Apotome

KHYAM ALLAMI X COUNTERPOINT

Tuning is one of the most fundamental elements of music making. It is also the least taught, least understood, and most veiled. It is a harbourer of cultural identity and a key concept in the progressive development of music.

Although today's music-making technologies allow for incredibly complex renderings of tunings from all cultures, these capabilities are rarely implemented. What DAWs, synthesizers, audio effects, notation programs, or even AI and machine learning models have in common, is that they are almost all exclusively based on Western music theory and Western musical concepts.

The hegemonic use of equal temperament and grid-based expression of rhythm that most pieces of technology impose have cemented cultural asymmetries, which restrict the creative possibilities of music makers from non-Western musical traditions and scenes. Yet they are also testimony to the normalization that the diversity of musical traditions of the West has been subjected to in recent history.

There is no such thing as neutral technology. Cultural bias inscribed in technology mirrors the bias that runs through Western music theory, which to this day has not yet succeeded to address and dismantle its non-neutrality and the colonial framework that informed many of its canonical 19th century works.

A critical decolonial review of available technology hence remains incomplete, unless we also discuss the underrepresentation of non-Western musical systems and knowledge in professional music education, and start to fully embrace the reciprocal flow of influences and ideas across the globe.

The Apotome project, as a whole, is a call to critically address and dismantle these inherent cultural biases that are hard coded (and wired) into today's digital and electronic music-making tools.

Apotome is a transcultural browser-based generative music system focused on using microtonal tuning systems and their subsets (scales/modes). Alongside its sister application, Leimma, which allows intuitive and immediate browser-based exploration of tunings, it is the final part in a trilogy of music-making tools that artist and researcher Khyam Allami has been developing in recent years.

Resulting from Allami's current PhD research and his in-depth collaboration with Counterpoint, these applications represent decolonised tools that allow music-makers from any culture to have the freedom of a musical tabula rasa (blank slate) and explore their individual creative ideas with complete sonic freedom.

At Berlin's CTM Festival 2021, which took place virtually under the theme of »Transformation«, Khyam Allami and Counterpoint, launched Apotome in manifold presentations as a focus of the festival, many of which will remain potent far beyond the festival itself.

OPEN ACCESS APPLICATIONS

Apotome and Leimma are browser-based and non-commercial, accessible to anyone with internet and a web-browser via a URL:

https://isartum.net

USER-SUBMITTED GENERATIVE COMPOSITIONS & AUTONOMOUS AUDIO VISUAL LIVE 24/7 STREAM

Apotome can be used as a standalone music making environment, but to push the virtual realm of the festival into more connected output, a system was created whereby users could develop complex generative compositions and submit them into a "community pool".

Throughout the festival Apotome autonomously generated audiovisual material in a 24/7 Live stream, based on material by Allami and submitted by users. This live stream was accessible via the website, and also within CTM's virtual festival environment, Cyberia.

LIVE USER TAKEOVERS

In addition to the submitting compositions, anyone, world-wide, was also able to sign-up for a predetermined time slot and have the chance "perform" Apotome by manipulating its parameters, whilst the result is broadcast live via both within CTM Cyberia and through the dedicated website.

REPRESSED POSSIBILITIES: AN INTRODUCTION TO APOTOME BY KHYAM ALLAMI

To better present the complexities of this subject Allami prepared a 30min video essay about the extra-musical elements this project seeks to address which was streamed as part of the CTM 2021 programme.

https://www.youtube.com/watch?v=GzcWzblOiSs

PANEL DISCUSSION

To further elaborate on the extra-musical concepts, a panel discussion was held to discuss the impact of Western bias on music-making and music-learning: Dismantling Western Bias in Music Software and Music Education with Khyam Allami, Tero Parviainen, Matana Roberts and Deena Abdelwahed, moderated by Dahlia Borsch.

https://www.youtube.com/BZIunKUWiQw?t=180

COMMISSIONED ARTIST TAKEOVERS

Artist takeovers by Deena Abdelwahed, Slikback and Wahono were streamed as part of the CTM 2021 programme featuring new works created and performed in a single take using Apotome from their home studios in Toulouse, Kampala, and Jakarta respectively.

Artist Takeover 1: Wahono
https://www.youtube.com/1cWBLs7qZDo

Artist Takeover 2: Deena Abdelwahed
https://www.youtube.com/watch?v=PHHDprf2q2o

Artist Takeover 3: Slikback
https://www.youtube.com/watch?v=vy966kFAQmE

TRANS/LOCAL LIVE PERFORMANCE

A live-streamed performance of Apotome also took place during the festival, featuring Enyang Ha, Nene H, Tot Onyx, and Tyler Friedman on synthesisers, and Lucy Railton improvising on acoustic cello. This quintet of musicians controlled the sonic rendering of Apotome's generative output and reacted to it, whilst the generative composition was crafted in real time by Khyam Allami on-site in Berlin, and Faten Kanaan connecting remotely from her home studio in New York city.

