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13th Academic Conference
Antibes - French
15-18 September, 2014



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**Meta-instrument and Natural User
Interface: a new Paradigm in
Music Education**

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Meta-instrument and Natural User Interface: a new Paradigm in Music Education



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Why

- ✓ Music is gaining a growing role in children and teenager education
- ✓ Playing music is not as natural as listening
- ✓ Strong limitation for educational contexts where student's time is a limited resource



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What

Meta-instrument

- ✓ A new music instrument paradigm that overcomes learning limitations
- ✓ Instantly execution of a music score without a specific training



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How

- ✓ Applying the natural ability of the human beings to tap the music
- ✓ Moving the interaction level to the timing
- ✓ Smart logic implementation
- ✓ Natural user interface (NUI)



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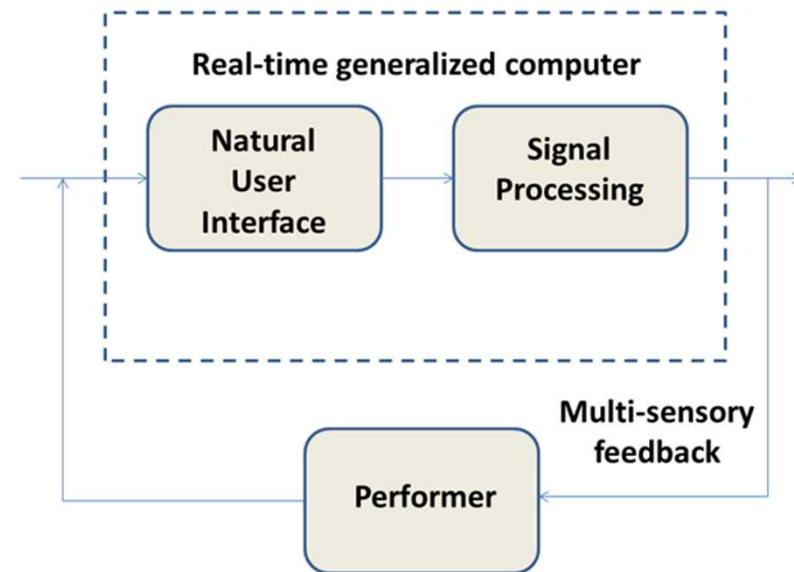
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Meta-instrument framework

- ✓ The meta-instrument is a new paradigm that enables the music performer to interact with the instrument via sensing technologies
- ✓ The music performer is part of a sound-generation process very similar to an automatic control system





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Meta-instrument framework

From the traditional musical instrument to the Meta-instrument

**Traditional
musical instrument**



Pitch control (full)
Intensity control (full)
Duration control (limited)
Timbre control (very limited)
Training (intensive)
Interaction (specific purpose)

**Musical
Meta-instrument**



Pitch control (extended)
Intensity control (extended)
Duration control (unlimited)
Timbre control (unlimited)
Training (not requested)
Interaction (general purpose)

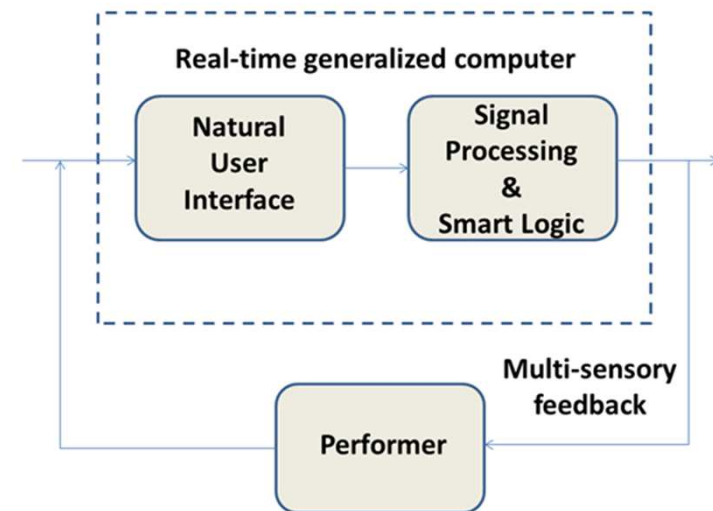


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Meta-instrument framework

- ✓ A computer is a generalized processing system capable of real-time performance
- ✓ The traditional instruments can be considered like a subset of all the possible instruments that can be implemented





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Learning by Meta-instrument

- ✓ The meta-instrument adapts itself to the performer
- ✓ The score is encoded into the meta-instrument memory
- ✓ The score is executed by a player engine that interprets the gesture coming from the interface



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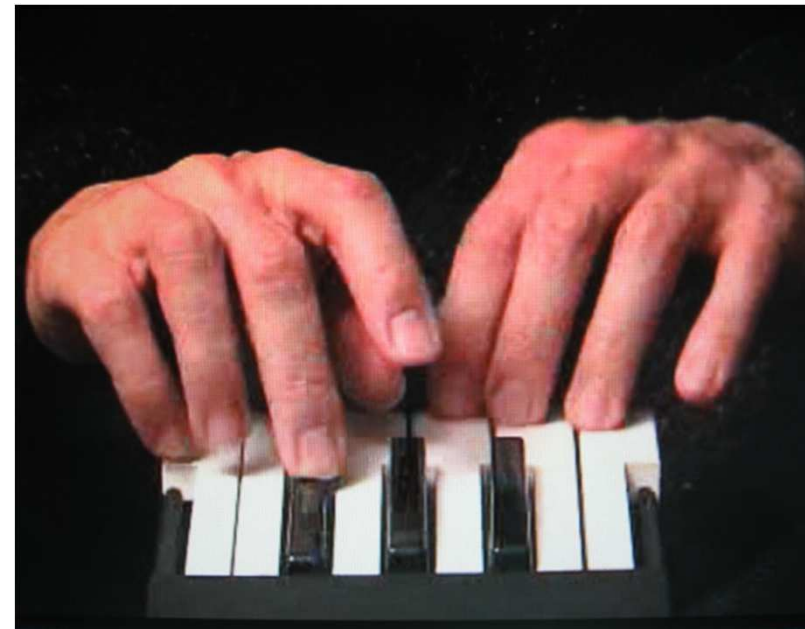
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Learning by Meta-instrument

- ✓ The performer can interact intuitively with the meta-instrument
- ✓ The score can be inputted from any media and encoded in a meta-code



The nine-key Metapiano by Jaen Haury allows to play any music score without specific playing skills



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IEEE 1599 Music Standard

- ✓ A peculiarity of the meta-instrument framework is that it can refer to multiple and heterogeneous contents
- ✓ To accomplish this goal we propose to apply the specification of IEEE 1599, an XML-based international standard for the representation of music



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Final considerations

- ✓ The meta-instrument framework can be a powerful tool to enhance the learning abilities of young students who approach music studies and the instrumental practice.
- ✓ The meta-instrument capitalizes the natural ability of children to play music intuitively by implementing a natural user interface that shifts the learning efforts of the performer from practice to music interpretation.



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Thank you for your attention



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