Linux Audio Conference
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Linux Audio Conference 2015

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The Sound of People

Single-nucleotide polymorphisms (SNPs) are molecular DNA markers, that are actively being researched in general science all over the world right now. Companies like 23andMe (and others) offer sequencing parts of their customers genome (and afterwards sends that collection of data to them). To free these sets of data for use in open science, openSNP started its work on collecting, indexing and making available their users' uploads.
The Sound of People was one of the first attempts of synthesizing sounds from them. To achieve this, all 25 chromosomes are listed by length and put into groups, which will define their octave later on. The longer the chromosome, the lower the used octave.
The notes A2 (110Hz), C2 (65.4Hz), G2 (98Hz) and D2 (73.42) have been mapped to the nucleotides **A**denine, **T**hymine, **C**ytosine & **G**uanine of the longest chromosome. For all following gradations the sounds are chosen from the eight octaves above these fundamentals. Base pairs with two different nucleotides are made audible by synthesizing the sound of the mean frequency distance between those two sounds.

$$f_{basepair} = \frac{f_{base1} + f_{base2}}{2} \tag{1}$$

Base pairs with two identical nucleotides have their sound generated from the single base.
Because of the extreme amount of data, that is being processed and generated sound from and the average auditory capabilities of a human, the total play time per data set is rendered to be two hours long (time-stretched). This is also a hardware limit for some audio interfaces. As all chromosomes are played in parallel, a multi-channel setup seemed to be the most plausible solution from the start, for better detection and spatialisation of the different auditory events.

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The Sound of People was written in the SuperCollider audio synthesis language and has been developed with the help of the Electronic Studio of TU Berlin. The software creates a unique audio experience for up to twelve speakers.
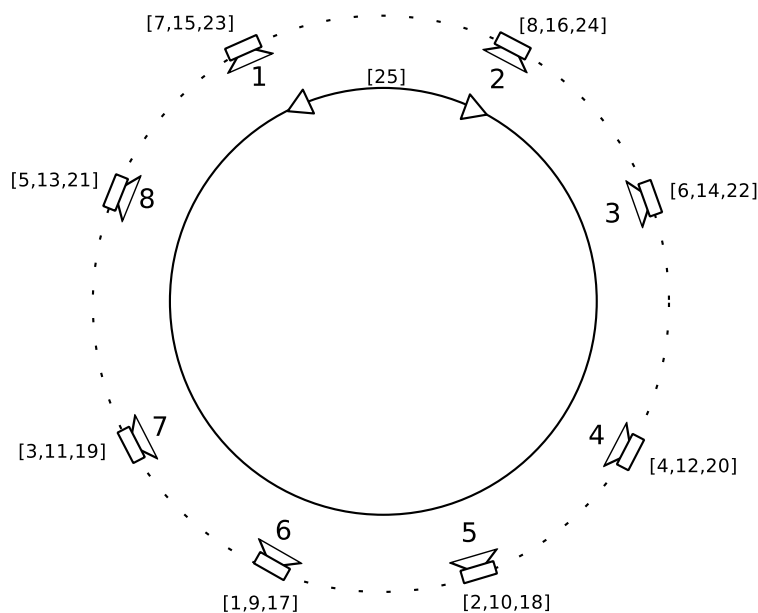

Figure 1: Example allocation of chromosome sounds on an eight-channel setup (chromosome numberings in square brackets)

The example in Figure 1 shows an eight channel setup, which can easily be extended to up to twelve speakers. The X (23) and Y (24) chromosomes are always fixed on being front left and front right respectively, while the MT chromosome is distributed randomly in a circular movement across all speakers. This is done for better auditory display.
Sound examples and remixes (only stereo) can be found on Soundcloud. All source code is hosted on Github.
Although the code base so far is mostly set out to be a pure script based experience, a first GUI element has been introduced last year to facilitate a rudimentary display of the chromosome sound distribution over the speaker setup.

I would be honored to receive the possibility of installing **The Sound of People** at **Linux Audio Conference 2015**.

Yours Sincerely,
David Runge

The Sound Of People
Technical requirements

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Audio

Speakers	Active (minimum frequency response: 50Hz-20kHz): Available setups include stereo and 4, 6, 8, or 12 speakers in a circular installation
Setup	For best sound dispersion, speakers should be aligned around a circle with a radius of more than 5m (if possible) for a multi-channel setup.
Cables	Balanced 6,3mm Jack -> XLR (Audio interface -> Speaker) if possible, for the planned amount of speakers

Power supply

Computer	For the computer and audio interface two standard 220V power supplies (Schuko sockets) are needed

Location

Computer and audio interface	Positioning of computer and audio interface should take place outside of the the speaker circle (if possible). For this a table is needed (minimum: 1m x 1m surface)

