

# **Digital Signal Processing for Music**

**Part 1: Introduction**

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# Digital Technology - Production

## Sound Synthesis

Product	Year
NED Synclavier Synthesizer/Sampler	1979
Fairlight CMI Synthesizer/Sampler	1979
Linn LM-1 Drumcomputer/Sampler	1980
E-MU Emulator I Sampling Keyboard	1981
Yamaha DX-7 Synthesizer	1983



## Sound Processing / Effects



Product	Year
Lexicon Delta-T 101 Digital Delay	1971
EMT 250 Digital Reverberation	1976
Lexicon L224 Digital Reverberation	1978

# Digital Technology - Production

## Sound Editing

Product	Year
Sony DAE-1100 Digital Audio Editor	1971
Sony DAE-3000 Digital Audio Editor	1976
Sonic Solutions Harddisk Editing	1978



## Other



Product	Year
MIDI Standard	1983

# Digital Storage & Consumer

## Professional

	Year
PCM-1600 (U-matic)	1978
PCM-1 (Betamax)	1978
Digital Multitrack (3M, Sony)	1978
Alesis ADAT	1991
Tascam DA-88	1993



## Consumer

	Year
Compact Disk	1982/83
Digital Audio Tape (DAT)	1987
MiniDisc	1991
Digital Compact Cassette	1992
DVD-Video	1997
DVD-Audio	1999
SACD	1999

# Driving Forces for Digital Adoption

## **Storage**

- Lossless Copying and Archiving of Digital Content

## **Editing & Processing**

- Splicing of Recordings
- Fast Convolution
- Granular Processing/Time-stretching/Pitch-shifting

## **Technical Characteristics**

- SNR, Distortion, Transfer Functions, ...

- **Dropping prices** for digital hardware and software

# Current Trends

## **Resolution & Data Rates**

- Lower data rates for compression formats

## **Spatialization & Environment**

- Formats: Multichannel, WFS, Object-based
- Environmental Modelling
- Sophisticated HRTF

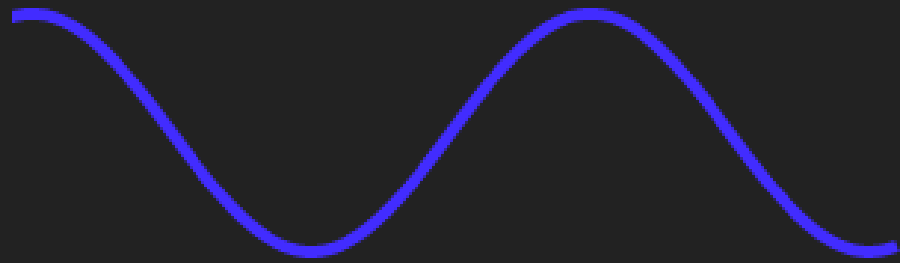
## **Production Environments**

- Online Collaboration
- Machine Musicianship

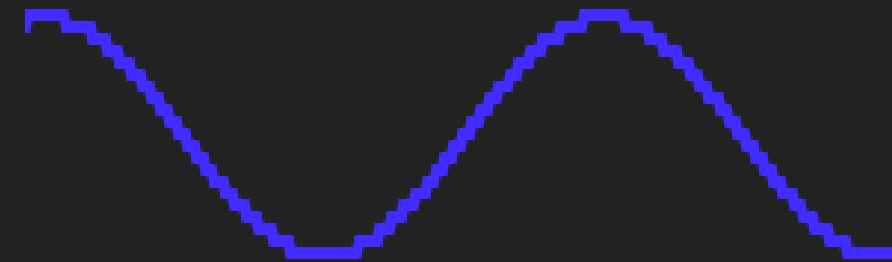
- Content-based recommendation / Listening
- Signal- & User-adaptive audio production
- Computer-aided editing, composition & performance
- Interactive & Creative audio consumer software
- Deep AI production

# Class Content

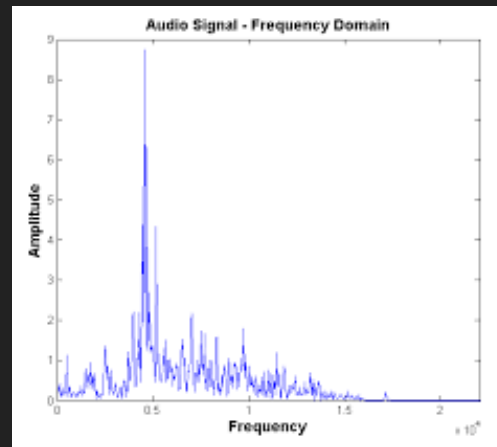
## Properties of Signals



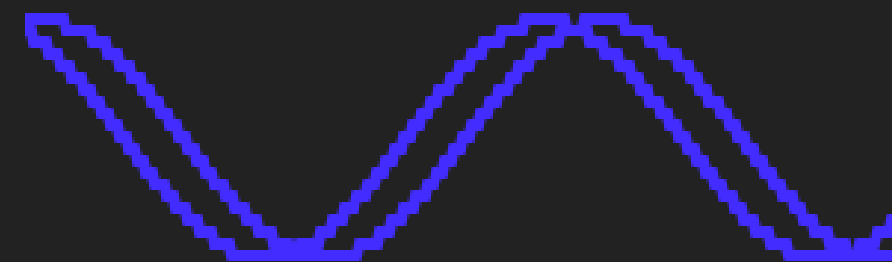
## Digitizing Signals



## Transforming Signals



## Processing Signals



## Encoding Signals