

**Voice automation system**

Neelankit Goswami

AISSMS IOIT

Abstract:

This project is on voice control. In Arduino, we have interfaced dc motor, LED, voice recognition module and LCD. For connecting, a male to male wires, male to female wires and single stand wires have been used, soldering of the wires has been done. In that voice recognition module is used to control the voice. The module is first burned in program and then this has controlled the voice.

The project works according to the voice. Everything is interfaced. The DC motor is 12 volt. The DC motor rotates at the speed of 1000 rpm. The DC motor continuously rotates in its own speed. The dc motor is getting a supply of 5 volts from Arduino. All the devices get a supply voltage, it works continuously. If the resistor is not connected in the interfacing of DC motor, then the DC motor will not rotate. The LCD and LED are continuously ON. As the LCD and LED are getting a supply voltage of 5V hence do not stop. With the help of voice recognition module, the voice is controlled to turn ON or turn OFF. The LED will continuously be ON and the dc motor will rotate continuously, though the voice recognition is not connected. But when the voice recognition module is connected, it detects the voice. If we say "LED ON", the LED will get turned ON. If we say "LED OFF", the LED will get turned off. If we say "DC MOTOR ON", then dc motor starts rotating. If we say "DC MOTOR OFF", then dc motor stops rotating.

In the proteus software, first the circuit is drawn and then the program is attached to that drawing. Without the program the simulation will not run. After when the program is attached, the simulation runs and we get the output.

For the software, the speech recognition module is installed in laptop. Through speech, if I say "open notepad", then notepad will get opened. In notepad also, if I say anything then that will be typed through voice.

Keywords: voice automation system

I. Introduction

The four bulbs, LCD and bluetooth module has been interfaced using Arduino uno. In all device, the program is loaded. Without programming, the device will not run. For example, in mobile, if the battery is removed then the mobile will not switch ON. The LED can be of any colour. The bulbs are red, green blue, white. The LCD is 16x2 LCD display. The bluetooth module has a mobile connected to it. Through mobile, if I say start device ON, then that device will get turned ON. Through mobile, if I say start device OFF, then that device will get turned OFF. The multiple bulbs can be connected. Whenever anyone device is ON, then the LCD will display that the device is ON. Whenever anyone device is OFF, then LCD will display that device is OFF. For interfacing Arduino uno to dc motor, transistor PN222, resistor 230 ohm is used. For interfacing Arduino uno to bulb, transistor is used. For interfacing Arduino uno to LCD, resistor 230 ohm and 1K potentiometer is used. Whatever project is made, according to that only, in proteus software the simulation is done.

Voice automation system are used in home appliance. If it is used in home, then it can be used to control the electric pump. If the water is overflowing, then it can be used to detect the flow rate. Voice recognition can be used in cars. But sometimes it distracts the driver. Voice recognition helps not to distract the driver but it helps to give the voice commands. In car, whatever command we are giving through voice, it activates that command. Voice command helps to give directions to driver. Voice command used in mobiles are as follows:

- 1) Android - Google has developed the new technology called android. Android allows the user to send SMS, send whatsapp message, send e-mail, call contacts, call diversion, listen to music, search google, go to websites, write a note, call business.
- 2) Microsoft window phone - This phone helps to call the phone number, redial the number, sent a text message, call your voice mail, read appointments, search text. It replaces the old telephone set. For example, if in one hospital, a doctor wants to call one patient who is admitted in the ICU.
- 3) iOS – Apple added a voice control to the family and the new technology is iPad, iPadmini, iPad5, iPad6. It replaces the siri. Siri is the intelligent personal assistant that helps you get you things done just by talking. Siri understands natural speech, so you don't have to learn specific commands or remember keywords. You can ask things in different ways. For example, set the alarm for 6:30am in the morning.
- 4) The whole project is based on voice. So the name is voice controlled automation system. A voice command device is a device controlled through human voice. Voice command can control the voice by removing dials and

switch pad. For example, washing machine. In washing machines, the motor can be operated by giving the voice commands.

