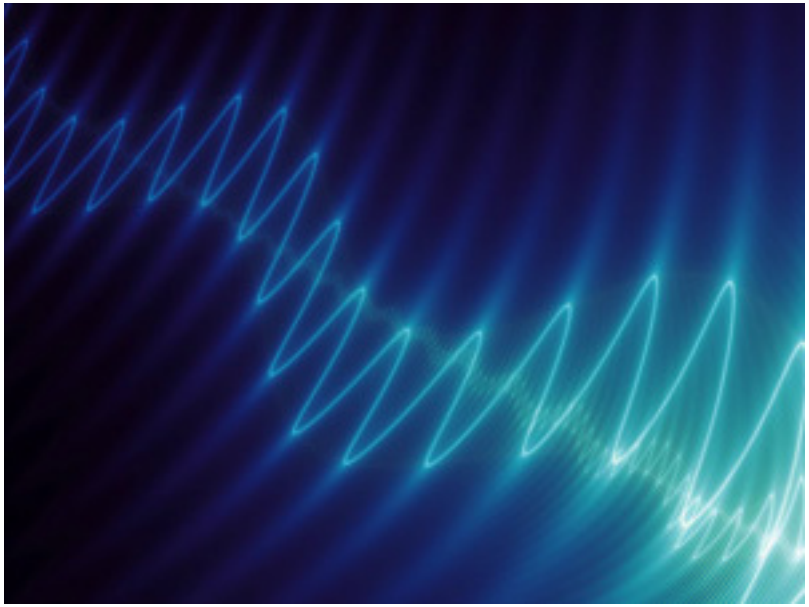


MUS421–571.1
Electroacoustic Music Composition

Kirsten Volness – 12 Feb 2016

Early Electronic Instruments

- Automata (1738) — Jacque Vaucanson
  - Claveçin électrique (1761) — Jean-Baptiste Delaborde
- Telharmonium (1906) – Thaddeus Cahill
  - Relation to telecommunications
  - Lee De Forest (1909) – Audion (vacuum tube)
- Theremin (1920) – Leon Theremin
  - Performed, not programmed
- Ondes Martenot (1928) – Maurice Martenot
  - More timbral control
  - 1930 Philadelphia Orchestra; 1937 Paris World's Fair
- Similar conception of music using different sounds

Sine Wave

- Created with oscillator
  - – DC (direct current) from power supply is converted to AC (alternating current) which creates the wave, the frequency of which can be controlled by adjusting the voltage
  - – More power, higher frequency; less power, lower frequency

Early Recording

- Phonautograph (1857) – Leon Scott
- Wax cylinders / phonograph / gramophone (1877)
- Loudspeaker (1877); Moving-coil loudspeaker (1898)
- Magnetic Tape (1928) – Fritz Fleumer

Musical Developments

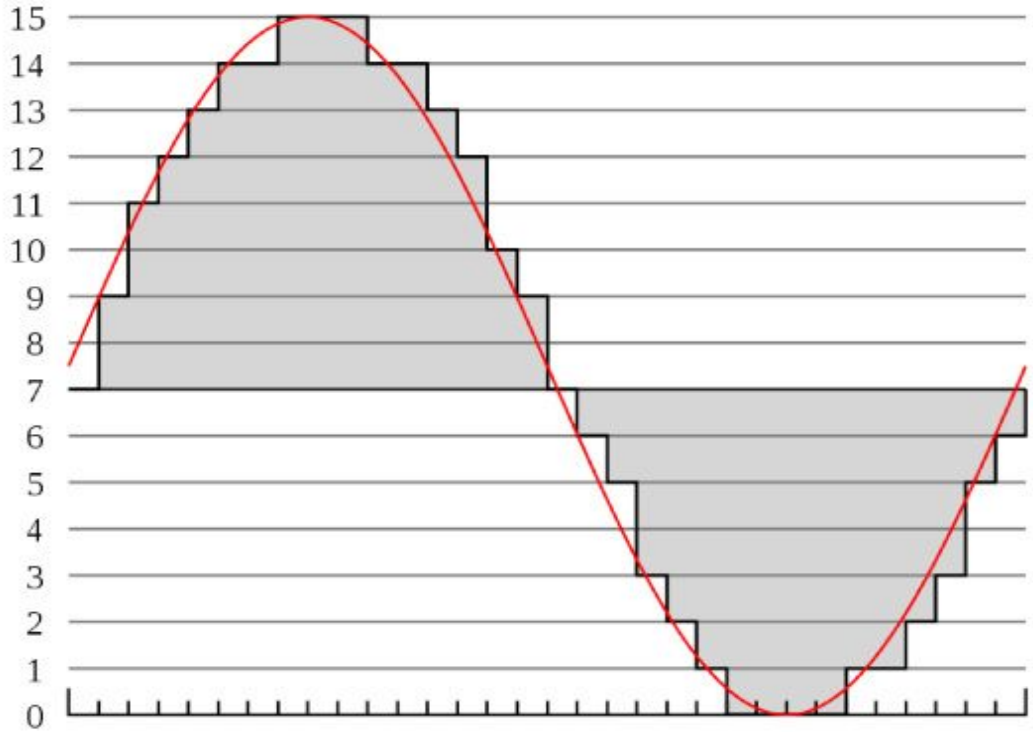
- Textural composition
  - Schoenberg's "Farben" from *Five Pieces for Orchestra, Op. 16)*
- Words as sound, without meaning
  - Dada
- Noise as music
  - Futurism
  - (Russolo – *intonarumori*, Antheil – *Ballet Méchanique*)

