

# Automation System Using Voice Recognition for Elderly and Physically Challenged People

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**Abstract** - Automation is a trending topic in 21st century making an important role in our daily lives. Automation reduces the human labor, time, effort and some human errors. The key objective of our project is to design a system for physically handicapped persons to control and operate home appliances and their own wheel chair by their own voice. Both these qualities are present in our project which has the capability to replace existing technologies. the design of the low cost voice recognition based home automation system for the physically challenged people suffering from quadriplegia or paraplegia who cannot move their limbs but can speak and listen to control the various home appliances just by their voice commands according to their need and comfort. The resultant system can provide a great assistance to the physically handicapped and elderly people without any need of third person.

**Index Terms** - Home Automation System, Arduino-Uno, Voice Recognition Module Apr9600, Relay Circuit, Robotic Wheel Chair.

## I. INTRODUCTION

The home automation systems are getting more popularity day to day due to their ease of use and wide operational capabilities and more applications. This Integrating voice recognition technology for home automation systems for paralyzed people can make the system more user friendly and easy to operate and control. Some require home automation system to satisfy their needs and comfort while for physically challenged people it can provide great assistance for the patients. There are several researches and developments on the home automation systems.

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automation systems for elderly and paralyzed people can make the system more user friendly and easy to operate and control. Some require home automation system to satisfy their needs and comfort while for physically challenged people it can provide great assistance for the patients. There are several researches and developments on the home automation systems. The voice recognition based home automation system for module is used for the controlling functions like switching lights on and off etc. We can also control the home appliances by voice commands. The voice recognition is done by the voice recognition module and thus given to the controller to control the devices.

## II. SYSTEM DESIGN

The home automation system which is we proposed is a way to control home appliances that are by using the voice commands. When the given command is recognized this information is transferred to the control circuit through controller serial port and the corresponding device is turned on or off. We can send the voice recognition based home automation system is an integrated system to facilitate the elderly and physically challenged people with an easily operated home automation system that operates fully on voice commands. The functional block diagram of the proposed system is shown in below block diagram.

It consists of all theoretical background and literature reviews of voice recognition. In addition, a review of past method and features of voice recognition is also included.

The speech input from microphone is given to the voice recognition module where the speech signal is compared with the previously stored trained voice samples. Upon successful recognition of voice command the Arduino microcontroller actuates corresponding electrical device using a the relay module like turning on lights using the relay module

and it also guides the robotic wheel chair through driver module.

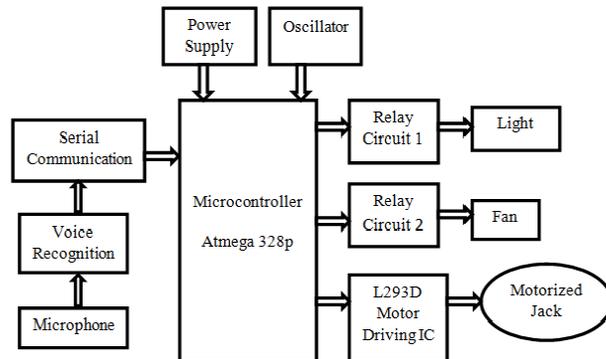


Fig.1. Block Diagram

The data from the illumination sensor is processed in Arduino controller and based on a set point value the automatic control action is taken to switch off the lights to save energy. The buzzer sounds when disable person need is calling for help or when he needs somebody's assistance.

### III. HARDWARE DESIGN

#### A. Microphone

A microphone is a transducer that converts sound into an electrical signal. It is commonly named as Mic or Mike. Microphones are used in many applications such as telephones, hearing aids, public address systems for concert halls and public production recorded audio engineering, sound recording, two way radios, megaphones, radio and television broadcasting, and in computers for recording voice, speech recognition, VoIP, and for non-acoustic purposes such as ultrasonic sensors or knock sensors.

#### B. Arduino-Uno

ATMega328p is the ATMEL Microcontroller on which Arduino UNO is based circuitry. This product let you to realize your small project without using a full size Arduino boards. To make this microcontroller working with the Arduino IDE you need a 16MHz crystal, a 5 V power supply and a serial connection. The ATMega328/P controller provides the following features:32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible vector, and the temporal sequence of such feature vectors thus forms a speech pattern.



Fig.2. Arduino Uno Board

#### C. Speech Recognition Module

The speech pattern is compared with a store of phoneme patterns or models through a dynamic programming process in order to generate a hypothesis or a number of hypotheses of the phonemic unit sequence. A phoneme is a basic unit of speech and a phoneme model is a succinct representation of the signal that corresponds to a phoneme, usually embedded in an utterance. A speech signal inherently has substantial variations along many dimensions.

Speaker dependent systems are trained by the individual who will be using the system. These systems are capable of achieving a high command count and better than 95% accuracy for word recognition. The drawback to this approach is that the system only responds accurately only to the individual who trained the system. This is the most common approach employed in software for personal computers

Speaker independent is a system trained to respond to a word regardless of who speaks. Therefore the system must respond to a large variety of speech patterns, inflections and enunciation's of the target word. The command word count is usually lower than the speaker.

