



中央音乐学院
CENTRAL CONSERVATORY
OF MUSIC

世界艺术与科技对话

Global Dialogue on Art & Technology Music Sub-Forum

音乐分会场
Music Sub-Forum



Global
Dialogue on
Art &
Technology
世界艺术与科技对话

BEIJING
101301 CHINA

演化与创生
艺术和科技的
融合创新
Evolution & Creation
Integration & Innovation
of Art & Technology

主办单位:

Organizers:

中央音乐学院创作部

Central Conservatory Composition Department of CCM

中央音乐学院理论部

Theoretical Research Department of CCM

中国经济社会网

China Economic Information Service

中国·北京

2026 04.27

世界艺术与科技对话音乐分会场活动介绍

Introduction to the Music Sub-forum of the Global Dialogue on Art and Technology

2026年4月27日，世界艺术与科技对话音乐分会场将在中央音乐学院盛大启幕。本次活动紧扣“演化与创生——艺术与科技的融合创新”核心主题，立足数字智能时代发展浪潮，深度聚焦音乐艺术与人工智能技术的跨界融合、协同共进，全力探索音乐智能化发展进程中的理论前沿、技术实践与文化内涵。

活动围绕未来音乐教育、音乐大模型研发、智能音乐创作、音乐感知与分析、人机协同表演、数字音乐产业发展六大核心议题展开深度研讨。大会汇聚全球音乐人工智能领域学术领军人物、全国各大音乐学院院长等顶尖专家学者，搭建跨学科、高层次、国际化的学术交流平台，着力推动音乐人工智能产业在“产、学、研、用”全链条的深度融合与落地实践。

本次分会场议程设置系统完备，涵盖开幕式暨多所音乐学院院长主题发言、国际专家学术论坛、闭幕式等核心板块，全面展示中国音乐人工智能学科领域的前沿思考、最新科研成果与产业发展动态。会议重点聚焦人工智能技术对音乐创作范式、表演形态、传播机制的重塑变革，深入回应数字时代音乐文化创新、审美理念转向、技术伦理规范等关键时代议题。

此次活动以汇聚多元跨界智慧、深化音乐与科技协同演化的理论研究与实践探索为宗旨，立足全球视野推动音乐艺术创新发展与国际文化交流互鉴，为构建面向未来的音乐智能生态体系、打造数字时代音乐文化新形态，提供坚实的思想引领与成熟的实践范式。

On April 27, 2026, the Music Sub-forum of the Global Dialogue on Art and Technology will grandly open at the Central Conservatory of Music. Centered on the theme "Evolution and Creation: The Integration and Innovation of Art and Technology," the event is situated within the broader wave of the digital intelligence era. It will focus on the cross-disciplinary integration and collaborative advancement of music and artificial intelligence, exploring the theoretical frontiers, technological practices, and cultural implications of intelligent music development.

The forum will engage in in-depth discussions across six core topics: future music education, music large model development, intelligent music creation, music perception and analysis, human-machine collaborative performance, and the development of the digital music industry. Bringing together leading scholars in music AI from around the world, as well as presidents of major music conservatories across China, the event will establish a high-level, international, and interdisciplinary platform for academic exchange. It aims to promote the full-chain integration of "industry, academia, research, and application" within the music AI ecosystem.

The program is comprehensively structured, featuring an opening ceremony with keynote speeches by presidents of leading music institutions, international expert forums, and a closing ceremony. The forum will present cutting-edge insights, the latest research achievements, and emerging industry trends in China's music AI field. It places particular emphasis on how artificial intelligence is reshaping paradigms of music creation, performance forms, and dissemination mechanisms, while also addressing key issues of the digital age, including cultural innovation, evolving aesthetics, and ethical considerations.

By gathering diverse cross-disciplinary perspectives and advancing the co-evolution of music and technology through both theoretical inquiry and practical exploration, the sub-forum seeks to foster global dialogue and cultural exchange. It aspires to provide intellectual leadership and mature practical models for building a future-oriented intelligent music ecosystem and shaping new forms of music culture in the digital era.

2026/04/27 Mon.

10:00-10:12 | 中央音乐学院琴房楼演奏厅 Recital Hall of the Practice Building, CCOM

世界艺术与科技对话音乐分会场 - 开幕式

Music Sub-forum of the Global Dialogue on Art and Technology - Opening Ceremony

领导致辞

Opening Remarks

10:12-11:05 | 中央音乐学院琴房楼演奏厅 Recital Hall of the Practice Building, CCOM

世界艺术与科技对话音乐分会场主题发言（中国专家专场）

Music Sub-forum of the Global Dialogue on Art and Technology Keynote Speech (Chinese Experts Session)



柯杨 Ke Yang

中央音乐学院副院长、教授、博士研究生导师
Vice President and Professor, Doctoral Supervisor, Central Conservatory of Music

跨界与重构：人工智能驱动的音乐新生态

Cross-Boundary Integration and Structural Reconfiguration: A New Ecosystem of Music Driven by Artificial Intelligence



刘忠心 Liu Zhongxin

中国音乐学院副院长
Vice President, China Conservatory of Music

关于人工智能时代音乐教育与科技融合发展的几点思考

Reflections on the Integrated Development of Music Education and Technology in the Era of Artificial Intelligence



田彦 Tian Yan

沈阳音乐学院党委副书记、院长、教授、男高音歌唱家
Deputy Party Secretary, President, Professor and Tenor, Shenyang Conservatory of Music

艺术与科技交叉融合的认知重塑与教育转型

Cognitive Reshaping and Educational Transformation in the Intersection of Art and Technology



陶陌 Tao Mo

星海音乐学院党委副书记、院长、教授、作曲家
Deputy Party Secretary, President, Professor and Composer, Xinghai Conservatory of Music

贯通科技人文，赋能人文湾区——探索新时代音乐与科技融合发展的“大湾区模式”

Bridging Tech and Humanities to Empower a Humanistic Bay Area – Toward a “Greater Bay Area Model” for Music-Tech Integration in the New Era



王瑞 Wang Rui

浙江音乐学院党委副书记、院长、教授
Deputy Party Secretary, President and Professor, Zhejiang Conservatory of Music

守恒与流变：音乐与科技的不二法则

Conservation and Transformation: The Fundamental Law of Music and Technology

13:30-16:00 | 中央音乐学院琴房楼演奏厅 Recital Hall of the Practice Building, CCOM

世界艺术与科技对话音乐分会场主题发言（国际专家专场）

Music Sub-forum of the Global Dialogue on Art and Technology Keynote Speech (International Experts Session)

领导致辞

Opening Remarks



热拉尔·阿萨亚格 Gérard Assayag

法国 IRCAM 研究主任，音乐人工智能与音乐表征专家
Research Director at IRCAM, expert in music AI and music representation

共创模型、符号交互与赛博人类音乐实践：REACH 项目

Cocreative Models, Symbolic Interaction, and Cyber-Human Musicianship : the REACH Project



乔治·海杜 Georg Hajdu

德国汉堡音乐与戏剧大学教授、利盖蒂中心主任，ICMC2026 主席
Professor at the Hamburg University of Music and Drama, Director of the Ligeti Center, and Chair of ICMC 2026

谁在塑造谁？艺术家、工具与技术演进

Who Shapes Whom? Artists, Tools, and Technological Evolution



克雷格·威尔 Craig Vear

英国诺丁汉音乐与计算机科学教授，欧洲研究理事会 DigiScore 项目首席研究员
Professor of Music and Computer Science at the University of Nottingham, Principal Investigator of the ERC DigiScore project

基于“音乐实践”的协同创作：音乐人工智能需要以人为中心的方法

Co-creating through Musicking (an Insider's Perspective): Why We Need a Human-Centred Approach to Music-AI



南周汉 Juhan Nam

韩国科学技术院 (KAIST) 文化科技研究生院教授，音乐与音频计算实验室负责人，ISMIR 2025 主席
Professor in the Graduate School of Culture Technology at KAIST, Head of the Music and Audio Computing Lab, and General Chair of ISMIR 2025

人机音乐合奏：会聆听与演奏的自动钢琴

Human-AI Music Ensemble: A Self-Playing Piano that Listens and Performs



乔纳森·怀纳 Jonathan Wyner

伯克利音乐学院教授，BEATL 艺术科技项目负责人
Professor of Music Production and Engineering at Berklee College of Music, Head of Artistic Technology Initiatives for BEATL

艺术家中心视角下的人工智能：作为音乐想象之镜像、媒介与延伸

The Artist at the Center: AI as Mirror, Instrument, and Extension of Musical Imagination



徐帆 Xu Fan

Suno 软件工程师
Software Engineer, Suno

从生成到协同：AI 音乐中的艺术与技术如何共同演化

From Generation to Collaboration: How Art and Technology Co-Evolve in AI Music





柯杨

Ke Yang

跨界与重构：人工智能驱动的音乐新生态

Cross-Boundary Integration and Structural Reconfiguration: A New Ecosystem of Music Driven by Artificial Intelligence

发言摘要 ABSTRACT

在人工智能快速发展的背景下，音乐正经历一场深刻而持续的结构变革。本报告以“跨界与重构”为核心视角，立足当代科技与艺术深度融合的历史进程，重新审视音乐与科技协同发展的图景。人工智能正在打破传统学科与艺术门类之间的边界，推动音乐从以作品为中心的生产逻辑，转向以开放系统与动态过程为特征的生成形态；从相对独立的艺术样式，迈向与多领域深度交织的复合结构。报告结合中央音乐学院在音乐人工智能重大方向上的持续探索，通过对未来发展路径的整体研判，强调在全球科技与艺术深度融合的背景下，构建具有前瞻性与引领性的音乐发展格局，推动形成兼具学术深度、文化内涵与社会价值的实践体系，为全球科技与艺术的深度融合提供中国视角与实践经验。

Amid the rapid advancement of artificial intelligence, music is undergoing a profound and ongoing structural transformation. Framed by the perspective of cross-boundary integration and structural reconfiguration, this report situates itself within the broader historical process of deep convergence between technology and the arts, and reexamines the evolving relationship between music and technological innovation. Artificial intelligence is dissolving traditional boundaries between disciplines and artistic domains, shifting music from a production model centered on individual works toward generative forms characterized by openness and dynamic processes. As a result, music is moving beyond a relatively autonomous art form and becoming part of a complex structure deeply intertwined with multiple fields. Drawing on the Central Conservatory of Music's sustained exploration in key areas of music artificial intelligence, the report presents an overall assessment of future development pathways and emphasizes the importance of building a forward-looking and leading framework for musical development in the context of global technological and artistic integration. It also highlights the need to develop a practice system that integrates academic rigor, cultural depth, and social relevance, while contributing a Chinese perspective and practical experience to the global dialogue on the convergence of technology and the arts.

个人简介 BIOGRAPHY

中央音乐学院副院长，教授，音乐美学博士，博士生导师，美国哥伦比亚大学音乐系访问学者，兼中国音乐美学学会、中国音乐评论学会理事。出版著作《有限的相对主义——论音乐的价值、质量及其评价》（独著），《现代西方音乐美学》（国家十一五规划教材、合著），《西方新音乐学背景下的音乐美学》（合著），《音乐鉴赏》（合著）；出版译著《音乐与社会学观察》（独译）、《音乐的意义与表现》（合译）。在《人民音乐》《中央音乐学院学报》等刊物发表各类文论30余篇。曾获全国优秀博士论文提名，中国音乐评论“学会奖”一等奖；入选教育部“新世纪优秀人才支持计划”；曾获“霍英东教育基金会高等院校青年教师基金基础性研究课题资助”等。

Ke Yang is the Vice President and Professor of the Central Conservatory of Music holding a PhD in Music Aesthetics and being the doctoral supervisor. He is a visiting scholar in the Music Department at Columbia University, USA, and serves as a director of both Chinese Music Aesthetics Society and Chinese Music Criticism Society. His publications include *Limited Relativism: On the Value, Quality, and Evaluation of Music* (sole author), *Modern Western Music Aesthetics* (co-author, a national textbook for the 11th Five-Year Plan), *Music Aesthetics in the Context of Western New Musicology* (co-author), and *"Music Appreciation"* (co-author). He has also translated *Music and the*

Sociological Gaze (sole translator) and *Musical Meaning and Expression* (co-translator). Ke Yang has published over 30 articles in journals such as *People's Music*, *Journal of the Central Conservatory of Music* and so on. He was nominated for the National Excellent Doctoral Dissertation Award and won the first prize of the "Society Award" for Chinese Music Criticism. He has been selected for the "New Century Excellent Talents in University" program by Chinese Ministry of Education and received funding from the "Basic Research Fund for Young Teachers in Higher Education Institutions" of the Fok Ying Tung Education Foundation.



