

# **Director and SequenceXtra for the Web**

## **Creating Multimedia that uses MIDI I/O**

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*Macromedia's Director is a popular development tool for building multimedia software complete with interactivity, animation, audio and graphics. Until recently its ability to handle MIDI data was limited to output through QuickTime or third-party Xtras with features that were platform dependent. With SequenceXtra by Source Force, the multimedia developer has a tool available to control all aspects of MIDI input and output for both stand-alone or internet delivered applications. This is powerful for music educators and multimedia developers who could make use of the advantages MIDI offers. This presentation will demonstrate the use of SequenceXtra in the context of on-line content development and the special requirements of internet delivery.*

### **I. Access to your site:**

- Using a small Shockwave file as a login or entry device on your front page allows you to confirm the user has the correct Shockwave plug-in and version for your movies.

### **II. Creating graphics:**

- Use Flash to create ultra-small files sizes that are great looking and flexible.
  - Flash files are vector graphics instead of bitmaps; they can be resized without losing clarity.
  - Flash now “communicates” better with Director. Pass Flash events to Lingo.
- Bitmaps can be used but they should be as low a resolution and limited color palette as possible. Don't be afraid to re-use as much as possible throughout the project.

### **III. SequenceXtra ([www.sourceforce.nu](http://www.sourceforce.nu)):**

- Initialize SequenceXtra
  - **new(xtra "sequenceXtra", tracks)**
  - All xtras require some call to the xtra to instantiate it.
  - Each instantiation of the Xtra will require a global variable. This is used when doing function calls.
- Sequence Xtra identifies devices in user's settings (QT/OMS/MME) for MIDI.
  - **sxGetOutputList()**
  - In Macintosh OS 9, if OMS is present, will return device list.
  - Returns a list with device names.
  - Selection is only for output.
  - Input seems open to any MIDI channel.
- Setting the output device
  - **sxSetOutput(outputNumber)**
  - sxSetOutput needs an integer, not a string.

- Could be accomplished by having the user choose from a text box, checking the list and getting its location.

#### IV. Method for receiving MIDI data:

- Getting data from a MIDI device
  - **sxGetMIDIIn()**
  - MIDI data is received from a buffer
  - The oldest event is transferred and then deleted from the buffer.

```
Code      on exitFrame
Example:  theEvent = sxGetMIDIIn()
          if listP(theEvent) then
            myEvent = string(theEvent)
          end if
          end exitFrame
```

#### V. Methods for playback for MIDI data:

- MIDI note event can contain 5 elements:
  - [1920, 144, 60, 100, 240]
  - **1920** means 1920 ticks from the starting position (PPQN = 480 ticks)
  - **144** is a noteOn event on MIDI channel 1
  - **60** is the MIDI note number for middle C
  - **100** is the attack velocity
  - **240** is the length of an eighth note.

- Xtra can call individual or small groups of events to happen
  - **sxSendMIDI(event)**

```
Code      --Takes each note number and puts it into a "sendMIDI" message
Example:  --Plays a chord on MIDI channel 1, velocity setting of 100, whole note
          repeat with x = 1 to (count(noteList))
            y = getAt(noteList,x)
            sxSendMIDI([144, y, 100, 1920])
          end repeat
```

- MIDI files can be loaded and modified
  - **sxOpenSMF(mySong, filePath or #useDialog) or sxDownloadSMF(mySong,URL)**
  - SequenceXtra can load both Standard MIDI files (.mid) and its on proprietary file (.sxs).
  - Using the Director function *preLoadNetThing* will return a integer that can be used for testing if the download has finished.
  - You must use the full URL to the external file even if it's on the same web server.
  - Then SequenceXtra will load the MIDI file into *mySong*.

```
Code      --Load a SMF (.mid) file from a server. First, can I get to the URL?
Example:  netID = preLoadNetThing ("http://127.0.0.1/session_five/midiFiles/sumrsend.mid")
          --If not complete, loop the frame that shows connection to server is in progress
          "loading.swf".
          if netDone(netID) <> 1 then
            go to the frame
          else
            --Is complete, so load the file into mySong
            sxDownloadSMF(mySong,"http://127.0.0.1/session_five/midiFiles/sumrsend.mid")
          end if
```

- Songs can be created on the fly
  - **sxCreatePart**(*song*, *trackNum*, *startPosition* {, *eventList*})
  - Parts can be created dynamically by input from computer or MIDI keyboard or, pre-built lists of data. Either property or linear lists will work.

