

VOICE RECOGNITION BASED ADVANCE PATIENT'S ROOM AUTOMATION

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Abstract

This is a unique and most useful system for totally or partially handicapped patients who are unable to do basic tasks. Patients who are unable to do anything have to totally depend on nurses. Hospitals have to provide a round-the-clock 24 Hour attendant for these patients and hence total fees of hospitals gets increased. The device that we proposed here can actually help these patients and hospitals without requiring 24 hour attendant. With this system, patient can call nurse or any attendant at any time whenever required by simply voice controlled commands. This system listens voice commands and can call nurse by simply ringing bell. It can also control basic switching on/off tasks of fan, light and any device by patient voice.

Keywords Automation, hospital automation, nursing, voice recognition, Atmega328 applications, Easy VR.

1. INTRODUCTION

The number of patients worldwide is increasing rapidly as a result of the increase of the average life expectancy of people and increase in the number of accidents etc. Caring for and supporting these patients is a concern for families and hospital staff around the globe. Patient's room automation is one of the fast growing industries that have the capability to change the way people live. The aim of the reported Voice Recognition Based Advanced Patient's Room Automation (VRBAPRA) is to provide the disabled patients' with a system that responds to their voice commands and control the on/off status of electrical appliances, such as fan, light, television, call an attendant etc. in the room. To gain maximum the system must be easily configurable, easy to run and reasonably cheap. The series of topics discussed in this paper are how to make people's life safer, more comfortable and convenient

1.1 Basic Concept of Voice Recognition

A voice recognition system accepts a user's words as inputs and interprets what are the instructions. It provides the system ability to "listen and understand". Voice recognition is mainly divided into two types - Speaker Dependent and Speaker Independent.

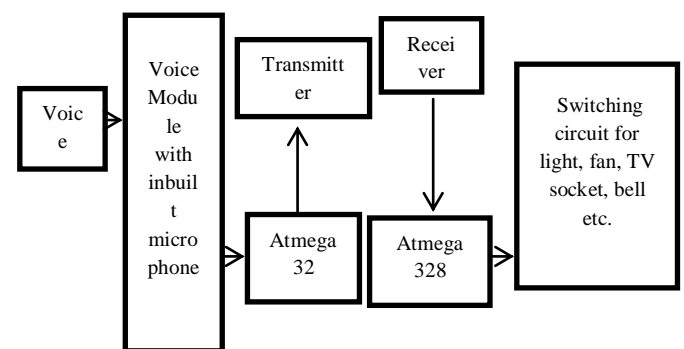
1.2 Working of Voice Recognition System

Our voice command is the input to the microphone which converts it to an analog signal. This gets processed by the voice module, which converts the signal to the digital form. Utterance that is the input from user is the binary form of i.e. using 1 and 0 which is the computer language. Computers do not hear sounds in any other way. Voice recognition software has acoustic models (An acoustic model is used in Automatic Speech Recognition to represent the relationship between an audio signal and the phonemes or other linguistic units that make up speech) that convert

the sounds to one of the speech elements (known as phonemes). The spoken words are converted into digital form of the phonemes.

