

**WAVES**VIENNA  
Music Festival & Conference



SAT.1.OCT. 2016  
[WWW.WAVESVIENNA.COM](http://WWW.WAVESVIENNA.COM)



## **WAVES VIENNA MUSIC HACKDAY**

Kick-Off & Tool Presentations  
Fri, 30 Sep 2016, 18:00 - 20:30

# 2nd Waves Vienna Music Hackday

Successful start last year

Crossover between music & technology

People with many different backgrounds:

*Hobby producer*

*Digital creatives*

*Hardware tinkerer*

*Coder*

*Artists*

*Researcher*

*Musicians*

*Audio geek*

*IT specialists*



# Music Hacking?

*music apps*

*software*

*audience interaction  
platforms*

*new instruments*

*sound installations*

*wearables*

*hardware*

***Anything goes, as long as it is related to music!***



# Tool Presentations

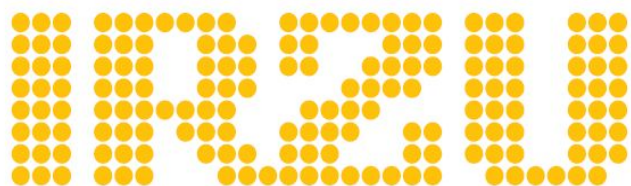
- Ultrasonic Audio Technologies
- MOD Devices: Step onto the future with MOD Duo
- IRCAM: Sound Music Movement Interaction
- Musimap's human and AI based music recommendation API
- Plux: BITalino – A DiY biosignals (r)evolution
- A Tour of Deezer Developer Tools
- Europeana Sounds: Identifying genres in musical heritage
- GiantSteps: Music Analysis and Composition APIs
- MusicBricks tools
- **Announcement of Challenges and Awards**

**U L T R A S O N I C**  
**A U D I O T E C H N O L O G I E S**

**By:**  
**Miha**  
**Ciglar**

Creating directional sound and contact free tactile feedback  
through airborne ultrasound

2008



INŠTITUT ZA      INSTITUTE FOR  
RAZISKOVANJE      SONIC ARTS  
ZVOČNIH UMETNOSTI      RESEARCH

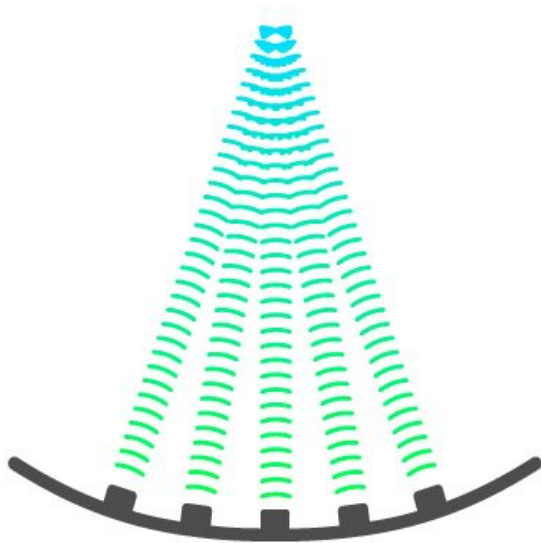
**Syntact - contact-free tactile feedback:**



The musician feels the frequencies and the temporal features of music and can change them in real time by virtually moulding the tactile signal



Syntact is a musical interface – It allows direct physical interaction with music



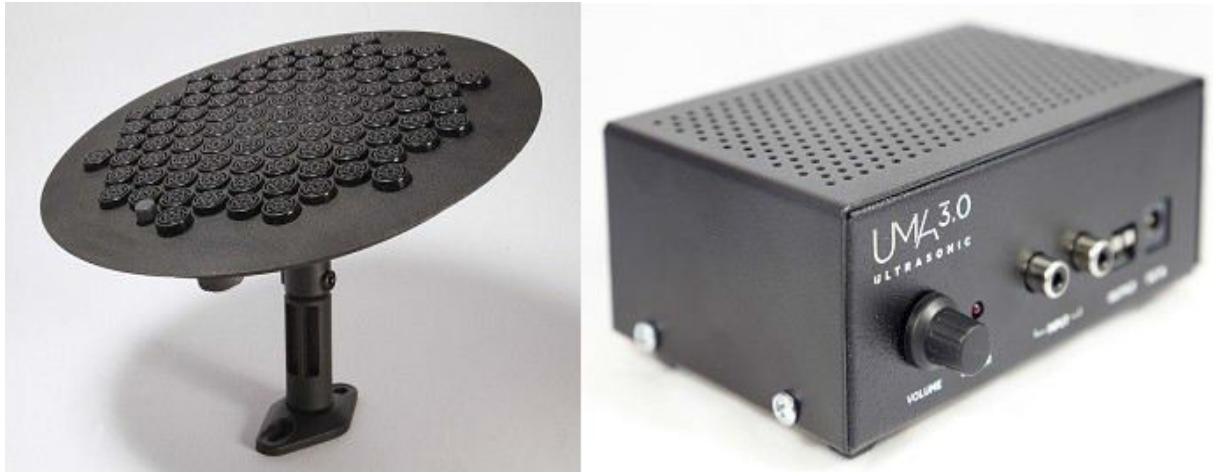
The acoustic energy off all the transducers is accumulated in the focal point where it creates a physical force (a tangible vibration)

**Syntact - contact-free tactile feedback:**



Visualization of the ultrasonic waves and the focal point with liquid nitrogen

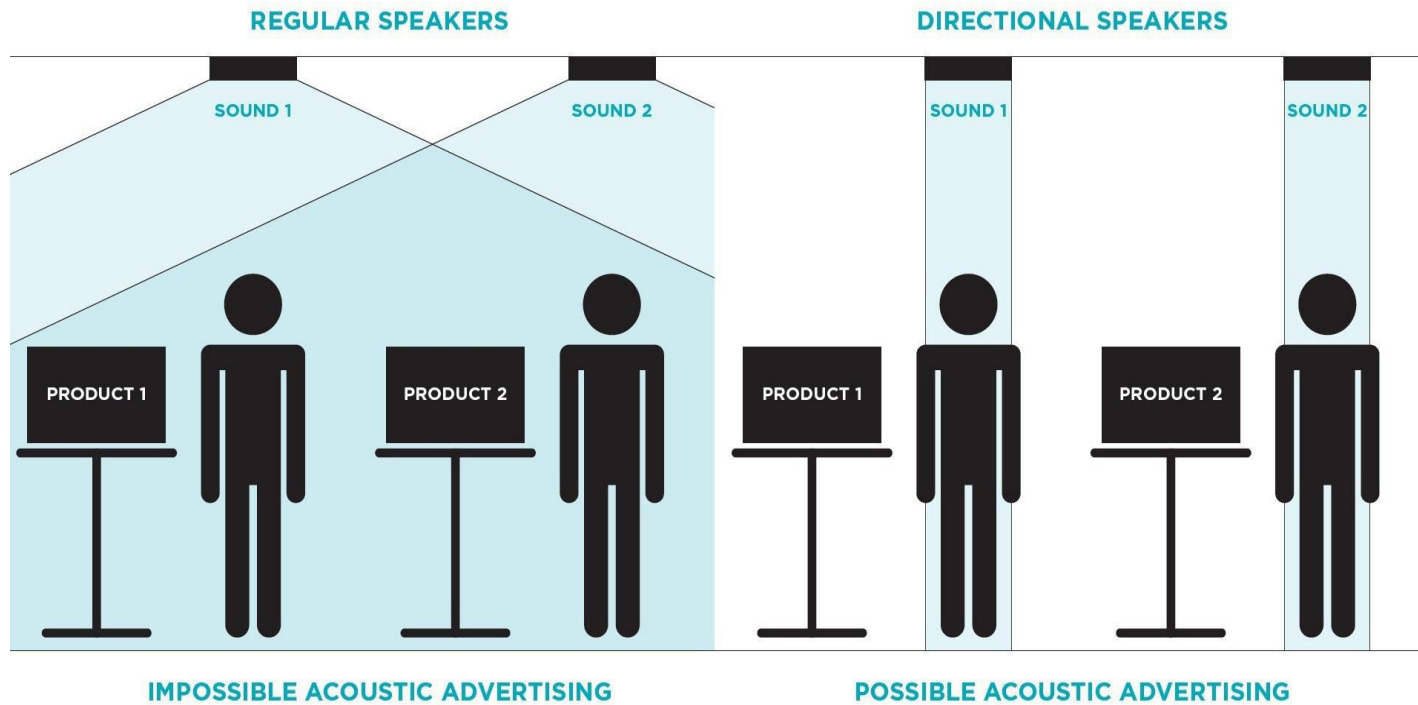
**Acouspade – speaker with focus (2012)**



**Hyper-directional sound is created by modulating a high frequency carrier. Due to nonlinear interaction of sound waves in air, the modulated ultrasonic signal gets self demodulated and becomes audible while passing through air.**

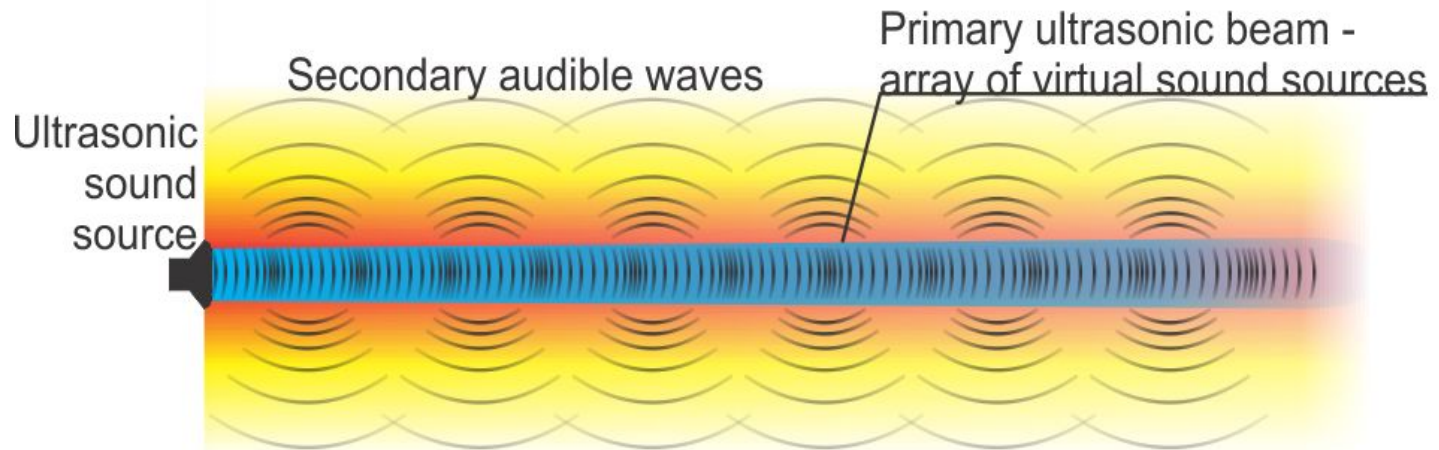
**Applications:** in-store advertising, museums, galleries

## RETAIL STORE



## Operation principle

The term Parametric Acoustic Array (PAA) was introduced by P. J. Westervelt in 1963

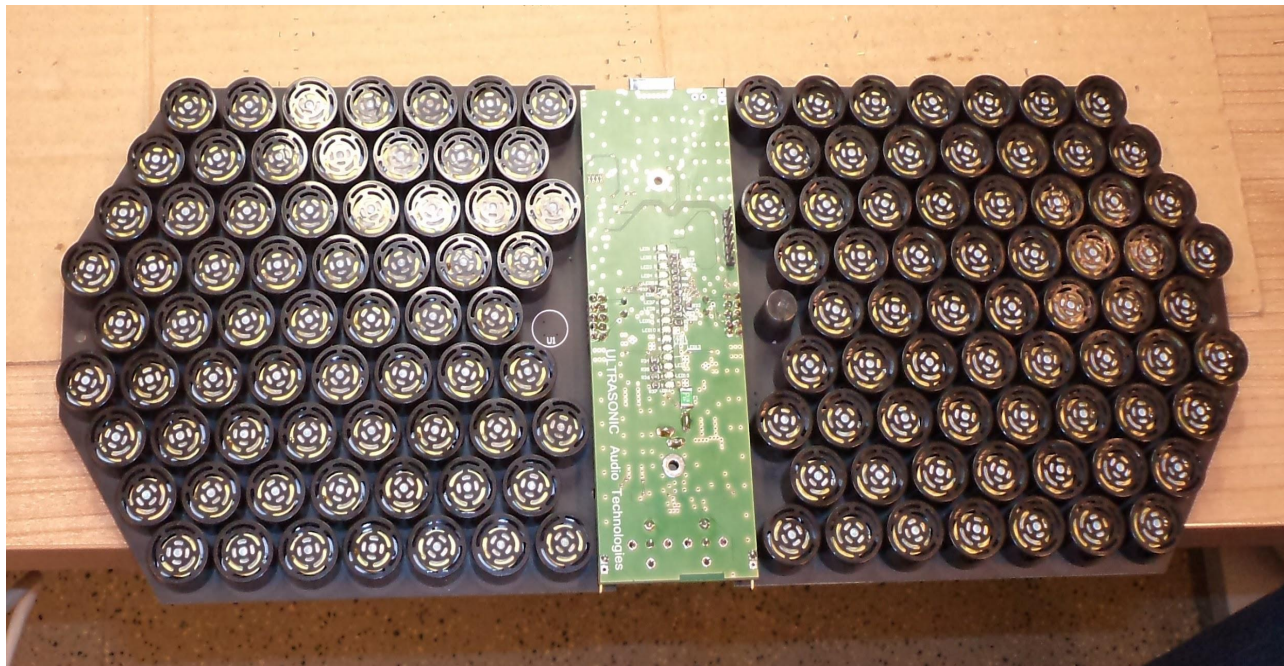


**Acouspade 134AB(S)DUMA-M/S**



- Miniaturised amplifier integrated within the emitter housing
- Bluetooth connection
- Motion detection