刘忠心

Liu Zhongxin

关于人工智能时代音乐教育与科技融合发展的几点思考

Reflections on the Integrated Development of Music Education and Technology in the Era of Artificial Intelligence

发言摘要 ABSTRACT

当前,人工智能正深刻重塑音乐创作、表演、传播与教育的底层逻辑。艺术院校作为我国高等教育体系的重要分类,必须主动拥抱 AI 时代,在教育强国、科技强国、文化强国建设中发挥独特作用。一是准确识变,把握人工智能时代音乐教育面临的新形势新任务新挑战,认清历史逻辑、看准现实机遇、直面实践挑战。二是合力共为,推动艺术院校在三大强国建设中问题共答,以 AI 赋能教育变革夯实人才根基,以艺科融合激发文化创新,以成果转化服务科技强国。三是务实探索,中国音乐学院着力打造“科技与音乐结合”的新模式,构建智能时代音乐人才新标准,探索智能音乐教育新场景,打造艺科融合创新高地。艺术与科技同源共生,全国艺术院校应携手并进,在服务国家战略中彰显担当,共同探索音乐教育新路径。

Artificial intelligence (AI) is profoundly reshaping the underlying logic of music creation, performance, dissemination, and education. As a vital category within China's higher education system, art academies must proactively embrace the AI era to play an indispensable role in building China into a leading country in education, science and technology, and culture. First, it is essential to accurately identify the changes, grasp the new situations, tasks, and challenges facing music education in the AI era, clarify its historical logic, recognize real opportunities, and confront practical challenges. Second, concerted efforts should be made to enable art academies to jointly address the imperatives of the three major national strategies, including empowering educational transformation with AI to consolidate the talent foundation, stimulating cultural innovation through the integration of art and technology, and contributing to the goal of a sci-tech powerhouse through the transformation of achievements into practical applications. Third, practical exploration is being undertaken, as exemplified by the China Conservatory of Music's development of the "music+technology" innovative model. This initiative aims to establish new standards for music talents in the intelligent era, explore new scenarios for intelligent music education, and advance the integration of art and technology. Art and technology share a common origin and coexist. Art academies across the country should work together to serve national strategies and explore new pathways for music education.

个人简介 BIOGRAPHY

中国音乐学院党委常委、副院长,长期从事首都教育行政管理、党建与体育美育工作,熟悉国家及北京市宏观教育战略、体教融合与美育改革顶层设计,积极参与北京市重大教育政策制定,负责学校体育美育改革具体推进工作。专注艺术院校发展战略研究,主持北京市课题两项,主编美育体育论文集三部,在《戏曲艺术》《北京教育》《中国校外教育》等发表论文十余篇。刘忠心,中国音乐学院党委常委、副院长,长期从事首都教育行政管理、党建与体育美育工作,熟悉国家及北京市宏观教育战略、体教融合与美育改革顶层设计,积极参与北京市重大教育政策制定,负责学校体育美育改革具体推进工作。专注艺术院校发展战略研究,主持北京市课题两项,主编美育体育论文集三部,在《戏曲艺术》《北京教育》《中国校外教育》等发表论文十余篇。

Liu Zhongxin, Member of the Standing Committee of the CPC Committee and Vice President of the China Conservatory of Music, has long been engaged in educational administration, Party building, and the promotion of physical and aesthetic education in Beijing. He is well-versed in national and Beijing municipal macro-level education strategies, as well as the top-level design for the integration of sports and education and for aesthetic education reform. He has actively participated in the formulation of major education policies in Beijing and is responsible for the implementation of physical and aesthetic education reforms in Beijing's schools at all levels. He focuses on research into development strategies for art academies, has presided over two Beijing municipal research projects, and has served as the chief editor of three volumes of collected papers on aesthetic and physical education. He has published over ten papers in journals including *Chinese Theatre Arts*, *Beijing Education*, and *Afterschool Education in China*.



田彦
Tian Yan

艺术与科技交叉融合的认知重塑与教育转型

Cognitive Reshaping and Educational Transformation in the Intersection of Art and Technology

发言摘要 ABSTRACT

在人工智能生成交响乐、空间计算重构声场的时代，艺术与科技的融合正引发一场深刻的认知重塑。报告沿用斯诺“两种文化”与布罗克曼“第三种文化”的理论脉络，揭示了技术从工具演变为具备感知与响应能力的“创作搭档”，催生感性智慧。音乐呈现从静态聆听转向沉浸式场域，观众体验更由感官延伸至神经交互层面。面对这一变革，教育转型成为必然回应。沈阳音乐学院以“谐律智愈”实验室为平台，推动项目制跨学科育人，聚焦乐音健康与脑科学交叉研究，探索智能乐器与非遗声景复原等，推动构建“教、创、演、学、研、评”六位一体的育人新生态。艺术院校须从课程体系、评价标准与培养模式入手，主动定义数字时代“何为音乐”与“如何培养音乐人”的新范式。

In an era where artificial intelligence can generate symphonies and spatial computing reshapes acoustic fields, the convergence of art and technology is triggering a profound cognitive reshaping. Building on the theoretical lineage of C.P. Snow's "Two Cultures" thesis and John Brockman's "Third Culture" concept, this report reveals how technology has evolved from a mere auxiliary tool into a "creative partner" endowed with perceptual, learning and responsive capabilities, giving rise to "perceptual wisdom." Musical presentation is shifting from static listening to immersive fields, while audience experience extends from sensory perception to neural interaction. Against this transformative backdrop, educational transformation has become an inevitable response. Shenyang Conservatory of Music has established the "Harmony Healing" Music Technology Innovation Lab as a platform for project-based, interdisciplinary education, focusing on cross-disciplinary research between music health and brain science, exploring intelligent musical instruments and the digital restoration of original soundscapes of intangible cultural heritage traditional music, and advancing a new educational ecosystem that integrates the six dimensions of "teaching, creation, performance, learning, research and evaluation." Art institutions must proactively redefine the new paradigms of "what constitutes music" and "how to cultivate musicians in the digital age" through curriculum restructuring, assessment criteria reform, and talent cultivation model innovation.

个人简介 BIOGRAPHY

沈阳音乐学院党委副书记、院长，教授、博士研究生导师，男高音歌唱家、中宣部文化名家暨“四个一批”人才、中国音乐家协会第九届理事会理事、中国歌剧研究会副会长。历任中国歌剧舞剧院歌剧团团长，中国歌剧舞剧院党委委员、副院长，曾挂职国家大剧院艺术教育部副部长。曾主演《花木兰》《杨贵妃》《青春之歌》《原野》《木兰诗篇》《罗密欧与朱丽叶》等多部歌剧及音乐剧作品，在大型剧目项目中曾担任监制、策划与导演，多次受邀担任中宣部、文旅部等相关评奖及赛事的评审专家。担任沈阳音

音乐学院院长以来，将深厚的艺术积淀与前瞻视野融入学院改革发展与人才培养之中，传承“鲁艺”红色血脉，坚守传统办学特色，创立“教、创、演、学、研、评”六位一体的教育理念，构建五育融合的育人体系；打造“艺术名师进沈音”“筑巢引凤回沈音”等学术品牌和“春秋艺韵”演出季，创办“新年”“新春”两大主题音乐会及“音润沈城，乐响生活”系列惠民演出品牌；积极构建高端国际艺术交流平台，赴澳大利亚举办《和平与纪念之声：80年回响》音乐会，主办第九届“首映歌剧”国际声乐大赛暨首届亚洲选拔赛，为深化国际人文合作、弘扬中华优秀传统文化作出了积极贡献。

Deputy Secretary of the Party Committee and President of Shenyang Conservatory of Music, Professor and Doctoral Supervisor, tenor, Cultural Master and Four Batches' Talent of the Publicity Department of the CPC Central Committee, Council Member of the 9th Council of the Chinese Musicians Association, Vice Chairman of China Opera Research Society. He has served as Head of the Opera Troupe of the China Opera and Dance Drama Theatre, Member of the Party Committee and Vice President of the China Opera and Dance Drama Theatre, and Deputy Director of the Art Education Department of the National Centre for the Performing Arts on secondment. He has starred in many operas and musical works including *Mulan*, *Yang Guifei*, *Song of Youth*, *The Savage Land*, *Mulan Psalm* and *Romeo and Juliet*, and acted as supervisor, planner and director in large-scale theatrical projects. He has been invited many times as a judging expert for evaluation and competition events of the Publicity Department of the CPC Central Committee, the Ministry of Culture and Tourism and other authorities. Since taking office as President of Shenyang Conservatory of Music, he has integrated profound artistic accumulation and forward-looking vision into the reform, development and talent cultivation of the conservatory, preserved the "Lu Xun Academy of Arts" red legacy, adhered to traditional school-running characteristics, established the six-in-one educational philosophy of "teaching, creation, performance, learning, research and evaluation", and constructed an education system integrating the five dimensions of education (moral, intellectual, physical, aesthetic, and labor education). He has created academic brands such as "Renowned Artists at Shenyang Conservatory of Music" and "Attracting Talents Back to Shenyang Conservatory of Music", as well as the "Spring and Autumn Artistic Rhythms" performance season, and founded two themed concert series of "New Year Concert" and "Spring Festival Concert" as well as the public welfare performance brand "Music Nourishing Shenyang City, Melodies Resonating with Life". He has actively built a high-end international art exchange platform, held the concert Sounds of Peace and Remembrance: 80 Years of Echoes in Australia, and hosted the 9th Premiere Opera Foundation International Vocal Competition and the 1st Asian Selection, making positive contributions to deepening international people-to-people and cultural cooperation and promoting the excellent traditional Chinese culture.



陶陌
Tao Mo

贯通科技人文，赋能人文湾区——探索新时代音乐与科技融合发展的“大湾区模式”

Bridging Tech and Humanities to Empower a Humanistic Bay Area – Toward a "Greater Bay Area Model" for Music-Tech Integration in the New Era

发言摘要 ABSTRACT

当前，艺术与科技的深度融合正推动音乐领域发生深刻变革。面对新一轮科技革命，星海音乐学院紧扣教育数字化、智能化转型要求，以“贯通科技人文”为理念，创办全国首个独立音乐科技学院，构建“音乐+人工智能+工程技术”跨学科课程体系，形成艺术与科技双轮驱动的学科架构。具体实践中，学校立足粤港澳大湾区，着力打造新时代音乐教育“大湾区模式”；以创新驱动为核心，构建“产学研转创用”六位一体培养模式，打造硬核课程与高端平台；深化产教融合，健全成果转化机制，构建服务产业发展新格局，旨在探索人才培养新范式，为服务人文湾区、赋能文化产业升级贡献高校力量。

As art and technology increasingly converge, music is undergoing profound change.

In response, Xinghai Conservatory of Music has embraced the digital and intelligent transformation of education. Guided by the principle of "bridging technology and the humanities," it has launched China's first independent College of Music Technology, offering an interdisciplinary curriculum that fuses music, AI, and engineering—creating an academic framework driven equally by artistic and technological innovation. Based in the Guangdong-Hong Kong-Macao Greater Bay Area, the Conservatory is pioneering a "Greater Bay Area model" for music education in the New Era. At its core is an innovation-driven "six-in-one" ecosystem (production, education, research, commercialization, entrepreneurship, and application), supported by high-caliber curricula and platforms. By deepening industry-education integration and streamlining the path from research to real-world application, the Conservatory is building a new framework to serve the cultural industry. Ultimately, this effort aims to forge a fresh paradigm for talent development, support the growth of a humanistic Bay Area, and help upgrade the region's cultural sector.

