motion capture in music analysis and performance

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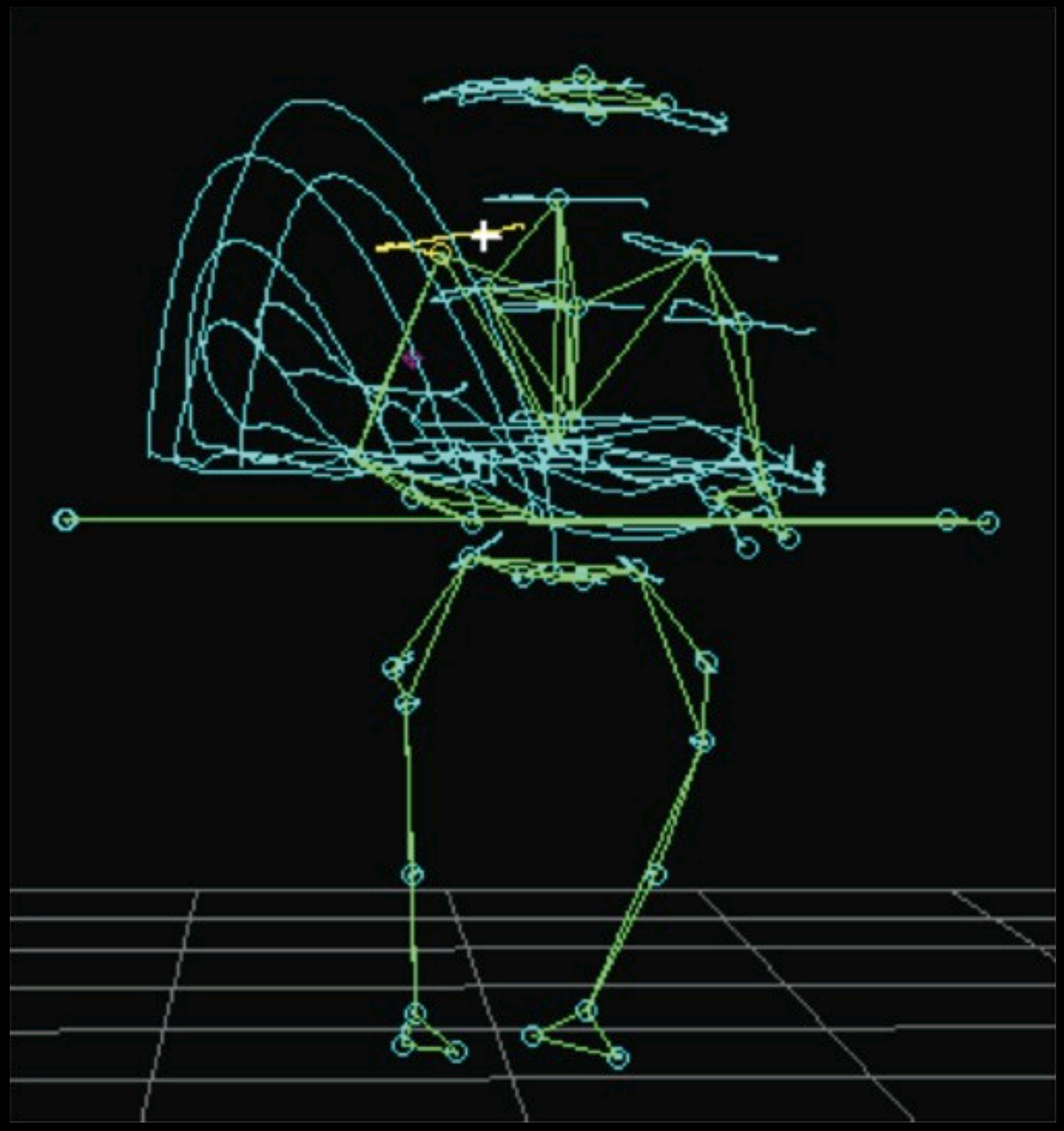