Acouspade AB(S)-134-DUMA-M/S



guts

**Acouspade AB(S)-134-DUMA-M/S**



-Launch: 1<sup>st</sup> March 2016

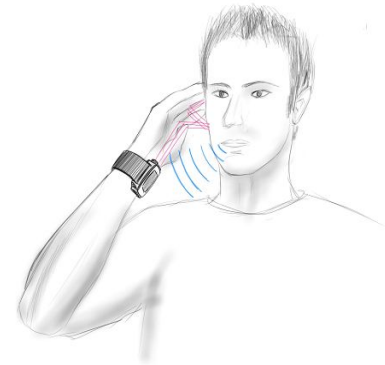


## **TaPa** (Talking Palm)



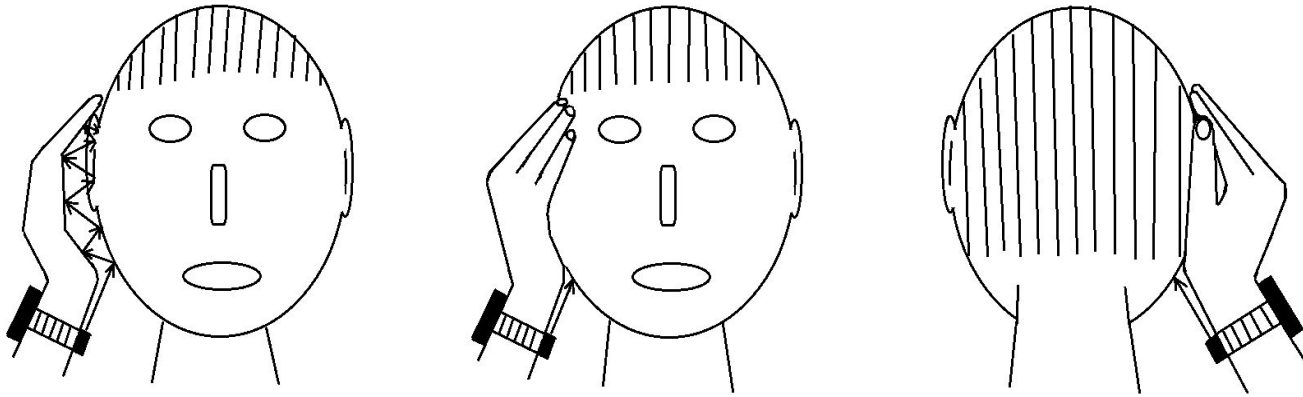
TaPa is - a bracelet containing a directional speaker. The bracelet is a substitute for the mobile phone. A hyper-directional speaker is mounted below the wrist, facing the palm. When you put your hand close to your ear, the sound bounces off the palm and is directed into your ear.

**TaPa**



-When you want to make a call, just rotate the bracelet around your wrist and lean you palm next to your ear

## TaPa



- A hyper-directional speaker is mounted below the wrist, facing the palm
- The sound enters a cavity formed between the face and the palm, where it is additionally amplified through acoustic resonances
- The sound does not spread into the environment which preserves silence for others and creates privacy for you



**Thank you!**





{SOUND MUSIC MOVEMENT} INTERACTION

Joseph Larralde  
Gabriel Meseguer Brocal

<http://ismm.ircam.fr/>

## RapidMix :

- Rapid Adaptive Prototyping for Industrial Design of Multimodal Interactive eXpressive technology
- wrap together technologies from Europe's research institutions in an API that will ease the use of bio / gesture sensors with machine-learning, MIR and audio synthesis algorithms for multimodal, interactive, expressive applications

<http://rapidmix.goldsmithsdigital.com/>



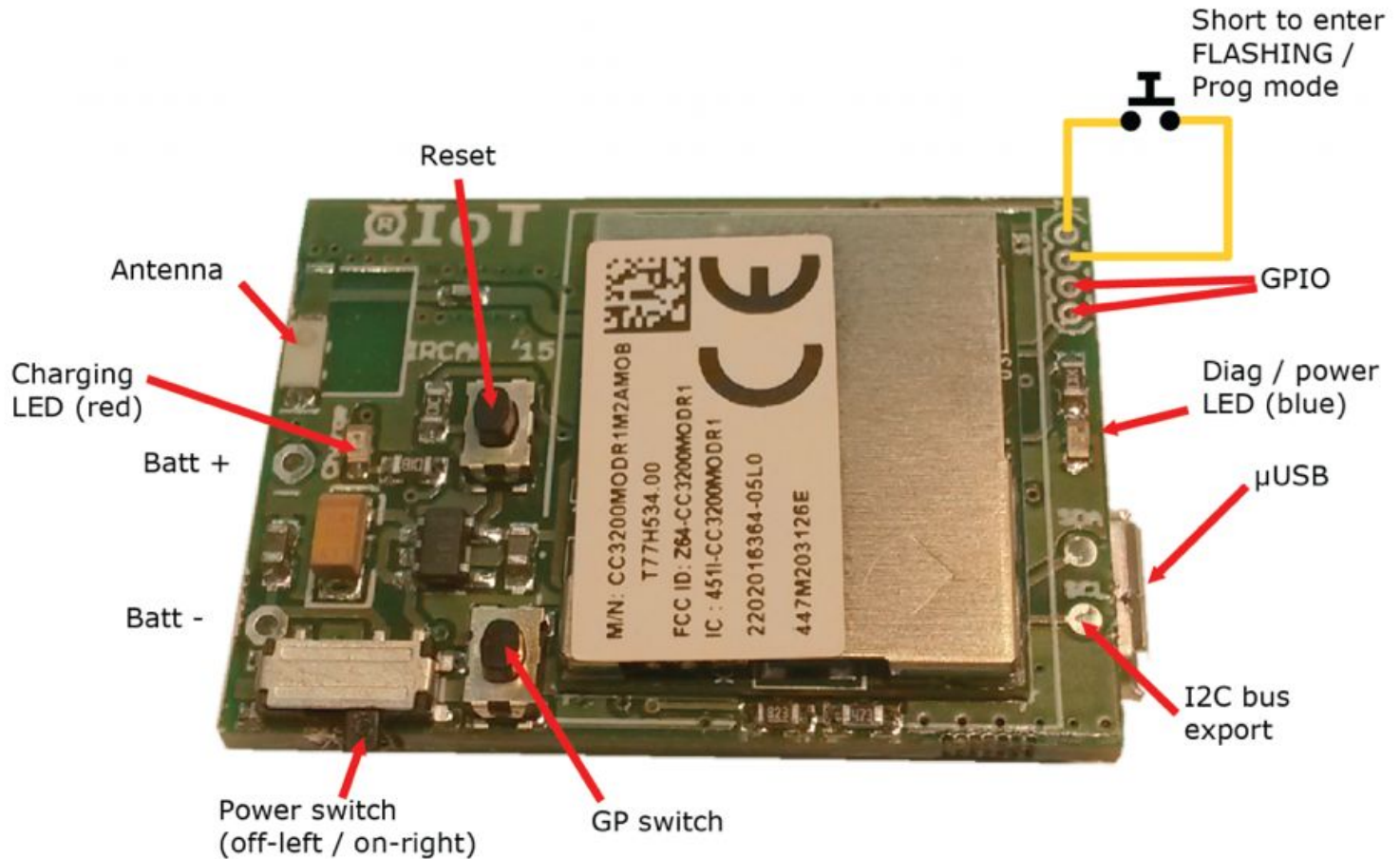
## Provided tools :

- R-IoT sensor  
Programmable 9 axis sensor board (IMU) sending OSC data over WiFi
- MuBu (MIR / audio synthesis library for Max)  
multi-buffer container with associated tools for gesture and sound analysis / synthesis
- XMM (machine learning library for gesture recognition)  
C++ library provided as MuBu objects / Python module / Node.js addon



# R-IoT WiFi Motion Sensor

9 axis- sensor with 3D accelerometers, gyroscopes and magnetometers



# R-IoT WiFi Motion Sensor

OSC Wifi Stream at 200 ms

- 3 accelerometers
- 3 gyroscopes
- 3 magnetometers
- Quaternions and Euler Angles

Based on Texas Instrument WiFi module with a 32 bit Cortex ARM processor

Compatible with TI's Code Composer and with Energia, a port of the Arduino environment



# Sensor Analysis

MaxMSP patches to facilitate the R-IoT modules

- Visualization and filtering
- Kick detection
- “Energy” computation

## *Playing Techniques*

- Freefall
- Shaking
- Spinning

Gesture Recognition available in the free MuBu library (Max7)





