Centre for Differently Abled Persons
Bharathidasan University

III BCA – VI SEMESTER

DATA COMMUNICATION AND NETWORKS
(20UCA6CC8)
UNIT – II

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UNIT – II

ANALOG AND DIGITAL DATA

Analog Data

❖ Analog data is any information that typically represents an analog signal.

❖ There are many types of analog data.

❖ However, all these data are converted into voltage and current using sensors

Digital Data

❖ Digital data, is the discrete, discontinuous representation of information or works.

❖ Numbers and letters are commonly used representations.

❖ Digital data is information stored on a computer system as a series of 0's and 1's in a   binary language.

❖ Information is stored on computer disks and drives as a magnetically charged switch which is in either a 0 or 1 state.

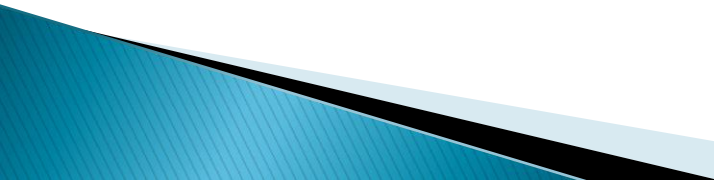❖ A single 0 or 1 is also called a bit.

ANALOG AND DIGITAL SIGNAL

Analog Signal

❖ Analog signal is a continuous signal in which one time-varying quantity represents another time-based variable.
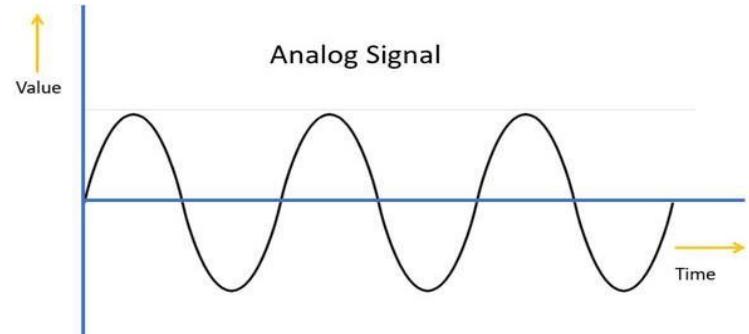
Analog Signal

❖ These kind of signals works with physical values and natural phenomena such as earthquake, frequency, volcano, speed of wind, weight, lighting, etc.

Essential characteristics of Analog Signal

- Minimum and maximum values which is either positive or negative.

- It can be either periodic or non-periodic and works on continuous data.

- The accuracy of the analog signal is not high when compared to the digital signal.

- Analog signal output form is like Curve, Line, or Graph, so it may not be meaningful to all.

Advantages of Analog Signals

- Easier in processing and best suited for audio and video transmission.
- It has a low cost and is portable.
- It has a much higher density so that it can present more refined information.
- Not necessary to buy a new graphics board.
- Uses less bandwidth than digital sounds
- Provide more accurate representation of a sound
- It is the natural form of a sound.

Disadvantages of Analog Signals

- Analog tends to have a lower quality signal than digital.
- The cables are sensitive to external influences.
- The cost of the Analog wire is high and not easily portable.
- Low availability of models with digital interfaces.
- Recording analog sound on tape is quite expensive if the tape is damaged
- It offers limitations in editing and Quality is easily lost
- It is quite difficult to synchronize analog sound & Data can become corrupted

Digital Signal

❖ A digital signal is a signal that is used to represent data as a sequence of separate values at any point in time.

❖ It can only take on one of a fixed number of values.

❖ This type of signal represents a real number within a constant range of values.