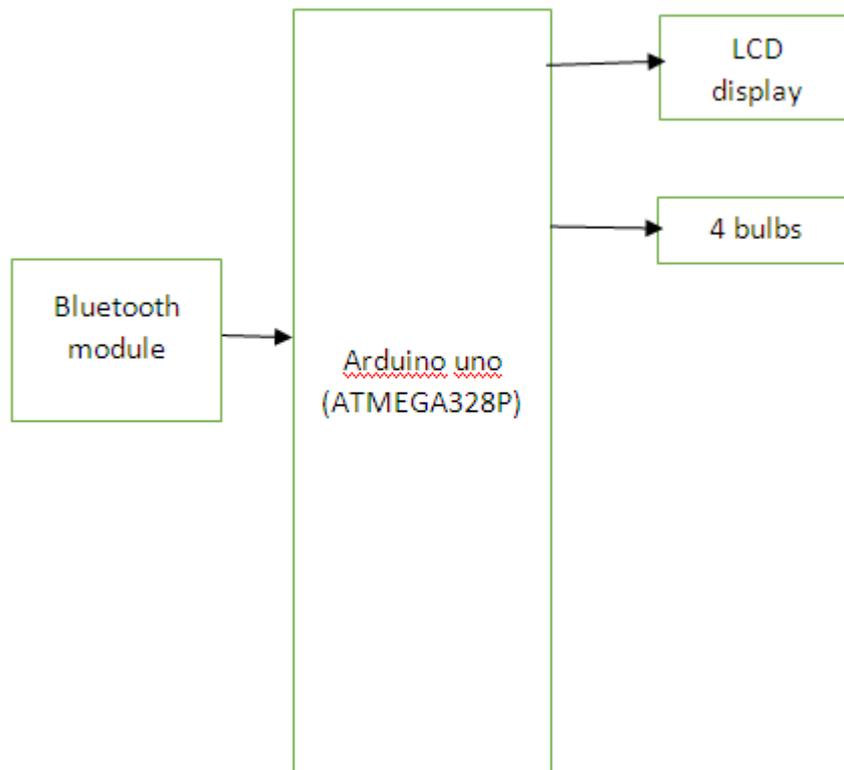
- 5) Newer VCDs are speaker independent, so they can receive multiple voice. They can respond to multiple messages and they can get the feedback. They can understand 50 different commands and they can retain upto 2 minutes of vocal messages. VCDs are found in computer systems, call centres, cars, mobile, internal search engines.

II. Functional units

The functional units are as follows:

- Input units
- Arduino uno with voice
- Output units

The functional block diagram is shown in the figure:



Input units:

The input unit consists of Bluetooth module. The Bluetooth name is HC-05. The transmitter of the Bluetooth module is connected to the receiver of the Arduino and the receiver of the Bluetooth module is connected to the transmitter of the Arduino for detecting the voice. When we say something, it gives the output to LCD.

Arduino with voice:

The Arduino is an I/O device. Everything is interfaced in Arduino. LED, dc motor, LCD and voice recognition module are interfaced in Arduino. The Arduino is a 32 bit processor.

Output units:

The output unit consists of LCD and four bulbs. When any one bulb is ON, it will display in LCD that bulb is ON. When any one bulb is OFF, it will display in LCD that bulb is OFF.

III. Literature survey

The Speech is the most common & primary mode of communication among human beings. It is the most natural and efficient form of exchanging information among humans. Human voice conveys much more information such as gender, emotion and identity of the speaker. Speech Recognition can be defined as the process of converting speech signal to a sequence of words by means an Algorithm.

The objective of speech recognition is to determine which speaker is present based on the individual's characterization. Several techniques have been proposed for compensating the mismatch occurred between the testing and training sessions. The communication among human computer interaction is called human computer interface.

The speech data contain different type of information that shows the speaker identity. This includes speaker specific information due to vocal tract, excitation.