个人简介 BIOGRAPHY

作曲家，星海音乐学院党委副书记、院长，教授，博士研究生导师。教育部国家级特色专业建设点主持人，首批国家级一流本科专业建设点主持人，教育部高等学校评估专家，文旅部国家艺术基金评审专家，欧洲文化首都项目特邀作曲家。广东省音乐与科技新兴特色学科带头人，华南地区音乐科技、现代器乐、爵士乐高等教育创办人。同时兼任教育部高等学校戏剧与影视学类教学指导委员会委员，广东省高校戏剧与影视学类教学指导委员会主任等。管弦乐作品《雨落庭间歌满楼》入选文旅部首批中国“时代交响”计划；大型民族音乐作品，如《自在云端》《The Elements》《天地艳》《点绛唇咏春》《千里水云》等在海内外持续上演；筝曲代表作《风之猎》《层层水澜》等入选中国《华乐大典》，并作为国家级赛乐曲目广泛应用和传播；《蝴蝶与蓝》等被改编为数十个版本在世界范围上演；并曾为《天下无双》等多部影视作品配乐；其“写意作曲法”被多地学界广泛研究；其著书《电脑音乐》作为近20年来全国相关专业最具影响力的教材之一，在全国高校广泛应用。

Tao Mo is a composer and currently serves as the Deputy Secretary of the Party Committee and President of Xinghai Conservatory of Music. He is a professor and doctoral supervisor. He is the principal researcher of a national characteristic program recognized by the Ministry of Education and one of the first principal researchers of national first-class undergraduate programs. He serves as an evaluation expert for higher education institutions for the Ministry of Education, a reviewer for the China National Arts Fund under the Ministry of Culture and Tourism, and a specially invited composer for the European Capital of Culture projects. He is a leading scholar of emerging music and technology disciplines in Guangdong Province and the founder of higher education programs in music technology, modern instruments, and jazz in South China. He also serves as a member of the Teaching Steering Committee for Theatre, Film and Television Majors in High Learning Institutions of the Ministry of Education and as Director of the Teaching Steering Committee for Theatre, Film and Television Majors in High Learning Institutions in Guangdong Province. His orchestral work "Rain Falls in the Courtyard, Songs Fill the Mansion" was selected for the first batch of China's "Symphony of Era" program by the Ministry of Culture and Tourism. Large-scale folk music works, including "At Ease in the Clouds", "The Elements", "Splendor of Heaven and Earth", "Dian Jiang Chun: Ode to Spring" and "A Thousand Miles of Water and Clouds" continue to be performed both domestically and internationally. His guzheng compositions, such as "Hunt in Wind" and "Layer upon Layer of Water Waves" have been included in the collection of "China Music" and widely adopted as repertoire for national-level competitions. His work "Butterfly & Blue" has been adapted into dozens of versions and performed worldwide. He has also composed scores for numerous film and television productions, including "Chinese Odyssey". His "Freehand (Xieyi) Composition Method" has been widely studied in academic circles across various regions. His book *Computer Music: MIDI and Audio Application Techniques* has become one of the most influential textbooks in the field over the past two decades and is widely used in universities across China.



王瑞

Wang Rui

守恒与流变：音乐与科技的不二法则

Conservation and Transformation: The Fundamental Law of Music and Technology

发言摘要 ABSTRACT

科技求真，艺术求美。人类历史中的每一次科技革命，都必然催生新的艺术语言、形态和审美意象。今天的审美正在被科技重新塑造，我们的感性经验也在被新的媒介所激发。有人担忧传统的失落，有人欢庆技术的胜利，但艺术与科技不是非此即彼的二元对立，却因科技的加持，那些跨越时间长河的音乐传统与艺术经典方能历久弥新，葆有那份清激与活力，恒久闪耀着人性的光辉。

Technology seeks truth, while art pursues beauty. Every technological revolution in human history has inevitably given rise to new artistic languages, forms, and aesthetic imaginaries. Today, aesthetic perception is being reshaped by technology, and our sensory experiences are continually stimulated by emerging media. Some express concern over the loss of tradition, while others celebrate the triumph of technology. Yet art and technology do not constitute a binary opposition. Rather, with the empowerment of technology, musical traditions and artistic classics that traverse the long river of time are able to renew themselves, retaining their clarity and vitality, and enduringly radiating the brilliance of human nature.

个人简介 BIOGRAPHY

博士、教授，博士生导师，浙江音乐学院院长、党委副书记。兼任中国音乐家协会理事，浙江省音乐家协会主席，浙江省文史馆研究员，《音乐文化研究》主编等。主要学术领域为中国音乐史学、歌剧学理论、音乐形态研究等。倡导“大历史、大文化”的艺术观和“形上形下相统一”的音乐学术观，先后提出“艺术学基础研究”“歌剧学基本问题研究”“中国音乐史学基本问题”“中国音乐古谱学”“中国民族音乐创作重大问题研究”“越剧学中国自主知识体系研究”等重大选题与学术观点，发表系列原创成果，创设“歌剧学”博士学位培养方向。先后主持国家社科艺术学重大项目《琴学文化体系研究》、上海市教育科研重大项目《歌剧学学科体系构建研究》《“音乐与舞蹈学”国际同行评估指标体系》以及浙江省新文科实验室“歌剧学实验室”等项目。

Wang Rui is a Ph.D., professor, and doctoral supervisor. He serves as President and Deputy Secretary of the Party Committee of Zhejiang Conservatory of Music. He is also a council member of the Chinese Musicians' Association, Chairman of the Zhejiang Musicians' Association, a research fellow at the Zhejiang Provincial Institute of Culture and History, and Editor-in-Chief of Music and Cultural Studies. His primary academic fields include Chinese music history, opera studies theory, and music morphology. He advocates an artistic perspective of "grand history and grand culture," as well as a musicological view emphasizing the unity of the metaphysical and the physical. He has successively proposed a series of major research topics and academic viewpoints, including "fundamental research in the arts," "basic issues in opera studies," "fundamental issues in Chinese music historiography," "Chinese ancient musical notation studies," "major issues in Chinese ethnic music composition," and "the construction of an indigenous Chinese knowledge system for Yue opera studies." He has published a series of original scholarly achievements and established a doctoral training direction in opera studies. He has led several major research projects, including the National Social Science Fund Art Major Project A Study on the Cultural System of Qin Studies, the Shanghai Municipal Education Research Major Projects The Construction of the Disciplinary System of Opera Studies and An International Peer-Review Evaluation Index System for Music and Dance Studies, as well as the Zhejiang Province New Liberal Arts Laboratory project, the "Opera Studies Laboratory."



热拉尔·阿萨亚格
Gérard Assayag

共创模型、符号交互与赛博人类音乐实践：REACH 项目 Cocreative Models, Symbolic Interaction, and Cyber-Human Musicianship : the REACH Project

报告摘要 ABSTRACT

REACH 项目建立在这样一个假设之上：在赛博人类系统中，共创性源于一种连贯行为的涌现，而这种连贯行为植根于事件、结构与过程的非线性模式之中，并进一步推动音乐形态的丰富共演化。这样的结果来自参与其中的各个行动体之间的交叉学习过程，其中包含反馈回路与强化机制。这一理念代表了创造性人工智能的一种全新且激进的方法，由此催生出一系列强大的音乐家—机器交互工具，例如 Somax2。此类系统融合了自动聆听、机器学习、音乐认知以及基于语料库的声音合成，能够对音乐家的现场演奏作出富有创造性的反应，并通过融入整体声音景观，创造出一种声音上的“混合现实”。这些共创过程可归入符号互动的范畴，也就是说，它是一种将形式化音乐结构与现场音乐经验背后的声学 and 认知因素连接起来的对话机制。在此基础上，REACH 通过提出“交互学习”这一新的概念，为创造性人工智能勾勒未来发展方向；这一概念可被视为对当前占主导地位的表征学习范式的拓展，同时也重新审视了机器智能中行动与信息内容之间动态纠缠的关系。

The REACH project is based on the hypothesis that cocreativity in cyber-human systems arises from the emergence of coherent behaviors grounded in nonlinear patterns of events, structures, and processes, leading to a rich co-evolution of musical forms. This outcome stems from cross-learning processes between agents involving feedback loops and reinforcement mechanisms. This concept, which represents a radically new approach to creative AI, has led to the development of powerful tools for musician-machine interaction, such as Somax2. Combining automatic listening, machine learning, musical cognition, and corpus-based synthesis, these systems react creatively to the musician's live performance and create a sonic "mixed reality" by merging into the collective soundscape. These cocreative processes fall under the umbrella of "symbolic interaction," that is a dialog connecting formal musical structures with the acoustic and cognitive factors underlying the live musical experience. Building on this, REACH charts the future directions of creative AI by promoting the novel concept of "interaction learning" as a widening of the dominant paradigm of "representation learning," while re-examining the dynamic entanglement of action and information content in machine intelligence.

个人简介 BIOGRAPHY

Gérard Assayag 是巴黎声学 / 音乐研究中心 (Institut de recherche et de coordination acoustique/musique, IRCAM) 总监，并在该院创立了“音乐表征”研究团队。该团队因在音乐计算科学与创造性人工智能领域的推进而享有国际声誉。他还曾多年担任 IRCAM 研究部门——音乐与声音科学技术实验室 (STMS) ——的负责人。该实验室由 IRCAM 与索邦大学及法国国家科学研究中心 (CNRS) 联合开展。Assayag 还是多个重要机构的共同创始人，包括索邦大学音乐科学研究所、索邦人工智能研究所、法国计算机音乐学会、国际音乐中的数学与计算学会，以及《数学与音乐》期刊等。这些机构都对当代音乐科学的发展产生了重要影响。Assayag 的研究兴趣包括音乐计算机语言与算法、计算机辅助作曲 (CAC) 以及创造性人工智能。他是 OpenMusic 语言的创造者，而 OpenMusic 已成为计算机辅助作曲领域的全球标准之一。他还推广了“赛博人类共创性” (cyber-human cocreativity) 这一概念，并通过一系列面向人类与人工智能实时即互动的系统环境加以实践和阐释，例如 Omax, Somax 和 Dyci2；这些系统已成为该领域的重要参照。他获得享有盛誉的欧洲研究理事会 (ERC) 高级研究基金 (Advanced

Grant)，以支持其 REACH 项目。该项目聚焦于提升赛博人类音乐实践中的共创能力。

G rard Assayag is research director at Institut de recherche et de coordination acoustique/musique (IRCAM) in Paris, where he founded the Musical Representations team, renowned internationally for its advances in computational science of music and creative AI. He was for several years the director of IRCAM's research department, the Laboratory for Sciences and Technologies of Music and Sound (STMS) in association with Sorbonne University and France Science Foundation (CNRS). Assayag is a co-founder of the Sorbonne University Institute for Music Sciences, the Sorbonne Institute for Artificial Intelligence, the French Society for Computer Music, the international Society for Mathematics and Computation in Music, the Journal of Mathematics and Music, among other major institutions shaping the world of music sciences. Assayag's areas of interest include computer languages and algorithms for music, computer-aided composition (CAC), and creative AI. He is the creator of the OpenMusic language, a global standard for CAC, and he popularized the concept of « cyber-human cocreativity », which he illustrated in a series of environments for real-time improvised human-AI interaction (Omax, Somax, Dyci2) that have become essential references in the field. Assayag is the recipient of the prestigious European Research Council (ERC) Advanced Grant for his REACH project on raising cocreativity in cyber-human musicianship.



乔治·海杜
Georg Hajdu

谁在塑造谁？艺术家、工具与技术演进

Who Shapes Whom? Artists, Tools, and Technological Evolution

报告摘要 ABSTRACT

艺术家与技术之间的关系并非简单的“使用”，而是一种持续的协同演化。自计算机音乐诞生以来，艺术观念与技术系统始终并行发展，在动态的反馈过程中相互塑造。本报告将追溯这一发展脉络：从早期的算法作曲出发——例如 Clarence Barlow 等作曲家设计生成系统——一直延伸到当今以人工智能为驱动的创作环境，在这些环境中，工具正日益成为具有共同创造能力的参与者。

当代人工智能正在模糊“乐器”与“合作者”之间的边界，引发关于作者性、控制权以及文化生产方式的一系列新问题。人工智能并非取代艺术实践，而是对其加以转化，促使艺术家以批判性的视角审视并参与所使用和构建的技术系统。本报告认为，当代艺术能动性体现在对这些不断演化的系统的塑造之中，以及在人类意图与机器自主性之间不断变化的张力中进行探索与调适。

The relationship between artists and technology is not one of simple use, but of continuous co-evolution. Since the emergence of computer music, artistic ideas and technical systems have developed in parallel, shaping one another in a dynamic feedback process. This presentation traces this trajectory from early algorithmic composition—where composers such as Clarence Barlow designed generative systems—to today's AI-driven environments, in which tools increasingly act as co-creative agents. Contemporary artificial intelligence blurs the boundary between instrument and collaborator, raising new questions about authorship, control, and cultural production. Rather than replacing artistic practice, AI transforms it, requiring artists to engage critically with the systems they use and build. The talk argues that artistic agency today lies in shaping these evolving systems—and in navigating the shifting balance between human intention and machine autonomy.