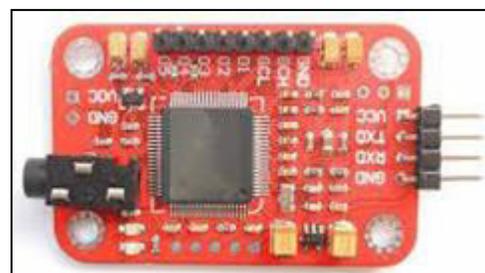


Fig.3. Speech Recognition Module

1) Parameters:

- Voltage: 4.5-5.5V.
- Current: <40mA.
- Digital Interface: 5V TTL level for UART interface and GPIO.
- Analog Interface: 3.5mm mono-channel microphone connector + microphone pin interface.
- Size: 31 mm x 50mm.
- Recognition accuracy: 99% (under ideal environment).

2) Features:

- Support maximum 7 voice commands, with each voice 1500ms (one or two words speaking).
- Maximum 7 voice commands effective at same time.
- Arduino library is supplied
- Easy Control: UART/GPIO.
- User-control General Pin Output.

D. Power Supply

A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power converters. Some power supplies are discrete, stand-alone devices, whereas others are built into larger devices along with their loads. Examples of the latter include power supplies found in desktop computers and consumer electronics devices.

E. Relay Module

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used

extensively in telephone exchanges and early computers to perform logical operations.

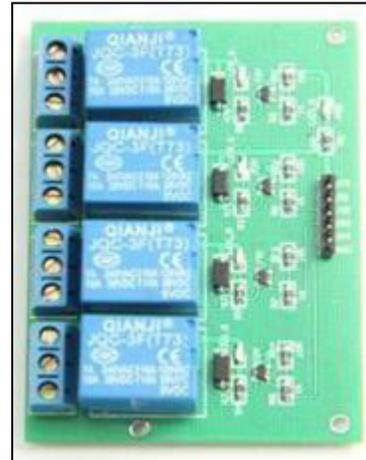


Fig.4. Relay Circuit

Pin description:

Input:

- Vcc : positive voltage supply
- Ground : ground
- IN1-IN4 : relay control port

Output:

- Connect a load.
- DC 30V/10A.
- AC 250V/10A.

F. L293D Motor Driving IC

Motor Driver – L293D Driver Module is a medium power motor driver perfect for driving DC Motors and Stepper Motors. It uses the popular L293 motor driver IC. It can drive 4 DC motors on and off, or drive 2 DC motors with directional and speed control.

The driver greatly simplifies and increases the ease with which you may control motors, relays, etc from micro-controllers. It can drive motors up to 12V with a total DC current of up to 600mA.

You can connect the two channels in parallel to double the maximum current or in series to double the maximum input voltage. This motor\_driver is perfect for robotics and mechatronics projects for

controlling motors from micro-controllers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro-mouse, line following robots, robot arms, etc.

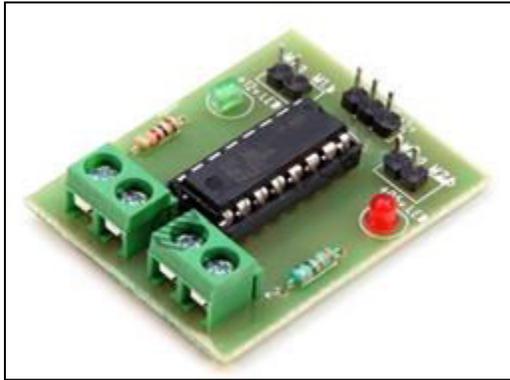


Fig.5. L293D Motor Driving IC

Features :

- Wide supply voltage: 4.5 V to 12 V.
- Max supply current: 600 mA per motor.
- The driver two holes of 3 mm dia.
- Male burg-stick connectors for supply, ground and input connection.
- Screw terminal connectors for easy motor connection.
- High noise immunity inputs

#### G. DC Motor

30RPM 12V DC geared motors for robotics applications. It gives a massive torque of 32Kgcm. The motor comes with metal gearbox and off-centered shaft.



Fig.6. DC Motor

Features:

- 30RPM 12V DC motors with Metal Gearbox and Metal Gears
- 18000RPM base motor
- 6mm diameter shaft with M3 thread hole
- Gearbox diameter 37mm
- Motor Diameter 28.5mm
- Length 63mm without shaft
- Shaft length 30mm
- 180gm weight
- 32kgcm torque
- No-load current = 800mA, Load current = up to 7.5A(Max)
- Recommended to be used with DC Motor Driver 20A or Dual DC Motor Driver 20A

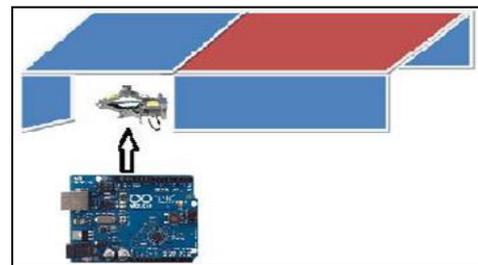


Fig.7. Motorized Jack's Position to Lift the Bed Up or Lower it Down

The motorized jack is fitted beneath the moveable part of the bed. The Arduino controller actuates the relays which further make the motor to move in clockwise and anti clock wise direction due to which jack opens up or closes in vertical direction which in turn lifts the bed up or down. The programming of the voice recognition module and controlling section will be done in Arduino IDE.

#### IV. CONCLUSION

This paper reviews the home automation system based on the voice recognition for the paralyzed people or elderly people, and since there has not been any voice recognition based home automation system which actuates the bed elevation according to the user voice commands, a new system is proposed. Hence this paper proposes the implementation of an efficient and robust voice recognition based home automation system for the paralyzed people which can change the state of home appliances on or off and adjust the bed elevation to

different angles according to the person voice commands.

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