# Music & Emotions

Waves Vienna Music HackDay  
Vienna, 01/10/2016

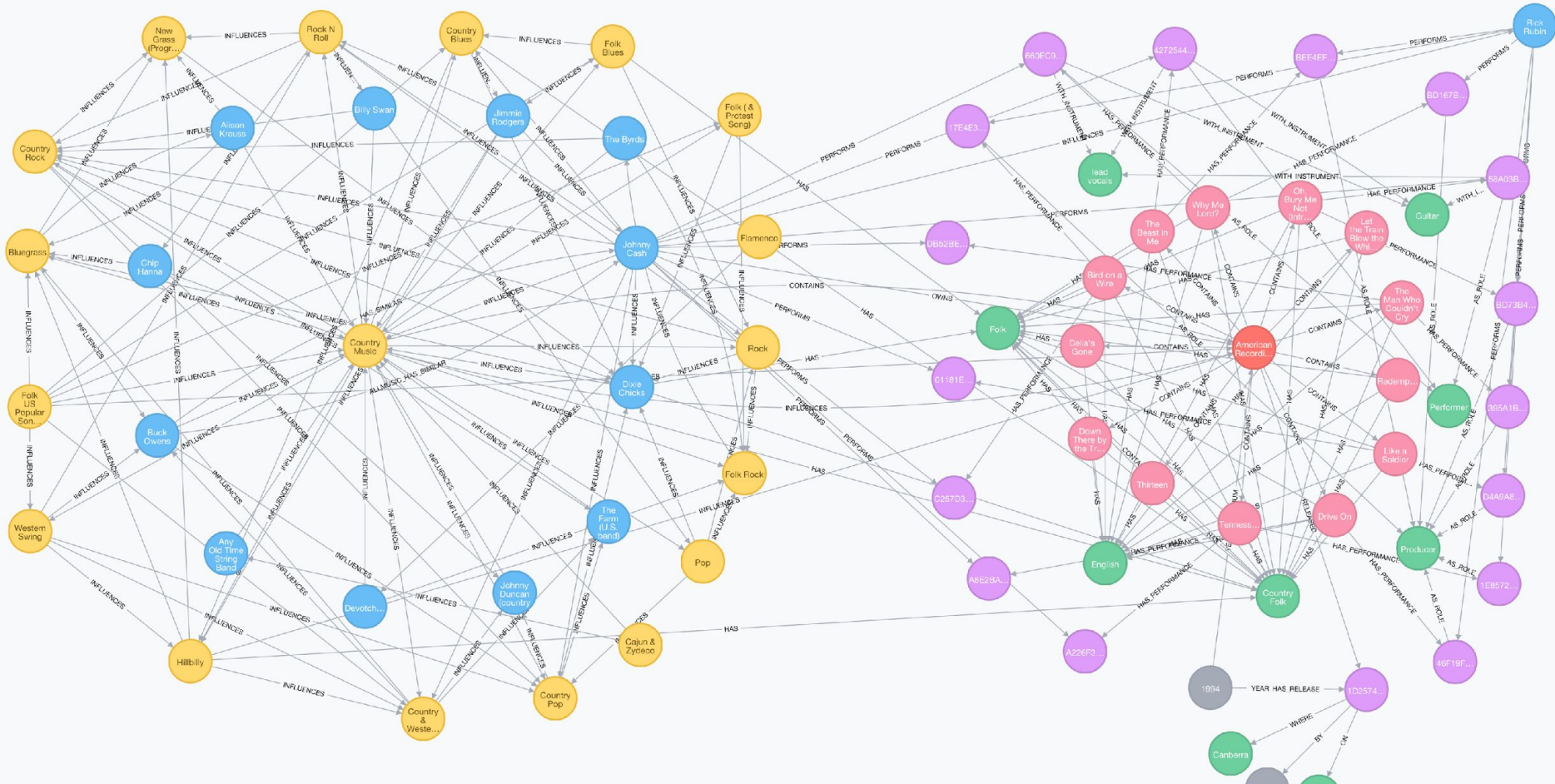
-

Frédéric Notet  
CTO

# The Project

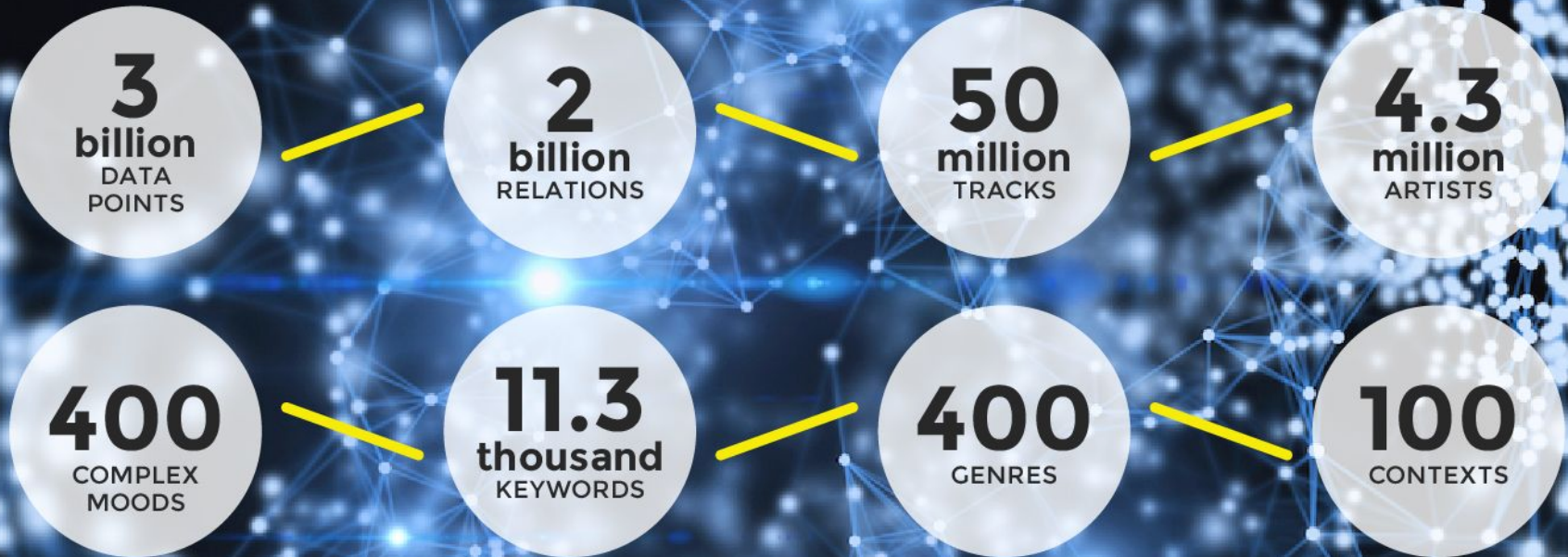


“No musician can compose Music forgetting his influences. All is connected”

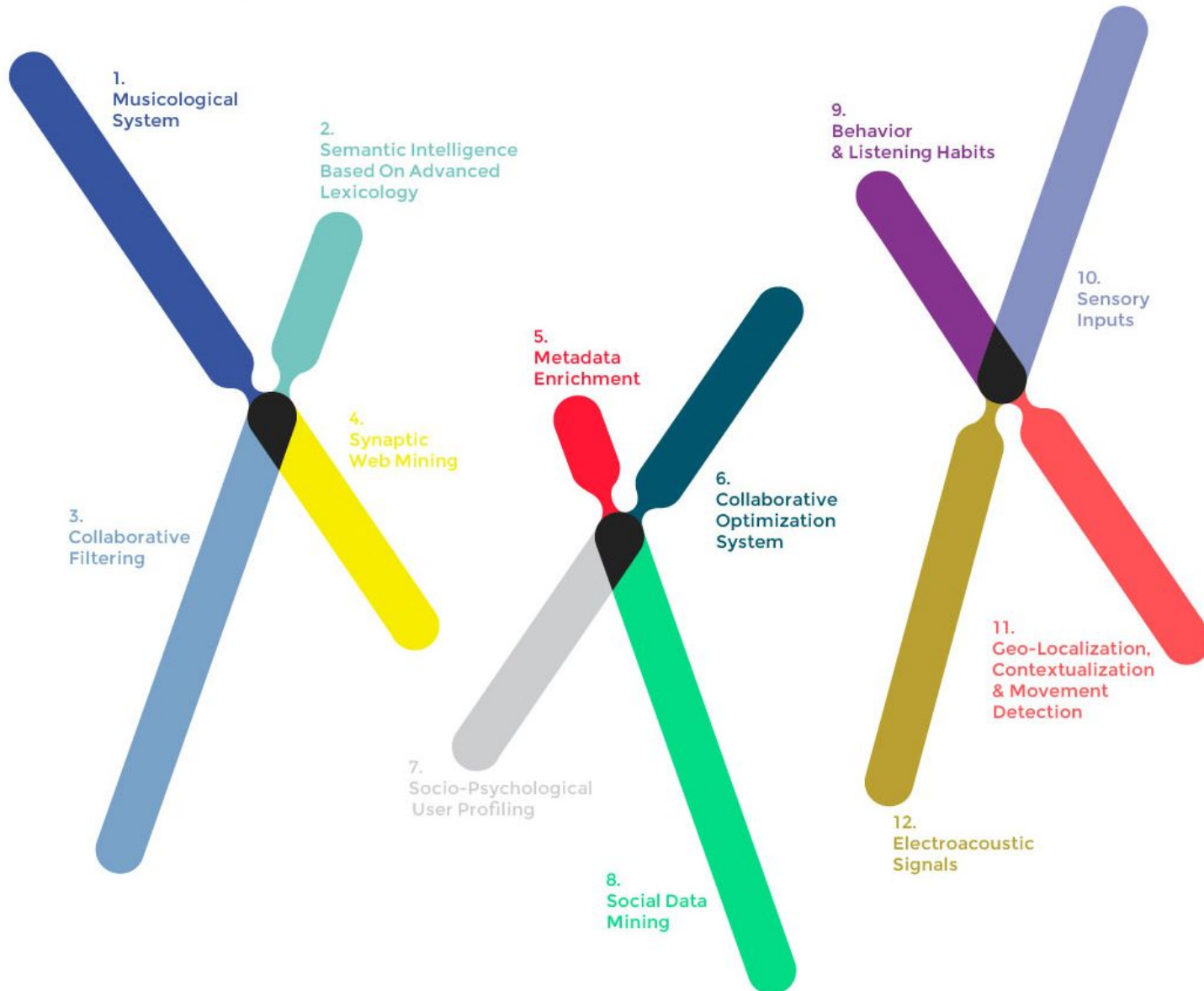


# THE ALGORITHM - Cross-weighted taxonomy

---



# Music DNA





# TECHNOLOGY – Rocket science!



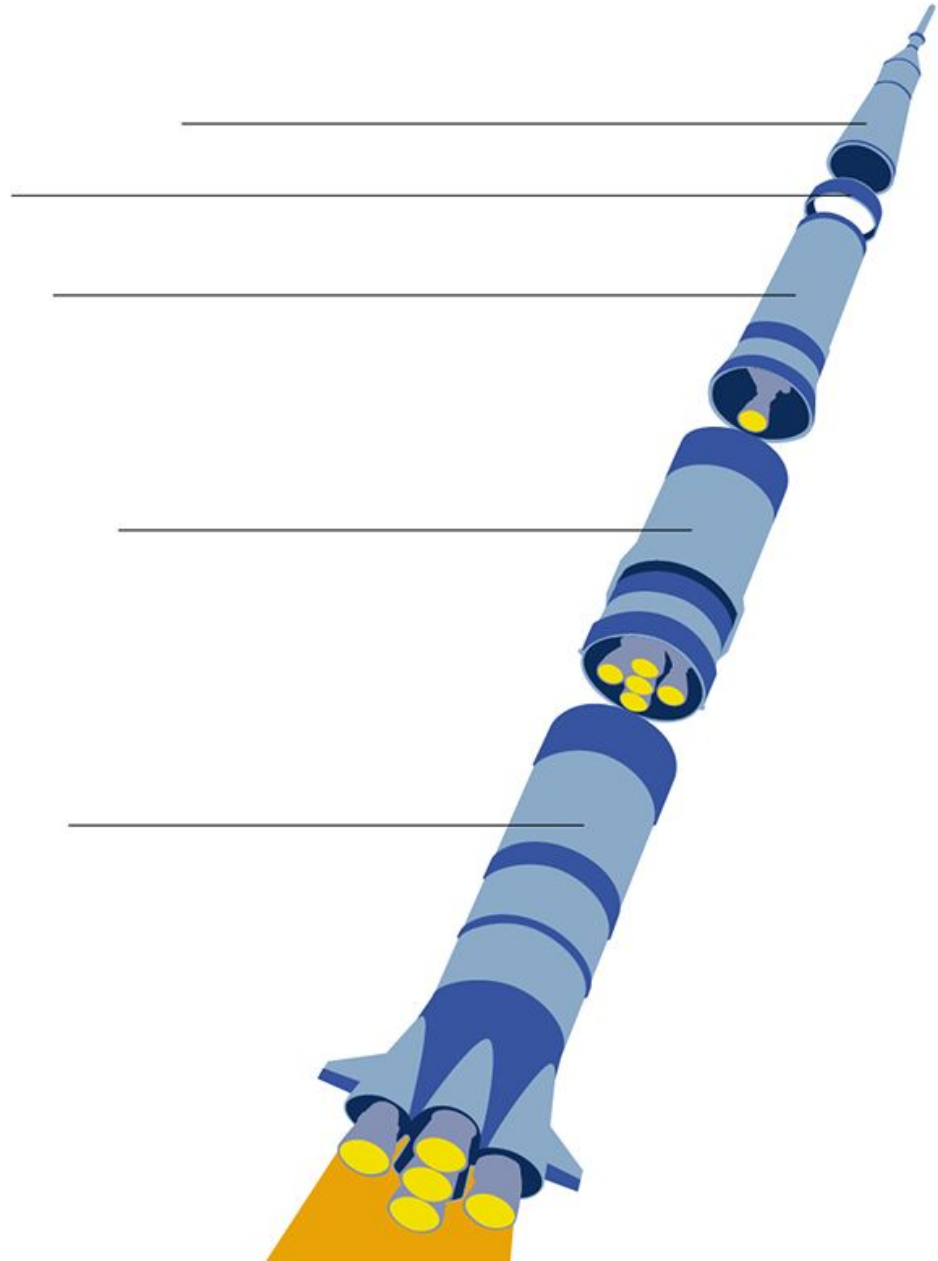
COLLABORATIVE FILTERING

DEEP LEARNING

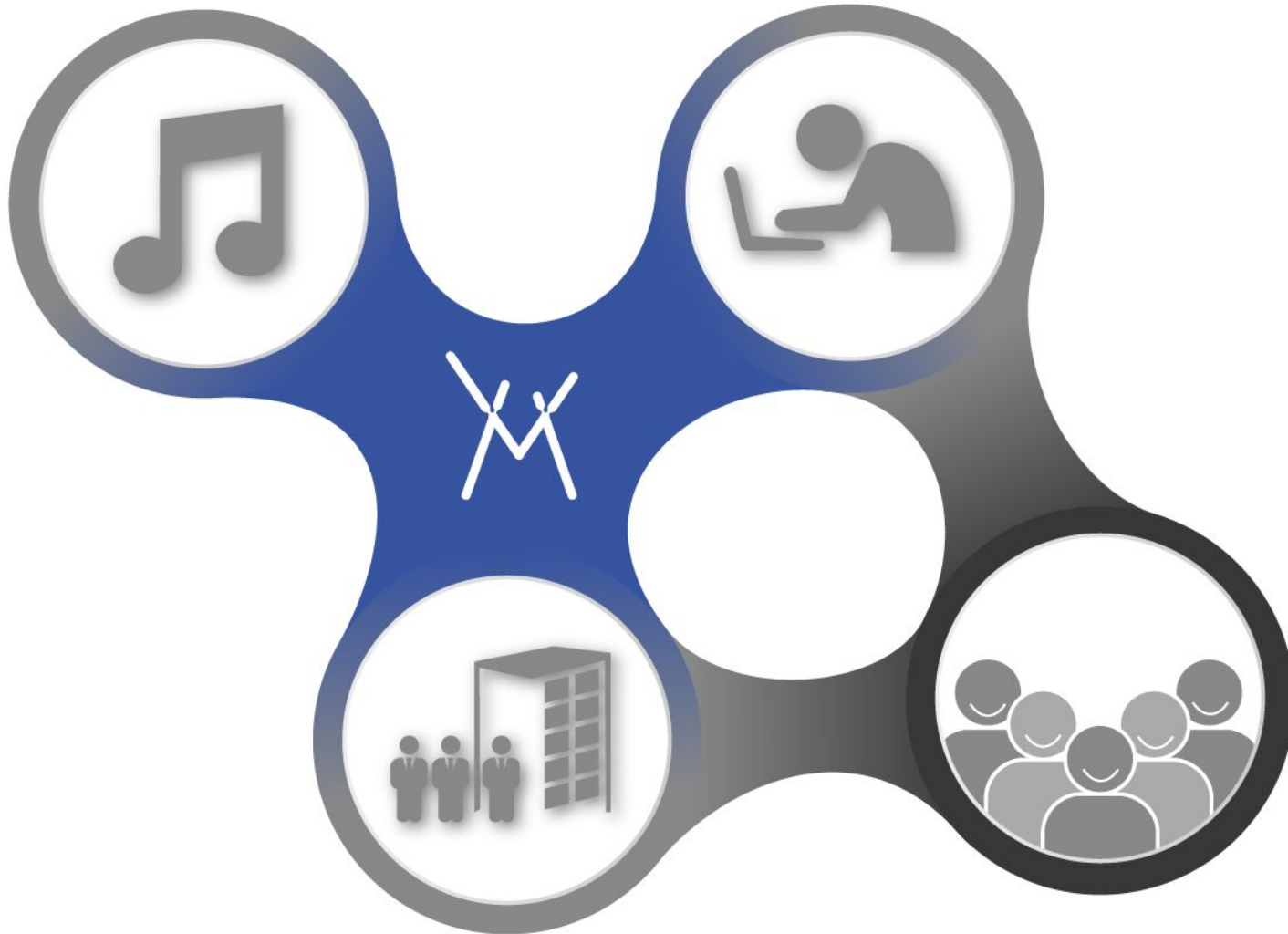
SIGNAL ANALYSIS

SOCIAL AGGREGATION

HUMAN EXPERTISE



# ALGORITHM + DATABASE – Matrix for innovative interfaces



# Our HTTP based API



## Client created !

You have successfully created a new client.

