

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor & UGC Approved Journal)

Website: www.ijirset.com

Vol. 6, Issue 9, September 2017

A Voice Assistant to Control Things in Home Using Arduino with Our Own Voice

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ABSTRACT: It will be pleasure for everyone to have a voice assistant i.e., a thing that responds to us for what we said and the same thing does the task based on our voice commands. This is bit cool to think of it .but for the real world it exists and we can make our home to talk with .with this project we can control the things in our home like switching on the sprinklers by a voice command ,switching on the led's, fans and others based on the commands we use. In order to perform this task we have to set some of our commands already familiar to the kit. The key thing to this project is ARDUINO and a voice module with that a text to speech convertor module. This will be quiet comfortable to everyone if they have the chance of commanding the thing with their voice and it suits better for people who are aged .here we used the module that converts text speech is "EMIC-2" .

KEYWORDS: ARDUINO- EMIC_2- VOICE RECOGNITION MODULE WITH MICROPHONE CONTROL VOICE BOARD FOR ARDUINO

I.INTRODUCTION

This project enables the usage of voice commands to get control over the things.in this project we used ARDUINO as the controller and the text speech convertor by name EMIC-2 that is well suited for ARDUINO. Here ARDUINO has the task of controlling the things based on the voice commands it receives. Here the voice recognition module receives the command send by the source (here source maybe a human or another external voice) and this voice recognition module converts the voices into the text. TheARDUINO verifies the text and performs the task related to the text it received. Now based on the voice received by the ARDUINO the controlling of things will be done for example let as assume that I say" switch on the light" this voice said by the source is been converted first to text and in the controller checks in the coding part what we had already dumped in it if the text in the code gets matched with what we said then the task assigned to the block of code is performed. like this based on the several commands we can control the things in our home here in this project we use ARDUINO MEGA as it has the high number of GPIO pins .The communication chain that exists in this project is as shown below:

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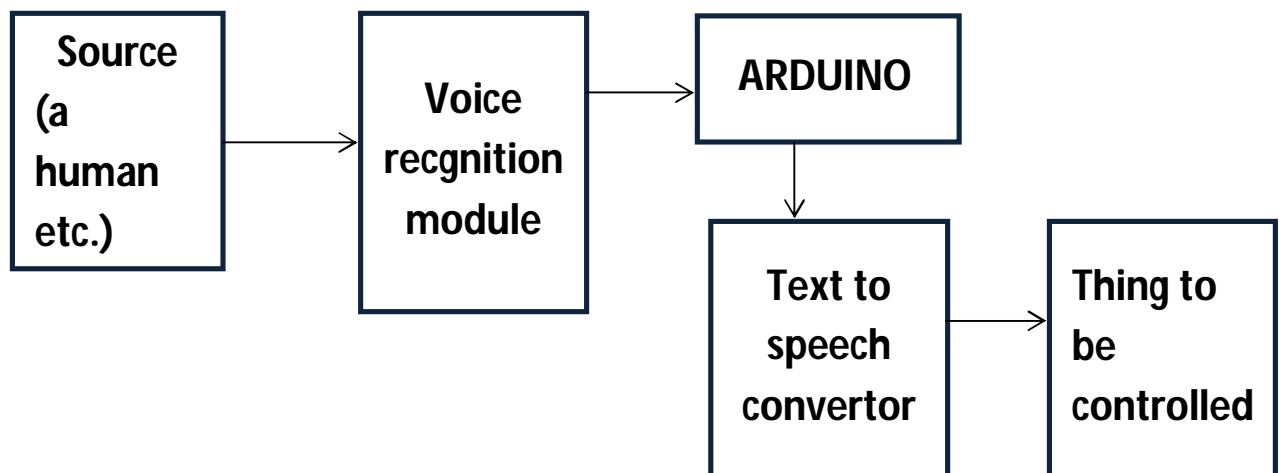


Fig: communication link between different components used in this project

Here we use ARDUINO IDE to code the controller. ARDUINO is little easier to code that's why we used ARDUINO mega for this project. As the number pins used either as digital as well analog required is of high in need so we choose ARDUINO MEGA.

