

# Artificial Intelligence as a Creative Partner in Music






SIGNAL OFF 2025

THE SCIENCE TIMES

HOME > TECH & INNOVATION

### Will Musicians Lose Jobs If AI Starts Making Music? Here's What the Experts Say

By **Caleb White** Published: Mar 28, 2024




The three-part podcast Fascinating Facts features a journalist, multimedia editor, and their industry.

NEXT GEN INVESTING

## There's 'no way' AI will completely replace human musicians, says award-winning producer

Published Fri, Dec 29 2023 1:11 PM EST

 Cheyenne DeVon

Forbes


BUSINESS > MEDIA

## AI's Impact On Music In 2025: Licensing, Creativity And Industry Survival


By **Virginie Berger**, Contributor. © Virginie Berger, based in L.A. covers musi... [Follow Author](#)

Published Dec 30, 2024, 03:58am EST, Updated Jan 03, 2025, 11:34am EST

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## Will AI replace musicians?

Intelligence – such as the human musicians out of the








TECH • ARTIFICIAL INTELLIGENCE

## AI's Influence on Music Is Real

6 MIN

## Will AI Replace Musicians? Examining the Growing Fears and Realities

AUGUST 29, 2024 · GARY WHITTAKER



### Will AI Take Over the Jobs of Musicians? A Heated Debate

Artificial intelligence (AI) has been making significant inroads into various industries, and the music industry is no exception. As AI-driven tools become more sophisticated, they are beginning to take on roles traditionally filled by human musicians, composers, and producers.



# Make a jazz song about watering my plants |

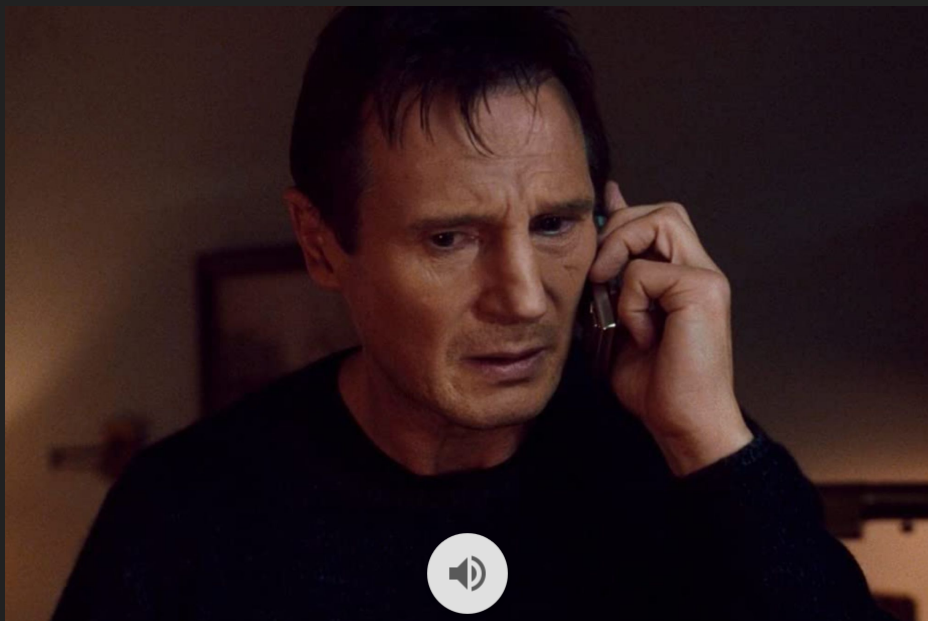
Start with a simple prompt or dive into our pro editing tools, your next track is just a step away.

+ Type any idea you have

Create

I'm a musician





# MOTIVATION

- There is more to Music AI than mindless prompt-based generation.
  - Practical examples!
- Knowing tools can inform subjective reflections on agency, ethics, ...
  - Pointers! *(Slides will be online)*

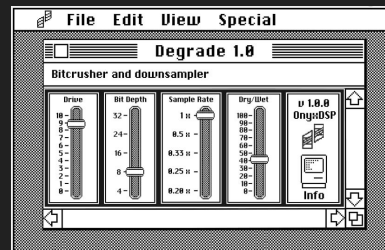
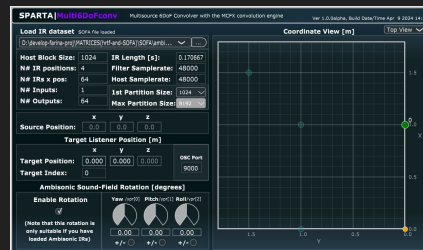
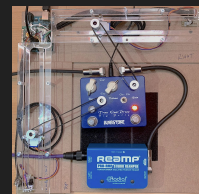
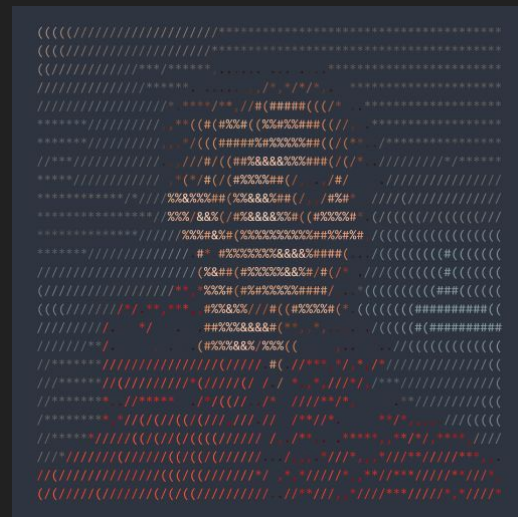
# ME

- PostDoc researcher at the University of Trento
- Audio Software Developer

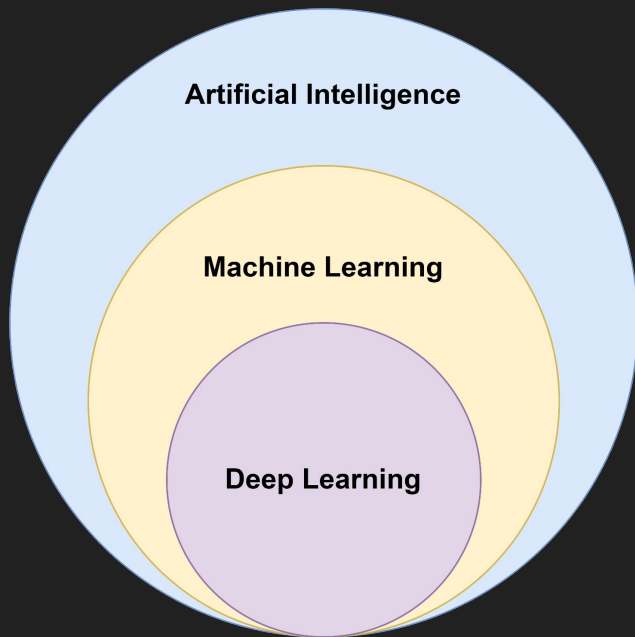
## Research:

- Deep learning (AI) for
  - Musical Audio Processing
  - Music Information Retrieval
  - Musical Instruments
- New Interfaces for Musical Expression

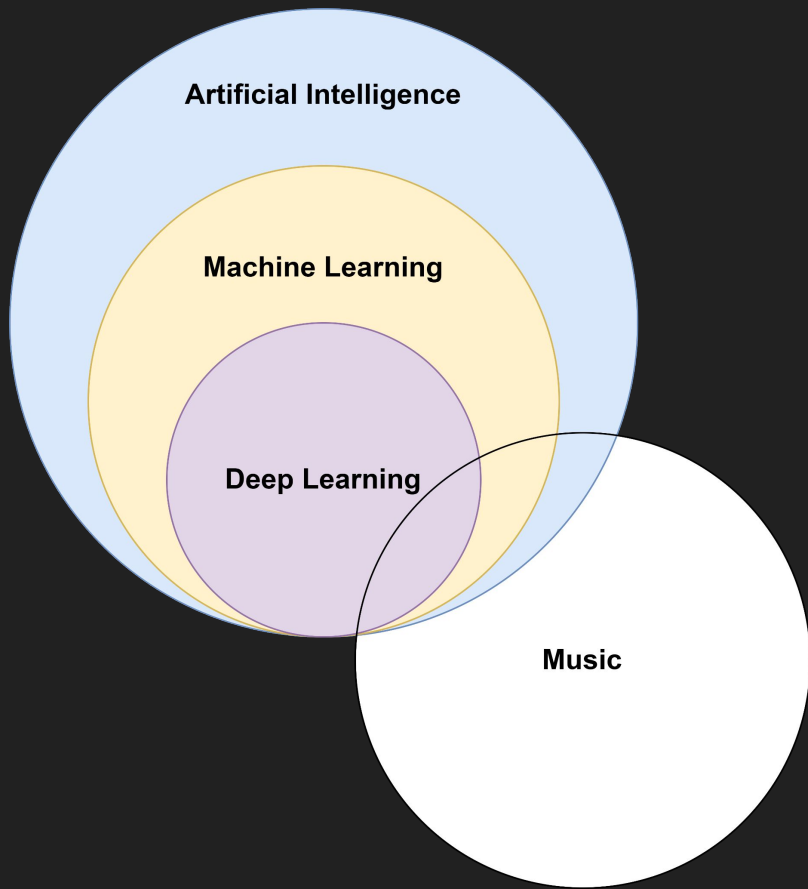
Music: guitar/processing/synthesis...



