NAME: OBI IFEANYI KINGSLEY

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1. Signal interfacing this is a process of linking two or more devices together in thus making them work as a functional unit i.e., working together to produce an output.
   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:
   - **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). Typical arithmetical operations include fixed-point and floating-point, real-valued, and complex-valued, multiplication and addition. Other typical operations supported by the hardware are circular buffers and lookup tables. 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.
   - **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. Polynomial signal processing is a type of non-linear signal processing, where polynomial systems may be interpreted as conceptually straight forward extensions of linear systems to the non-linear case.
   - **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.
   - **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. This technology mainly discusses the modeling of linear time-invariant continuous system, integral of the system's zero-state response, setting up system function and the continuous time filtering of deterministic signals.

- **Analog signal processing:** this is for signals that have not been digitized, as in most 20th-century radio, telephone, radar, and television systems. This involves linear electronic circuits as well as nonlinear ones. The former are, for instance, passive filters, active filters, additive mixers, integrators, and delay lines. Nonlinear circuits include compandors, multipliers (frequency mixers, voltage-controlled amplifiers), voltage-controlled filters, voltage-controlled oscillators, and phase-locked loops.

EXPERT SYSTEM INSTRUMENTATION

2. Expert system: This is a term that refers to systems capable of mimicking human like decision making thus leading to the term AI (ARTIFICIAL INTERLIGENCE). 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