



## **CONFERENCE GUIDE**

**The 23rd International Society  
for Music Information Retrieval Conference  
(ISMIR 2022)**

December 04-08, 2022  
Bengaluru, India



# ISMIR 2022

**December 4-8, Bengaluru, India**

Welcome to ISMIR 2022, the 23rd International Society for Music Information Retrieval Conference. This year's ISMIR conference, being held in Bengaluru, marks the very first time that ISMIR is being hosted in India. Due to the changing global landscape as a result of the COVID-19 pandemic, the 23rd ISMIR conference became the first ISMIR to be hybrid, with both in-person and virtual attendees and presenters. While this posed unique challenges, we took this as an opportunity to bring back the benefits of a physical conference, while maintaining the expanded reach and improved inclusivity that the past two virtual editions of ISMIR have provided.

This conference guide book can be used by in-person participants as a ready reckoner to different events happening in ISMIR 2022. While we have ensured the information in this guide is as accurate as possible, this book came out of the press a few days before the conference. So, you are encouraged to refer to the latest information on the website and to the announcements made during the conference for any last-minute changes.

The organizing team welcomes you to ISMIR 2022 and thanks you for traveling to Bengaluru to attend the conference in person! We have planned an exciting scientific and social program and we look forward to your whole-hearted participation over the course of this week.

The ISMIR 2022 Scientific Program spans over five days and comprises two Keynote talks, 113 papers (distributed over 7 paper sessions), 6 tutorials, 2 hybrid special sessions, 3 online special sessions and a WiMIR session. ISMIR 2022 also includes physical and online Late-breaking demo sessions, ISMIR society meetings and industry presentations from our sponsors.

The ISMIR 2022 Social Program offers fascinating new experiences with a puppet theater performance by Dhaatu, an Indian street food themed welcome reception, a jugalbandi Indian art music concert by Kaustuv Kanti Ganguli and Vignesh Ishwar, and a banquet in an Indian village themed museum.

There is also a day-long satellite event at the Indian Music Experience museum, with workshops on Indian music by expert musicians and guided museum tours (for those who signed up for it during registration).

Finally, we gratefully acknowledge the generous support of our sponsors. We sincerely hope that you will enjoy the conference experience, meet old friends and make new connections while getting a good glimpse of the culture of southern India.

**Preeti Rao, Hema Murthy, Ajay Srinivasamurthy**

General Chairs

ISMIR 2022

## ISMIR 2022 Organizers



# ISMIR

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Hema Murthy (Indian Institute of Technology Madras, Chennai, India)

Ajay Srinivasamurthy (Amazon Alexa, Bengaluru, India)

### Scientific Program

Rachel Bittner (Spotify, Paris, France)

Rafael Caro Repetto (Institute for Ethnomusicology, Kunsthochschule Graz, Austria)

Masataka Goto (National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan)

Xavier Serra (Universitat Pompeu Fabra, Barcelona, Spain)

### Tutorials

Vipul Arora (Indian Institute of Technology Kanpur, Kanpur, India)

Keunwoo Choi (Gaudio Lab, Seoul, South Korea)

Sri Rama Murty K. (Indian Institute of Technology Hyderabad, Hyderabad, India)

### Late-Breaking/Demo

Sanjeel Parekh (Telecom, Paris, France)

Siddharth Gururani (NVIDIA, Santa Clara, USA)

### Music Program

Kaustuv Kanti Ganguli (Zayed University, Abu Dhabi, UAE)

Sumitra Ranganathan (Krea University, Sri City, India)

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Xiao Hu (University of Hong Kong, Hong Kong, China)

Makarand Velankar (Cummins College, Pune, India)

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Pratibha Moogi (IBM Research, Bengaluru, India)

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Sharath Adavanne (Freshworks, Bengaluru, India)

Swapnil Gupta (Bengaluru, India)

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Chitralekha Gupta (National University of Singapore, Singapore)

Ashvala Vinay (Georgia Institute of Technology, Atlanta, USA)

## **Social Media/Publicity**

Albin Andrew Correya (Moodagent, Copenhagen, Denmark)

Vishnu Srinivasa Murthy (Vellore Institute of Technology, Vellore, India)

## **Social Program**

Oriol Nieto (Adobe, San Francisco, USA)

Kaustuv Kanti Ganguli (Zayed University, Abu Dhabi, UAE)

## **Volunteers**

Sangsguptak Pal	Parampreet Singh
Gowripasad R	Rajesh R
Milind Barman	Vayyavaru Venkatesh
Elena Georgieva	Prashant Mishra
Vibha Masti	Kavya Ranjan Saxena
Suraj Jaiswal	Nithya Shikarpur
Pratap Kyoganahalli	Rhythm Jain
Utkarsh Gupta	Adbhut Vipin Bhardwaj
Vishruth Veerendranath	Jom Kuriakose
Jyoti Narang	Rohit M. A.
Sharvaree Sinkar	Tirna Ghosh
Venkatakrishnan V K	Shreyas Nadkarni
Thishyan Raj T	Yuxi Qiao
Recep Oğuz Araz	Adithi Shankar
Dilip Harish	

# Program and Schedule

We provide a detailed schedule here. We request you to read the instructions for participants on the website carefully.

		ISMR 2022 Scientific Program		Sun 4/12		Mon 5/12		Tue 6/12		Wed 7/12		Thu 8/12		Fri 9/12		Sat 10/12		Sun 11/12		
		08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	08:00 - 09:00	Registration	
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	Morning Tutorials (TM-T3M) 09:00 - 13:00			09:00 - 10:00	Opening session	09:00 - 10:00	Keynote-1 (Rita Krishna)	09:00 - 10:00	Keynote-2 (Richa Singh)	09:00 - 10:00	Paper session - 1	10:00 - 12:30	Paper session - 3 (Special Call) 10:00 - 12:30	10:00 - 12:30	Paper session - 5	10:00 - 12:30	Paper session - 7	09:00 - 11:30		
	11:00																			
	12:00																			
	13:00	Lunch	13:00 - 14:00																	
	14:00	Afternoon Tutorials (T4A-T6A) 14:00 - 18:00																		
	15:00																			
	16:00																			
	17:00																			
	18:00	Performance by Dhanau Puppet Theater 17:30 - 19:00																		
	19:00	Welcome Reception 19:00-21:00																		
	20:00																			
	21:00																			
	22:00																			
	23:00																			
	Special session-A (Online) 22:00 - 23:15	Special session-B (Online) 22:00 - 23:15	Special session-C (Online) 22:00 - 23:15																	