# AI? MACHINE LEARNING? DEEP? NEURAL?

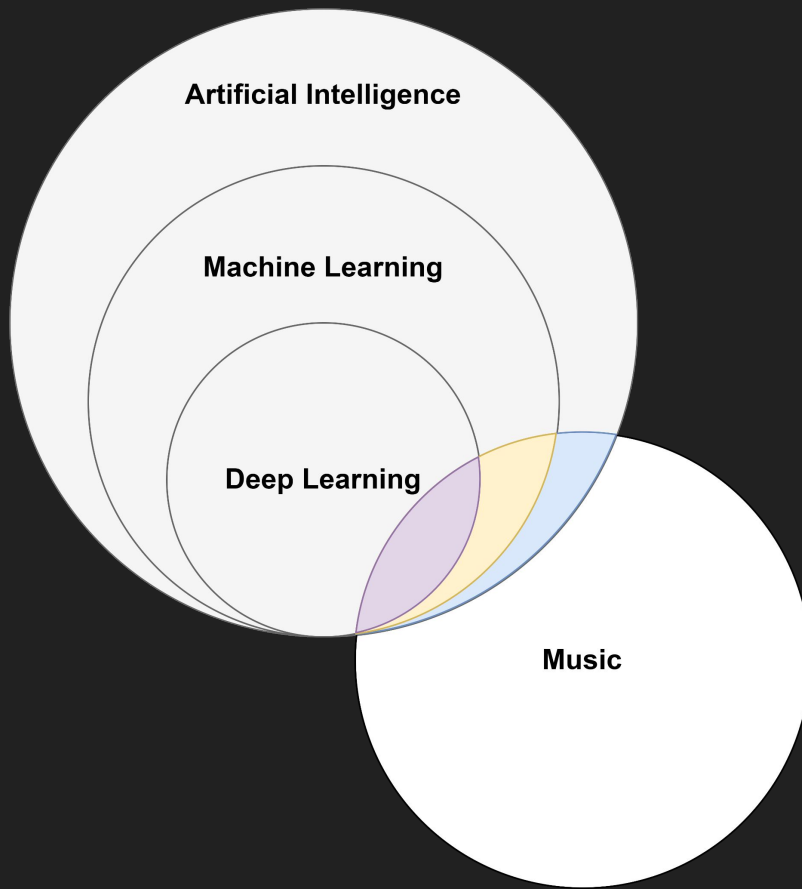


# AI? MACHINE LEARNING? DEEP? NEURAL?

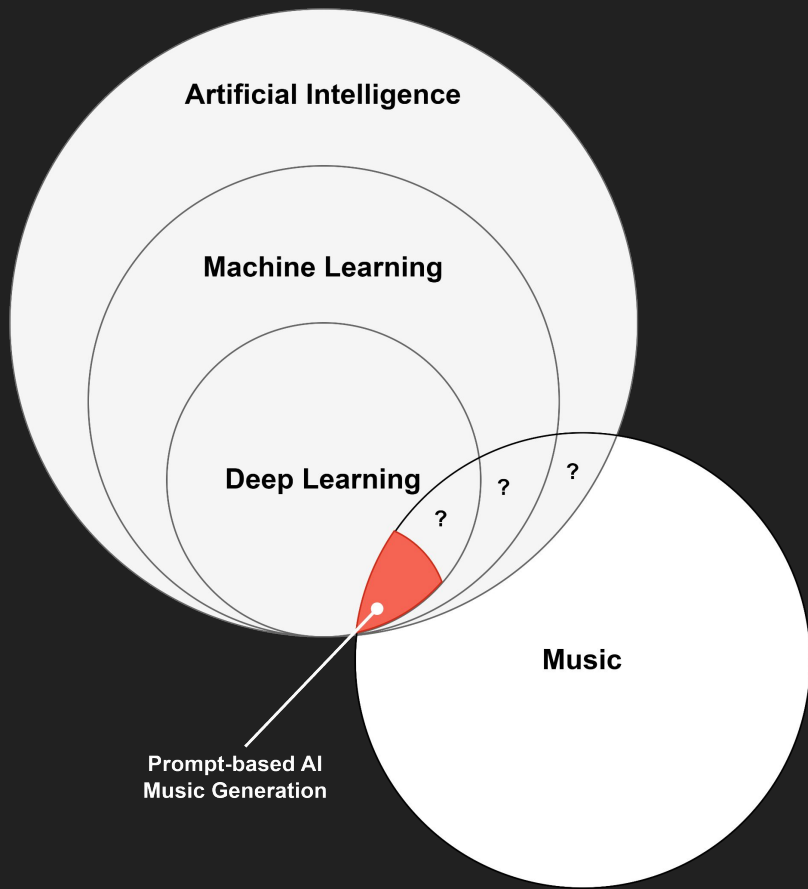




# AI? MACHINE LEARNING? DEEP? NEURAL?



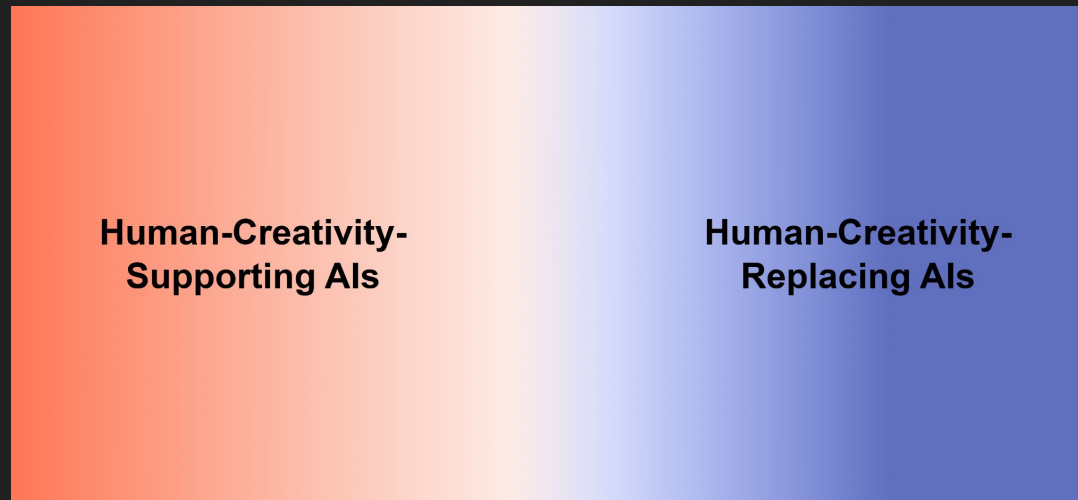
# AI? MACHINE LEARNING? DEEP? NEURAL?



“AI will steal our job”  
area

Prompt-based AI  
Music Generation

# TECHNICAL vs CONCEPTUAL DISTINCTIONS



# Some History: AI & Music

1957 Illiac Suite for string quartet  
composed by an electronic computer



(1957, Lejaren Hiller, Leonard Isaacson)

<https://distributedmuseum.illinois.edu/exhibit/illiac-suite/>

# Some History: AI & Music

1957 Illiac Suite



Lejaren Hiller - Illiac Suite for String Quartet (1956)

First experiment: presto, andante, allegro

<https://distributedmuseum.illinois.edu/exhibit/illiac-suite/>

# Some History: AI & Music

1957 Illiac Suite



Lejaren Hiller - Illiac Suite for String Quartet (1956)

Fourth experiment: tanto presto che possibile

<https://distributedmuseum.illinois.edu/exhibit/illiac-suite/>

# EMI - Experiments in Musical Intelligence

~1981 David Cope, composer and professor of music at the University of California, Santa Cruz.

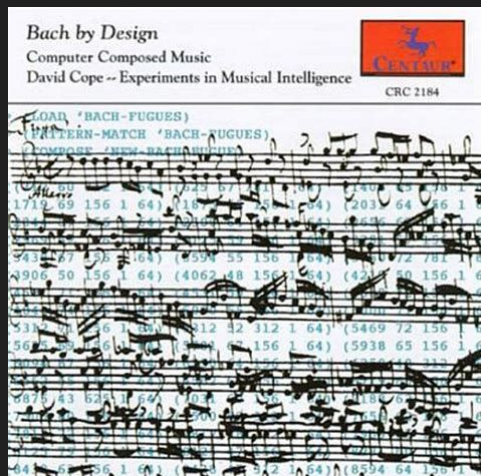
Idea: write a computer program that could analyze many compositions from himself and compose new pieces in his style, to understand and modify his own style.

Later: he applied the same method to other composers like Bartok, Brahms, Bach...



# EMI - Experiments in Musical Intelligence

- 1993. Bach by Design. Centaur Records
- 1997. Classical Music Composed by Computer. Centaur Records. CRC 2329
- ...





# EMI - Experiments in Musical Intelligence

1997 Douglas Hofstadter - EMI Turing Test

- 3 Pieces: Bach, Dr, Steve Larson, EMI
- 1 Performer (Winifred Kerner)



The audience voted Larson's piece as being composed by EMI and EMI's piece as being an authentic Bach

Only few months after Deep Blue defeated World Chess Champion Garry Kasparov

<https://computerhistory.org/blog/algorithmic-music-david-cope-and-emi/>  
[https://en.wikipedia.org/wiki/Deep\\_Blue\\_versus\\_Garry\\_Kasparov](https://en.wikipedia.org/wiki/Deep_Blue_versus_Garry_Kasparov)

# Improvising with Computers

George E. Lewis - Voyager (~1985 - now)

Interactive **improvisation** system.

Voyager “listens” to live performers and reacts



<https://www.youtube.com/watch?v=wGfeh7MNTpU>

Lewis, G. E. (2000). Too Many Notes: Computers, Complexity and Culture in Voyager. Leonardo Music Journal, 10, 33–39. <https://doi.org/10.1162/096112100570585>

# George E. Lewis - Why Do We Want Our Computers to Improvise?



**CTM 2018: Why Do We Want Our Computers to Improvise?**

<https://youtu.be/wDP8FsjiyCaA?si=SA9i470Z7souDAcY>

# Neural Networks (Machine and Deep Learning)

- First connectionist approaches in 1988
  - 1988 Todd "Creation by refinement: a creativity paradigm for gradient descent learning networks"
  - J. P. Lewis, 1988 – "Creation by Refinement: A creativity paradigm for gradient descent learning networks" in International Conference on Neural Networks.
- Early LSTM compositions  
2002 Eck & Schmidhuber, 2002 – "Finding temporal structure in music: Blues improvisation with LSTM recurrent networks" in IEEE Workshop on Neural Networks for Signal Processing.



