



TENOR 2022 CONFERENCE PROGRAM

PRISM Laboratory
(Perception, Representations, Image, Sound, Music)
Marseille, France
May 9-11, 2022

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Welcome to TENOR 2022

The 7th International Conference on Technologies for Music Notation and Representation (TENOR) is hosted by the PRISM laboratory (part of the *French National Centre for Scientific Research–CNRS*), in collaboration with the *Institute of Creativity and Innovation of Aix-Marseille (InCIAM)*, and the Aix-Marseille University (AMU). PRISM adopts the French interdisciplinary research model (art-science-technology), under the impulse of Jean-Claude Risset (co-founder of PRISM), a pioneer in computer music, who worked at Bell Labs (USA) and IRCAM (France).

For this edition, we are particularly happy to meet you in person again, in a year when the conference returns to France —the first Tenor conference was held in Paris in 2015. This time, it takes place in Marseille, France's oldest city, home of its largest port, a city that offers a vibrant and diverse cultural scene. Alongside its focus on musical notation technologies, this year special topics include *Comprovisation* and its musicological dimensions, as well as AR, VR, and 3D technologies applied to music writing and performance.

In addition to our scientific collaborators, the *Salle Musicatreize* and the Marseille Conservatory contributed to the organization of the artistic events of the conference. For the Marseille Conservatory, on May 9th, several events will be offered around *Comprovisation*. On May 10th, we have the pleasure to welcome on Musicatreize's stage the renowned vocal ensemble *Neue Vocalsolisten* from Stuttgart, and four local musicians for the evening's second concert. The organizing committee would like to express its gratitude to the *Salle Musicatreize* for their hospitality, *Musik der Jahrhunderte* for their generous support, and the Université Côte d'Azur (UCA) for their technical support in the realization of these two concerts.

We would like to extend our thanks to Craig Vear and his *DigiScore Project* (a ERC Project), as well as to Sandeep Bhagwati and the *TENOR Network Funding*, in addition to Yann Orlarey of the AFIM (*Association Francophone d'Informatique Musicale*).

Vincent Tiffon, Jonathan Bell & Charles de Paiva Santana
For the TENOR 2022 Organising Committee

TENOR

The TENOR Conference is dedicated to research and development issues in Music Notation and Representation. It has a strong focus on computer tools and applications, as well as a tight connection to music creation. "Technology" in the conference name refers to any mean that may contribute to the notation, representation and visualisation of the music and sound, for purposes that may include (but not limited to) music composition, performance, representation, transcription, analysis and pedagogy.

Organizing committee

PRISM-CNRS

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Timetable

CT: Contributed Talk, KL: Keynote Lecture, IT: Invited Talk, MC: Music Concert.

Monday, May 9th “Comprovisation”

9:00–9:30		Opening Workshop (PRISM, Campus Joseph Aiguier)	
9:30–11:00		Workshop 1: PatchXR, Scorecraft, Bach, CosmoNote	
11:00–11:30		Coffee Break	
11:30–13:00		Workshop 2: PatchXR, Scorecraft, Maxscore	
13:00–14:00		Lunch	
15:00–15:30		Opening TENOR 2022 (Marseille Conservatory)	
SESSION 1: Musicology/Comprovisation			
15:30–17:00	KL	Raphaël IMBERT & Benjamin LEVY Paris, France	Comprovisation with O'Max
17:00–17:20	CT	Terri HRON Montreal, Quebec	Holistic perspective. A report on scoring beyond Eurological traditions
17:20–17:40	CT	Diemo SCHWARZ & Clément CANONNE Paris, France	Notation, Transmission, and Comprovisation: A Case Study of the ONCEIM Improvisation Orchestra
17:40–18:00	CT	Filipa MAGALHÃES Lisbon, Portugal	Idiosyncratic ways of preserving performing arts creation in an (digital) archive
18:00–18:30		Coffee Break	
18:30	MC	Workshop COMPROVISATION Marseille Conservatory	Compositions by Frame, Adams, Bolaños, Robertson and Sobek

Tuesday, May 10th “Écritures”

SESSION 2: AR, VR, 3D (PRISM)			
9:00–9:20	CT	David KIM-BOYLE Sydney, Australia	The Twittering Machine
9:20–9:40	CT	Giovanni SANTINI Hong Kong	LINEAR: a multi-device Augmented Reality environment for interactive notation and music improvisation
9:40–10:00	CT	Anna SHVETS & Samer DARKAZANLI Paris, France	Conditional semantic music generation in a context of VR project “Graphs in harmony learning”
10:00–10:20	CT	David KIM-BOYLE Sydney, Australia	96 Postcards in Real Color
10:30–11:00		Coffee Break	

SESSION 3: Programming (PRISM)			
11:00–11:20	CT	Bertrand PETIT Sophia-Antipolis, France	Music Notation using Reactive Synchronous Programming
11:20–11:40	CT	Chandan MISRA XIM Univeristy, India	SangeetTEX: A LaTeX Engine for Transcribing and Rendering Indic Music
11:40–12:00	CT	Wander Vieira RODRIGUES Recife, Brazil	Textural Composition in 3D Environment through Swarm Algorithm
12:00–13:00	KL	Sandeep BHAGWATI & Terri HRON Montreal, Quebec	Expanding the Notion of Score: Provincializing Notation Technologies in a Transtraditional Perspective
13:00–13:10	Anthony de Ritis introduces TENOR23 in Boston, Northeastern University		
13:10	Lunch		
16:30–18:00	MC	Vocal Concert Salle Musicatreize	With the Neue Vocalsolisten: Geertruida van der Poel, Suzanne Leitz-Lorey, Andreas Fischer, Martin Nagy
18:00–18:30	Coffee Break		
18:30–20:00	MC	Instrumental Concert Salle Musicatreize	With Ambre Vuillermoz (accordion), Marine Rodalec (cello) Joël Versavaud (sax.), Bastian Pfefferli (percu.)
20:00	Dinner		

Wednesday, May 11th “Notation and technological environments”

SESSION 4: Machine Learning (PRISM)			
9:00–9:20	CT	Hugo SCURTO Paris, France	Musicking Deep Reinforcement Learning.
9:20–9:40	CT	Gonzalo ROMERO-GARCÍA, Corentin GUICHAOUA & Elaine CHEW Paris, France	A Model of Rhythm Transcription as Path Selection through Approximate Common Divisor Graphs
9:40–10:00	CT	Brandon SNYDER & Marlon SCHUMACHER Karlsruhe, Germany	Integrating Machine Learning with DSP frameworks for Transcription & Synthesis in Computer-Aided Composition
SESSION 5: Systems/Environments (PRISM)			
10:00–10:20	CT	Rama GOTTFRIED Hamburg, Germany	Symbolist Re-imagined: bidirectional graphic-semantic mapping for media notation authoring and performance
10:20–10:40	CT	Jean-Michaël CELERIER, Myriam DESAINTE-CATHERINE & Pia BALTAZAR Bordeaux, France	Ossia Score 3
10:40–11:00	CT	Aaron WYATT & Cat HOPE Melbourne, Australia	The Decibel ScorePlayer – Learning From and For Usability
11:00–11:30	Coffee Break		