❖ Essential characteristics of Digital signals

- Digital signal are continuous signals
- This type of electronic l signals can be processed and transmitted better compared to analog signal.
- Digital signals are versatile, so it is widely used.
- The accuracy of the digital signal is better than that of the analog signal.
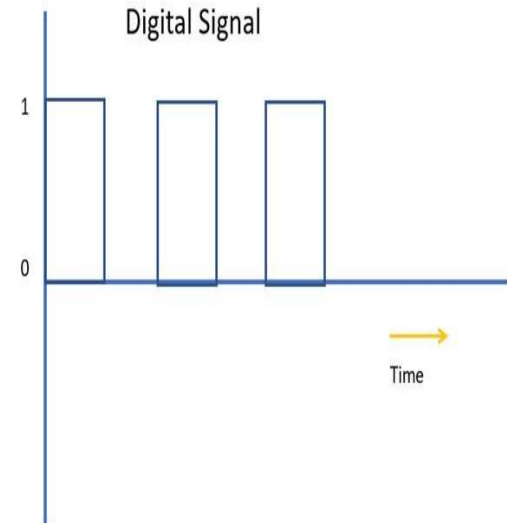
Advantages of Digital Signals

- Digital data can be easily compressed.
- Any information in the digital form can be encrypted.
- Equipment that uses digital signals is more common and less expensive
- Digital signal makes running instruments free from observation errors parallax and approximation errors.
- A lot of editing tools are available
- You can edit the sound without altering the original copy

PERIODIC AND APERIODIC SIGNAL

❖ **Periodic Signal**
- A signal is considered to be periodic signal if it completes a pattern within a measurable time frame, called a period.
- Periodic signals are more commonly identified by their frequency (f) rather than their period. The frequency of a signal is the inverse of the period.
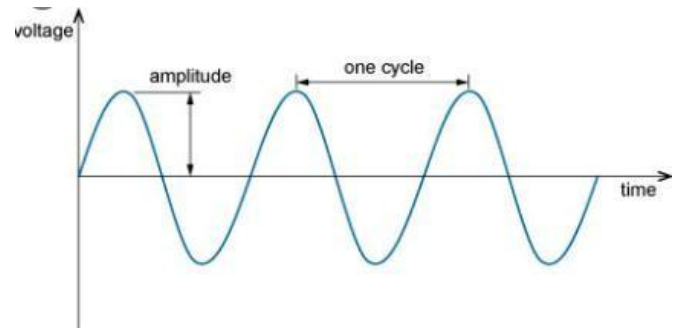
Disadvantage of Digital Signals

- Sampling may cause loss of information.
- A/D and D/A demands mixed-signal hardware
- Processor speed is limited
- Develop quantization and round-off errors
- It requires greater bandwidth
- Systems   and
  processing
        is more
  complex.

Aperiodic Signal

- Aperiodic signal is a signal which does not repeat itself after a specific interval of time.
- In order to show that an aperiodic signal can be expressed as a continuous sum (or integral) of infinite exponentials, a limiting process is applied.
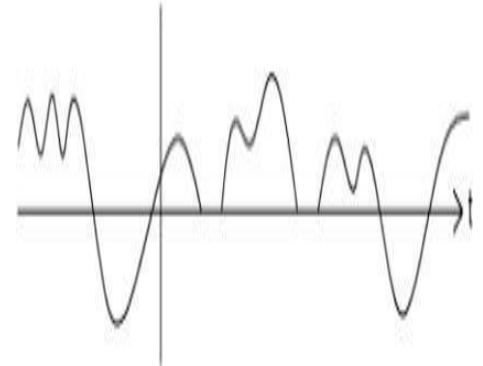
DECOMPOSITION OF A DIGITAL SIGNAL

❖The goal of signal decomposition is extraction and separation of signal components from composite signals, which should preferably be related to semantic units.

❖Examples for this are distinct objects in images or video, video shots, melody sequences in music, spoken words or sentences in speech signals.

ENCODING AND MODULATING

Encoding

- Encoding is the conversion of streams of bits into a digital signal
- Encoding is about converting digital or analog data to digital signal

Encoding

- Encoding is used to ensure efficient transmission and storage
- Encoding is the process of turning thoughts into communication.
- The encoder uses a 'medium' to send the message — a phone call, email, text message, face-to-face meeting, or other communication tool.
- The four primary types of encoding are

- visual
- acoustic

- elaborative
- semantic

❖ Modulating

- Modulation is transformation of a digital or analog signal into another analog signal
- Modulation is about converting digital or analog data to an analog signal
- Modulation is used to send the signals to a long way.
- Modulation is typically used for AM, FM radio, and short-wave broadcasting

- Modulation techniques are roughly divided into four

  types:

  - Analog modulation

  - Digital modulation

  - Pulse modulation

  - Spread spectrum method

Thank You