SMART HOME SYSTEM USING VOICE RECOGNITION

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Abstract*: The aim of this project is to give luxurious and comfortable life by considering this we have designed an automated smart system which control the home appliances on our voice. We know that in this era automation is one of the highly growing. So we have developed a system to control the home appliances through our voice. The speech recognition is divided in 2 methods text dependent and independent method. In this system we did text dependent method. In this project we use ATmega328p, mic, relays and relay driver IC. In it the speech recognition is done by Google API.*

This paper concerns with the control of home appliances by using the speech recognition. The Google API is the major attraction of our project where it has been relates to J.A.R.V.I.S. The J.A.R.V.I.S. Speech API is designed to be simple and efficient, using the speech engines created by Google to provide functionality for parts of the API. Essentially, it is an API written in Java, including a recognizer, synthesizer, and a mic capture utility.

Keywords: Voice recognition, Google API,* J.A.R.V.I.S., *HMM, MFCC.

I.INTRODUCTION:

A. Overview:

Today's world is a global hub due to advancements in technology. Inventions and evolution in technology has made this possible.

There is huge difference between ordinary system and smart home system. In today's date there are verity of systems which can good than ordinary system but controlling the device or home appliances trough voice command is gives more luxuries and helpful.

We know that, voice recognition is automatic identification& it also has good ROI. For getting the feathers from the given voice command to the mic there are many processes &algorithms are available such as MFCC, HMM, etc.

Emotion, identity of speaker, frequency, etc. Such information can get from the human voice. We know that frequency of human voice is approximately 300 and 3000 Hz.

B Basic overview procedure:

By using MFCC & HMM these 2 algorithms we can extracted some features from the given voice later these voice get converted into text using GoogleApi. Speech to text conversion is done in Google API and in it MFCC &HMM these 2 algorithms are used. The Mel-frequency cestrum (MFC) is a representation of the short-tar power spectrum of a given voice or sound based on a linear cosine transform of a log power spectrum on a nonlinear Mel scale of frequency. These coefficients are collectively make up an MFC which are derived from a type of Cepstral representation of the audio clip, while HMM is a statistical Markov model in which the system being modeled is assumed to be a Markov process with unobserved states. In that we collect the likelihood maximum probability features.

II. RELATED WORK

[1]Chadawan Ittichaichareon, Siwat Suksri and Thaweesak Yingthawornsuk

This paper describes an approach of speech recognition by using the Mel-Scale Frequency Cepstral Coefficients (MFCC) extracted from speech signal of spoken words. Principal Component Analysis is employed as the supplement in feature dimensional reduction state, prior to training and testing speech samples via Maximum Likelihood Classifier (ML) and Support Vector Machine (SVM). Based on experimental database of total 40 times of speaking words collected under acoustically controlled room, the sixteen-ordered MFCC extracts have shown the improvement in recognition rates significantly when training the SVM with more MFCC samples by randomly selected from database, compared with the ML.

[2] Zhe Gong, Hongchaun Li

This project builds a system that can remotely control on and off of multiple power sockets in different rooms, each with corresponding voice command, thus conveniently manage different electric equipment by voice. The project verifications are met and design goal is successfully achieved, however noise and distance handling may need future development.

[3]Aqeel-ur-Rehman, Royda Arif and Hira Khursheed Home automation is one of the major growing industries that can

change the way people live. Some of these home automation systems target those seeking luxury and sophisticated home automation platforms; others target those with special needs like the elderly and the disabled. Typical wireless home automation system allows one to control house hold appliances from a centralized control unit which is wireless. These appliances usually have to be specially designed to be compatible with each other and with the control unit for most commercially available home automation systems. The developed system can be integrated as a single portable unit and allows one to wirelessly control lights, fans, air conditioners, television sets, security cameras, electronic doors, computer systems, audio/visual equipment's etc. and turn ON or OFF any appliance that is plugged into a wall outlet

[4]R.Sandanalakshmi, P.Abinaya viji M.Kiruthiga, M.Manjari, A.Sharina an efficient speech to text converter for mobile application is presented in this work. The prime motive is to formulate a system which would give optimum performance in terms of complexity, accuracy, delay and memory requirements for mobile environment. The speech to text converter consists of two stages namely front-end analysis and pattern recognition. The front end analysis involves preprocessing and feature extraction. The traditional voice activity detection algorithms which track only energy cannot successfully identify potential speech from input because the unwanted part of the speech also has some energy and appears to be speech.

