More Parameters for Your Music in Real Time

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Inspired by Sensor 32, see www.sensor32.com

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Eduard Hanslick 1854

"Music consists of successions and **forms** of sound, and these alone constitute the subject"

„Tönend bewegte Formen sind einzig und allein Inhalt und Gegenstand der Musik" *

in: E. Hanslick: vom Musikalisch Schönen 1. Auflage 1854

*may not extend in the viewing room but auditory room/domain

Parameters is a mathematical term …...
looking for its advent in
(western) Music

Hanslicks FORMS could be
described using parameters

Schillinger 1942 „Parameters“

In „The Mathematical Basis Of The Arts“ p.146

Joseph Schillinger proposed the Term **Parameters**

Published by his Widow Frances Schillinger, NYC 1943

Meyer-Eppler, Stockhausen 1952/53, Cologne

- Scientific terms were preferred for theory of serial composition.....the instruments were electronic lab equipment.

- Stockhausen was initially using „Dimensions“, this could suggest the parameters are **linear independent**

- Werner Meyer-Eppler „Parameters“.

  Parameter became a self evident term

  Source all: Pietro Cavallotti in: Lexikon Neue Musik p.502f, Stuttgart 2016

Nowadays use of „Parameters“ for conventional music

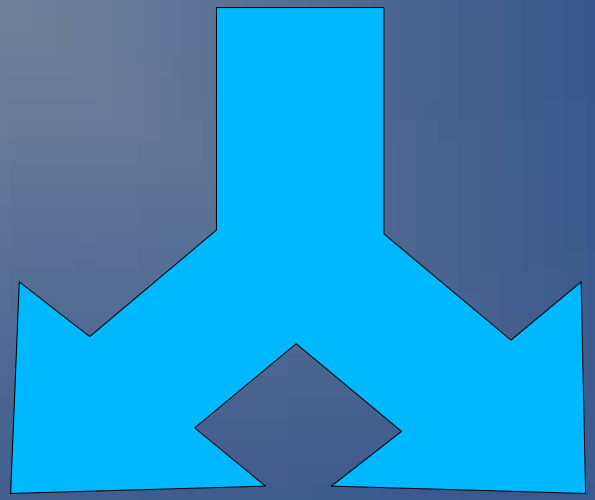
The term was not used prior to serial composition but is now transferred to conventional music:

„the 10 most common musical **parameters**: Rhythm, tempo, harmony, melody, instrumentation, dynamic, texture, genre, form and temperature“

Source: http://musicproductionhq.com/

Psychoacoustic Parameters?

musical
parameters
in general



Performers
actions

Not: Perception,

such as loudness,

sharpness,

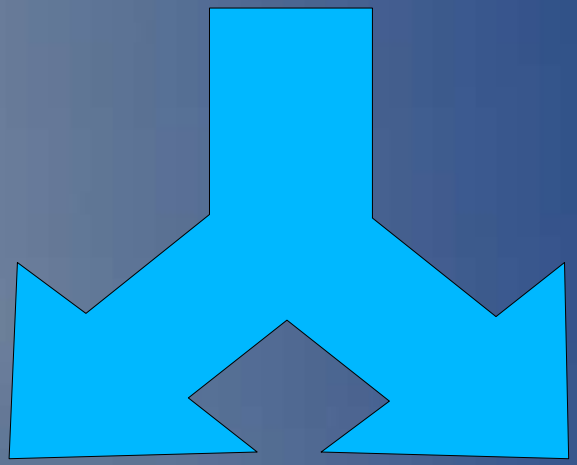
roughness, tonality

Proposal

Live Performing Parameter:

„A variable that the performer can intentionally change to create sound, thus appropriate for improvising music“

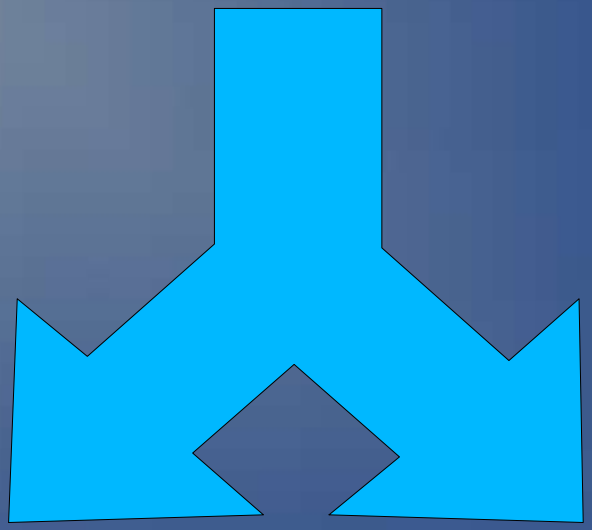
Improv vs Composition



Also limited by means available in that moment in time;
many parameters desirable

