

Luca Turchet

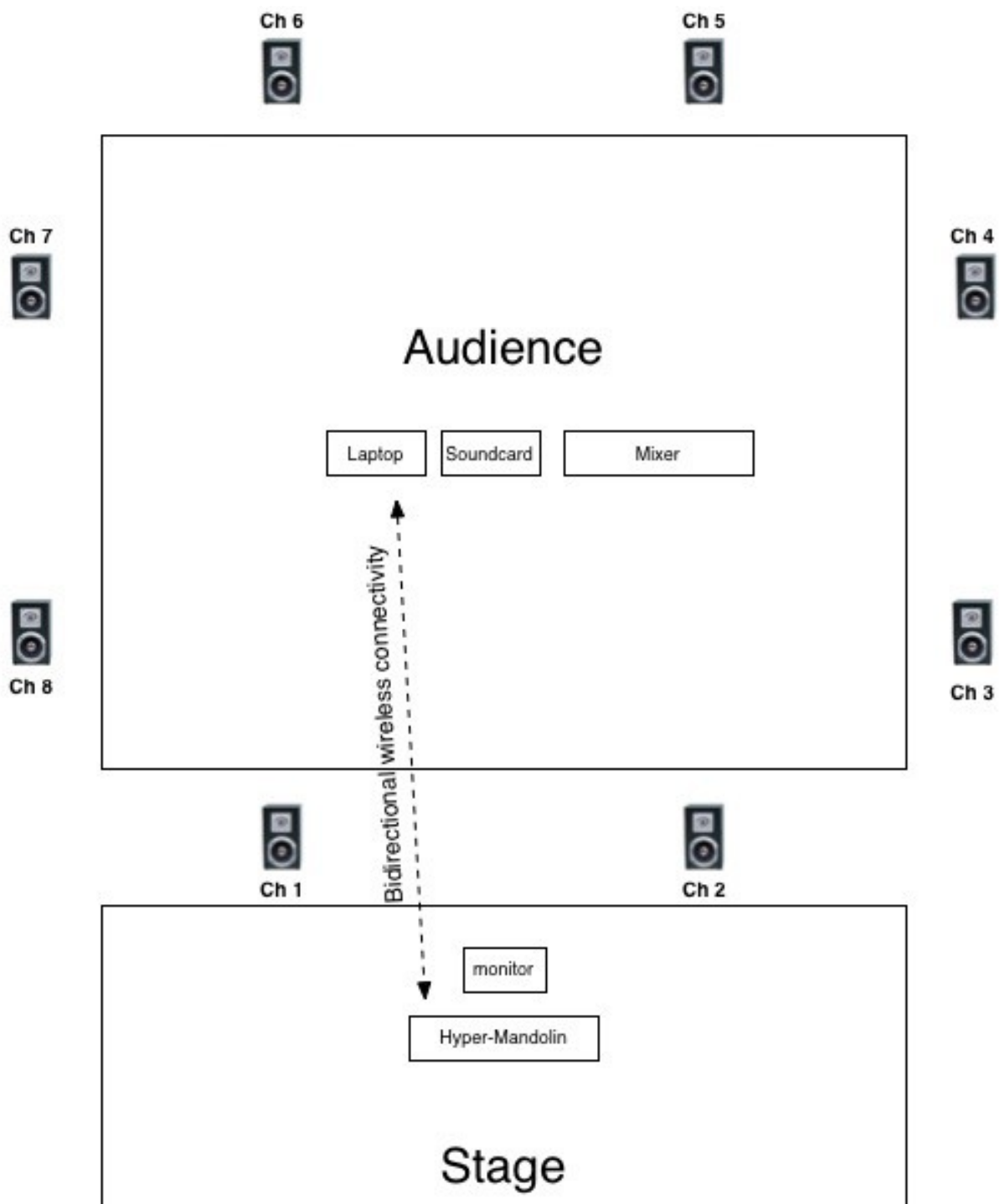
The beauty of fireflies in Central Park

for hyper-mandolin

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Equipment

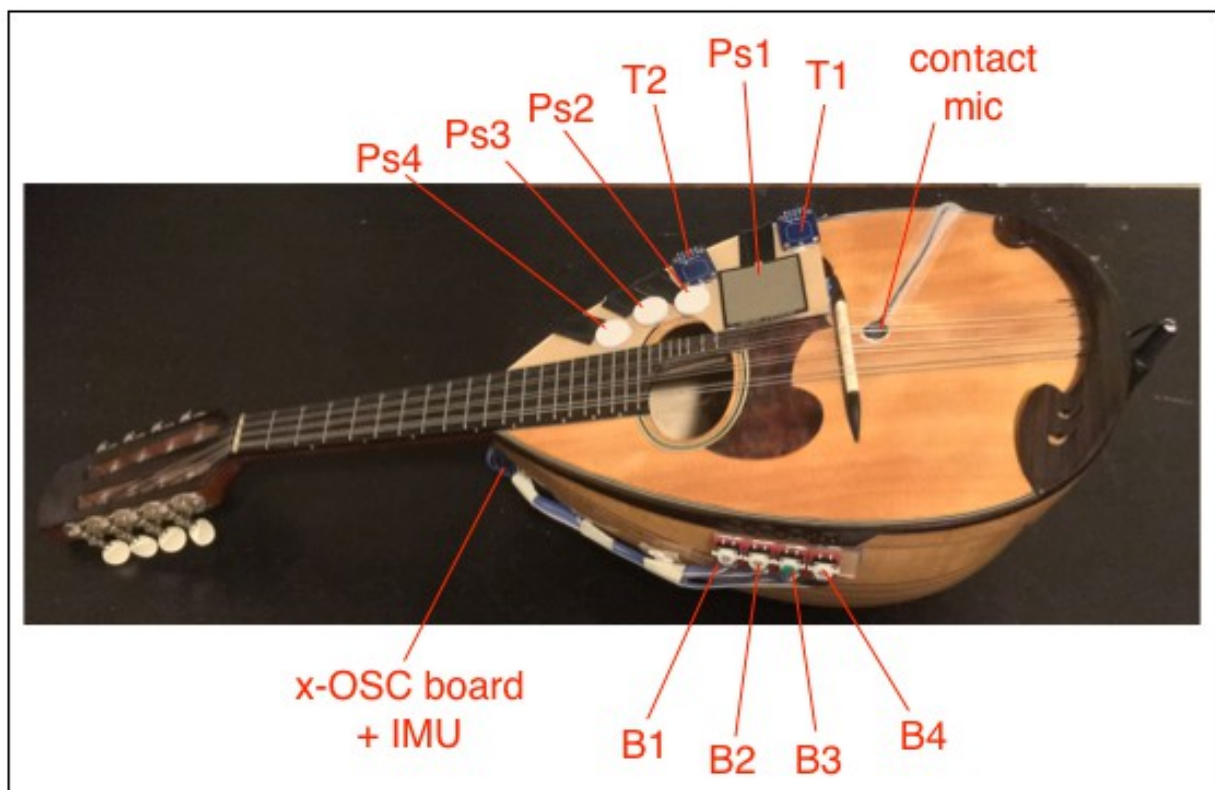
- Hyper-Mandolin
- Computer running Max/MSP version 6.1 and above.
- Soundcard with at least 1 input channels and 8 output channels
- 8 (possibly identical) loudspeakers placed in the configuration illustrated in the figure below.
- A monitor loudspeaker for the hyper-mandolinist
- Mixer with at least 8 input channels and 9 output channels



Hyper-Mandolin

The Hyper-Mandolin is composed of the conventional acoustic mandolin and embedded technology. The involved acoustic mandolin consists of 4 double strings tuned in the standard way (G, D, A, E). The embedded technology consists of:

