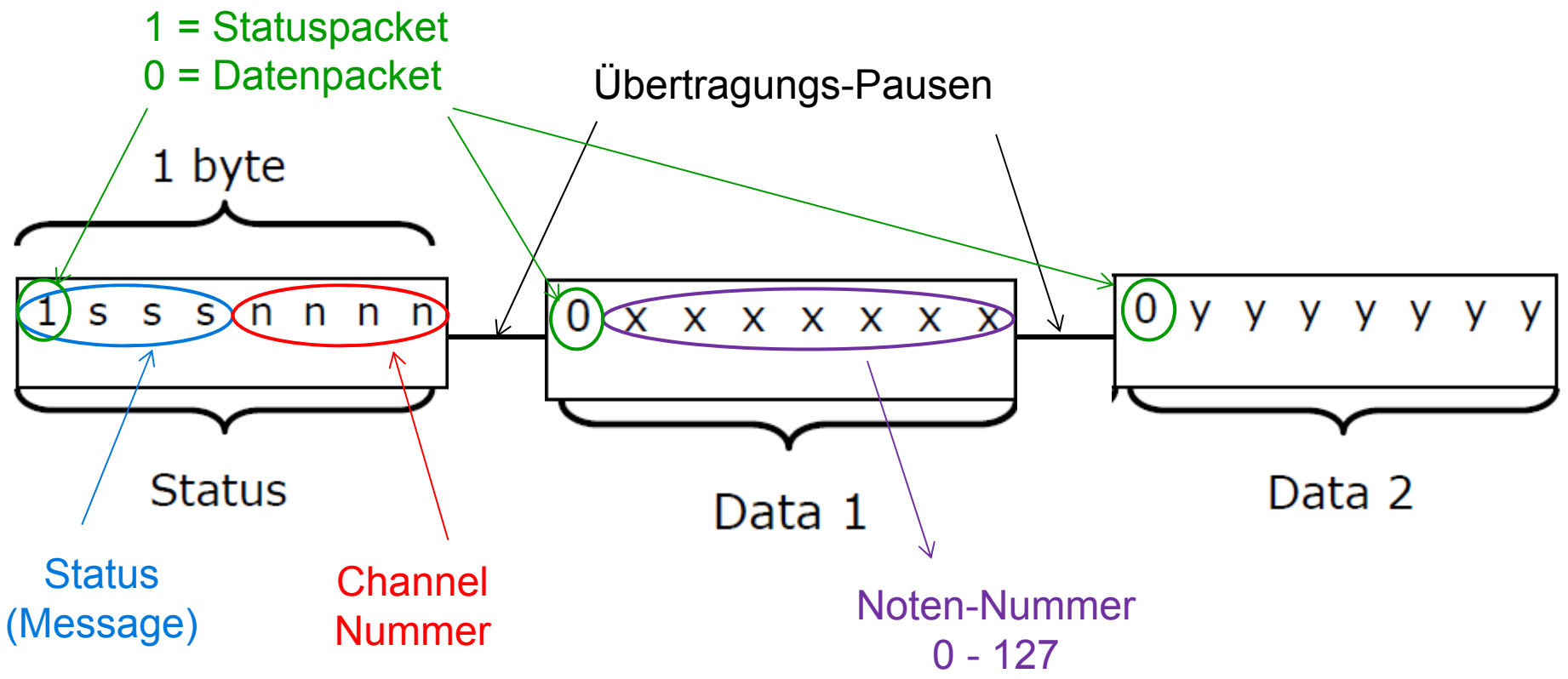
DTP2_PROJ_8

School of Engineering

Extra Feature Keyboard

MIDI Datenübertragung

School of Engineering



MIDI Channel Messages

School of Engineering

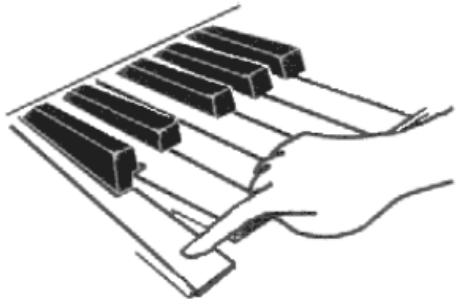
Message	Status	Data 1	Data 2
Note off	8n	Note number	Velocity
Note on	9n	Note number	Velocity
Polyphonic aftertouch	An	Note number	Pressure
Control change	Bn	Controller number	Data
Program change	Cn	Program number	-
Channel aftertouch	Dn	Pressure	-
Pitch wheel	En	LSbyte	MSbyte