个人简介 BIOGRAPHY

德国作曲家、学者，现任德国汉堡音乐与戏剧学院 (HfMT) 教授，利盖蒂中心主任。他长期致力于音乐、科技与跨学科艺术实践的融合研究，关注多媒体作曲、网络化音乐、生成式音乐系统与数字乐谱等方向。Hajdu 早年在科隆学习分子生物学与作曲，后于英

国加州大学伯克利分校完成博士学位，并与 CNMAT 保持紧密关联，是当代音乐科技领域具有代表性的学者与作曲家之一。

Georg Hajdu is a German composer and scholar, currently serving as Professor of Multimedia Composition at the Hochschule für Musik und Theater Hamburg (HfMT). He also leads the Ligeti Center and serves as the university's Commissioner for Research and Transfer. His work focuses on the intersection of music, technology, and interdisciplinary artistic practice, with particular interests in multimedia composition, networked music, generative systems, and digital score environments. Hajdu studied molecular biology and composition in Cologne and later earned his PhD at the University of California, Berkeley, in close connection with CNMAT.



克雷格·维尔
Craig Vear

基于“音乐实践”的协同创作：音乐人工智能需要以人为中心的方法
Co-creating through musicking (an insider's perspective): why we need a human-centred approach to music-AI

报告摘要 ABSTRACT

这篇演讲介绍了 Solaris —— 一个由三位人工智能乐手和一位人类乐手组成的爵士四重奏。从底层架构开始，Solaris 强调的是音乐创作中的具身性，即共同行动、对生命力的相互感知以及响应式适配，而非仅仅依赖 MIDI 或乐谱等符号表征。通过采集专业即兴演奏者的专属具身音乐数据集（包含音频、基于视频的肢体动作、脑电图 EEG 及皮肤电传导数据），我们训练了一个模块化的 AI 工厂。该系统实现了罗伯特·柯克（Robert Kirk）关于知觉经验的基础框架：原生感知与反射；知觉驱动的控制；持续的环境建模；相互依赖的跨模态能力；用于表达信念的极符号语言。

一套专用的数字乐谱将 AI 内部的情感与信念状态外化为不断演变的几何色彩形态，为人类伙伴提供了共享意图的可视化通道。现场表演和受控听力实验表明，随着接触时间的增加，乐手之间的默契感、信任感和沉浸感也随之增强；同时，AI 现象学的透明化显著提升了人类对其主体性的感知。除了实践成果外，本次演讲还通过查尔斯·皮尔斯（Charles Peirce）的连续论探讨了人工感知的可能性，将 AI 视为与人类认知处于同一连续谱系上的“低密度心灵”。这一视角消解了笛卡尔的二元论，将 AI 定位为具备初步情感经验的合作伙伴，而非冰冷的工具。演讲指出，以人为中心的设计——即将感知、情感和透明沟通嵌入其中——对于艺术与技术的真正共创进化至关重要。最后，文章概述了其在跨流派扩展、多模态表演及持续在线学习方面的意义，指向了一个 AI 与人类在共享音乐生态中共同进化的整合型未来。

This talk presents Solaris, a four-voice jazz quartet in which three members are artificial musicians and only one is human. Built from the ground up, Solaris foregrounds the embodied nature of musicking—joint action, mutual perception of liveness, and responsive adaptation—rather than reliance on symbolic representations such as MIDI or scores. By recording a bespoke “embodied musicking” dataset (audio, video-based gesture, EEG, and skin-conductance) from professional improvisers, we trained a modular AI factory that implements Robert Kirk’s “basic package” of perceptual experience: (1) raw perception and reflex, (2) perception-driven control, (3) continuous environmental modeling, (4) inter-dependent cross-modal capacities, and (5) a minimal symbolic language for belief. A dedicated digital score externalises the AI’s internal affect and belief state as evolving geometric-color forms, giving human partners a visual channel for shared intentionality. Live performance and controlled listening experiments show that musicians’ sense of togetherness, trust, and flow increases with exposure, and that visibility of the AI’s phenomenology significantly enhances perceived agency. Beyond practical outcomes, the talk uses Solaris to explore artificial sentience through Charles Peirce’s synechism, framing AI as a lower-density mind on a continuum with human cognition. This perspective dissolves Cartesian dualism, positioning AI not as

a cold tool but as a collaborative partner capable of rudimentary affective experience. The presentation argues that a human-centred design—embedding perception, affect, and transparent communication—is indispensable for genuine co-creative evolution of art and technology. Implications for cross-genre extensions, multimodal performance, and continual online learning are outlined, pointing toward an integrative future where AI and humans co-evolve within the shared ecology of musicking.

个人简介 BIOGRAPHY

Craig Vear 现任 英国诺丁汉大学音乐与计算机科学教授，同时在音乐学科与 Mixed Reality Lab（混合现实实验室）开展跨领域研究与教学工作。他的研究具有鲜明的交叉性，融合了音乐、数字表演、创意技术、人工智能、创造力研究、游戏、混合现实与机器人等多个方向。Vear 教授在国际上最具代表性的研究领域，是围绕 Digital Score（数智乐谱 / 数字乐谱）所展开的理论与实践探索。他著有 *The Digital Score: Musicianship, Creativity and Innovation* (Routledge, 2019) 一书，系统讨论了数字技术如何重塑乐谱的形态与功能，并进一步改变作曲、记谱、即兴与现场表演之间的关系。

他同时担任欧洲研究理事会（ERC）资助项目 DigiScore——“investigating the technological transformation of the music score”——的首席研究员。该项目属于 ERC Consolidator Grant，资助周期为 2021 年 10 月 1 日至 2026 年 9 月 30 日，重点考察数字技术如何通过交互式、计算性和动态化的记谱方式，推动音乐创作、表演与可及性的转型。除学术写作与项目主持外，Craig Vear 还长期从事实践导向的创作研究，在数字表演、人工智能音乐实践以及新型乐谱系统设计等方面持续推进实验与创新。相关官方简介将其研究概括为一种“天然的混合型研究”，即在批判性思考、技术实验与艺术实践之间建立紧密联系。凭借在数智乐谱、音乐科技与未来音乐实践研究中的持续贡献，Craig Vear 已成为当代国际音乐科技与数字表演研究领域的重要代表学者之一。

Craig Vear is Professor of Music and Computer Science at the University of Nottingham, with appointments spanning music and the Mixed Reality Lab. His work is widely recognized for bringing together music, digital performance, creative technologies, artificial intelligence, creativity, gaming, mixed reality, and robotics in a strongly interdisciplinary way. Professor Vear is best known internationally for his research on the digital score and its implications for contemporary musicianship, creativity, and performance. He is the author of *The Digital Score: Musicianship, Creativity and Innovation* (Routledge, 2019), a major study examining how digital technologies are reshaping the musical score and expanding the relationships among composition, notation, improvisation, and live performance.

He is also Principal Investigator of DigiScore—investigating the technological transformation of the music score—an ERC Consolidator Grant project funded by the European Research Council under Horizon 2020, running from 1 October 2021 to 30 September 2026. The project explores how digital technologies transform music creation, performance, and accessibility through new forms of interactive and computational notation. Alongside his writing and research leadership, Vear has developed a broad body of practice-based work in digital performance and AI-informed music making. Official profiles describe his research as naturally hybrid, combining critical inquiry with artistic experimentation across emerging technologies and contemporary musical practice. He has also contributed to wider academic discourse through edited scholarship and international conference activity in music, AI, and digital performance. Through his creative research, publications, and institution-building, Craig Vear has become one of the leading voices in contemporary debates on digital scores, music technology, and the future of musical practice.



南周汉

Juhan Nam

人机音乐合奏：会聆听与演奏的自动钢琴

Human-AI Music Ensemble: A Self-Playing Piano that Listens and Performs

报告摘要 ABSTRACT

本次报告介绍了人机合奏表演的最新进展，重点围绕一台具有音乐智能的自动演奏钢琴系统展开。该系统不仅具备对琴键进行精确机械控制的能力，更被设计为能够展现音乐性，通过感知、理解并生成富有表现力的音乐演奏，实现更具艺术性的表达。为实现这一目标，我们融合了音乐信息检索与多模态机器学习领域的多项核心技术，包括钢琴自动转录、乐谱跟随，以及基于视觉的信息处理任务（如音乐提示检测与演奏可视化）。这些模块共同支持系统在实时环境中与人类演奏者进行互动，实现灵活响应与协同配合的合奏演出。

本次报告将结合技术框架与艺术实践成果，通过演示与精选舞台表演案例进行说明。通过这些实例，我们探讨人工智能如何从单纯的自动化工具，转变为音乐实践中具有创造力与协作能力的伙伴。

This talk presents recent advances in human-AI ensemble performance, centered on a musically intelligent self-playing piano. Beyond its mechanical capability to precisely control key actuation, the system is designed to exhibit musicianship by perceiving, understanding, and generating expressive musical performance. To achieve this, we integrate multiple core technologies from music information retrieval and multimodal machine learning, including piano transcription, score following, and visually grounded tasks such as musical cue detection and performance visualization. These components enable the system to interact with human performers in real time, supporting responsive and coordinated ensemble playing.

The talk will highlight both the technical framework and artistic outcomes of this research, illustrated through demonstrations and selected stage performances. Through these examples, we explore how AI can move beyond automation toward a creative and collaborative partner in musical practice.

个人简介 BIOGRAPHY

Juhan Nam 现任韩国科学技术院（KAIST）教授、文化科技研究生院音乐与音频计算实验室主任。研究聚焦于音乐信息检索、音频信号处理及人工智能音乐应用等。他同时担任 Sumi Jo 表演艺术研究中心主任，致力于与艺术家协作开发面向音乐表演与教育的创新技术。他于斯坦福大学计算机音乐与声学研究中心（CCRMA）获音乐博士学位，在开启学术生涯之前，他曾任职于英昌乐器（Young Chang / Kurzweil），负责合成器和数码钢琴的研发工作。他亦担任第 26 届国际音乐信息检索会议 ISMIR 2025 主席。

Juhan Nam is a Professor at the Korea Advanced Institute of Science and Technology (KAIST), South Korea. He leads the Music and Audio Computing Lab at the Graduate School of Culture Technology, where his research focuses on music information retrieval, audio signal processing, and AI-based music applications. He also serves as the Director of the Sumi Jo Performing Arts Research Center, fostering collaborations with artists to develop innovative technologies for music performance and education. He received his Ph.D. in Music from Stanford University, where he studied at the Center for Computer Research in Music and Acoustics (CCRMA). Before his academic career, he worked at Young Chang (Kurzweil), developing synthesizers and digital pianos. He also was the General Chair of the 26th International Society for Music Information Retrieval Conference (ISMIR 2025).



乔纳森·怀纳
Jonathan Wyner

艺术家中心视角下的人工智能：作为音乐想象的镜像、媒介与延伸 The Artist at the Center: AI as Mirror, Instrument, and Extension of Musical Imagination

报告摘要 ABSTRACT

随着人工智能逐渐成为创意生态的一部分，最重要的问题不再是技术本身能够独立生成什么，而是它如何能够深化、挑战并拓展艺术家的创作工作。在音乐领域，AI 可以充当一面镜子，映照出我们在习惯、偏好与假设中的种种模式；它也可以作为一种乐器，开启新的演奏、控制与表达方式；同时，它还可以成为音乐想象力的延伸，帮助艺术家探索那些仅凭传统手段可能难以抵达的创意路径。

本次演讲并不将 AI 视为创造力的替代品，而是将其视为人类意图、音乐实践与技术可能性之间不断演进关系中的一个新层次。基于以艺术家为中心的视角，并结合伯克利音乐学院对创作身份、教育与创新的一贯重视，演讲将探讨这些工具如何支持下一代音乐人在发展个人声音、主体性与判断力方面不断成长。音乐的未来，并不只会由自动化来定义，而将取决于艺术家如何运用新兴技术来创造意义、拓展表达，并塑造新的文化形式。

As AI becomes part of the creative landscape, the most important question is not what the technology can generate on its own, but how it can deepen, challenge, and extend the work of the artist. In music, AI can act as a mirror, reflecting patterns in our habits, tastes, and assumptions. It can function as an instrument, inviting new forms of play, control, and expression. And it can serve as an extension of musical imagination, helping artists explore ideas that may have been difficult to reach through traditional means alone.

This talk examines AI not as a substitute for creativity, but as a new layer in the evolving relationship between human intention, musical practice, and technological possibility. Drawing on an artist-centered perspective shaped by Berklee's commitment to creative identity, education, and innovation, it considers how these tools can support the next generation of musicians in developing voice, agency, and discernment. The future of music will not be defined by automation alone, but by the ways artists use emerging technologies to create meaning, expand expression, and shape new cultural forms.