<https://artintech.substack.com/p/the-forgotten-ogs-of-ai-music>

<https://highnoongmt.wordpress.com/2015/09/02/paper-of-the-day-pod-recurrent-neural-networks-for-music-computation-edition/>

<https://artintech.substack.com/i/155553187/lstms-early-s>

# Neural Networks - From Early 2000s to Today

2006: Hinton introduces systematic deep neural network training  
Specialized architectures for understanding and generation Key  
generative models:

- Variational Autoencoders (VAEs)
- Generative Adversarial Networks (GANs)
- Diffusion Models
- Transformers

Transformers (~2017): Most powerful architecture

Foundation of ChatGPT (2022)

GPT = Generative Pre-trained Transformer

# Part 2

## Spectrum Of Partnership

# SPECTRUM OF PARTNERSHIP

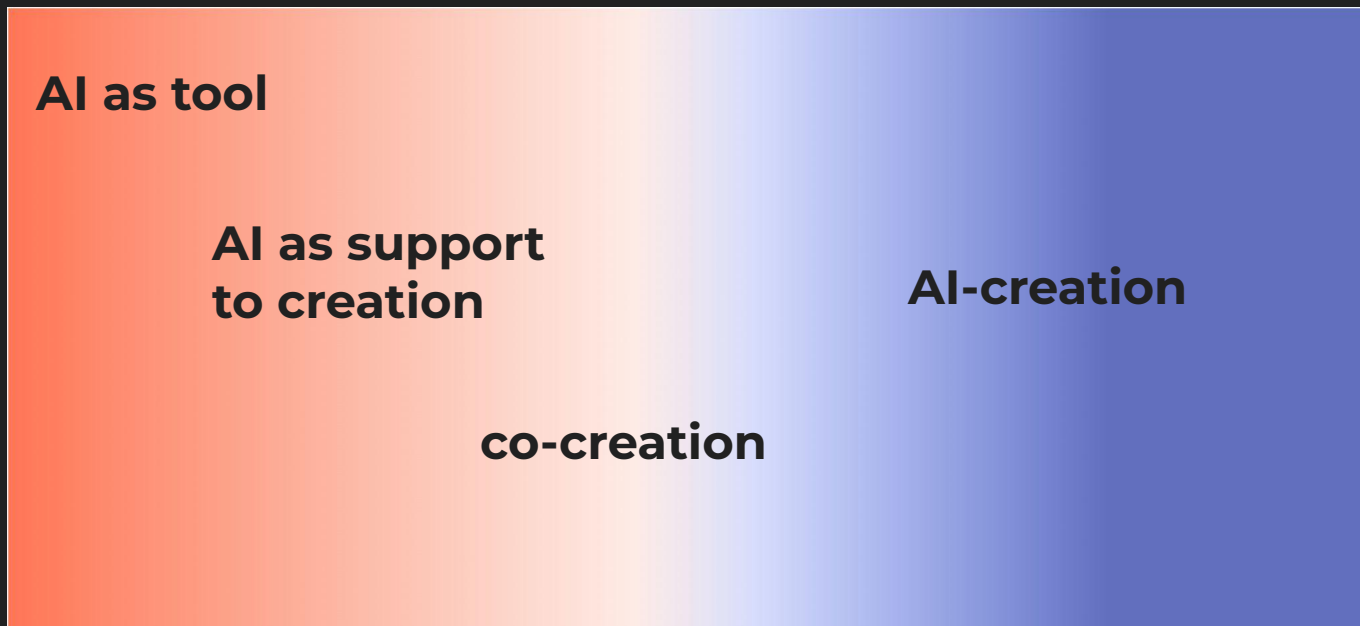
AI

**Human-creativity-  
supporting AI**

**Human-creativity-  
replacing AI**

# SPECTRUM OF PARTNERSHIP

Music AI works



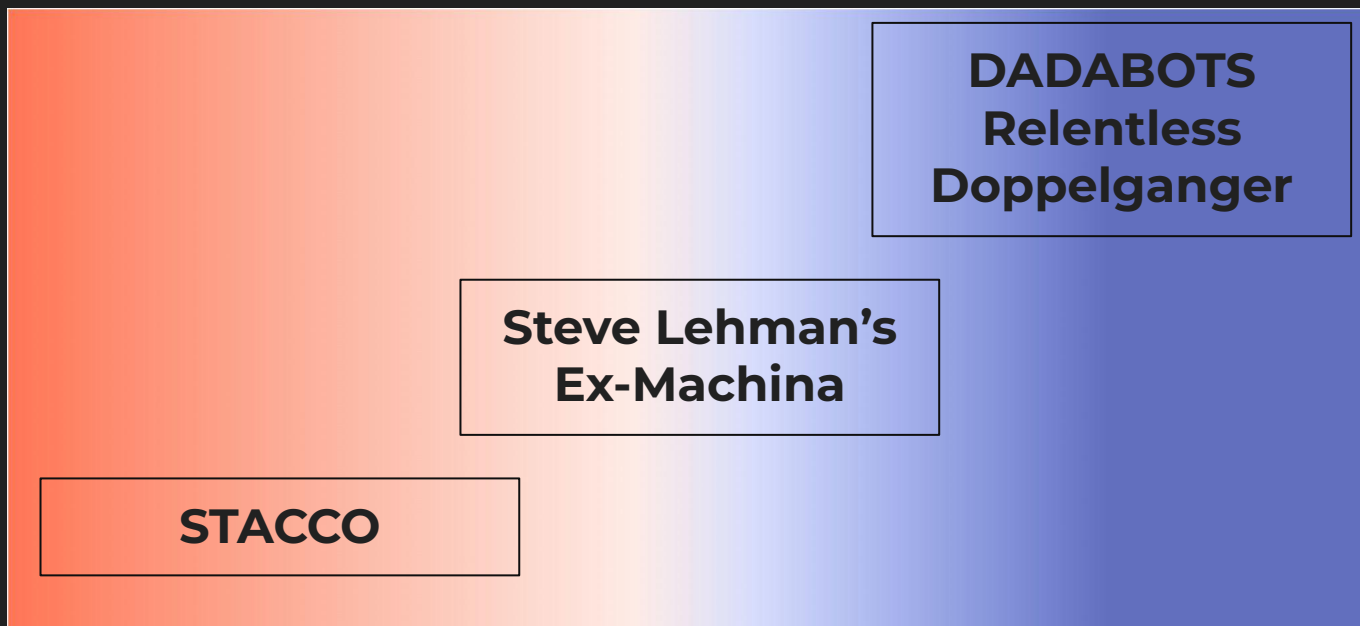


# SPECTRUM OF PARTNERSHIP

## Human Agency and Intent

- Creative vision
- Decision-making
- Artistic direction.

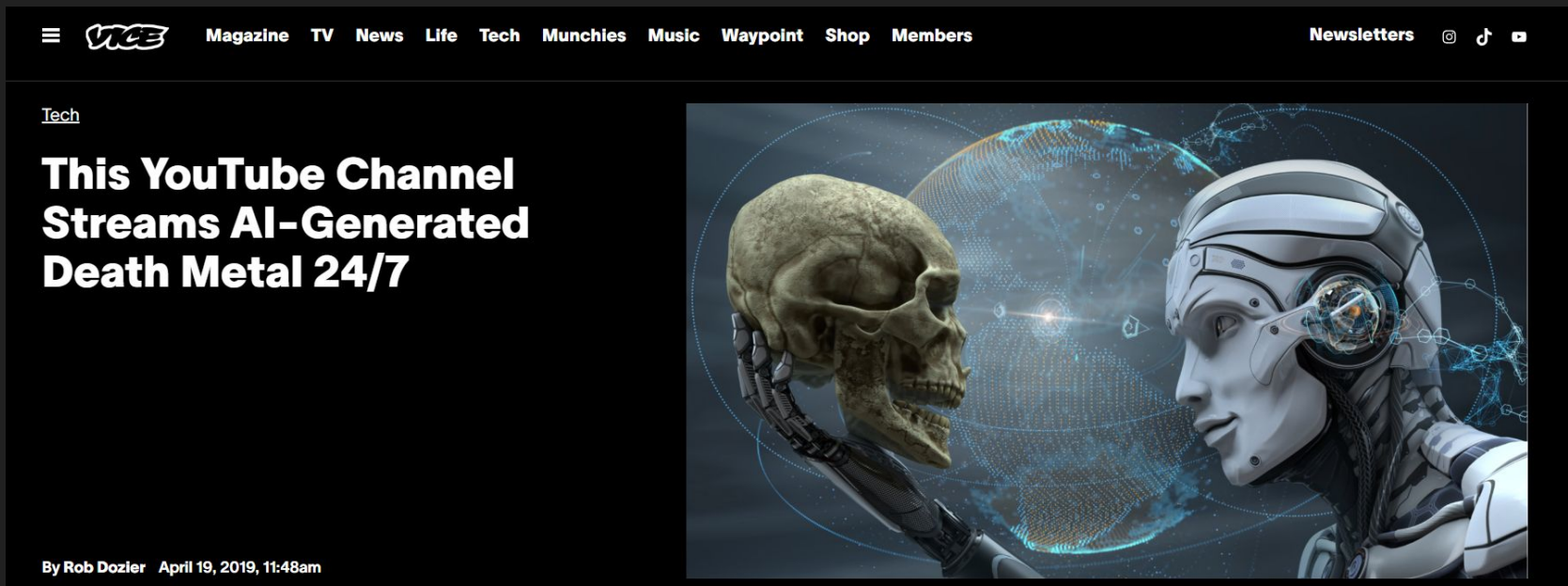
# SPECTRUM OF PARTNERSHIP



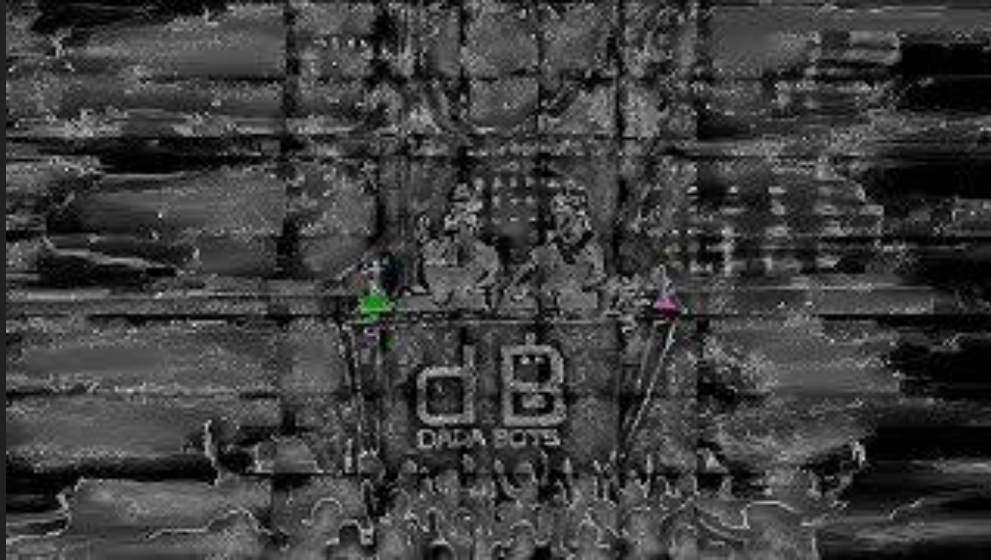
# 1. DADABOTS: Relentless Doppelganger

(Carr, Zukowski)

