Digital System Design: An Introduction

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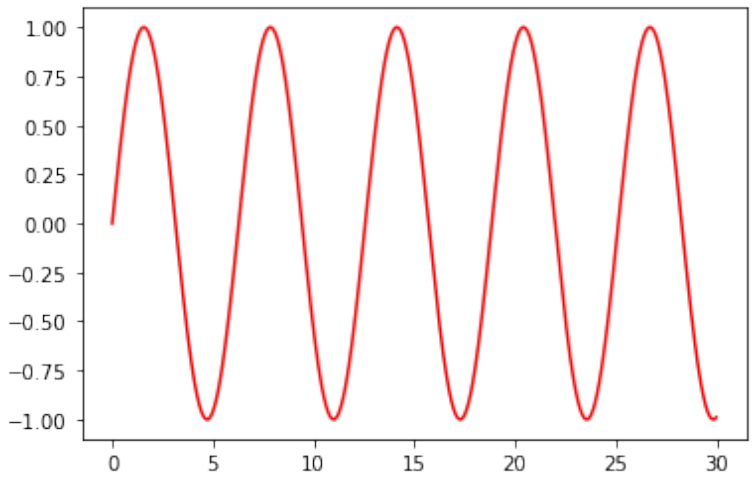
Digital Systems

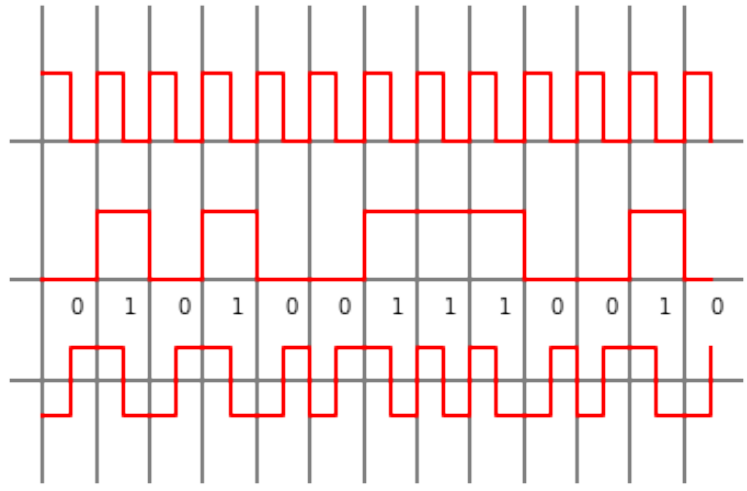
- A system is a set of components connected together to achieve a specific goal.
- The systems are characterized by a set of Input signals, set of output signals, and the relationship between input and output (known as system Behaviour)

