Digital Signal Processing

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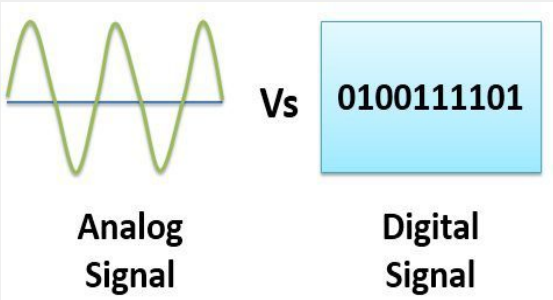
Lecture 2 - Topics

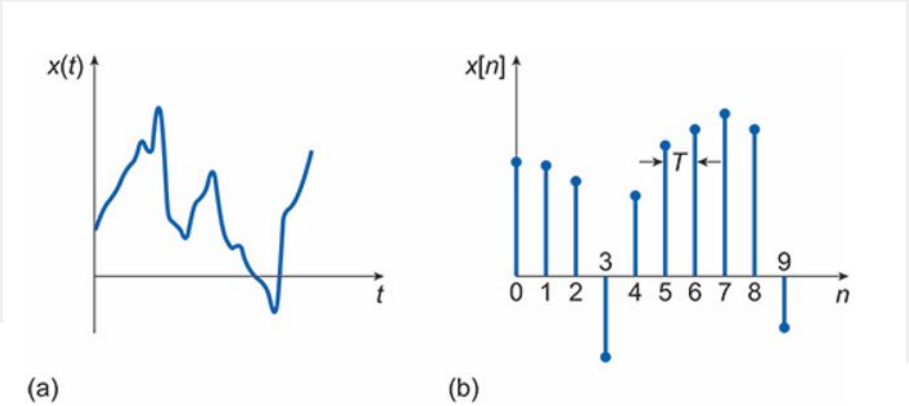
Classification of Signals:

a. **Continous or Discrete Time**
b. **Periodic or Non periodic**
c. **Deterministic or Random**
d. **Even or Odd**
e. **Energy or Power**



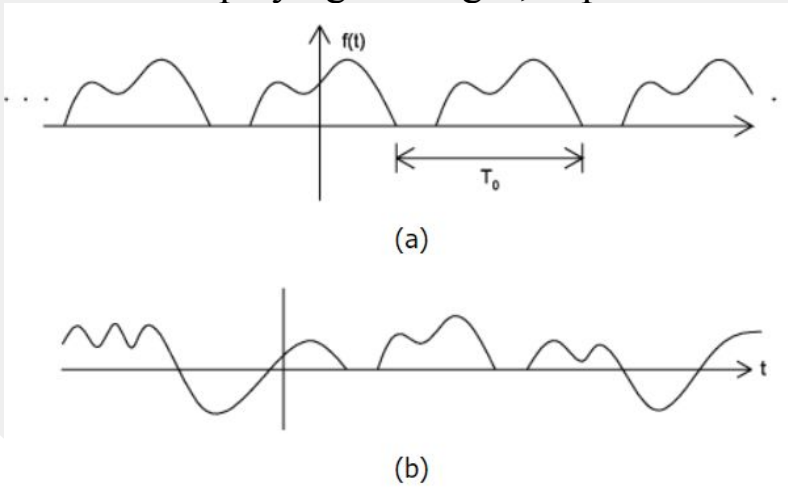
Continous and Discrete Time Signal

- **A continuous-time signal** will contain a value for all real numbers along the time axis. **A discrete-time signal is** created by sampling a continuous signal, will only have values at equally spaced intervals along the time axis.
- Ex: Continous - Television, Discrete - Radio



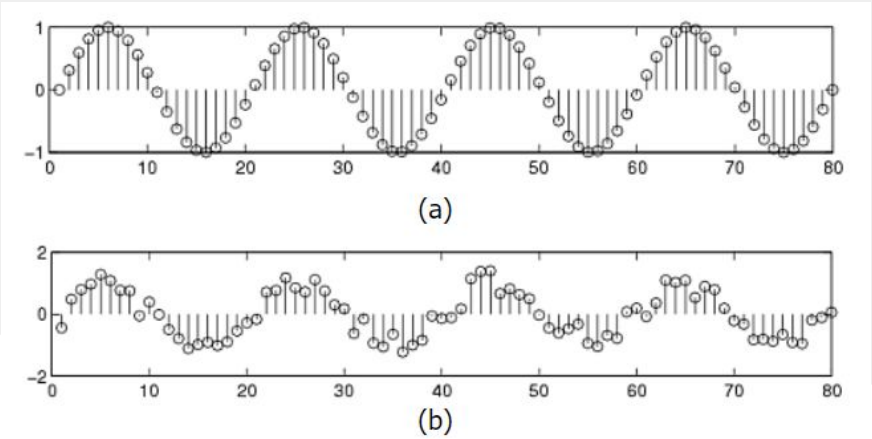
Periodic and Nonperiodic Signal

- **Periodic** signals repeat with some period T , while **Aperiodic**, or **Nonperiodic**, signals do not.
- Ex: Periodic - LED Screens displaying messages, A periodic - Sensors



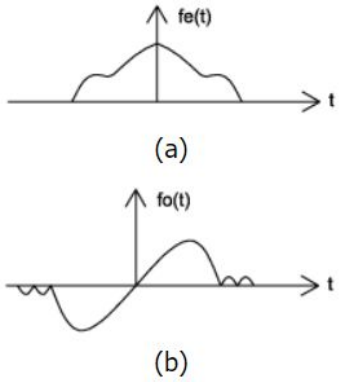
Deterministic or Random Signal

- A **Deterministic signal** is a signal in which each value of the signal is fixed, being determined by a mathematical expression, rule, or table. On the other hand, the values of a **Random signal** are not strictly defined, and cannot be calculated or predicted.
- Same examples as periodic and aperiodic can be considered.



Even and Odd Signal

- **Even** signals are symmetric on vertical axis. **Odd** signals are asymmetric on vertical axis.
- Ex: **Even** - Can be used for signal analysis because of its symmetric nature, like heart rate prediction analysis.
- **Odd** - these signals are used if you want to load test any machine, because they are symmetric in nature.



Energy or Power Signal

- The word “energy” is used to describe many different things—how we heat and cool our homes, how we fuel cars, and even how we’re feeling on a day. Energy isn’t something that can be seen or felt, but you can see and feel the effects when energy is transferred from one place to another.
- Energy is what makes change happen and can be transferred form one object to another. Energy can be transformed from one form to another.
- Power is the rate at which energy is transferred. It is not energy but is often confused with energy.
- A signal is said to be an Energy signal, if and only if, the total energy contained is finite and nonzero $0<E<\infty$
- A signal is said to be power type signal, if and only if, average power is finite and non-zero i.e. $0<p<\infty$.

Thank you!