个人简介 BIOGRAPHY

伯克利音乐学院音乐制作与工程教授、伯克利新兴艺术技术实验室 (BEATL) 艺术技术项目负责人，同时任教于 Berklee Online，并担任 M Works Studios 首席工程师。作为活跃于音乐制作、音频工程、教育与新兴技术交叉领域的重要专家，他长期推动以艺术家为中心的音频技术与创作工具发展。他集音乐家、制作人、录音及母带工程师、教育者与技术顾问于一身，四十余年来参与完成超过 5000 张录音作品的制作与母带处理，与众多顶尖艺术家合作。著有音频工程领域重要著作《音频母带处理：核心实践》。曾任国际音频工程学会 (AES) 主席，并获授 AES Fellow 会士。近年来，他持续围绕音频制作、人工智能、沉浸式音频与艺术科技教育等议题，在 AES 及相关国际专业平台开展演讲、教学与交流。

Jonathan Wyner is Professor of Music Production and Engineering at Berklee College of Music and Head of Artistic Technology Initiatives at the Berklee Emerging Artistic Technology Lab (BEATL). He also teaches for Berklee Online and serves as Chief Engineer at M Works Studios. As a leading figure working at the intersection of music production, audio engineering, education, and emerging technologies, he has long been committed to advancing artist-centered audio technologies and creative tools. He is a musician, producer, recording and mastering engineer, educator, and technology consultant. Over the past four decades, he has contributed to the production and mastering of more than 5,000 recordings and has collaborated with numerous top-tier artists. He is the author of the influential audio engineering book *Audio Mastering*:

Essential Practices. He previously served as President of the Audio Engineering Society (AES) and was named an AES Fellow. In recent years, he has continued to lecture, teach, and engage internationally on topics including audio production, artificial intelligence, immersive audio, and education in art and technology through AES and other leading professional platforms.



徐帆
Xu Fan

从生成到协同：AI 音乐中的艺术与技术如何共同演化

From Generation to Collaboration: How Art and Technology Co-Evolve in AI Music

报告摘要 ABSTRACT

随着生成式人工智能的发展，AI 音乐系统正在改变艺术与技术的互动方式。以 Suno 等为例，用户可以通过自然语言生成包含旋律、人声与编曲的完整作品，使创作中的生成与迭代过程被显性化并显著加速。这一变化不仅降低了创作门槛，也使技术从传统工具转变为创作流程中的参与者。艺术与技术在中呈现出可观察的协同演化机制：新技术扩展表达边界，艺术实践随之提出新的表达需求，这些需求反过来暴露技术边界，并推动其在控制性、风格一致性与结构表达等方面持续发展；而技术能力的变化，又进一步重塑艺术对“作者”“作品”与“原创”的理解。报告将基于这一机制，探讨艺术与技术如何在“生成—选择—再生成”的共同逻辑中实现同源发展与协同演化。

With the advancement of generative artificial intelligence, AI music systems are reshaping the interaction between art and technology. Taking Suno as an example, users can generate complete works—including melody, vocals, and arrangement—through natural language prompts, making the processes of generation and iteration in creation both explicit and significantly accelerated. This transformation not only lowers the barrier to creation, but also shifts technology from a traditional tool into an active participant within the creative process. The development of art and technology reveals an observable mechanism of co-evolution: new technologies expand the boundaries of expression, prompting artistic practices to articulate new expressive demands. These demands, in turn, expose the limitations of technology and drive its continuous advancement in areas such as controllability, stylistic coherence, and structural representation. Meanwhile, changes in technological capabilities further reshape artistic conceptions of “authorship,” “the work,” and “originality.” Based on this mechanism, the report explores how art and technology achieve co-originated development and collaborative evolution within a shared logic of “generation–selection–regeneration.”

个人简介 BIOGRAPHY

现任 Suno 软件工程师，长期从事软件系统、机器学习与智能音乐相关技术开发。加入 Suno 之前，他曾在 Meta 参与 AR/VR 平台工程工作，也曾于 Hewlett Packard Enterprise 从事数据库驱动与系统开发，并曾在北京大学微电子学研究所担任研究助理。徐帆拥有东北大学电子与计算机工程硕士学位及北京大学电子工程与计算机科学学士学位，在软件工程、机器学习、网络系统与音乐生成技术交叉领域具有丰富经验。

Xu Fan is a Software Engineer at Suno, working at the intersection of software systems, machine learning, and AI-driven music technology. Before joining Suno, he worked at Meta on AR/VR platform engineering and previously served as a software engineer at Hewlett Packard Enterprise, focusing on database drivers and system development. He also worked as a research assistant at the Institute of Microelectronics, Peking University. Xu holds an M.S. in Electrical and Computer Engineering from Northeastern University and a B.S. in Electrical Engineering and Computer Science from Peking University.



张萌

Zhang Meng

博士，中国文联音乐艺术中心副主任，《人民音乐》杂志副主编。他同时担任北京音乐家协会副主席、中国文艺评论家协会理事，曾担任中宣部“五个一工程”奖评委，国家艺术基金评审委员及中央电视台“中国器乐大赛”评委。毕业于中央音乐学院，代表作包括《悲玄之音——论日本邦乐的审美特征》《武满彻音乐创作的民族音乐学分析》等论著。每年参加、观摩近百场有关中国当代音乐创作、表演以及音乐学术研究领域的音乐会及研讨会等活动，并撰写大量理论评论文章。2012年起至今，担任中国文联《中国艺术年度发展报告（音乐分报告）》的主笔撰写工作。

PhD, Deputy Director of the Music Art Center of the China Federation of Literary and Art Circles, and Deputy Editor-in-Chief of *People's Music* magazine. He also serves as Vice Chairman of the Beijing Musicians Association and a Council Member of the China Literature and Art Critics Association. He has served as a jury member for the "Five-One Project" Award, a member of the National Arts Fund Review Committee, and a judge for the CCTV Chinese Instrumental Music Competition. A graduate of the Central Conservatory of Music, his representative works include *The Sound of Yūgen: On the*

Aesthetic Characteristics of Japanese National Music and An Ethnomusicological Analysis of the Musical Compositions of Toru Takemitsu. Each year, he attends and observes hundreds of concerts and seminars related to contemporary Chinese music creation, performance, and academic research, and writes numerous theoretical and critical articles. Since 2012, he has been the principal writer of the Music Section of the *China Art Annual Development Report* published by the China Federation of Literary and Art Circles.



李小兵

Li Xiaobing

中央音乐学院教授、博士生导师，音乐人工智能系主任。中国计算机学会理事、计算艺术分会主任，中国人工智能学会会士、艺术与人工智能专委会主任。国家哲学社会科学领军人才，中宣部“四个一批人才”，享受国务院政府特殊津贴专家，国家社科重大项目首席专家，“全国高校黄大年式教师团队”负责人。致力于人工智能与音乐艺术的交叉研究与创新实践，将人工智能引入音乐创作、表演等核心艺术环节，系统推进面向未来音乐形态与音乐教育转型的发展研究。多年来，带领团队持续开展音乐人工智能、脑科学等多学科融合探索，在相关领域形成具有国际影响力的研究成果与实践路径。

作曲博士，毕业于中央音乐学院作曲系，师从吴祖强先生。音乐创作涵盖多种体裁与风格，部分作品具有广泛社会影响。曾荣获中国音乐金钟奖、文华大奖、文华作曲奖、全国歌剧舞剧一等奖、中宣部“五个一工程”奖等重要奖项。

Li Xiaobing is a Professor and Doctoral Supervisor at the Central Conservatory of Music, and Director of the Department of Music Artificial Intelligence. He serves as a Council Member of the China Computer Federation (CCF) and Chair of its Computational Art Branch, as well as a Fellow of the Chinese Association for Artificial Intelligence (CAAI)

and Chair of its Art and Artificial Intelligence Commission. He is recognized as a National Leading Talent in Philosophy and Social Sciences, a recipient of the Central Propaganda Department's "Four Kinds of Talents" award, an expert entitled to special government allowances from the State Council, Principal Investigator of major national social science projects, and leader of the "National Huang Danian-style Faculty Team" in higher education. He has been dedicated to interdisciplinary research and innovative practice at the intersection of artificial intelligence and music. He introduced artificial intelligence into core areas of musical creation and performance, and has systematically advanced research on future music forms and the transformation of music education. Over the years, he has led his team in sustained explorations integrating music artificial intelligence, brain science, and other disciplines, producing research outcomes and practical approaches with international influence in the field.

Li Xiaobing holds a Doctor of Composition degree from the Composition Department of the Central Conservatory of Music, where he studied under Professor Wu Zuqiang. His compositional work spans a wide range of genres and styles, with some works achieving broad social impact. He has received numerous prestigious awards, including the Golden Bell Award, the Wenhua Grand Prize, the Wenhua Composition Award, First Prize in National Opera and Dance Drama competitions, and the "Five One Project" Award from the Central Propaganda Department.

中国文学艺术界联合会

China Federation of Literary and Art Circles (CFLAC)

中国文学艺术界联合会（简称中国文联）成立于中华人民共和国诞生前夕的1949年7月，是国家批准成立的全国性文艺界人民团体。

中国文联实行团体会员制，现有团体会员55个，包括14个全国性文艺家协会、32个省级团体会员、9个全国性产（行）业文联。上述协会现国家级会员共计约15万人，省市县级会员共计460余万人。

中国文联众多宗旨中就包括开展国际民间文化交流和与港澳台文化交流等。

China Federation of Literary and Art Circles (CFLAC) is a national non-governmental organization founded with the approval of the state in July 1949, three months before the founding of the People's Republic of China (PRC).

CFLAC practices group membership. Now it has 55 group members, including 14 national associations of writers and artists (of which China Writers Association is an independent administrative organization), 32 provincial group members and 9 national federations of enterprise (trade) nature. So far these associations have a total of approximately 150,000 national-level members and over 4.6 million members at provincial, municipal and county levels.

One of the missions of CFLAC is to promote international cultural exchanges and the cultural exchanges with Hong Kong, Macao, and Taiwan.





中国音乐家协会

China Musicians Association (CMA)

中国音乐家协会（简称中国音协）成立于1949年，是由中国各民族音乐家和音乐工作者组成的专业性人民团体。中国音协是中国文联的团体会员，也是国际音乐理事会和国际青年音乐联盟的国家会员。

中国音协下设9个专业委员会和34个音乐门类的专业学会，编辑出版5个音乐刊物，拥有38个团体会员和近2万名个人会员，在全国各个省、市常设音乐家协会组织。

作为中国最高级别的国家级音乐组织，中国音协通过支持演出实践、音乐创作、理论研究、人才培养与国际交流，致力于中国音乐事业的繁荣发展，努力成为广大音乐工作者的温馨之家。

Founded in 1949, China Musicians Association (CMA) is a non-profit professional organization consisting of musicians of different ethnic groups in China. It is one of the group members of CFLAC, and also a national member of International Music Council and Jeunesses Musicales International.

It has 9 professional committees and 34 specialized societies in different music categories, publishes 5 music journals, and owns 37 group members and nearly 20,000 individual members. Branch music associations are established in all provinces and municipal cities across China.

As China's highest-level national music organization, CMA has committed to the music prosperity and development of China and dedicated to serve the Chinese musicians through supporting performance, composition, theoretical research, talent cultivation and international cultural exchange.