Apotome LIVE by Faten Kanaan feat. Enyang Ha, Nene H, Tot Onyx, Tyler Friedman and Lucy Railton
https://www.youtube.com/watch?v=HLBKKs_iwB0

Apotome LIVE by Khyam Allami feat. Enyang Ha, Nene H, Tot Onyx, Tyler Friedman and Lucy Railton
https://www.youtube.com/watch?v=Zn8XHijHUm8

TUTORIAL VIDEOS AND USER GUIDE

Separate tutorial videos for Leimma and Apotome were made by Khyam Allami alongside a text based User Guide. The user guide includes contextual and educational information about tuning and the problematics this project interrogates.

Apotome & Leimma User Guide
https://smarturl.it/userguide-aptm-lmm

Leimma Tutorial Video
https://vimeo.com/503475532

Apotome Tutorial Video
https://vimeo.com/503451447

Leimma's design narrative follows the principle of dimensionality.

From zero dimensions (a point)...

1. You start with a point, which is your reference pitch

...to one (a line)

Tuning system

MIDI output: Internal synth (poly) ⌄

Import Scala File   Export Scala File

Switch tuning system

C4 ⌄   261.626   Hz

C4   C#4   D4   D#4   E4   F4   F#4   G4   G#4   A4   A#4   B4   C5

600 cents

1:1

2:1

0   cents / ratio   Add +

0 1 2   Octave-repeating tuning systems are based on the division of the octave into different pitches. Click the bar or type cents/ratio value to divide. Select a division to edit/delete. Hover to hear.   Next

Anonymous user   Sign in

2. You expand into a line, which your octave and your slicing of it - your tuning system.

...to two (a circle).


3. You wrap the line into a circle, revealing the octave-repeating nature of it.

Databases which include tunings from musical cultures worldwide almost never include any references to their sources nor any contextual information (see Scala scale archive of over 5000 tunings: http://www. huygens-fokker.org/scala/downloads.html#scales). This maintains the exoticisation and othering of these cultures, whilst often simply making their tunings inaccessible and incomprehensible.

By clearly displaying the sources and contextual descriptive information alongside the simple notions of a scale/mode's root notes, primary notes and secondary notes, Leimma presents the tunings and subsets in a manner that is quick and easy to understand whilst remaining respectful to the musical cultures the tuning systems come from. In addition, the Leimma tuning database is carefully curated and researched by Khyam Allami and will be constantly updated.

Apotome, on the other hand, focuses on using generative music to bring Leimma's database of tuning systems to life.
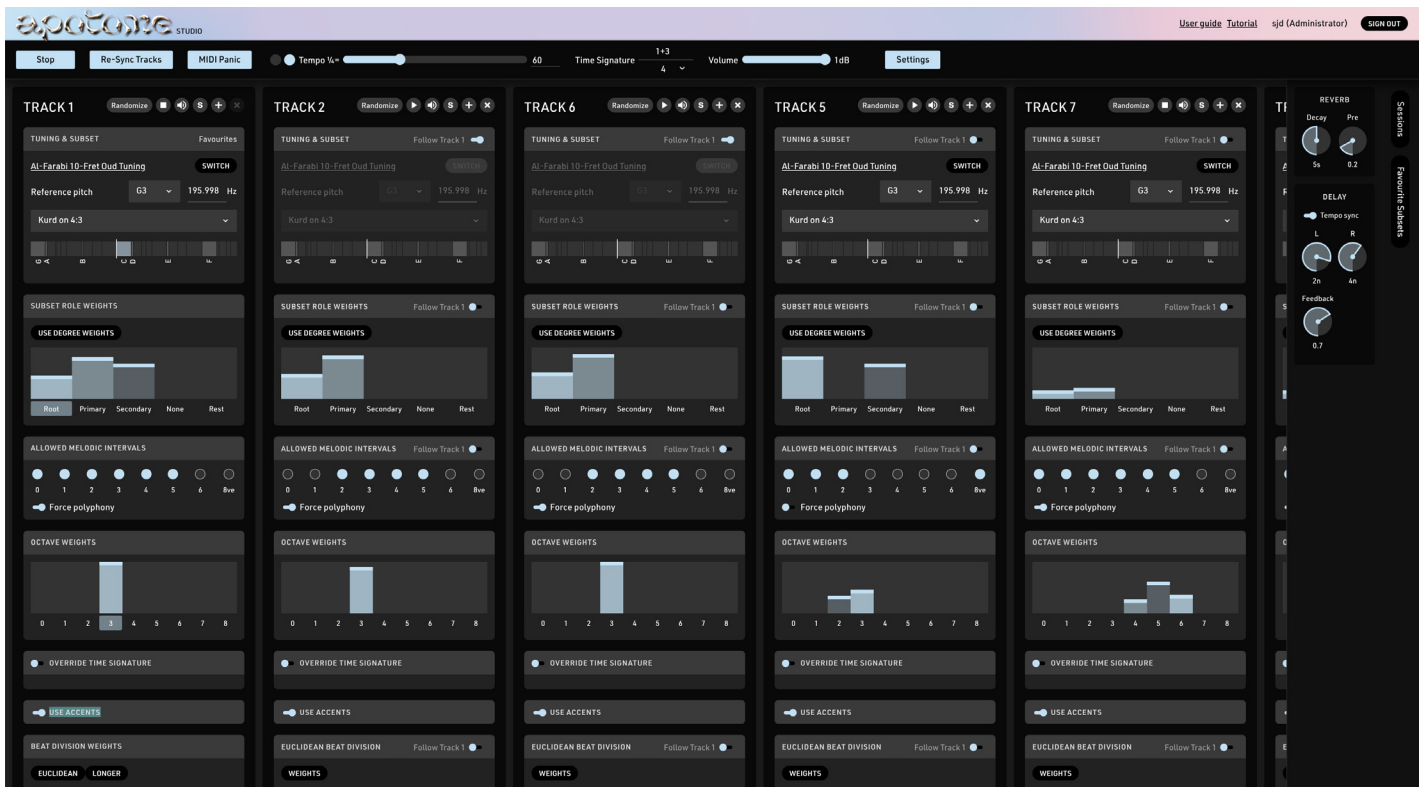
The Apotome user interface.