11:30–12:00	IT	Maxime BARTHELEMY Marseille, France	Maison Ona
SESSION 6: Case Studies (PRISM)			
12:00–12:20	CT	Christina KARPODINI & Tychonas MICHAILIDIS Birmingham, UK	Making Graphical Score More Accessible: a Case Study
12:20–12:40	CT	Claudio PINA Lisbon, Portugal	Notation For Organ Extended Techniques
12:40–13:00	CT	Benjamin Bacon Berlin, Germany	Rethinking the Notation Design Space
13:00–14:30	Lunch		
14:30–15:30	KL	Craig VEAR Leicester, UK	Digital Scores – investigating the technological transformation of the music score
SESSION 7: New Notation Practices and Research (PRISM)			
15:30–15:50	CT	Ciaran FRAME, Alon ILSAR & Sam TROLLAND Melbourne, Australia	Mutable Gestures: A New Animated-d Notation System for Conductor and Chamber Ensemble
15:50–16:10	CT	Vincent-Raphaël CARINOLA & Jean GEOFFROY Lyon, France	On Notational Spaces In Interactive Music
16:10–16:30	CT	Georg HAJDU, Konstantina ORLANDATOU & James Tsz-Him CHEUNG Hamburg, Germany	A Few Thoughts On Polymorphism In Digital Scores
16:30–17:00	Coffee Break		
17:00–17:10	MC	Dimeo SCHWARZ Paris, France	<i>I am Speaking into a microphone</i>
17:10–17:20	Anthony de RITIS: Announcement Tenor 2023 in Boston		
17:20–17:30	Closing Session (PRISM)		

Keynote speakers

Craig Vear (De Montfort University, UK)

Digital Scores – investigating the technological transformation of the music score Digital transformation pervades all aspects of life. Music is no exception. Computers and digital media are increasingly being used to create digital scores. In this context, the ERC-funded DigiScore project will explore the effect of digital scores on creativity and musicianship. This is important because digital scores are creating new music experiences and introducing innovative compositional approaches and performance opportunities. This will be the first scientific investigation into the transformation of the music score through computational technologies. The project will build a scientific study of inclusive digital musicianship. The findings will benefit not only music studies but extend to computer science, digital humanities and new media research.

Bio For more than two decades Professor Craig Vear has established himself as an internationally recognised composer of experimental music with technology, and recently as a scholar of digital performance and music. His research is practice-Based and operates on a dual thematic axis of 1) digital creativity in music performance, and 2) innovation in the use of digital music in performance. Peer reviews of his contribution to this field have commented on how his research is ‘a major point of reference in computer music interactivity, live composition and improvisation’; ‘enhance practice by creators and researchers in interactive composition’ ... ‘particularly in the case of ensembles involving human and computer performers’; ‘will enhance thinking and practice by creators and researchers’.

Sandeep Bhagwati & Terri Hron

EXPANDING THE NOTION OF THE SCORE, Provincializing Notation Technologies in a Transnational Perspective The TENOR Network (which the two speakers lead as coordinator and director, respectively) was founded in 2018 by 15 institutions in Canada, US, UK, Australia, Germany and France. It is dedicated to developing, exploring, charting, categorizing, but also to critically examining communication technologies in sonic practice - and their evolution in the live arts. One of its missions was to actively search for other researchers and artists engaged in similar concerns working in countries beyond the regions mentioned above - in Asia, Africa, Latin America. It soon became clear that this mission would be severely impeded by the strong bias of current score technologies towards western common notation and towards graphic notations derived from a cartesian, flat surface, instructional bias. Many non-eurological, global art music traditions, in contrast, work with systems of notation and representation that favour other parameters than eurological notations, use notation in different ways - or, indeed, ‘notate’ in other media than the written page. A score thus might appear as a variety of existences - from an object to a social context. Some of these alternative ways of notating and representing music have inspired eurological composers in their notation research and experimentation, thus giving rise to a plethora of culturally hybrid notation systems. During the TENOR conference 2019 in Melbourne, the speakers organized a panel that showcased such non-Western and hybrid perspectives.

Bio Sandeep Bhagwati is a composer, researcher, poet, theatre maker, installation artist, and conductor, born in India, a citizen of Germany now living in Montreal, Quebec. In his work, he likes to ask himself questions that he cannot answer, set himself tasks that stymie him, and to break with practices that no one thinks are broken. In order to further foster and enhance his ignorance, he founded, in 2006, a research-creation lab at Concordia University, the matralab, where he and his team work on computer-improvisation, interactive scores, invisible bodysuit scores and creative research into inter-traditional music and theater forms, but also on the theoretical-artistic exploration of improvitational technique, inter-traditional aesthetics and world-conscious art practices such as political performance, environmental sound art or responsive creation.

Bio Terri Hron is a musician, a performer and a multimedia artist. Her work explores historical performance practice, field recording, invented ceramic instruments and videoscores. She often works in close collaboration with others. Besides composing and performing works for and with others, she produces performances, gatherings and events. Terri studied musicology and art history at the University of Alberta, historical and contemporary performance at the Conservatorium van Amsterdam and electroacoustic composition at the Université de Montréal. Her research focuses on collaborative practice and scoring in multimedia performance art. She was a Visiting Scholar at Wesleyan University before taking her current position as Executive Director of the Canadian New Music Network, where she has developed programs focusing on pluralism and sustainability. She was the coordinator of the Technologies for Notation and Representation Network at matralab, Concordia University from 2017-2020.

Raphael Imbert & Benjamin Lévy

Comprovisation with O'Max In January 2010, Raphaël Imbert met O'Max... and Benjamin Lévy. Since then, 12 years of experimentation in duo, in group, in concert, in residency, in research have allowed the two musicians and the software to be put in many unexpected situations. This is the occasion for a sort of retrospective where we will talk about the software of course, but above all about the musical and scientific research themes that underlie, animate and feed our long-term collaboration!

Bio Raphaël Imbert is a French jazz saxophonist, conductor, composer, and music teacher. He is founder and artistic director of the Nine Spirit Company, and currently director of the Conservatory with regional influence of Marseille. In 2010, Raphaël Imbert became a member of the "Improtech" research group, which studies the relationship between improvisation and new technologies, on behalf of the National Research Agency. Raphaël Imbert's project, Omax at Lomax, is a research mission in the United States on the ground of traditional musical roots, musical knowledge relating to orality, and their link with improvisation and new technologies.

Bio Nowadays audio R&D engineer, computer musician and computer music designer, Benjamin Lévy works as a freelancer for various creative projects as well as small audio technology companies. He is collaborating with Ircam since 2008 in particular around the OMax improvisation software. As a computer musician, his work extends to very various artistically creations from contemporary music to jazz, free improvisation, theater and dance. He has collaborated notably with choreographers as Aurélien Richard, plays for more than 10 years with jazz saxophonist Raphaël Imbert and has recorded during the last few years two albums with saxophonist and vocalist Alexandra Grimal.

List of Abstracts – Papers

Monday 9th: SESSION 1 - Musicology/Comprovisation (5pm)

HOLISTIC PERSPECTIVES: A REPORT ON SCORING BEYOND EUROLOGICAL TRADITIONS

Terri Hron (Matralab, Concordia University Montreal, QC) In 2021, the TENOR Network supported a consultation with artists to investigate scoring practice beyond Eurological traditions towards a publication of edited interviews. This paper presents results from the initial round of interviews with a report on the emergent connections that brought out a relational ontology and a holistic perspective of scores. Starting with a critique of the composer-centered work concept, the author presents how consulted artists reflect on roles implied by scores, temporal considerations and definitions of scoring technology, and how these can be expanded with a holistic perspective. Orality, ancestral knowledge, witnessing practice and collective creativity are recurrent themes. The last section offers a number of ways to consider scores that might open the TENOR community to practitioners outside its current purview. Interviewed artists are quoted at length in anticipation of the publication of edited interviews.