IV. Methodology

The procedure for the project are as follows:

- The program is loaded using Arduino.
- Then the LCD program is loaded before interfacing LCD to Arduino.
- Then the bulb is interfaced using Arduino. When the program for bulb is loaded then the output comes in LCD.
- Then the overall program is loaded for the whole project.
- The program is verified and then uploaded using Arduino.
- According to that, the project runs.

Note that any device cannot run without loading the program. Consider an example, when the battery from the mobile is removed, then the mobile cannot work. The same concept is that any device without loading the program cannot run.

V. Objectives

Speech recognition basically means talking to a voice recognition module, having it recognize what we are saying, and lastly, doing this in real time. This process basically converts voice into display signal.

- **Transform the voice into better display** – It picks up the voice and converts into LCD display. It cannot record so many voice. It can record only one voice at a time.
- **LCD display** - If any device is turned on, then LCD will show the output that “device ON”. If any device is turned OFF, then LCD will show the output that “device OFF”.
- **Bulb**– the colour of the bulb can be red, yellow, green or blue.

VI. Problem statement

Four bulbs are connected along with relay. When we say “1 ON”, then all bulbs get turned ON. When we say “2 ON”, then all bulbs get turned OFF. But through voice, when the bulb is not working, then that is a problem. The relays has 4 inputs. When only 3 inputs are ON, and one is not working, then there is a problem. All bulbs should be in working condition. If any one is defective then there is a problem. In Bluetooth, if I say “1 ON”, and the module is detecting “when on”, then the bulb will not get turned ON.

VII. Basic functions of voice recognition

The system will function according to voice. Through voice, the two devices are controlled by speaking in a voice recognition module. The functions of voice recognition are as follows:

- It detects the voice.
- It is speaker independent and continuous spoken module.
- It generates enabled from text based retrieval from spoken language documents.
- It improves a text synchronization with audio video scripts.
- It supplies information for library segmentation and multimedia abstraction.
- It provides speech interface to digital library.

You can also use speech recognition software in homes and businesses. A range of software products allows users to dictate to their computer and have their words converted to text in a word processing or e-mail document. You can access function commands, such as opening files and accessing menus, with voice instructions. Some programs are for specific business settings, such as medical or legal transcription.

VIII. Advantages of voice recognition

- Speech is a very natural way to interact, and it is not necessary to sit at a keyboard or work with a remote control.
- No training required for users.

IX. Limitations of voice recognition

- Even the best speech recognition systems sometimes make errors. If there is noise or some other sound in the room (e.g. the television or a kettle boiling), the number of errors will increase.
- Speech Recognition works best if the microphone is close to the user (e.g. in a phone, or if the user is wearing a microphone). More distant microphones (e.g. on a table or wall) will tend to increase the number of errors.

X. Features of voice recognition

- Support maximum 80 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

XI. Case study

This feasibility study examined the possibility of using an independent voice recognition system as the input device during a training delivery requirement. The intent was to determine whether the voice recognition system could be incorporated into a training delivery system designed to train students how to use the Communications Electronics Operating Instructions manual, a tool used for communicating over the radio network during military operations.

This study showed how the voice recognition system worked in an integrated voice based delivery system for the purpose of delivering instruction. An added importance of the study was that the voice system was an independent speech recognition system. At the time this study was conducted, there did not exist a reasonably priced speech recognition system that interfaced with both graphics and authoring software which allowed any student to speak to the system without training the system to recognize the individual student's voice. This feature increased the usefulness and flexibility of the system.

The findings of this feasibility study indicated that an effective voice based training delivery system could be developed by integrating an IBM clone personal computer with a graphics board and supporting software, signal processing board and supporting software for audio output and input, and instructional authoring software.

Data entry has become the bottleneck of many scientific applications designed to collect and manage information related to experimental studies. In animal drug toxicology studies, this is true because of the need to collect data in hands-busy or eyes-busy environments. For example, during microscopy, the operator's hands and eyes are occupied with the process of examining tissue slides. During necropsy, gross observations and organ weights must be collected while the operator's hands are busy. With in-life data collection, technicians must record daily observations while handling animals. An ancillary issue with in-life data collection is that it may not be practical to keep computer equipment in animal rooms, where it is most convenient to record observations. In these areas, there is a definite need to develop tools for computer-automated data collection that do not rely on a keyboard for input or a monitor for output.