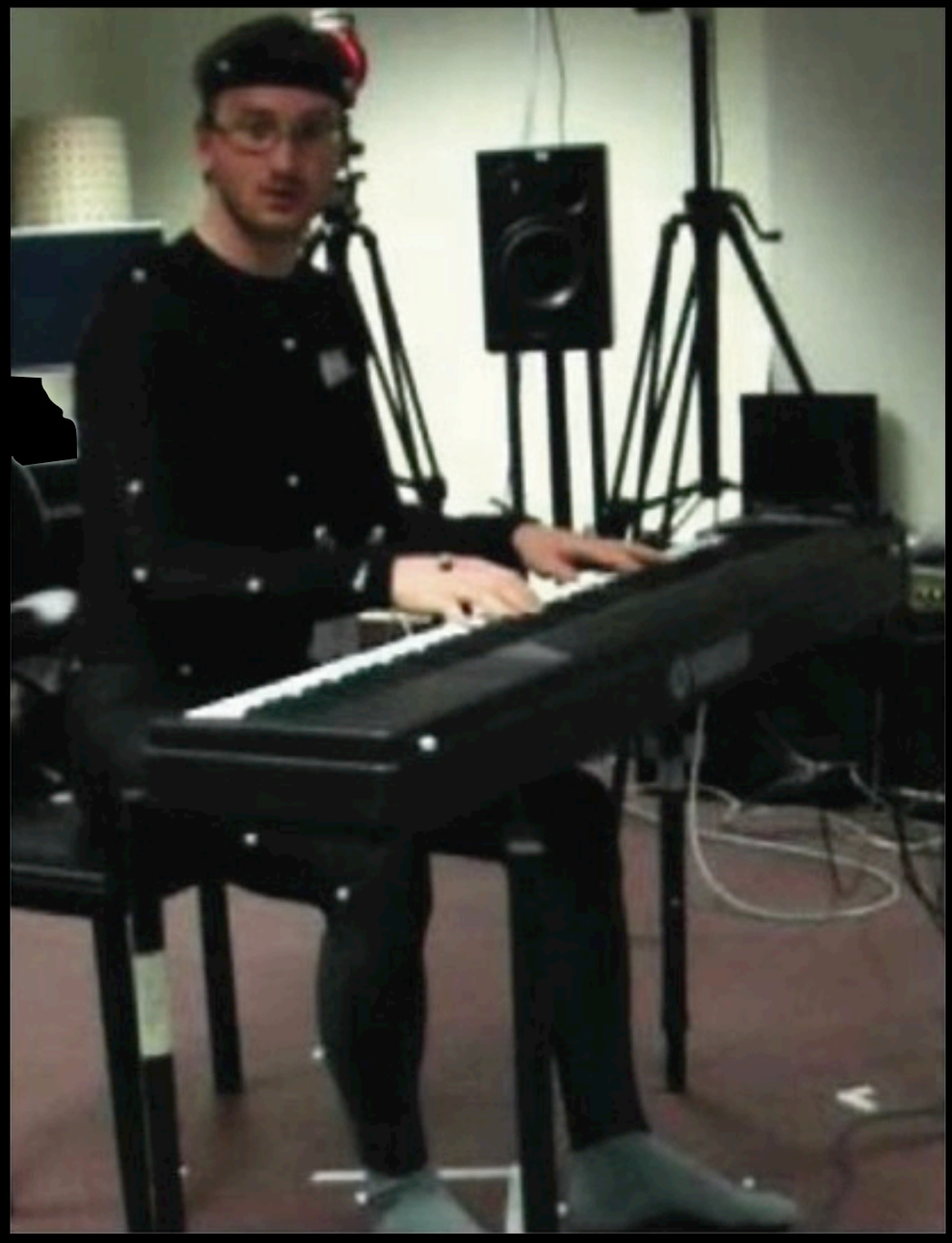
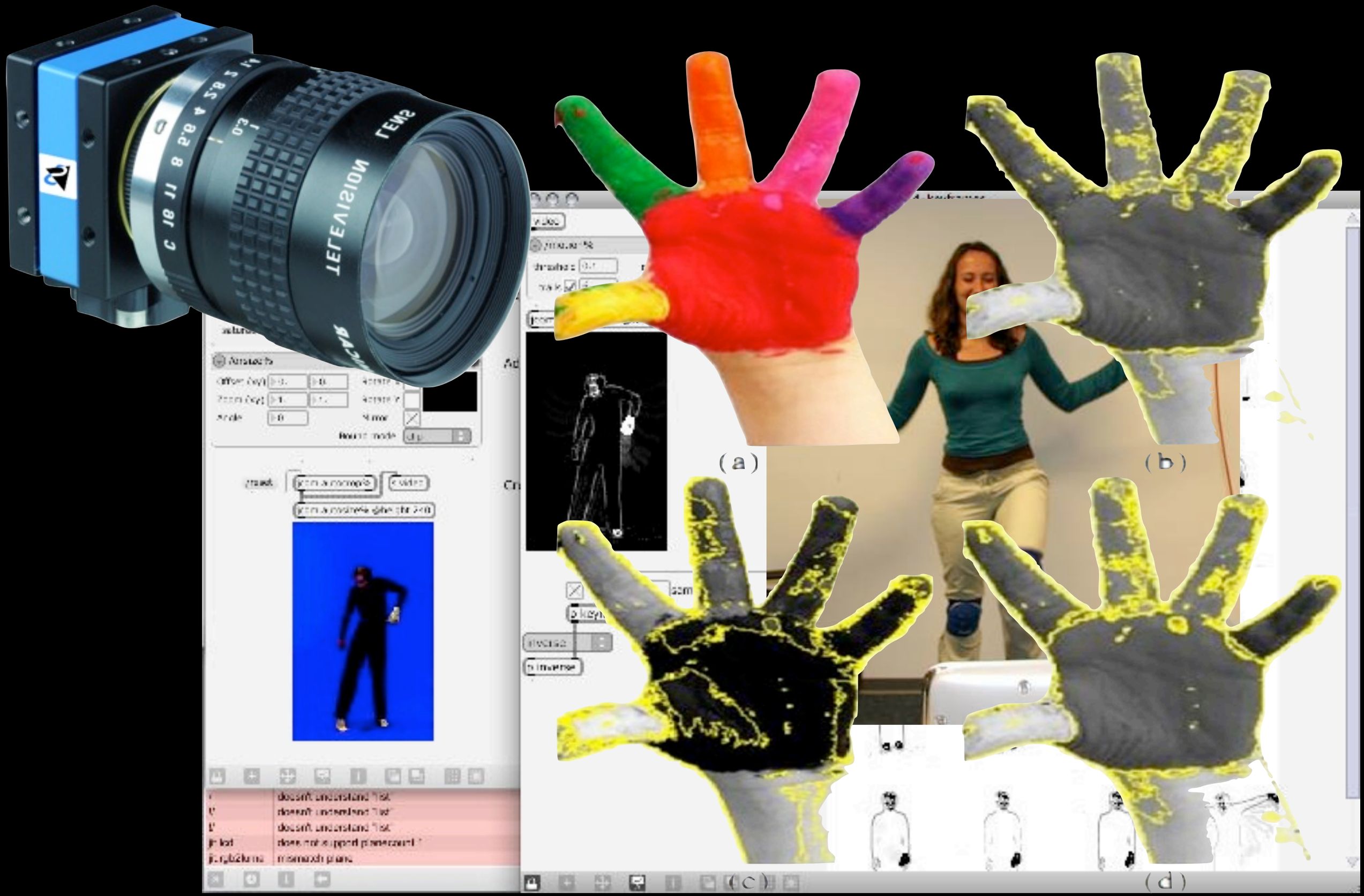
09:30-10:15. **Lecture: MoCap in music**
10:15-10:30. **Demo: Musical Gestures Toolbox**
10:30-11:00. **Demo: Xsens**
11:00-12:00. **Workshop: misc. controllers**

