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Computer Engineering

1. Explain briefly the signal processing and interfacing techniques in instruments.

Ans:

Signal processing condenses measurement to extract information about some distant state of nature. It can be described from different perspectives, like to an acoustician, it is a tool to turn measured signal into useful information. To a sonar designer, it is one part of a sonar system while to an individual electrical engineer, it is often restricted to digitalization, sampling, filtering and spectral estimation.

A modern underwater acoustic signal processing system includes the following:

- Digitalization (sampling in time and quantizing in amplitude)
- Beamforming (spatial filtering)
- Band-pass and ~~some~~ band filtering.
- Detection, classification, localization and tracking.
- Matched filtering and/or incoherent integration.

Although measurements are typically acquired jointly in space and time, signal processing is usually partitioned to compute signals across space first and then time.

2. Expert system instrumentation.

In an AI (artificial intelligence) expert system is a computer system emulating the decision making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge.

represented mainly as if then rules rather than through conventional procedures code. The first expert systems were created in the 1970s and then proliferated in the 1980s. They are among the first truly successful forms of artificial intelligence (AI) software.

An expert system is divided into two subsystems which are:

- The inference engine and
- The knowledge base.

The inference engine applies the rules to the known facts in order to deduce new facts. It can also include explanation and debugging abilities while the knowledge base represents the facts and rules.