Time	Session	Venue
<b>Sunday, Dec 4</b>		
08:00 - 09:00	<b>Registration</b>	
	<b>Morning Tutorials</b>	
	T1(M): An Introduction to Symbolic Music Processing in Python with Partitura Carlos Cancino-Chacón, Francesco Foscarin, Emmanouil Karystinaios, Silvan David Peter	Hall-B
09:00 - 13:00	T2(M): Computational Methods For Supporting Corpus-Based Research On Indian Art Music Thomas Nuttall, Genís Plaja-Roglans, Lara Pearson, Brindha Manickavasakan, Ajay Srinivasamurthy, Kaustuv Kanti Ganguli	Hall-C
	T3(M): Designing Controllable Synthesis System for Musical Signals Hyeong-Seok Choi, Yusong Wu	Hall-A
13:00 - 14:00	<b>Lunch</b>	Dining area
	<b>Afternoon Tutorials</b>	
	T4(A): Few-Shot and Zero-Shot Learning for Musical Audio Yu Wang, Hugo Flores García, Jeong Choi	Hall-A
14:00 - 18:00	T5(A): Deep learning for automatic mixing Christian J. Steinmetz, Soumya Sai Vanka, Gary Bromham, Marco A. Martínez Ramírez	Hall-B
	T6(A): Trustworthy MIR: Creating MIR applications with values Christine Bauer, Andrés Ferraro, Emilia Gómez, Lorenzo Porcaro	Hall-C

Time	Session	Venue
<b>Monday, Dec 5</b>		
08:00 - 09:00	Registration	
09:00 - 10:00	<b>Opening Session</b> <b>Session Chairs:</b> Preeti Rao (IIT Bombay), Hema Murthy (IIT Madras), Ajay Srinivasamurthy (Amazon Alexa India)	J N Tata Auditorium
10:00 - 12:30	<b>Paper session - 1</b> <b>Session Chair:</b> Emilia Parada-Cabaleiro (Johannes Kepler University)  * P1-01: Interpreting Song Lyrics with an Audio-Informed Pre-trained Language Model Yixiao Zhang, Junyan Jiang, Gus Xia, Simon Dixon P1-02: Toward postprocessing-free neural networks for joint beat and downbeat estimation Tsung-Ping Chen, Li Su P1-03: Music Translation: Generating Piano Arrangements in Different Playing Levels Matan Gover, Oded Zewi P1-04: Scaling Polyphonic Transcription with Mixtures of Monophonic Transcriptions Ian Simon, Joshua Gardner, Curtis Hawthorne, Ethan Manitow, Jesse Engel P1-05: Attention-based audio embeddings for query-by-example Anup Singh, Kris Demuynck, Vipul Arora P1-06: SIATEC-C: Computationally efficient repeated pattern discovery in polyphonic music Otso Björklund P1-07: Tailed U-Net: Multi-Scale Music Representation Learning Marcel A Vélez Vásquez, John Ashley Burgoyne P1-08: DDSM-based Singing Vocoders: A New Subtractive-based Synthesizer and A Comprehensive Evaluation Da-Yi Wu, Wen-Yi Hsiao, Fu-Rong Yang, Oscar D Friedman, Warren Jackson, Scott Brzenak, Yi-Wen Liu, Yi-Hsuan Yang P1-09: Equivariant self-supervision for musical tempo estimation Elio Quinton P1-10: How Music features and Musical Data Representations Affect Objective Evaluation of Music Composition: A Review of CSMT Data Challenge 2020 Yuqiang Li, Shengchen Li, George Fazekas P1-11: YM2413-MDB: A Multi-Instrumental FM Video Game Music Dataset with Emotion Annotations Eunjin Choi, Yoonjin Chung, Seolhee Lee, Jongik Jeon, Taegyun Kwon, Juhan Nam P1-12: Detecting Symmetries of All Cardinalities With Application to Musical 12-Tone Rows Anil Venkatesh, Viren Sachdev P1-13: The power of deep without going deep? A study of HDPGMM music representation learning Jaehun Kim, Cynthia C. S. Liem P1-14: Pop Music Generation with Controllable Phrase Lengths Daiki Naruse, Tomoyuki Takahata, Yusuke Mukuta, Tatsuya Harada P1-15: Exploiting Pre-trained Feature Networks for Generative Adversarial Networks in Audio-domain Loop Generation Yen-Tung Yeh, Yi-Hsuan Yang, Bo-Yu Chen P1-16: Modeling the rhythm from lyrics for melody generation of pop songs Daiyu Zhang, Ju-Chiang Wang, Katerina Kosta, Jordan B. L. Smith, Shicen Zhou	J N Tata Auditorium and Poster Area
12:30 - 13:30	Lunch	Dining Area

Time	Session	Venue
13:30 - 16:00	<b>Paper session - 2</b> <b>Session Chair:</b> Chitralekha Gupta (National University of Singapore)  * P2-01: <b>Visualization for AI-Assisted Composing</b> Simeon Rau, Frank Heyen, Stefan Wagner, Michael Sedlmair P2-02: <b>Retrieving musical information from neural data: how cognitive features enrich acoustic ones</b> Ellie Bean Abrams, Eva Muñoz Vidal, Claire Pelofi, Pablo Ripollés P2-03: <b>Beat Transformer: Demixed Beat and Downbeat Tracking with Dilated Self-Attention</b> Jingwei Zhao, Gus Xia, Ye Wang P2-04: <b>Sketching the Expression: Flexible Rendering of Expressive Piano Performance with Self-Supervised Learning</b> Seungyeon Rhyu, Sarah Kim, Kyogu Lee P2-05: <b>Exploiting Device and Audio Data to Tag Music with User-Aware Listening Contexts</b> Karim M. Ibrahim, Elena V. Epure, Geoffroy Peeters, Gaël Richard P2-06: <b>Jukedrummer: Conditional Beat-aware Audio-domain Drum Accompaniment Generation via Transformer VQ-VAE</b> Yueh-Kai Wu, Ching-Yu Chiu, Yi-Hsuan Yang P2-07: <b>Learning Hierarchical Metrical Structure Beyond Measures</b> Junyan Jiang, Daniel Chin, Yixiao Zhang, Gus Xia P2-08: <b>Mid-level Harmonic Audio Features for Musical Style Classification</b> Francisco C. F. Almeida, Gilberto Bernardes, Christof Weiss P2-09: <b>Distortion Audio Effects: Learning How to Recover the Clean Signal</b> Johannes Imort, Giorgio Fabbro, Marco A Martinez Ramirez, Stefan Uhlich, Yuichiro Koyama, Yuki Mitsufuji P2-10: <b>End-to-End Full-Page Optical Music Recognition for Mensural Notation</b> Antonio Ríos-Vila, Jose M. Inesta, Jorge Calvo-Zaragoza P2-11: <b>Mel Spectrogram Inversion with Stable Pitch</b> Bruno Di Giorgi, Mark Levy, Richard Sharp P2-12: <b>Latent feature augmentation for chorus detection</b> Xingjian Du, Huidong Liang, Yuan Wan, Yuheng Lin, Ke Chen, Bilei Zhu, Zejun Ma P2-13: <b>AccoMontage2: A Complete Harmonization and Accompaniment Arrangement System</b> Li Yi, Haochen Hu, Jingwei Zhao, Gus Xia P2-14: <b>Supervised and Unsupervised Learning of Audio Representations for Music Understanding</b> Matthew C McCallum, Filip Korzeniowski, Sergio Oramas, Fabien Gouyon, Andreas Ehmann P2-15: <b>Generating Coherent Drum Accompaniment with Fills and Improvisations</b> Rishabh A Dahale, Vaibhav Vinayak Talwadker, Preeti Rao, Prateek Verma P2-16: <b>Bottlenecks and solutions for audio to score alignment research</b> Alia Ahmed Morsi, Xavier Serra	J N Tata Auditorium and Poster Area
16:00 - 17:30	<b>WiMIR plenary session</b> <b>Music for Health and Well-being</b>  <b>Moderators:</b> Xiao Hu (Hong Kong University)(remote), Ranjani H G (Ericsson R&D) (in-person)  <b>Panelists:</b> Xiao Hu (Hong Kong University), Shahar Elisha (Spotify), Emilia Parada-Cabaleiro (Johannes Kepler University)	J N Tata Auditorium
17:30 - 19:00	<b>Performance by Dhaatu Puppet Theater</b>	Satish Dhawan Auditorium
19:00 - 21:00	<b>Welcome Reception</b>	Main Guest House Lawns
22:00 - 23:15	<b>Special session - A (Online)</b> <b>Ethics/Code of Conduct for ISMIR</b>  <b>Moderators:</b> Andre Holzapfel (KTH Royal Institute of Technology, Sweden), Fabio Moreale (University of Auckland), Bob Sturm (KTH Royal Institute of Technology, Sweden)	Online