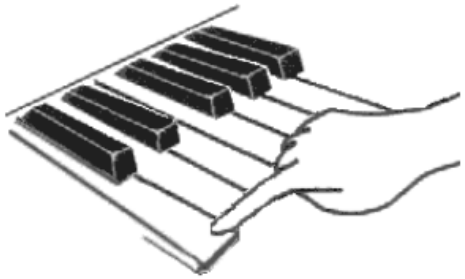
Note On / Note Off

School of Engineering

Message	Status	Data 1	Data 2
Note off	8n	Note number	Velocity
Note on	9n	Note number	Velocity

- "Note on" triggers a musical note, "note off" turns it off



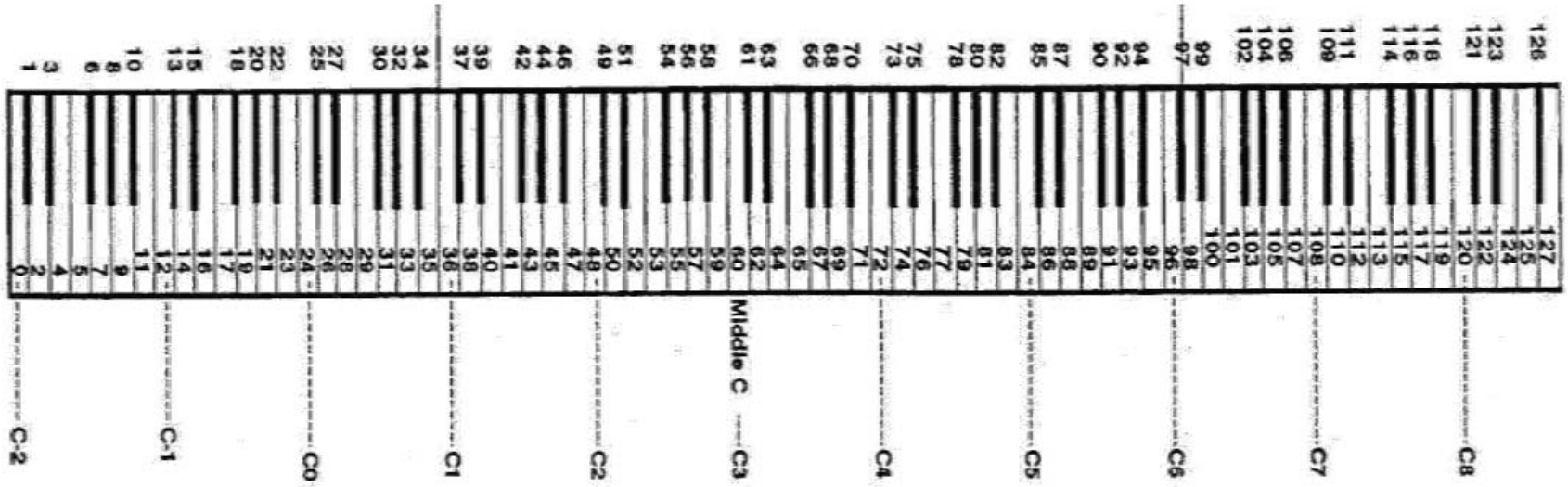


- All notes MUST be turned off (otherwise they'll sound indefinitely)

Note on / Note Off (2)

School of Engineering

- There are 128 (0-127) possible note values (~10 octaves) mapped to the chromatic western music scale.

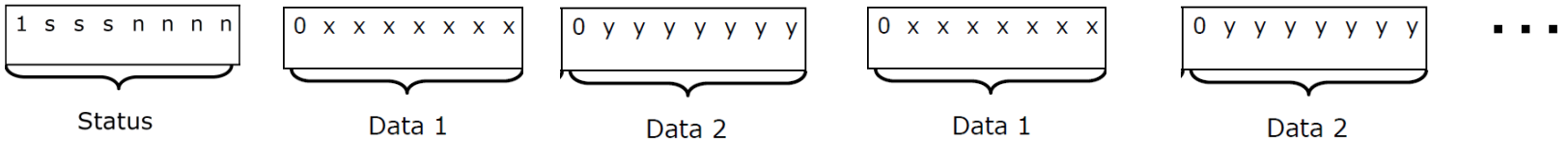


- Commonly, middle C is mapped to MIDI's C-3 (note number 60, 6th octave).