Full AI generation, artist-steered/curated generation



# 1. DADABOTS: Relentless Doppelganger

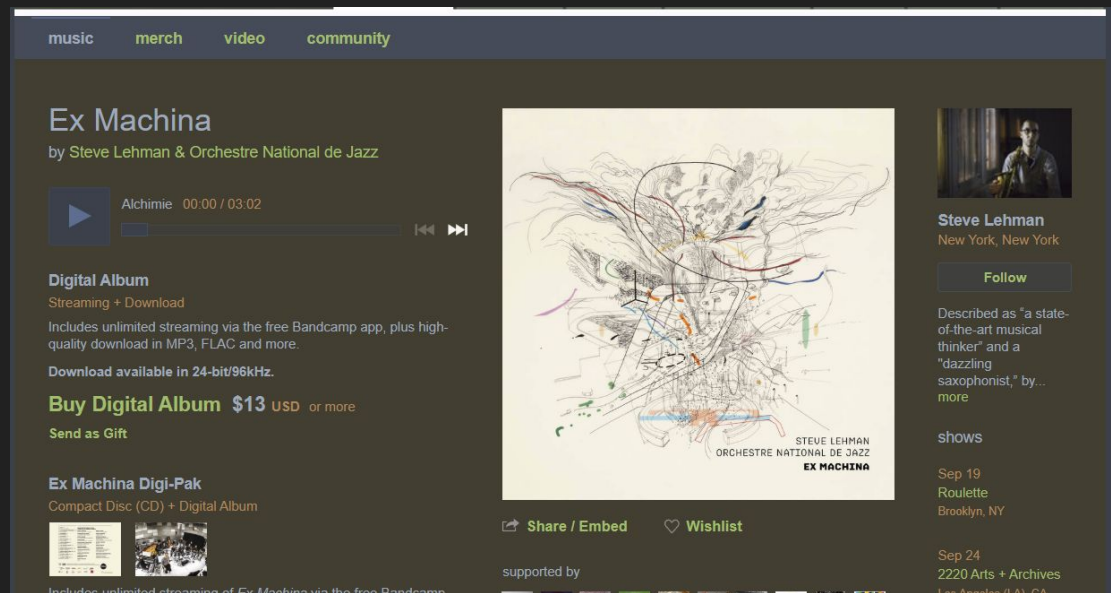


[https://www.youtube.com/watch?v=JF2p0Hlg\\_5U&ab\\_channel=DADABOTS](https://www.youtube.com/watch?v=JF2p0Hlg_5U&ab_channel=DADABOTS)

“... artists intentionally explore the absence of **artistic agency**, critically and creatively embracing AI”

## 2. Steve Lehman's Ex-Machina

Composed and Improvised Human elements interact with computer Improvisation.



The screenshot shows a music platform interface for the album "Ex Machina" by Steve Lehman & Orchestre National de Jazz. The top navigation bar includes links for "music", "merch", "video", and "community". The album title "Ex Machina" is prominently displayed, followed by the artist "by Steve Lehman & Orchestre National de Jazz". A player for the track "Alchimie" is shown with a progress bar at 00:00 / 03:02. Below the player, there are options for "Digital Album" (Streaming + Download) and "Buy Digital Album \$13 USD or more". A "Send as Gift" button is also present. The "Ex Machina Digi-Pak" section offers a "Compact Disc (CD) + Digital Album" bundle. A central image of the album cover, featuring a complex, abstract line drawing, is displayed. To the right, a "Share / Embed" and "Wishlist" section is visible. Further right, a "Follow" button and a "shows" section are present. The "shows" section lists "Sep 19 Roulette Brooklyn, NY" and "Sep 24 2220 Arts + Archives Los Angeles CA, CA".

music merch video community

### Ex Machina

by Steve Lehman & Orchestre National de Jazz

Alchimie 00:00 / 03:02

**Digital Album**  
Streaming + Download  
Includes unlimited streaming via the free Bandcamp app, plus high-quality download in MP3, FLAC and more.  
Download available in 24-bit/96kHz.  
**Buy Digital Album \$13 USD** or more  
Send as Gift

**Ex Machina Digi-Pak**  
Compact Disc (CD) + Digital Album

Share / Embed Wishlist

supported by

**Steve Lehman**  
New York, New York  
Follow  
Described as "a state-of-the-art musical thinker" and a "dazzling saxophonist," by... more

**shows**  
Sep 19  
Roulette  
Brooklyn, NY  
Sep 24  
2220 Arts + Archives  
Los Angeles CA, CA

## 2. Steve Lehman's Ex-Machina

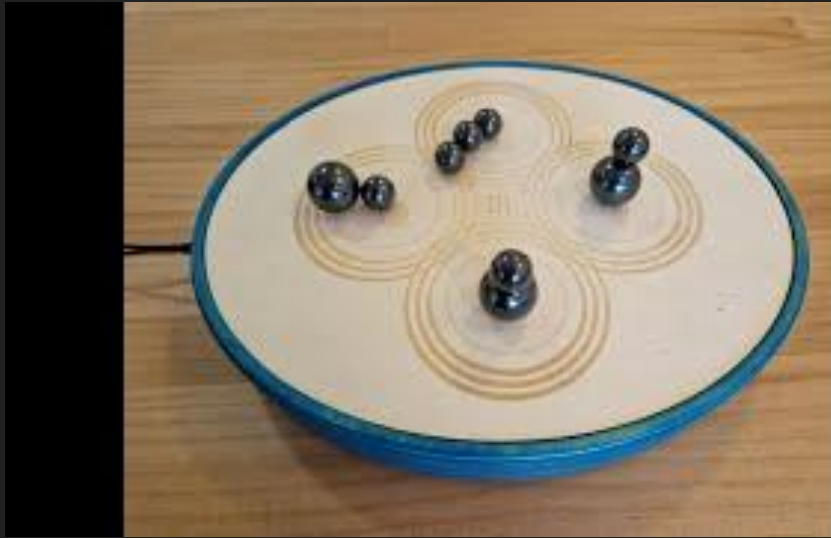


<https://www.youtube.com/watch?v=-xZLUyCRz58>

### 3. STACCO (Privato, Lepri, Úlfarsson)

Instrument: Embodied interface to AI sound generation

<https://iil.is/research/stacco>

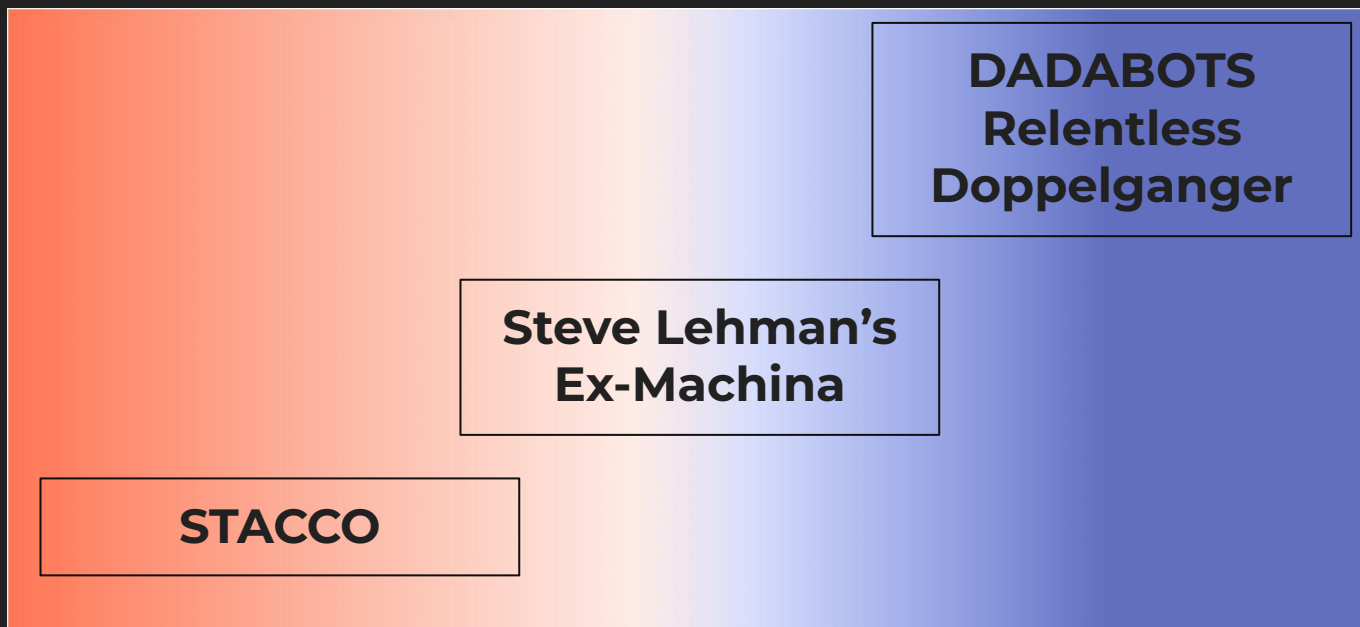


[https://youtu.be/\\_u5\\_UsiKZPY](https://youtu.be/_u5_UsiKZPY)



<https://youtu.be/Bt3O-ihSqiU>

# SPECTRUM OF PARTNERSHIP/AGENCY



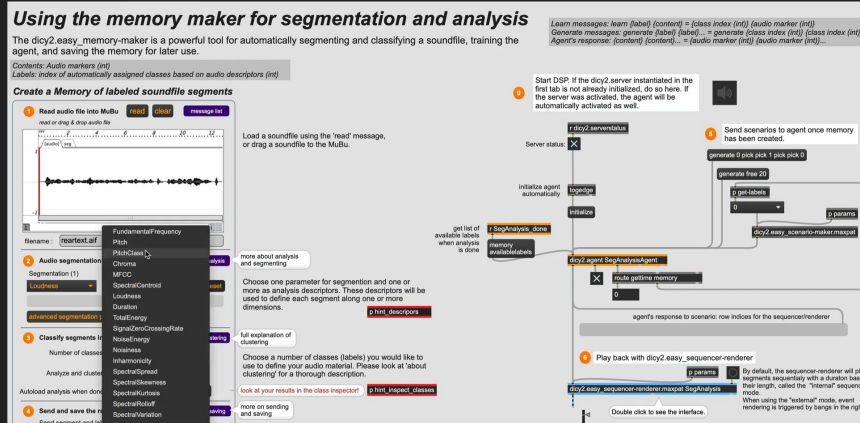
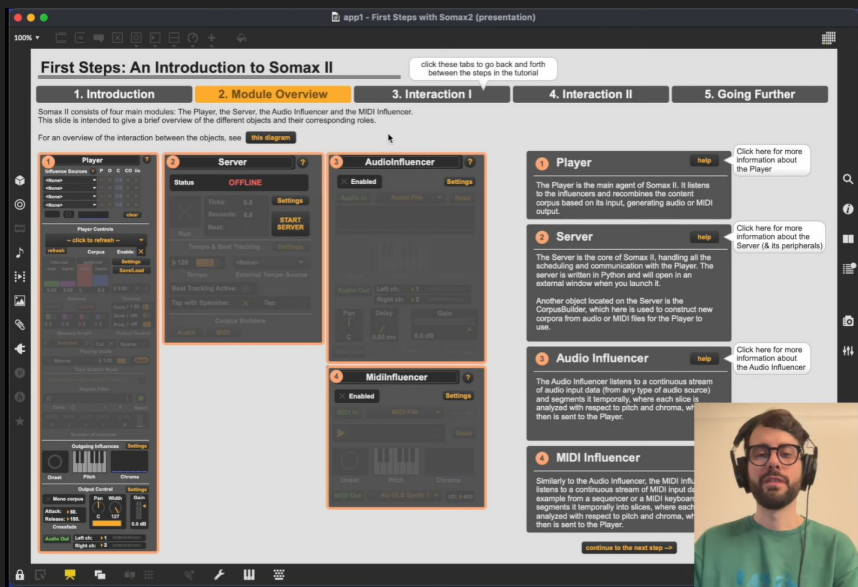


