BAIN MUSC 336
Introduction to Computer Music

MUSICAL INSTRUMENT DIGITAL INTERFACE (MIDI)

> "MIDI data is simply a series of number values, from 0 to 255, that allow control events to be universally understood by different hardware and software."
>
> – Peter Kirn, *Real World Digital Audio*

Reading

- Hass, § 3.1 MIDI Overview and History, and § 2. MIDI Hardware, in *Introduction to Computer Music* (Hass 2021)
- Kirn, How MIDI Models Performances; Adding Expressivity; Programs & Banks (GM) & System Messages, in *Real World Digital Audio* (Kirn 2006)

Terms & Concepts

Note Messages	**Devices**	**Control Change (CC) #**
Note-on/note-off pair	Synthesizer (Hardware)	#1 - Modulation wheel
- Note-on command	Virtual Instrument (Software)	#7 - Volume
- Note-off command	Controller keyboard	#10 - Pan
Note number (0-127)	Alternative controller	#64 - Sustain pedal
Key velocity (0 & 1-127)	Broadcast channel	#120 - All sound off
Channel number: 1-16, 10 drums	Polyphony	#123 - All notes off
Channel Messages	**Data**	**Hardware Interconnection**
Aftertouch	Bit	MIDI Ports: IN/OUT/THRU
- Polyphonic	Baud rate (bits per second)	5-pin DIN connector
- Channel	Byte (8 bits)	MIDI interface (2x2, 4x4, etc.)
Control change (CC)	- Data byte (0-127)	Main controller/secondary instr.
- Continuous (#0-#63, 0-127)	- Status byte	Daisy chain
- Switch (#64-#127, 0 or 127)	Powers of 2	
Pitch bend	- $2^8 = 256$ values (0-255)	**Standards**
- Course	- $2^7 = 128$ values (0-127)	The MIDI Association
- Fine	Numeric notation	General MIDI (GM)
Program change	- Binary	- GM Instrument Library
- Bank	- Decimal	- GM Perc. Key Map
- Program number	- Hexadecimal	- GM1, GM2 & GML
	MIDI bus	MIDI 2.0
System Messages	MIDI data format	
System common	MIDI data rate (31.25 kilobaud)	OpenSound Control (OSC)
System real-time	MIDI event	
System-exclusive (SYSEX)	MSB/LSB	**Synchronization**
	Pulse per quarter (PPQ)	MIDI Clock, MMC, MTC, SMPTE, etc.
Adding Expressivity		
Pitch-bend wheel	Standard MIDI File (SMF)	
Modulation wheel	- Type 0	
Sustain pedal	- Type 1	
Expression pedal		

References

Hass, Jeffery. 2021. Introduction to Computer Music: An Electronic Textbook, 2nd ed. Bloomington, IN: Indiana University. Available online at: <https://cmtext.indiana.edu>.

Kirn, Peter. 2006. *Real World Digital Audio*. Berkeley: Peachpit Press.