Slide Courtesy of Juan P Bello

MIDI «Running Status» Übertragungsart

School of Engineering



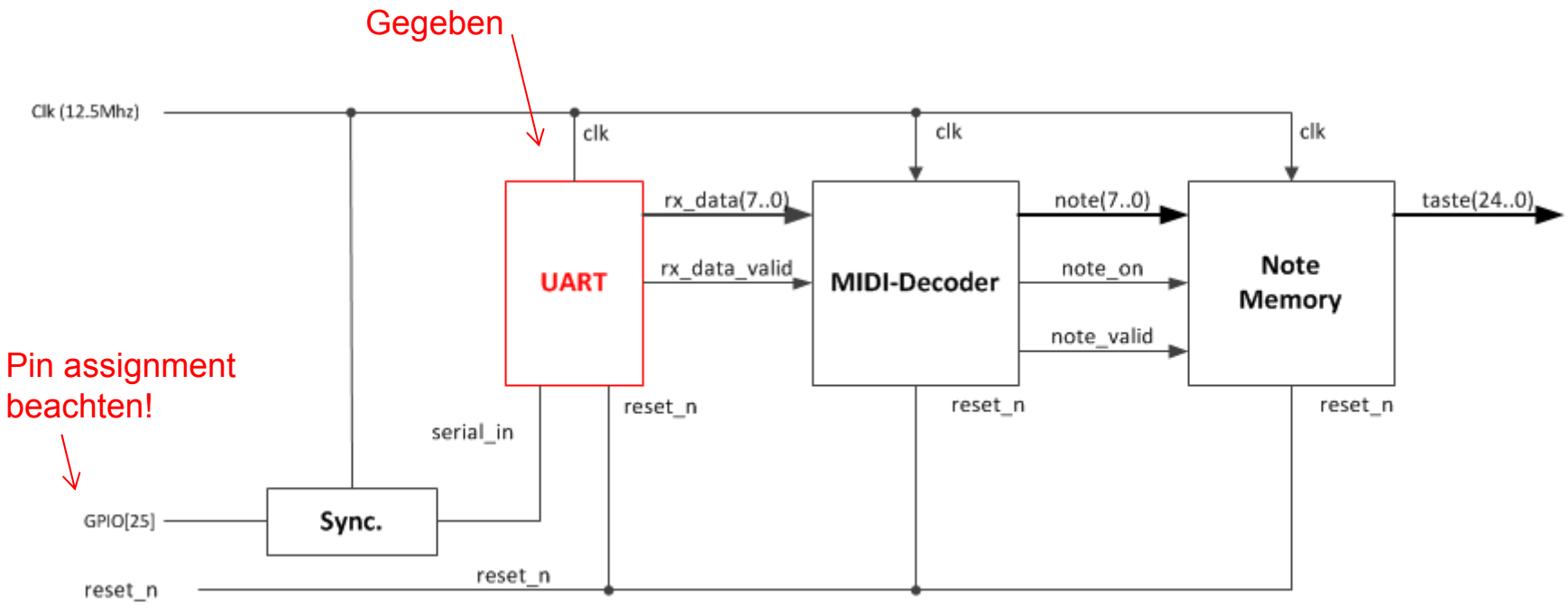
Note On | Note 1 | Velocity 1 | Note 2 | Velocity 2

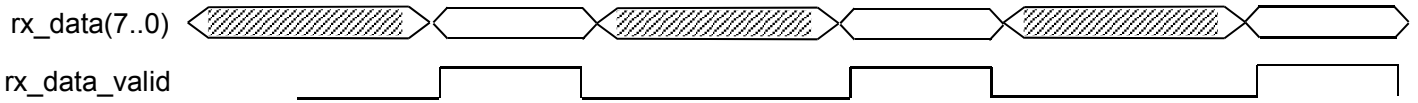
Drücken mehrerer Tasten gleichzeitig (Polyphonie)