NOTATION, TRANSMISSION, AND COMPROVISATION: A CASE STUDY OF THE ONCEIM IMPROVISATION ORCHESTRA

Diemo Schwarz (STMS - Ircam CNRS Sorbonne Université Paris, France) ONCEIM is a collective free improvisation ensemble consisting of 30 musicians. Beyond free improvisation, the orchestra also performs new comprovisation works, commissioned from a variety of composers such as Eliane Radigue, Stephen O'Malley, John Tilbury, or Jean-Luc Guionnet. In this paper, we present a case study based on the 23 pieces commissioned by ONCEIM over a period of ten years, from 2012 to 2022. We first give an account of the different approaches encountered, illustrated by some examples of pieces. We then show how ONCEIM's musicians use re-notation strategies in the process of rehearsing such comprovisation pieces. Finally, we reflect on the role and use of electronics, as imagined by the composers with whom ONCEIM has collaborated, within a mostly acoustic setting.

IDIOSYNCRATIC WAYS OF PRESERVING PERFORMING ARTS CREATION IN AN (DIGITAL) ARCHIVE

Filipa Magalhães (NOVA School of Social Sciences and Humanities, Lisbon, Portugal) Most collections conceived in artistic domains, whether in dance, music or theatre, as they are performances and involve heterogeneous sources such as text, image, audio-video recordings, music, scenarios, gesture, movement, among others, are difficult to describe or document in archival contexts (e.g., music theatre). Archiving these works challenges musicologists, as it requires an in-depth knowledge of their collaborative practices, in addition to a study considering an archaeological musicology, being necessary to gather the pieces of the puzzle,

since the different elements/materials of the works are dispersed by various sources. Post-custodial forms of archive present some solutions, however it would be important to seek for a common core language and combine archival standards in order to allow the interoperability of information to understand these works from a holistic perspective. In this paper, I seek to broaden discussions about the issues around preserving creations in the field of performing arts in the (digital) archive, giving specific examples in different artistic spheres.

Tuesday 10th: SESSION 2 - AR, VR, 3D (9am)

THE TWITTERING MACHINE

David Kim-Boyle (The University of Sydney Sydney, Australia) This paper describes the development of The Twittering Machine (2021) for HoloLens 2 and prepared piano, which features a three-dimensional (3D) performance score holographically projected on the surface of the piano keyboard. The score presents a real-time visualization of Twitter tweets scraped during the performance and generated through the application of various Natural Language Processing (NLP) techniques. Various technical aspects of the work are discussed including the NLP processes, network architecture facilitating communication with the HoloLens 2, and techniques through which the holographic score is accurately mapped to the surface of the piano keyboard. The paper describes the work's aesthetic focus and details how mapping process from language to musical notation provides structural form.

LINEAR: A MULTI-DEVICE AUGMENTED REALITY ENVIRONMENT FOR INTERACTIVE NOTATION AND MUSIC IMPROVISATION

Giovanni Santini (Hong Kong Baptist University) LINEAR (Live-generated Interface and Notation Environment in Augmented Reality) is an environment for the generation of real-time 3D interactive graphic notation. The environment is suitable for ensemble improvisative performances featuring acoustic instruments, live-electronics and two Augmented Reality (AR) performers. One AR performer uses an iPhone for drawing virtual trajectories in the space, rendered as a sequence of Virtual Objects (VOs) aligned along the trajectory. VOs trigger samples upon virtual collisions with the iPhone. They are also used as a form of graphic notation for instrumentalists/vocalists: the screen of the iPhone is mirrored to a projector. The second AR performer uses a headset and can use VR controllers to design trajectories used for the spatialization of each audio source in a 3D audio setup. The headset AR performer can use virtual spheres (one per instrument) to control the position of each sound source (one per instrument). The sound of every acoustic instrument is processed live. The mixing of processing effects are controlled by a laptop player. The system has been repeatedly tested during a two-semester long workshop. The system was also used for two online concerts. Beyond demonstrating the technical and musical viability of LINEAR, the workshop also gave the chance to record student's response to the system. Although the sample size is quite small (four students completed the survey), the answers show encouraging results in terms of engagement and interest. Future work should be conducted to further enhance the user experience and more clearly assess LINEAR's usability and effectiveness as an innovative system for improvisation and musical performance.

CONDITIONAL SEMANTIC MUSIC GENERATION IN A CONTEXT OF VR PROJECT “GRAPHS IN HARMONY LEARNING”

Anna Shvets (Fablab by Inetum Paris, France), Samer Darkazanli (iMSA Montauban, France)

The article proposes a perspective on the use of generative artificial models in a context of the VR project “Graphs in harmony learning”. The usage of LSTM, convLSTM and conditional GAN with convolutional 1D layers for semantic music generation is discussed. The efficiency of the novel data encoding scheme, along with the design patterns based on the system of graphs, are shown.

96 POSTCARDS IN REAL COLOR

David Kim-Boyle (The University of Sydney Sydney, Australia) This paper describes the development of 96 Postcards in Real Color (2022), a virtual reality (VR) work for up to eight singers which features a three-dimensional immersive score generated from image captions scraped from Instagram. The poetic inspiration is briefly presented and various technical elements of the work's design, development, and implementation are discussed including how the Selenium and BeautifulSoup Python libraries were used to scrape and parse images and text from Instagram, and how the multiplayer framework of the work is supported with the Photon Unity Networking SDK. Various user experience (UX) considerations influencing the work's design are discussed, together with a discussion of future research directions.

SESSION 3: Programming (11am)

Music Notation using Reactive Synchronous Programming

Bertrand Petit (INRIA Sophia-Antipolis, France) This article presents a notation system for music based on patterns (or clips) as they have been popularized for more than twenty years with the Digital Audio Workstations on the market like Ableton Live, Bitwig Studio or FL Studio. This system named Skini uses the HipHop.js programming language to describe music pieces. This language, belonging to the family of synchronous reactive languages, was initially designed for the orchestration of Web services. Skini, by combining HipHop.js and queuing mechanisms, was developed for interactive and generative music performances. It has also proven to be an efficient tool for notating musical pieces outside of these interactive and generative contexts because of its ability to describe the structure of a piece of music in a form close to its expression in everyday language. Moreover, Skini, while using certain concepts specific to electronic music, can be used for the creation and performance of instrumental and orchestral music.

SANGETTEX: A LATEX ENGINE FOR TRANSCRIBING AND RENDERING INDIC MUSIC

Chandan Misra (XIM University Bhubaneswar, India) Notation system is the building block of a particular genre of music which aids in reading, composing, and performing music in a structured manner. Though computers are being used for annotating musical scores in Staff notation, it has not been used for Indic music to a substantial extent. Available systems and archives either employ romanization or uses image formats for representing scores which makes it less usable in terms of recreating scores as part of other documents,

retrieving musical information out of the format etc. Creating music-sheets for Indic Music in computer is a inconvenient process involving placing music symbols in its proper place according to the underlying grammar and drawing the same similar to published musical texts. Document preparation tools like Latex is suitable choice for this task making it easier for developers to print quality music-sheets. In this paper, we present Sangeet- TEX, a Latex based music rendering engine for Rabindra Sangeet (Tagore Songs in English), a distinguished genre of Indic music and a collection of more than 2200 songs composed and written by Bengali poet and Nobel Laureate Rabindranath Tagore. It allows users to create beautiful music sheets while preserving the published typesetting in its original published form and provides easy ex- change of musical information in text format. Sangeet- TEX is available at <https://github.com/cmisra/ SangeetTeX>.