中央音乐学院

Central Conservatory of Music

中央音乐学院于 1949 年成立，是新中国成立后创办的第一所高等专业音乐院校。1960 年被中央确定为国家重点大学，1981 年被国务院批准为全国高校首批博士学位授予单位，1999 年被列入国家“211 工程”重点建设高校，2017 年入选国家“双一流”建设高校。

作为全国音乐教育、创作、表演和研究中心以及社会音乐推广中心，中央音乐学院是一所代表中国专业音乐教育水平，专业设置齐全，在国内外享有很高声誉的音乐学府。学校构建了从附小、附中、本科、硕士、博士至博士后的一体化人才培养体系，设有作曲系、音乐学系、指挥系、钢琴系、管弦系、民乐系、声乐歌剧系、音乐教育学院、音乐人工智能与音乐信息科技系、提琴制作研究中心、人文学部、思政部、附属中等音乐学校、鼓浪屿钢琴学校等教学院系。2017 年成立音乐表演艺术中心、中国音乐创作中心和音乐理论研究中心，成为国家艺术创新与呈现的重要载体。学校拥有全国艺术门类唯一的教育部人文社科重点研究基地——音乐学研究所，教育部科技重点实验室，教育部首批中华优秀传统文化传承基地（中国民族音乐）和国家非物质文化遗产保护与研究中心。学校积极探索引领音乐与科技融合，2019 年率先成立音乐人工智能与音乐信息科技系，着力培养音乐与理工科交叉融合的复合型拔尖创新人才。

中央音乐学院是国内外音乐人才向往的地方，七十余年来，学校已建立起一支实力雄厚的师资和教学管理队伍，在教学、创作、表演和科研中涌现出一批有突出贡献的专家和学者。培养了数万名优秀音乐人才及数千名留学生，其中大多数已成为国内外享有盛誉的作曲家、音乐学家、音乐教育家、音乐表演艺术家、文化艺术机构的领导人和各大乐团的首席及业务骨干。建校以来，师生在柴科夫斯基国际音乐比赛、慕尼黑国际音乐比赛（ARD）、中国音乐金钟奖等国内外重要赛事中获奖，展现出卓越的教育教学实力。

中央音乐学院在继承中华民族音乐传统的同时，不断吸纳世界各国、各民族的音乐文化。学校积极践行以人民为中心的创作导向，首创 5·23 音乐节和 10·15 艺术节，在全国 17 个省市建立“中央音乐学院新时代文明实践中心”，推动音乐服务社会发展。学校不断构建教育对外开放多元化格局，与美国茱莉亚音乐学院、奥地利维也纳音乐与表演艺术大学等世界一流音乐学院建立合作友好关系，创建“一带一路”国际音乐教育联盟，积极拓展海外办学，在巴德学院设立美中音乐研习院，为中国民乐学位纳入西方院校教学体系开创先例。学校不断推出中国当代音乐新作，每年在纽约林肯中心、卡内基音乐厅、维也纳音乐厅等世界艺术殿堂举行专场音乐会，集中展现中国当代音乐风采。

Central Conservatory of Music was founded in 1949, being the first professional music higher institute founded after the founding of the People's Republic of China. In 1960, it was identified by the central government as a national key university. In 1981, it was approved by the State Council as one of the first doctoral degree-granting units in universities nationwide.

As a center for music education, composition, performance, and research as well as a social music promotion



center in China, Central Conservatory of Music represents the professional music education level in the country with a comprehensive range of majors and a high reputation both domestically and internationally. The conservatory established an integrated talent cultivation system from elementary school, middle school, undergraduate, graduated students', doctoral, and postdoctoral levels. The educating departments in CCOM includes Composition Department, Musicology Department, Conducting Department, Piano Department, Orchestral Instruments Department, Traditional Chinese Musical Instruments Department, Voice and Opera Department, Music Education Institute, Department of Music Artificial Intelligence and Music Information Technology, Violin Making Research Center, Humanities Department, Ideological and Political Department, Middle School, and Piano School at Gulangyu. In 2017, the Music Performance Art Center, China Music Creation Center, and Music Theory Research Center were established. CCOM boasts the only key research base for humanities and social sciences under the Ministry of Education in the national art category - the Institute of Musicology, as well as a key laboratory of science and technology under the Ministry of Education, one of the first batch of bases for inheriting Chinese excellent traditional culture (Chinese folk music) under the Ministry of Education, and a national center for the protection and research of intangible cultural heritage. CCOM actively explores and leads the integration of music and technology. In 2019, the Department of Music Artificial Intelligence and Music Information Technology was founded, focusing on cultivating top-notch innovative talents who are proficient in both music and science.

Central Conservatory of Music is a highly coveted destination for music talents both domestically and internationally. Over the past seventy years, the school has established a strong faculty and teaching management team, and has seen the emergence of a number of experts and scholars who have made outstanding contributions in teaching, composition, performance, and scientific research. It has cultivated tens of thousands of outstanding music talents and thousands of overseas students, most of whom have become renowned composers, musicologists, music educators, music performance artists, leaders of cultural and art institutions, and chief executives and key personnel of major academies and troupes both domestically and internationally. Since its establishment, teachers and students won awards in important competitions both domestically and internationally, such as the Tchaikovsky International Music Competition, ARD International Music Competition, and the China Music Golden Bell Award, demonstrating excellent educational and teaching strength.

While inheriting the excellent traditional Chinese ethnic music, CCOM continuously absorbs the music cultures of various countries and ethnic groups around the world. CCOM actively practices a people-centered composing orientation, creating 5·23 Music Festival and 10·15 Art Festival, and establishing "Central Conservatory of Music New Era Civilization Practice Centers" in 17 provinces and cities across the country to promote music services for social development. CCOM continues to build a diversified pattern of opening up education to the outside world, establishing cooperative and friendly relationships with world-class music institutes such as the Julliard School and the University of Music and Performing Arts Vienna and creating Music Education Alliance Across "the Belt and Road". The conservatory also established the US-China Music Institute at Bard College to explore overseas education, setting a precedent for incorporating Chinese folk music degrees into Western educational systems. CCOM launches new composed musical works by Chinese composers, and holds concerts every year in venues such as Lincoln Center in New York, Carnegie Hall, and Vienna Konzerthaus, presenting the charm of Chinese contemporary music.



中央音乐学院
CENTRAL CONSERVATORY
OF MUSIC



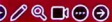
中央音乐学院
CENTRAL CONSERVATORY
OF MUSIC

跨界与重构：人工智能驱动的音乐新生态

Cross-Boundary Integration and Structural Reconfiguration: A New Ecosystem of Music Driven by Artificial Intelligence

柯 扬
Ke Yang

中央音乐学院
Central Conservatory of Music





跨境

Cross-Boundary Integration

重构

Structural Reconfiguration

音乐以其高度抽象性与跨文化沟通能力，往往**最先感知并回应**技术带来的结构性变化，成为艺术与科技深度融合的重要前沿领域。

Music, with its high level of abstraction and its capacity for cross-cultural communication, is often **among the first to perceive and respond** to the structural transformations brought about by technology, making it a key frontier for the deep integration of art and technology.



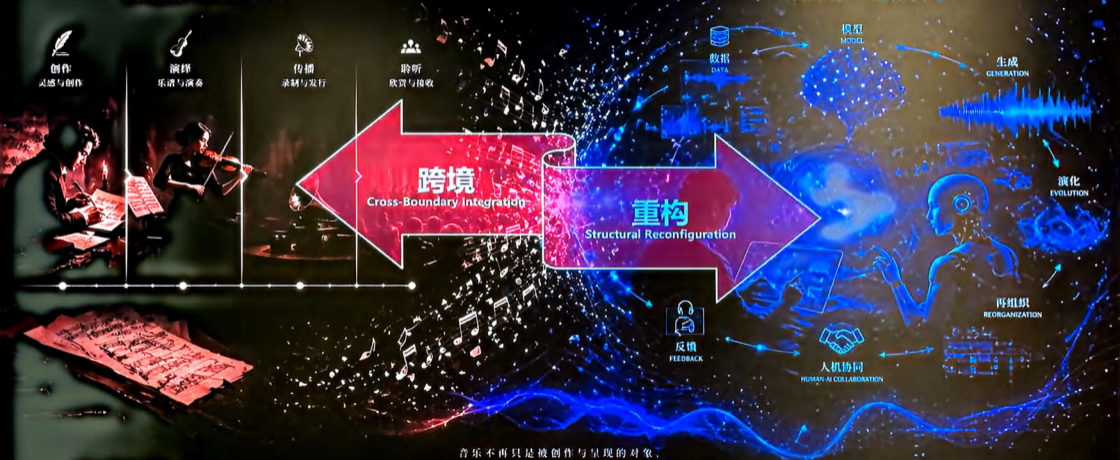
中央音乐学院
CENTRAL CONSERVATORY
OF MUSIC

音乐的演化：从作品到开放系统

从线性结构到开放生态，从人类创作到人机协同

线性结构 · 以作品为中心

开放系统 · 以过程为中心



封闭 · 稳定 · 线性 · 作品中心

音乐不再只是被创作与呈现的对象，
而成为可以被计算、生成、演化与再组织的动态过程。

开放 · 动态 · 网络 · 过程中心

音乐人工智能与音乐信息科技系 (北京市高精尖学科)

Department of AI Music and Music Information Technology

(Advanced Discipline Construction Project of Beijing Universities)

跨境

Cross-Boundary Integration

音乐人工智能与音乐信息科技系成立于2019年，汇聚了众多一流音乐人工智能与脑科学方面专家学者、音乐家。

The Department of AI Music and Music Information Technology, established in 2019, brings together a distinguished group of leading experts, scholars, and musicians in the fields of music AI and brain science.

科技导师

戴琼海，中国人工智能学会理事长，国务院参事，中国工程院院士

管晓宏，中国科学院院士

郭毅可，香港科技大学副校长，英国皇家工程院院士，欧洲科学院院士，香港工程科学院院士

孙茂松，欧洲科学院外籍院士，清华大学人工智能研究院常务副院长

朱松纯，北京大学智能学院院长、人工智能研究院院长，北京通用人工智能研究院院长

王小勤，清华大学脑与智能实验室首任主任，音乐与脑科学实验室首席科学家

魏一镜，中国医学科学院北京协和医院心理医学科主任、精神病和精神卫生学系主任

刘河生，昌平实验室首席科学家，北京大学生物医学前沿创新中心教授

吴玺宏，北京大学智能学院党委书记，教授

胡斌，北京理工大学医学技术学院执行院长

李一伟，复旦大学计算机科学技术学院教授



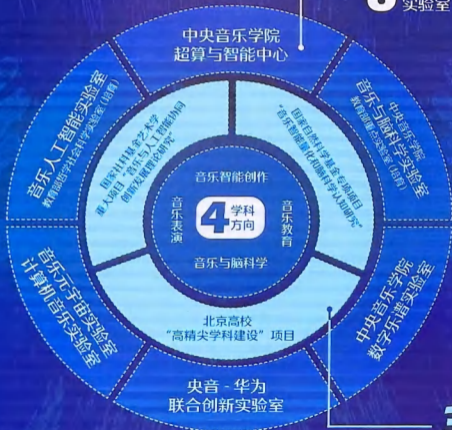


中央音乐学院
CENTRAL CONSERVATORY OF MUSIC

音乐人工智能与音乐信息科技系

DEPARTMENT OF AI MUSIC AND MUSIC INFORMATION TECHNOLOGY

6 学科
实验室 1 学科
中心



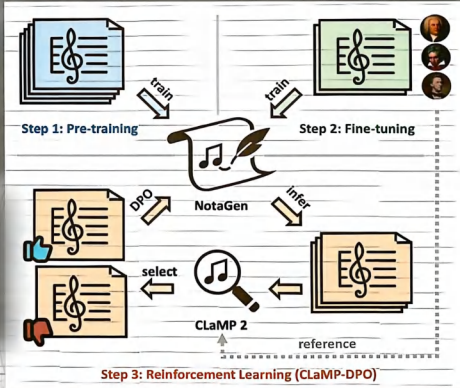
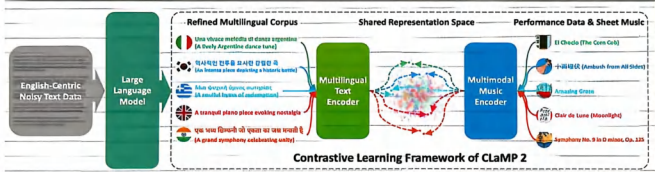
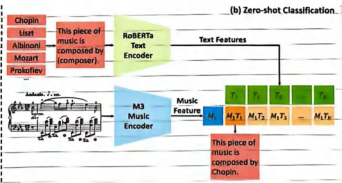
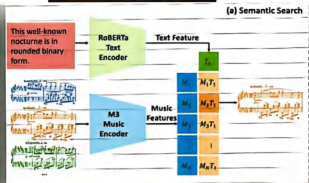
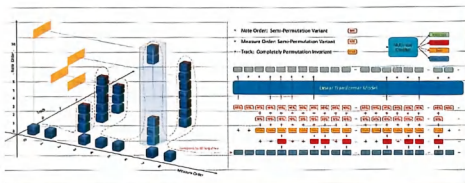
3 学科
项目



跨境

Cross-Boundary Integration

Struc



首届CCF中国计算艺术大会, 2025年9月
Inaugural CCF China Computational Art Conference,
Sept. 2025.

世界音乐人工智能大会, 第一届2021年10月, 第二届2023年
10月, 第三届2026年4月
Summit on Music Intelligence
First Summit, Oct. 2021; Second Summit, Oct. 2023;
Third Summit, Apr. 2026.

首届
CCF

中国计算艺术大会

Inaugural CCF China Computational Art Conference



科学与艺术携手创造美好的未来
祝中国计算艺术大会圆满成功!

