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The Smart Home System Based on IOT

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ABSTRACT: The primary objective of our project is to construct a fully functional voice based home automation system that uses internet of things to provide a cost-effective, efficient way to work together with home appliances. There are many smart home solution in the market that aim to automate the basic operations of these home appliances using various technologies such as GSM, NFC etc. However, most of these systems focus mimicking to basic operation of the electrical switch. Our project aims at providing a fully automated voice based solution that our users can rely on, to perform more than just switching on/off the appliances. The user sends a command through speech to the mobile device, which interprets the message and sends the appropriate command to the specific appliance. The appliances are associated with the mobile device through an Arduino Board that establishes the concept of Internet of Things.

KEYWORDS: NLP, Voice Recognition, GSM, Arduino.

I. INTRODUCTION

Smart homes systems are some what different from ordinary homes, where the different smart devices in the presence of communication network being installed that allows devices to communicate with each other. Integrated communication systems provide the facility for monitoring and managing the performance of the home, and offer the choice support to the occupants for available facilities. The varieties of systems are installed in today's modern home. Smart home provides the facility of passing information and commands among different installed device and system. Such facility and control not only provide better control locally and remotely but also supports special names, particularly services that support the elderly. Smart home technology also greatly improve the usability and functionality of any home. A smart home automation system allows saving money and the environment. Our research decided to create an IOT system which is able to interactive with uses by natural speech. This IOT system will record users voice into a media file in memory. After set up duration it uploads media file to Google's speech to text(STT)service to get plain text.

II. THE STRUCTURE DESIGN OF THE SMART HOME SYSTEM

The system offers switching functionalities to control the appliances connected to the system, which includes Lights, Fans, Air-conditioners and various other appliances connected to the system. In India, the alternating current supplied to our homes is of 230V. Arduino Board is not capable of withstanding such high Voltages. Thus, Relays are used to convert this high voltage to low voltage,(ie)5V. We are considers the Four Relay for our project. Relay 0 for fan, Relay1 for light and Relay2 for motor, another one for future purpose. The structure of the smart home system is shown in Figure1

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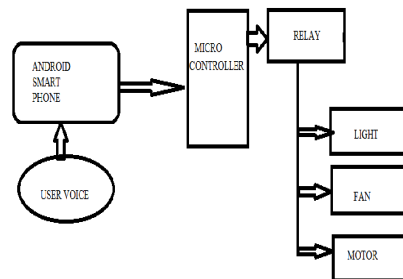


Figure 1: Structure of smart home system

III. CLASSIFICATION OF SPEECH RECOGNITION SYSTEM

Speech recognition system can be classified in several different types by describing the type of speech, utterance, type of speaker, vocabulary that they have the ability to recognize, They are classified as:

A. Types of speech utterance

Speech recognition are classified according to what type of utterance they have ability to recognize. They are classified as:

1. Isolated word:

Isolated word recognizer usually requires each spoken word to have quiet (lack of an audio accepts single word at a time).

2. Connected word:

It is similar to isolated word, but it allows separate utterances to “run-together” which contains a minimum pause in between them.

3. Continuous Speech:

It allows the users to speak naturally and in parallel the computer will determine the content.

4. Spontaneous Speech:

It is the type of speech which is natural sounding and is not rehearsed

B. Types of speaker model

Speech recognition system is broadly into two main categories based on speaker models namely speaker dependent and independent

Speaker dependent models:

These systems are designed for a specific speaker. They are easier to develop and more accurate but they are not so flexible.

Speaker Independent models:

These systems are designed for variety of speaker. These systems are difficult to develop and less accurate but they are very much flexible.

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C. Types of vocabulary

The vocabulary size of speech recognition systems affects the processing requirements, accuracy and complexity of the system. In types of vocabularies can be classified as follows:

1. Small vocabulary : Single letter.
2. Medium vocabulary : Two or three letter words
3. Large vocabulary : More letter words.

RELAY

A relay is an electromechanical switch which is activated by an electric current. A two relay board arrangement contains driver circuit, power supply circuit and isolation circuit Four-relay board is shown in Figure2.

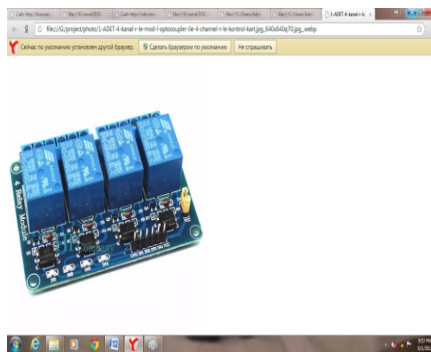


Figure 2: Four-relay

MODULES

AC'97 Controller Module

This module takes three inputs: The AC'97 clock, a reset signal, and a one-bit data signal (sdata-in) from the AC'97 containing relevant audio information. Naturally, this module outputs the 18-bit wide audio signal given by the AC'97. This module implemented a shift register to read the appropriate 18 bits of each frame. Coding for AC'97 controller is written in java. The coding is shown in Figure3

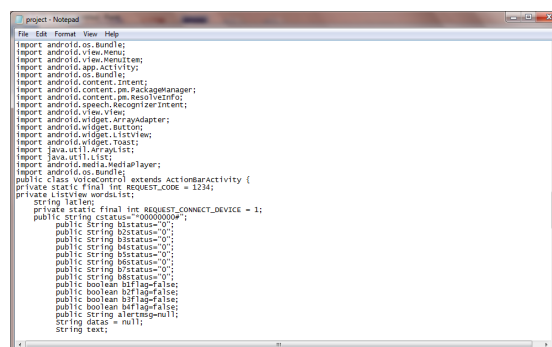


Figure3: AC'97 controller coding

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Audio Control Module

This module's main purpose is to control the amount of time for which the audio input is processed by signaling the FIFO buffer when to write and read audio signals coming from the AC'97. The FIFO Buffer that it should accept input audio and a counter is initialized to 0. When the FIFO gets full, the counter is increased by 1, the write signal is decreased and the read signal is asserted.