Marcel Duchamp – *Fountain* (1917)

Editing Techniques

- Overdubbing – re-recording multiple takes on the same tape
- Reverse
- Splicing
- Layering
  - Foreground / middle ground / background
  - Dynamic texture
  - Melody / perception of time

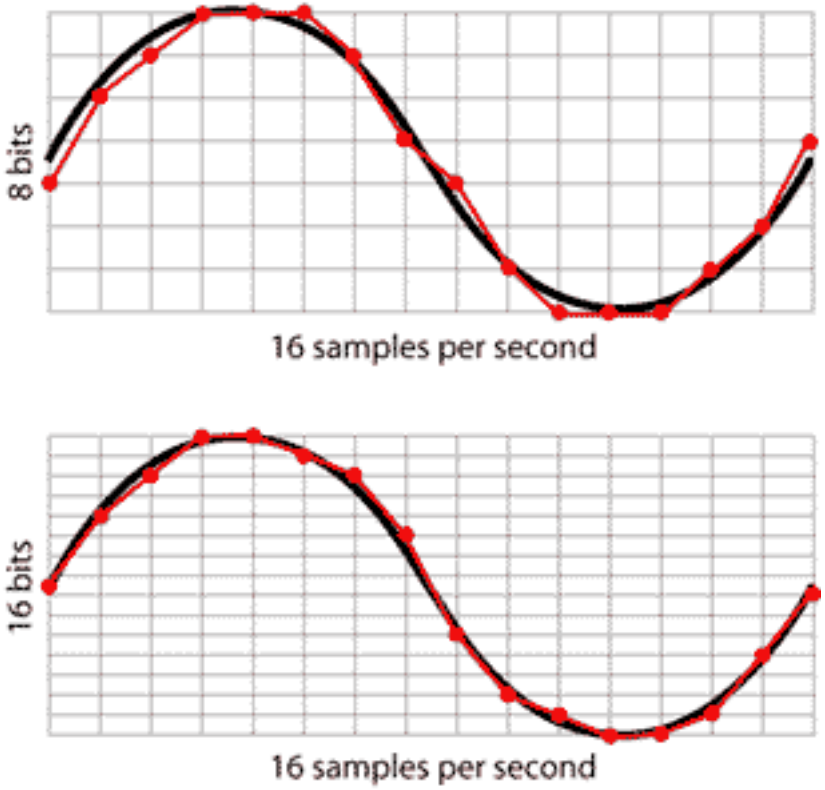
Analog vs. Digital



Each digitized sample of audio is assigned a value that corresponds to the amplitude of the analog wave.

Sample rate = how many measurements of amplitude are taken each second
44, 100 (44.1 kHz) for CD audio; 48, 000 (48 kHz) for video sync

Bit Depth (or Bit Rate)



- Bit Depth = how specific a value is captured with each sample.
- The higher the bit depth, the more fine the scale of measurement, thus the more closely the digital wave approximates the analog wave

Time Compression and Expansion

- Excessive time expansion will create granular "artifacts" (a gritty sound)
  - The sample resolution is not high enough to fill in the missing data to reproduce the sound exactly
  - This can be effective for creating texture when layered beneath another cleaner copy of the sound