- Name : Waves Vienna Music HackDay - 10/2016
- Client id : jhuom07mp4pr95vf
- Client secret : t09c0gg3906mcfrrwxlkkms6bxv361ymu

Please keep those informations. A mail has been sent.

- Access metadata for millions of Artists, Albums or Tracks
- Access recommendation for Tracks
- Access audio analyzer for Audio Files
- Access special catalog of “Waves Vienna Festival” Artists
- Access special catalog of “Barack Obama Profile”

→ [HTTPS://DEVELOPERS.MUSIMAP.NET](https://developers.musimap.net)

# A JSON formatted API



```
curl "https://api.musimap.net/search/v1/tracks?access_token=jgcWP3LzRcGZ7Mn844vz6Kf7mnRc2eHlvUhkX"
```

```
{
  "status": "success",
  "code": 200,
  "stats": {
    "total": 11731,
    "offset": 0,
    "limit": 1
  },
  "tracks": [
    {
      "uid": "FB803E56-EC9A-9E21-3AEA-6665A270A904",
      "name": "La Valse d'Am\u00e9lie",
      "score": 98.19,
      "album": {
        "uid": "74ADAF2F-0CC4-B448-7942-76E190CEFF0F",
        "name": "Le Fabuleux Destin d'Am\u00e9lie Poulain",
        "year": "200104"
      },
      "genre": {
        "uid": "07C7436A-EF77-6207-0036-A35FEB5D8CB1",
        "name": "Soundtrack And Movie Theme",
        "bgcolor": "bed6dc"
      },
      "owners": [
        {
          "uid": "F8028ECC-4DAE-57F6-B403-E993520BAEE8",
          "nickname": "Yann Tiersen"
        }
      ],
      "references": {
        "deezer": "14406851",
        "spotify": 0,
        "clip": "https://www.youtube.com/watch?v=yYGpQSAf0Ac"
      }
    }
  ]
}
```

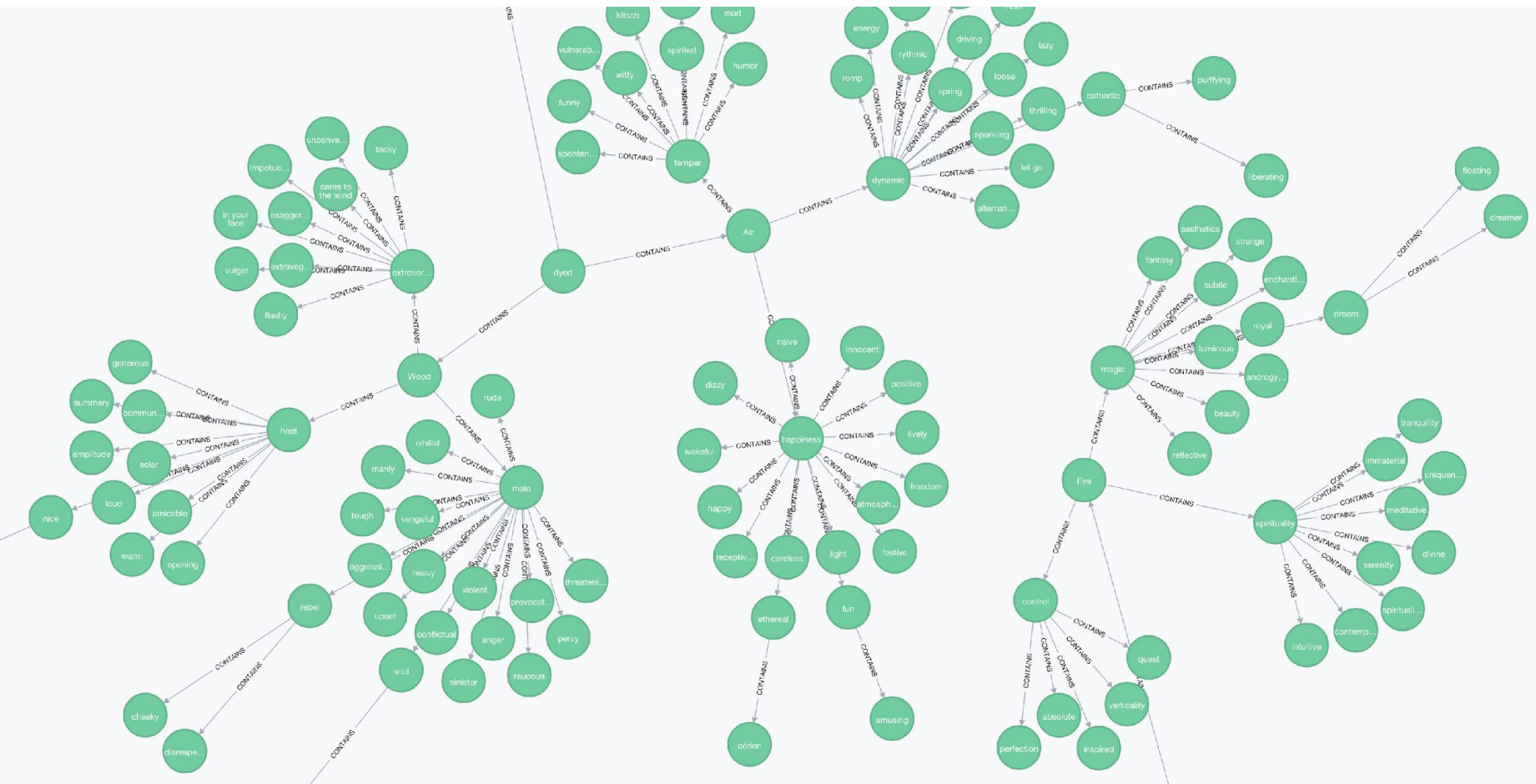
The screenshot shows the Postman interface with a GET request to `https://api.musimap.net`. The response is displayed in JSON format, showing the API's metadata and a list of routes.

```
1 {
2   "title": "Musimap API",
3   "version": "3.0",
4   "description": "Use this API to search and retrieve musical information from Musimap databases",
5   "website": "https://developers.musimap.net",
6   "routes": [
7     {
8       "name": "/",
9       "method": "GET"
10    },
11    {
12      "name": "/status",
13      "method": "GET"
14    },
15    {
16      "name": "/recommendation/{trackId}",
17      "method": "GET",
18      "require": {
19        "trackId": "[a-zA-Z0-9]{8}-[a-zA-Z0-9]{4}-[a-zA-Z0-9]{4}-[a-zA-Z0-9]{4}-[a-zA-Z0-9]{12}"
20      },
21      "documentation": "/recommendation/{trackId}?syntax"
22    },
23    {
24      "name": "/suggest",
25      "method": "GET",
26      "documentation": "/suggest?syntax"
27    },
28    {
29      "name": "/match",
30      "method": "GET",
31      "documentation": "/match?syntax"
32    }
33  ]
34 }
```

# A moods network to humanize results



Moods are in a hierarchy, describing each human feeling



# Moods Analyzer – Expertise your audio files



## Audio Analysis

[Back home](#)

feeling-good.mp3

3.38 MB September 25, 2018 12:58

0:00

## Musical Analysis

<b>Duration :</b>	176 seconds
Duration is the number of seconds that lasts the file.	
<b>Key :</b>	D minor
Key is the main key signature related to its mode (minor or major).	
<b>BPM :</b>	0
BPM is the "Beats per minute" average.	

## Meta Data

<b>Title :</b>	Feeling Good
<b>Album :</b>	Compact Jazz: Nina Simone
<b>Artist :</b>	nina simone
<b>Genre :</b>	Jazz
<b>Index :</b>	2
<b>Year :</b>	1991
<b>Duration :</b>	02:56
<b>File Size :</b>	3.38 MB
<b>Type :</b>	mp3
<b>Bite Rate :</b>	160000

## Complex Analysis

<b>Melody Flavour :</b>	0
Melody's Flavour is...	
<b>Melody Instrument :</b>	0
Melody's Instrument is...	
<b>Bass Flavour :</b>	0
Bass Flavour is...	
<b>Bass Instrument :</b>	0
Bass Instrument is...	
<b>Intensity :</b>	-1
Intensity is...	
<b>Centroid :</b>	0.6971652507782
Centroid is...	
<b>Danceability :</b>	0.98660409450531
Danceability is...	
<b>Derivative :</b>	0.036295101046562
Derivative is...	
<b>General Loudness :</b>	1636.8115234375
General Loudness is...	
<b>Complexity :</b>	7.3340210914612
Complexity is...	
<b>Complexity Loudness :</b>	-22.223861694336
Complexity's Loudness is...	