limited by imagination

Parameter Time



Time:
Always present

Other:
Selected and controlled by performer

For macros I only count the independent variables

e.g. if an extremely powerful algorithm has one (1-dimensional) input I count it as one p. under the aspect of improvisation use.

OR if a continuous variable is discriminated to select and trigger multiple events I look at it as one parameter.

For audio signals as variables: it depends on what the improviser can shape (spectra as multidimensional variables)

Examples

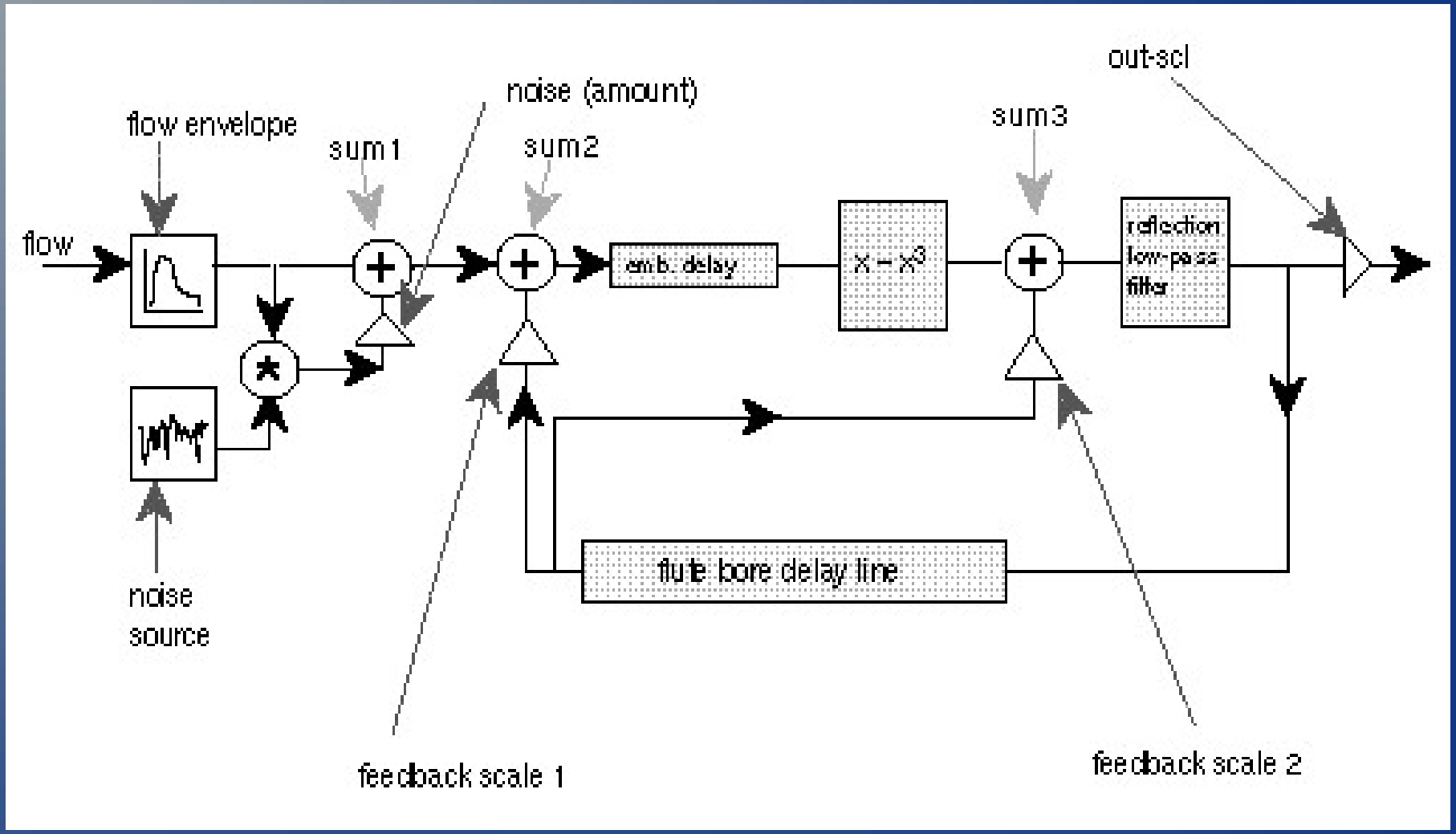
https://www.amazona.de/vangelis-interview-2016-deutsche-version/

