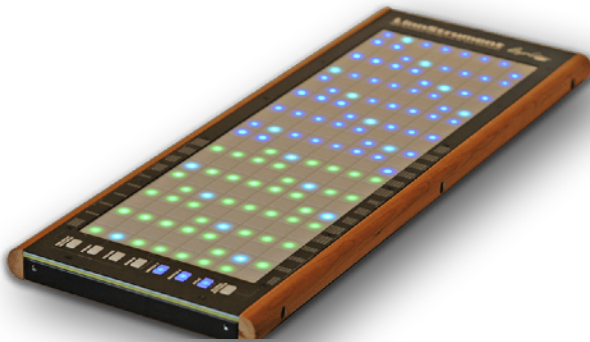# MIDI Polyphonic Expression (MPE) Profile for MIDI 2
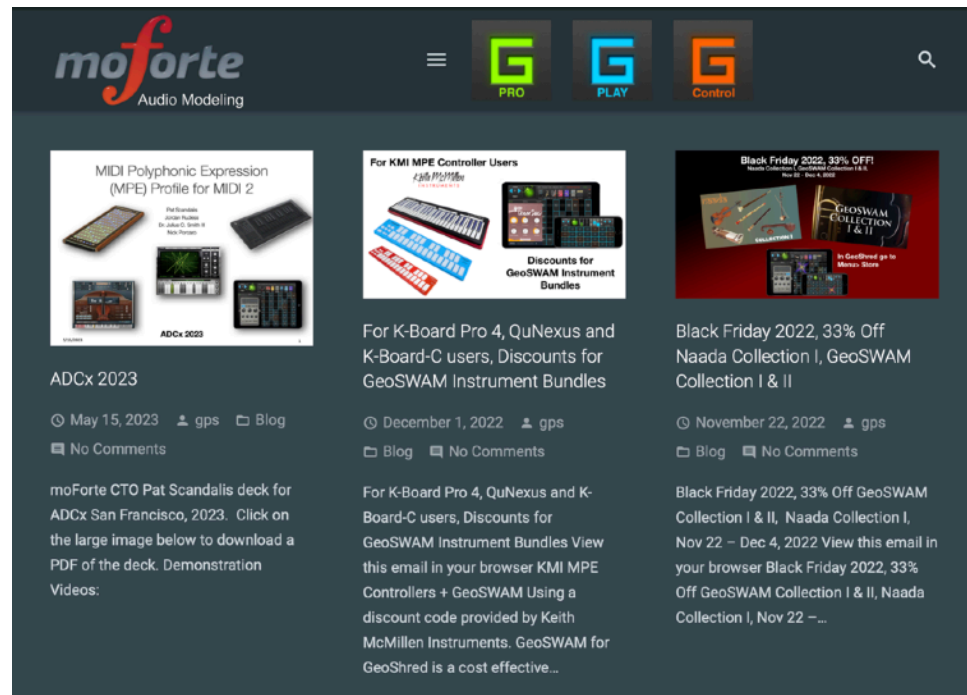
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ADCx 2023

This Presentation Can be Found at:

http://www.moforte.com/news

MPE
MIDI Polyphonic Expression

- A set of *conventions built on MIDI 1.0* to communicate per note, *multidimensional (x|y|z) control data*.

- Enables *independent expression* for each note or row.

- *Already supported* by over **250 hardware and software products**. MPE has legs

- MPE is a Lingua Franca for musical expression.

- The spec was ratified in January-2018, and a clarification revision was released April-2022: https://www.midi.org/specifications/midi1-specifications/mpe-midi-polyphonic-expression

- MIDI 2 profile is in the works and expected to complete in 2023

MPE Roots

- Similar to how Guitar Controllers have used MIDI 1.0 for 35 years.

- The Haken Continuum (x|y|z) expression
  (1999, Lippold Haken)

- The kBow and AIM (Keith McMillen, 2010, 2014)

- The LinnStrument is one of the first instruments to implement MPE (2014, Roger Linn and Geert Bevin)

- Roli later adopted MPE for the original Seaboard (2014, Roland Lamb)

MPE in a Nutshell

- Derivative of MIDI Modes 3/4; enabled with RPN-6/0

- Can be Channel-Per-Note (for Keyboards, like the Seaboard) or Channel-Per-Row (String) (GeoShred, LinnStrument, Guitar Controller).

- Expression Control Conventions (per Channel)
    - o KeyX – Pitch Bend (Roli calls this *Glide*)
    - o KeyY – CC-74 (Roli calls this *Slide*)
    - o KeyZ – Channel Pressure (Roli calls this *Press*)

- Provides for Manager Channel (typically 1 or 16) that globally controls the MPE Member Channels (ie modWheel to all Member Channels)

- Provides for a low/high split, and each split can have it's own Manager Channel.

