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Signal processing is an electrical engineering subfield that focuses on analyzing, modifying, and synthesizing signals such as images, sound, and scientific measurements. Signal processing techniques can be used to improve transmission, storage efficiency and subjective quality and to also emphasize or detect components of interest in a measured signal.

Signal processing and interfacing work together to produce more precise and accurate results and improve the quality of outputs

Techniques associated with signal processing include:

Nonlinear signal processing: this involves the analysis and processing of signals produced from nonlinear systems and can be in the time, frequency, or spatio-temporal domains.[6][7] Nonlinear systems can produce highly complex behaviors including bifurcations, chaos, harmonics, and subharmonics which cannot be produced or analyzed using linear methods.

Statistical signal processing: this is an approach which treats signals as stochastic processes, utilizing their statistical properties to perform signal processing tasks.[9] Statistical techniques are widely used in signal processing applications. For example, one can model the probability distribution of noise incurred when photographing an image, and construct techniques based on this model to reduce the noise in the resulting image.

- **Digital signal processing**: this is the processing of digitized discrete-time sampled signals. Processing is done by general-purpose computers or by digital circuits such as ASICs, field-programmable gate arrays or specialized digital signal processors (DSP chips). Examples of algorithms are the fast Fourier transform (FFT), finite impulse response (FIR) filter, Infinite impulse response (IIR) filter, and adaptive filters such as the Wiener and Kalman filters.

- **Discrete-time signal processing**: this is for sampled signals, defined only at discrete points in time, and as such are quantized in time, but not in magnitude. Analog discrete-time signal processing is a technology based on electronic devices such as sample and hold circuits, analog time-division multiplexers, analog delay lines and analog feedback shift registers. This technology was a predecessor of digital signal processing (see below) and is still used in advanced processing of gigahertz signals.
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- **Continuous-time signal processing** this is for signals that vary with the change of continuous domain (without considering some individual interrupted points). The methods of signal processing include time domain, frequency domain, and complex frequency domain.

EXPERT SYSTEM INSTRUMENTATION

This is a term that refers to systems capable of mimicking human like decision making thus leading to the term AI (ARTIFICIAL INTELLIGENCE). The architecture of an expert system is an example of a knowledge-based system. Expert systems were the first commercial systems to use a knowledge-based architecture.

A knowledge-based system is essentially composed of two sub-systems: the knowledge base and the inference engine. In the field of artificial intelligence, **inference engine** is a component of the system that applies logical rules to the knowledge base to deduce new information while **knowledge base** (KB) is a technology used to store complex structured and unstructured information used by a computer system