

# DESIGN AND DEVELOPMENT OF ARDUINO CONTROLLED WRITING ROBOT

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**Abstract** - The main aim of this project is to develop a writing robot in order to help the education system to make more interesting by speech recognition technique. In which visual basic software is used in this system. Speech recognition has been implemented using arduino microcontroller (ATMEGA328). It has been used to control the robotic arm by servo motor based on the user's input. Robots have been used in various industries like medical, science, research etc. So in this paper a new idea has been proposed to implement robots in education.

**Key Words:** Arduino microcontroller, Servo motor, Servo driver, Speech recognition, condenser microphone.

## 1. INTRODUCTION

Education system plays a major role in describing the innovative ideas to the students. In recent years, the definition of a robot is generally used to mean an unmanned system or automation, as often seen in industrial applications, deep sea planetary probes. Historically speaking, a robot used to be shaped like humans, and referred to as machines and electric systems that were capable of performing similar actions as humans. In this highly developing society; time and man power are critical constrains for completion of task in large scales. The automation is playing important role to save human efforts in most of the regular and frequently carried works e.g. most of the industrial jobs like welding, painting, assembly, container filling etc.

### 1.1 EXISTING SYSTEM

In the present scenario education system is handled through blackboard presentation or by power point presentation. Blackboard presentation is the process held from the ancient days which is defined as boring by the children. In order to improve power point presentation is used which is more interesting and easy to understand than black board teaching.

### 1.2 DRAWBACKS

The major drawback of this paper is same process of teaching leads to boring environment for neither teacher nor student. This system leads to reduce the interest of a student's observing capacity.

## 2. PROPOSED SYSTEM

In this competitive world, students expect creativity and innovation in every field including teaching. The ultimate aim of this project is to overcome the boring education system. This system demonstrates that arduino is a powerful means to control robot arms in closed-loop and real-time, outperforming other invasive and non-invasive approaches to human-Machine-Interfaces. User is to feed message via mike that will be filtered and strengthened by instrumentation amplifier and low pass filter. Then the analog signal given to the personal computer with Microsoft visual basic studio 2010. Using speech to text conversion algorithm analog signal converted into text depend on the user's input. Then the converted text will send to the arduino controller using serial cable (RS232). Servo motor used to control the angular movement of robot hand. It makes writing on a paper using robot hand fixed with Pen. The entire robot is based on servo mechanism and neuro-fuzzy control. The result is purely based on trial and error method.

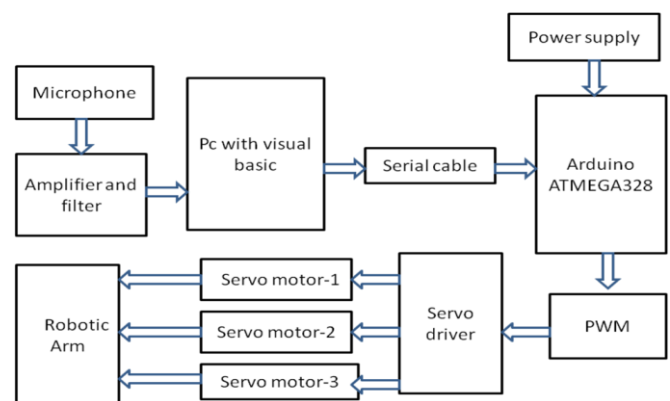


Fig -1: Block diagram

## 3. BLOCK DIAGRAM DESCRIPTION

### 3.1 ARDUINO ATMEGA328

The ATmega328/P is a 8-bit microcontroller and it is based on the AVR architecture. ATmega328/P achieves throughputs close to 1MIPS per MHz where the powerful instructions executing a single clock cycle. The ultimate aim of the arduino is to increase the processing speed. It uses non volatile memory technology. It has memory like SRAM (Static Ram Memory), EEPROM (Electrically Erasable Programmable Read Only Memory) and I/O (Input/output)

memory. It has an operating voltage of 1.8 to 5.5 volt. The arduino I/O package has 23 programmable lines. Arduino controller has 8 ADC channels and it consist of 14 digital pins and 14 analog pins.

