Yamaha DX7 FM Synthesizer

Shadi Abdu Rahman
Rajanarayana Priyanka Marigi
Andreas Irestål

Yamaha DX7

- Launched 1983
- The most successful commercial synthesizer ever made so far
- Uses FM (Frequency Modulation) in the audible range to produce interesting sounds

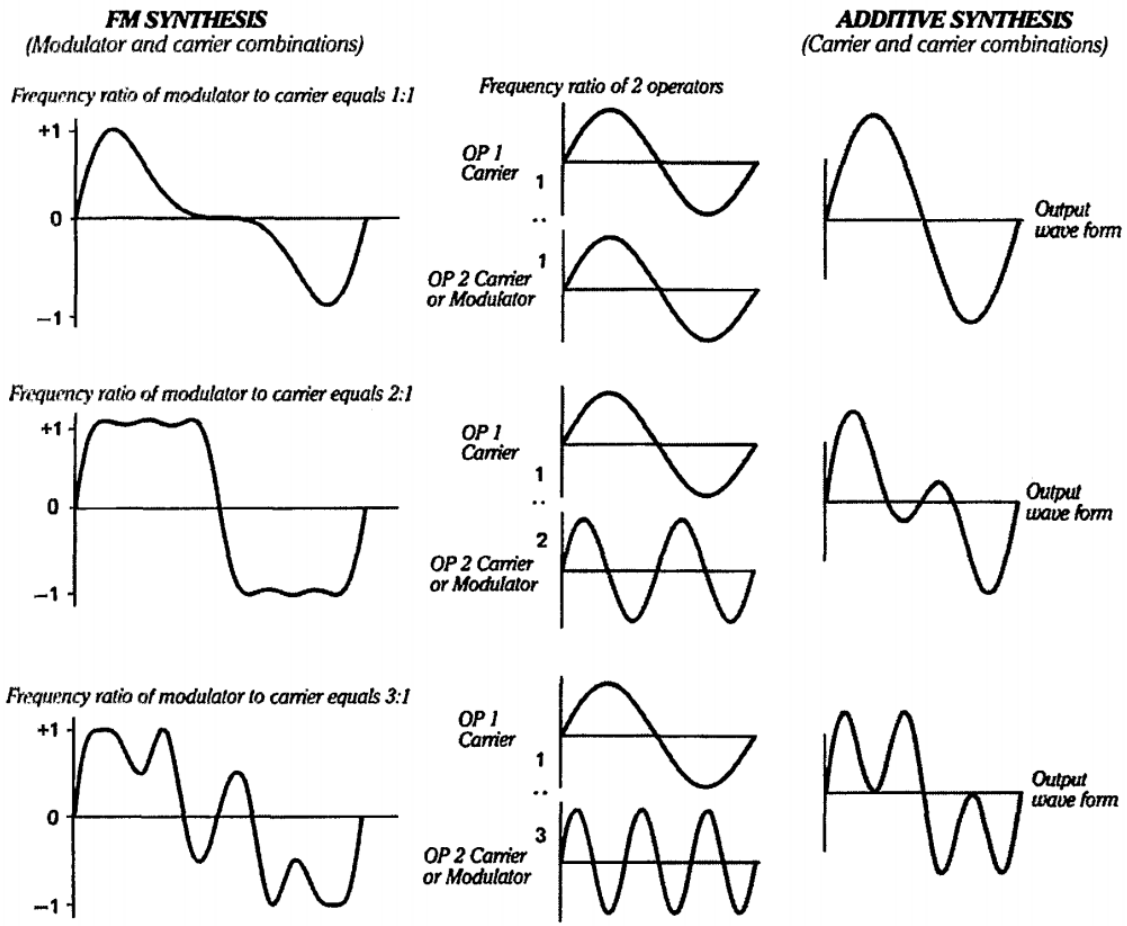
Frequency Modulation

- Common Method for Radio Broadcasting
- The output of one oscillator (modulator) modulates the frequency of another oscillator(carrier)

$$\sin(\omega_1 + I\sin(\omega_2))$$

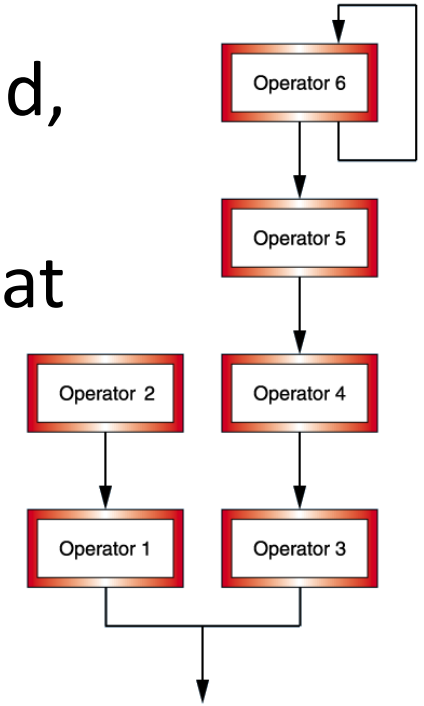
- *I* is called the Modulation Index, and decides amount of modulation applied to the carrier.
- Produces interesting sounds