III. SYSTEM ANALYSIS

A. Problem Definition

There are only few problem that is faced in our work. To overcome that we need to further study. Now we just have studied according to make our life comfort. The issue is this system is operated online so internet connectivity is required and other issue is that it is made for small area for work.

B. Proposed System Feature

The proposed feature of our project revolve around google API and the internal work done by the MFCC and HMM. The important feature is that it is made speaker independent so that it is usable for each and every member of house or if built in office so usable to office member also. This speaker independent feature is the perfect option for all the patient and old age people for the use and not taking any efforts to switch device on/off themselves or by asking the person available nearby. Online system makes it more effective n comfortable for use as its accuracy level is way far better than the offline feature. So this system is way better and make the life comfortable from this stressful day to day work.

IV. SYSTEM DESIGN AND IMPLEMENTATION

A. Proposed System:

In this system, we give command through the mic to give voice command we extracted some features using MFCC, HMM algorithms. In MFCC we collect Mel – frequency coefficients which are the shorter power spectrum of sound and which are based on the linear cosine transform of a log power spectrum on a nonlinear Mel scale of frequency. In HMM we collect the likely hood from the above coefficients. These two algorithms are using to converts the speech into text.

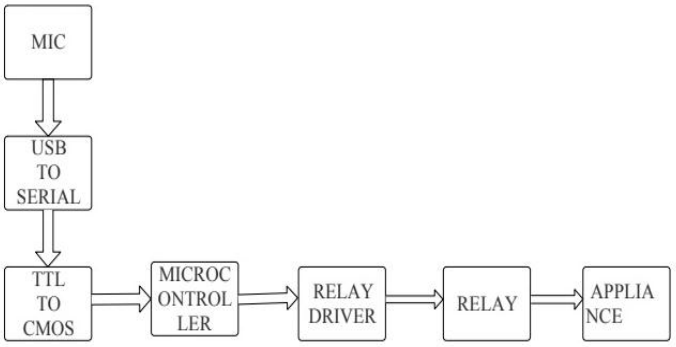

Fig 1: Block Diagram

This whole process is done in the Google API. To give information from computer to microcontroller we use RS232 and to make output of RS232 feasible of microcontroller we use driver IC Max 232 which converts TTL to CMOS or vice versa. By using this driver IC we can give the data from computer to the microcontroller in the sequential manner. We set a character for the commands and these characters are sent toward the microcontroller. If the given command matches then the voltage is given to the relay via relay driver. Here we have used ULN2803 relay driver IC. In it Darlington pair of transistor is used. This IC is used for increase the strength of signals which are coming from the microcontroller. If the command is matched the relay will turn on so that the connected appliances turn on/off. So we can control the switching of the devices which are used in the home like bulb, TV, tube light, etc. We may control the speed of fan by using an OptocouplerMOC3021 IC which is 6 pin IC.

Opto-coupler is made up of LED Diac. We connect the microcontroller to the Optocoupler IC when we give command to fan microcontroller will generate the pulse and this pulse is given to the LED which turn on and light will fall on the Diac then it will drive the high voltage. So the fan will turn on or speed up or low or fan will turn off.