# Part 3

## Practical Tools

# Real-time Improvisation & Co-creation

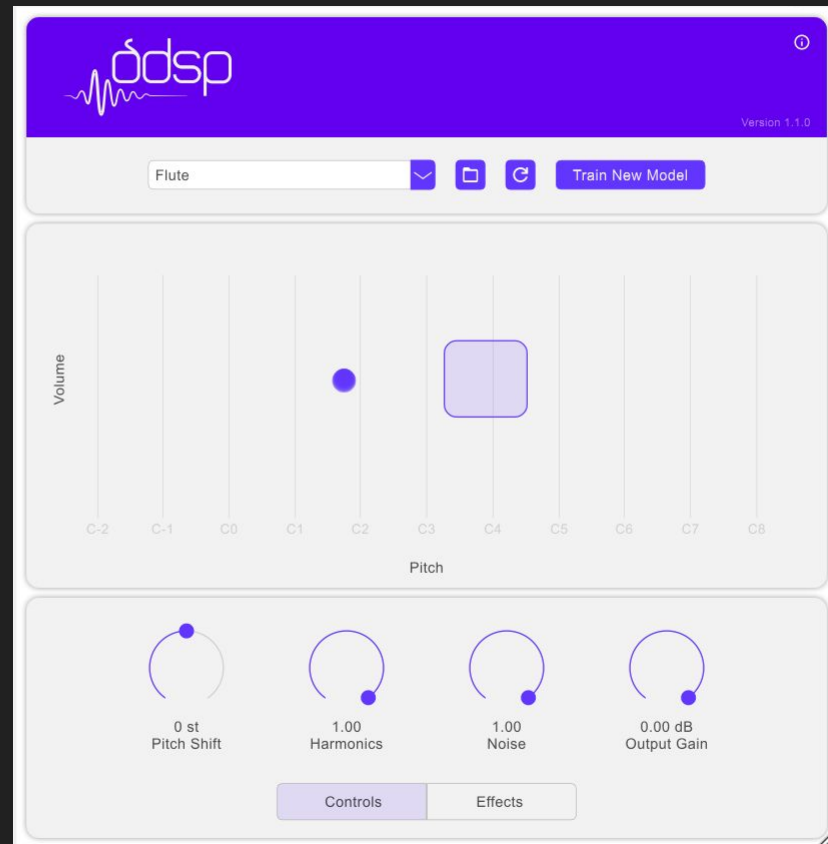
IRCAM - Somax2, OMax5, Dicy2



[https://www.youtube.com/@Ircam\\_Paris](https://www.youtube.com/@Ircam_Paris)

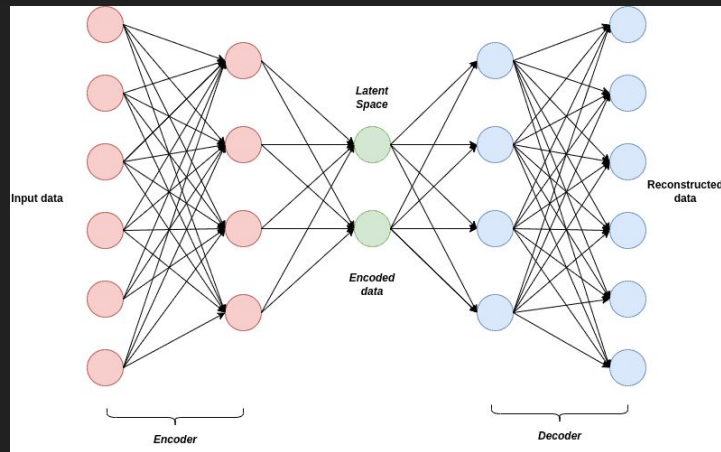
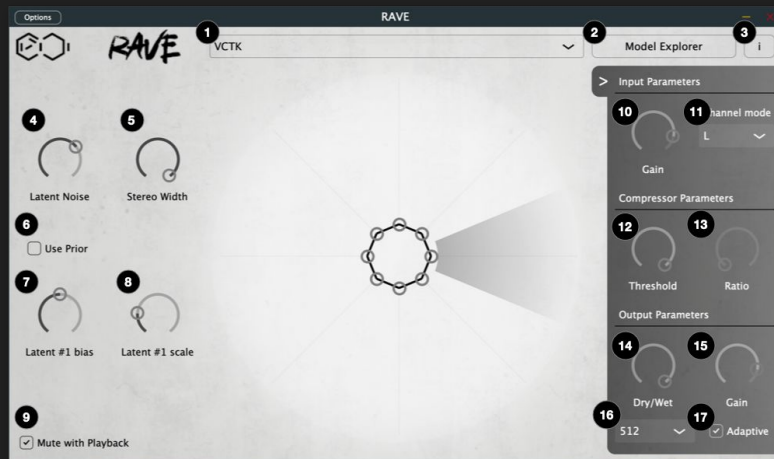
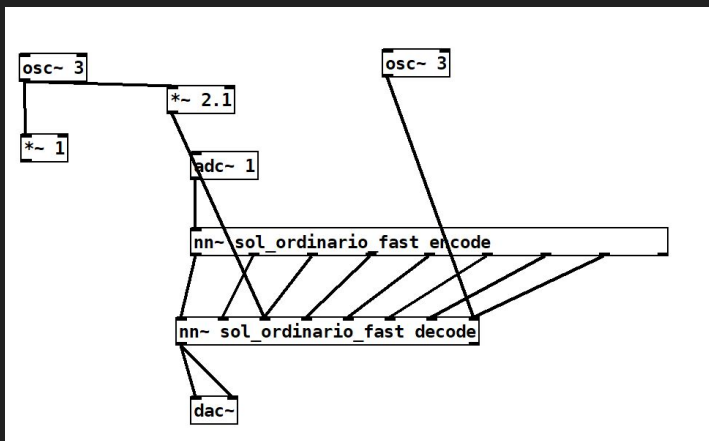
# Audio Transformation

## Timbre Transfer: Magenta DDS



# Audio Transformation

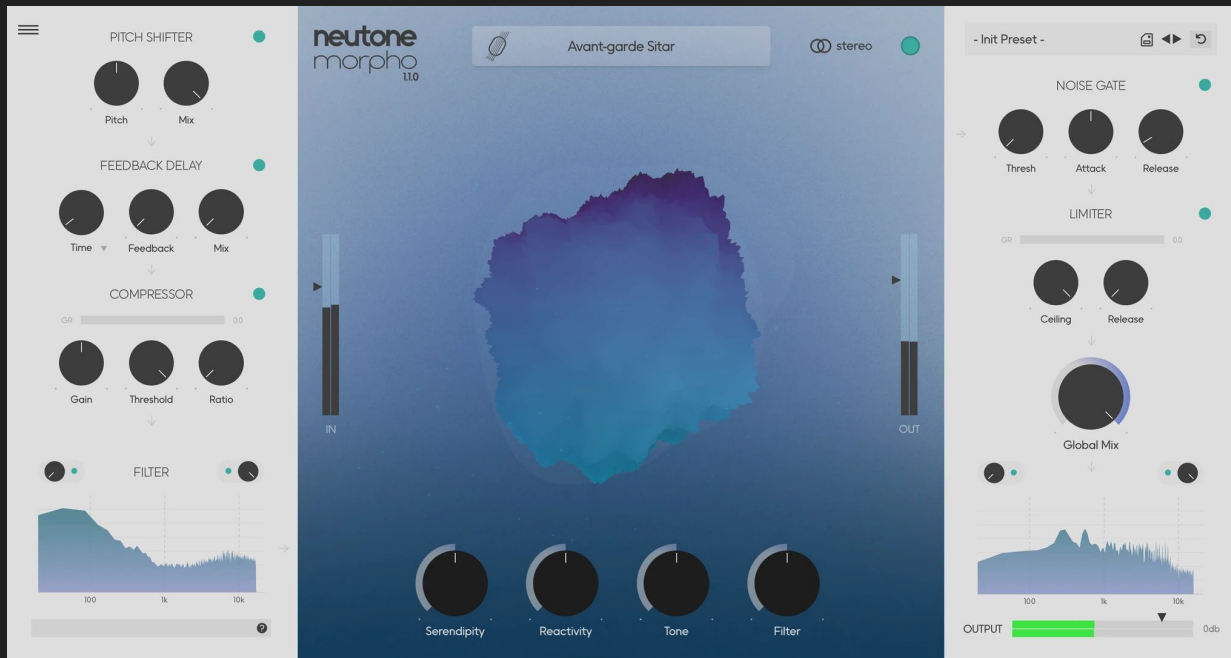
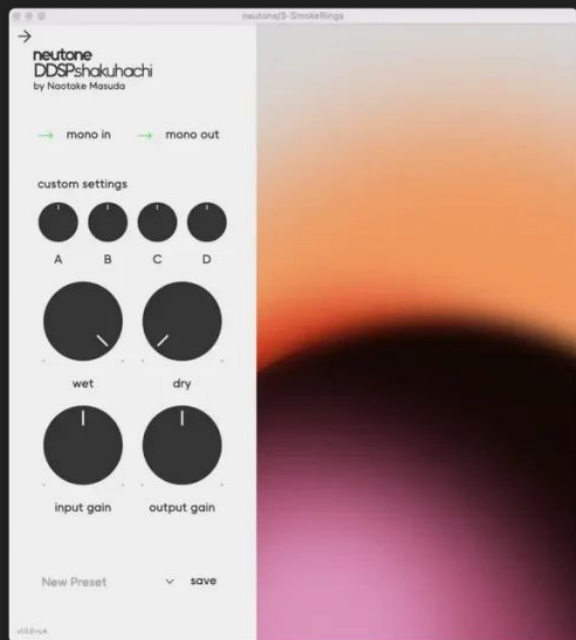
## Timbre Transfer: IRCAM RAVE