Time	Session	Venue
<b>Tuesday, Dec 6</b>		
09:00 - 10:00	<b>Keynote-1: TM Krishna</b> <b>Evolution of Performance and Aesthetics in Indian Art Music</b> <b>Session Chair:</b> Ajay Srinivasamurthy (Amazon Alexa)	J N Tata Auditorium
10:00 - 12:30	<b>Paper session - 3 (Special Call)</b> <b>Session Chair:</b> Rafael Caro Repetto (Kunstuniversität Graz)	J N Tata Auditorium and Poster Area
	* P3-01: Raga Classification From Vocal Performances Using Multimodal Analysis Martin Clayton, Preeti Rao, Nithya Nadig Shikarpur, Sujoy Roychowdhury, Jin Li	
	* P3-02: Traces of Globalization in Online Music Consumption Patterns and Results of Recommendation Algorithms Oleg Lesota, Emilia Parada-Cabaleiro, Elisabeth Lex, Navid Rekabsaz, Stefan Brandl, Markus Schedl	
	P3-03: Network Analyses for Cross-Cultural Music Popularity Kongmeng Liew, Vipul Mishra, Yangyang Zhou, Elena V. Epure, Romain Hennequin, Shoko Wakamiya, Eiji Aramaki	
	P3-04: Three related corpora in Middle Byzantine music notation and a preliminary comparative analysis Polykarpos Polykarpidis, Dionysios Kalofonos, Dimitrios Balageorgos, Christina Anagnostopoulou	
	P3-05: Playing Technique Detection by Fusing Note Onset Information in Guzheng Performance Dichucheng Li, Yulun Wu, Qinyu Li, Jiahao Zhao, Yi Yu, Fan Xia, Wei Li	
	P3-06: KDC: an open corpus for computational research of dastgāhi music Babak Nikzat, Rafael Caro Repetto	
	P3-07: Inaccurate Prediction or Genre Evolution? Rethinking Genre Classification Ke Nie	
	P3-08: In Search of Sañcāras: Tradition-informed Repeated Melodic Pattern Recognition in Carnatic Music Thomas Nuttall, Genís Plaja-Roglans, Lara Pearson, Xavier Serra	
	P3-09: Automatic Chinese National Pentatonic Modes Recognition Using Convolutional Neural Network Zhaowen Wang, Mingjin Che, Yue Yang, Wen Wu Meng, Qinyu Li, Fan Xia, Wei Li	
	P3-10: Teach Yourself Georgian Folk Songs Dataset: A Annotated Corpus Of Traditional Vocal Polyphony David Gilman, Atalay Kutlay, Uday Goyat	
	P3-11: Adapting meter tracking models to Latin American music Lucas S Maia, Martin Rocamora, Luiz W P Biscainho, Magdalena Fuentes	
	P3-12: Critiquing Task- versus Goal-oriented Approaches: A Case for Makam Recognition Kaustuv Kanti Ganguli, Sertan Şentürk, Carlos Guedes	
	P3-13: A Dataset for Greek Traditional and Folk Music: Lyra Charilaos Papaiouannou, Ioannis Valantzias, Theodore Giannakopoulos, Maximos Kalaiakatos-Papakostas, Alexandros Potamianos	
	P3-14: Analysis and detection of singing techniques in repertoires of J-POP solo singers Yuya Yamamoto, Juhan Nam, Hiroko Terasawa	
12:30 - 13:30	<b>Lunch</b>	Dining Area

Time	Session	Venue
13:30 - 16:00	<p><b>Paper session - 4</b>  <b>Session Chair:</b> Vinoo Alluri (IIIT Hyderabad)</p> <p>* P4-01: Performance MIDI-to-score conversion by neural beat tracking  Lele Liu, Qiuqiang Kong, Veronica Morfi, Emmanouil Benetos</p> <p>P4-02: Symbolic Music Loop Generation with Neural Discrete Representations  Sangjun Han, Hyeongrae Ihm, Moontae Lee, Woohyung Lim</p> <p>P4-03: Automatic music mixing with deep learning and out-of-domain data  Marco A Martinez Ramirez, Weihsiang Liao, Chihiro Nagashima, Giorgio Fabbro, Stefan Uhlich, Yuki Mitsufuji</p> <p>P4-04: Music-STAR: a Style Translation system for Audio-based Re-instrumentation  Mahshid Alnoori, Vassilos Tzerpos</p> <p>P4-05: Learning Unsupervised Hierarchies of Audio Concepts  Darius Afchar, Romain Hennequin, Vincent Guigue</p> <p>P4-06: Multi-objective Hyper-parameter Optimization of Behavioral Song Embeddings  Massimo Quadrana, Antoine Larreche-Mouly, Matthias Mauch</p> <p>P4-07: ATEP: A Dataset of Automatically Transcribed Expressive Piano Performance  Huan Zhang, Jingjing Tang, Syed Rm Rafee, Simon Dixon, George Fazekas, Geraint A. Wiggins</p> <p>P4-08: PDAugment: Data Augmentation by Pitch and Duration Adjustments for Automatic Lyrics Transcription  Chen Zhang, Jiaxing Yu, Luchin Chang, Xu Tan, Jiawei Chen, Tao Qin, Kejun Zhang</p> <p>P4-09: Parameter Sensitivity of Deep-Feature based Evaluation Metrics for Audio Textures  Chitralekha Gupta, Yize Wei, Zequn Gong, Purnima Kamath, Zhuoyao Li, Lonce Wyse</p> <p>P4-10: Stability of Symbolic Feature Group Importance in the Context of Multi-Modal Music Classification  Igor Vatolkin, Cory McKay</p> <p>P4-11: Multi-pitch Estimation meets Microphone Mismatch: Applicability of Domain Adaptation  Franca Bittner, Marcel Gonzalez, Maike L Richter, Hanna Lukashevich, Jakob Abeßer</p> <p>P4-12: Melody transcription via generative pre-training  Chris Donahue, John Thickstun, Percy Liang</p> <p>P4-13: Source Separation of Piano Concertos with Test-Time Adaptation  Yigitcan Özer, Meinard Müller</p> <p>P4-14: Counterpoint Error-Detection Tools for Optical Music Recognition of Renaissance Polyphonic Music  Martha E Thomas Elias, Julie Cumming, Ichiro Fujinaga</p> <p>P4-15: A Dataset of Symbolic Texture Annotations in Mozart Piano Sonatas  Louis Couturier, Louis Bigo, Florence Leve</p> <p>P4-16: Violin Etudes: A Comprehensive Dataset for f0 Estimation and Performance Analysis  Nazif Can Tamer, Pedro Ramoneda, Xavier Serra</p> <p>P4-17: Checklist Models for Improved Output Fluency in Piano Fingering Prediction  Nikita Srivatsan, Taylor Berg-Kirkpatrick</p>	J N Tata Auditorium and Poster Area
16:00 - 17:00	<p><b>Special session - 1</b>  <i>Enhancing music listening with MIR</i></p> <p><b>Moderator:</b> Xavier Serra (Universitat Pompeu Fabra)</p> <p><b>Panelists:</b> Thomas Lidy (Utopia), Fabien Gouyon (Pandora), Hugo Rodrigues (Moises.ai), Anna Gatziorou (Chordify)</p>	J N Tata Auditorium