XII. Software development life cycle phases



Problem recognition

The first step in the SDLC is the recognition and understanding of the problem. It is not always the case that a programmer is presented with a detailed list of instructions describing how the final application should operate. Instead, a programmer is often approached when an organization senses that something is wrong, but does not quite know where the problem lies. During the problem recognition phase, the programmer uses research and investigation to more narrowly define the problem that must be addressed.

Development

The development phase is when the application is coded. The detailed design generated during the software design phase is used to create the application. Few programs are completely built from the ground up. During this phase, the programmer may acquire pre-built libraries or modules to implement standardized pieces of the new application. No matter how comprehensive the libraries or modules may be, some amount of programming will be necessary to satisfy the specific requirements of the user. Finally, it is necessary to perform testing during this phase to ensure the application is bug free.

XIII. Quantitative result

Through voice:

LED ON: LED turns ON

LED OFF: LED turns OFF

DC motor ON: DC motor turns ON

DC motor OFF: DC motor turns OFF

XIV. Requirements

The hardware requirements are Arduino uno, LED, LCD, dc motor and breadboard. The software requirements are proteus software.

XV. References

- [1] ANDROID (OS). [HTTP://EN.WIKIPEDIA.ORG/WIKI/ANDROID_\(OPERATING_SYSTEM\)](http://en.wikipedia.org/wiki/Android_(operating_system))
- [2] FUNCTIONAL REQUIREMENT. [HTTP://EN.WIKIPEDIA.ORG/WIKI/FUNCTIONAL_REQUIREMENT](http://en.wikipedia.org/wiki/Functional_requirement)
- [3] USER STORIES. [HTTP://WWW.ECE.RUTGERS.EDU/~MARSIC/BOOKS/SE/](http://www.ece.rutgers.edu/~marsic/books/se/)
- [4] ISO. [HTTPS://DEVELOPER.APPLE.COM](https://developer.apple.com)
- [5] ANDROID APPLICATION PLATFORM. [WWW.MANTRAI.COM/MOBILE/ ANDROID- APPLICATION- DEVELOPMENT/](http://www.mantrais.com/mobile/android-application-development/)
- [6] VOICE COMMAND DEVICE. [HTTP://EN.WIKIPEDIA.ORG/WIKI/VOICE_COMMAND_DEVICE](http://en.wikipedia.org/wiki/Voice_command_device)
- [7] NON-FUNCTIONAL REQUIREMENT. [HTTP://EN.WIKIPEDIA.ORG/WIKI/NON-FUNCTIONAL_REQUIREMENT](http://en.wikipedia.org/wiki/Non-functional_requirement)