Examples: Look-mum-no-computer

The Megatron

https://youtu.be/c3wk9WWTfNs

Examples: Parameters in Physical Modelling



Cook, Perry, "A Meta-Wind-Instrument Physical Model, and a Meta-Controller for Real Time Performance Control", Proceedings of the ICMC, 1992. web via Nicky Hind

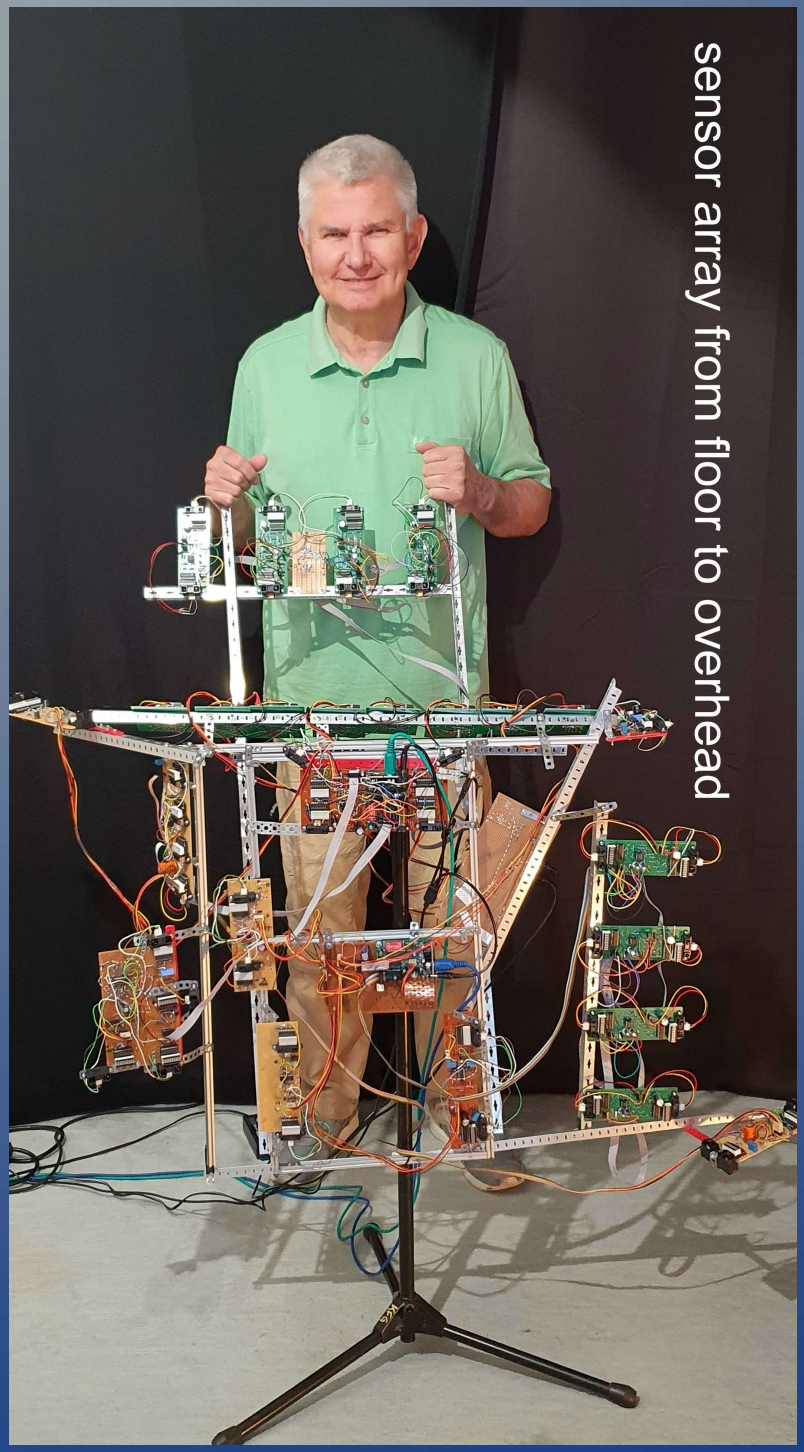
Sensor 32: Predecessor: Six Proximity Sensors

- In „Approaches“ The flautist can control the violin approaching the violin automaton from all sides and via pitch.
- Karina Erhard on flute.