motion capture





optical infrared marker-based motion capture



optical marker-based motion capture

KINECT™
for XBOX 360

optical infrared

motion capture

inertial sensor-based motion capture

mechanical sensor-based motion capture

electromagnetic sensor-based motion capture

physiological sensor-based motion capture

Optical (visual)

Optical (infrared)

Inertial

Electromagnetic

Mechanical

motion capture

Physiological

	Inertial/ magnetic	Mechanical	Electro-magnetic	Optical (visual)	Optical (infrared)	Physiological
+	- flexible - small	- flexible - small	- resolution - identification - absolute	- flexible - no cables - no markers - accessible	- speed - resolution - # markers	- indirect motion sensing
−	- relative	- relative	- cable - short range	- 2D - speed - resolution - identification	- markers - calibration - identification	- indirect motion sensing

motion capture

in

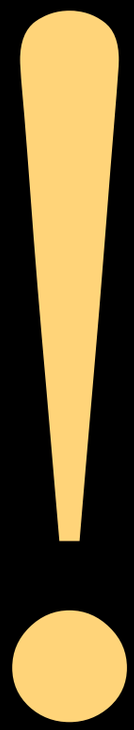
music analysis and performance

practical challenges

conceptual challenges

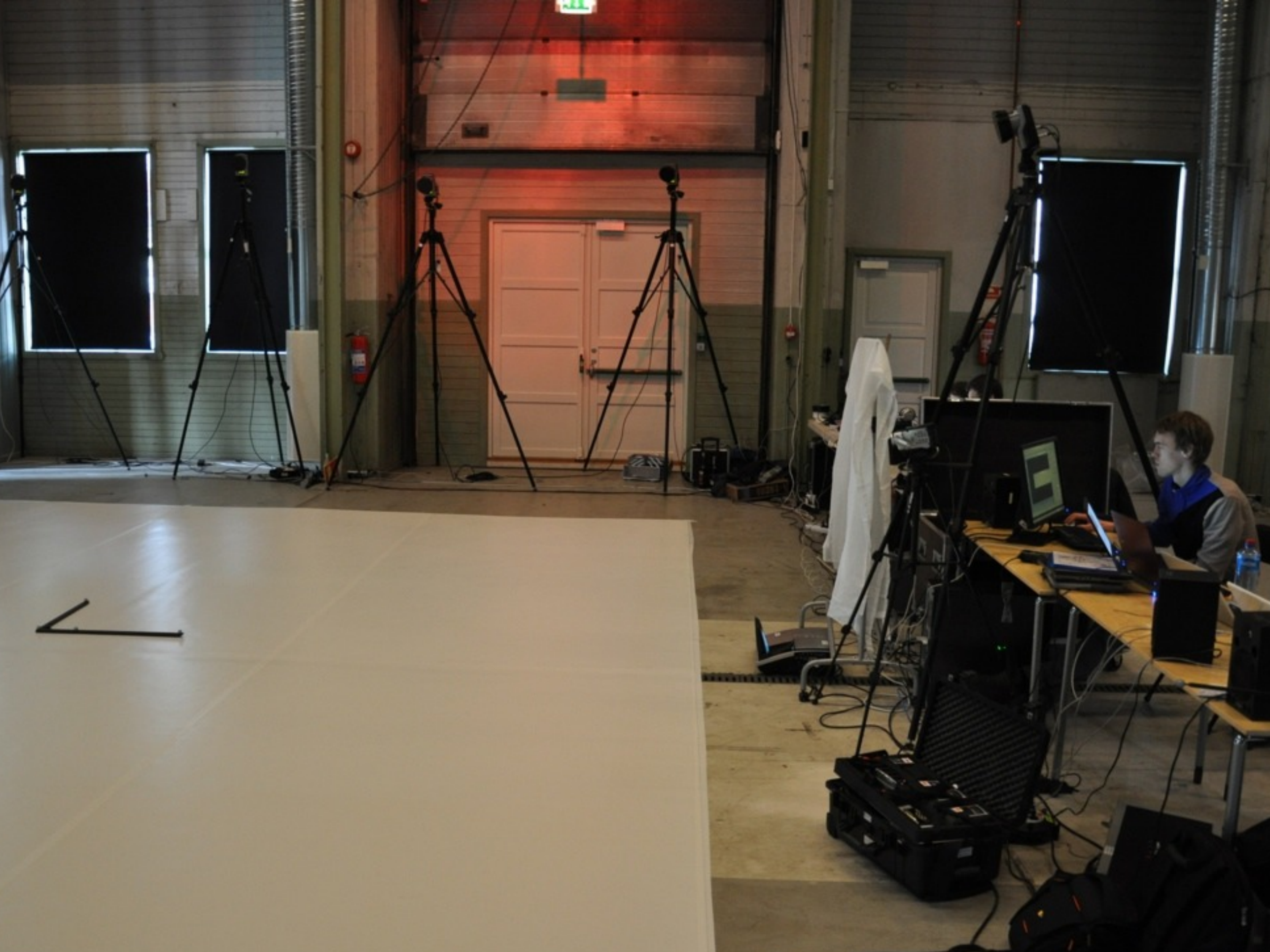
!