杨振宁

2025年9月13日

国际物理学家、诺贝尔物理学奖获得者
杨振宁先生给大会的寄语

世界音乐人工智能大会

SOMI: Summit on Music Intelligence



科学与艺术的交融
艺术与科学的盛会

祝世界音乐人工智能大会
圆满成功!

李政道

二〇二一年十月

国际物理学家、诺贝尔物理学奖获得者
李政道先生给大会的寄语

重构

Structural Reconfiguration



艺术与科技正加速迈向更加系统化、协同化的新阶段。

Art and technology are rapidly advancing toward a more systematized and collaborative new stage.

让我们携手拓展中国音乐的国际表达能力与学术影响力，持续贡献具有文化深度、创新价值与时代意义的中国实践。

Let us work together to expand the international expressive capacity and academic influence of Chinese music, and continue contributing Chinese practices that embody cultural depth, innovative value, and contemporary significance.

跨境

Cross-Boundary Integration

重构

Structural Reconfiguration

北京市西城区鲍家街43号 (100031)

43 Baojia Street, Xicheng District

100031 Beijing, P.R.C.

www.ccom.edu.cn





CONTENTS
目录

- 01 准确识变，
把握人工智能时代音乐教育面临的新形势新任务新挑战
- 02 合力共为，
推动艺术院校在三大强国建设中问题共答
- 03 务实探索，
中国音乐学院打造“科技与音乐结合”的新模式



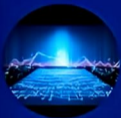
艺科融合时代思考

当前，新一轮科技革命深刻重塑全球格局。人工智能正从数字感知走向物理交互，深刻改变音乐创作、表演、传播、教育的底层逻辑。

艺术院校作为我国高等教育体系中的重要分类，如何主动拥抱人工智能时代，在教育强国、科技强国、文化强国建设中发挥独特作用，是我们必须回答好的时代课题。



艺术院校的机遇与挑战



历史逻辑

科技与艺术同源共生。从古代声学原理到电子音乐，再到今天 AI 深度介入创作与教学，科技始终拓展音乐的表达边界。



现实机遇

生成式 AI、多模态大模型、具身智能、智能交互技术快速突破，正深刻改变音乐创作、表演、教学、传播全链条，为音乐教育打开了前所未有的发展空间。



实践挑战

部分从业者对智能技术接纳不足；传统育人模式偏重单一技能培养，复合型人才供给存在短板；学科壁垒、评价滞后等体制机制问题，制约艺科融合深度落地。



合力共为，推动艺术院校在三大强国建设中问题共答

三大强国建设关联

建设教育强国、文化强国、科技强国的三大目标任务，对艺术类院校来说，高度统一、相辅相成。

面对人工智能时代机遇与挑战，全国艺术院校必须同频共振、携手并进，以高站位谋划、大格局推动艺科融合发展。

艺科融合路径布局

将艺科融合作为服务三大强国建设的重要路径，在人才培养、艺术创作、科技转化、文化传承等领域谋篇落子。



一是以AI赋能艺术教育变革，夯实教育强国人才根基



高等音乐教育使命

承担培养高水平艺术人才、提升全民审美素养、传承中华优秀传统文化的重要使命。



艺术院校人才培养方向

坚持立德树人根本任务，以艺科融合提升人才培养质量，着力培育具有文化自信、过硬专业本领、掌握数字技术的复合型艺术人才。



二是以艺科融合激发创作活力，助力文化强国建设



传统音乐文化价值

中华优秀传统文化是文化强国建设的重要根基，在人工智能时代，传承发展传统音乐，既要守根铸魂，也要创新表达。应当积极运用数字技术挖掘、活化传统音乐，创作彰显中国精神的精品力作。



数字平台传播推广

借助数字平台推动中国传统音乐走向世界，以艺科融合激发创作活力助力文化强国。



三是以人工智能成果转化应用为抓手，服务科技强国战略

艺科融合助力科技强国

艺术院校应推进音乐科技自主创新，推动成果转化助力数字文化产业，培养艺术科技复合型人才，实现艺术与科技创新协同助力科技强国。

国内高校的艺科探索

国内多所高校积极探索艺科融合，如西安交大、北邮等各有举措，中央音乐学院经验成熟，艺科融合已从理念转为行动，期待更多成果。



一是重塑人才培养理念，构建智能时代音乐人才新标准



人才培养方案优化

对标人工智能时代产业需求与艺术变革，全面优化人才培养方案与标准，推动课程体系、教学模式系统性变革。



复合型人才培养目标

着力培养兼具艺术素养、科技能力、家国情怀的复合型音乐人才，实现从“单一技能型”向“复合型高素质”人才转型。



艺科融合人才支撑

通过人才培养模式的革新，为人工智能背景下的艺科融合发展提供坚实的人才支撑。



二是深化大模型教学应用，探索智能音乐教育新场景



大模型赋能音乐教育

人工智能大模型为音乐教育精准化、个性化、高效化发展提供重要支撑。推动大模型在教学、创作、科研等全场景落地。

教学场景智能应用

依托AI大模型开发智能教学辅助系统，实现声乐、器乐演奏的实时音准、节奏、音色智能分析与纠错。

实践场景创新探索

运用大模型开展民族音乐数字化采集与风格复刻，通过智能传播模型分析传播规律，助力优秀作品精准触达受众，拓宽传播渠道。

艺术与科技交叉融合的起点在哪里



Where Does the Intersection of Art and Technology Begin?



查尔斯·珀西·斯诺
Charles Percy Snow

两种
文化

"Two
Cultures"



约翰·布罗克曼 (John Brockman)

第三种
文化

"Third Culture"

认知重塑的变革究竟发生在哪里



Where Exactly Is the Transformation Happening?



01

审美认知的重构，技术从“工具”转变为“搭档”

The first shift: the reconstruction of aesthetic cognition—technology from "tool" to "partner."



02

音乐边界的消融，音乐从“聆听对象”走向“置身场域”

The second shift: the dissolution of musical boundaries—music from "object of listening" to "immersive field."



03

体验边界的突破，观众从“用心感受”迈向“神经交互”

The third shift: the expansion of experiential boundaries—the audience from "listening with the heart" to "neural interaction."

教育转型的路径选择

The Path of Educational Transformation



多模态数据实时同步采集与分析

Real-time synchronous acquisition and analysis of multimodal data



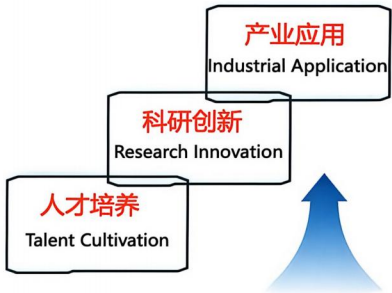
沈阳音乐学院2025年成立了“谐律智愈”音乐科技创新实验室，面向全院开放，让作曲、表演、乐器修造、乐音与健康等专业师生均可在此找到艺术与科技融合的切入点。

In 2025, Shenyang Conservatory of Music established the “Harmony & Intelligent Healing” Music Technology Innovation Lab, which is open to the entire college.

教育转型的路径选择



The Path of Educational Transformation



在沈阳音乐学院，我们将实验室定位为学科交叉与教育转型的策源地。
At Shenyang Conservatory of Music, we position our laboratory as a catalyst for cross-disciplinary exchange and educational transformation

课程体系构建



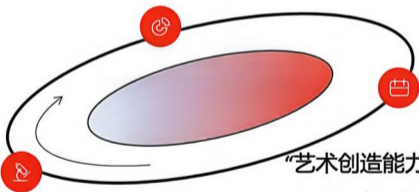
Construction of a curriculum system

“艺科交叉”的模块化课程系统

"art-science crossover" course structure

建立跨学科导师制、项目制学习与真实场景驱动的实践平台

establishing cross-disciplinary mentorship,
project-based learning, and practice
platforms driven by real-world contexts.



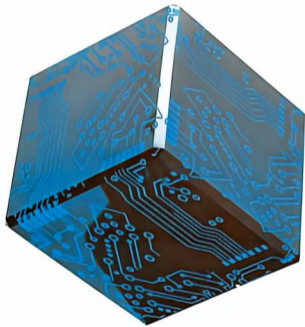
“艺术创造能力”的综合评估

a comprehensive assessment of "artistic creativity"
ability"



让我们以“第三种文化”的视野，推动教育转型走向深入，共同书写艺术与科技融合的新篇章。

Let us adopt the perspective of the "Third Culture," deepen educational transformation, and together write a new chapter in the integration of art and technology.



感谢观看
THANK YOU

贯通科技人文 赋能人文湾区

探索新时代音乐与科技融合发展的“大湾区模式”

Bridging Tech and Humanities to Empower a Humanistic Bay Area – Toward
a New-Era “Greater Bay Area Model” for Music-Tech Integration

星海音乐学院

Xinghai Conservatory of Music

陶陌

Tao Mo

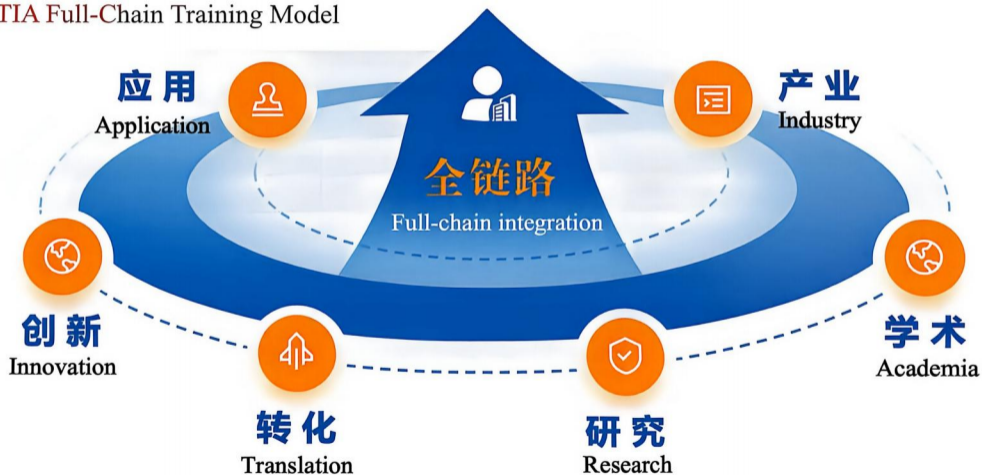
2026年4月27日

图书馆

星海音乐学院

培养模式·产学研转创用

IARTIA Full-Chain Training Model



课程与平台 · 硬核支撑

Curriculum & Platforms · Core Infrastructure



核心金课

《音乐与人工智能应用》等
Flagship Courses:
Music and AI Applications, etc



教学改革

本硕附中一体化贯通
Educational Reform:
High School–Undergraduate–
Graduate Integrated Pathway



高水平实验室

AI作曲、虚拟演出等
Advanced Labs:
AI Composition,
Virtual Performance, etc

课程改革数据统计

Curriculum Reform Statistics

38

新增前沿课程

56

淘汰滞后课程

31

重组同类课程

38 cutting-edge courses added

56 outdated courses eliminated

31 similar courses restructured



中央音樂學院

Central Conservatory of Music

音乐与现代科技共生的故事已经一百多年了。工业革命生产出许多新的声音，电气革命带来了无数新的音效，自然声音、人类声音和人工声音的关系变得错综复杂。二十世纪，现代技术创造了可以大规模复制艺术作品和听觉经验的工具，开辟了可以让声音、图像、文本在百万分之一秒间进行传输的信息通道，

The story of symbiosis between music and modern technology spans over a century. The Industrial Revolution gave birth to a multitude of new sounds, while the Electrical Revolution introduced novel sonic effects, making the relationships between natural, human, and artificial sounds increasingly intricate. Modern technology of the 20th century has forged tools and equipment for mass reproduction of artworks and auditory experience, opening information channels that can transmit sounds, images and texts within a millionth of a second.

后来的合成器以及各种电声设备，在破坏音乐传统价值的同时，也为音乐创作打开新的空间。现代音乐由此被转化为一种抵抗性、实验性的，无法被标准化的声音“技术/艺术”实践——Techne，技术和艺术仿佛重新召回了其同源共生的本质。

Subsequent developments in synthesisers and various electro-acoustic instruments have dismantled the traditional musical values while at the same time opening new horizons for music composition. Modern music, thus, is transformed into a form of resistant, experimental and non-standardisable sound practice of Techne, where art and technology seem to have reclaimed their original co-generative essence.