Digital Systems

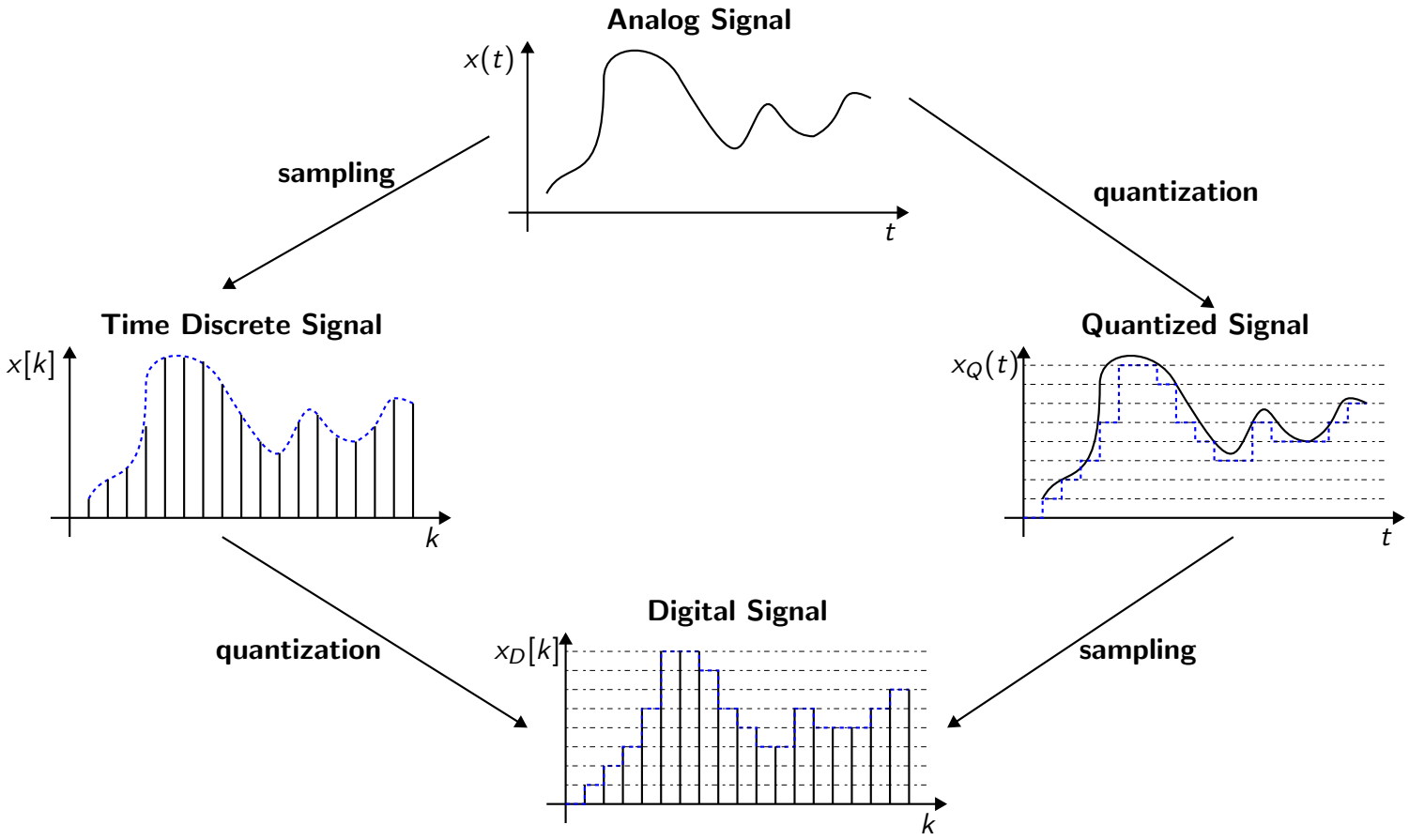
- Every signal is characterized by its type. It could be a voltage, or a force, a temperature, and so on, and it is characterized by a range of values.
- In the case of a voltage, it may lie between 0 volts to 5 volts. If the Input is coming from a switch, Its value may be ON or OFF.
- Digital systems are systems which operates on a digital signal and produces a digital signal.
- Analog Systems have values from a continuous set
- Mixed signal systems are also there which can take both analog and digital signals
- Example of Digital Systems: Digital computer, Digital clock, Mobile etc.

Analog and Digital Signal





Analog To Digital Conversion



Digital Systems

Advantages

- Digital Representation is very well suited for both numerical and non numeric data processing.
- Easy to design
- Adjustable Precision
- Noise Immunity
- Easily Controllable by Computer
- Complex Digital Ics are manufactured with the advent of Microelectronics technology

Digital Systems

Disadvantages

- Lower Speed.
- Requires A/D and D/A converter in many real world applications.

Digital Systems

- DS are capable of representing and manipulating discrete set of information.
- Any set restricted to a finite number of elements is refereed as discrete information.
- As stated before, discrete information is represented using signals. The signals in most present day digital systems use two values: 0 and 1. This is known as binary. A binary digit is called a bit.
- A group of binary bits can be used as a binary code.

Digital Systems

Synchronous and Asynchronous Systems

- In Synchronous systems, elements or components change their value at specified instant of time (Clocked)
- In asynchronous systems, outputs may change at any time (independent of clock signal)

Digital System Design

- A digital system is an interconnection of digital modules or digital sub systems.
- The Efficient design of any digital system considers the following parameters
  - Low Power (CMOS)
  - Area
  - Delay


Thank
you!