# Audio Transformation

Timbre Transfer: Qosmo Neutone (Free!), Morpho (Mostly free)

<https://neutone.ai/>



# Audio Transformation

VOICE Timbre Transfer: Holly+

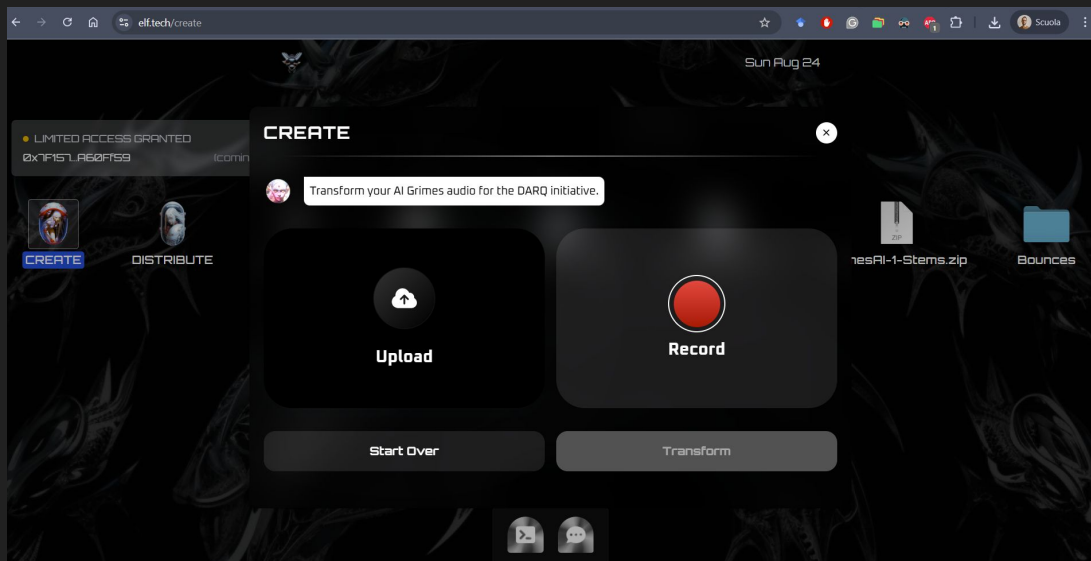
<https://holly.plus/>



# Audio Transformation

VOICE Timbre Transfer: Grimes

<https://elf.tech/create>



# Sound Design / Effects

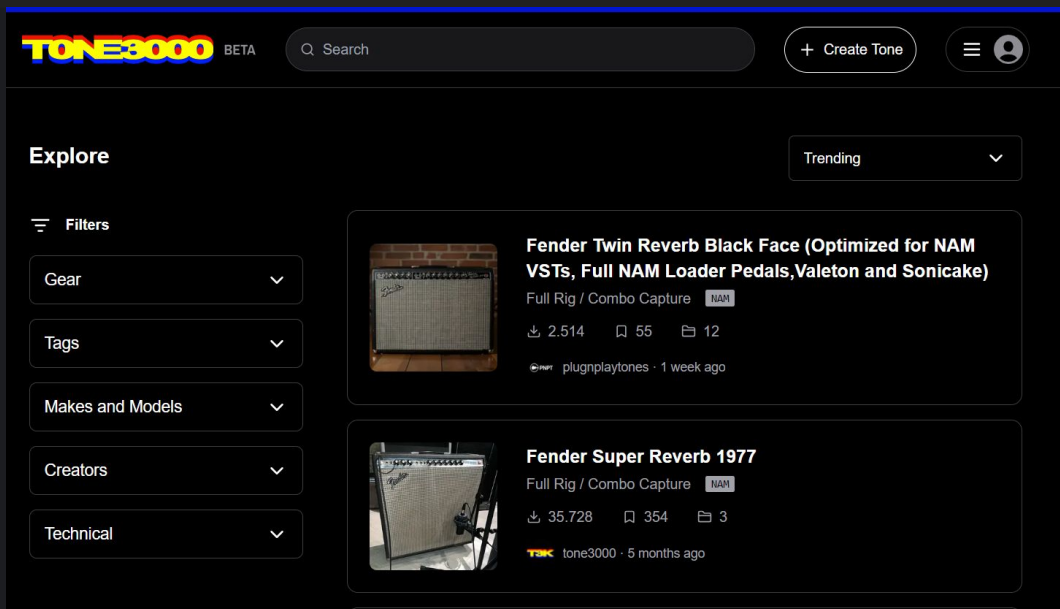
Neural Amp Modeler (free)





# Sound Design / Effects

## Neural Amp Modeler



# Sound Design / Effects

## Primo APFX



Dynamic tone based on signal analysis



# Sound Design / Effects

More Analog Modeling:

Baby Audio TAIP



Neural Q



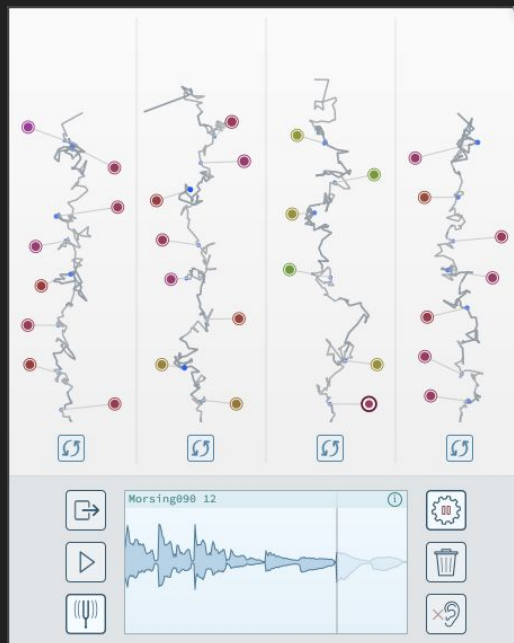
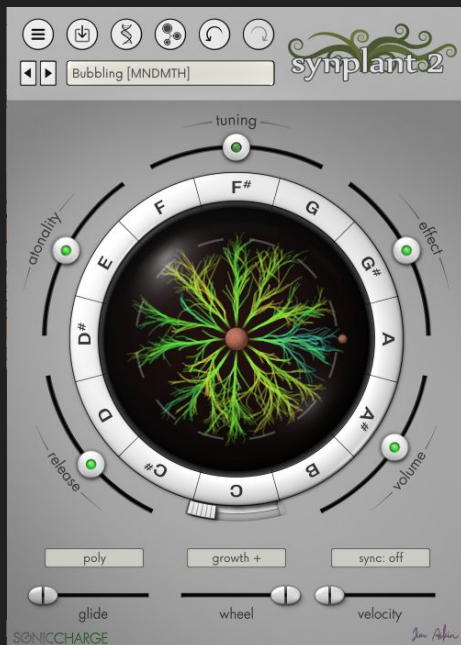
# Sound Design / Effects

