MIDI Extensions, alternatives

Music 253/CS 275A

Stanford University

Widely acknowledged shortcomings

Pitch

- Non-Western
- Non-equally tempered
- Interpretation of accidentals (inflections)



Modes vs. chromatic scale

Dorian Mode (II)

CS 275A/Music 253

Ionian Mode (I)

2016 Eleanor Selfridge-Field

Phrygian Mode (III)

Mapping (or not) to the chromatic scale

- Diatonic=8 tones
- Chromatic=12 tones
- Pentatonic=5 tones





Lady playing tanpura, c. 1735

Widely acknowledged shortcomings



Durations

- □ Ties (certain kinds)
- Ambiguity of articulation/

instrumentation

 Matching written values to sounding values

Articulations

- Staccato
- o Marcato
- o Tentuto

Accent absent in MIDI

- □ Barring
- □ Accent
- Beams
- □ Grouping





Proposed MIDI extensions (overview)

- Methods
 - System-exclusive messages
 - Bit re-purposing
 - Addition of control track

Expressive MIDI: Code vs. Hardware

(Making MIDI more competent for notation)

Who: Cooper, Ng, Boyle

- expEvent (SysEx)
- \Box Min length = 5 bytes
 - 0xF0 start of message
 - 0x7D non-commercial
 - <data bytes [2..n]>
 - 0xF7 end of message



Linnstrument

Two encoding tables

- Finale [=Adobe] font list
- "Isolated" symbols
 - Articulation signs
 - Dynamics
 - Rests
 - Stems and tails
- Bit flags for graphical placement of adjunctive objects

Expressive MIDI

Extensible symbols, with bit flags

- 8ve
- Pedal markings
- Trills
- Crescendos
- Beams
- Slurs



Super objects [MuseData]

Objects that pertain to multiple objects/events

Beams

Slurs



Augmented MIDI

(How to accommodate gesture in MIDI)

- Who?: Max Mathews
- Method
 - Addition of "drum track"
- Gestural information
 - Accents
 - Articulations (incl. slurs)
- □ How?
 - Reassign two bits from note-on command



Max Mathews' Radio Baton

Numbered keyboard: Physical key is absolute Tonal music notation: Notated pitch relative to key



MIDI Plus

(How to make MIDI enharmonically accurate)

- □ Who? Walter Hewlett
- □ Method

Reassign two bits from velocity byte

- □ US Patent #5675100 (1996)
- http://www.google.com/patents?id=6RcIAAAA
 <u>EBAJ&pg=PA2&source=gbs_selected_pages&</u>
 <u>cad=4#v=onepage&q&f=false</u>

BINARY DECIMAL	x	64	32	16	8	4	2	1
88		1	0	1	1	0	0	0
89		I	0	I	I	0	0	١
90		1	0	1	1	0	1	0
91		1	0	1	1	0	1	1
92		1	0	1	1	1	0	0

Complements Base-40 music arithmetic

Method for enharmonic accuracy





Hardware approaches to enharmonicity

C - 3 - minor + L	_ydian b7 🗸 🧲	🚔 🎘 🏟					
by Mudcu.be / built with MIDLjs							
Playback Speed:	82%						
Synesthesia:	Louis Bertrand Castel (1734) -						

Non-equal temperament

- Baroque tunings
 - "Just" intonation
 - Meantone
 - Werckmeister III

• Arbitrary 8ve arrangements ("short octaves", split keys)









Pitch and timbre: Music V and CSound

Approaches that define sounds

- Music V: Max Mathews (Bell Labs, 1960s, 1970s)
- Csound: Barry Vercoe (MIT, 1980s, 1990s)
 - □ score
 - □ scot
- Strengths:
 - decimal system using cents (frequency)
 - Instruments can be arbitrary (scot)
 - Arbitrary objects can be encoded (*pling* command)
 - Canonical Csound Reference Manual: <u>http://csounds.com/manual/html/indexframes.html</u>

Tutorial: <u>https://www.youtube.com/watch?v=rkBIUrJoJ3Y</u>