Time	Session	Venue
17:00 - 18:30	<b>ISMIR Music Program</b> <b>Session Chair:</b> Carlos Guedes (NYU Abu Dhabi)	J N Tata Auditorium
	M1: Hindustronic Live Carlos Guedes	
	M2: Conformity #16 for autonomous piano and large ensemble Jason Palamara	
	M3: "Wings", for Solo Clarinet and Automated Accompaniment Video Animation Kaitlin Pet, Nikki Pet, Christopher Raphael	
	M4: AI Phantasy Panayiotis Kokoras	
	M5: A song with yati Patterns- Visual representation through Kolam Saroja TK, Sujatha TKL, Chandrakanth Mamillapalli	
	M6: Fantastic AI Sinawi Danbinaerin Han, Hannah Park, Chaeryeong Oh, Dasaem Jeong	
	M7: Mukti - Kahani Re Aaya Tu (मुक्ति - कहाँ रे आया तू) Jyoti Narang, Thomas Nuttall	
	M8: The Oratory of Saint Philip Neri Luke Dzwonczyk	
	M9: Beatboxing with a homespun Sound box Ranapratap Ponnambalam	
	M10: Confluence of Carnatic and Western Music using Grahabedha and Carnatic Gamakas Tallapragada Shanmukha Sreevatsa, Suswara Pochampally	
	M11: Recurrent Variations for String Orchestra Hendrik Vincent Koops	
	M12: 'b_dot_io': an Audio-Visual Miniature for Saxophone and Computer Mark Hanslip	
	M13: Bloom for cello and live electronics Austin A Franklin	
	<b>ISMIR music concert</b> A Jugalbandi (Hindustani and Carnatic music) vocal Indian art music concert	
18:30 - 20:00	<b>Hindustani vocals:</b> Kaustuv Kanti Ganguli <b>Carnatic vocals:</b> Vignesh Ishwar <b>Harmonium:</b> Ravindra Katotli <b>Carnatic violin:</b> Sayee Rakshit <b>Tabla:</b> Tejovrush Joshi <b>Mridangam:</b> Sumesh Narayanan	J N Tata Auditorium
22:00 - 23:15	<b>Special session - B (Online)</b> <b>PhD in MIR: Challenges and Opportunities</b> <b>Moderator:</b> Meinard Müller (International Audio Laboratories Erlangen)	Online

Time	Session	Venue
<b>Wednesday, Dec 7</b>		
09:00 - 10:00	<b>Keynote-2: Richa Singh Adventures of AI: Deepfake and Bias in Audio Processing</b> <b>Session Chair: Hema Murthy (IIT Madras)</b>	J N Tata Auditorium
10:00 - 12:30	<b>Paper session - 5</b> <b>Session Chair: Rachel Bittner (Spotify)</b> <ul style="list-style-type: none"> <li>* P5-01: <b>Sonus Texere! Automated Dense Soundtrack Construction for Books using Movie Adaptations</b> Jaidev Shriram, Makarand Tapaswi, Vinoo Alluri</li> <li>P5-02: <b>Musikal Fast Infinite Waveform Music Generation</b> Marco Pasini, Jan Schlüter</li> <li>P5-03: <b>Symphony Generation with Permutation Invariant Language Model</b> Jiafeng Liu, Yuanliang Dong, Zehua Cheng, Xinran Zhang, Xiaobing Li, Feng Yu, Maosong Sun</li> <li>P5-04: <b>MuLan: A Joint Embedding of Music Audio and Natural Language</b> Qingqing Huang, Aren Jansen, Joonseok Lee, Ravi Ganti, Judith Yue Li, Daniel P W Ellis</li> <li>P5-05: <b>MeloForm: Generating Melody with Musical Form based on Expert Systems and Neural Networks</b> Peiling Lu, Xu Tan, Botaq Yu, Tao Qin, Sheng Zhao, Tie-Yan Liu</li> <li>P5-06: <b>Towards robust music source separation on loud commercial music</b> Chang-Bin Jeon, Kyung Lee</li> <li>P5-07: <b>Towards Quantifying the Strength of Music Scenes Using Live Event Data</b> Michael Zhou, Andrew Mcgraw, Douglas R Turnbull</li> <li>P5-08: <b>Learning Multi-Level Representations for Hierarchical Music Structure Analysis</b> Morgan Buisson, Brian Mcfee, Slim Essid, Hélène C. Crayencour Crayencour</li> <li>P5-09: <b>Multi-instrument Music Synthesis with Spectrogram Diffusion</b> Curtis Hawthorne, Ian Simon, Adam Roberts, Neil Zeghidour, Joshua Gardner, Ethan Manilow, Jesse Engel</li> <li>P5-10: <b>DDX7: Differentiable FM Synthesis of Musical Instrument Sounds</b> Franco Caspe, Andrew Mcpherson, Mark Sandler</li> <li>P5-11: <b>Singing beat tracking with Self-supervised front-end and linear transformers</b> Mojtaba Heydari, Zhiyao Duan</li> <li>P5-12: <b>EnsembleSet: a new high quality synthesised dataset for chamber ensemble separation</b> Saurjya Sarkar, Emmanouil Benetos, Mark Sandler</li> <li>P5-13: <b>End-to-End Lyrics Transcription Informed by Pitch and Onset Estimation</b> Tengyu Deng, Eita Nakamura, Kazuyoshi Yoshii</li> <li>P5-14: <b>Contrastive Audio-Language Learning for Music</b> Ilaria Manco, Emmanouil Benetos, Elio Quinton, George Fazekas</li> <li>P5-15: <b>MusAV: A dataset of relative arousal-valence annotations for validation of audio models</b> Dmitry Bogdanov, Xavier Lizarraga-Seijas, Pablo Alonso-Jiménez, Xavier Serra</li> <li>P5-16: <b>What is missing in deep music generation? A study of repetition and structure in popular music</b> Shuqi Dai, Huiran Yu, Roger B Dannenberg</li> <li>P5-17: <b>Heterogeneous Graph Neural Network for Music Emotion Recognition</b> Angelo Cesar Mendes Da Silva, Diego F Silva, Ricardo Marcondes Marcacini</li> </ul>	J N Tata Auditorium and Poster Area
12:30 - 13:30	<b>Lunch</b>	Dining Area

