MIDI
MIDI
Musical Instrument Digital Interface

• an industry-standard protocol adopted in 1983
• by mid 1980s almost every electronic instrument manufactured was MIDI compatible
What does MIDI do?

• Allows MIDI-compatible devices to communicate with each other
  – keyboards
  – computers
  – drum machines
  – other electronic gear (effects, mixers, consoles)

• Transmits instructions for playing music between MIDI devices
• MIDI information is sent on MIDI channels, 1-16.
• Channels allow for the flow of information both ways
  – MIDI cables are uni-directional
    (USB is bi-directional)
• Multi-timbral devices - able to respond to up to 16 different MIDI channels at once
MIDI is not recorded sound, it is a set of instructions
The MIDI standard

• Two components:
  – **Hardware Specifications** – how MIDI devices are connected
  – **Performance Data** – language used between MIDI devices
MIDI Hardware Specifications

- Three MIDI ports:
  - **IN** accepts MIDI data
  - **OUT** sends MIDI data
  - **THRU** passes data through to another device
USB/MIDI

• The trend in the last decade has been toward MIDI devices with USB ports.
Three ways of connecting MIDI devices to a computer:

1. External audio interface with MIDI ports (ex. Digidesign M-Box)
2. MIDI interface (ex. MOTU Midi Express)
3. USB Keyboard (ex. Axiom 61)
Three common possibilities for MIDI set-ups:
1. Basic

Simplest way of connecting a MIDI device to a computer.
2. Multi-Port MIDI Interface

- Advantages of a multi-port MIDI interface:
  - each device is capable of having its own discrete 16 channels
  - may have multiple controllers
3. USB Hub

Allows the greatest flexibility in terms of type and number of devices connected.
MIDI Performance Data

• Consists of two major sets of MIDI messages:
  – **System Messages**
    • commands sent to all devices on all MIDI channels
      – e.g. tune request, bulk dump, system reset
  – **Channel Messages**
    • commands sent to a MIDI device on any of the 16 MIDI channels
    • standard range of values is 128 (0-127 or 1-128)
Most used channel messages:

1. **Note on**
   - most basic command - “play a note”
     (middle C = note #60)
     • also velocity (how hard the note is struck)

2. **Control Change**
   - adds expressive qualities to sequenced music
     • sustain (#64)
     • modulation (#1 typically used to add vibrato)
     • volume (#7)
     • pan (#10)
Most used channel messages:

3. Program Change
   - sets or changes the patch to be used on a particular channel
   - originally not standardized
General MIDI

• Established in 1991
• Standardized instrument patch numbers (1-128)
  – divided into 16 groups (e.g. piano, strings, reeds, brass, ethnic)
    • 1 - grand piano
    • 43 - cello
    • 67 - tenor sax
MIDI Devices

• Controller
  – sends MIDI messages when its keys are played
  – can’t generate any sound of its own
  – most common is keyboard controller, also:
    • wind (Akai EWI)
    • percussion (DrumKat)
    • guitar (Roland GK-3)
MIDI Devices

• Module
  – generates sound when it receives MIDI messages, but has no keyboard
  – multi-timbral
MIDI Devices

- Keyboard Synthesizer ("synth")
  - can send MIDI messages when its keys are played
  - can generate sound when it receives MIDI messages
  - may be thought of as a controller and a module combined
MIDI Devices

• Workstation
  – includes synth features, may include:
    • MIDI sequencer
    • audio f/x
    • digital audio recorder
Deleted Slides
Most used channel messages:

1. **Note on** – contains three pieces of information
   1) MIDI note number (0-127)
      • middle C = 60
   2) Velocity (0-127)
      • how hard a note was struck
   3) MIDI channel number
      • 1-16
2. Control Change - allows us to add expressive qualities to sequenced music
   - sustain (#64)
   - modulation (#1)
   - volume (#7)
   - pan (#10)
3. Program Change
   – sets the patch or instrument to be used on a particular channel
   – originally not standardized
General MIDI specs

• Sound Set - standardized instrument patch numbers (1-128)
  – divided into 16 groups (e.g. piano, strings, reeds, brass, ethnic)
    • 1 - grand piano
    • 43 - cello
    • 67 - tenor sax

GM Patch List : http://www.midi.org/techspecs/gm1sound.php
General MIDI

• **Voices**
  – 24 note polyphony

• **Channels**
  – uses all 16 channels, 10 is reserved for percussion

• **Channel Messages**
  – velocity sensitivity
  – key pressure (aftertouch)
  – pitch bend
General MIDI

• Controllers
  – modulation
  – volume
  – pan
  – sustain
General MIDI

• Established in 1991
  – defined a set of minimum standards for MIDI devices