## Mood Analysis

- Chaotic
- Dynamic
- Wood
- Heat
- Ground
- Playfulness
- Roots
- Coldness



<https://www.musimap.com>

<https://developers.musimap.net>

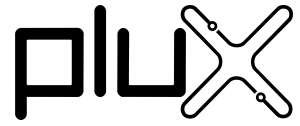
@Musimap / @frednotet

**Frédéric Notet**

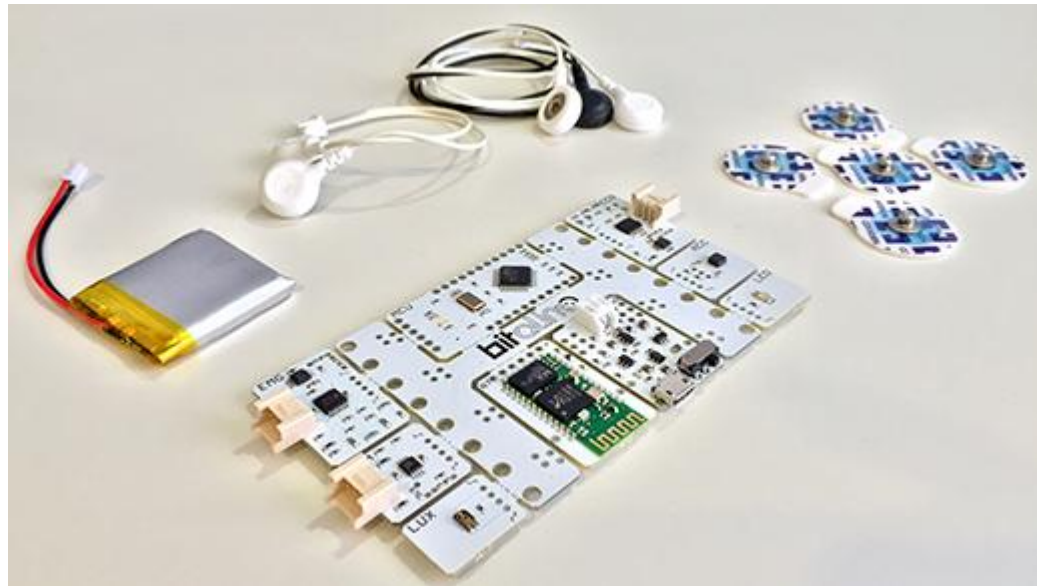
---

frederic@musimap.com  
www.musimap.com





# bitolino





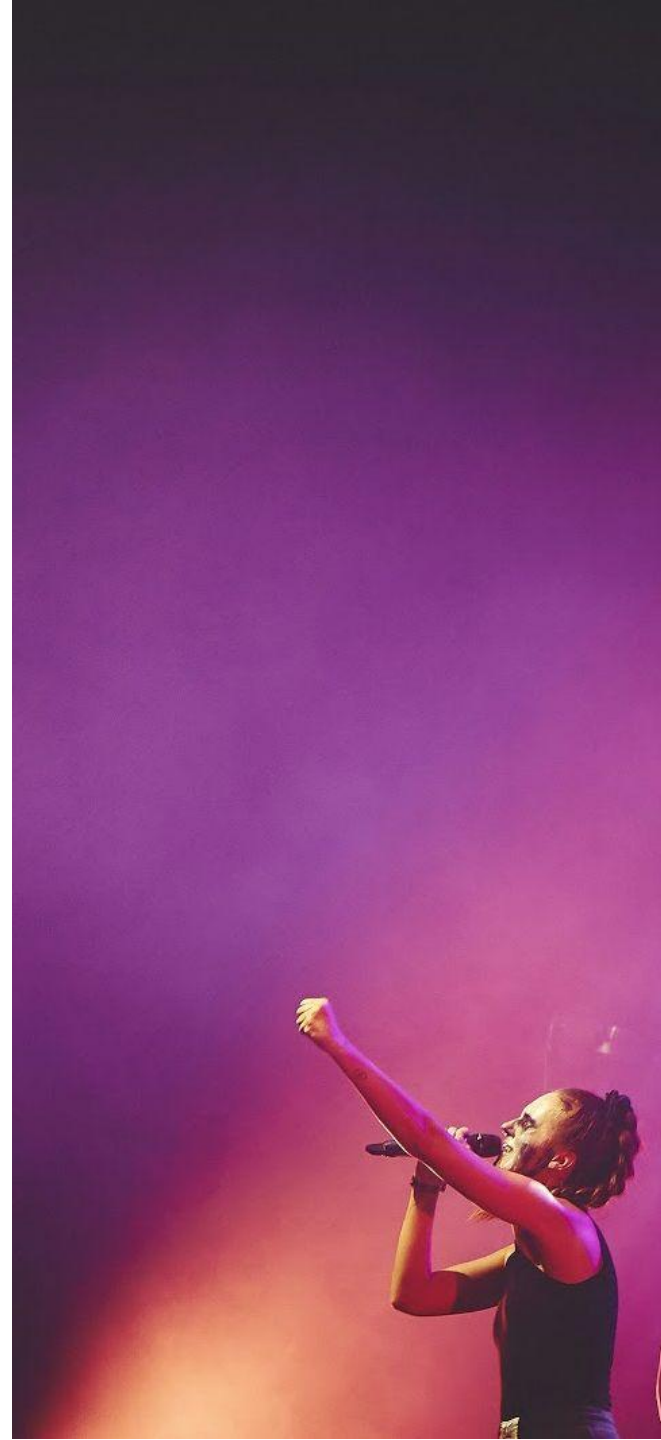


# Open Deezer

The gateway to music innovation

## Table of contents

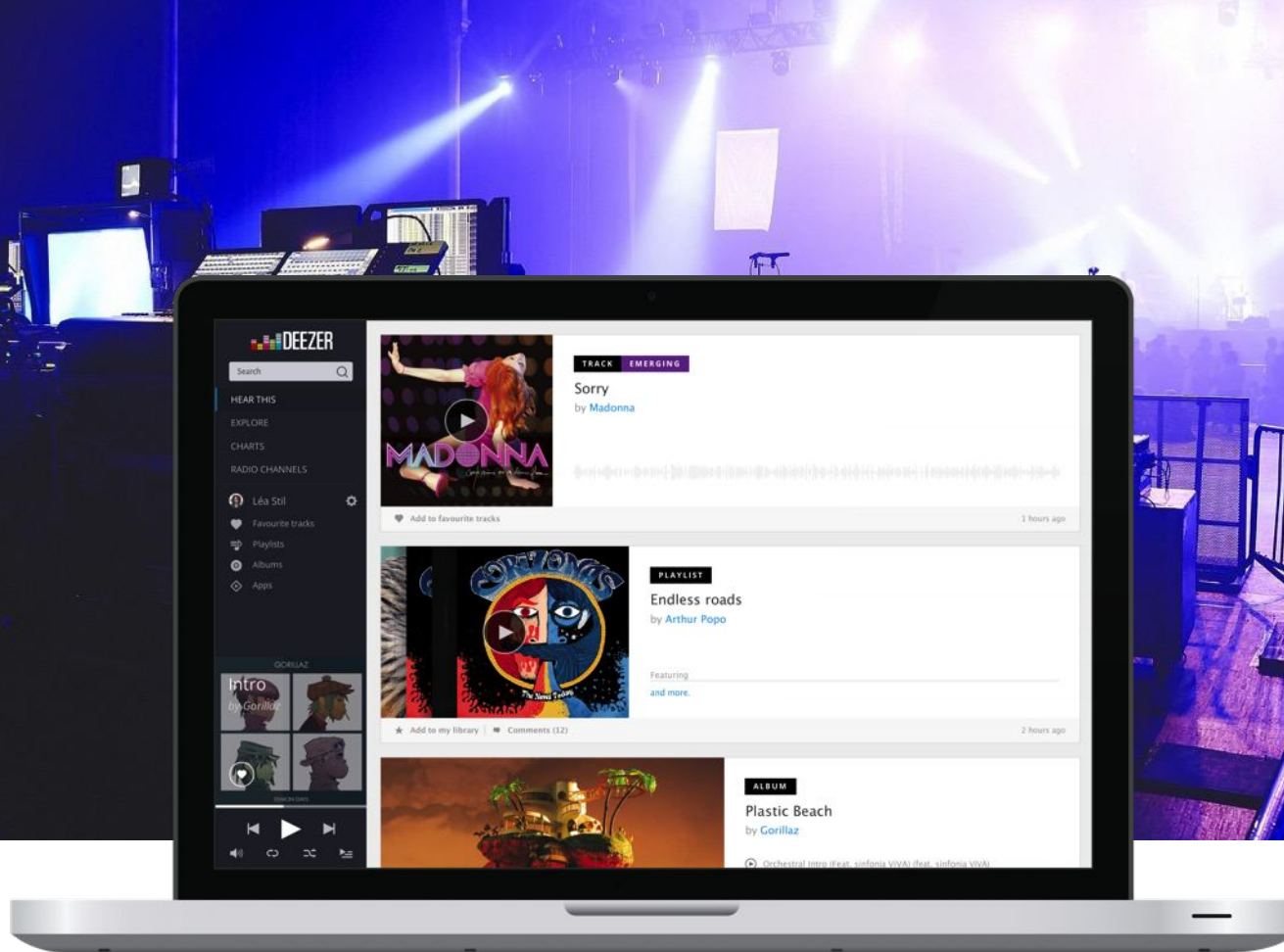
- /01** Deezer
- /02** Presentation of the API
- /03** Leverage the API
- /04** Showcase



A young man and woman are sitting in the back of a car. The woman is wearing a light blue hoodie and white earbuds, smiling and looking down. The man is leaning over her shoulder, looking at her with a smile. The car's interior is visible, including the ceiling and windows. The scene is brightly lit, suggesting daytime.

/01

Global Presentation



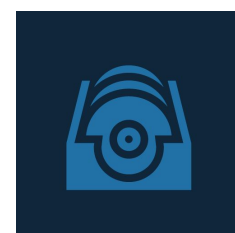
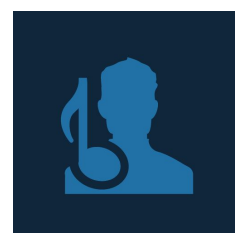
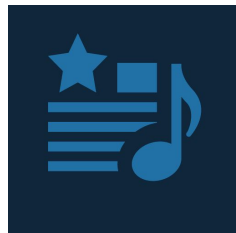
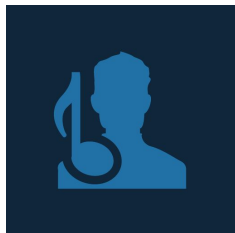
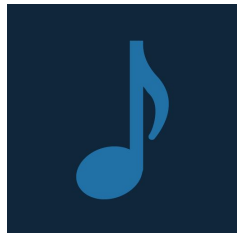
40M Tracks

16M MAU

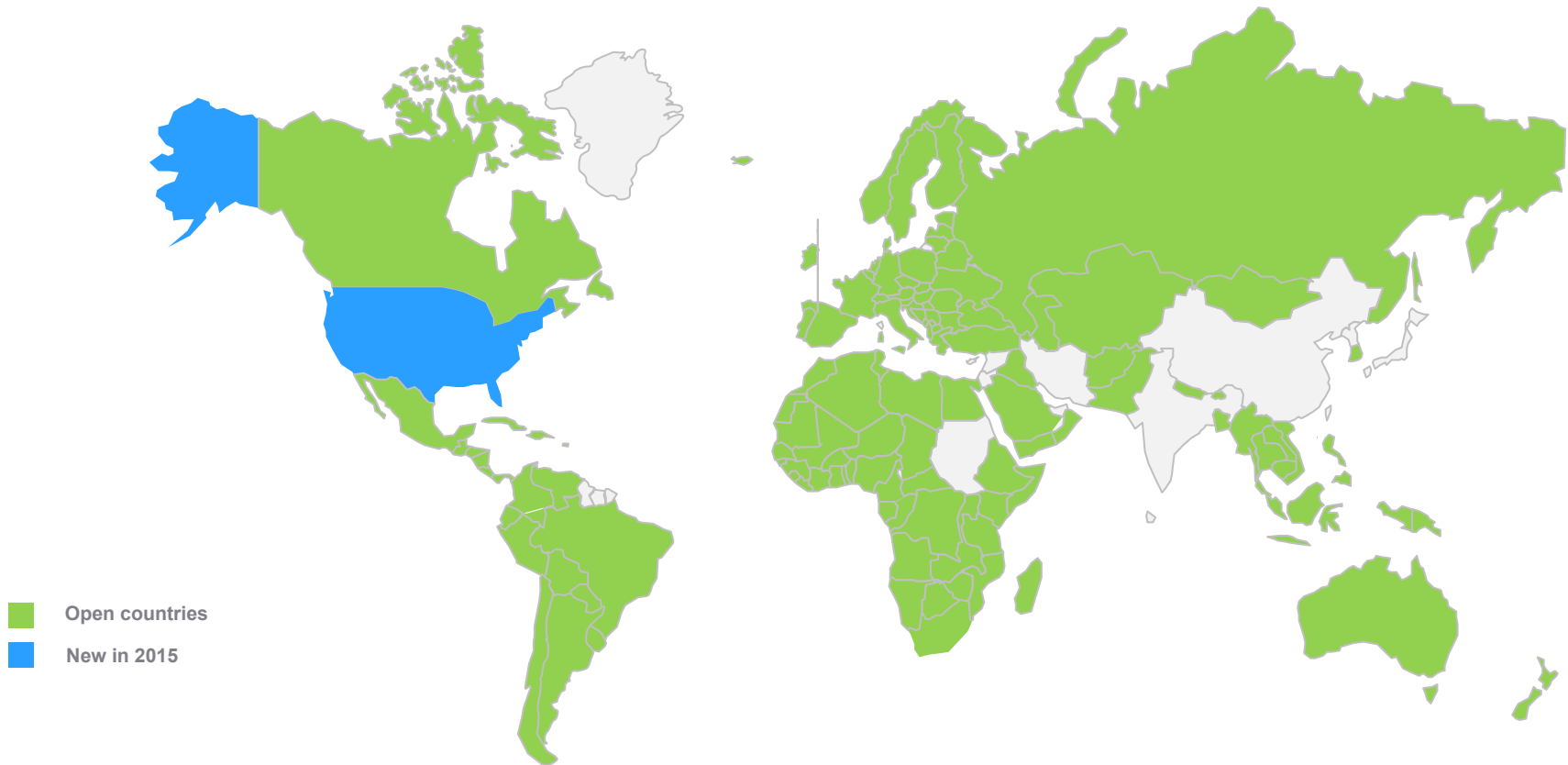
100M Playlists

Editorial

Recommendations



# Available in 180+ countries



A man and a young child are sitting on a couch in a living room, smiling and playing music together. The man is holding a blue and white tennis racket, and the child is holding a wooden spoon. A laptop is open on the couch in front of them. The scene is lit with warm, soft light, and the overall tone is joyful and family-oriented.

# /02

Accessing the content through our API

# Content management

Artists

Albums

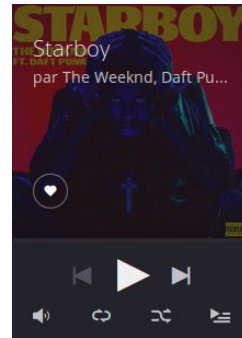
Tracks

Genres

Playlists

Charts

Podcasts



Episodes

Channels

Flow

Editorial

EXPLORE CHANNELS >  
Immerse yourself in worlds of new music





# REST API

<http://developers.deezer.com>

No authentication is required to use the API

Possibility to choose between different return formats

Check out our API discovery development tool at <http://developers.deezer.com> !

frbJZSWDla5343c0ef729299zilbPP35343c0ef729615jNWAat

GET

**Album** Artist Comment Editorial Folder Genre Infos Oembed Options Playlist Radio Search Chart

Track User

Album > [comments](#) [fans](#) [tracks](#)

Try console.log(dzResult) in your console

```
{
  "id": "302127",
  "title": "Discovery",
  "upc": "724384960650",
  "link": "http://www.deezer.com/album/302127",
  "share": "http://www.deezer.com/album/302127?utm_source=deezer&utm_content=album-302127&utm_term=0_1429660474&utm_medium=web",
  "cover": "https://api.deezer.com/album/302127/image",
  "genre_id": 113,
  "genres": {
    "data": [
      {
        "id": 113,
        "name": "Dance"
      }
    ]
  }
}
```

## Fields

NAME	DESCRIPTION	TYPE
id	The track's Deezer id	int
readable	true if the track is readable in the player for the current user	boolean
title	The track's fulltitle	string
title_short	The track's short title	string
title_version	The track version	string
unseen	The track unseen status	boolean
isrc	The track isrc	string
link	The url of the track on Deezer	url
share	The share link of the track on Deezer	url
duration	The track's duration in seconds	int
track_position	The position of the track in its album	int
disk_number	The track's album's disk number	int
rank	The track's Deezer rank	int
release_date	The track's release date	date
explicit_lyrics	Whether the track contains explicit lyrics	boolean
preview	The url of track's preview file. This file contains the first 30 seconds of the track	url
bpm	Beats per minute	float
gain	Signal strength	float
available_countries	List of countries where the track is available	list
alternative	Return an alternative readable track if the current track is not readable	track
contributors	Return a list of contributors on the track	list
artist	artist object containing : id, name, link, share, picture, picture_small, picture_medium, picture_big, picture_xl, nb_album, nb_fan, radio, tracklist, role	object
album	album object containing : id, title, link, cover, cover_small, cover_medium, cover_big, cover_xl, release_date	object



# /03

Leverage the API: SDKs, WebApps, widgets...