TEXTURAL COMPOSITION IN 3D ENVIRONMENT THROUGH SWARM ALGORITHM

Wander Vieira Rodrigues (Unicamp/NICS Campinas, Brazil), Walber de Macedo Rodrigues (CIn/UFPE Recife, Brazil) The notation of extended techniques on the organ do not have a clear standard. Composers use their own notation or guiding rules to express their sonic expansion on the instrument. Since 1960, the most prolific period on organ experimentation, Ligeti, Kagel and Cage were the first to become known for using non-standard notation on the organ. From this collection of works, the ones from Ligeti are paramount. From the graphical score of Volumina, the long clusters of Harmonies to the fast torrent of notes of Coulée. Kagel develops further with other notations for clusters and graphical gestures in Phantasie für Orgel. Finally, with Cage we find a simpler way of notating long notes and stop changes. Kurt Stone has a chapter on his book, Music Notation in the Twentieth Century, regarding notation on the organ, but it not describes half-drawn registers, half-depressed keys and does not present anything regarding motor or other air manipulations. A clearer notation and explanation is needed for these extended techniques. In an instrument so tied to a functionality, it is pertinent nowadays to re-incorporate these techniques in the contemporary organ repertoire. A new simple notation is presented, alternative to graphical notation or lengthy performance notes. This will create an easy understandable approach.

Wednesday 11th: SESSION 4 - Machine learning (9am)

MUSICKING DEEP REINFORCEMENT LEARNING

Hugo Scurto (EUR ArTeC / Université Paris 8 / EnsadLab, France) In this paper, I relate an auto-reflexive analysis of my practice of designing and musicking deep reinforcement learning. Based on technical description of the Co-Explorer, a deep reinforcement learning agent designed to support sonic exploration through positive or negative human feedback, I discuss how deep reinforcement learning can be seen as a form of sonic improvisational agent, which enables musicians to compose a parameter sound space, then to engage in embodied improvisation by guiding the agent through sound space using feedback. I then relate on my own musicking experiments led with the Co-Explorer, which resulted to the creation of the ægo music performance, and build on these to sketch a music representation for deep reinforcement learning, highlighting its original aesthetics, as well as its ontological shifts between performer and agent, and epistemological tensions with engineering-oriented

representations. Rather than discrediting the latter, my wish is to create space for practice-based approaches to machine learning in a way that is complementary to engineering-oriented approaches, while contributing to further music representations and discourses on artificial intelligence.

A MODEL OF RHYTHM TRANSCRIPTION AS PATH SELECTION THROUGH APPROXIMATE COMMON DIVISOR GRAPHS

Gonzalo Romero-Garcia, Corentin Guichaoua, Elaine Chew (Sorbonne Université, Ircam, CNRS, Ministère de la Culture Sciences and Technologies of Music and Sound Laboratory, Paris, France) We apply the concept of approximated common divisors (ACDs) to estimate the tempo and quantize the durations of a rhythmic sequence. The ACD models the duration of the tatum within the sequence, giving its rate in beats per minute. The rhythm input, a series of timestamps, is first split into overlapping frames. Then, we compute the possible ACDs that fit this frame and build a graph with the candidate ACDs as nodes. By building this graph, we transform the quantization problem into one of path selection, where the nodes represent the ACDs and determine the note values of the transcription and the edges represent tempo transitions between frames. A path through the graph thus corresponds to a rhythm transcription. For path selection, we present both an automated method using weights for evaluating the transcription and finding the shortest path, and an interactive approach that gives users the possibility of influencing the path selection.

INTEGRATING MACHINE LEARNING WITH DSP FRAMEWORKS FOR TRANSCRIPTION & SYNTHESIS IN COMPUTER-AIDED COMPOSITION

Brandon Lincoln Snyder and Marlon Schumacher (Hochschule fur Musik Karlsruhe, Germany) In this paper we present applications integrating two classic machine learning methods into a Computer-aided Composition environment with the specific purpose of notating, organizing and synthesizing audio from large sets of sound data. We present a modular sample replacement engine driven by a classification method, and a texture synthesis application employing a clustering method. The applications are designed and presented with a particular focus on modularity and extensibility, with the goal of providing flexible options for integration into existing Open-Music projects. Therefore, in addition to presenting the methodology behind our applications, we also highlight the modular aspects of their structure along with several functions for performing transient detection, Mel-frequency cepstrum analysis, and probability vector calculation.

SESSION 5: Systems/Environments (10am)

SYMBOLIST RE-IMAGINED: BIDIRECTIONAL GRAPHIC-SEMANTIC MAPPING FOR MEDIA NOTATION AUTHORING AND PERFORMANCE

Rama Gottfried (Hochschule fur Musik und Theater Hamburg, Germany) SYMBOLIST is an in-development application for experimental notation, which aims to provide an un-opinionated authoring environment for the design and performance of symbolic notation. By following an information visualization rather than prescribed musical orientation, the application is

thought of as an open play-space, with tools for experimentation and thinking visually about relationships between representation and interpretation in media performance. In the paper we begin with an overview of the project's background, iterations and relationship to the DRAWSOCKET project, and introduce a redesign of the system, centered on a new framework for custom symbol definitions for bidirectional mapping and user interaction. In conclusion we discuss future development directions and evaluation of the project.

OSSIA SCORE 3

Jean-Michaël Celerier (*ossia.io F-33400 Talence*), **Myriam Desainte-Catherine** (CNRS, LaBRI, UMR 5800), **Pia Baltazar** (*ossia.io F-33400 Talence*) The ossia system has been introduced in 2015 as a notation for interactive scores. We present the result of seven years of usage and improvements to the ossia score software which acts as both an editor and player for such scores, and how it morphed from a simple OSC-only control sequencer to a fully-fledged multimedia system supporting live audio and video processing, live-coding with multiple embedded programming languages, communication with a variety of software and hardware and adaptations for more traditional music creation such as support for varying tempo and time signatures. In particular, we mention a few "original sins" and implementation mistakes done at the beginning of the software engineering process and how they had to be fixed.

THE DECIBEL SCOREPLAYER - LEARNING FROM AND FOR USABILITY

Aaron Wyatt, **Cat Hope** (*Monash University, Melbourne, Australia*) This paper outlines new developments in the Decibel Score- Player application for iPad, the functionality of the associated .dsz score file, and the evolution of the Decibel Score Creator desktop application that have been driven by re- cent user experience. This includes the introduction of an annotation layer, so that users may 'write' directly on to the score via the iPad screen; new methods for transferring scores to the iPad application, including the prototyping of a score server using QR code functionality; the ability to have different audio parts within a single score file and the expansion of the Decibel Score Creator's capabilities. Each of these developments has been primarily driven by user feedback, and to a lesser extent the evolution of various op- erating system compatibilities. The changes have enabled the Decibel ScorePlayer to remain relevant, easy to use and a valuable tool for reading animated, graphic notation.