David Runge
Live music performances, installations, recordings, production

Age: 29
dave@sleepmap.de
Mobile: +491781436915

Formation

November 1985	Born in Diepholz, Lower Saxony
May 2005	Abitur at the Graf-Friedrich-Schule - Diepholz, Germany
2006 − 2011	Media Informatics B.Sc. at Hochschule Bremen (Autovisual: Automatic Visuals for Live Performers – *"A Max For Live device designed to create automatic visuals with Ableton Live"*)
2011 − now	Audio Communication and Technology M.Sc. at Technical University of Berlin

Work

2010 − 2013	Web development freelancing for various agencies
2012 − now	Linux systems administrator at Technical University of Berlin

Programming

Scripting	Java, Javascript, Python, PHP, SQL, some C & C++ , Ruby, Bash
Audio (Synthesis)	SuperCollider, PureData, Ardour

Performative Music

2005 − now	Das Bluul (experimental/drone/noise/ambient)
2007 − now	Mêlon Kallisti (prog/70s/metal)
2011 − now	Drafted To Haunt (folk/singer-songwriter)
2012 − now	13\/1532 (experimental/drone/noise)
2013 − now	Wasserturm (lofi/indie/electronic)

Installative

Waldeck Freakquenz (2012 & 2013)	The Sound of People (six channel installation, synthesizing sounds from the human genome)
Manu's Place, New Delhi (2013)	The Sound of People (six channel installation, synthesizing sounds from the human genome)
UDK Berlin, 3DMIN (2014)	No place like /dev/random? (stereo installation, synthesizing sounds from a random number generator made with an Americium 241 sample)
Bendend Realities (2014)	The Sound of People (six channel installation, synthesizing sounds from the human genome)

Biography

From an early age on, I have been interested in creating sounds apart from mainstream media. The first vessel allowing me to channel my interests, is my longterm project Das Bluul. Creating sounds from feedback manipulation of several guitar and bass amplifiers, the path was set for high amplitude music creations in years to come.
Shifting through many genres in between (i.e. as singer for progressive/metal band Mêlon Kallisti), I found another passion in code, throughout my Bachelor studies. During that time I got in touch with common synthesis softwares and audio work stations like Max/MSP & Jitter and Ableton Live. For the first time I realized the complicated interplay of my field of study and my artistic work with licensing industries. I sought a radical change in the way and what tools I work with. From my thesis on I decided to only use free software, a path I have followed ever since.

Further work with different synthesis softwares like SuperCollider and PureData, led to first installation experiences with multi-channel systems (The Sound of People) and a deeper dive into open development structures. Especially latter pushed its working environment and its recipients to their respective limits (concerning length and resources).

Very impressed by minimalism over the past years, I realized some of its premises and attributes had subconsciously already leaked into my way of working with and perceiving music before I started studying about it.

By the beginning of my Master studies a new music project (1)3\/1532) emerged. More concentrating on self-made (modular) devices and sound environments, than ever before. Apart from its extreme and sometimes violently noisy nature, this project stems from the same explorative roots, as my installation work: The desire to create sound from (seemingly) random processes or systems.

Linux Audio Conference 2015 Performances

Agreement to Conditions of Participation

I make the following art work available to the Linux Audio Conference (LAC 2015) organization team, to be presented during the Linux Audio Conference at the Johannes Gutenberg University (JGU), Institute of Art History and Musicology (IKM), Mainz, Germany, 9-12 April 2015.

Title of work: *The Sound Of People*

Duration: *2:00h*

Name of composer: *David Runge*

Full address: *Köpenicker Straße 163, 10997 Berlin*

Email address: *dave@sleepmap.de*

I am registered with a royalties society:

☑ no

☐ yes (please specify):

I agree that my composition may be streamed once or several times in compressed format on the internet, either during the performance, or afterwards, or both:

☑ yes

☐ no

I hereby state that the sound and/or video material I play or present at the conference is entirely my own work and does not infringe any copyrights. In no case shall the Johannes Gutenberg University (JGU) or the Institute of Art History and Musicology (IKM) be responsible for copyright infringement as a result of (dis)playing or performing my work. I am aware that any materials I send to JGU/IKM for the submission process will not be returned. I am aware that I will receive no fee from JGU/IKM whether my work is performed, streamed, or not, and that JGU/IKM cannot organize or pay for travel or accommodation of me or of any needed performers. I accept that JGU/IKM is not liable for damage or loss of any materials, which I provide for the presentation of my work during the conference. I also recognize that the jury's decision is final, and waive my rights to legal action regarding the jury's decision. I accept the terms and conditions presented in this form.

Date: *07.02.2015*

Signature: *Runge*