Time	Session	Venue
13:30 - 16:00	<p><b>Paper session - 6</b>  <b>Session Chair:</b> Juhan Nam (Korea Advanced Institute of Science and Technology)</p> <p>* P6-01: <b>And what if two musical versions don't share melody, harmony, rhythm, or lyrics?</b>          Mathilde Abrassart, Guillaume Doras</p> <p>P6-02: <b>A diffusion-inspired training strategy for singing voice extraction in the waveform domain</b>          Genís Plaja-Roglans, Marius Miron, Xavier Serra</p> <p>P6-03: <b>A Model You Can Hear: Audio Identification with Playable Prototypes</b>          Romain Loiseau, Baptiste Bouvier, Yann Teytaut, Elliot Vincent, Mathieu Aubry, Loïc Landrieu</p> <p>P6-04: <b>An Exploration of Generating Sheet Music Images</b>          Marcos Acosta, Irmak Bukey, TJ Tsai</p> <p>P6-05: <b>HPNNet: Modeling the Harmonic Structure and Pitch Invariance in Piano Transcription</b>          Weixing Wei, Peilin Li, Yi Yu, Wei Li</p> <p>P6-06: <b>Generating music with sentiment using Transformer-GANs</b>          Pedro L T Neves, José Fornari, João B Florindo</p> <p>P6-07: <b>Improving Choral Music Separation through Expressive Synthesized Data from Sampled Instruments</b>          Ke Chen, Hao-Wen Dong, Yi Luo, Julian McAuley, Taylor Berg-Kirkpatrick, Miller Puckette, Shlomo Dubnov</p> <p>P6-08: <b>Ethics of Singing Voice Synthesis: Perceptions of Users and Developers</b>          Kyungyun Lee, Gladys Hitt, Emily Terada, Jin Ha Lee</p> <p>P6-09: <b>Emotion-driven Harmonisation And Tempo Arrangement of Melodies Using Transfer Learning</b>          Takuya Takahashi, Mathieu Barthet</p> <p>P6-10: <b>Using Activation Functions for Improving Measure-Level Audio Synchronization</b>          Yigitcan Ozer, Matej Istvánek, Vlora Arifi-Müller, Meinard Müller</p> <p>P6-11: <b>A deep learning method for melody extraction from a polyphonic symbolic music representation</b>          Katerina Kosta, Wei Tsung Lu, Gabriele Medeo, Pierre Chanquier</p> <p>P6-12: <b>A Reproducibility Study on User-centric MIR Research and Why it is Important</b>          Peter Knees, Bruce Ferwerda, Andreas Rauber, Sebastian Strumbelj, Annabel Resch, Laurenz Tomandl, Valentin Bauer, Fung Yee Tang, Josip Bobinac, Amila Ceranic, Riad Dizdar</p> <p>P6-13: <b>Music Separation Enhancement with Generative Modeling</b>          Noah Schaffer, Boaz Cogan, Ethan Manilow, Max Morrison, Prem Seetharaman, Bryan Pardo</p> <p>P6-14: <b>SampleMatch: Drum Sample Retrieval by Musical Context</b>          Stefan Lattner</p> <p>P6-15: <b>A Transformer-Based "Spellchecker" for Detecting Errors in OMR Output</b>          Timothy De Reuse, Ichiro Fujinaga</p> <p>P6-16: <b>"More than words": Linking Music Preferences and Moral Values through Lyrics</b>          Vjosa Preniqi, Kyriaki Kalimeri, Charalampos Saitis</p>	J N Tata Auditorium and Poster Area
16:00 - 17:00	<p><b>Special session - 2</b>  <i>Enhancing music creativity with MIR</i></p> <p><b>Moderator:</b> Jan Van Balen (Spotify)</p> <p><b>Panelists:</b> Oriol Nieto (Adobe), Akira Maezawa (Yamaha), Georgi Dzhambazov (Smule), Igor Pereira (Moises.ai)</p>	J N Tata Auditorium
17:00 - 21:00	<b>ISMIR 2022 Banquet</b>	Rangoli Gardens
22:00 - 23:15	<p><b>Special session - C (Online)</b>  <i>TISMIR: the open journal of the ISMIR society</i></p> <p><b>Moderator:</b> Emilia Gómez (Joint Research Centre, European Commission and Universitat Pompeu Fabra)</p>	Online

Time	Session	Venue
<b>Thursday, Dec 8</b>		
09:00 - 11:30	<b>Paper session - 7</b> <b>Session Chair:</b> Gaël Richard (Télécom Paris)	J N Tata Auditorium and Poster Area
	P7-01: A unified model for zero-shot singing voice conversion and synthesis Jui-Té Wu, Jun-You Wang, Jyh-Shing Roger Jang, Li Su	
	P7-02: Semantic Control of Generative Musical Attributes Stewart Greenhill, Majid Abdolsah, Vuong Le, Sunil Gupta, Svetha Venkatesh	
	P7-03: Music Representation Learning Based on Editorial Metadata from Discogs Pablo Alonso-Jiménez, Xavier Serra, Dmitry Bogdanov	
	P7-04: Melody Infilling with User-Provided Structural Context Chih-Pin Tan, Alvin W Y Su, Yi-Hsuan Yang	
	P7-05: Robust Melody Track Identification in Symbolic Music Xichu Ma, Xiao Liu, Bowen Zhang, Yu Wang	
	P7-06: Tracking the Evolution of a Band's Live Performances over Decades Florian Thalmann, Eita Nakamura, Kazuyoshi Yoshii	
	P7-07: Evaluating Generative Audio Systems and Their Metrics Ashvala Vinay, Alexander Lerch	
	P7-08: Representation Learning for the Automatic Indexing of Sound Effects Libraries Alison B Ma, Alexander Lerch	
	P7-09: Concept-Based Techniques for "Musicologist-Friendly" Explanations in Deep Music Classifiers Francesco Foscarini, Katharina Hoedt, Verena Praher, Arthur Flexer, Gerhard Widmer	
	P7-10: Verse versus Chorus: Structure-aware Feature Extraction for Lyrics-based Genre Recognition Maximilian Mayerl, Stefan Brandl, Günther Specht, Markus Schedl, Eva Zangerle	
	P7-11: Transfer Learning of wav2vec 2.0 for Automatic Lyric Transcription Longshen Ou, Xiangming Gu, Ye Wang	
	P7-12: A Novel Dataset and Deep Learning Benchmark for Classical Music Form Recognition and Analysis Daniel Szelogowski, Lopamudra Mukherjee, Benjamin Whitcomb	
	P7-13: BAF: An audio fingerprinting dataset for broadcast monitoring Guillem Cortès, Alex Ciurana, Emilio Molina, Marius Miron, Owen Meyers, Joren Six, Xavier Serra	
	P7-14: Cadence Detection in Symbolic Classical Music using Graph Neural Networks Emmanouil Karystinios, Gerhard Widmer	
	P7-15: Domain Adversarial Training on Conditional Variational Auto-Encoder for Controllable Music Generation Jingwei Zhao, Gus Xia, Ye Wang	
	P7-16: Modeling perceptual loudness of piano tone: theory and applications Yang Qu, Yutian Qin, Lecheng Chao, Hangkai Qian, Ziyu Wang, Gus Xia	
	P7-17: On the Impact and Interplay of Input Representations and Network Architectures for Automatic Music Tagging Maximilian Damböck, Richard Vogl, Peter Knees	