SESSION 6: Case Studies (12am)

MAKING GRAPHICAL SCORE MORE ACCESSIBLE: A CASE STUDY

Christina Karpodini, **Tychonas Michailidis** (*DMT Lab School of Computing and Digital Technology Birmingham City University, Birmingham, UK*) This paper explores new ways of making graphical scores more accessible for visually impaired users. Existing assistive technologies demonstrate a gap in providing accessible tools for composing and performing contemporary music with non traditional western notation. The two case studies presented, Blocks Sound and Logothetis Sound examine the interactive relationships and affordances

through tactile interaction and how this interaction can influence their experience and understanding of both graphic scores and interactive composition of users. We present the process and limitations and propose the use of haptic technology and tangible experience for making contemporary graphic scores more accessible and inclusive.

NOTATION FOR ORGAN EXTENDED TECHNIQUES

Cláudio de Pina (CESEM Lisbon, Portugal) The notation of extended techniques on the organ do not have a clear standard. Composers use their own notation or guiding rules to express their sonic expansion on the instrument. Since 1960, the most prolific period on organ experimentation, Ligeti, Kagel and Cage were the first to become known for using non-standard notation on the organ. From this collection of works, the ones from Ligeti are paramount. From the graphical score of *Volumina*, the long clusters of Harmonies to the fast torrent of notes of *Coulée*. Kagel develops further with other notations for clusters and graphical gestures in *Phantasie für Orgel*. Finally, with Cage we find a simpler way of notating long notes and stop changes. Kurt Stone has a chapter on his book, *Music Notation in the Twentieth Century*, regarding notation on the organ, but it not describes half-drawn registers, half-depressed keys and does not present anything regarding motor or other air manipulations. A clearer notation and explanation is needed for these extended techniques. In an instrument so tied to a functionality, it is pertinent nowadays to re-incorporate these techniques in the contemporary organ repertoire. A new simple notation is presented, alternative to graphical notation or lengthy performance notes. This will create an easy understandable approach.

RETHINKING THE NOTATION DESIGN SPACE

Benjamin Bacon (Technische Universität Berlin Berlin, Germany) Previous work has demonstrated how the analysis and creation of musical notation can be seen within the context of information visualisation. In this case, graphical and musical features are broken down into primary categories which can then be linked to one another, allowing for the visualisation of notation mapping schemes. The space for mapping these elements is known as the Notation Design Space (NDS). While the NDS has the potential to be a powerful tool for analysing and creating new notations, the current model does not provide adequate support for notations which depict the actions of the performer. This paper proposes changes to the current NDS to include the mapping of sound-producing and facilitating gestures, followed by a theoretical analysis of the similarities between notation and digital musical instrument mapping. The inclusion of musical gesture within the NDS serves a dual purpose; it allows for a more nuanced reading of prescriptive-based notation focusing more on the actions of the performer, while also aligning the development of new notations with interaction design processes.

SESSION 7: New Notation Practices and Research (15:30)

MUTABLE GESTURES: A NEW ANIMATED NOTATION SYSTEM FOR CONDUCTOR AND CHAMBER ENSEMBLE

Ciaran Frame, Alon Ilisar, Sam Trolland (SensiLab, Monash University Melbourne, Australia)

This paper outlines the creation of a new real-time scoring work, *Mutable Gestures*, for any combination of chamber instruments with a conductor. The work translates a conductor's gestures into real-time animated notation, relayed to performers over a wireless network to generate musical material for improvisation. Drawing on recent real-time notation works, *Mutable Gestures* proposes a new form of gestural notation creation through the use of the *AirStick*, a new gestural musical instrument. The creation of this work contributes to the growing field of real-time animated notation, a field that reinterprets the traditional roles of score, conductor, composer and performer.

ON NOTATIONAL SPACES IN INTERACTIVE MUSIC

Vincent-Raphaël Carinola, Jean Geoffroy (CESEM Lisbon, Portugal) This article presents a reflection on the nature of notational spaces in interactive musical works using digital devices. It builds on the author's experiences in *Toucher1* (2009) for theremin and computer and *Virtual Rhizome2* (2018) for Smart Hand Computers³. In interactive music, notational spaces are correlated to the spatial structuring of the *dispositif*⁴, a notion that must be understood in the sense of an extension of the traditional instrument. That's why composing a work is equivalent, at least in part, to composing the instrument. The notational spaces — in other words: the places making possible a writing, and thus a musical interpretation — are distributed among the different components of the *dispositif*. The way in which its digital devices are interconnected (the mapping), the algorithmic logic of the "if-then-else" and the notion of openness play a fundamental role for the composer and the performer. However, in the case of miniaturised (or embedded, or embodied) *dispositifs*, this spatial structuring of its components seems to be absent and, consequently, questions the existence of a place for composition and interpretation. One of the solutions explored here is to conceive the work as a virtual architecture that recalls a "world" in the field of video games. This architecture, open to a plurality of courses, then assumes the function of a notational space by calling, paradoxically, on techniques of memory specific to orality.

A FEW THOUGHTS ON POLYMORPHISM IN DIGITAL SCORES

Georg Hajdu (Hochschule für Musik und Theater Hamburg, Germany) This paper is motivated by the phenomenon of polymorphism in graphic notation, a notion introduced to the discourse of graphical composition by Greek composer Anestis Logothetis. It refers to the reading of a graphic score in which alternative paths can be taken by a performer. The reading can either be synthetic/global or analytical/local with intermediary levels. We are contrasting Logothetis' concept of polymorphism with analogous phenomena in molecular biology and look at the paradigm shift leveraged by digital technologies where machine and hybrid readings ought to be taken into consideration. Examples of current practices are given for live, extended reality and hybrid scenarios. The paper finishes with an outlook on how AI might eventually become another game changer.

Comprovisation Workshop

**Monday May 10th 18h30
at the Marseille Conservatory**

Ciaran Frame: *Mutable Gestures*

Sebastian Adams: *Chat music*

Gabriel Jose Bolaños: *Senderos*

Chloe Sobeck: *Apotropaic*

Libero Mureddu: *Joy Against the Machine*

Goni Peles: *ScoreCraft*

Hugo Scurto: *Co-Explorer / CoMo*

Anders Lind: *Animated notation for piano and remote pen-and-paper Quartet*

Jaslyn Robertson: *Computer Virus*

Instrumentalists

Paul Scapillati *Percussion*

Clement Rioland *Saxophone*

Lucille Griffon *Flute*

Huihui Cheng *Voice*

Elie Duris *Batterie*

Music concert

Tuesday May 10th
at Salle Musicatzeize

16:30 Vocal Concert

Sandeep Bhagwati: *Villanelles de Voyelles*
Christian Klinkenberg: *The legionaries*
David Kim-Boyle: *96 Postcards in Real Color*
Jonathan Bell: *Machine à sons*
Gregory Beller: *Casual Causality*
Micha Seidenberg: *MY MOTHER is a fish*

The Neue Vocalsolisten Stuttgart

Suzanne Leitz-Lorey *Soprano*
Geertruida van der Poel *Mezzosoprano*
Martin Nagy *Tenor*
Andreas Fischer *Bass*

Camille Giuglaris, RIM (*réalisateur en informatique musicale*, UCA – CTE)
Monica Gil Giraldo, RIM (*réalisatrice en informatique musicale*, CIRM-CNCM)

18:00 Coffee break

18:30 Instrumental Concert

Se-Lien Chuang & Andreas Weixler: *General Tenor*
Cat Hope: *Muska Landay*
Richard Hoadley: *Calder's Cello*
Xiao Fu: *A trip in an oyster::2*
Yang Song: *Petrichor*
Shai Cohen: *Who does not play the dice*

Ambre Vuillermoz, accordion
Marine Rodalec, cello
Joël Versavaud, saxophone
Bastian Pfefferli, percussion
Camille Giuglaris, RIM (*réalisateur en informatique musicale*)
Monica Gil Giraldo, RIM (*réalisatrice en informatique musicale*)

Music program

Comprovisation Concert - Monday 18:30 - Marseille Conservatory

Mutable Gestures by Ciaran Frame

Mutable Gestures is a real-time notation work for any combination of chamber instruments with a conductor. The work translates a conductor's gestures into animated notation, relayed to performers over a wireless network to generate musical material for improvisation. Drawing on recent real-time notation works, *Mutable Gestures* proposes a new form of gestural notation creation through the use of the *AirStick*, a new gestural musical instrument. The creation of this work contributes to the growing field of real-time animated notation, a field that reinterprets the traditional roles of score, conductor, composer and performer.