## 3 things SDKs are useful for



Third party auth  
via oauth2  
Access to account  
information



Content streaming  
(requires an  
account)

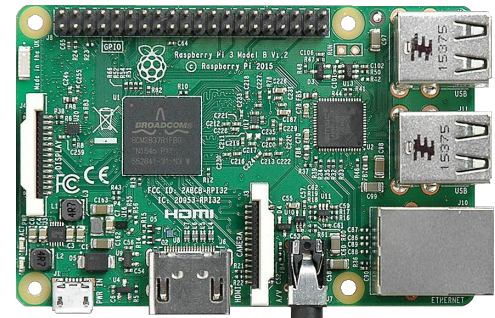
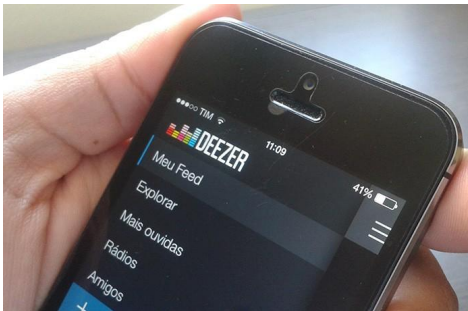


Automated  
API Calls

# Choose the SDK that fits your needs...



...and bring deezer to all of your devices





## Deezer WebApps API

[www.deezer.com/app/demo](http://www.deezer.com/app/demo)

- Based on JavaScript SDK
- Support for all major browsers: IE7+, FF, Chrome, Opéra
- Same code for both platforms: inside or outside Deezer
- Interactions with Deezer's player and user's library

# Deezer's App Studio

The screenshot displays the Deezer App Studio interface. At the top, there's a navigation bar with tabs for 'All apps', 'Curators', 'Labels', 'Tools', 'Discovery', 'Games', and 'Events'. Below this, a grid of app cards is shown, each with a unique visual header and descriptive text. The cards include:

- cubic.fm**: Discover playlists by users, and get discovered! (Discovery)
- Red Bus Studios**: On the road and in the studio with Red Bus! Discover the music history of the studios! (Curators)
- Concert With Me**: Find your perfect gig in a click! Find great concerts around town, friends who can come along and get more personalized (Events)
- What's That track**: "What's that track?" is a fun quiz that tests your musical knowledge. Play alone, or challenge us to (Games)
- Play Guetta**: Join the Global Interactive Listening Experience! Be part of David Guetta's Top Fans across the Globe by (Labels)
- YSL Mascara**: Augmentez le volume. Entrez dans la légende. Découvrez du contenu exclusif et tentez de (Curators)
- edjing**: Discover the new edjing. Millions of tracks, new design and ergonomics, new features. Nothin can (Discovery)
- Disney**: Disney Magic! (Curators)
- BNP Paribas Mast...**: La FFT s'associe à Deezer pour vous faire vivre le BNP Paribas Masters sous l'angle musical! De belles (Curators)
- RockMAP**: RockMAP is an app for mobile (android and iPhone) that provides information on Rock & (Curators)
- Deezer Sessions**: Deezer Sessions : see music differently. (Events)
- MyLittleRadio**: Retrouvez toutes les playlists de My little Radio! (Curators)
- SHUFFLER.FM**: (Discovery)
- Skeep.io**: (Curators)
- travel mix**: (Discovery)
- chordify**: (Discovery)
- DEEZER**: (Discovery)

The left sidebar contains navigation options like 'NEW RELEASES', 'TOP PLAYLISTS', 'PODCASTS', and 'Louis Tha Boogie'. At the bottom, there's a music player interface with play, pause, and shuffle buttons.

# Hacking Fast

- **1. Create your App ID**

MyApps: <http://developers.deezer.com/myapps>

- **2. Select your SDK**

JS SDK: <http://developers.deezer.com/sdk/javascript>

- **3. Learn how to hack fast with our API explorer**

API explorer:  
<http://developers.deezer.com/api/explorer>

- **4. Guidelines for an immersive experience ;)**

Guidelines:  
<http://developers.deezer.com/guidelines>

UI & logo Guidelines:  
<http://developers.deezer.com/guidelines/logo>  
<http://developers.deezer.com/guidelines/ui-kit>

The screenshot shows the Deezer developers website. At the top, there is a navigation bar with the Deezer logo and links for 'developers', 'Plugins', 'API', 'SDKs', 'Guidelines', and 'API Partners'. Below the navigation bar is a sidebar menu with the following items: 'INTRODUCTION', 'Getting Started' (highlighted), 'Core Concepts', 'Key features', 'User levels', 'Content access rules', 'Available tools', 'Streaming URL privacy', 'Local Storage policy', 'GRAPHICAL GUIDELINES', 'Logo', 'UI Kit', and 'OTHER', 'Available countries'. The main content area is titled 'Getting Started' and contains the following sections: 'Welcome to Deezer developers website. Please create your own Deezer experience, using the...', 'What is Deezer?', 'Where is Deezer available?', and 'What are Deezer requirements?'. The 'What are Deezer requirements?' section includes sub-sections for 'Deezer users access rules', 'Deezer logo guidelines', and 'Deezer features guidelines'. At the bottom, there is a 'Resources' section.

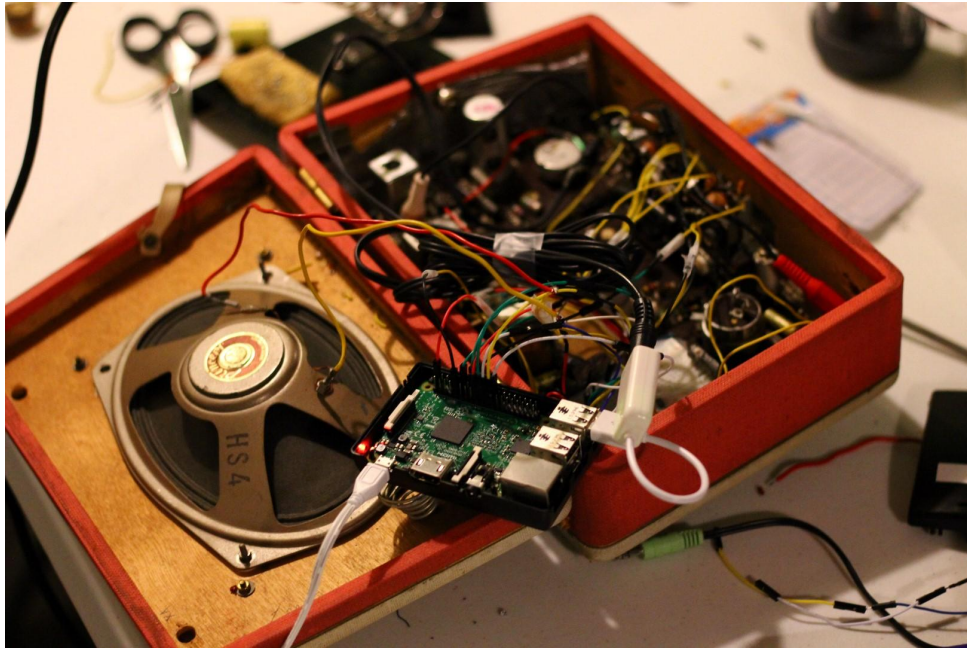


/04

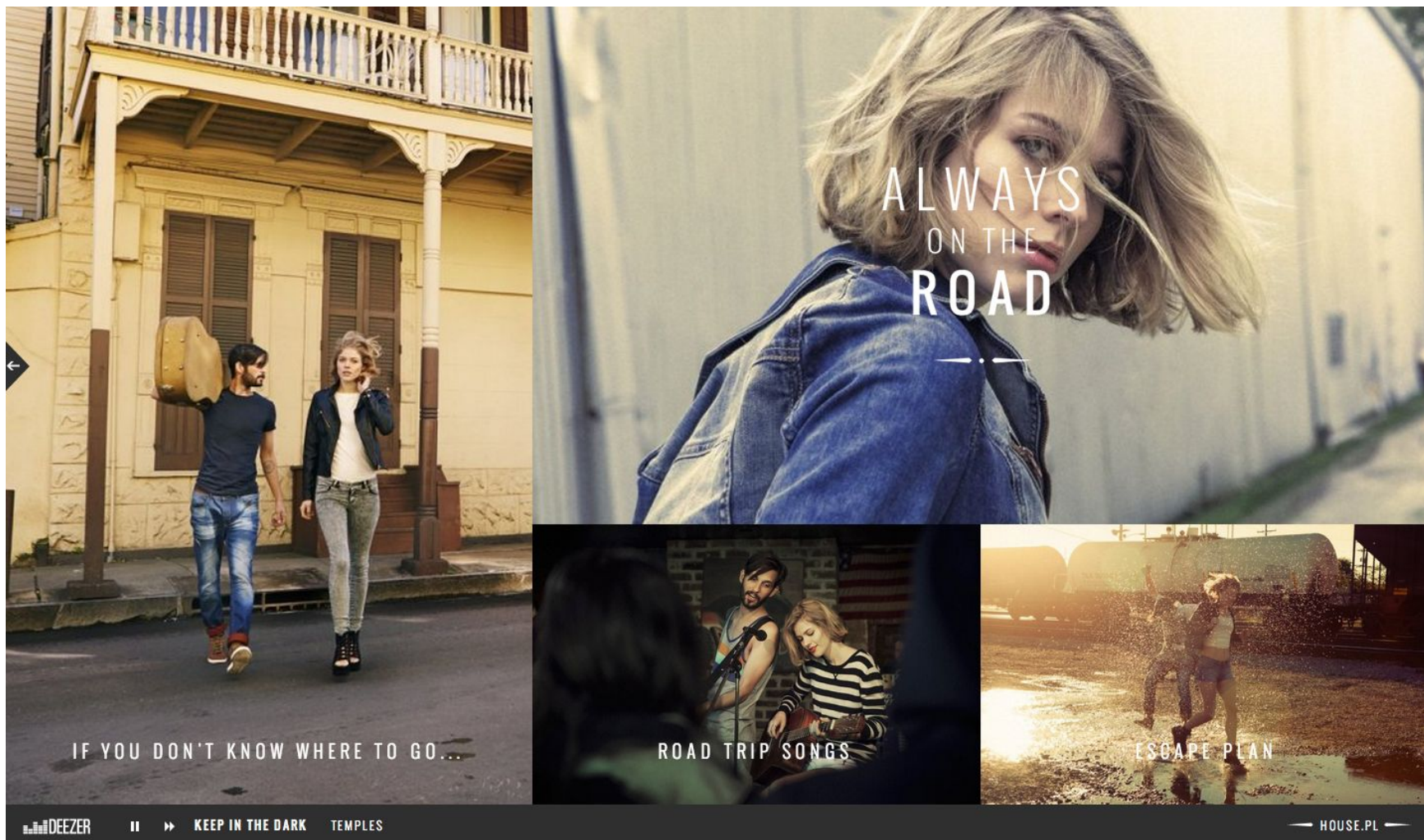
Showcase



## OldRadio - Deezer... in a 1959 radio



# House.pl - Custom Players



# Shuffler.fm – Audio magazine curated by tastemakers

The screenshot displays the Deezer Shuffler.fm interface. On the left is the Deezer navigation sidebar with options like 'HEAR THIS', 'NEW RELEASES', and 'PODCASTS'. The main content area features a 'SHUFFLER.FM' header with a 'RADIO' section. Below this, there are filter tabs for 'Popular', 'All', 'Indie', 'Electronic', 'Folk', 'Remix', 'Rock', 'Indie Rock', and 'French'. A large 'RADIO' section includes a description: 'Play and read the top emerging songs and artists. Posted on the web's leading music sites. Learn More' and a 'Play Channel' button. Below the radio section are three featured items:

- 1** **Can't Do Without You** by Caribou. The description reads: 'The basement of my childhood house was a lot of things: a'. Source: **noisey** Noisey + 45 others, 6 DAYS AGO.
- 2** **So Many Pros** by Snoop Dogg. The description reads: 'Marijuana-delivery app Eaze has raised \$10 million from investors'. Source: **F** The FADER + 31 others, 7 DAYS AGO.
- 3** **American Oxygen** by Rihanna. The description reads: 'Yakında çıkacak olan sekizinci albümünden üçüncü single'ını da'. Source: **Hafif Muzik** + 28 others, 5 DAYS AGO.