Time	Session	Venue
11:30 - 12:30	<b>Industry presentations</b> Short presentations by Spotify, Moises, Adobe, Deezer, Utopia music, Pandora, Smule, Yamaha, Chordify <b>Session Chair:</b> Siddharth Bhardwaj (beatoven.ai)	J N Tata Auditorium
12:30 - 13:30	<b>Lunch</b>	Dining Area
13:30 - 15:30	<b>Society Meeting, Awards, Closing Session</b> <b>Session Chair:</b> Geoffroy Peeters (IRCAM, Télécom Paris) <b>Late-breaking/Demo (Physical)</b>	J N Tata Auditorium
15:30 - 17:30	<b>Session Chairs:</b> Sanjeel Parekh (Télécom Paris), Siddharth Gururani (NVIDIA) <b>Late-breaking/Demo (Online)</b>	Poster area
17:30 - 19:00	<b>Session Chairs:</b> Sanjeel Parekh (Télécom Paris), Siddharth Gururani (NVIDIA)	Online
	An asterisk (*) indicates long presentations (paper award candidates)	

# Local Information

We recommend you to read through the information on travel, stay and general information available on the conference website. The following sections highlight important local information applicable mainly to in-person participants.

## The Logo and Symbols of ISMIR 2022

The ISMIR logo is an artistic abstraction of the Sarasvati Veena, a fretted string instrument used in Carnatic music. The letters S and R are designed to form the two resonators of the Veena, while the other letters make up the bridge of the instrument. The other symbols of the conference include abstract line drawings of the tabla and tanpura, two music instruments used in Hindustani music, as well as a motif of the Stone Chariot of Hampi, Karnataka, India.

## Conference Venue

The primary venue for the conference is the Indian Institute of Science (IISc). The Indian Institute of Science (IISc) is a public, deemed, research university for higher education and research in science, engineering, design, and management. The institute was established in 1909 with active support from Jamsetji Tata and thus is also locally known as the "Tata Institute". It is ranked among the most prestigious academic institutions in India. Most events of the conference are planned within the IISc university campus.

A map of the campus can be downloaded from the conference website. A printed map of the campus is available for you to take at the registration desk. In the map, the preferred entrances to the campus are circled in blue and the main venues of the conference and guest houses are marked with a blue rectangle for your convenience.

The venue for the scientific program is the National Science Seminar Complex (NSSC). The NSSC (85 on the map) comprises:

1. J N Tata Auditorium where the paper presentations, plenary sessions and special sessions will be conducted
2. A poster area where in-person participants present their posters
3. Seminar Halls A, B, and C for tutorial sessions
4. An open exhibition area with sponsor booths
5. A dining area where conference lunches will be served

Appropriate signage at the venue will guide you to the different rooms through the days of the conference.

The puppet theater performance by Dhaatu will be held at the Satish Dhawan Auditorium (90 on the map), which is around 200m from NSSC. The welcome reception following the Dhaatu performance will be held on the Main Guest House (160 on the map) Lawns. Volunteers will guide you to these two venues from NSSC.

### **Access to IISc and Directions**

IISc is in the North-West of the inner Bengaluru City. It is easily accessible and is one of the greenest parts of the city. The nearest metro station is Sandal Soap Factory on the Green Line, which is a 20-minute walk from NSSC (though we recommend caution due to absence of sidewalks at some places on the path). IISc is also served by BMTC buses, taxis (uber, ola) and auto-rickshaws.

Entrance to IISc and NSSC is access controlled. The campus can be accessed only through one of the entrance gates marked on the map. Please display your ISMIR 2022 badge to the IISc security staff at the gate for you to be let into the campus. If you don't have your badge, please say you are an ISMIR 2022 participant. They might need to see your registration confirmation email (printed or on your device) to be let in.

NSSC and Satish Dhawan Auditorium are on the South-side of the campus. Most of the campus is on the North-side and the two sides are separated by the C V Raman Avenue, which is a public road.

Please use the J N Tata auditorium gate (173 on the map) on the C V Raman Avenue to access NSSC during the days of the conference if you are commuting from outside the campus. If you are already in the North-side of the campus, NSSC can be accessed through the under-bridge (marked as a yellow rectangle) next to the Department of Materials Engineering (39 on the map).

The Main Guest House Lawns are on the North-side of the campus, and is a leisurely 15-minute walk from NSSC.

### **Banquet Venue**

The ISMIR 2022 Banquet will be held at:

#### **Rangoli Gardens**

Inside Mahatma Gandhi Institute of Rural Energy and Development  
Srirampura Cross, Rachenahalli, Jakkuru,  
Bengaluru, Karnataka 560064

Rangoli Gardens is around 11 km away from IISc and transportation will be arranged for the banquet from IISc. We recommend you use the conference shuttles to travel to the banquet venue. The banquet venue is otherwise accessible mainly by a Taxi. and is a leisurely 15-minute walk from NSSC.

### **Indian Music Experience Workshop Venue**

The satellite event Indian Music Experience (IME) workshop will be held at:

**Indian Music Experience (IME) Museum,**  
Brigade Millennium Avenue,  
JP Nagar 7th phase,  
Bengaluru, Karnataka 560078

IME is around 16 km from IISc and transportation will be provided for the workshop. The museum can also be reached by Metro. It is 2.2 km from Yelachenahalli Metro station (Green line).

## Sustainability and Indian Culture

We made a conscious effort to showcase Indian culture and ethos throughout the conference, while at the same time supporting organizations that are making efforts towards sustainable development and responsibly supporting our communities. The organizing team is committed to ensuring that we promote sustainable development practices throughout the conference. We will minimize the use of single-use plastic, procure articles from sources that support our cause, and minimize the carbon footprint of the conference.

This thought process of responsible showcase of Indian culture is reflected in all of our decisions with the conference, including the conference kit, choice of venues, catering choices and the social program.