practical challenges



setup
calibration
streaming
recording
storing
analysing
mapping

setup



calibration

100 %

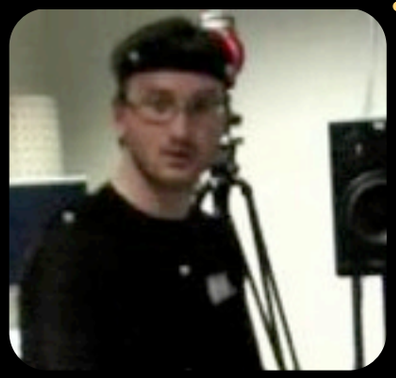
F

2D

3D

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 sec

streaming
recording
storing
analysing
mapping



Pre-process

Feature extraction

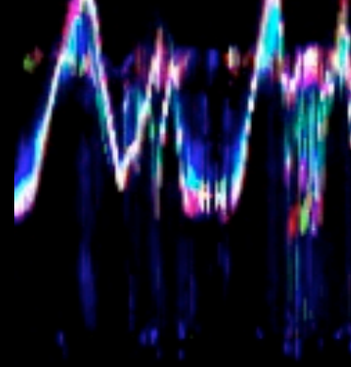
Realtime synthesis

Annotations

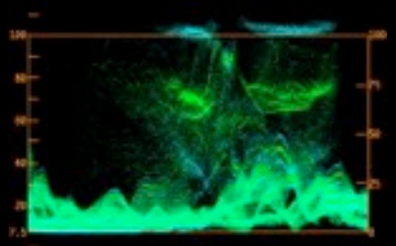
mocap storage

MIDI

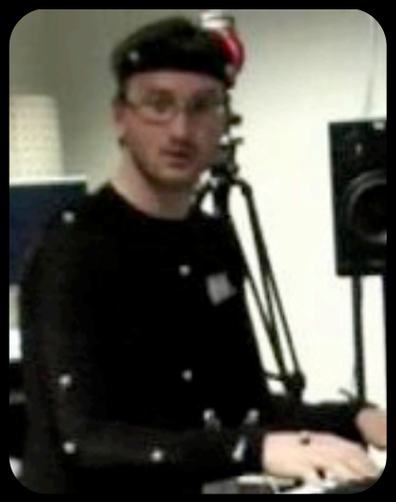
Analysis

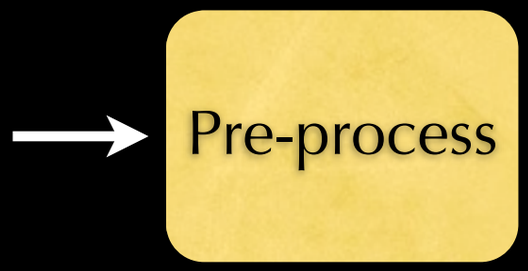


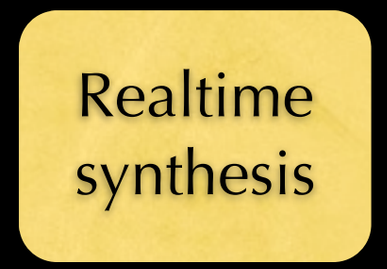
Video



Audio





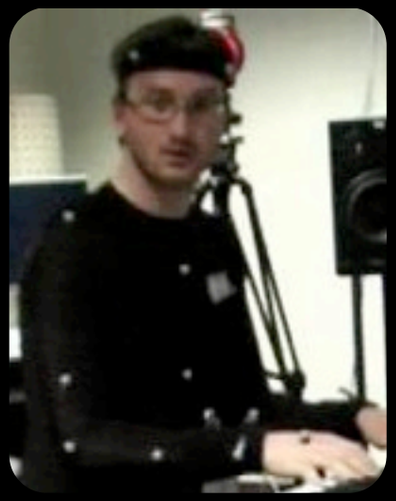