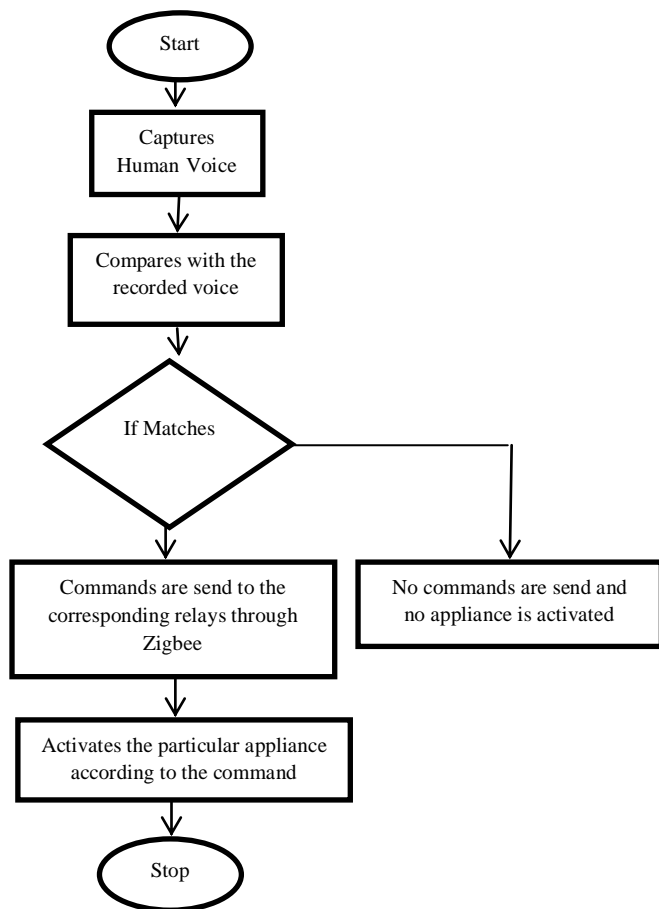
On its completion, another part of the software gets to work. The input commands are compared to the pre-stored ones. These comprise of a large collection of words, usually more than 100,000. When a suitable match is found based on the digital form it displays words on the screen. This is the basic process for all voice recognition systems and software.

2. BLOCK DIAGRAM



The Voice Recognition Based Advanced Patient's Room Automation (VRBAPRA) is an integrated system to facilitate disabled people with an easy-to-use patient's room automation system that can be operated using voice commands. The block diagram of the system is shown in Figure 2. The system consists of two modules: Handheld Microphone Module with a ZigBee transceiver and a unit for voice recognition. Two microcontrollers are used in this project. Two ZigBee chips are used to set up wireless communication. One of them works as transmitter and is connected to the first ATmega328 the other one is connected to the second ATmega32 working as the receiver.

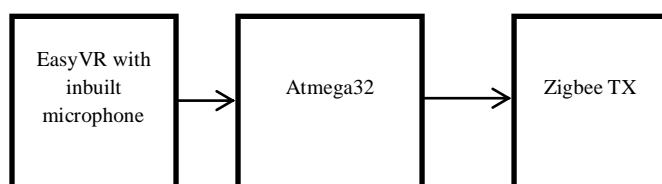
2.1 Process Flow



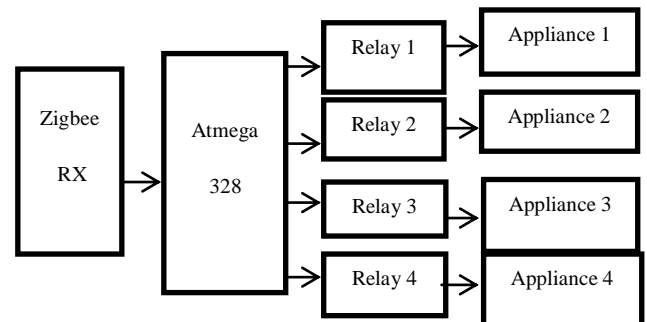
The system gets activated as soon as any the password is spoken. When the user says a particular voice instruction, it enters the microphone of the Easy VR 2.0 at first and then the ATmega328 at the transmitting end receives it. The ATmega328 will transmit a particular command to the ZigBee device at the transmitting end. On enabling the ZigBee, it will send the corresponding command to the ZigBee device on the receiving end. On successful establishment of wireless communication, it will instruct the ATmega328 microcontroller. Consequently, the appliances can be controlled like increasing or decreasing the speed or turned ON or OFF depending on the control commands received.