## Creative Effects: SAMPLESON rePEDAL (Free)



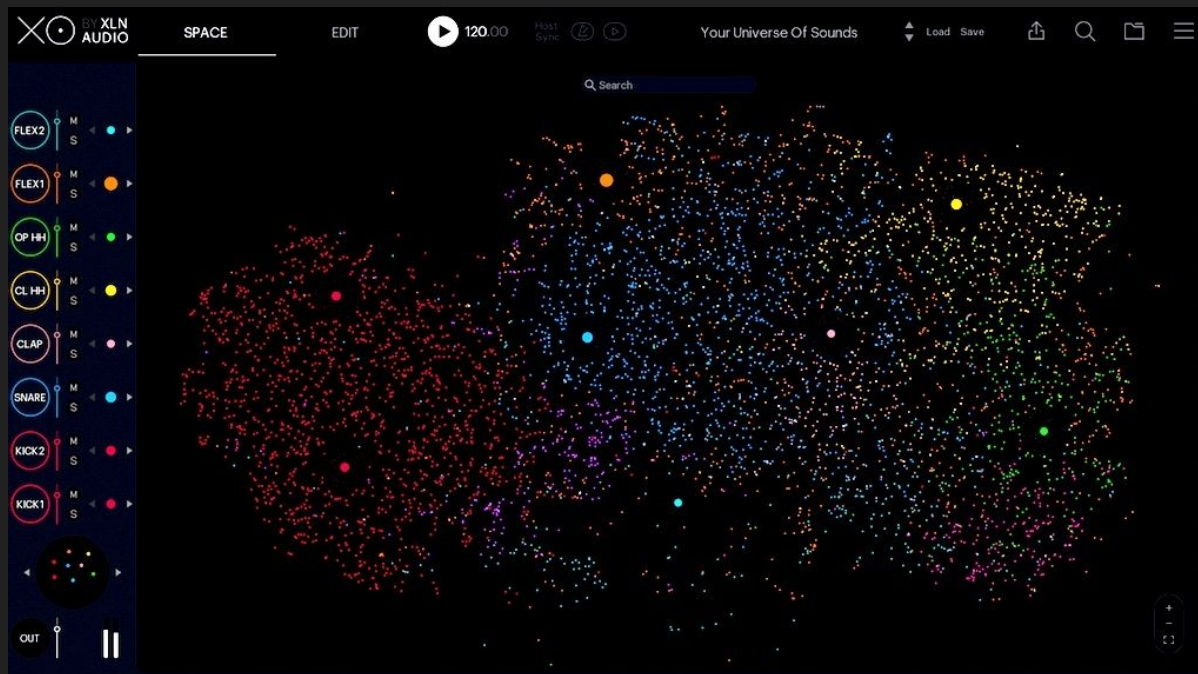
# Sound Design / Effects

## Synplant 2



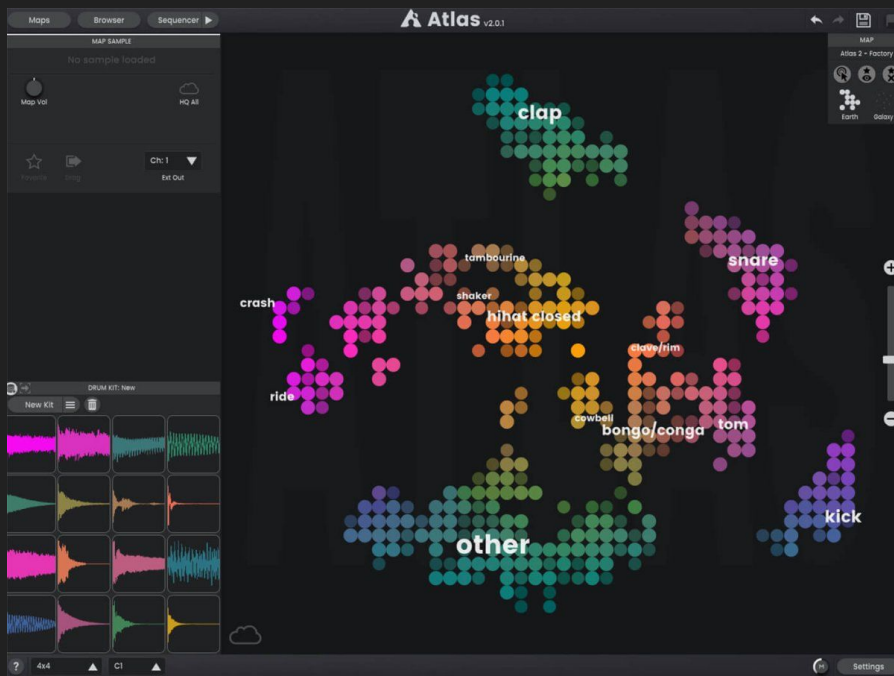
# Sampling

Sample maps: XLN Audio XO



# Sampling

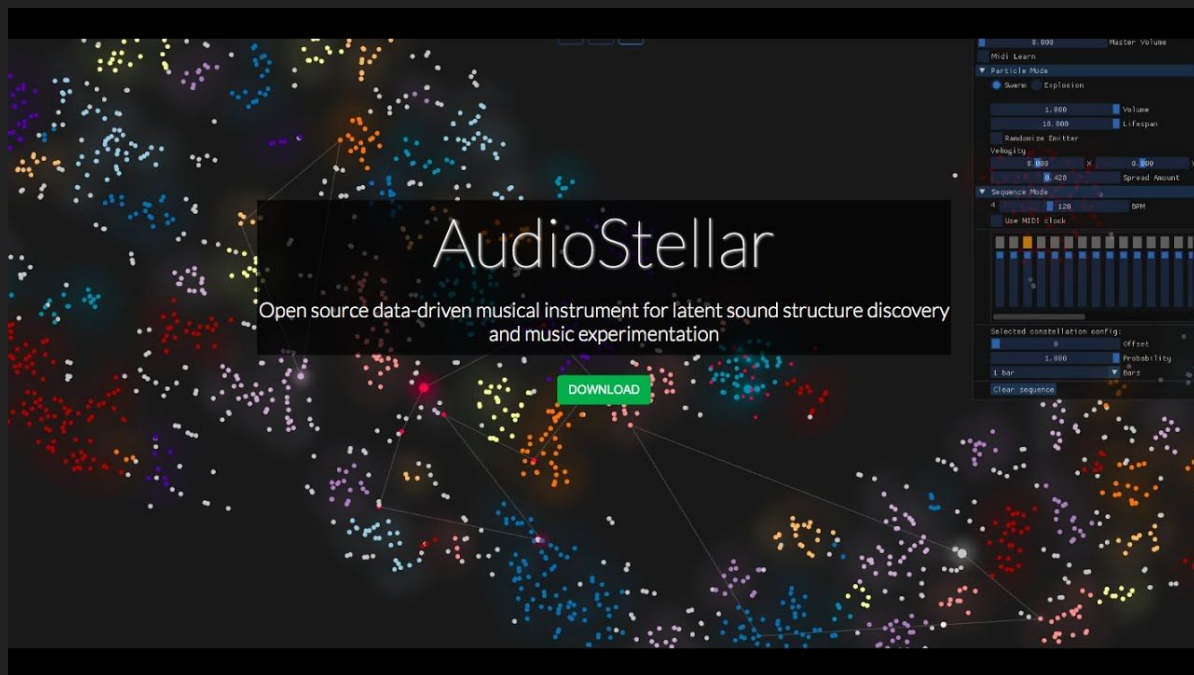
## Sample maps: Algonaut Atlas





# Sampling

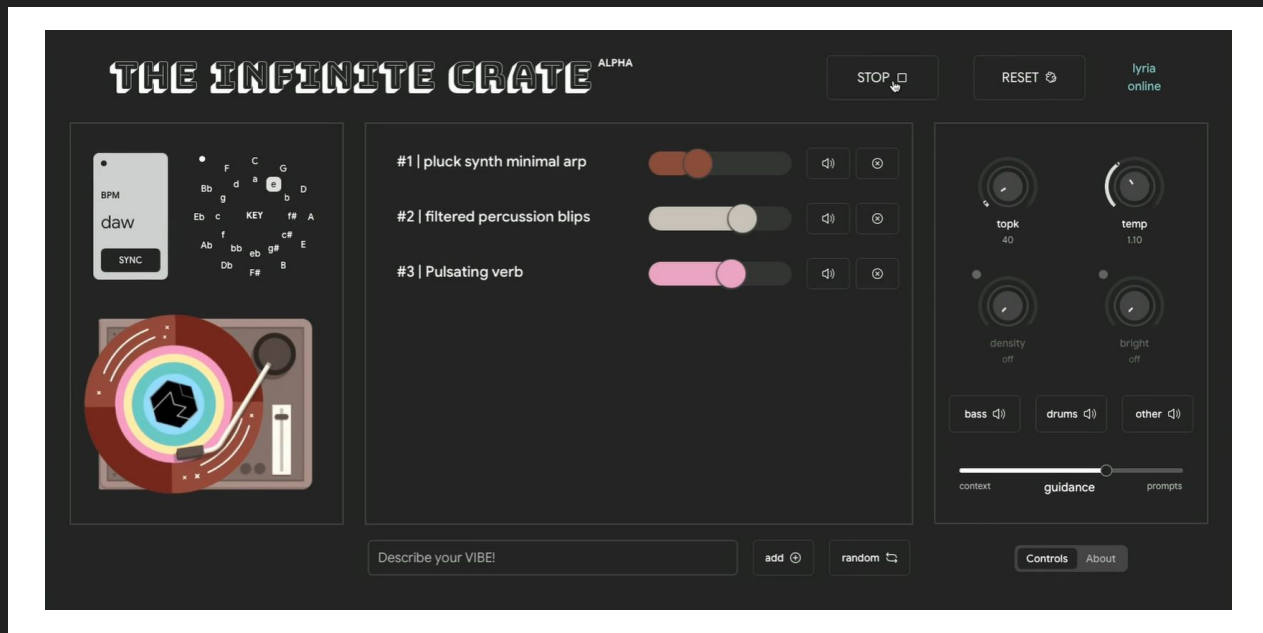
Sample maps + Generative Sequencing: AudioStellar (Free!)





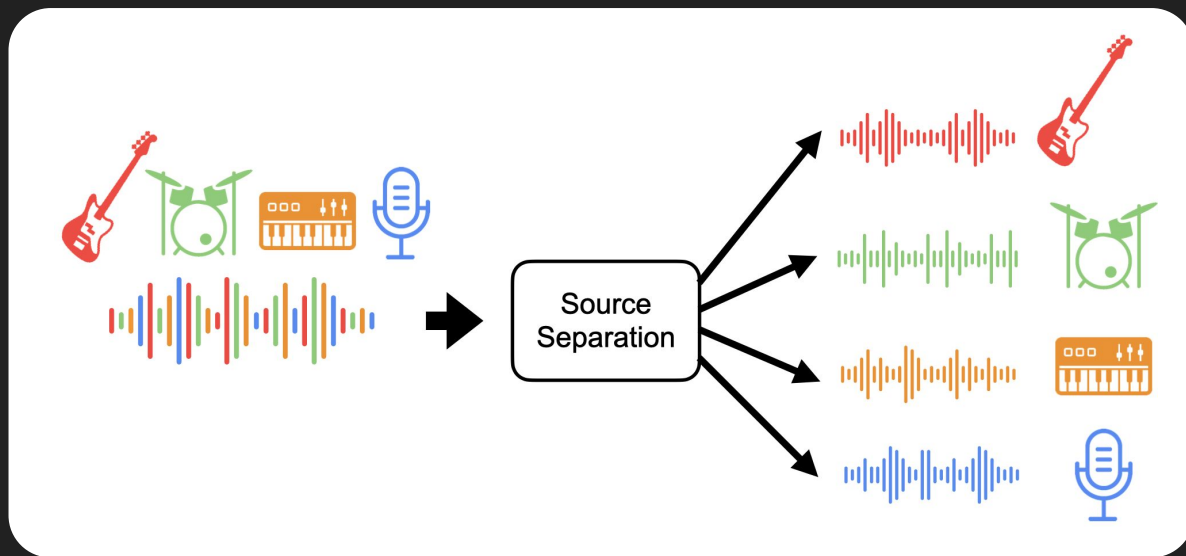
# Sampling

Magenta Infinite Crate (Google): Live Generative Music VST for sampling



# Learning and Production

## Stem Separation - Music Demixing



# Learning and Production

## Stem Separation

- <https://vocalremover.org/splitter-ai>
- <https://voice.ai/tools/stem-splitter>
- <https://audiocleaner.ai/ai-stem-splitter>

Search for “free stem separation” or “stem splitter”

## Limitations:

- Often limited to band music (voice, guitar, bass, drums)
- Baked in compression/sidechain is often not reversible

# Learning and Production

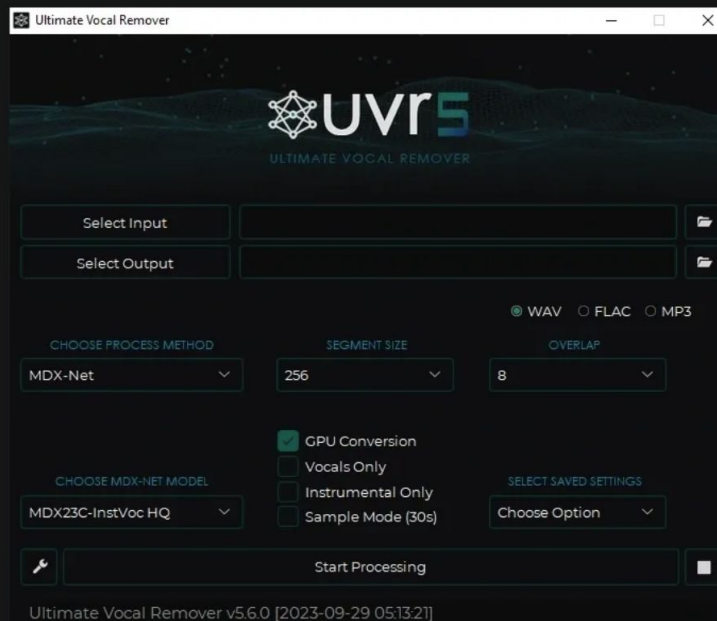
## Vocal removal - Music Demixing

### ULTIMATE VOCAL REMOVER V5

The best vocal remover application on the internet, and it's totally free and open source!

