Synthesizers are electronic instruments that generate waveforms
Types of Synthesizers
Types of Synthesizers
Types of Synthesizers

Minimoog Model D
Types of Synthesizers

Nord Electro 4
Types of Synthesizers

Quasimidi Quasar Sound Module
History of Synthesizers

1896 - Telharmonium

- Thaddeus Cahill, American inventor
- Weighed 200 tons
- Velocity-sensitive keys

- 12 steam-powered electromagnetic generators
- 1906 - Series of “concerts”
History of Synthesizers

1919 - Theremin

• Leon Theremin, Russian inventor
• No touching
• Similar quality of timber to voice
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1929 – Ondes Martenot

- Maurice Martenot, French cellist
- Similar to Theremin
- Used by Jonny Greenwood
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1945 – Electronic Sackbut

- Hugh Le Caine, Canadian luminary
- First voltage based synth
- Looks awesome.
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1957 – RCA Mark II Sound Synthesizer

- Herbert Belar and Harry Olson, RCA/Columbia University
- Size of a room
- Had a sequencer
History of Synthesizers

1965 – Modular synthesizers

- Bob Moog, American innovator
- Simon and Garfunkel (1968)
- The Beatles – Abbey Road (1969)
History of Synthesizers

1969 – Compact synthesizer

• Bob Moog, American innovator

• Easier to use
• Cheaper
History of Synthesizers

1983 – MIDI

- Technical standard
- Synchronize tempos
- Simply transports data
- 16 channels
History of Synthesizers

1990s – Software Synthesizers

• Run on general purpose computers
• Virtual controls
• Emulate physical synthesizers
How do synthesizers shape sounds?
Oscillators

Types

– Electronic Oscillators

– Low Frequency Oscillators (LFOs)

Waveforms

- Sine
- Square
- Triangle
- Sawtooth
Envelopes

- Attack (A)
- Decay (D)
- Sustain (S)
- Release (R)

Amplitude

$O_{\text{key pressed}}$ → $A$ → $D$ → $S$ → $R$ → $O_{\text{key released}}$
Filters

1. **Low-pass Filter**: Allows frequencies below a certain threshold to pass through, attenuating higher frequencies.

2. **High-pass Filter**: Allows frequencies above a certain threshold to pass through, attenuating lower frequencies.

3. **Band-pass Filter**: Allows frequencies within a specific range to pass through, attenuating frequencies outside this range.

4. **Band-stop Filter**: Attenuates frequencies within a specific range, allowing frequencies outside this range to pass through.