  K.F. Gerber composition, program and automaton
- CMMR 2020 Best Music Award

https://vimeo.com/503203526

Developing the Sensor32 array: straighten out



http://www.sensor32.com

MIDI as a Substitute?

Choose MIDI as a model, as its limitations can be overcome and taken into account for this study.

Resolution, speed, response etc.

- For sensor32 I use continuous controllers(CC) of 7bit resolution, 128 CC per channel basically available.
- Even when I limit myself to 14bit (PB) pitchbend: 16 variables per module available ……

  the array consist of two modules on different channels thus providing 32 PB-parameters

Still Questioning MIDI for Sensor32 ?

- Resolution 6 or 7 bits often adeqaute, 14bits basically possible via combination of 2CC; also Pitchbend with 14bits
- Stepwise response to transmissions: can be (smoothed e.g. in Reaktor)
- Response, not for percussion, but for DJ-ing, conducting, experimental, visuals
- Any more accurate AD (analog 2 digital converters) solution should work ….. but probably highlighting the weaknesses of the sensors.....

Controller Requirements for Improvisation

Smooth transitions as well as sudden changes

Soundscapes: many parameters at the same time

Access, ergonomics, spatial layout

Feedback: optical, tactile

Connectivity, interoperability....

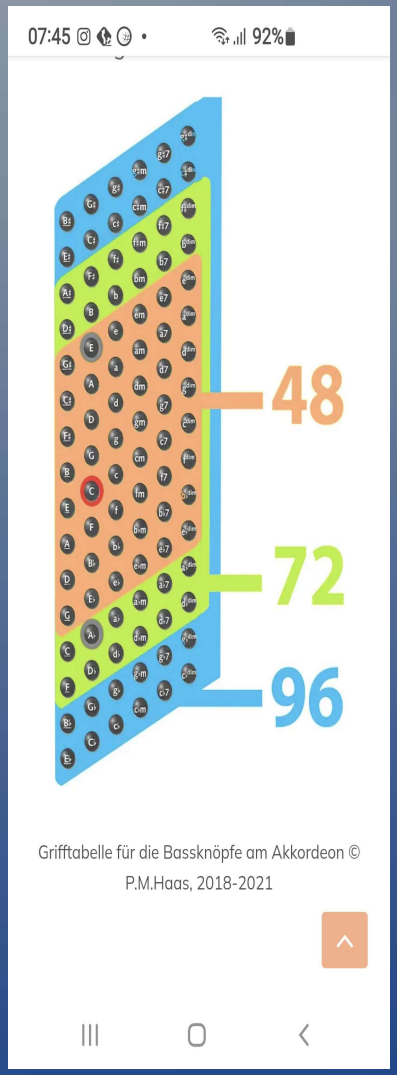
Some like to freeze „Scenes“

Sufficient number of parameters in parallel

Requirements for this Array

- Orientation, stability
- Fine gradations or continuous
- Sensitivity
- Simple subsequent processing
- Independent
- Transportable (tourist bags)
- Feedback (besides tonal)