At the bottom, there is a music player for 'Want To Want Me' by Jason Derulo and a notification badge with the number 7.

# Identifying genres in musical heritage

- Europeana Project
  - +3500 cultural institutions
  - Over 50 million records
  - Photographs, archival records, art, fashion, tv broadcasts etc.



# Identifying genres in musical heritage

- Europeana Sounds
  - +25 content partners
  - Over 300.000 records
  - Pictures/film/recordings/sheet music





# EUROPEANA MUSIC

Add a search term



Browse ▾

Explore 268,522 music recordings, pieces of sheet music and other music items from across Europe.

28/5/22, fête des Limousins  
Bibliothèque nationale de France  
© Public Domain

# About Europeana Music

- Largely unknown material
- Not to be found anywhere else (Spotify, Deezer etc.)
- But.. often difficult to navigate

**METADATA**



# The challenge

- Work on tools and solutions to detect genres in the sound files.
- Data:  
[http://www.ifs.tuwien.ac.at/~schindler/eusounds\\_challenge/](http://www.ifs.tuwien.ac.at/~schindler/eusounds_challenge/)
- Europeana Sounds Vocabulary:  
<https://github.com/gsergiu/music-genres/tree/master/music-genre/src/main/resources/>

# The awards

- For the best solution of the day we have 500 euros in vouchers.
- If you are interested, we want to further develop today's prototype into a working tool for production

# giant...steps™

SEVEN LEAGUE BOOTS  
FOR MUSIC CREATION AND PERFORMANCE

STRIDING FORWARD  
IN ELECTRONIC  
MUSICAL CREATION  
EXPERIMENTATION  
& PERFORMANCE



## GiantSteps Challenge @ Waves Festival

Peter KNEES, Richard VOGL (JKU Linz)

# The GiantSteps Project

*The seven-league boots for music creation and performance*

## Goals

- Improve music creation tools to boost inspiration and creative flow
- Break barriers caused by a lack of technical and musical knowledge
- Empower potential music creators

## Approach

- Combining **MIR** with **interfaces and interaction** design techniques
- Develop musical expert agents that provide **musical suggestions** when composing
- Align with **user requirements**; test in real-world situations, with practitioners

# Partners



Department of  
Computational  
Perception



JOHANNES KEPLER  
UNIVERSITY LINZ



Music  
Technology  
Group



**NATIVE INSTRUMENTS**



reactable



**Red Bull Music Academy**



GiantSteps is partly funded by the European  
Community's Seventh Framework Programme.

giant...steps™

SEVEN LEAGUE BOOTS  
FOR MUSIC CREATION AND PERFORMANCE

# GiantSteps Frameworks

- madmom
- Essentia / EssentiaRT~
- Various GiantSteps Assets on GitHub

<http://www.giantsteps-project.eu/#/downloads/software>

# madmom

- Python music processing library
- Signal processing/Music Information Retrieval tools
  - Tempo detection
  - Beat and downbeat tracking
  - Onset detection
  - Chord transcription
  - etc.
- State of the art technology in these areas
- <https://github.com/CPJKU/madmom>

# ESSENTIA

- C++ music processing library, Python bindings
- EssentiaRT~: Pure Data version for real-time processing
- For audio analysis and audio-based MIR
  - Audio I/O, DSP blocks
  - Statistical characterization of data
  - Large set of spectral, temporal, tonal and high-level music descriptors
- <http://essentia.upf.edu>
- <http://mtg.upf.edu/technologies/EssentiaRT~>



# Various Assets

- Various tools and libraries developed for music making
  - **RhythmCAT**: Real-time concatenative synthesis for rhythms (VST plugin)
  - API for **rhythm pattern variation** (C++ )
  - **DrDrum**: Generative drum machine (Pure Data)
  - **House-Harmonic-Filler**: Harmony expert agent (Pure Data)
  - and many more...
- <https://github.com/GiantSteps>

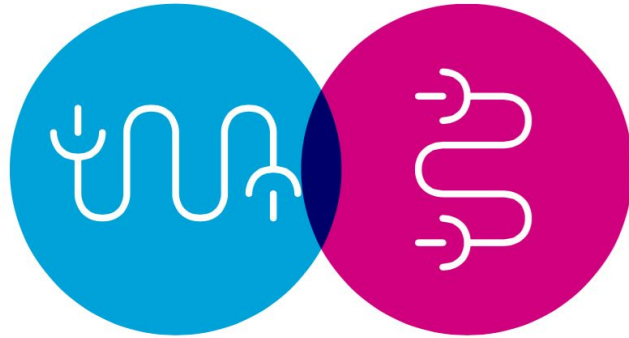
# Challenge and Award

## Best use of GiantSteps APIs

Use one or more of the GiantSteps APIs for music analysis, recommendation, and semantic sound analysis for

- music making and performance,
- new instruments,
- improvising systems,
- virtual band mates,
- real-time visualizations
- ...

**Reward: 250€ music store vouchers**



# #MusicBricks

is a European initiative  
**providing innovative Music (Analysis)  
Software and Hardware tools**  
as building blocks for hackers

[www.musicbricks.net](http://www.musicbricks.net)



# Freesound API

<https://www.freesound.org/docs/api/>

- +200k CC licensed sounds
- WebAPI
  - django-rest
- Freesound APIv2 Clients:
  - Python,
  - Java,
  - ObjectiveC

The screenshot shows the Freesound website interface. At the top, there is a navigation bar with the Freesound logo, a search bar, and links for Register, Log In, and Upload Sounds. Below the navigation bar, there are tabs for Sounds, Forums, People, and Help. The main content area displays search results for the query 'berlin'. The results are sorted by relevance. Each result includes a waveform image, the sound title, a star rating, the user name, the upload date, the number of downloads, and the number of comments. There are also links to view more results in the same pack.

previous next 1 2 3 4 5 6 7 ... 20 | 609 sounds

**Motzstrasse2.mp3** ★★★★★ laureci  
Recorded with a Soundman OKM and an old sony portable md-player in **berlin** Schöneberg 2008 Read more about it on ...  
more Schneberg Motzstrasse 2008 sony OKM 2008Read Soundman berlin  
◆ 13 more results in the same pack "Berlin Sounds"

**Inside Berlin metro 1112...** ★★★★★ LG  
Inside the **berlin** metro, traveling between several stations. Sony PCM-D50  
field-recording metro public-transport berlin traveling trip  
◆ 16 more results in the same pack "Berlin Public Transport"

**Birds in Tiergarten earl...** ★★★★★ Owl  
Early morning in Tiergarten, **berlin**. Birds singing, recorded with a Zoom H-1, may 2013.  
Tiergarten Birdsong Everyday Morning Peaceful Berlin Environment Bird Park Nature City  
◆ 5 more results in the same pack "Berlin May 2013"

**licenses**

- Attribution (311)
- Attribution Noncommercial (83)
- Creative Commons 0 (197)
- Sampling+ (18)

**tags**

airplane **ambience** ambient **berlin** city crowd drum drums field-recording germany loop night noise people public-transport rain ring-berlin ringbahn-berlin ringbahn-s41 room s41ring-berlin sequence snare sound station street train trip underground-berlin urban

**type**

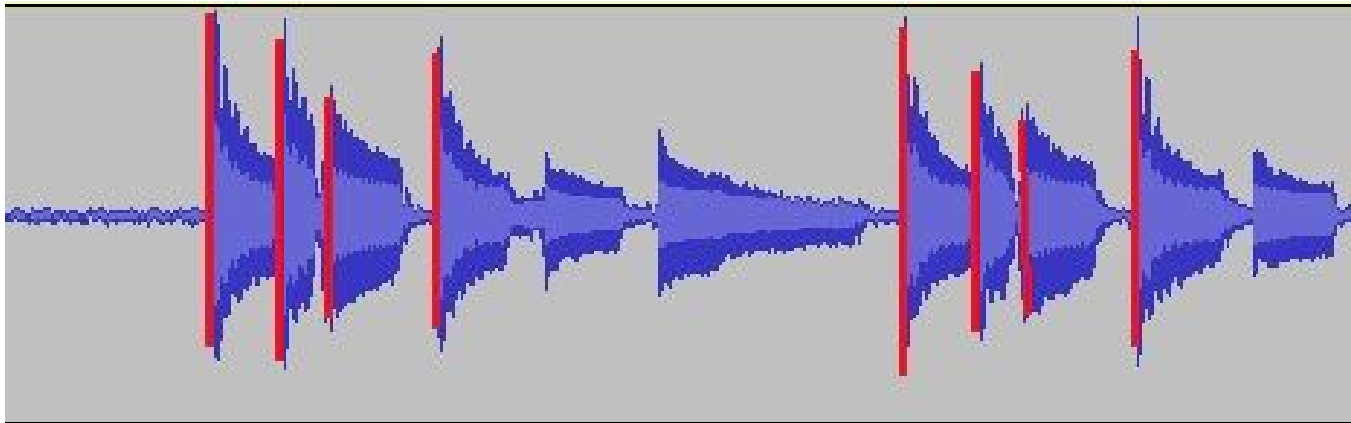
- aif (15)
- aiff (16)
- flac (76)
- mp3 (78)

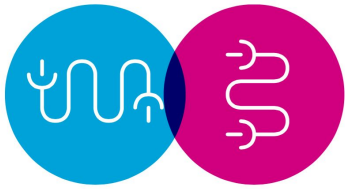
# Onset detection

Real-time onset detection/description

Provides **onset** information:

loudness, timbre, pitch, spectral features

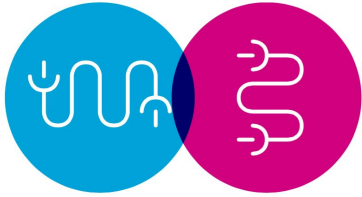




# Tools by UPF Bcn

- Onset Detection
- Melody Extraction  
<http://essentia.upf.edu>
- PureData and MaxMSP objects  
<http://mtg.upf.edu/technologies/EssentiaRT~>
- Freesound API  
<http://freesound.org/docs/api>

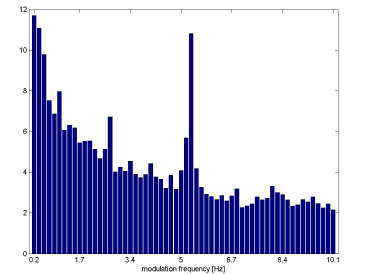
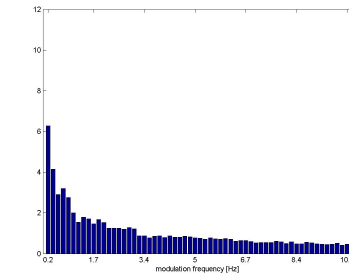
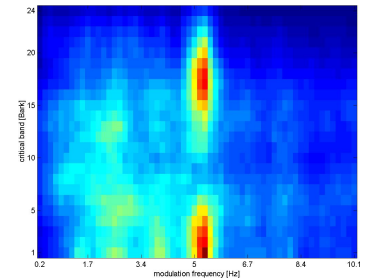
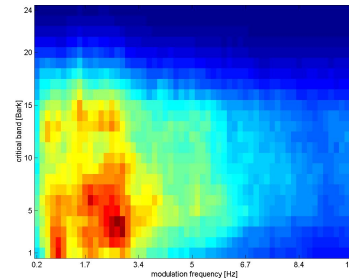




# Rhythm & Timbre

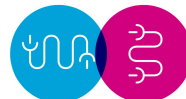
## Analysis from Music

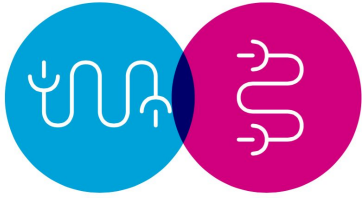
- analyzes audio (segments or songs)
- get analyzed features:
  - Rhythm Pattern
  - Rhythm Histogram
  - Spectral Descriptor (capturing timbre)



Classical

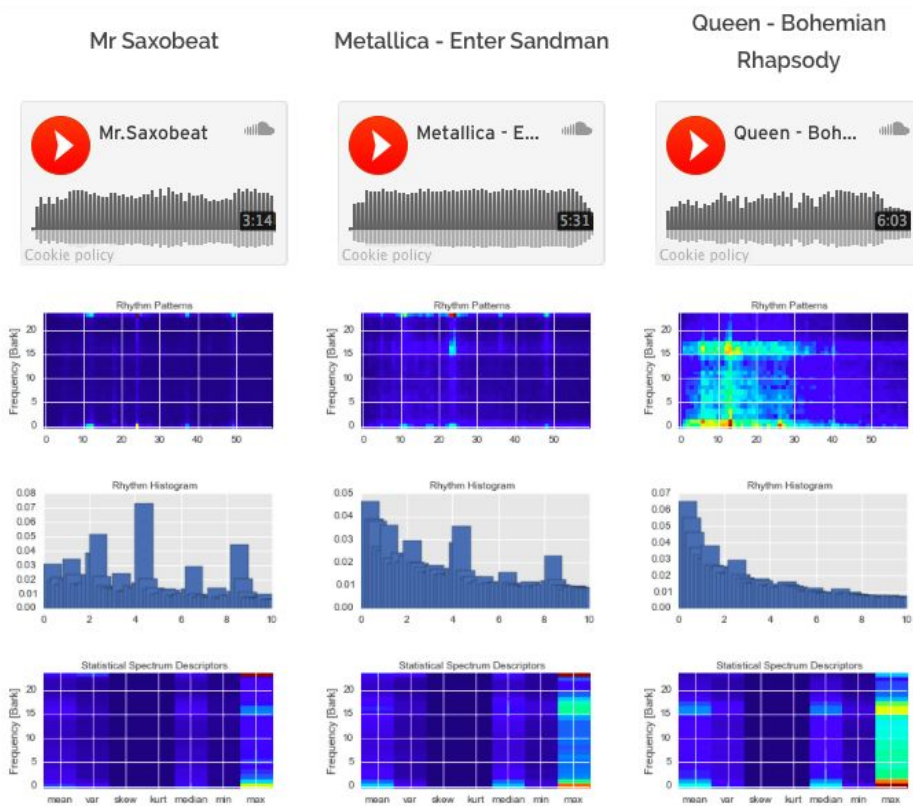
Rock





# Rhythm & Timbre

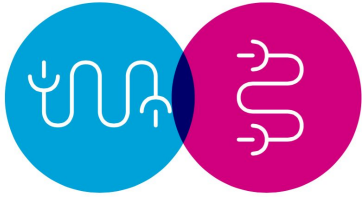
## Analysis from Music



- compute acoustic similarity
- get similar sounding songs by rhythm and/or timbre
- create playlists of a certain style
- detect the genre of a song
- make music recommendations
- etc. etc.

