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Implementation of Wireless Automation of Home Loads Based On Microsoft SDK

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ABSTRACT

The design of this project helps in providing a full solution for people to control their home appliances by giving voice commands in a wireless environment. It is a completely programmable speech recognition circuit that can be trained with any number of words. Some of the interesting applications are controlling mouse of your PC, other home loads, robot navigation, etc. The automation centers on recognition of voice commands and uses RF modules for transmission and reception, which are relatively cheap. In this paper we are testing our idea with RF transmission because with the IR transmitters there is a problem of directivity and range of working, that problem is eliminated with RF transmission. RF has better directivity and frequency range**.** The home automation system is intended to control all electrical appliances at home or office using voice commands. Software Development Kit is the speech recognition module that we are using and it can recognize and process the voice input. Software Development Kit has earlier been used only for controlling a single device with just two or three words in a shorter distance. In this paper, the voice input is captured through a microphone and processed into a text and transmitted. Different devices connected to the relay switch are switched on and off as per the user's needs and demands.

Keywords: *Microsoft Software Development Kit, RF module, Micro Controller, Relay, Home Loads*

1. INTRODUCTION

Speech recognition is an expanding trend nowadays for automation. There are many different kinds of speech recognition. But everybody needs a method which is 1) Easy to access/get 2) Reliable and efficient in identifying the voice accurately and 3) Fast. Compared to many other kinds of automation using voice recognition, SDK is easy to use and not as difficult as manual operation with hands or remote access or through voice recognition chips. And, it has very efficient accuracy performance; not like remote access and HM2007. The problem with voice recognition is that the performance complexity and accuracy of the current algorithms and methodologies. There are many different methodologies proposed for voice recognition. But, mostly they use HM2007 voice recognition chip [1] & [3], which increase the complexity and is time consuming. The usage of Microsoft SDK was used in the earlier stages for automation [2], but its usage was limited to recognize only few words and in a shorter range. In this paper we research on how Microsoft SDK can be used to automate more than one device by recognizing multiple words and why shouldn't it be used for a longer range.

The process of voice controlled automation of home loads based on speech recognition is firstly introduced in this paper. Then the implementation of voice controlled automation, in a wireless medium, based on Microsoft Speech recognition is described in detail. Finally the system is tested and analyzed. Experiments show that, although the voice controlled system lacks flexibility, it still has some practical value for its high recognition rate and its robustness.

2. GENERAL OUTLOOK

2.1 Voice Recognition Module

As with any approach to voice recognition, the first step is for the user to speak a word or phrase into a microphone. The electrical signal from the microphone is digitized by an "analog-to-digital (A/D) converter", and is stored in memory [2]. To determine the "meaning" of this voice input, the computer attempts to match the input with a digitized voice sample, or template, which has a known meaning. This technique is a close analogy to the traditional command inputs from a keyboard. The program contains the input template, and attempts to match this template with the actual input using a simple conditional statement. Since each person's voice is different, the program cannot possibly contain a template for each potential user, so the program must first be "trained" with a new user's voice input before that user's voice can be recognized by the program. During a training session, the program displays a printed word or phrase, and the user speaks that word or phrase several times into a microphone. The program computes a statistical average of the multiple samples of the same word and stores the averaged sample as a template in a program data

structure. With this approach to voice recognition, the program has a "vocabulary" that is limited to the words or phrases used in the training session, and its user base is also limited to those users who have trained the program. This type of system is known as "speaker dependent." It can have vocabularies on the order of a few hundred words and short phrases, and recognition accuracy can be about 98 percent.

2.2 Transmitter Section

The 8-bit microcontroller is the main controlling part of the transmitter section. It is connected to the encoder IC and voice recognition module. The device control program is stored in the memory of the microcontroller to control the devices. The 18- pin encoder IC encodes 4-bit data and sends it to RF transmitter module. The RF transmitter module uses a digital modulation technique called amplitude-shift keying (ASK) or on-off keying. In this technique, whenever logic "1" is to be sent, it is modulated with carrier signal (434MHz). This modulated signal is then transmitted through the antenna. The main specifications of the RF module are shown in the table [4].

2.3 Receiver Section

The 12V DC supply, used along with a 5V regulator [8], can be provided by a 12V battery or power adaptor. The receiver module receives the ASK signal from TWS-434. The decoder demodulates the received address and data bits. The relay driver consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching the inductive loads. The collector-current rating of a single Darlington pair is 500 mA.