- Property list example:

```
pV1Chord =[#c7:["c7",[[0,144,60,100,0],[0,144,70,100,0],[0,144,76,100,0]]],\
#f7:["f7",[[0,144,53,100,0],[0,144,69,100,0],[0,144,75,100,0]]],#bb7 . . . etc.
```

- The function below creates a track from the linear list called “noteList” with a half note rhythm. A similar function is used to assign the appropriate duration.

```
Code      on buildChordTrack(noteList)
Example:  --This will hold the new array to create the track
            set finalPart = [ ]
            --go through the entire list noteList created above.
            repeat with i = 1 to count(noteList)
            -- the amount added to each chord to create half note rhythm
            z = gHalfNoteTicks * i
            a = getAt(noteList,i)
            --Each chord has multiple notes
            repeat with j = 1 to count(a)
            -- go through the each chord tone
            b = getAt(a,j)
            --get the first element & add "z" with gHalfNoteTicks(960) offset
            c = getAt(b,1) + (z - 960)
            -- Put it back
            setAt b, 1, c
            -- Add the new chord to finalPart list
            append finalPart, b
            end repeat
            end repeat
            --Create the track
            sxCreatePart(mySong, 1, 3, finalPart)
            end
```

## VI. Other functions:

- Get position
  - **sxGetPos**(*mySong*{*format*{*tick* }})
  - **sxGetPos** converts a tick value to a bar number, beat and/or subdivision. With the format argument included; #bar, #beat, #subdivision/ #tick can be individually returned. Without it, a complete list is returned. (ex. [4, 2, 240] )
  - If done in a looped frame, the accuracy may depend upon the frame rate of the movie’s playback.

```
Code      case (sxGetPos(mySong,#bar)) of
Example:  1:
            GoBackToTop ()
            6:
            if (sxGetPos(mySong,#beat)) > 2 then
            sprite(4).locV = origLocV - 150
            end if
            ETC . . .
            end case
```

-Transpose

- **sxSetTrackTranspose**(*mySong*, *trackNum*, *interval num*{128 to -128})

- Remember, if you're doing a global key change, skip what's on MIDI channel 10!

```

Code          Repeat with x = 1 to count(trackList)
Example:      if sxGetTrackChannel (mySong, x) <> 10 then
                  SxSetTrackTranspose (mySong, x, intervalNum)
                  end if
                  end repeat

```

- Other track functions

sxGetTrackInfo()	sxSetTrackChannel()	sxGetTrackReverb()	sxAddToTrack()
sxSetMIDIThruState()	sxGetTrackChannel()	sxSetTrackChorus()	sxGetTrackCount()
sxSetMIDIThru()	sxSetTrackInstrument()	sxGetTrackChorus()	sxGetPartCount()
sxSetTrackTranspose()	sxGetTrackInstrument()	sxCreateTrack()	sxGetMarkerList()
sxGetTrackTranspose()	sxSetTrackVolume()	sxBuildTrack()	sxGetKeySignList()
sxSetTrackMute()	sxGetTrackVolume()	sxGetTrack()	sxChannelSort()
sxGetTrackMute()	sxSetTrackPan()	sxBuildSong()	sxSetTrackQuantize()
sxSetTrackName()	sxGetTrackPan()	sxMergeTracks()	sxUnquantizeTrack()
sxGetTrackName()	sxSetTrackReverb()	sxClearTrack()	sxDeleteTrackEvents()

## VII. Shockwave:

- Auto download of the Xtra

- Using Shockwave content that includes Xtras requires that the appropriate packages are downloaded to the user's computer. Director comes with a default set.
- The file "xtrainfo.txt" must be edited to include SequenceXtra. Since this requires the URL of a server, it's usually done from the server that is hosting the shockwave file.
- In Director go to Modify->Movie->Xtras and add SequenceXtra to the list of Xtras. For Shockwave movies, check the "Download if necessary" checkbox (this requires an active internet connection).
- For more information about auto download of Xtras go to:  
**[http://www.macromedia.com/support/director/ts/documents/sw8\\_xtras.htm](http://www.macromedia.com/support/director/ts/documents/sw8_xtras.htm)**

- Publishing the completed Director file as a Shockwave movie.

- A Shockwave movie (.dcr) is a compressed version of a movie's data but does not include a player. Shockwave movies are created primarily to distribute over the internet for playback in a web browser.
- Shockwave works with Netscape Navigator as a plug-in, with Microsoft Internet Explorer for Windows 95/98/ME/NT/2000/XP as an ActiveX control, with Microsoft Internet Explorer for Mac OS as a plug-in, and with Apple Safari for Mac OS X as a plug-in.
- Shockwave movies can also play in America Online 4.0 or later running under Windows 95/98/2000/XP/NT4.0 or later, Mac OS 8.6 or later.

## VIII. Further information:

- Director MX** ([www.macromedia.com/software/director](http://www.macromedia.com/software/director)) - This is the home site for Director with links to FAQs, support, tutorials, etc.
- Director Web** ([www.mcli.dist.maricopa.edu/director](http://www.mcli.dist.maricopa.edu/director)) - One of the most comprehensive Director sites including a searchable listserv.
- SequenceXtra** ([www.sourceforge.net](http://www.sourceforge.net)) - This is the home site for SequenceXtra with links to download a fully functional demo, on-line tutorial, and message board.
- CPS (Cycles Per Second)** (<http://www.bonneville.nl/cps>) - Programming environment for audio and MIDI. Can be used stand-alone, VST plug-in, or Xtra for Director.
- AudioXtra** ([www.updatestage.com](http://www.updatestage.com)) - Audio I/O Xtra for Director and Authorware.