GDIF
Gesture Description Interchange Format

C3D, BVH, BVA, ADX, OSC, PML, GMS....

Jensenius, Kvifte, Godøy: *Towards a gesture description interchange format*. NIME 2006

Jensenius, et al.: *Panel: the need of formats for streaming and storing music-related movement and gesture data*. ICMC 2007



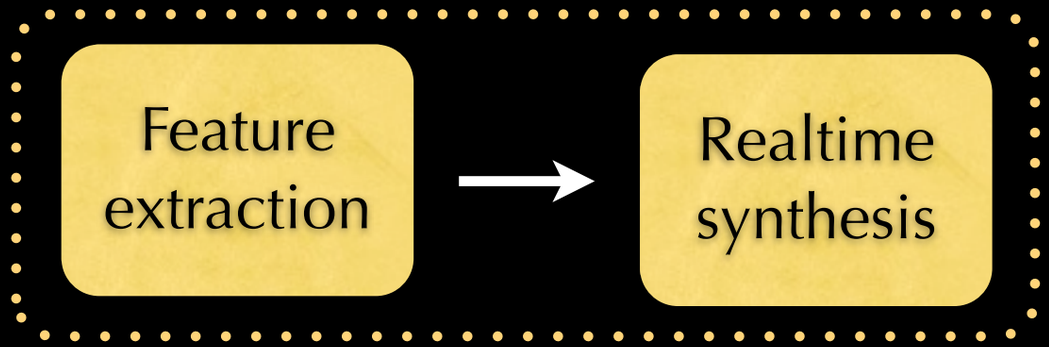
Pre-process

Feature extraction

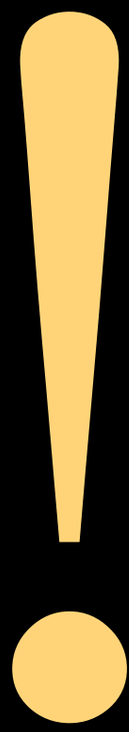
GDIF
OSC

Realtime synthesis

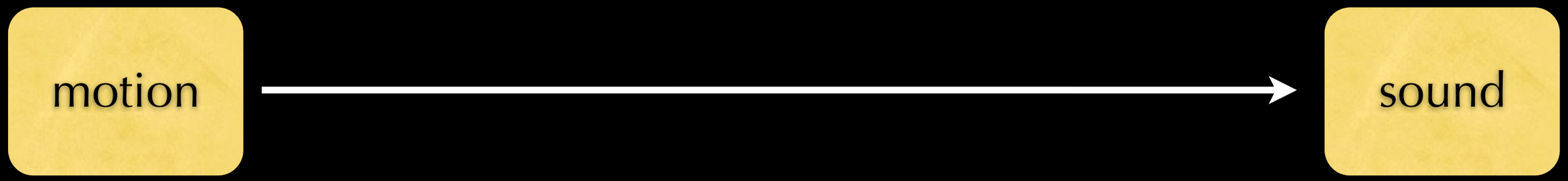
G/SDIF storage


Feature extraction
Realtime synthesis

mapping



conceptual challenges



motion?
action?
gesture?