- [8] FURPS. [HTTP://EN.WIKIPEDIA.ORG/WIKI/FURPS](http://en.wikipedia.org/wiki/FURPS)
- [9] NON-FUNCTIONAL REQUIREMENT. [HTTP://WWW.MOUNTANGOATSOFTWARE.COM/BLOG/NON-FUNCTIONAL-REQUIREMENTS-AS-USER-STORIES](http://www.mountangoatsoftware.com/blog/non-functional-requirements-as-user-stories)
- [10] HOUSING. [HTTP://MONEYNING.COM/HOUSING/THE-FIVE-YEAR-RULE-FOR-BUYING-A-HOUSE/](http://moneyning.com/housing/the-five-year-rule-for-buying-a-house/)
- [11] UI-OVERVIEW. [HTTP://DEVELOPER.ANDROID.COM/DESIGN/GET-STARTED/UI-OVERVIEW.HTML](http://developer.android.com/design/get-started/ui-overview.html)
- [12] ANDROID. [HTTP://WWW.ANDROID.COM/ABOUT/](http://www.android.com/about/)
- [13] MOBILEPHONE UI DESIGN. [HTTPS://WWW.GOOGLE.COM.HK/SEARCH? Q=MOBILE+UI+DESIGN&SAFE=STRICT&SA=X&TBM=ISCH&TBO=U&SOURCE=UNIV&EI=30LMUOSCLIHQ8QTBNOG4AG&VED=0CDUQSAQ&BIW=1280&BIH=650&DPR=1](https://www.google.com.hk/search?q=mobile+ui+design&safe=strict&sa=x&tbm=isch&tbo=u&source=univ&ei=30LMUOSCLIHQ8QTBNOG4AG&ved=0CDUQSAQ&biw=1280&bih=650&dpr=1)
- [14] MOBILE-PATTERNS. [HTTP://WWW.MOBILE-PATTERNS.COM/](http://www.mobile-patterns.com/)
- [15] MOBILE APP DESIGN. [HTTP://WWW.1STWEBDESIGNER.COM/DESIGN/ MOBILE-APPS-DESIGNS/](http://www.1stwebdesigner.com/design/mobile-apps-designs/)
- [16] GLADE. [HTTPS://GLADE.GNOME.ORG/](https://glade.gnome.org/)
- [17] HOME AUTOMATION AND CONTROL. [HTTP://WWW.SAVANTSYSTEMS.COM/HOME_AUTOMATION_AND_CONTROL.ASPX](http://www.savantsystems.com/home_automation_and_control.aspx)
- [18] SOFTWARE ENGINEERING. [HTTP://WWW.ECE.RUTGERS.EDU/~MARSIC/ BOOKS/SE/](http://www.ece.rutgers.edu/~marsic/books/se/)
- [19] STAKEHOLDERS. [HTTP://EN.WIKIPEDIA.ORG/WIKI/STAKEHOLDERS](http://en.wikipedia.org/wiki/Stakeholders)
- [20] USE CASE. [HTTP://EN.WIKIPEDIA.ORG/WIKI/USE_CASE#ACTORS](http://en.wikipedia.org/wiki/Use_case#actors)
- [21] AUTOHOME. [HTTP://ECEWEB1.RUTGERS.EDU/~MARSIC/BOOKS/SE/PROJECTS/ AUTOHOME/2012-G1- REPORT3.PDF](http://eceweb1.rutgers.edu/~marsic/books/se/projects/AutoHome/2012-G1-REPORT3.pdf)
- [22] SE PROJECT REPORT3. [HTTP://ECEWEB1.RUTGERS.EDU/~MARSIC/ BOOKS/SE/PROJECTS/OTHER/2012-G4-REPORT3.PDF](http://eceweb1.rutgers.edu/~marsic/books/se/projects/other/2012-G4-REPORT3.pdf)
- [23] SOFTWARE ENGINEERING. [HTTP://WWW.ECE.RUTGERS.EDU/~MARSIC/ BOOKS/SE/](http://www.ece.rutgers.edu/~marsic/books/se/)
- [24] SYSTEM SEQUENCE DIAGRAM. [HTTP://EN.WIKIPEDIA.ORG/WIKI/ SYSTEM_SEQUENCE_DIAGRAM](http://en.wikipedia.org/wiki/System_sequence_diagram)