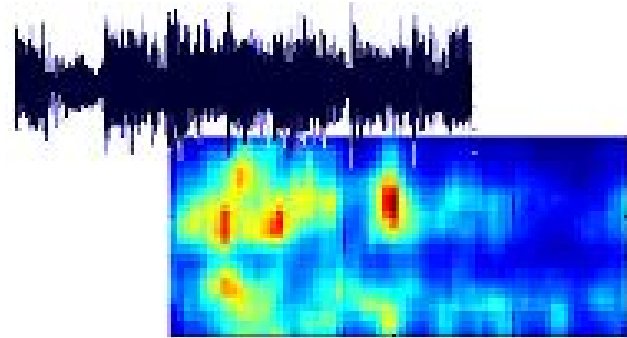
'More like this' - Finding Similar Songs





# Rhythm & Timbre

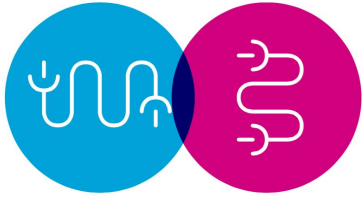
- open source
  - Python
  - Java
  - Matlab



- Download and Tutorials:

<http://ifs.tuwien.ac.at/mir/musicbricks>

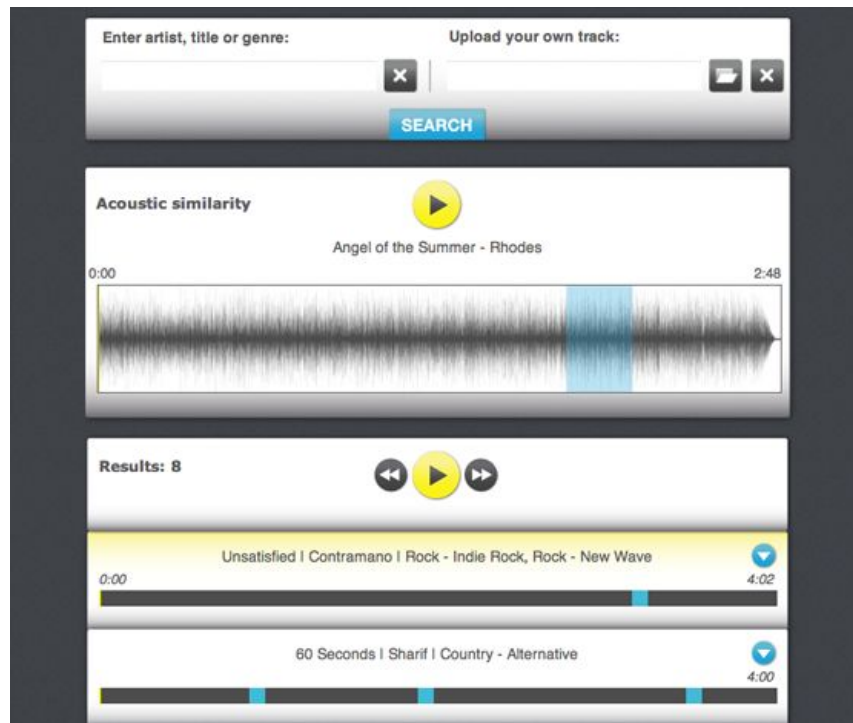




# Music Similarity



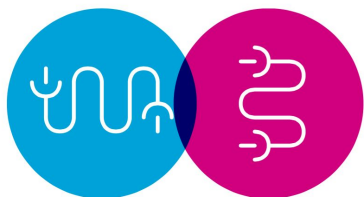
**Search by Sound: get similar music  
Web API**



<http://ifs.tuwien.ac.at/mir/musicbricks>



#MusicBricks



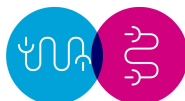
# Music Similarity

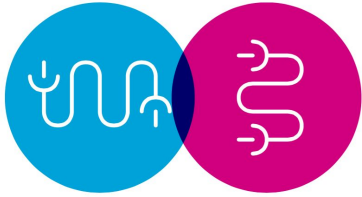


## Search by Sound: Web API

- REST API (no installation needed!)
- 50,000 songs from freemusicarchive.org pre-analyzed
- add own songs
- get similar songs (by timbre or rhythm)
- super-fast analysis (~ 1-2 sec/full song)

<http://ifs.tuwien.ac.at/mir/musicbricks>





# Sonarflow

Visual Music Discovery Apps (iOS + Android)

Discovery  
from  
online  
sources

- Youtube
- last.fm
- iTunes
- Spotify
- 7digital



**SPEC  
TRAL  
MIND**

[www.sonarflow.com](http://www.sonarflow.com) - <https://github.com/spectralmind>



#MusicBricks

# MusicBricks Transcriber (by Fraunhofer IDMT)

## Extract Melody + Bass line from audio

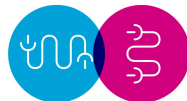
- Predominant melody / bass line (note onset, duration, pitch)
- Key & Chords (e.g., Cm / E / Fm)
- Time signature & beat-grid
- Average tempo (bpm)
- Output formats (MIDI, MusicXML, etc.)
- Executable for Win, Mac & Linux



# Real-Time Pitch Detection (by Fraunhofer IDMT)

## Realtime analysis of audio samples

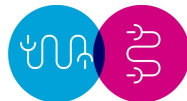
- Detect currently sung or played pitches
- Monophonic mode (f0 + pitch)
- Polyphonic mode (pitches)
  - Informed algorithm (provide most likely pitches -> define search range)
- Library incl. sample projects for all platforms (Win, Mac, Lnx, Android, iOS)



# Time Stretch & Pitch Shift (by Fraunhofer IDMT)

## Stretch or pitch audio samples

- Realtime
- 50% to 200% of tempo
- -/+ half Octave
- Library incl. sample projects (Win, Mac, Lnx, Android, iOS)
- **Application Example: Songs2See**



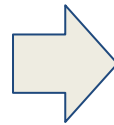
# Goatify

## Replace melody with sample

- Predominant melody extraction
- Input sample pitched according to melody
- Original melody muted



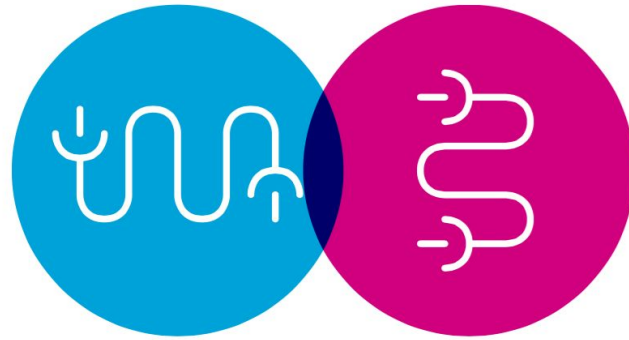
Scream & Shout - will.i.am ft Britney Spears GOAT EDITION!



Scream & Shout - will.i.am ft Britney Spears GOAT EDITION!







# **#MusicBricks**

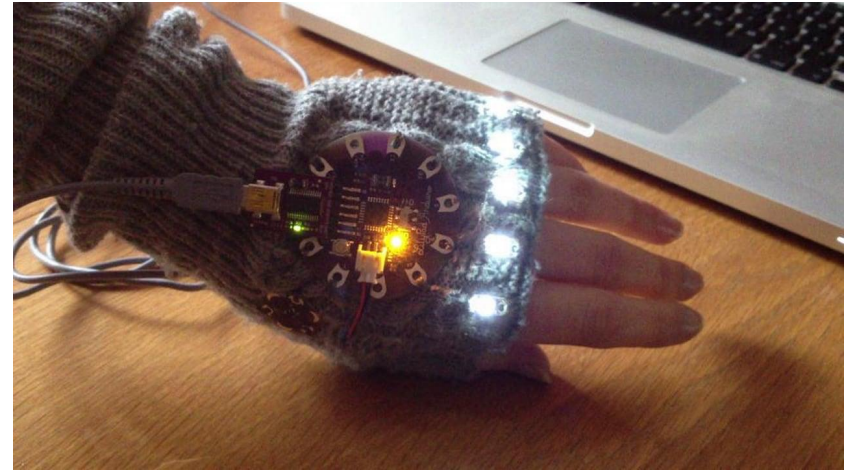
## Music Analysis Tools

available from

[www.musicbricks.net](http://www.musicbricks.net)

# Other Tools

- Arduinos + SunFounder Starter Kit
- Raspberry Pi's
- Lilypad Sewing Kit + Textile Fabrics
- FLORA - Wearable electronic platform
- Bitalino body signal kits
- Neurosky Brainwave Kits
- Pico Boards
- Adafruit 12-Key Capacitive Touch Sensor
- KaossPad
- Novation Launchkey MIDI keyboard
- x-OSC Microcontroller
- Bare Conductive Electric Paint
- Flora RGB Smart Neo Pixel
- RFID Wristbands
- PlayStation Portable for Rhythm Hack
- Voice-Changer Boards
- Necomimi Brainwave Cat Ears
- Adafruit NeoPixel RGB
- 3D Printer (MakerBot 2)
- Soldering Station



# Challenges

- Best gesture and sound combination (proposed by MOD)
- Best hack on music & emotions (using Musimap API)
- Best hack using body signals
- Best use of GiantSteps APIs for music & sound analysis and recommendation
- Europeana Sounds Music Collection Genre Detection Challenge

**Details:** <http://bit.ly/waveshack>

# Challenges

- Best gesture and sound combination
- Best hack on music & emotions
- Best hack using body signals
- Best use of GiantSteps APIs for music & sound analysis and recommendation
- Europeana Sounds Music Collection Genre Detection Challenge

# Awards

1 MOD Duo  
500 € by Musimap  
Hardware\*

250 € vouchers

500 € by Europeana

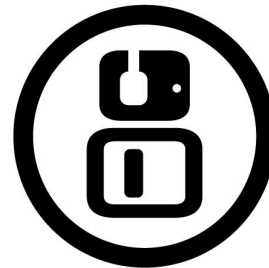
\* from MindTecStore and Bitalino

**Details:** <http://bit.ly/waveshack>

# Thanks to our Sponsors and Partners



ULTRASONIC



MOD



ircam



Centre  
Pompidou



OESTERREICHISCHE  
COMPUTER GESELLSCHAFT  
AUSTRIAN  
COMPUTER SOCIETY

bitalign

# Organized by

Thomas Lidy

Alexander Schindler

Oliver Hödl

Peter Knees

Richard Vogl

Joris Pikel

Wulf Gaebele

Christian Löw

Andreas Rauber



universität  
wien



JOHANNES KEPLER  
UNIVERSITÄT LINZ



europæana  
sounds



Red Bull Music Academy

giant...steps...

# Announcements

- Austrian Heartbeats  
Music Label &  
Music Technology (Startup) Event  
15-17 November 2016 in Tel Aviv



# **HACKING!**

**Saturday 9:45 a.m.**  
**Be here in time!**

Programme:

- 9:45 - 10:00 Welcome & Ideas Presentation
- 10:00 - 18:00 Hacking
- 18:00 - 18:30 Jury Session
- 18:30 - 20:00 Final Presentations & Awards

Food & Drinks provided!

**All Details:** <http://bit.ly/waveshack>



# **FESTIVAL!**

Enjoy the concerts...



**... but don't be late!**

**Saturday 9:45 a.m.**