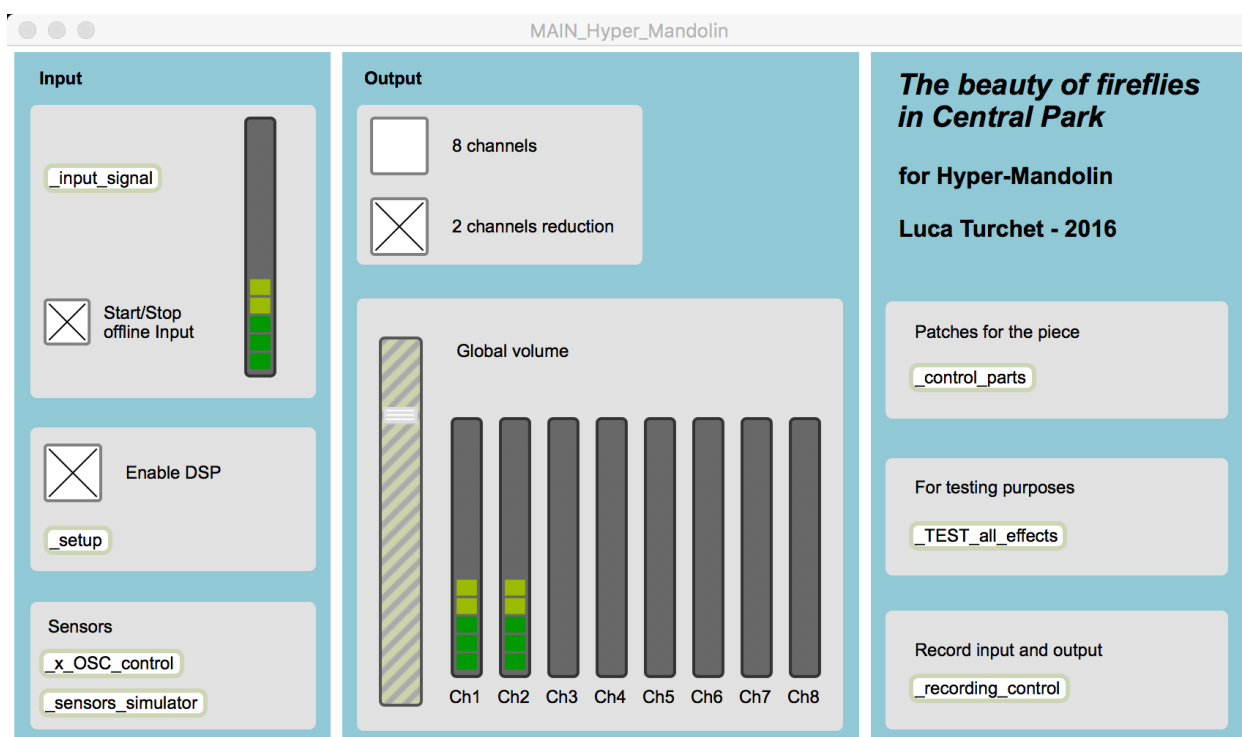
- 1 contact microphone placed adjacently to the bridge.
- 4 pressure sensors attached to a plexiglass support placed on the bottom side of the soundboard. They are indicated in the score as Ps1, Ps2, Ps3 and Ps4 and their shape and placement is illustrated in the figure below.
- 2 toggle capacitive touch sensors attached to the same plexiglass support. They are indicated in the score as T1 and T2.
- An inertial measurement unit for up-down and front-back movements tracking, attached to the back of the instrument. The two tracked movements are respectively indicated in the score as IMU U-D and IMU F-B.
- 4 pushbutton switches with integrated led, attached to a plexiglass support placed on the top side of the instrument body, in the configuration illustrated in the figure below. They are indicated in the score as B1, B2, B3, B4.
- A small micro-controller board for the analog-to-digital conversion of the sensors data, gifted of a system for low latency-wireless transmission to a receiving computer running the live electronics), attached to the central part of the body of the instrument as illustrated in the figure below. In the present implementation, the x-OSC board is utilized, which also features and embedded IMU.



Software

The software for the composition is coded in Max/MSP version 6.1 and above. It is based on the “Hyper-Mandolin Library”, developed by the author.

A screenshot of the main patch is illustrated in the figure below. The software is attached to the present score.



Notes:

- There are no prerecorded sounds involved, or synthesizers. All sounds are produced by processing the mandolin sound captured by the attached contact microphone.
- Dynamics are never indicated throughout the piece. Their rendering is entrusted to the fantasy of the performer.
- In all parts the direct sound is always spatialized on all channels, at a volume lower than the processed sounds appearing on selected channels as indicated in the section Mappings.
- All produced sounds are affected by a final reverberation. Such reverberation, present on all 8 output channels should be accomplished by the facilities offered by involved mixer.

