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 is not recorded sound, it is a set of instructions
USB/MIDI

• The trend in the last decade has been toward MIDI devices with USB ports.
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
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.
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
MIDI Performance Data

• Consists of two major sets of MIDI messages:
  – System Messages
    • commands sent to all devices on all MIDI channels
      – tune request
      – system reset
      – bulk dump
  – 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)

2. Control Change
   - adds expressive qualities to sequenced music

3. Program Change
   - sets the patch to be used on a particular channel
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
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

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

- Controllers
  - modulation
  - volume
  - pan
  - sustain