Chat music by Sebastian Adams

The basic idea is instantaneous conversion of the text written into the chat by audience members into musical notation. This is presented as a real-time notation which blends text with traditional music notation, for use as an interactive improvisational framework. Audience members in the room (+ other audience who are viewing remotely) will be invited to log on to a Twitch channel and make comments which will be interpreted live by the musicians in the room. Duration of the piece is open-ended.

Senderos by Gabriel Jose Bolanos

Senderos are a collection of video-scores for variable instrumentation. The scrolling graphic notation questions inherent biases in standard western notation. Each piece explores a different balance of freedom vs constraint.

Apotropaic by Chloe Sobeck

Between 2020-2021, Melbourne endured a total of 262 days in strict lockdown, much of which saw residents confined to a 5km radius of their homes and a 9pm-5am curfew. *Apotropaic* was created in the midst of this lockdown and follows the sound of the wind whistling through the ceiling of the composer's apartment. This sound became the soundtrack to the seemingly endless isolation of lockdown and is represented on the score by the endlessly scrolling assembly of glitchy gold blocks.

Animated notation for piano, and remote pen-and-paper Quartet, by Anders Lind

This proposal is the premiere live performance of a composition for a Remote Pen and Paper Quartet. Four people are situated at their individual homes in Sweden, using pen and paper as their musical instruments, conducted by web-based animated notation. The composition is a part of an artistic research project entitled *Home Participatory Orchestra*.

Vocal Concert - Tuesday 16:30 - Musicatreize

Villanelles de Voyelles by Sandeep Bhagwati

NIRGUN BHAJAN *Villanelles de Voyelles* is part of a series of works in which I explore the Indian tradition of "nirgun bhajans" – spiritual songs to nameless entities, neither gods nor animistic spirits that to this day, in some rural regions of Northern India, is sung by often Muslim singers for Hindu audiences, often using poems by the medieval mystical poet Kabir. Almost forgotten in the cultural mainstream, they were revived in the late 20th century by the extraordinary singer-composer Kumar Gandharva. VILLANELLES In this piece, singers react to audio scores which tell them how to use their vocal apparatus in specific ways, in order to produce specific vowel sounds. Consonants are avoided throughout. They also are asked to imitate electronically re-composed bird songs and to move their body in certain ways reminiscent of Sufi rituals. Ideally, the singers should be masked as bird-like beings, and thus become non-human entities. A villanelle is a repetitive rural song, and in 2017, I made a version for fixed audio scores, a linear composition which has been performed by several vocal ensembles. In 2021/2022, together with the help of Kasey Pocius, this piece has been re-thought as a non-linear audio score – each time the score is activated the software will generate a new sequence of instructions for each voice, coordinated in certain moments amongst the singers.

The legionaries

Composition: Christian Klinkenberg – **PaperCut-Film:** Nicole Erbe – **Papercut:** Dorthe Goeden – **Graphic scores:** Jeanne Weishaupt – **Autoconductor:** Lothar Felten – **Performers:** Neue Vocalsolisten During the lockdown, Nicole Erbe, the theater-director found the artwork remnants of the paper artist Dorthe Goeden. Nicole about the process: "Animating the negative forms of her silhouettes had been an idea that fascinated me for over 10 years, as I saw in them diverse figures with hidden lives of their own. PaperCut Films refers to the idea of assembling black or white pieces of paper that fall out of the abstract works, which can be up to 9m in size and no longer have any meaning for the visual artist, into surreal figures and fairytale-like scenic images and bringing them to life cinematically." Christian Klinkenberg has set this silent film to music and tried to let the different characters and the wit flow into the composition. The music creates a new dimension: Even the invisible is made visible in the minds of the listeners.

96 Postcards in Real Color by David Kim-Boyle

Poiesis: In 1978, French writer Georges Perec composed his playful *Deux Cent Quarante-Trois Cartes Postales en Couleurs Véritables*, a series of postcard texts generated with a set of simple combinatorial rules. Each text describes a location, either a city, region or hotel at which various activities and entertainments occur, before signing off with a farewell. Taking inspiration from Perec's 1978 work and the various constraint-based approaches of the Oulipo (*Ouvroir de littérature potentielle*) school of whom he was an exemplar member, *96 Postcards in Real Color* for up to eight singers adopts a similar combinatorial approach to musical organization. It features a three-dimensional, immersive performance score generated from Instagram image caption data scraped from 96 locations around the world

from Ajaccio to Zimbabwe. The score is uniquely instantiated for each performance and surrounds the performers in a virtual reality space. As the performers sound out various pathways through the score, actualizing its latent possibilities, their *dérive-like* exploration traces a musical trail through the lens of idealized Instagram memories.

Technē: I have been exploring the musical affordances of performance scores generated in real-time for many years. As much an exploration of technical possibility as poetic expression, these works have forced me to think about musical form in new ways and as often as not, develop solutions to complex technical challenges. *96 Postcards in Real Color* is my first work for virtual reality, a medium whose technical affordances have allowed me to create three-dimensional immersive data visualizations with realistic presentation of depth but which have also offered exciting new avenues of creative enquiry. Foremost among these, is the real-time gathering and visualization of data from social media. In *96 Postcards in Real Color*, this has required the use of various Python libraries (Selenium, Beautiful Soup, spaCy) to gather and process Instagram data and Unity SDKs (Photon Unity Networking) to help create multiplayer VR scenes in Unity3D, the development platform used to create the VR environment in which the performers are immersed.

MY MOTHER is a fish by Micha Seidenberg

William Faulkner's *As I lay dying* has occupied me for some time. I am fascinated by the content, language and form that Faulkner has given to his novel. He often writes in the form of a stream of consciousness and thus penetrates linguistically into the interstices of perception. There, different senses intermingle and rational ways of thinking fray into the edges of the surreal. These complex experiences, as well as Faulkner's particular narrative style, punctuated by flashbacks with their intersecting narrative threads, are a wonderful proposition for compositional exploration. Just as formative as the text, is the "instrument" that emerges from the wonderful instrumentation of the vocal quartet with electronics: here the interplay of the vocal sound and the sound of my synthesizer, controlled by a score, is in the foreground. On the one hand, I was looking for the difference, on the other, the synthetic. I was always fascinated by the greatest possible mixture of vocal and frequency modulation-based sound synthesis. Sometimes it is no longer possible to distinguish between human and non-human sounds. Similar to Faulkner's streams of consciousness, yet in a very different, musical way, moments of rapture and perceptual shift occur in this process.