II. ANALYSIS

In this part we are going to make an outlook of the design to be implemented. Now in this section we have to analyze how the project has to work. First in this project we are going to connect some devices to the ARDUINO mega in order to control over the things in our home. The things and the sensor related to thing to be controlled are namely TUBE LIGHT(relay sensor), FAN (relay sensor), microwave oven (relay sensor) and a FLAME SENSOR is been interfaced to the device and this sensor is placed in the kitchen in order to detect whether there is any fire accident occurred and to this sensor we connect the sprinklers to protect the kitchen. Thus like this we can control over the things. Here the voice recognition module converts whatever the voice command said by the source is been converted to text and this text is given to the ARDUINO board for verification, and then if the voice command gets matched with the list of commands in the program then the ARDUINO performs the task regarding the command. For example let this be the block of code for the ARDUINO to perform the task of switching the tube light. Let the command set for the this task is "PLEASE SWITCH ON THE LIGHT" "this is what a user has to give the command to the ARDUINO as a voice. This voice command is converted to text and this text is stored in an array in the program and the program may be:

```

/*let voicecmd[] be the array allotted to receive the voice command*/
If(voicecmd[]=='PLEASE SWITCH ON THE LIGHT')
{
digitalWrite(RELAY1, HIGH); // let relay1is connected to tube light
}
  
```

Thus like by changing the command we can write many cases regarding the operation. In this the both EMIC-2 and the Voice recognition module has to access the Transmitter (Tx) and the Receiver (Rx). In order to overcome this problem we use the PWM pins provided in the ARDUINO as transmitter and the receiver for any one of the above.

Like this we can control over the things in our home .in this project as a demo model we are going to connect a tube light, a fan, a heater, a sprinkler and in addition we are adding a flame sensor to detect the fire accidents.

