

**THEME: : PROCESSING OF AUDIO AND VIDEO RECORDINGS**

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**ANNOTATION**

Video and audio signals are processed and transferred in different ways depending on how the converter is being used or configured. A better understanding of how the switch processes these signals will help you achieve the output you need.

**ABSTRACT**

Audio signal processing is used to convert between analog and digital formats, cut or amplify selected frequency bands, remove unwanted noise, add effects and many other desired results. Today, this process can be done on a regular PC or laptop, as well as on special recording equipment.

**Keywords:** audio, video, digital, signal processing, laptop or PC, recording equipment

The following tutorials cover some common types of audio processing:

- Compression : Reducing the dynamic range of a signal.
- Expansion : Expanding the dynamic range of a signal.
- Equalization : Increasing or decreasing the levels of different frequencies in a signal.
- Limiting : Constraining the level of a signal to a specified threshold.
- Reverb : Adding reverberation to a signal.
- Phasing : Creating interesting effects through sound wave phase interaction.
- Flanging : A specific type of phasing.
- Chorus : An effect which makes a single source sound like multiple sources.

In electronics engineering, video processing is a particular case of signal processing, in particular image processing, which often employs video filters and where the input and output signals are video files or video streams. Video processing techniques are used in television sets, VCRs, DVDs, video codecs, video players, video scalers and other devices

How video processing is done?

Video processing uses hardware, software, and combinations of the two for editing the images and sound recorded in video files. Extensive algorithms in the processing software and the peripheral equipment allow the user to perform editing functions using various filters. The two principal human senses are vision and hearing. Correspondingly, much of DSP is related to image and audio processing. People listen to both music and speech. DSP has made revolutionary changes in both these areas.

Music The path leading from the musician's microphone to the audiophile's speaker is remarkably long. Digital data representation is important to prevent the degradation commonly associated with analog storage and manipulation. This is very familiar to anyone who has compared the musical quality of cassette tapes with compact disks. In a typical scenario, a musical piece is recorded in a sound studio on multiple channels or tracks. In some cases, this even involves recording individual instruments and singers separately. This is done

to give the sound engineer greater flexibility in creating the final product. The complex process of combining the individual tracks into a final product is called mix down. DSP can provide several important functions during mix down, including: filtering, signal addition and subtraction, signal editing, etc.

One of the most interesting DSP applications in music preparation is artificial reverberation. If the individual channels are simply added together, the resulting piece sounds frail and diluted, much as if the musicians were playing outdoors. This is because listeners are greatly influenced by the echo or reverberation content of the music, which is usually minimized in the sound studio. DSP allows artificial echoes and reverberation to be added during mix down to simulate various ideal listening environments. Echoes with delays of a few hundred milliseconds give the impression of cathedral like locations. Adding echoes with delays of 10-20 milliseconds provide the perception of more modest size listening rooms.

#### Speech generation

Speech generation and recognition are used to communicate between humans and machines. Rather than using your hands and eyes, you use your mouth and ears. This is very convenient when your hands and eyes should be doing something else, such as: driving a car, performing surgery, or (unfortunately) firing your weapons at the enemy. Two approaches are used for computer generated speech: digital recording and vocal tract simulation. In digital recording, the voice of a human speaker is digitized and stored, usually in a compressed form. During playback, the stored data are uncompressed and converted back into an analog signal. An entire hour of recorded speech requires only about three megabytes of storage, well within the capabilities of even small computer systems. This is the most common method of digital speech generation used today.

Vocal tract simulators are more complicated, trying to mimic the physical mechanisms by which humans create speech. The human vocal tract is an acoustic cavity with resonate frequencies determined by the size and shape of the chambers. Sound originates in the vocal tract in one of two basic ways, called voiced and fricative sounds. With voiced sounds, vocal cord vibration produces near periodic pulses of air into the vocal cavities. In comparison, fricative sounds originate from the noisy air turbulence at narrow constrictions, such as the teeth and lips. Vocal tract simulators operate by generating digital signals that resemble these two types of excitation. The characteristics of the resonate chamber are simulated by passing the excitation signal through a digital filter with similar resonances. This approach was used in one of the very early DSP success stories, the Speak & Spell, a widely sold electronic learning aid for children.

#### Speech recognition

The automated recognition of human speech is immensely more difficult than speech generation. Speech recognition is a classic example of things that the human brain does well, but digital computers do poorly. Digital computers can store and recall vast amounts of data, perform mathematical calculations at blazing speeds, and do repetitive tasks without becoming bored or inefficient. Unfortunately, present day computers perform very poorly when faced with raw sensory data. Teaching a computer to send you a monthly electric bill is easy.

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