Discrete Time Signals & Systems – What & Why?

Signal Classification

Continuous

$x(t) \rightarrow$ an

of

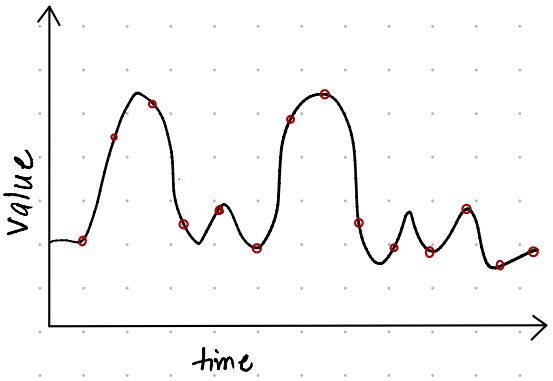
across time.

Discrete

$x[n] \rightarrow$ a

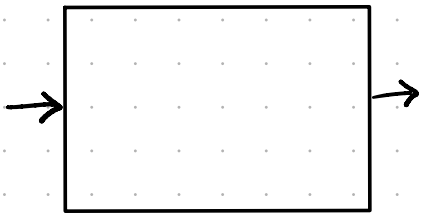
across time.

A discrete time signal is a

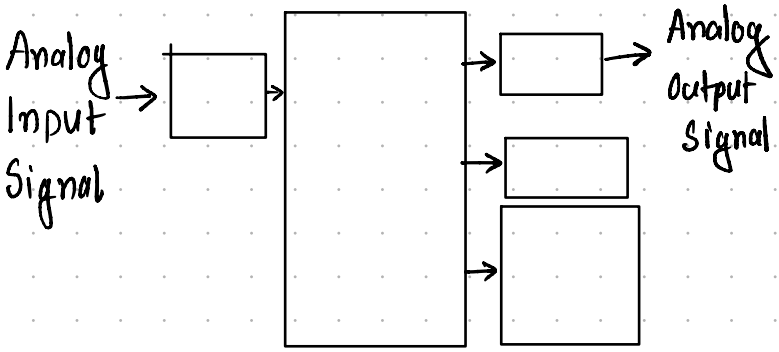


$n \rightarrow$

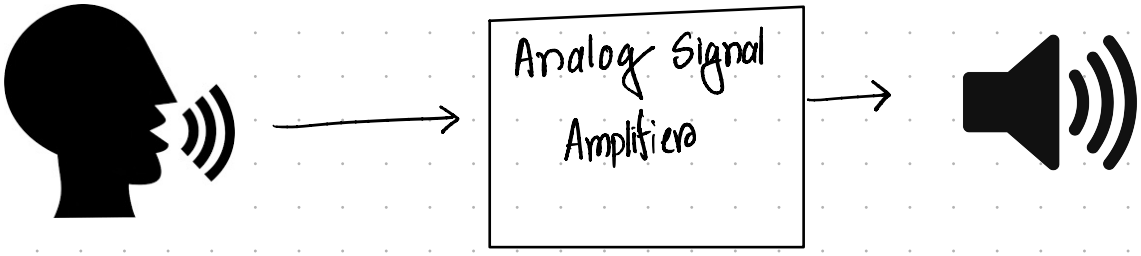
Analog ( )

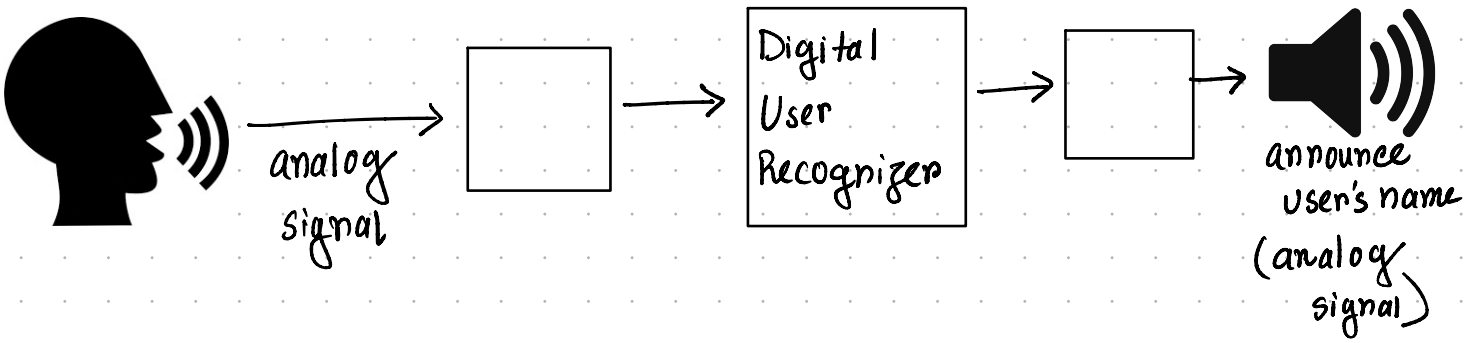


Digital ( )



Real World Scenario





Advantages of Digital System.

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- entirely reproducable
- simpler development on general purpose computer
- less effected by component tolerance resulting in more accuracy
- excellent for extremely complex systems.

Disadvantages of Digital System

Digital System / Discrete-Time System.

- A discrete time system transforms inputs into outputs

$x(t) \rightarrow \square \rightarrow x[n] \rightarrow \square \rightarrow y[n] \rightarrow \square \rightarrow y(t)$

ADC → Analog to Digital Conversion.

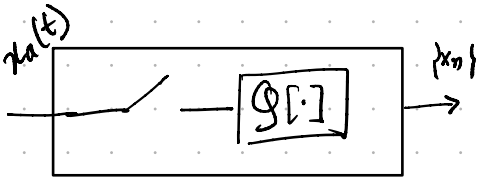
of analog signal gives us discrete signals

↓

microprocessor reads number of

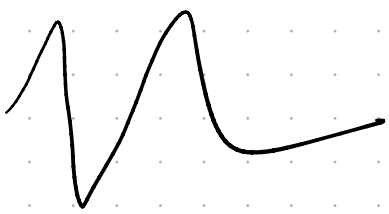
↓

of discrete signals



↓

Resulting signal is



analog signal

10 bit microprocessor

digital signal.

DAC → Digital to Analog Conversion

Goal: recovering an analog signal from a digital signal

MATLAB

→ Useful tool that can be used to model and analyze signals and systems.

→ This course will extensively use MATLAB throughout the term.