### 3.2 SERIAL CABLE RS232

Information send between Peripherals and data processing equipment which transmit neither in a serial nor in a parallel mode is in the form of digital data. Parallel communications are used for associations between test instruments or computers and printers, while serial is frequently used between computers and other peripherals. Serial transmission involves the sending of data over a single communication line, one bit at a time. For an 8 bit word it requires 8 transmission lines. For long distance communications, serial transmission is used while +parallel is designed for short distances.

### 3.3 SERVO MOTOR

A servo motor allows precise control of linear or angular position, speed. And it is a rotary actuator. It involves a sensor which is coupled to a motor for location feedback. It also requires a servo driver to send the feedback about the PWM signals.

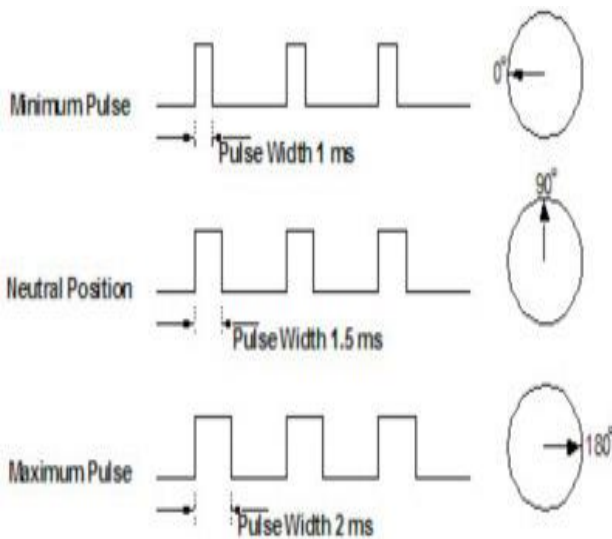


Fig -2: Rotation of the servo motor

It refers to a motor appropriate for use in a closed-loop control system. Applications of Servomotors are Metal Cutting and Metal Forming Machines and solar tracking system. When the beam of the motor at the preferred location, power supply to the motor is stopped. If not, the motor is twisted in the suitable direction.

### 3.4 VISUAL STUDIO

Visual studio 2010 is an integrated development environment (IDE) which was developed by Microsoft. It is

used to build up computer programs for Microsoft applications, as well as web applications, web armed forces and mobile applications. Microsoft software development platforms involve windows API, windows forms, windows presentation foundation and windows store was used by visual studio. Native code and managed code given by visual studio.

## 4. METHODOLOGY

### 4.1 SPEECH RECOGNITION

Speech recognition used in this paper can be defined as a transformation of voice to text in the other hand analog signal to digital signal. Speech recognition is the ability of a machine or program to identify words and that voice is changed into machine readable language and verified in the provided library. It may only recognize these if they are spoken very evidently. Then converted signal is represented as text in the output which is transformed to arduino controller for further process.

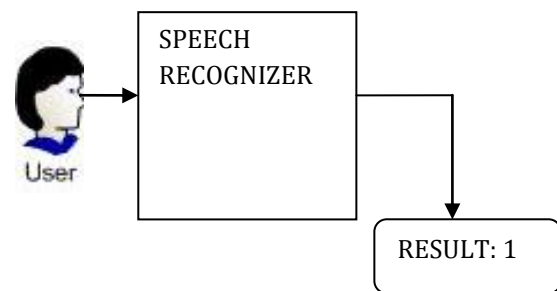


Fig -3: Speech recognition

### 4.2 NEURO FUZZY

Neuro-fuzzy is a combination of two techniques that combines the human like reasoning with the learning technology. It is also defined as an intelligent system in the automation. It uses IF-THEN fuzzy rules that involve human style of reasoning. This fuzzy system used to train the robot depends on the user's input .This neuro fuzzy technique entirely based on trial and error method.

## 5. RESULT

This project made innovation and interest in education field and it is also used to develop the curiosity of learning and gave the result of text depend on the user's input.



**Fig -4:** Snapshot of writing robot

## 6. CONCLUSION

Interaction between human and machine is an important factor of developing a technology of Speech recognition. This robotic arm was successfully trained to recognize speech inputs that were recorded using a microphone as well as speech sample obtained from the database.

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