It is not only progressive in its usage of transcultural tunings, but also in that it is designed for exploration and experimentation, to help us "unlearn" and "untrain" our ears away from equal temperament and away from traditional rules of music making associated with different musical cultures.

At its heart, Apotome is a set of intricately weighted and interconnected probabilistic arpeggiators. You control the music by adjusting the various melodic and rhythmic weights and constraints, and then let the system play itself.
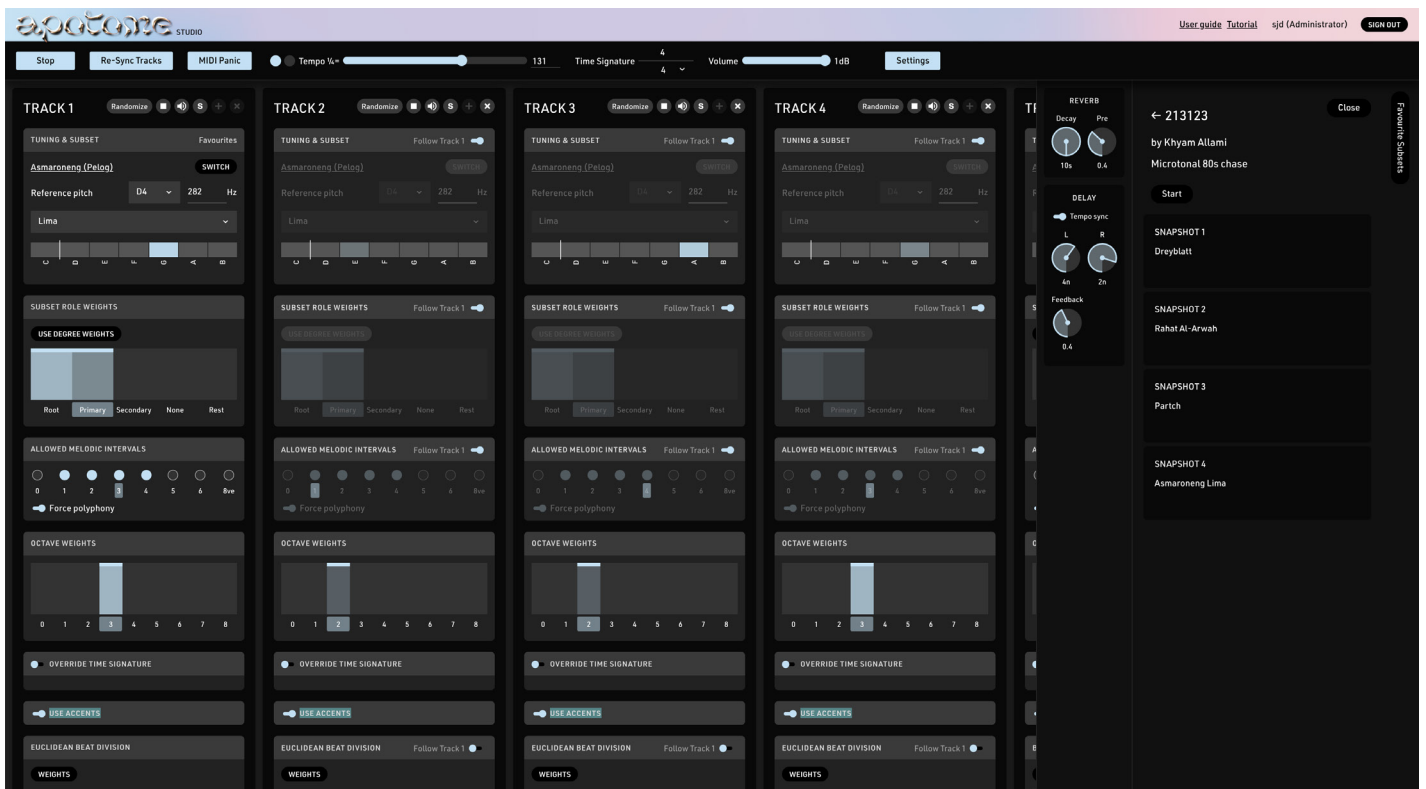
The Apotome session menu.

