# Home Automation using Speaker Identification

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**Abstract:** This paper discusses the methodology for a project named "Speech Recognized Automation System using Speaker Identification through wireless communication". This project gives the design of Automation system using wireless communication and speaker recognition using MATLAB code. Straightforward programming interface of MATLAB makes it an ideal tool for speech analysis in project. This automation system is useful for home appliances as well as in industry. This paper discusses the overall design of a wireless automation system, which is built and implemented. The speech recognition centers on recognition of speech commands stored in database of MATLAB and it is matched with incoming voice command of speaker. Mel Frequency Cepstral Coefficient (MFCC) algorithm is used to recognize the speech of speaker and to extract features of speech. This automation system is intended to control lights, fans and other electrical appliances in a home or office using speech commands like Light, Fan etc. Further, if security is not big issue then Speech processor is used to control the appliances without speaker identification.

**Keywords —** Automation system, MATLAB code, MFCC, speaker identification.

**Introduction:** Speech is greatly plagued by accents, articulation, pronunciation, roughness, spirit, gender, pitch, speed, volume, background signal and echoes. Speech recognition uses the method and relevant technology to convert speech signals into the sequence of words by suggests that of a rule enforced as a Trojan horse. At present, speech recognition systems area unit capable of beneath standing of thousands of words under useful atmosphere.    Sound intelligence is added to a home automation based on acoustics for sophistication of physically challenged people as a broad perspective of the thesis. Home automation already in practice is by switching on or off a device via wired networks. However, this is inefficient for people with impairment in mobility or spinal cord disability due to ageing factors.  Home automation or smart house is the residential extension of building automation and involves the management and automation of lighting, heating (such as good thermostats), ventilation, air con, and security, likewise as home appliances like washer/dryers, ovens or refrigerators/freezers that use wireless local area network for remote watching. [1] In this paper, the project is divided in

certain parts; they are Home Automation System, Speech Recognition using MATLAB, Preprocessing, Pre-emphasis of signal, MFCC and ANN. A multiagent system (MAS) is a system composed of several agents, capable of speedy mutual interaction between them [2, 3]. This can be message passing or generating changes in their common environment. The agents can be autonomous entities e.g. robots or software agents. MAS can consist of human agents as well. MAS allows the sub problems of a constraint satisfaction problem to be subcontracted to different problem solving agents with their own interests and goals. Each agent in MAS has a set of goals and capabilities.

**Home Automation System:** It gives you access to control devices in your home from a mobile device anywhere in the world. The term may be used for isolated programmable devices, like thermostats and sprinkler systems, but home automation more accurately describes homes in which nearly everything -- lights, appliances, electrical outlets, heating and cooling systems -- are hooked up to a remotely controllable network. From a home security perspective, this also includes your alarm system, and all of the doors, windows, locks, smoke detectors, surveillance cameras and any other sensors that are linked to it.

**Speech Recognition:** Speech is that the vocalized sort of human interactions. During this step, the speech of the speaker is received in wave. There are a unit several code on the market that area unit accustomed record the speech of humans. The acoustic surroundings and transduction instrumentality could have nice impact on the speech generated. We will have background signal or area reverberation at the side of the speech signal that is very undesirable. The method of speech recognition is advanced and a cumbersome job. The subsequent figure shows the steps concerned. Figure 1 gives process of speech recognition.
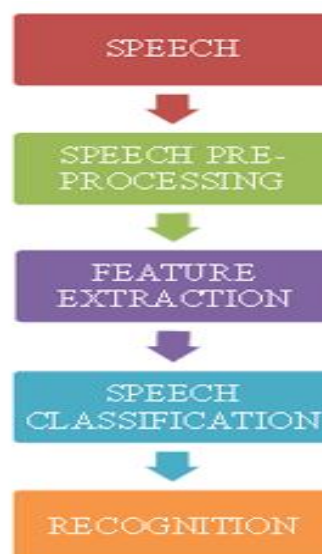
Figure 1: Process of Speech Recognition

**Preprocessing and Pre-emphasis of signal:** Speech pre-processing is meant to unravel such issues. This plays a vital role in eliminating the immaterial sources of variation. It ultimately improves the accuracy of speech recognition. The speech pre-processing usually involves noise filtering, smoothing, finish purpose detection, framing, windowing, reverberation cancelling and echo removing.