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III. BLOCK DIAGRAM

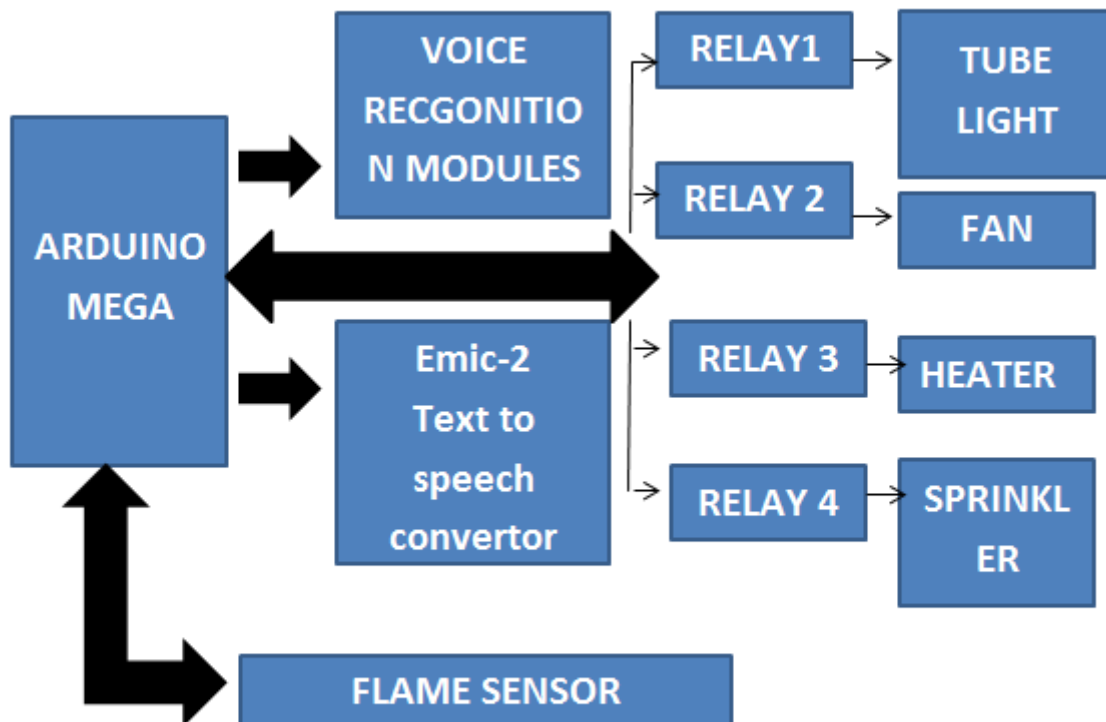


Fig: Block Diagram

3.1 HARDWARE REQUIREMENTS:

1. ARDUINO MEGA
2. VOICE RECOGNITION MODULE
3. EMIC-2 (text to speech convertor)
4. RELAYS (4)
5. TUBELIGHT
6. FAN
7. HEATER
8. FLAME SENSOR
9. SPRINKLER

3.2 HARDWARE REQUIREMENTS

1. ARDUINO IDE

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IV. OPERATION AND CONNECTIONS

4.1 Emic-2 interfacing and pin out

The emic-2 module will look like as shown below:

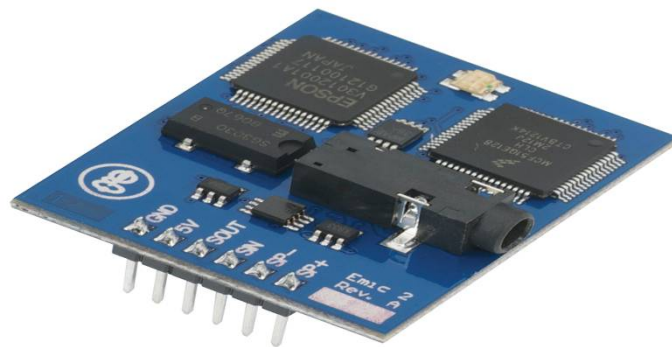


Fig: emic -2 module

In the above module it has six pins of the six pins we use the most four pins. These four pins are connected to the ARDUINO as shown below:

Gnd ---- Gnd(ARDUINO)
Vcc ---- +5v of ARDUINO
Sout ---- Rx of ARDUINO
Sin ---- Tx of ARDUINO

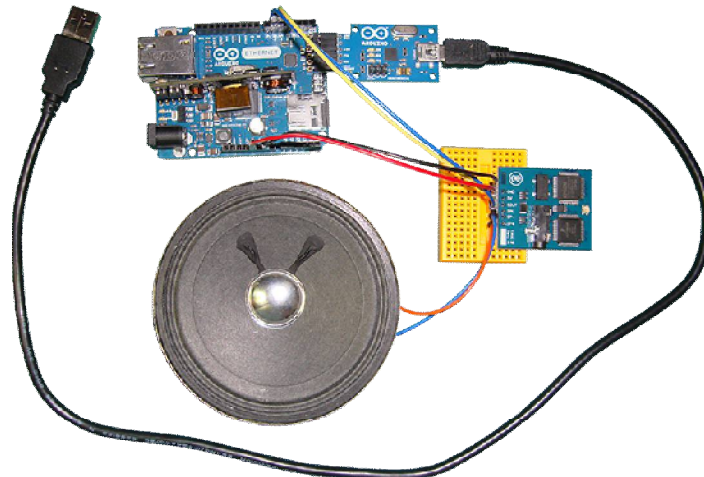


Fig: interfacing the EMIC -2 with ARDUINO

Emic 2 Text-to-Speech Module is a multi-language voice synthesizer that converts a stream of digital data into natural sounding speech output that resembles a human voice. Using the universally recognized DECTalk text-to-speech synthesizer engine, Emic 2 provides full speech synthesis capabilities for any embedded system using a simple command-based interface.