Instrumental Concert - Tuesday 18:30 - Musicatreize

General Tenor by Se-Lien Chuang & Andreas Weixler

General Tenor is an immersive realtime audiovisual compositional environment with interactive generative score (iScore) for multiple computer and open ensemble. An open acoustic instruments ensemble including electronic devices using digital interfaces (laptops etc.) serves as mutual media for score conducting, reading, and interpreting. In concert, it is performed within any combination of audiovisual real-time processing and improvisation conducted by interactive graphic scores on individual screens/computer-driven by virtuoso random functions and intentional choices of a digital conductor/composer, which underline

the visual and graphic components that are linked" to and experienced by the musical sound environments.

The essence of this compositional environment is to entice and express musical ideas by offering visual and graphic incentives within the personal and individual spontaneity of the performer and the composer. Further, it aims to crosslink the aural and visual environments for the performer and especially for the audience by fulfilling the audiovisual real-time processing through the multichannel audio processing and sound spatialization on the one hand, on the other hand, the large-size projection of the visual transformation. An interactive score turns the concert into a live event of a very special kind: the score is assembled within an algorithmic/random real-time process on stage based on mainly graphic notation.

Calder's Cello by Richard Hoadley

Calder's Cello explores cross-domain expression through the use of live dynamic notations. The title references the 1924 photograph 'Le Violon d'Ingres' by Man Ray and the mobile sculptures of Alexander Calder. Reflecting the variable nature of the latter, the music is created through hybrid processes of structured programming, generative procedures, and live coding. The material is produced, processed, and generated live. Live notations are dynamically created in response to a variety of data sources as well as algorithms.

A trip in an oyster::2 by Xiao Fu

A trip in an oyster::2 is part of my dance-theater piece enactment::interchange. Eastern aesthetics focuses on a kind of "meaning" - which could be called communication without language. In this dance piece, the old Eastern aesthetics is brought into a new media context and thereby exposing the audience to its ambiguities and complexities.

Muska Landay by Cat Hope

This piece is set to an English translation of an Afghan Landay, conceived by Rhalia Muska:

I call. You're stone. One day you'll look and I'll be gone.

The Landay is an Afghan form of poetry consisting of a single couplet in Pashto, one of the two national languages of Afghanistan. Commonly shared orally amongst Pashtun women, these poems consist of 22 syllables - 9 on the first line, 13 on the second. Traditionally, they are sung aloud with the beat of a hand drum. They typically address themes of love, grief, homeland, war, and separation. Like all music, they were banned by the Taliban during 1996 - 2001, and likely again now given the recent Taliban takeover of Afghanistan.

Rahlia Muska (Muska means 'smile' in Pashto) was a teenage girl who recited Landays over the phone to a radio program on local Radio Azadi. Radio was her only contact with the outside world. However she passed away after setting herself on fire, not long after her brothers had discovered she was making poetry. This is one of many tragic stories from the women and girls under the Taliban, but her Landays are rebellious and powerful, belying the notion of Afghan women as submissive or defeated. They are strong, resilient, pollical, creative and rebellious. The graphic score is made by creating musical gestures by tracing

over a photograph of flowing burqa's worn by Afghan women under an aircraft, taken by Seamus Murphy.

Casual causality by Greg Beller

Casual causality, by the fertile oxymoron between chaos and determinism, underlines the newly precarious character given by our time which feeds on doubt, to acquired certainties, coming from the scientific knowledge for example. Its construction questions our perception of causality by staging a confrontation between linear time and cyclical time. The piece is part of a set of works for human and synthetic voices composed with artificial intelligence algorithms as part of a doctoral thesis in multimedia composition at the HfMT in Hamburg. The synchronization of the singers' voices and the synthetic voices is achieved by scrolling through a score written in symbolic and proportional notation, using drawsocket technology, developed by the HfMT Hamburg.

Who does not play the dice by Shai Cohen

The composition is dedicated to Borges's "*The Lottery in Babylon*" story which explores the role of chance in life, whether we truly deserve certain things or if everything in life is simply a matter of luck. In my piece, the audio-visual "tape" material is referring to several aleatoric works from the twentieth century. Many of those works include graphic notations that describe the music vaguely, a phenomenon that allows for unexpected, but desirable, events to occur. In my piece the lotteries are held in the area of instrumentation, register, techniques, dynamics, and signal processing: ring modulation, transpose, and 8 channel routing.

Petrichor by Yang Song

"*Petrichor*" describes a pleasant smell that frequently accompanies the first rain after a long period of warm, dry weather. The score of this piece is written in time-space proportional notation, and includes some improvised parts. The idea is to try to ignore the limitations that come together with tempo and rhythm, prompting the musician to pay more attention on musical communication through playing. In concert situation, the musician are asked to sit separately, whilst connected via a web page to different sections/pages of the piece. The composer also takes part in the performative process, conducting and synchronizing the performance process through a Max patch which controls the web page from the local network.

I am speaking into a microphone by Diemo Schwarz

This piece puts forward a less common form of real-time composition: the automatic analysis of live sound from the speaking voice. However, the transformation of the voice into musical material and structure does not happen in the instant (like with beat boxing or voice-controlled synthesis), but is projected into time and space, in that the voice's constituent particles are sequenced so much slower than they have been spoken such as to generate a rhythmic and spatial score.

Workshops

**PatchXR (Pelle Juul), Room 2,
9h30–11h Group 1, 11h30–13h Group 2**

PatchXR develops a native VR creative environment that lets you build brand new instruments and play electronic music in the metaverse. Break out of the old paradigms, and bring your art to the next level. Create interactive worlds with the building blocks of sound. Explore an unlimited environment that looks to the future of human-computer interface and the endless possibilities of your imagination.

**Bach - bach automated composer's helper (Micha Seidenberg),
Conf. Room, 9h30–11h**

bach brings music notation inside Max. You can generate, edit, script, modify and play your scores either with mouse and keyboard or through patching. Any Max audio module can be easily driven. Micha proposes in this workshop to control synthesis with `bach.roll` & `bach.score`

**Maxscore, drawsocket & Symbolist (Georg Hajdu, Rama Gottfried),
Conf. Room, 11h30–13h**

MaxScore is a leading application for graphical and microtonal notation. Drawsocket is an `node.js` based server/client platform for generating synchronized, browser-based displays across an array of networked devices. SYMBOLIST is a graphic notation environment for music and multimedia.

CosmoNote (Daniel Bedoya), Room PRISM, 9h30–11h

CosmoNote was created to enable people from diverse backgrounds to mark structures such as groupings and boundaries in performed music. This workshop will explain to the general user the capabilities of this new tool and equip users with the knowledge to make the most of this interface.

**Scorecraft (Goni Peles & Yuval Adler),
Room 1 and Z' Building, 9h30–11h Group 1, 11h30–13h Group 2**

ScoreCraft is a multiplayer music game exploring online music making mediated through gameplay. Each player controls the game by producing sounds, so effectively by playing the game the players are making music. The workshop/performance will consist of several game sessions showing a variety of game scenarios and their resultant music.