Available on Windows, Mac, & Linux

[Download UVR](#)



# Learning and Production

Audio to Score: Convert Audio to music scores

- <https://www.songscription.ai/>
- <https://klang.io/transcription-studio/>



5-Audio 3  
[2021-05-06  
000403].wav



Transcribed by songscription.ai

$\text{♩} = 167$

A musical score for piano, transcribed from audio. It consists of four systems of staves, each with a treble and bass clef. The music is in 4/4 time and features a melody in the right hand and a bass line in the left hand. The score is transcribed by songscription.ai.

4

8

12

# Learning and Production

## Audio to MIDI

- <https://ai-midi.com/> (Free?)



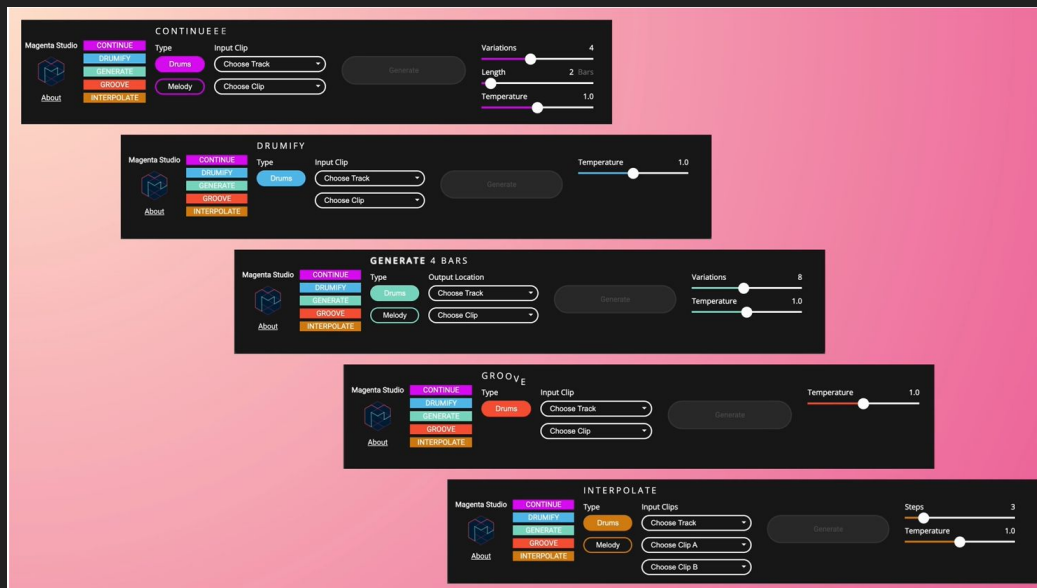
5-Audio 3  
[2021-05-06  
000403].wav



# All that glitters is not gold

Magenta Studio (Google):

MIDI generation Max4Live, but limited in scope and quality

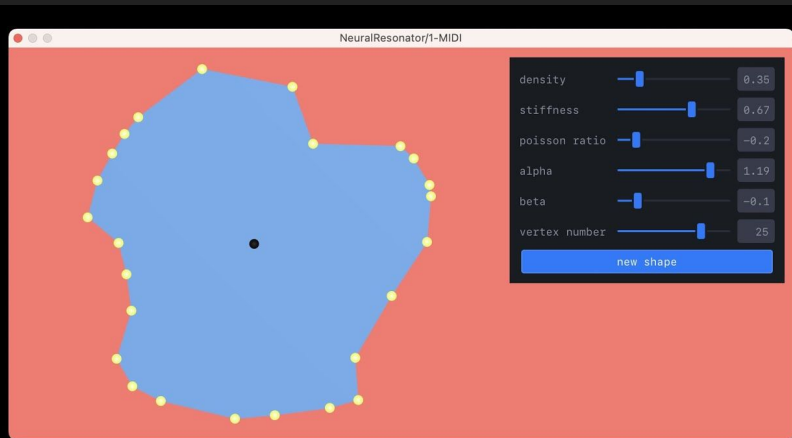


# Sometimes, gold does not glitter (Research that is not ready for production)

Academic research hardly targets production.

Research fundings stop at publication.

Production and dissemination of even rough prototypes is hard to justify.



Download the latest version for **macOS Apple Silicon** and the essential pretrained models to get started.



# VIEWING / READING SUGGESTIONS

# George E. Lewis - Why Do We Want Our Computers to Improvise?



**CTM 2018: Why Do We Want Our Computers to Improvise?**

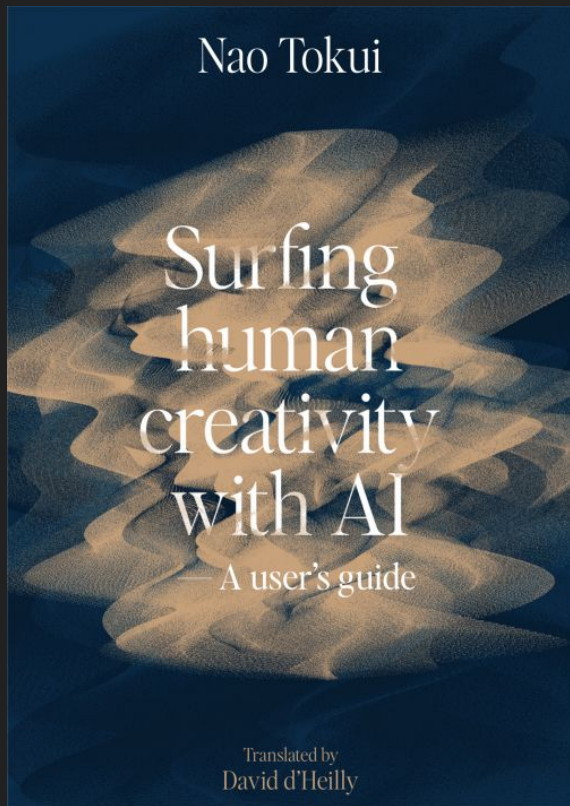
<https://youtu.be/wDP8FsjiyCaA?si=SA9i470Z7souDAcY>

# Voyager and Somax



<https://www.youtube.com/live/hyRiy7PL4dk>

# READING SUGGESTIONS



## Considerations on Creativity, Artificial Intelligence and Natural Intelligence

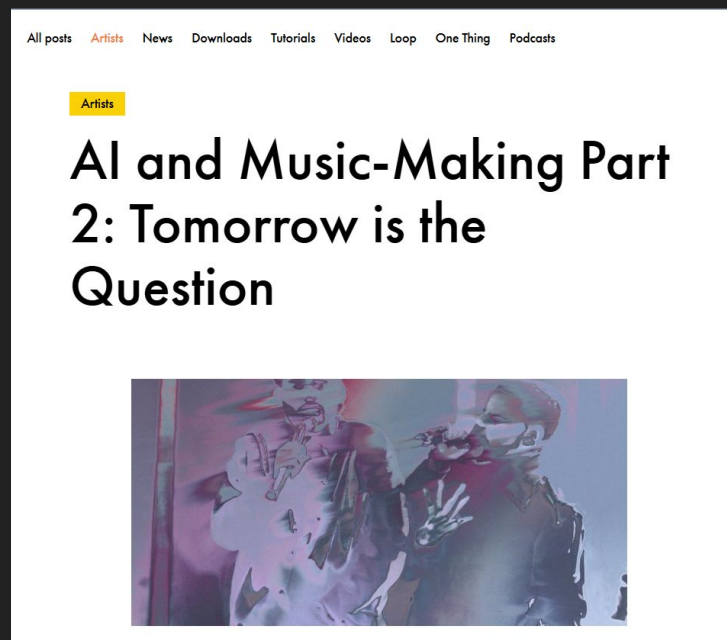
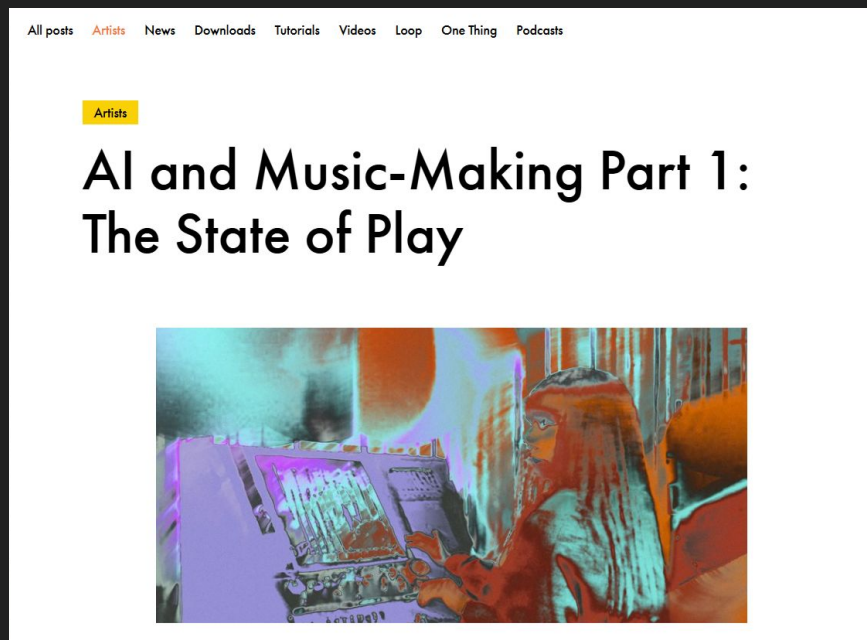
*by Nao Tokui: artist, DJ, AI technology researcher, and visiting associate professor at Keio University, Tokyo.*

English/Japanese

Free PDF

<https://qosmo.jp/en/publication/naotokui-book>

# READING SUGGESTIONS



Angus Finlayson <https://www.ableton.com/en/blog/ai-and-music-making-the-state-of-play/>