- [25]SOFTWARE ENGINEERING. [HTTP://WWW.ECE.RUTGERS.EDU/~MARSIC/ BOOKS/SE/](http://www.ece.rutgers.edu/~marsic/books/se/) [26]SE PROJECT REPORT3. [HTTP://ECEWEB1.RUTGERS.EDU/~MARSIC/ BOOKS/SE/PROJECTS/AUTOHOME/2012-G1-REPORT3.PDF](http://eceweb1.rutgers.edu/~marsic/books/se/projects/autohome/2012-g1-report3.pdf)
- [27]SE PROJECT REPORT3. [HTTP://ECEWEB1.RUTGERS.EDU/~MARSIC/ BOOKS/SE/PROJECTS/OTHER/2012-G4-REPORT3.PDF](http://eceweb1.rutgers.edu/~marsic/books/se/projects/other/2012-g4-report3.pdf)
- [28]EFFORT ESTIMATION. [HTTP://EN.WIKIPEDIA.ORG/WIKI/SOFTWARE_DEVELOPMENT_EFFORT_ESTIMATION](http://en.wikipedia.org/wiki/software_development_effort_estimation)
- [29]HARDWARE DOCUMENTATION. [HTTP://WWW.FRITZING.ORG](http://www.fritzing.org)
- [30]INFRARED COMMUNICATION. [HTTP://WWW.SBPROJECTS.COM/KNOWLEDGE/ IR/SIRC.PHP](http://www.sbprojects.com/knowledge/ir/sirc.php)
- [31]INFRARED COMMUNICATION PROTOCOL. [HTTP://LEARN.ADAFRUIT.COM/TRINKET-GEMMA-IR-REMOTE-CONTROL/USING-IR-CODES-1](http://learn.adafruit.com/trinket-gemma-ir-remote-control/using-ir-codes-1)
- [32]COMMUNICATION PROTOCOL. [HTTP://WWW.PIC-TRONICS.COM/ IR-TRANSMITTER-AND-RECEIVER.PHP](http://www.pic-tronics.com/ir-transmitter-and-receiver.php)
- [33]SERIALPORT COMMUNICATION. [HTTP://PLAYGROUND.ARDUINO.CC//CSHARP/SERIALCOMMSSHARP](http://playground.arduino.cc/csharp/serialcommsharp)
- [34]INFRARED COMMUNICATION COMMUNICATION. [HTTP://WWW.PYROELECTRO.COM/TUTORIALS/INFRARED_IR_RECEIVER/IR_THEORY_1.HTML](http://www.pyroelectro.com/tutorials/infrared_ir_receiver/ir_theory_1.html)
- [35]WIRELESS COMMUNICATION. [HTTP://WW1.MICROCHIP.COM/DOWNLOADS/EN/DEVICEDOC/ADN006.PDF](http://ww1.microchip.com/downloads/en/devicedoc/adn006.pdf)
- [36]PIC MICROCONTROLLER. [HTTP://WWW.MICROCHIP.COM/WWWPRODUCTS/DEVICES.ASPX?DDOCNAME=EN010297](http://www.microchip.com/wwwproducts/devices.aspx?ddocname=en010297)
- [37]ARDUINO BASICS. [HTTP://HTTP://WWW.NFIAUTOMATION.ORG/NFI_PROJECTS.HTML](http://http://www.nfiautomation.org/nfi_projects.html)
- [38]COMMUNICATION PROTOCOL. [HTTP://RATUL-ELECTRONICS.BLOGSPOT.COM/2012/03/RF-MODULE-TRANSMITTER-RECEIVER.HTML](http://ratul-electronics.blogspot.com/2012/03/rf-module-transmitter-receiver.html)
- [39]ARDUINO BASICS. [HTTP://HTTP://WWW.NFIAUTOMATION.ORG/NFI_PROJECTS.HTML](http://http://www.nfiautomation.org/nfi_projects.html)
- [40]MICROPHONE BASICS. [HTTP://EN.WIKIPEDIA.ORG/WIKI/MICROPHONE](http://en.wikipedia.org/wiki/microphone)
- [41]IR PROTOCOLS. [HTTP://WWW.EPANORAMA.NET/LINKS/IRREMOTE.HTML](http://www.epanorama.net/links/irremote.html)
- [42]STAR NETWORK. [HTTP://EN.WIKIPEDIA.ORG/WIKI/STAR_NETWORK](http://en.wikipedia.org/wiki/star_network)
- [43]HANDSHAKING PROTOCOL. [HTTP://EN.WIKIPEDIA.ORG/WIKI/HANDSHAKING](http://en.wikipedia.org/wiki/handshaking) [44]CHECKSUM. [HTTP://EN.WIKIPEDIA.ORG/WIKI/CHECKSUM](http://en.wikipedia.org/wiki/checksum)
- [45]MAKING THINGS TALK BY TOM IGOE