B. Proposed Home Automation System

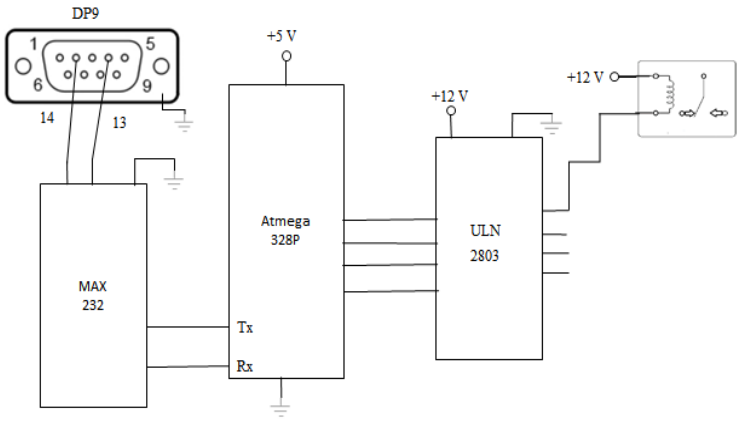

Fig2: Interfacing Diagram

This is an interfacing diagram. In which the input coming from RS232 to Max232. In Max232 the signal is made as µc feasible. Then the microcontroller get signal and if given character is matched then the signal is pass towards the relay through the relay driver and device is turned on.

B. Methodology

Firstly we give input voice command from microphone to computer at 300 Hz to 3000 Hz frequency. The voice signal taken is in analog format.

After that it passes through the segmentation after which the audible part is processed through MFCC and HMM.

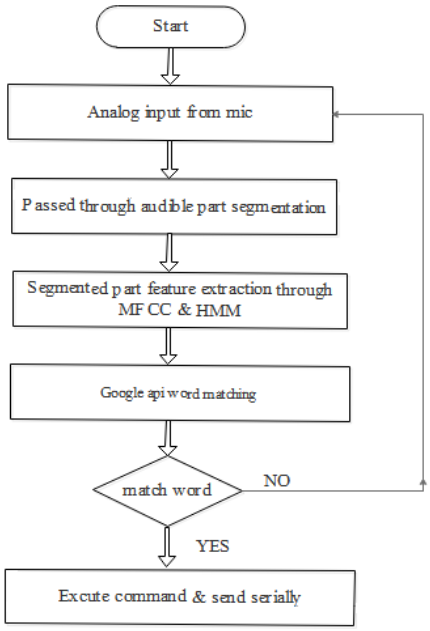

Fig 3: flow chart

Then that spoken word is accepted by the Google API and as per the given command it takes and if the spoken word is correct then it will turn on the relay for the device to get turn on and if the spoken word is incorrect then the process will start again and the word acceptance procedure will start. And in between we take Mel frequency cestrum coefficient from that speech. Which we given to the computer later we take HMM which collect likely hood probability. These two process are done by Google API which converts speech to text. If the given command is not match then the system doesn't execute

V. RESULTS:

Fig 4: system off

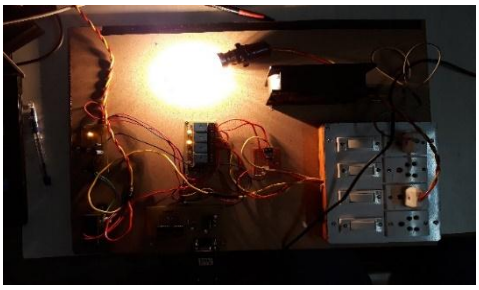

Fig 5: bulb on

FIG6: Fan On

VI. CONCLUSION:

Smart home system using voice recognition was built and implemented. The system is targeted at elderly and disabled

people to help their life. The system developed can be used to control AC and DC appliances through speech. Voice recognition was successfully implemented using ATmega328p. Power through appliances was controlled by making use of a microcontroller chip and relays. Hence we conclude that the aim of the proposed system has been attained and that the system is functioning as predicted. Through this system we have been able to control the switching on and switching off of fan 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.

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