Note_On & Velocity = 0 equivalent zu Note_Off

Aufteilung der Blöcke

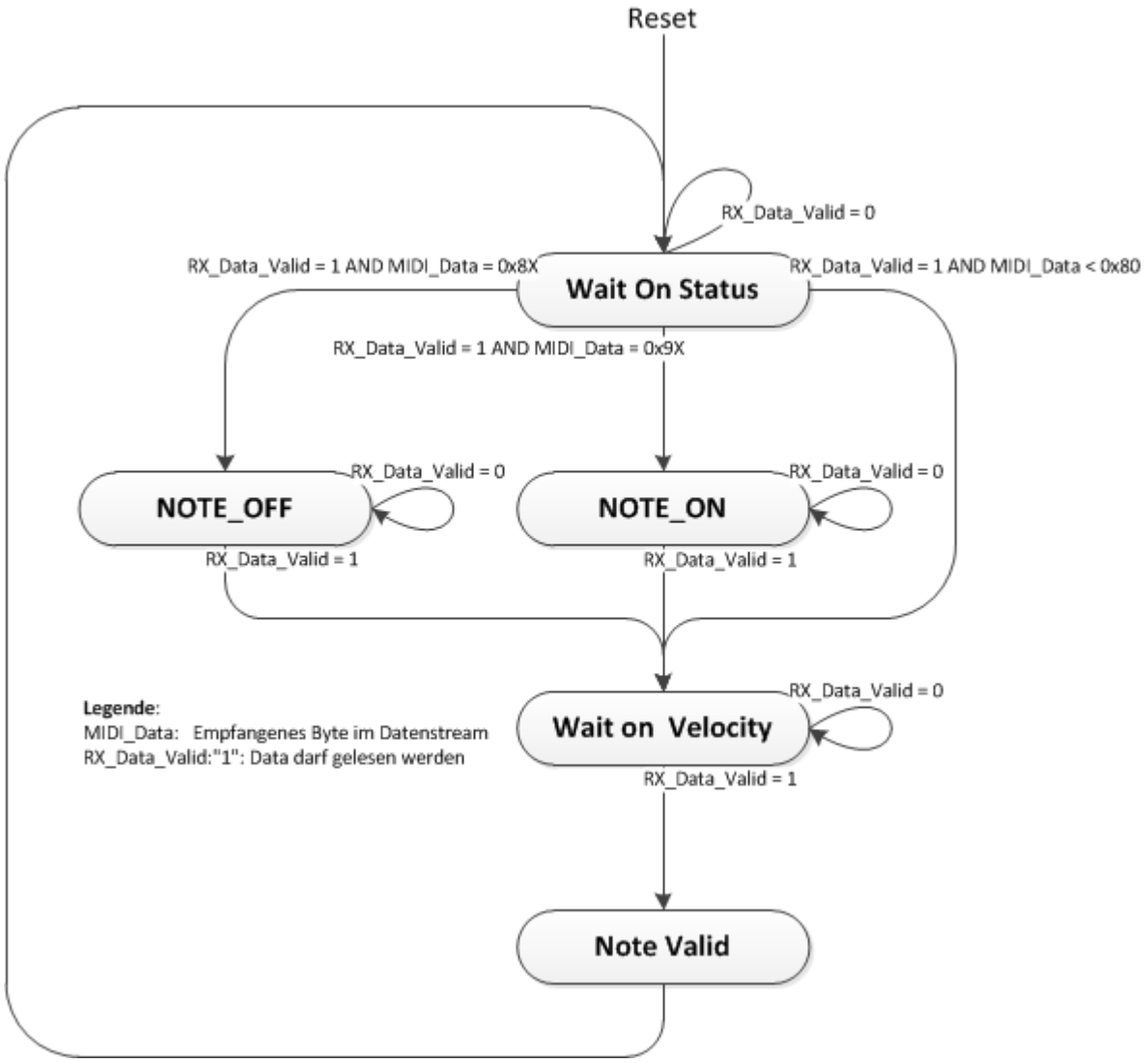
School of Engineering





Vorschlag für MIDI Controller FSM

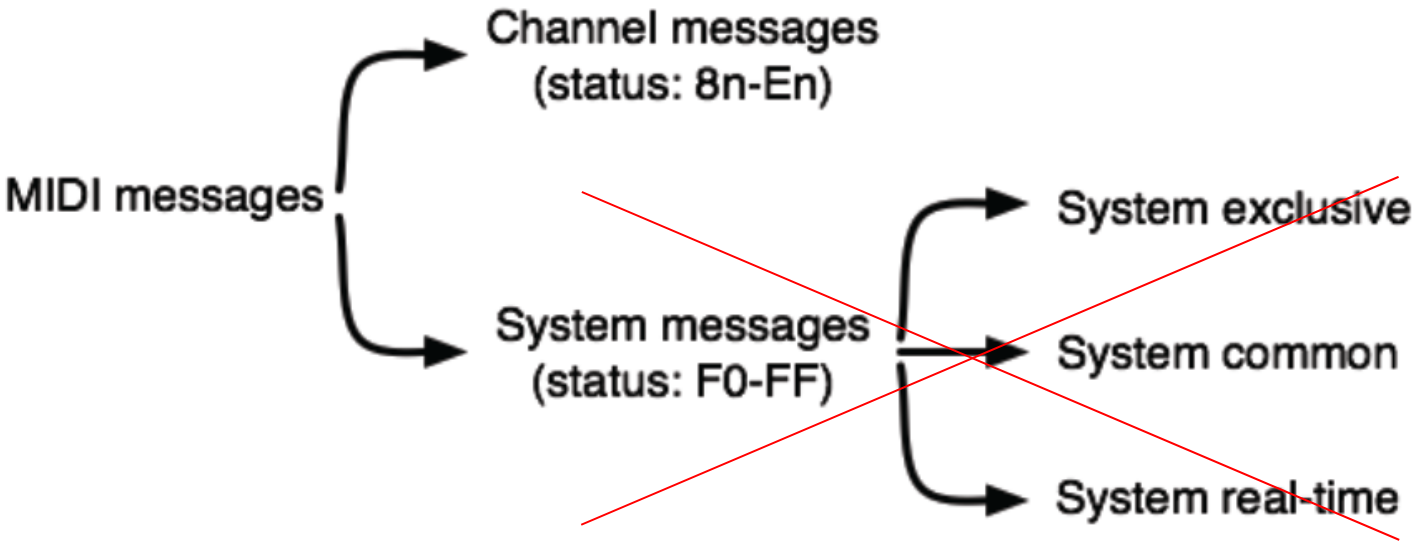
School of Engineering



MIDI Messages

School of Engineering

- There are two main types of MIDI messages: channel and system



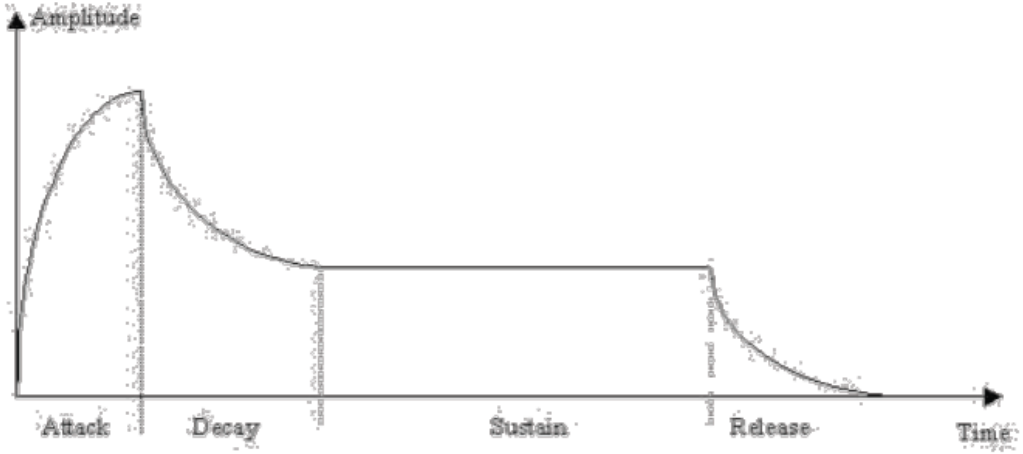
- As their names indicate they are addressed to individual channels or the whole system (exception: "omni on" channel messages)
- Wir müssen nur Channel Messages benutzen

Slide Courtesy of Juan P Bello

Note on / Note Off (3)

School of Engineering

- Note on messages are also associated to a "velocity" value, characterizing how hard the key was hit.
- Note on velocity can be used to control volume and timbre of a sound (e.g. by controlling the scaling of an envelope generator)



- The mapping between velocity and the parameter it controls is often logarithmic.
- Note off velocity relates to the speed at which a note was released
- It could be used to affect a sound, but it is not normally used.

Slide Courtesy of Juan P Bello

Note on / Note Off (4)

School of Engineering

- Note on, velocity zero is equivalent to note off.
- It is convenient when large amounts of data are sent to the MIDI bus (e.g. a high-polyphony chord)
- Normally we will need 6 bytes for each note of a chord: [9n] [pitch][velocity] and [8n][pitch][velocity]
- Instead we can clutter note on and off messages together: [9n] [pitch][vel][pitch][vel]…[pitch][vel]
- This is known as running status
- For a 4-note chord it means 17 bytes are transmitted rather than 24 bytes (assuming running status remains unchanged).

Slide Courtesy of Juan P Bello

Aftertouch

School of Engineering

- Key pressure messages are called aftertouch
- It refers to the amount of pressure placed on a key at the bottom of its travel (triggering performance parameters, e.g. vibrato)

Message	Status	Data 1	Data 2
Polyphonic aftertouch	An	Note number	Pressure
Channel aftertouch	Dn	Pressure	-

- Polyphonic key pressure transmits a separate value per key (thus requiring separate sensors)
- This is expensive as most players do not maintain constant pressure on the bottom of the key
- Most instruments use a single sensor, thus one message is sent with the approx. total pressure sensed (channel aftertouch)

Slide Courtesy of Juan P Bello