3. HARDWARE DESIGN

An input voice is directly given to the microphone, which converts the voice command into electrical signal, and then it is connected to the pc. Microsoft SDK software in the pc converts the electrical signal into text; this text is fed into the Microcontroller. The microcontroller has an inbuilt UART for carrying out serial communication. The serial communication is done in the asynchronous mode. This transfer, through serial port, takes place bit by bit. The range -3V to +3V is undefined. The TTL standards came a long time after the RS232 standard was set [5 & 6]. Due to this reason RS232 voltage levels are not compatible with TTL logic. Therefore, while connecting an RS232 to microcontroller system, a voltage converter is required. This converter converts the microcontroller output level to the RS232 voltage levels, and vice versa. IC MAX232 [3], also known as line driver, is very commonly used for this purpose. The simplest connection between a PC and microcontroller requires a minimum of three pins, RxD (receiver, pin2), TxD (transmitter, pin3) and ground (pin5) of the serial port of computer. TxD pin of serial port connects to RxD pin of controller via MAX232. And similarly, RxD pin of serial port connects to the TxD pin of controller through MAX232. There are two sets of line drivers in MAX232 for transferring and receiving data. The line drivers used for transmission are called T1 and T2, where as the line drivers for receiver are designated as R1 and R2. Any one I/O port of the microcontroller is connected to encoder and the Dout pin in the Encoder is connected to the data pin of RF transmitter module. Transmitter, upon receiving serial data from encoder, transmits it wirelessly to the RF receiver. The receiver, up on receiving these signals, sends them to the decoder. The serial data is received at the data pin of decoder. The decoder then retrieves the original parallel format from the received serial data. When no signal is received at data pin of decoder, it remains in standby mode and consumes very less current (less than 1µA) for a voltage of 5V. When signal is received by receiver, it is given to data pin of decoder. On reception of signal, oscillator of decoder gets activated. It then decodes the serial data and checks the address bits three times. If these bits match with the local address pin of Decoder, then it puts the data bits on and makes the VT pin in the decoder high. Now comparison is done in the microcontroller between the decoded data and programmed data. The compared output is given to the relay. Finally the device is connected to the relay.

4. SOFTWARE DESIGN

The software part of this system includes software development kit developed using Microsoft Visual Basic.Net and the speech recognition software utilizes the Microsoft Speech (SAPI) [2 & 7].

5. RESULT

The analysis is done to measure the capability for each home appliance device to response after certain command is given. Five types of devices are being tested including Lamps, Fans, Air-conditioner, TV and Radio. This system needs wireless network to operate and the performance is based on type and range of the coverage. The parameter that must be considered for wireless coverage analysis is

the performance based on the distance or wireless coverage.

Analysis of Wireless Coverage

This system needs wireless network to operate and the performance is based on type and range of the coverage. The parameter that must be considered for wireless coverage analysis is the performance based on the distance or wireless coverage. Figure shows that the performance of the system is inversely proportional with the range or distance of wireless coverage. When the transmitter communicates with receiver from a short distance, the entire system can respond quickly and vice versa. Besides that, the coverage distance is limited by the type of wireless router that can be used.

6. ANALYSIS AND CONCLUSION

In general, speech or voice interfacing can be implemented in many applications such as the home appliances control, computer application control and kiosk machine. The interfacing and link between PC/ Laptop and Micro-controller is more convenient. This allows easier control and management of the home appliances system besides performing other tasks.

To conclude, this system recognizes the input commands very well and manages to give a good response if the wireless coverage have strong signal in order to get a good interfacing result. Another consideration is that the system must run in a clear and quiet environment condition. Other disruption such as weather, buildings and noise must be avoided to get a better performance. The advantage of this system is the mobility of the user which can access a server from any location which has wireless coverage. Besides that, the input voice is friendlier for any stage of ages and gender because it can be set-up manually by the user.

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REFERENCES

[1] Kailash Pati Dutta, Pankaj Rai and Vineet Shekher, Microcontroller based voice activated wireless automation system, VSRD-IJEECE, Vol2 (8), 2012, 642-649.

[2] XiaoJie Yuan, Jing Fan, Design and Implementation of voice controlled Tetris Game based on Microsoft SDK 978-1-61284-774-0/11/$26.00 2011 IEEE.

[3] AK Gnanasekar, P Jayavelu, V Nagarajan Speech Recognition Based wireless automation of home loads with fault identification for physically challenged, , 978-1-4673-1622-4/12/$31.00 2012 IEEE

[4] Jigar Daki, Dhaivat Vasoya, J. M. Rathod and A. B. Bambhaniya Wireless control for industrial instruments and home appliances at UHF.

[5] Sunpreet Kaur Nanda, Akshay P.Dhande, Microcontroller Implementation of a Voice Command Recognition System for Human Machine Interface in Embedded System International Journal of Electronics, Communication & Soft Computing Science and Engineering (IJECSCSE) Volume 1, Issue 1

[6] www.ehow.com

[7] www.engineersgarage.com

[8] Programming Visual Basic 2008 by Tim Patrick, published by O'Reilly Media, Inc., 1105 Gravenstein Highway North, Sebastopol,CA 95472