Legend



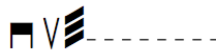
Improvise a melody by selecting among the indicated notes. Avoid repeating twice in a row the same note (at the same octave). Rhythmical patterns ad libitum. Follow the indicated level of density.



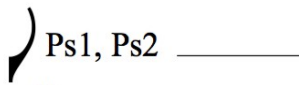
There are three levels of density (not considering grace notes and glissando): Low (L): between 1 and 3 notes per time slot of 5 seconds; Medium (M): between 4 and 6 notes per time slot of 5 seconds; High (H): more than 7 notes per time slot of 5 seconds. The duration of the effect is indicated by the straight line. Arrowed lines indicate a transformation between the indicated densities.



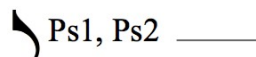
Play the notes selecting, ad libitum, picking up and down.



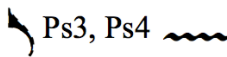
Play the notes selecting, ad libitum, picking up and down, and tremolo. When using tremolo keep the duration shorter than one second.



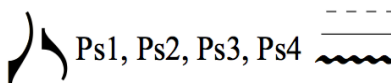
Use the listed pressure sensors for the duration indicated by the solid line. Each used sensor must be activated after having played the note. Not all the notes under the line must necessarily be affected by the sensor. More than one sensor can be used simultaneously.



Use the listed pressure sensors for the duration indicated by the solid line. Each used sensor must be activated before having played the note. Not all the notes under the line must necessarily be affected by the sensor. More than one sensor can be used simultaneously.



Use the listed pressure sensors for the duration indicated by the solid line. Each used sensor must be activated before having played the note. Press and release the sensor at the indicated velocity, but do not release the sensor completely. If no indication on the velocity is present then select a velocity ad libitum. Not all the notes under the line must necessarily be affected by the sensor. More than one sensor can be used simultaneously.



Combine, ad libitum, the techniques previously described.

Mappings

The following sections are not intended to explain exhaustively the involved mappings, but just to inform, by and large, what is going on sensor-wise. For the details see the attached code.

Part A

Sensor	Controlled parameter/status
Ps1	Volume of a vibrato effect. Spatialized on channel 1.
Ps2	Volume of a tremolo effect. Spatialized on channel 3.
Ps3	Volume of a pitch shifter effect tuned one octave higher. Spatialized on channel 5.
Ps4	Volume of a pitch shifter effect tuned one octave lower. Spatialized on channel 7.
IMU U-D	Volume of a reverse effect. Spatialized on channels 2, 4, 6, 8 (at low volume).
IMU F-B	Volume and rate of a chorus effect. Spatialized on all channels (at low volume).
T1	Not used
T2	Preset of a parametric equalizer on the input signal. When On an equalization more oriented to the low frequencies is involved, when Off the unfiltered input sound is used.
B1	Off
B2	Off
B3	Off
B4	Off

Part B

Sensor	Controlled parameter/status
Ps1	Volume of a delay line with feedback followed by a vibrato effect. Spatialized on channel 2.
Ps2	Volume of a delay line with feedback followed by a tremolo effect. Spatialized on channel 4.
Ps3	Volume of a delay line with feedback followed by a pitch shifter effect tuned one octave higher. Spatialized on channel 6.
Ps4	Volume of a delay line with feedback followed by a pitch shifter effect tuned one octave lower. Spatialized on channel 8.
IMU U-D	Volume of a delay line with feedback followed by a reverse effect. Spatialized on channels 1, 3, 5, 7 (at low volume).
IMU F-B	Volume and depth of a phaser effect. Spatialized on all channels (at low volume).
T1	When turned On it starts recording for 15 seconds the signals arriving from all 8 channels. Subsequently it starts looping the recorded sounds, filtered according to the notes indicated on the score. Spatialized on all channels (at low volume). When Off it stops playing the loops after having gradually decreased their volume. The loops start with the beginning of Part C. In Part D they are filtered in such a way that only the fundamental of the indicated chords is played (at 3 different octaves).
T2	As in Part A.
B1	On

B2	Off
B3	Off
B4	Off

Note: the involved delays lines with feedback are designed with parameters different from each other.