### What's in your conference kit?

The conference kit you receive reflects the thought process of promoting Indian cultural ethos responsibly during the conference. The kit consists of the following:

1. A cotton canvas bag
2. A pen and a conference guide that doubles up as a notebook
3. A sipper bottle that you can use for water refills
4. A badge (along with name stickers)
5. A little tree made with Agates of Cambay, which are attractive colorful stones from Khambat (or Cambay) in Gujarat, India, sourced from GI Tagged
6. A colorful keychain depicting Yakshagana, a traditional theater form from Karnataka, India, sourced from Aralikatte
7. Promo items from our sponsors

GI Tagged (<https://www.gitagged.com/>) is a store of celebrated products having geographical origin (GI Tag) in India. They procure,

produce and market GI Tag products and adhere to the requirements as mentioned in the Geographical Indications registry. Aralikatte (<https://www.aralikatte.co.in/>) is a themed-store that aims to showcase Karnataka's rich historical legacy by infusing age-old tradition with fashion.

Some of the elements of the conference were made by the students of Bala Mano Vikasa Kendra, a special school in Bengaluru that trains and works with children and adults with global developmental delays.

Your badge has identifiers for the add-ons you have registered to attend in the conference. Each tutorial you have registered to attend is identified by an Indian art music instrument on your badge, while your registration for IME workshop is shown with a museum symbol. The following table explains the symbol mapping:

<b>Symbol</b>	<b>Instrument/ Meaning</b>	<b>Add-on</b>
	Mridangam, the primary percussion accompaniment used in Carnatic music	T1(M): An Introduction to Symbolic Music Processing in Python with Partitura
	Carnatic violin, the primary melodic accompaniment used in Carnatic music	T2(M): Computational Methods For Supporting Corpus-Based Research On Indian Art Music
	Carnatic flute (or venu), a transverse side-blown bamboo flute	T3(M): Designing Controllable Synthesis System for Musical Signals

	Sitar, a plucked string instrument widely played in Hindustani music	T4(M): Few-Shot and Zero-Shot Learning for Musical Audio
	Tabla, the primary percussion accompaniment used in Hindustani music	T5(A): Deep learning for automatic mixing
	Harmonium, one of the melodic accompaniments used in Khayal style of Hindustani music	T6(A): Trustworthy MIR: Creating MIR applications with values
	A museum	Indian Music Experience workshop

## What to expect during the conference

**COVID-19 guidelines:** As on the date of printing this guide, COVID-19 related restrictions in India have been relaxed significantly. Wearing masks, maintaining social distance, and checking for symptoms are not mandatory or enforced. However, we strongly encourage participants to wear a mask, maintain social distancing and practice COVID-19 appropriate behavior while attending the conference for your safety. The conference venue will take all precautions to ensure a safe space for participants by maintaining the facility based on best practices to prevent COVID-19. We request you adhere to the latest guidelines issued by Indian government agencies.

**An inclusive hybrid mode:** Given that the conference is hybrid, with a large portion of participants attending the conference remotely, there is a need to accommodate the needs of our remote attendees during the conference. When possible, we will first seek questions/comments from remote attendees during plenary sessions, given that in-person attendees will have the opportunity to meet with the speakers at the venue for further questions. We request all participants to be considerate about remote attendees' time zone differences while engaging with them via asynchronous interaction. We request to make an effort to include any remote attendees who are desirous of participating in any discussions during the conference.

**Drinking water:** Most homes and institutions in India use a water filter to supply safe drinking water. Safe drinking water will be available at all conference venues. To minimize the use of single-use plastic, we have installed drinking water canisters that you can refill your bottles from. If you are using the bottle from the conference kit, we recommend washing it before the first use. Given that all participants of the conference get identical bottles, we have added stickers with your name in your badge pouch. You can use this sticker (or any other means) to identify your bottle.

**Food and beverages:** The lunches will be served during the scheduled hour during the day, but coffee/tea and snacks will be available throughout the poster sessions at designated areas.

The back of your badge contains a QR code that is used to provide access to lunches for conference attendees. Our staff will request you to scan the QR code during lunches, welcome reception and banquet. We request your kind cooperation during this process.

We had collected your dietary preferences and restrictions during registration, and also sent out a survey to seek inputs on your cuisine preferences. Taking all this data into due consideration, we have designed the menu for the lunches, coffee breaks, welcome reception and the banquet that aims to cater everyone's palate, preference and

restrictions. However, it is possible that your specific preferences might not have been satisfied - please let the organization team know and we will do our best to cater to your needs.

The lunches will be a combination of Indian cuisine with elements from a different part of the world each day. The welcome reception is themed around Indian street food.

Given that the conference is happening inside a public university campus and the Indian government rules that do not permit serving alcoholic beverages within educational institutions, there will be no alcohol served during the formal conference events including the welcome reception and banquet. There are, however, good places close to IISc where you can go to socialize and get a beer (or more).

**Emergency:**

In case of an emergency during the conference, please contact one of the organizers or directly contact the respective emergency service using the following numbers:

Police: 112 or 100

Fire and Rescue: 101

Ambulance: 102 or 108

Emergency contacts from the organizing team will be added on the conference website.

## Credits and Attributions

The ISMIR 2022 logo was designed by Mrinali Kamath (<https://mrinali.medium.com/>).

The ISMIR 2022 graphics elements were designed by Vivek Vasudev.

The images of symbols on badges are from the Noun Project, and were assets released under CC BY 3.0 with the following attributions:

**Mridangam:** Tabla by lcongeek26 from Noun Project  
(<https://thenounproject.com/icon/tabla-4082187/>)

**Violin:** Violin by mynamepong from Noun Project  
(<https://thenounproject.com/icon/violin-3021868/>)

**Flute:** Flute by Creative Mania from Noun Project  
(<https://thenounproject.com/icon/flute-1175161/>)

**Sitar:** Sitar by Symbolon from Noun Project  
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**Tabla:** Tabla by Creative Mania from Noun Project  
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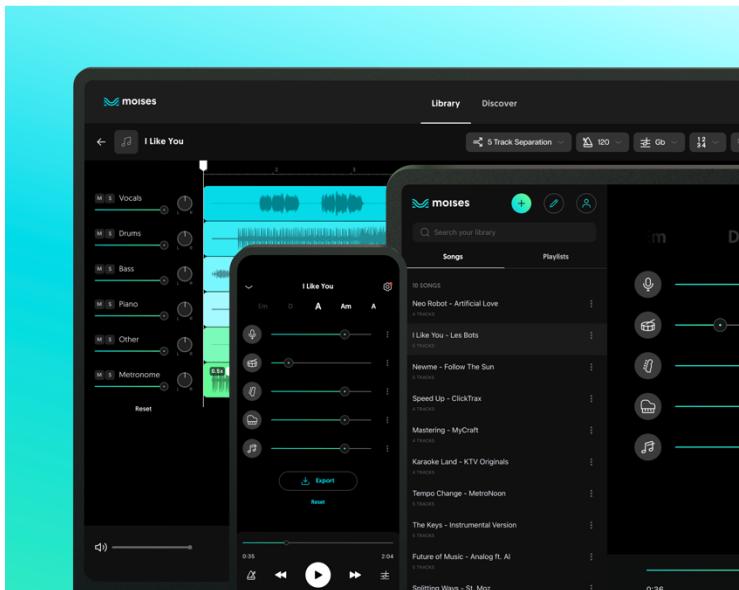
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A composite image illustrating Moises AI's developer integration. On the left, a terminal window displays a curl command for processing audio media. To the right, a spectrogram visualizes the audio data, showing various tracks like stems, vocals, and chords. Below the terminal is a QR code, with the text "Scan to get Moises Premium & Developer credits" centered below it.

```
> curl --request POST \  
  --url http://developer.moises.ai/api/media \  
  --header 'Authorization: your-api-key' \  
  --data {  
    "inputUrl": "https://your-server.com/audio.m4a",  
    "operations": [  
      { "type": "STEMS", "mode": "vocals-accompaniment" }  
      { "type": "BEATCHORDS" }  
    ]  
  }
```