**MFCC:** The speech varies from person-to-person. This can be owing to the very fact that each person has very different characteristics embedded in auditory communication. On paper, chance ought to be there to acknowledge speech from the digitized wave shape. However owing to the big variation in speech signal, there arise a necessity to perform some feature extraction to cut back those variations. The subsequent section summarizes a number of the feature extraction technologies that square measure in use today. These techniques also are helpful in different areas of speech process. Amongst varied techniques like MFCC (Mel Frequency Cepstrum Coefficients) or the LPC (Linear predictive Coding), the one we have used is as follows: Mel Frequency Cepstrum Coefficients (MFCC) is that the most outstanding methodology utilized in the method of feature extraction in speech recognition. It has supported the frequency domain that relies on Mel scale supported human ear scale. MFCCs, being frequency domain options, are a lot of correct than time domain options. MFCC represents the important cepstral of windowed short sign that comes from fast Fourier transform (FFT). These coefficients are strong and reliable for variations of speaker and operation atmosphere. Figure 3 below gives the block diagram of a MFCC processor.
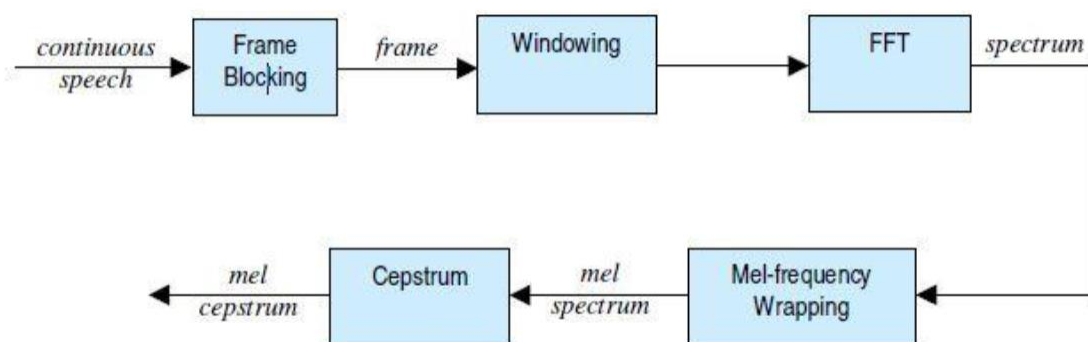


Figure 2:  Block Diagram of a MFCC processor

By applying the procedure described above, a set of Mel-frequency Cepstrum coefficients (MFCC) is computed for each speech frame of around 30 secs. The set of coefficients is called

an acoustic vector. Thus, each input speech utterance is transformed into a sequence of acoustic vectors.

**Artificial Neural Network:** ANN have the flexibility to learn the way to do task supported the data given for training, learning and initial expertise. ANN will produce their own organization and need no management, as they will learn on their own unsupervised competitive learning. Computations of ANN are often dole out in parallel. ANN are often employed in pattern recognition that may be a powerful technique for harnessing the info and generalizing regarding it. The event of system is thru learning rather than programming. ANN ar versatile in dynamical environments. ANN will build informative model once standard model fails. They will handle terribly complicated interactions.[4] ANN may be a nonlinear model that is straightforward to use and perceive than applied math ways.
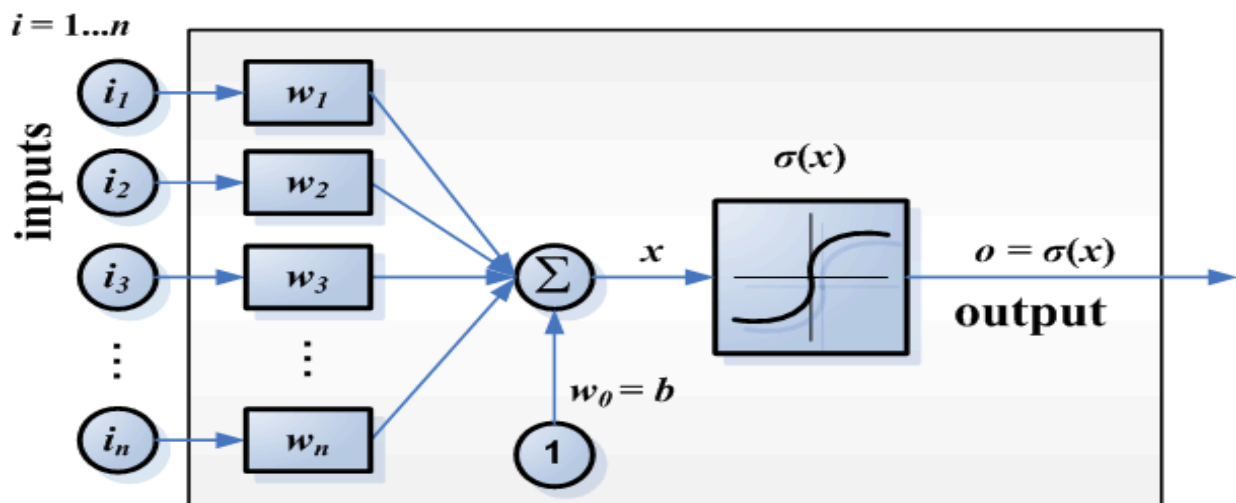


Figure 3: Basic Artificial Neuron

**Conclusion:** The smart home automation system is strictly user authorized identification, only specific user is authenticated to automate after MFCC and ANN processing. ANN are one among the guarantees for the long run computing. This paper shows that they will be terribly helpful in speech signal classification. They operate additional equally to human brain than a traditional laptop logic. differing types of ANN square measure shortly mentioned during this paper and it will be over that RNN have achieved higher speech recognition rates than MLP, however the coaching formula is more advanced and dynamically sensitive, which may cause issues. Speech recognition has attracted several scientists and has created technological influence on society. Hope this paper brings out the fundamental understanding of ANN and encourage the analysis cluster functioning on Automatic Speech Recognition. The long run of this technology is extremely promising and the whole key lies in hardware development, as ANN would like quicker hardware. This system brings innovation to the prevailing technology

and conjointly improves the options, thence proving to be an efficient development in numerous remote systems.

**References:**

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