action

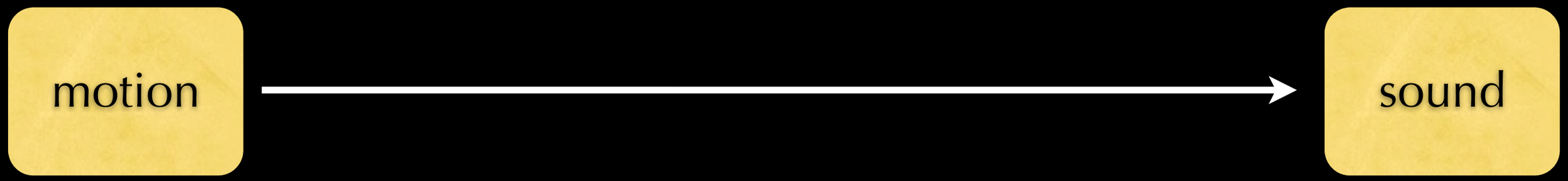
motion

musical gesture

Jensenius, Wanderley, Godøy, Leman, (2010). *Musical gestures: concepts and methods in research*. In Godøy, Leman, (eds.) Musical Gestures: Sound, Movement, and Meaning

Sound

sound objects


motion
sound

functional relationships

sound-producing:

modification

excitation

communicative:
performer-performer

ancillary:

phrasing

support

entrained

Sound-accompanying
mimicking, sound-tracing,
emotive, dance, ...