Spatial Layout: not necessarily „linear“



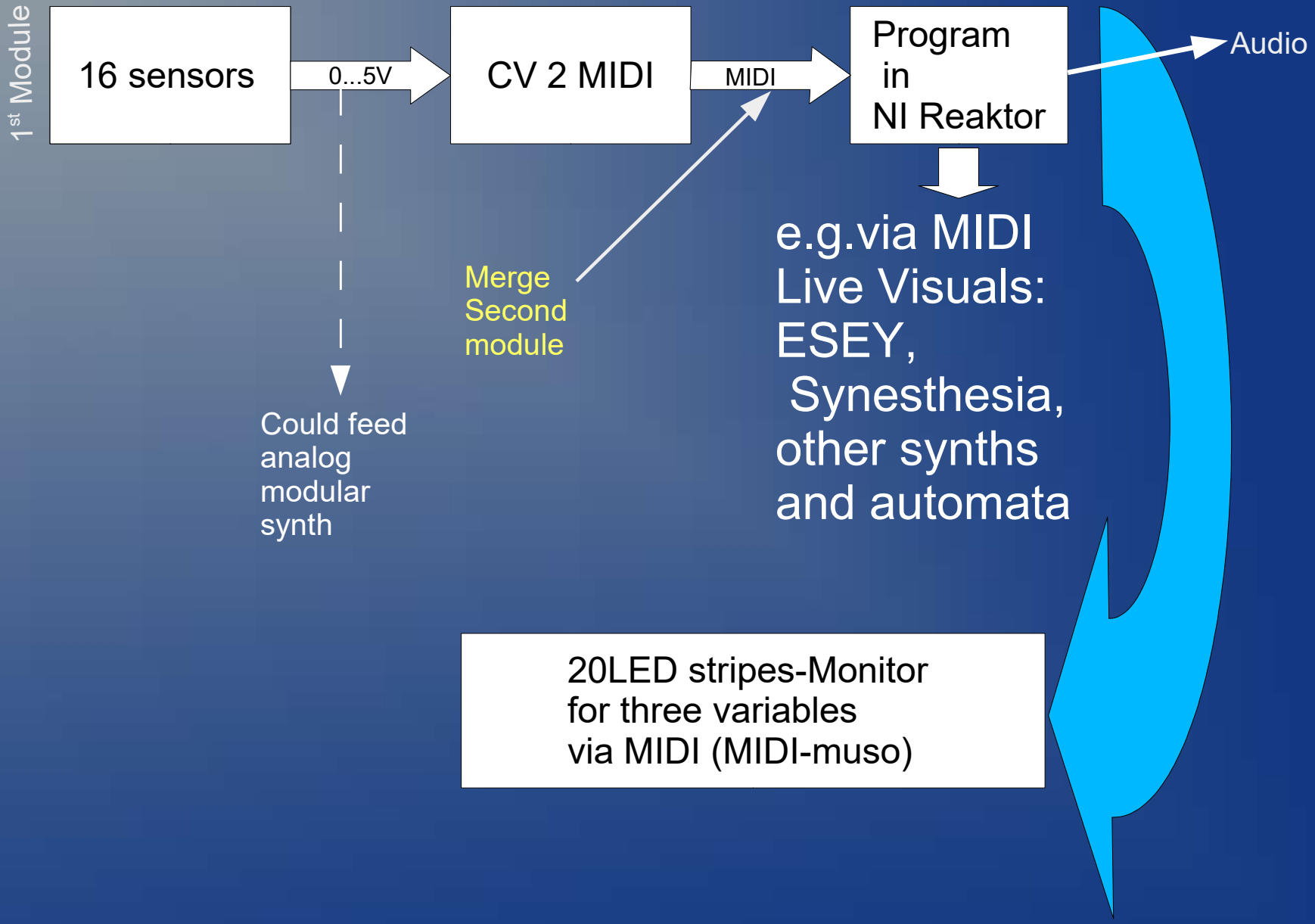
In trad. Instruments e.g.:

Accordeon Bass-Section

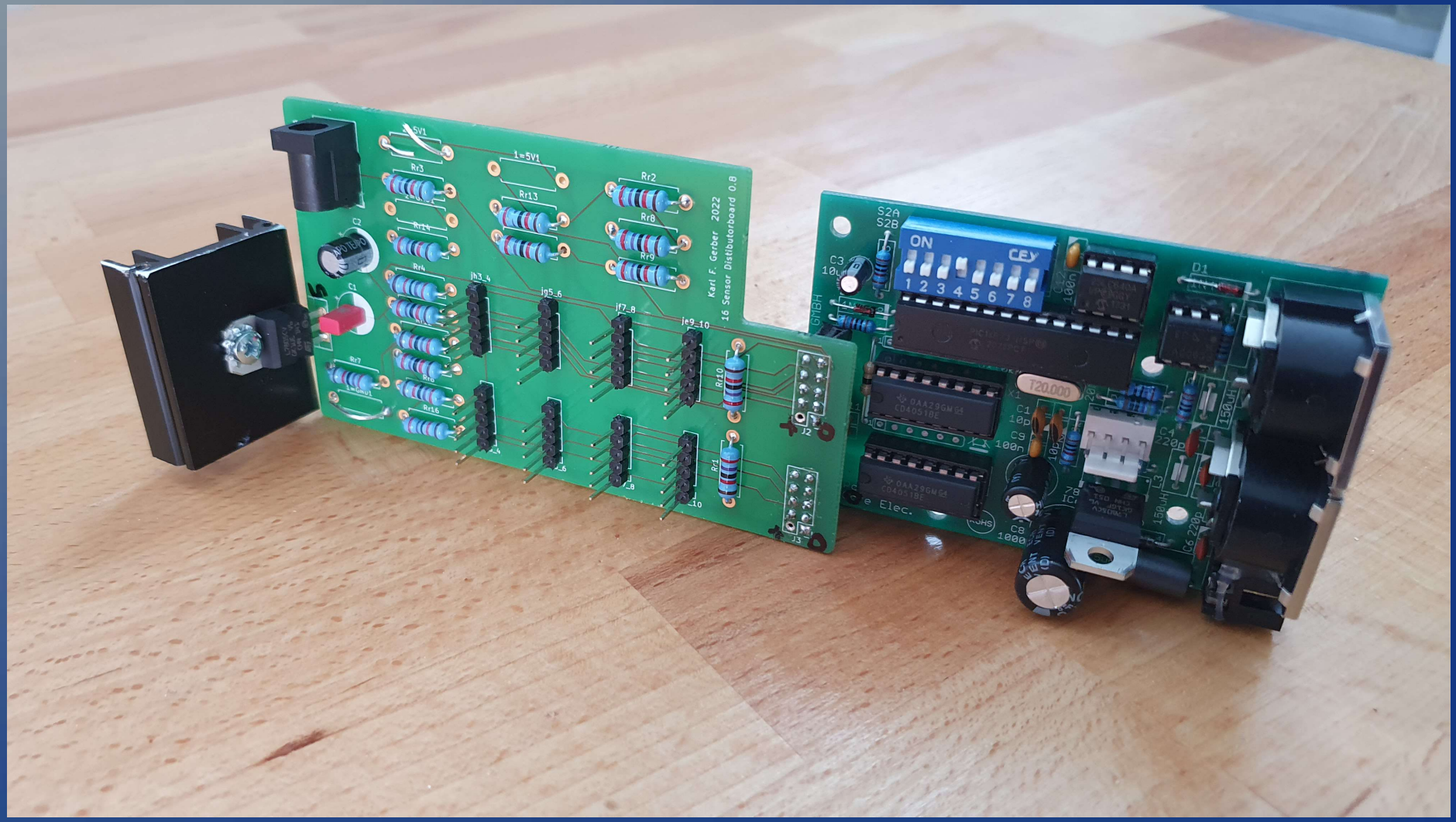
Hawaian stringing of Ukelele

Sensor32 Learning:
For slowly varying parameters
use lower legs

Data Flow

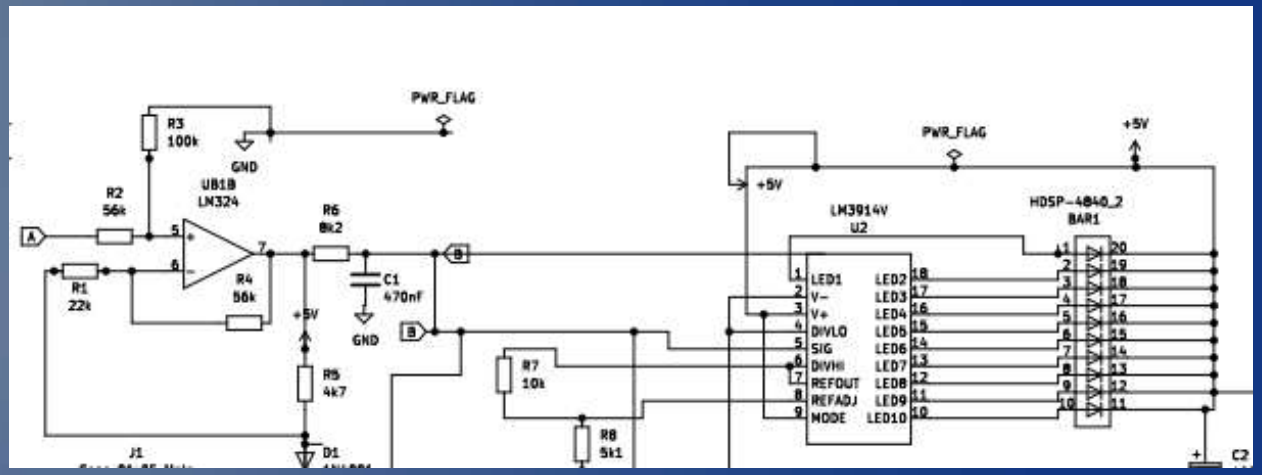

1st Module
16 sensors
0...5V
CV 2 MIDI
MIDI
Program
in
NI Reaktor
Audio
Merge
Second
module
Could feed
analog
modular
synth
e.g.via MIDI
Live Visuals:
ESEY,
Synesthesia,
other synths
and automata
20LED stripes-Monitor
for three variables
via MIDI (MIDI-muso)

PCB 16 CV to MIDI plugged to Doepfer PE



Analog Circuitry for each Parameter

Sensor Input



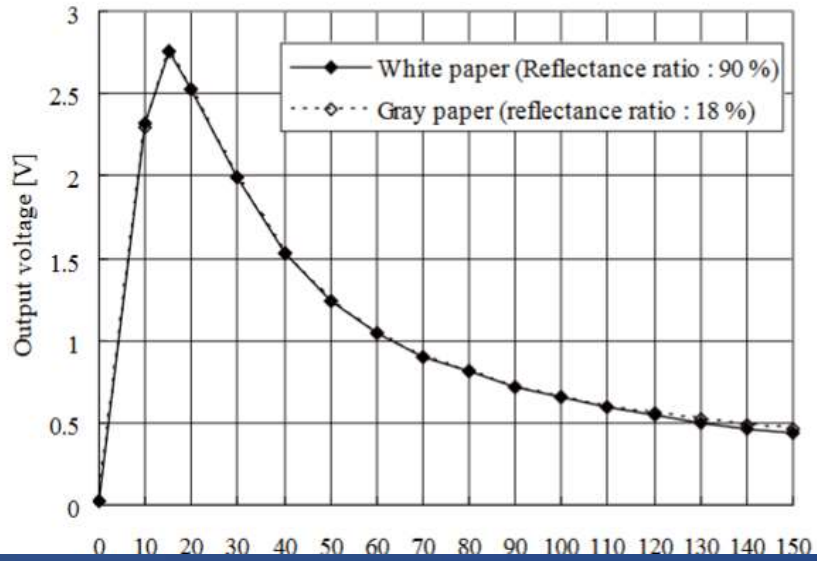
Analog Preprocessing, Scalable, reduce processor load, buffering

LED chain for orientation local

IR Sensor using Triangulation