Part C

Sensor	Controlled parameter/status
Ps1	Volume of a vibrato effect followed by a tremolo effect. Spatialized on channels 1, 3, 5, and 7.
Ps2	Volume of a vibrato effect followed by a tremolo effect, followed by a delay line with 8 repetitions. The repetitions are spatialized sequentially on all channels clockwise.
Ps3	Volume of two pitch shifter effects tuned one octave higher and one octave lower respectively. Spatialized on channels 2, 4, 6 and 8.
Ps4	Volume of two pitch shifter effects tuned one octave higher and one octave lower respectively, followed by a delay line with 8 repetitions. The repetitions are spatialized sequentially on all channels counter-clockwise.
IMU U-D	Volume of the looped sounds.
IMU F-B	Volume and depth of a phaser effect. Spatialized on channels 1, 3, 5 and 7 (at low volume). Volume and rate of a chorus effect. Spatialized on channels 2, 4, 6 and 8 (at low volume).
T1	Not used.
T2	As in Part A.
B1	On
B2	On
B3	Off
B4	Off

Note: the involved delays lines with feedback are designed with parameters different from each other.

Part D

Sensor	Controlled parameter/status
Ps1	As in Part B.
Ps2	As in Part B.
Ps3	As in Part B.
Ps4	As in Part B.
IMU U-D	As in Part B.
IMU F-B	As in Part B.
T1	Not used.

T2	As in Part A.
B1	On
B2	On
B3	On
B4	Off

Part E

Sensor	Controlled parameter/status
Ps1	As in Part A.
Ps2	As in Part A.
Ps3	As in Part A.
Ps4	As in Part A.
IMU U-D	As in Part A.
IMU F-B	As in Part A.
T1	Used to toggle to Off.
T2	As in Part A.
B1	On
B2	On
B3	On
B4	On

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for Hyper-Mandolin

Luca Turchet (2016)

Toggle T2 ad libitum during the whole piece

Throughout all the piece use IMU U-D and IMU F-B ad libitum

B1 = Off
B2 = Off
B3 = Off
B4 = Off

A

Ps1, Ps2

Do not play chords during the improvisation, exclusively single notes

dolcissimo

L

15 sec

Ps3, Ps4

sim.

L

15 sec

Ps1, Ps2, Ps3, Ps4

From now on, enrich with grace notes and glissando

L

M

15 sec

Ps1, Ps2, Ps3, Ps4

M

15 sec

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

H

Ps1, Ps2, Ps3, Ps4

V

H

15 sec

H

- B1 = On
- B2 = Off
- B3 = Off
- B4 = Off

B

Ps1, Ps2

V

L

15 sec

L

Ps3, Ps4

V

L

15 sec

L

Ps1, Ps2, Ps3, Ps4

V

L

15 sec

M

Ps1, Ps2, Ps3, Ps4

M

15 sec

Ps1, Ps2, Ps3, Ps4

M

H

15 sec

T1 = On

Ps1, Ps2, Ps3, Ps4

H

15 sec

B1 = On (*)
 B2 = On
 B3 = Off
 B4 = Off

C

Ps1, Ps2, Ps3, Ps4

From now on, include chords during the improvisation

H

15 sec

Ps1, Ps2, Ps3, Ps4

H

15 sec

(*) Here the background loop starts. It is based on the recording and filtering of the notes played during the past 15 seconds. The notes produced are the same indicated in each bar.

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Ps1, Ps2, Ps3, Ps4

V

H

15 sec

Ps1, Ps2, Ps3, Ps4

V

H

15 sec

Ps1, Ps2, Ps3, Ps4

V

H

15 sec

Ps1, Ps2, Ps3, Ps4

V

H

M

15 sec

- B1 = On
- B2 = On
- B3 = On
- B4 = Off

D

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

From now on, do not play chords during the improvisation, exclusively single notes

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

Ps1, Ps2, Ps3, Ps4

V

M

15 sec

B1 = On
B2 = On
B3 = On
B4 = On

E

Ps1, Ps2, Ps3, Ps4

15 sec

dolcissimo

T1 = Off

Ps1, Ps2, Ps3, Ps4

15 sec

rallentando e morendo

B1 = Off
B2 = On
B3 = On
B4 = On