FM Example


FM SYNTHESIS
(Modulator and carrier combinations)
ADDITIVE SYNTHESIS
(Carrier and carrier combinations)
Frequency ratio of modulator to carrier equals 1:1
Frequency ratio of 2 operators
+1
0
–1
OP 1 Carrier
1
OP 2 Carrier or Modulator
1
Output wave form
Frequency ratio of modulator to carrier equals 2:1
+1
0
–1
OP 1 Carrier
1
OP 2 Carrier or Modulator
2
Output wave form
Frequency ratio of modulator to carrier equals 3:1
+1
0
–1
OP 1 Carrier
1
OP 2 Carrier or Modulator
3
Output wave form

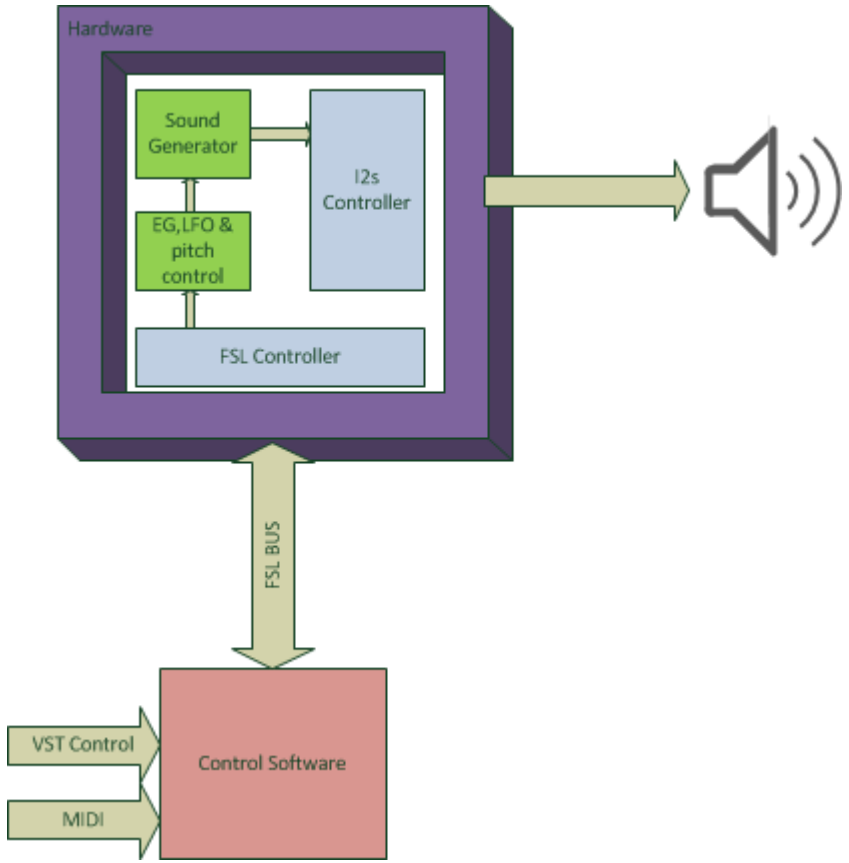
Yamaha DX7 (again)

- Has 16 voices of polyphony
- Has some advanced scaling features (e.g. More modulation could be applied to certain parts of the playing area)
- Uses 6 oscillators to produce FM sound, configurable in 32 pre-defined configurations. Stacked (modulator that modulates modulator) configurations exists.



Required Components

- FM Synthesizer core with support for changes in modulation over time (EG & LFO)
- Control Software
- MIDI interface
- VST interface
- I2s interface



Work Schedule

Name	Andreas	Priyanka	Shadi
Week 1	Planning	Planning	Planning
Week 2	HW development	HW development	VST Software development
Week 3	HW & SW development	HW & SW development	Midi Interface Building
Week 4	SW development	SW development	VST & Software development
Week 5	DX7 Measurements & adjustments	Extension Work	SW/Extension Work
Week 6	Report Writing	Report Writing	Demo Song
Week 7	Presentation	Presentation	Presentation

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