

Development of Natural Language Interface to Voice Control Smart Environment

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Abstract— Development of smart home technology changed the human living conditions greatly. In smart home we can control and automate the lighting, heating, ventilation and air conditioning by voice. System can change the state of devices. For remote monitoring of devices we use Wi-Fi of IOT(Internet of Things).In this paper, we provide a natural language interface to control the smart devices, by speaking in the own language. It uses microphone to collect the speech signals and object recognition technology to locate the target object. Finally, SRM (Speech Recognition Module) can communicate with the central control program by socket.

Index Terms:-IOT (Internet of Things), SRM (Speech Recognition Module)

I. INTRODUCTION

Speech and voice recognition are emerging scope of security and authentication for future. Issuing of voice commands to voice enabled products and systems probably is not the way we normally speak. It needs particular pattern and the phrase you wish perfectly in the order for technology to understand what you want. Today the easiest way to incorporate voice control in to your home is to buy a single product with the technology built in. Humans are always comfortable to communicate in their own language. Communication is an integral part of human life , the symbol of authorization and identity. However in case of computer human communication language accent and dialects differ for different set of people. The existing voice recognition systems are limited to some particular language and in deeds consistency depends on whether the user is a native speaker or not and how much close the user's language commands are to the data set trained.

II. TEMPLATE MATCHING

Template matching is the simplest technique and has the highest accuracy when used properly but it also suffers from most limitations as with any approach to voice recognition the first step is for the speaker is to speak a word or phrase into a micro phone, then the electrical signal from the micro phone digitized by an analog to digital converter and is stored in a separate memory. To determine the meaning of this input the computer attempts to integrate or match the input with a digitized voice sample, that has a meaning. This technique is analog to the traditional command inputs from a computer. Program

contains template input and attempts to match this template it actual input using a simple conditioning statement. The program cannot possibly contains a template for each potential since each person's voice is different so the program must be trained with new users input before that voice can be recognized by the program printed word or phrase displayed by program during training session statistical average of the multiple sample computed by the program of same mode and stores the averages sample as a template in data structure . With this approach to speech recognition the program has a vocabulary that is limited to the phrases or words used in the training session.

This type of system is known as speaker dependent it can have vocabularies on the order of a few hundred words and recognition accuracy can be about maximum percent.

III. FEATURE ANALYSIS

Voice recognition is available through feature analysis and this technique leads to speaker independent voice recognition. This method first processes the input voice using Fourier transforms, instead of trying to find an exact or near exact match between the actual voice input and previously stored template. The similarities will be present for a broad range of speakers so, the system needs to be trained by new user. The type of speech difference that speaker independent method can deal with, but which pattern matching would fail to handle, this includes accents and regulating the speed of delivery, pitch ,inflection and volume user independent voice recognition have proven to be difficult , with some of variety of accents and inflections used by speakers of different nationalities. The

accuracy for speaker and independent systems is less than for speaker dependent systems, usually between 90 and 95 percent.

IV ANALYSIS AND DESIGN

This method is aimed to design voice control smart home for the following reasons one of them is Wastage of energy consumption is continuously increasing year by year. Now a day's some people may be lazy or busy to get up and turnoff particular appliance and also Old or disabled persons may fell some difficulties to turn on or off the appliances in their home So, for them it will be easier to use the voice control system and also it will help the blind people to turn on the appliances in their homes. so that the system is designed in such a way that it is easy to install and use. Here we use the Digital Signal Processor(DSP) for speech processing and recognition and hence the output of DSP will be sent to the Xbee transceivers.

The System can be divided into 3 main parts:

1. Audio processing part (DSP and Microphone)
2. Transmission part(XBee Transceivers)
3. Control part (Relays and microcontrollers)

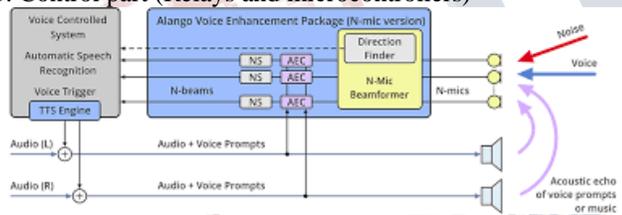


Fig: Smart home appliance



Fig.chip board

The voice commands with first recaptured in the dsp according to the voice recognition method used after identification of commands control characters wirelessly sent through XBee transceivers the receiver to controller as a result home appliances could be turned on or off depending of voice command given.