Features

- High-quality speech synthesis for English and other languages
- It has Nine in build voice styles comprising male, female, and child

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- Dynamic control of speech and voice characteristics, including pitch, speaking rate, and word emphasis
- It has Industry-standard DECTalk text-to-speech synthesizer engine (5.0.E1)
- On-board audio power amplifier and 1/8" (3.5 mm) audio jack
- Single row, 6-pin, 0.1" header for easy connection to a host system

Key Specifications

- The Power requirements suggested are : +5 VDC, 30 mA idle, 46-220 mA active (depending on speech parameters and output load)
- The Communication technique used : Asynchronous serial, 9600 bps
- Operating temperature: -20 to +70 °C (-4 to +158 °F)
- Dimensions of the : 1.25" W x 1.5" L x 0.37" H (3.17 W x 3.81 L x 0.94 H cm)

4.2 Voice recognition interfacing with ARDUINO:

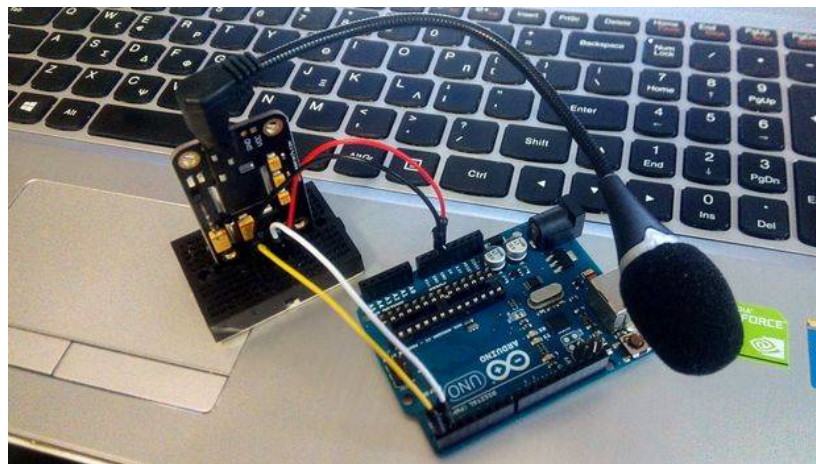
The voice recognition module we used is like the following:



Fig: Voice recognition module

Voice recognition module is termed shortly as VR module. The connections made to the ARDUINO WITH VR module is as follows:

ARDUINO		VR Module
Gnd	-----	Gnd(ARDUINO)
Vcc	-----	+5v of ARDUINO
Sout	----	Rx of ARDUINO
Sin	----	Tx of ARDUINO



PARAMETER

- The Voltage requirements: 4.5-5.5V
- The Current requirements : <40mA

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- Digital Interface required : 5V TTL level for UART interface and GPIO
- Analog Interface required : 3.5mm mono-channel microphone connector + microphone pin interface
- Design Size: 31mm x 50mm
- Recognition accuracy: 99% (under ideal environment)

FEATURE

- 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

V. CONCLUSION

Thus in this project we successfully accomplished the task of controlling the things using our own voice commands and this is achieved using the technology EMIC-2 and the voice recognition module and this made our work easier in doing so. This can be made IoT by using the IoT sensor ESP8266. This main use of this project is to reduce the usage of switches and thus leads to a reduction in the cost of installation of switches and to be an assistant for the people who are aged.

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BIOGRAPHY



Ms. USHA RANI ANAM has received her B.Tech in Electronics and Communications from Dr SGIET, Markapur and M.Tech degree in Systems and Signal Processing from JNTUH College of Engineering, Hyderabad 2010. She is dedicated to teaching field from the last 11 years. She has guided 4 P.G Students and 30 U.G students. Her research included Signal and Image processing. At present she is working as Assistant Professor in Institute of Aeronautical Engineering (IARE), Hyderabad.



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