3. HARDWARE DESIGN

This section, describes the hardware of the two modules that constitute the VRBAPRA – a handheld module with a microphone and ZigBee transceiver and a Voice Recognition unit. The microphone module comprise of-



The microphone captures the human voice and compares it with the pre-recorded voice in the EasyVR. If they match, the corresponding symbol is sent through ZigBee. The Easy VR voice recognition module along with Atmega328 constitutes the Voice Recognition System which is an easy to use programmable circuit. By being programmable means that the words (or vocal utterances) that we want the circuit to recognize can be trained. Once the voice commands are recognized, control characters are sent to the specified appliance through ZigBee. Relay controlling precedes each appliance that has to be coded. The components used in the appliance control module are shown-



Then the control characters corresponding to the recognized commands are sent serially from the controller module to the appliance control modules that are connected to the room appliances.

4. SOFTWARE DESIGN

Software Design includes – Voice Recognition Application. Easy VR is used to train the voice commands with its compatible voice recognition software named “Easy VR Commander”. Any custom voice command can be entered and then the module is trained to recognize the command entered. Also, the voice command is tested to ensure accurate recognition. This is done by speaking it in the microphone and then the command spoken is indicated by the software on the screen.

Easy Commander used for training voice commands
 The Easy VR Voice Recognition Unit is a multi-purpose voice recognition module designed to make the voice recognition system robust, cost effective and versatile.

ZigBee RF communication
 The ZigBee communication protocol is used for an efficient transmission of data from the ZigBee transmitter to the ZigBee receiver. The ZigBee communication protocol is used for an efficient transmission of data from the ZigBee transmitter to the ZigBee receiver.

5. CONCLUSION AND FUTURE WORK

A voice recognition based patient’s room automation system is built and implemented. The system implements voice recognition using Easy VR. ZigBee RF module is used to implement wireless communication because of its efficiency and low power consumption. This system lowers the cost of

keeping the patient because is no 24-hour attendant is required to help them in doing the basics like swithcingh ON/OFF light, fan, ac, television, other appliance and even call anyone from outside by just ringing a bell. The same system can be used in home/office automation also. This can be used with generalized settings or can be customized for the customer using it.

REFERENCES

- [1]. <https://www.sparkfun.com/products/10963>
- [2]. Noergaard Tammy. Embedded Systems Architecture, A Comprehensive Guide for Engineers and Programmers. United States of America: Elsevier Inc; 2005
- [3]. D., Jurafsky, —Speech Recognition and Synthesis: Acoustic Modeling , winter 2005.
- [4]. <http://ife.speech.cs.cmu.edu/sphinx>
- [5]. Halimah B.Z.Dep. of Info. Science,UKM, Selangor, Malaysia.hbz@ftsm.ukm.my,Azlina A.Dep. of Indus. Comp.UKM, Selangor,Malaysia.aa@ftsm.ukm.my Behrang P. Dep. of Info. Science, UKM, Selangor, Mlaysia.hani_p114@yahoo.com Choo W.O.UTAR, Kampar,Perak, Malaysia.kenny@yahoo.com
- [6]. <http://project.uet.itgo.com/speech.htm>
- [7]. M.R., Hasan, M., Jamil, and M.G., Saifur Rahman, —Speaker Identification Using MelFrequency Cepstral Coefficients . 3rd International Conference on Electrical and Computer Engineering, Dhaka, Bangladesh, 2004, pp. 565-568.
- [8]. M., Jackson, —Automatic Speech Recognition: Human Computer Interface for Kinyarwanda Language . Master Thesis, Faculty of Computing and Information Technology, Makerere University, 2005.
- [9]. Huu-Cong Nguyen, Shim-Byoung, Chang-Hak Kang, Dong-Jun Park and Sung-Hyun Han Division of Mechanical System Eng., Graduate School, Kyungnam University, Masan, Korea Integration of Robust Voice Recognition and Navigation System on Mobile Robot, ICROS-SICE International Joint Conference 2009
- [10]. R.K.Moore, Twenty things we still don t know about speech,Proc.CRIM/ FORWISS Workshop on Progress and Prospects of speech Research an Technology , 1994