SHARP GP2Y0A02YK0F

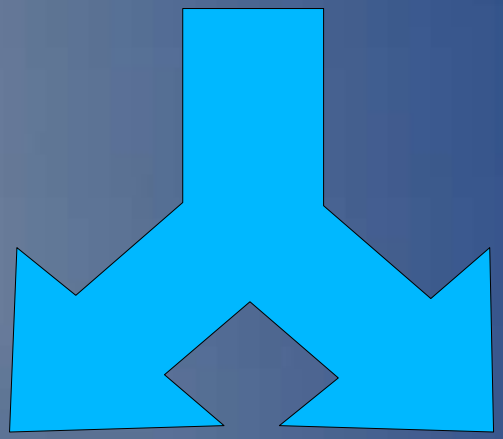
Fig. 2 Example of distance measuring characteristics (output)



Distance in cm

Not monotonous

Target User Group? An Authors Instrument



The Inventor.
Other Musicians

Dancers*, Gesture Recognition

Multifading,
Improvisers,
Soundscape
VJ,DJ,
Live-scoring,
Lighting/Laser...

*If dancers would learn to control.....
then we would consider dancers
as musicians

Limitations and Room for Improvement

- Tractile feedback could be useful for a few parameters
- Consider freezing mode
- Simplify mechanical structure
- Version for children/multi-user/installation
- Listen to people
- Use AI/ML to narrow down variable limits of complex synthesis algorithms ?