Useful Information

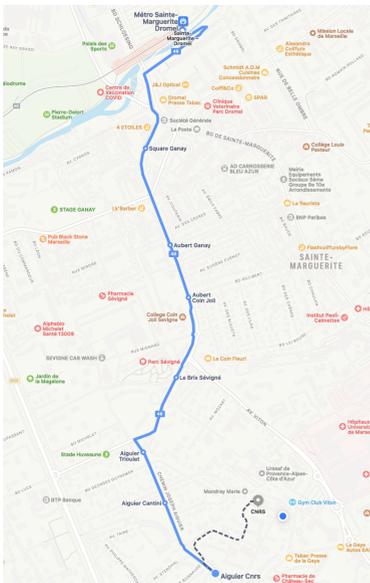
The scientific part of TENOR2022 will mainly take place at the Campus Joseph Aiguier (CNRS) that hosts the PRISM Laboratory.

How to get to the PRISM CNRS Laboratory?

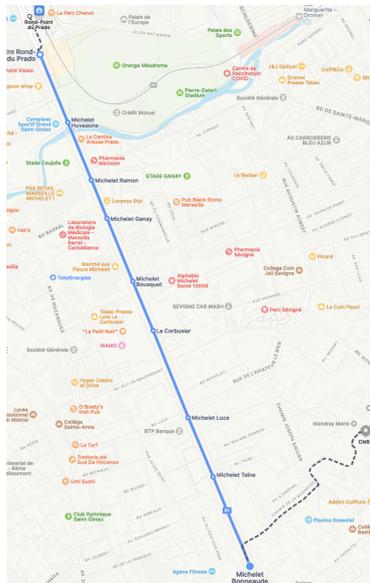
From Marseille-Provence airport: Take the shuttle bus that will drive you to Saint-Charles Railway Station (**Gare Saint Charles**).

From Saint-Charles railway station: Take the subway line #2 towards **Sainte Marguerite Dromel** and go either to **Rond-Point du Prado** or to the end of the line: **Sainte Marguerite Dromel**.

From subway stations Rond-point du Prado: take bus #81 to station Michelet Bon-neaude. Sainte Marguerite-Dromel: take bus #48 to station Aiguier CNRS. A visitor parking is also available on the Campus.



(a) 48 bus from Sainte-Marguerite Dromel station

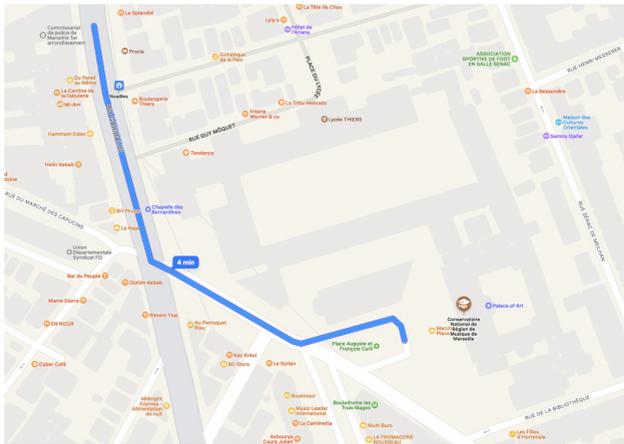


(b) B1 bus from Rond-Point du Prado station

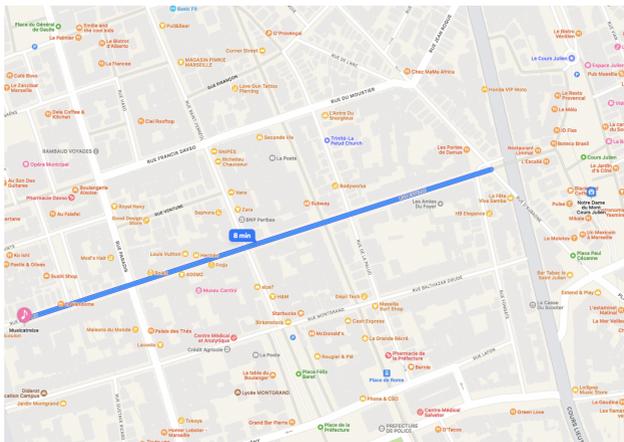
Other venues

Marseille Conservatory: 2 place Auguste Carli, 13001 Marseille. To get there from the *Campus Aiguier* (CNRS) take the Bus 48 and then the Metro M2 (Stop at *Noailles*). 25 mn.

Musicatzeize: 53 rue Grignan, 13006 Marseille. To get to Musicatzeize from the *Campus Aiguier* (CNRS) take the bus B1 or Bus 48 then the Metro (Stop at *Estrangin* or *Notre Dame du Mont*).

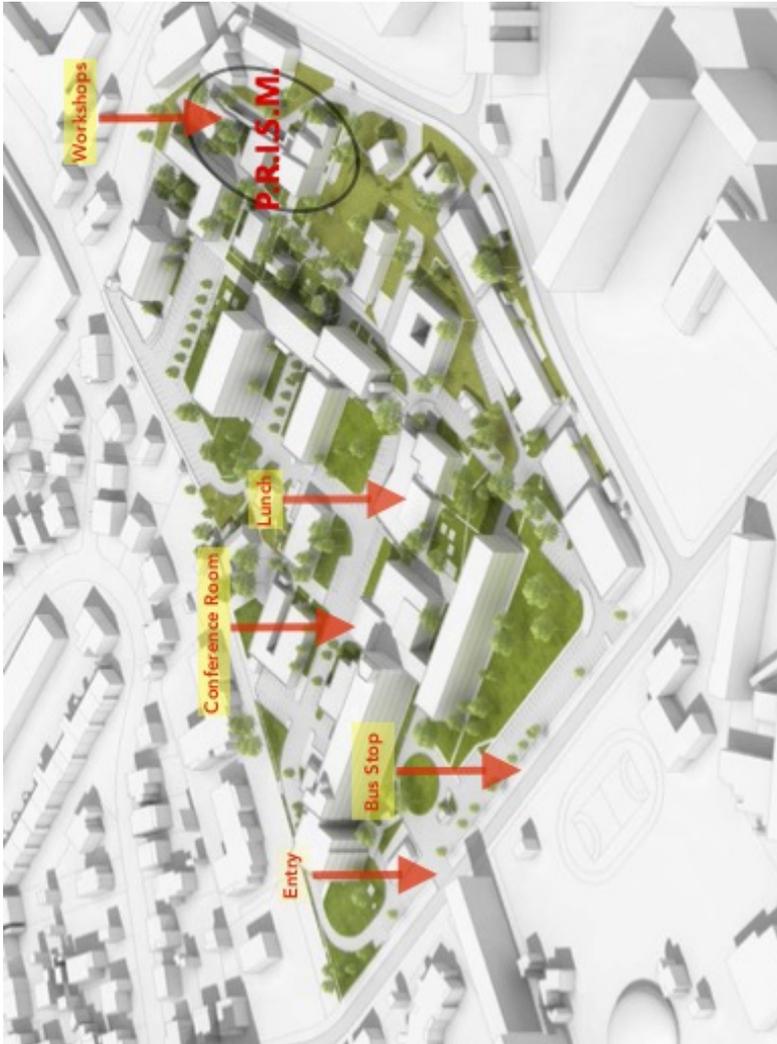


(a) The conservatory is at 4 min walking from *Nouailles* station



(b) To get to *musicatzeize* stop at *Notre dame du mont* station and walk 8 min.

Map of the Joseph Aiguier Campus



Partner Institutions and Sponsors

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