based on the principle of SCARA.

Latter stages were crucial since programming the microcontroller threw up a tough challenge because the arm had to move in accordance with user handwriting. As we are aware that ARDUINO is well suited for beginners with its simple library functions also it comes up with its own compiling tool which is again a freeware.

Once the programming was done testing and implementing it was a curious stage that decides picks and falls of the project, finally our mission was a great success with legible writings of the arm.

VII. CONCLUSIONS

The goal of this project is to build a robotic arm that would draw anything the user wished to. As shown in the figures the project was a success. The robot arm was successfully converted into a user controlled model. Three servo motors were put into the arm to drive different parts of the arm.

During the automation of arm it was discovered that initiation was a big hurdle, to compensate for that movement of some motors were driven simultaneously to readjust the gearing mechanisms.

Other approaches to this arm include providing control through voice recognition. Since interfacing VR module becomes highly challenging due to its complexity hope this achieves a feat.

However acquisition of a different type of robot arm may allow for that a create a robotic arm with even more accuracy.

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BIOGRAPHIES

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