Conclusions

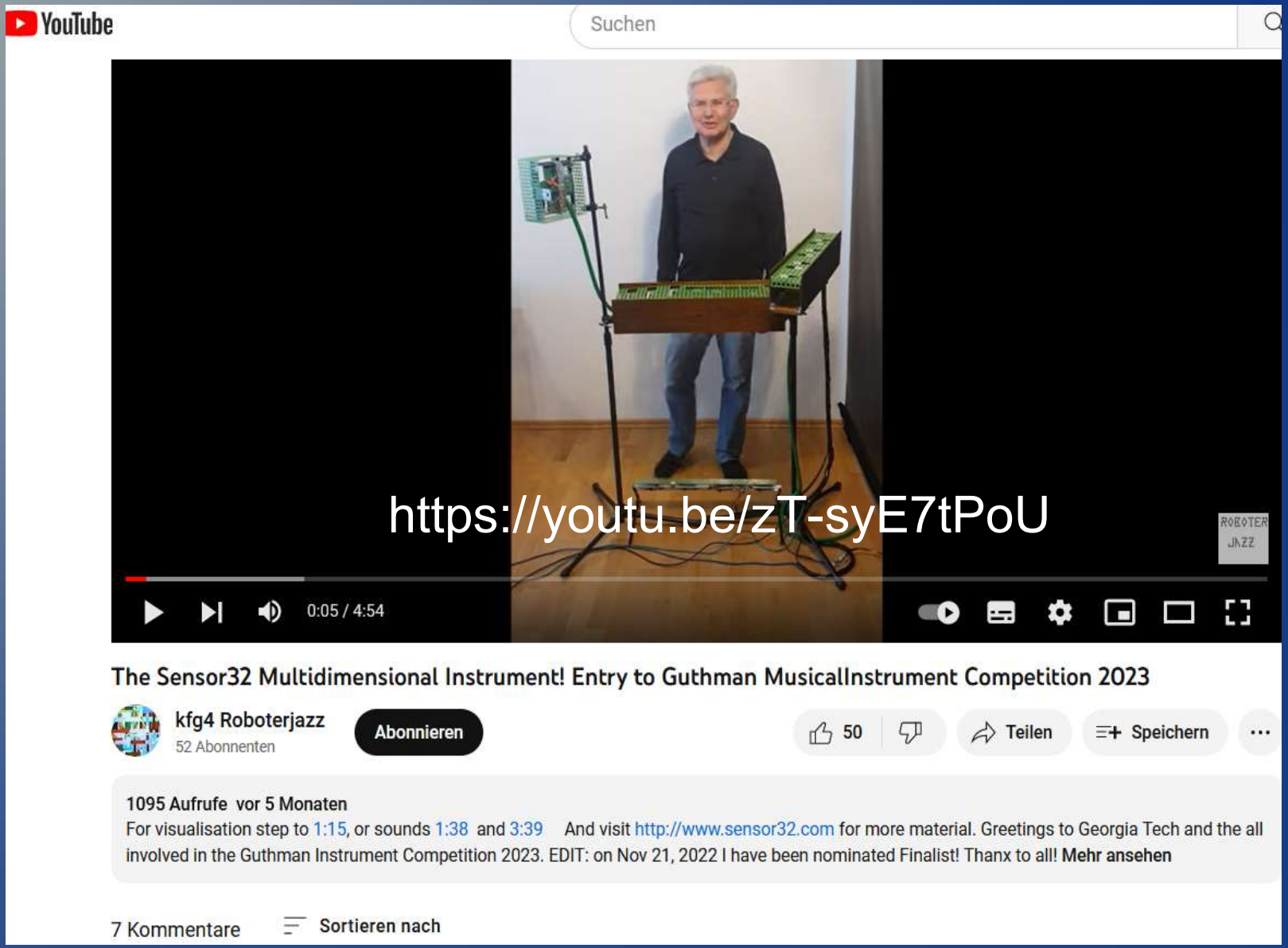
- Functional
- Natural visualization of live electronic music making
- Universal, but processing/sonification is crucial
- Use full body: allows many parameters
- Assign parameters(sensors) ergonomical with music use in mind, mapping crucial, configurable
- Not a scientific instrument
- Direct and transparent response
- Adding some tactile and lockable (freeze) functionality be attractive
- Unify sensor array to identical universal blocks 4x8 (ease spare parts, manufacturing...)

Dankeschön!

Trivia: Conducting the 16 bows- bowed psaltery

Trivia: featured Composer

Trivia: Guthman Finalist



https://www.youtube.com/live/NPtHGYH0JV0?feature=share&t=1629