Large-scale compositions can be constructed by building "Snapshots" - sequences of different track & weighting combinations, themselves also controlled using probabilistic timing. This allows building a generative piece that develops over time.

As for sound production, Leimma provides a basic triangle wave Tone.js synth whose odd partials are useful for listening to tunings and a Karplus-Strong string synth AudioWorklet.

In Apotome, in addition to these there is an OBXD (Oberheim OB-X emulation), a DEXED (DX7 emulation), and a Yoshimi synth. Web Audio Modules allowed us to include all these synths - compiled into WebAssembly and running in AudioWorklets - and achieve far more timbral variety than there would have been resources to work on ourselves.

Allami uses Apotome and Leimma in conjunction with the new Ableton Live 11 for FACT: Against The Clock

Most importantly, in both Leimma and Apotome, the user can plug out to MIDI to play everything on their own software or hardware instruments.

Scala File export and most importantly MPE (MIDI Polyphonic Expression) support, allows users to utilise MPE capable software or hardware synths for detailed and highly manipulable sonics without any tuning problems or artefacts.

International press coverage

PITCHFORK

"Decolonizing Electronic Music Starts With Its Software"
by Tom Faber, February 25, 2021

https://pitchfork.com/thepitch/decolonizing-electronic-music-starts-with-its-software/

FACT MAGAZINE

"Against The Clock: Khyam Allami"
by FACT, March 2, 2021

https://www.factmag.com/2021/03/02/against-the-clock-khyam-allami/

THE WIRE

"Unleashing microtonality: an interview with Khyam Allami"
by Emily Bick, January 2021

https://www.thewire.co.uk/in-writing/interviews/unleashing-microtonality-an-interview-with-khyam-allami

CDM

"Escaping tuning's restrictive default setting – a conversation with Khyam Allami"
by Peter Kirn, March 8, 2021

https://cdm.link/2021/03/escaping-tunings-restrictive-default-setting-a-conversation-with-khyam-allami/

THE NATIONAL

"How composer Khyam Allami is tackling cultural bias by creating tools to make non-western music" by India Stoughton - January 26, 2021

https://www.thenationalnews.com/arts-culture/music/how-composer-khyam-allami-is-tackling-cultural-bias-by-creating-tools-to-make-non-western-music-1.1153134

Technical requirements for Apotome live presentation

LIVE PERFORMANCE
TECHNICAL REQUIREMENTS

4-6 Musicians: Khyam Allami, Tyler Friedman, Tot Onyx (all performing with synthesisers) and Lucy Railton (Cello) would be the core group, with Nene H and Enyang Ha as additional synthesiser performers if possible. See supporting video material for extract from CTM live performance featuring all six musicians.

- Fully tuned full range PA System
- Fully tuned stereo monitoring for each performer (4-6 performers = 8-12 monitors)
- 4 x Stereo DI
- 4 x 2m by 1m tables
- Large diaphragm condenser microphone with short boom stand for Cellist
- Piano Stool for Cellist
- Music stand with lights for Cellist

All above named musicians are based in Berlin and would need performance fees, travel, accommodation and per diems covered.

INSTALLATION
TECHNICAL REQUIREMENTS

Dependent on the installation location and curatorial desires.

One example could be a long-form 8-channel installation which would need:

- 8 x Genelec monitors or similar
- 2 x Genelec subwoofers
- Up to date iMac or similar with Chrome and Ableton Live
- RME Fireface 8 Channel output sound card

Plus the presence of Khyam Allami and collaborator Tyler Friedman to set-up the installation and develop the musical material.

It is also possible to conceive an audio-visual installation using generative visuals, which would require its own technical considerations.

All above named musicians are based in Berlin and would need performance fees, travel, accommodation and per diems covered.