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A taste of our open source tools

## Spotify Libraries for Working with Audio

### Pedalboard

[github.com/spotify/pedalboard](https://github.com/spotify/pedalboard)

Read and write audio, add effects, and more, in Python. Implements a range of common audio effects, and supports the use of of third-party VST3 and Audio Unit plugins.

### Basic Pitch

[github.com/spotify/basic-pitch](https://github.com/spotify/basic-pitch) • [github.com/spotify/basic-pitch-ts](https://github.com/spotify/basic-pitch-ts)

A lightweight, lightning-fast audio-to-MIDI converter that features pitch bend detection and works on recordings of almost any instrument, including voice. Python and Typescript.

A sample of Spotify research data

## Spotify Datasets: from Podcasts to Music Recommendation

### Million Playlist Dataset: Learning from Music Playlists

Dataset for music recommendation and automatic music playlist continuation. Contains 1,000,000 playlists, including playlist- and track-level metadata.

### Spotify Podcasts Dataset: Over 100,000 episodes with text and audio

Dataset for podcast research in English and Portuguese. Contains episodes from thousands of shows on Spotify, including audio files and speech transcriptions.

### OpenMic: Audio and Crowd- Sourced Instrument Labels

Dataset for researching multi-instrument recognition in polyphonic recordings, a fundamental problem in music information retrieval.

Find all our resources for research at <https://research.atspotify.com/> or scan the code below.

Internships will be posted at <https://www.lifeatspotify.com/students> in late 2022

Find full-time job listings at <https://www.lifeatspotify.com/>



**Highlighted summer 2023 internship**

**Research Science Internship in Audio Intelligence**

**Location:** remote or in-person global, within CET and EST time zones\*

**Dates:** 12 weeks, in Summer 2023

**Application Deadline:** January 1, 2023

**Offers given out:** February-March 2023

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- Communicate your results and their importance to key stakeholders and in external publications.
- Be a valued member of an autonomous, cross-functional team of researchers, product managers, software engineers and others across the company.

**Who you are:**

- You have, or are pursuing a PhD degree in Computer Science, Mathematics, Engineering or a related discipline.
- You have experience in at least two of the following fields: machine learning, music information retrieval, speech processing, signal processing, probabilistic modeling.
- You have strong coding skills in several of the following languages/libraries: Python, NumPy, TensorFlow, PyTorch.
- You have experience working on independent research projects, and in leading publications.
- You are a great communicator. You can explain complex topics in simple terms, and you love building strong relationships with colleagues and stakeholders.

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Internships will be posted at <https://www.lifeatspotify.com/students> in late 2022

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DECEMBER 4 - 8, 2022

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Scientific research sings through every product at SiriusXM. In pursuit of the best customer experience, we push the state-of-the-art in ML for content understanding, personalization, discovery and advertising. Working here is a chance to collaborate with top-notch scientists with very diverse backgrounds (MIR, core ML, RecSys, NLP, Economists, etc.), and benefit from one-of-a-kind data: millions of musical tracks labeled by expert musicologists, or sequenced by renowned radio DJs; listening history in the trillions of hours from 100+ millions of listeners, and over a hundred billion pieces of explicit feedback.

We are hiring for a number of Science roles at various levels (including internships). If you're curious to learn more, reach out during ISMIR. Or check out our current openings at <http://www.siriusxm.com/careers>



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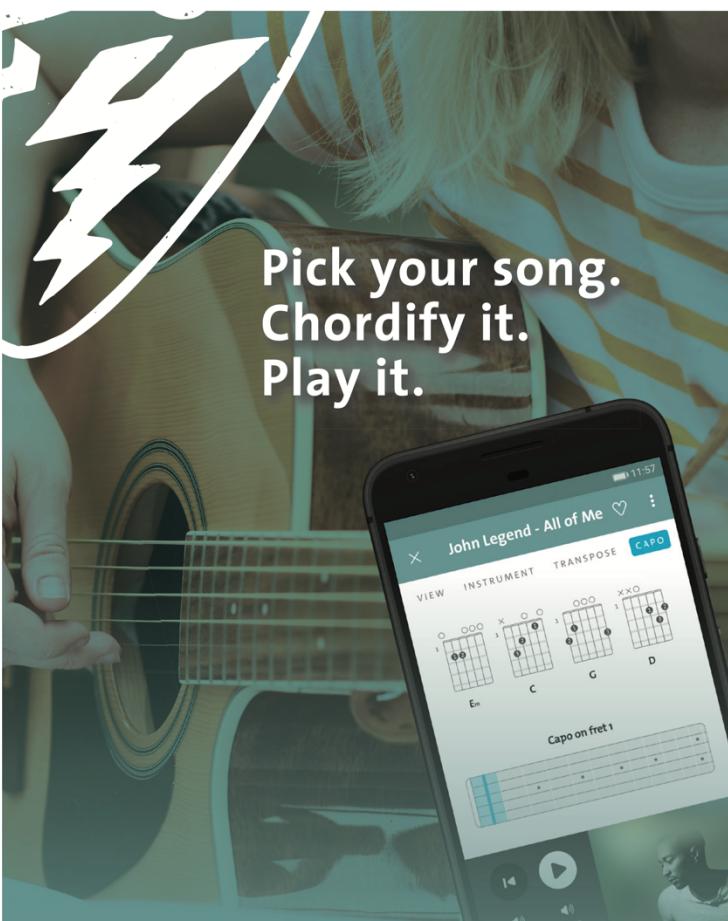




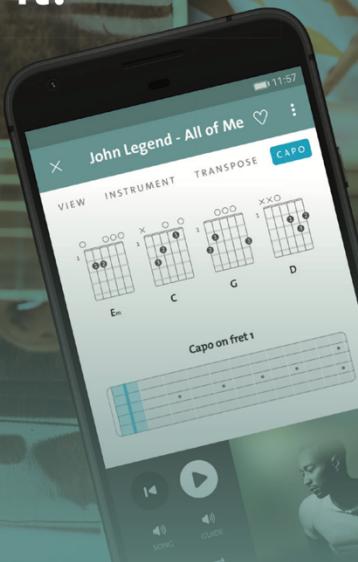
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