FIFO Buffer Module

This module takes audio samples from the AC'97 Controller module and stores them temporarily whenever the write signal is asserted by the Audio Controller module and it is not already full. Similarly, it outputs stored audio samples whenever the read signal from the Audio Control is asserted and the buffer is not empty.

Audio Processing Subsystem

When the control Unit asserts a signal requesting audio to be processed, this subsystem collects and processes real-time audio signals of approximately 6.8 seconds and determine their spectral coefficients. There are two main units within this subsystem: The Front End Processing Unit gathers the audio samples that will be processed, and the Back End Processing Unit performs the actual processing.

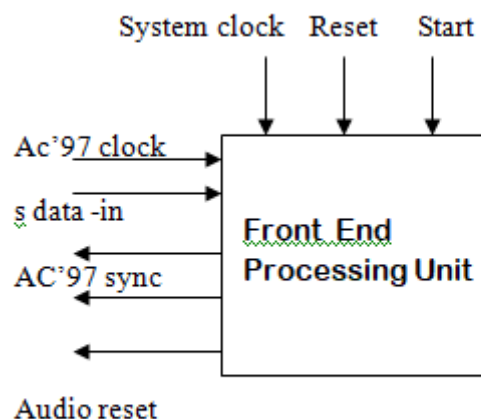


Figure4: pin diagram

IV. MACHINE TRANSLATION AND NATURAL LANGUAGE PROCESSING IN STATICS CORPUS

Prior to 1990, machine translation systems could be grouped into three basic types: direct translation, intermediate language translation, and transfer translation (Hutchins, 2009:505-509). On the Fourth high-level meeting of Machine Translation held in Kobe, Japan in July 1993, the famous British scholar W.J. Hutchins declared in this special report that since 1989 the development of machine translation has entered into a new era. An important symbol of the corpus converted database into machine translation by means of natural language processing. In recent years, corpus-based machine translation systems have developed rapidly and achieved outstanding results. Translation model chart diagram is shown in figure5.

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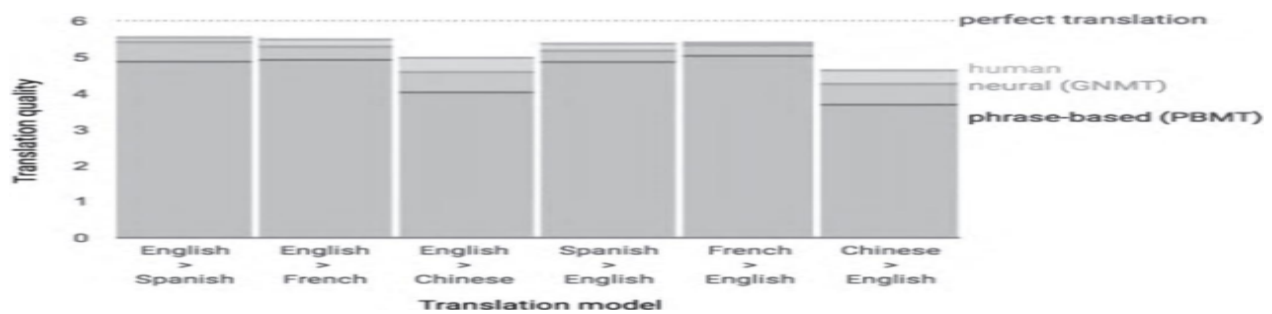


Figure5: Translation model

Natural Language Processing

Natural Language Processing is a tract of Artificial Intelligence and Linguistics, devoted to make computers understand the statements or words written in human languages. Natural language. Since all the users may not be well-versed in machine specific language, NLP caters those users who do not have enough time to learn new languages or get perfection in it. A language can be defined as a set of rules or set of symbol. Symbol are combined and used for conveying information or broadcasting the Rules. Natural Language Processing basically can be classified into two parts i.e. Natural

Advantages of Home automation systems:

In recent years, wireless systems like Wi-Fi have become more common in home and building automation systems, the use of wireless technologies gives several advantages that could not be achieved using wired network only

1) Reduced scalability and easy extension:

First and foremost, installation costs are significantly reduced. Since no cabling, where material as well as the professional laying of cables (e.g. into walls) is expensive.

2) System scalability and easy extension:

Deploying a wireless network is especially advantages when, due to new or changed requirements, extension of the network is necessary. In contrast to wired installations, in which cabling extension is tedious. This makes wireless installation a seminal investment.

V. CONCLUSION

Smart home system bring us more convenience and new experience. Some experts think it is a domino market as rapid development and wide application of smart home system is towards the directions of networked, information, intelligent. The smart home industry will have opportunities to develop.

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