HARDWARE

In this section, we present hardware description of the system the main parts for smart home are

1. Audio Processing
2. Transmission
3. Control
 1. Audio Processing: In this the voice is captured by microphone.
 2. Transmission: It concerns wireless transmission of signals using XBee transceivers. And if once voice commands have been recognized, corresponding control characters are sent through the XBee transmitter.
 3. Control: The transmitted control characters are received by the microcontroller and compared with some predefined characters. If there is a match, the microcontroller will switch the corresponding relay and turn on/off the appliance connected to it.

V SOFTWARE DESIGN

In this section, we present software description of the system, It consists of

1. Voice Recognition
2. Controller
 1. **Voice Recognition:** Voice recognition is performed using the ZCPA method; It is the simple technique that can be used for this application. This method basically counts the number of times the signal crosses zero, and hence it can determine the approximate frequency of the signal.
 2. **Controller:** In this, the microcontroller has to be programmed to be able to receive control characters from the receiver XBee module and activate/control the required relays accordingly. Whenever a control character is received, the Interrupt Service Routine (ISR) runs and those characters are compared with predetermined ones.

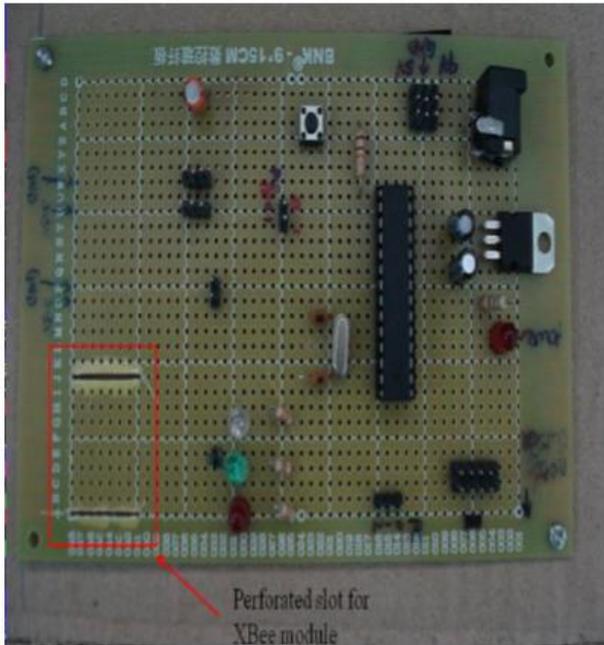


Fig. Micro controller Board

VI CONCLUSION

Hence we conclude that the aim of the proposed system has been attained and that the system is functioning as Through this system we have been able to control the switching on and switching off of two different devices through voice commands. The proposed system therefore provides solutions for the problems faced by old or disabled persons in daily life and makes their life easier and more comfortable by proposing a cost effective and reliable solution.

REFERENCES

[1] Van Nguyen, Dong Gun Lee, Yong Ho Seol, Myung Hwan Yu, Deokjai Choi, "Ubiquitous Access to Home Appliance Control System using Infrared Ray and Power Line Communication", ICI 2007, 3rd IEEE/IFIP[1].

[2] . N.P.Jawarkar, Vasif Ahmed and R.D. Thakare. "Remote Control using Mobile

[3]. S. M. AnamulHaque, S. M. Kamruzzaman and Md. Ashraful Islam1 "A System for Smart- Home Control of Appliances Based on Timer and Speech Interaction" Proceedings of the 4th International Conference on Electrical Engineering & 2nd annual Paper Meet 26-28 , pp. 128-131, January, 2006 .

[4]. S. K. Hasnain, A. Beg and S. Awan, "Frequency Analysis of Urdu Spoken Numbers Using MATLAB and Simulink" Journal of Science & Technology PAF KIET ISSN 1994- 862x, Karachi, Dec. 2007.

[5]. Y.Usha Devi, "Wireless Home Automation System Using ZigBee", Nalanda institute of Engg., and tech., Department of ECE, International Journal of Scientific and Engineering Research Volume 3, Issue 8, August-2012 .