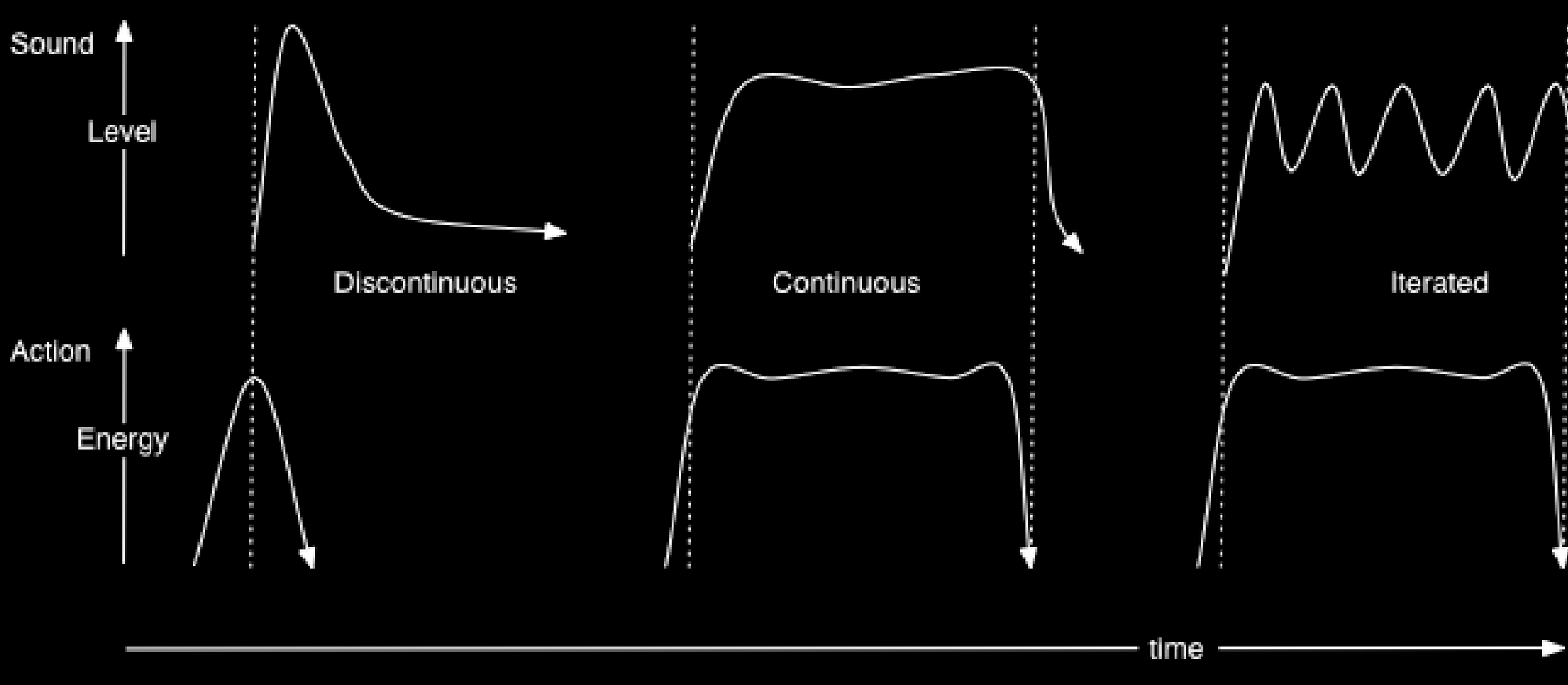
performer-perceiver

action-sound relationships

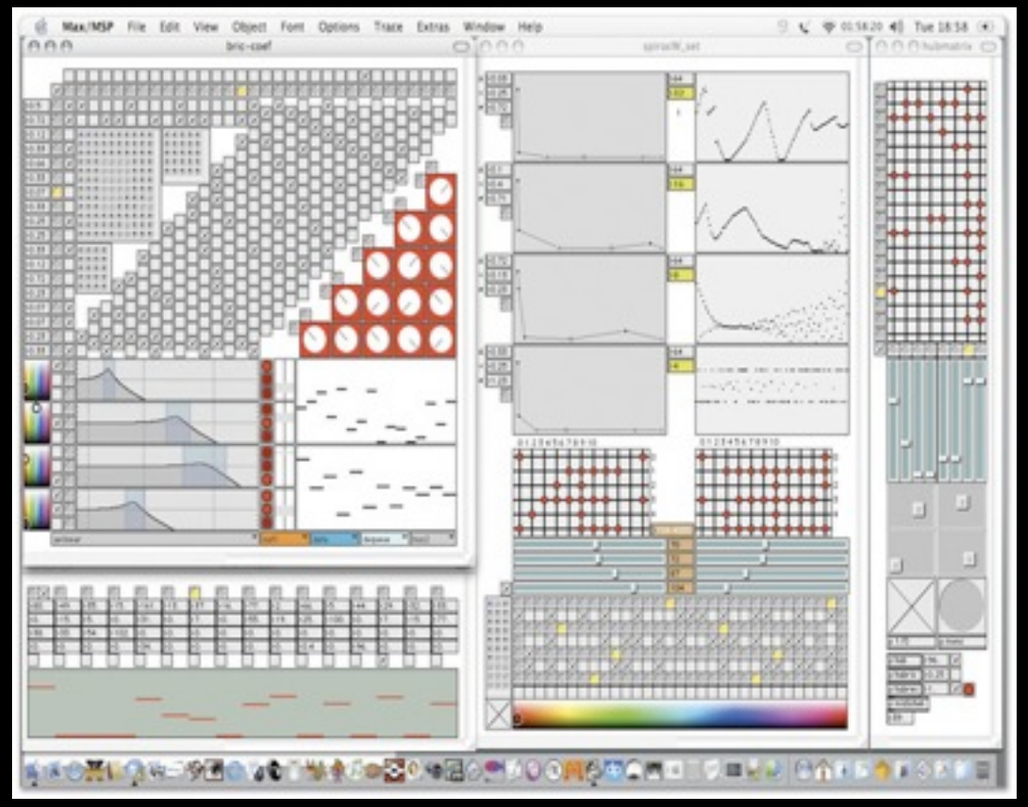
impulsive

sustained

iterative



Semantic mapping



examples

simple motion capture

Laser dance (2001)

performing in the air

Dance Jockey (2010)

musician =? dancer

Transformation (2011)

motion capture instrument?

Soundsaber (2010)

micromovements

arj.no

fourMs.uio.no