KeyY = CC-74

KeyX = Pitch Wheel

KeyZ = Channel Pressure
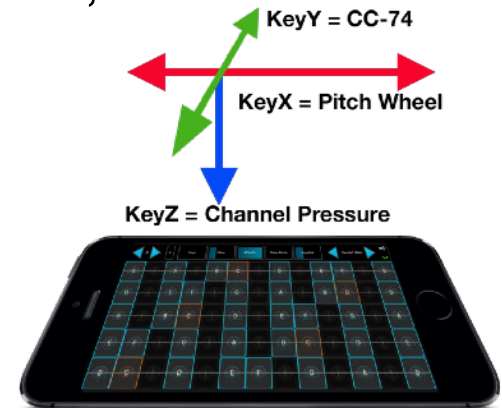
The Importance of Pitch Fluidity

- Pitch Fluidity is an essential expressive metaphor for musical performances around the world. For example South Asian Music.

- MPE directly addresses Pitch Fluidity directly by supporting per-note multi octave pitch bending.

Modeling Synthesis and MPE

- Models are parameterized and as such can be musically expressive.

- Until recently, the options for expressing musical parameters were limited, *and affected all notes,* pitch wheel, mod wheel, knobs…

- **MPE creates a standard for individual expressive control on a per-note or per-row (string) basis.**
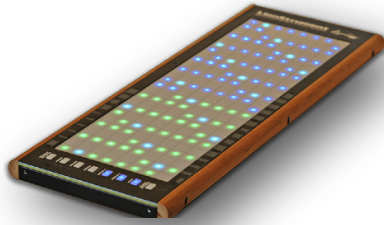
MPE + Modeled Synthesis
… BIG DEAL

- MPE makes a whole new generation of controllers possible. **Whatever instrument makers dream up!**

- MPE offers an expressive performance mechanism for parameterized synthesis methods. Physical Modeling, Virtual Analog, FM, … others

- **Together, whole is greater than the sum of the parts!**

Some MPE Controllers

- Haken Continuum
- Lumi Keys
- KMI K-Board Pro 4
- Ere Touch
- Sensel Morph
- Osmose
- Artiphon INSTRUMENT 1
- Joué
- GeoShred
- Seaboard
- LinnStrument
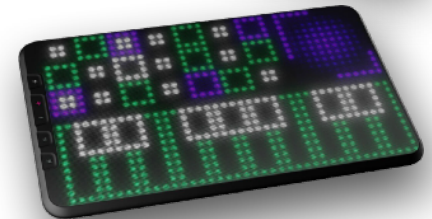
Some MPE Modeled Synths

- Animoog
  Model-D
  Model 15

- SWAM

- GeoShred

- [Roger Linn's list of MPE sound sources](#)

- [Roli's List of MPE Products](#)

Demos

MPE + Modeled Synthesis

MPE for MIDI 1.0, here's what ya gotta do!

- Decide if you want to support Channel-Per-Note (MIDI Mode 3, Aka Poly) or Channel-Per-Row (MIDI Mode 4, AKA Mono).

- Program your instrument to send the MCM, MPE Configuration Message with RPN6. The MCM will identify the Manager Channel (usually 1) and the number of Member Channels (usually 15).

- Program your instrument to send Pitch Bend Sensitivity with RPN0. The default Pitch Bend Sensitivity for MPE receivers is +/- 48

- The default MIDI Mode for MPE receivers is Channel-Per-Note (MIDI Mode 3). If you implement Channel-Per-Row (MIDI Mode 4), you will need to send MIDI Mode messages to configure the receiver for MIDI Mode 4.

- Send MIDI Channel Voice Messages, NoteOn, NoteOff on individual channels.

- Send (x|y|z) expression using Pitch Wheel Change, Channel Pressure and CC#74 on individual Channels. You may need to send reset values for these before the Note On to clear the channel.

MPE in MIDI 2
(In Progress)

- MCM (RPN 6) is replaced with an MPE Profile Details Inquiry negotiation using MIDI-CI.

- Profiles are receiver centric. The receiver will report back the range of channels that it can support and the sender will adapt.

- Zones are gone and are handled by enabling multiple profiles.

- A profile can use any base channel as the Manager Channel, not just 1, 16.

- Will work with legacy MIDI 1.0 or MIDI 2, Profiles, CI, UMP.

- 16 additional high resolution dimensions of expression per note.

- MIDI Modes 3/4 are now called Polyphonic Channel Response and Monophonic Channel Response and are determined by the current program on the receiver, NOT the receiver and NOT the sender.

Now That You Know How Simple MPE is … Make Some New Expressive Instruments!

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PAOLO PUGGIONI
CONCEPT ART & ILLUSTRATION

Questions?

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