半个世纪以来，我们看到，电子音乐和数字音乐的模拟性声响大行其道，声音体验变得越来越“超真实”，却越来越失去了其“原真性”（Echtheit, 本雅明）。人们沉浸在各自的听觉“气泡”里自得其乐，在不断增殖的幻觉工业中难以自拔，而音乐的场所精神、声音的自然性和差异性却日益微薄。

Over the past half-century, the prevalent simulated sounds in electronic and digital music have pushed our auditory experience to become increasingly 'hyper-real', yet have increasingly lost their 'authenticity', or Echtheit in Walter Benjamin's terms. People are immersed in their preferred auditory "bubbles" and find themselves trapped within the proliferating illusion industries. However, the genius loci of music, the naturalness of sound, and the richness of diversity are steadily waning.

最近这十年，AI科技大爆发，一切都改变了，从行业尤其消费端来看，对音乐的冲击尤其剧烈。山姆-奥特曼提出，AI发展有五阶段：chatbots（聊天机器人）、reasoners（推理体）、AI agents（智能体）、innovators（创新者）、full organizations（完整组织）。

In the last decade, the explosion of AI has changed everything — and from the perspective of industry, especially the consumer end, its impact on music has been particularly dramatic. Sam Altman has proposed 5 stages of AI evolvement: Chatbots, Reasoners, AI agents, Innovators and Full Organizations.

我们目前正处在哪个阶段，以及未来AGI时代艺术的境遇，我在此不多做分析，只想再次强调这些年我一直坚持的观点：我们有两个AI，一个是artificial intelligence人工智能，一种是artistic intelligence艺术智性。人工智能越发达，人类越需要艺术智性；数字虚拟技术及其幻觉工业越发达，身心交感的艺术经验、从艺术经验而来的感性与感兴就越发的可贵。

I will not dwell on which stage we are currently in or the fate of art in the age of AGI. Instead, I wish to re-emphasise the vision I have long championed, that is, we have two kinds of AI—Artificial Intelligence and Artistic Intelligence. The more advanced Artificial Intelligence gets, the more humanity yearns for Artistic Intelligence. The more digital virtual technologies and their industries of illusion flourish, the more precious our psycho-physical artistic experience becomes, and the more valuable the sensibility and aesthetic stirring they inspire.



中国·北京
2026 04.27

世界艺术与科技对话 音乐分会场

World Dialogue on Art & Technology Music Sub-Forum

指导单位 SUPERVISING ORGANIZATIONS 中国文联 China Federation of Literary and Art Circles | 主办单位 Hosts 中国音乐家协会 Chinese Musicians' Association / 中央音乐学院 Central Conservatory of Music

共创模型、符号交互与赛博人类音乐实践：REACH 项目

Cocreative Models, Symbolic Interaction, and Cyber-Human Musicianship: the REACH Project

热拉尔·阿萨亚格

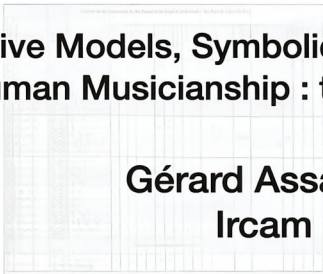
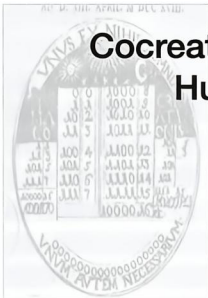
G rard Assayag

巴黎声学 / 音乐研究中心总监

Research director at Institut de recherche et de coordination acoustique/musique (IRCAM) in Paris

Cocreative Models, Symbolic Interaction, and Cyber-Human Musicianship : the REACH Project.

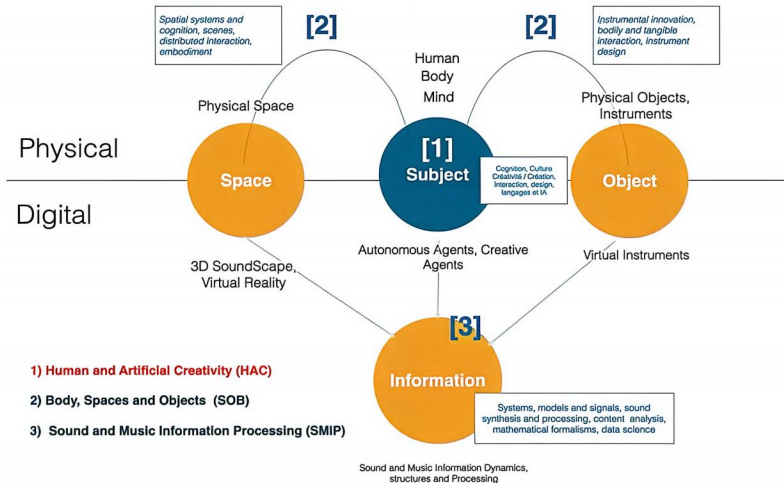
G rard Assayag
Ircam



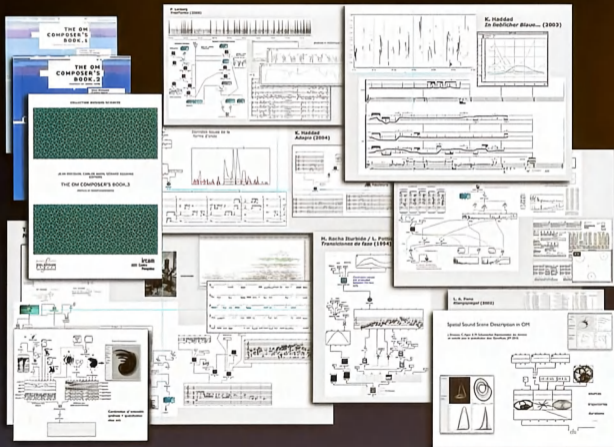
SORBONNE
UNIVERSIT 



Research Directions at IRCAM STMS LAB

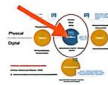


OpenMusic : an general environment for composition. Processing Musical Information.



- A reflexive **visual programming environment** with meta-programming capacities
- A **multi-paradigm** language (visual, functional, object-oriented, with constraint programming)
- **Duality structure / process** (out-of-time / in-time) reified by **Patches** and **Maquettes**
- **Duality** between representing the **computation** and representing the **musical surface**
- **Duality** between **symbol** and **signal**
- Exploring **temporal structures** : chronological, hierarchical, functional, logical

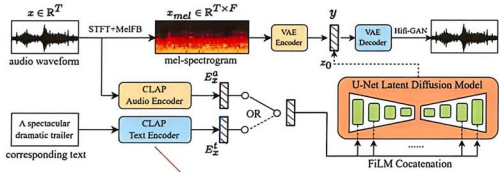
MusicLDM: Enhancing Novelty in Text-to-Music Generation Using Beat-Synchronous Mixup Strategies with Latent Diffusion



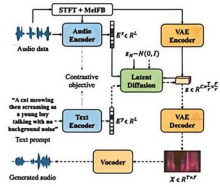
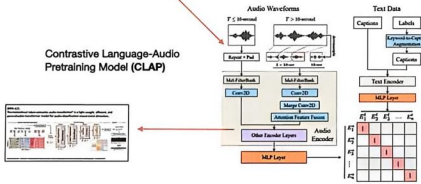
Audio/Music Latent Diffusion Model

Treat the latent variable as the input and output of the diffusion model:

- Condition Embedding: CLAP (HTS-AT + RoBERTa)
- Manipulated Space: Mel-Spectrogram and Latent Variable (VAE)
- Vocoder: HiFi-GAN



Contrastive Language-Audio Pretraining Model (CLAP)



Inspired by Liu, Plumbay et al, AudioLDM: Text-to-Audio Generation with Latent Diffusion Models, Proc. 40th ICML, Hawaii USA, 2023

Diffusion Model: Noise and Denoise

- Forward Process: degenerate a data point to Gaussian noise
- Reverse Process: reconstruct a data point from Gaussian noise





REACH: Raising co-crEActivity in Cyber-Human Musicianship

5-Years European Research Council Grant, PI Gérard Assayag

When interactions are created between complex systems such as humans and machines, we observe more than just a simple addition of behaviors, but an **"emergence"** of joint sonic shapes that are **unpredictable, rich, and inspiring** for the musician. Thus we replace the concept of « **artificial creativity** » by the concept of **CoCreativity** in cyber-human settings where :

- **creativity is an emerging dynamics** resulting from complex interactions between heterogeneous natural and artificial actors
- It cannot be understood by **considering each agent's production** separately (the whole is greater than the sum of its part)

As a consequence, **creativity is not an individual state, but a dynamical effect of interaction in a complex network of agents**

Cyber-human co-creativity is mostly asserted when there is:

- **emergence** of cohesive and / or contrasting **joint actions** not reducible to individual processes, opening to **distributed musical processes and cognition**
- apparition of **non-linear regimes** of events and structures formation, leading to rich musical **co-evolution of forms**.

Assumption is that these surging phenomena result from

- **cross-learning** processes between agents involving
- multiple **feed-backs** loops and **reinforcement signals** between agents

Cyber-physical systems create a **continuity** between the digital and the physical world. We propose the term **Cyber-human** for systems that generate **continuous interaction between human cognition and digital entities**, that learn one from the other.

The combination of the two systems would provide actual **embodiment** through **creative instruments** and boost the process of co-creativity in **Mixed Reality settings**.



European Research Council
Established by the European Commission



UCSan Diego



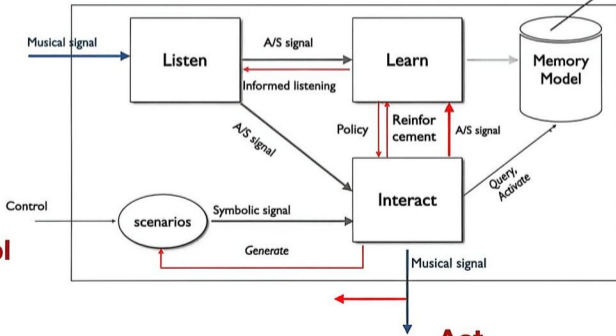


A general « creative agent » architecture for symbiotic interaction

erc reach.ircam.fr

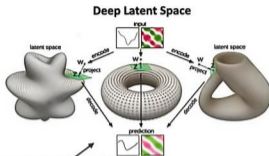
Perceive

Reach Creative agents : data and control flows, **feed-backs** circuit



Control

Imagine

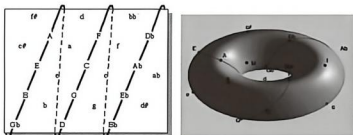


- Agent **queries** a representation space (**imagine**) as a response to live context (**Listen**)
- The agent is **learning from both the content (music information) and the very course of interaction through reinforcement**
- An agent can be submitted to **external scenarios** (composition), **discover scenarios** from the interaction, or **generate scenarios** as a result of interaction

Act

From SOM to Deep Learning

- Petri Toivainen, Visualization of tonal content with **self-organizing maps (SOM)** and self-similarity matrices, *Computers in Entertainment 3(4):1-10 (2005)*



Structure of a self-organizing map trained with 24 tonal hierarchies (12 major and 12 minor). The subfigure on the left depicts the map in two dimensions (opposite edges are considered joined to each other); the subfigure on the right depicts the map in three dimensions.



Tonnetz projected on a torus

SOMs are shallow neuro networks (**Frugal AI**) that produce low dimensional projection images of high-dimensional data distributions, in which **the similarity relations between the data items are preserved**

Variational Auto Encoders (VAE) are deep (non frugal) models that learns probability distributions of data in a latent space where **similarity relations are preserved**

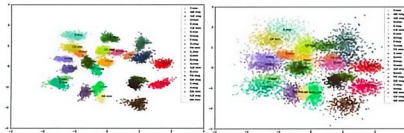
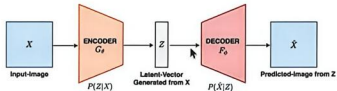
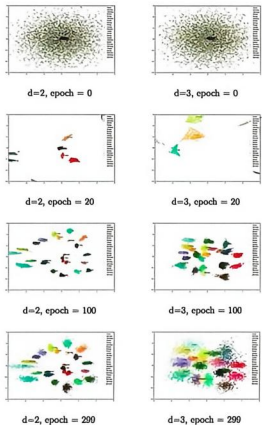


Figure 2. Chords data set projected in the VAE latent space. Variants of the same chord appear as compact clouds. 3dimensional VAE codes reduced to 2D by PCA. 100 learning epochs (left), 299 epochs (right). From [Feidman 2021] report.

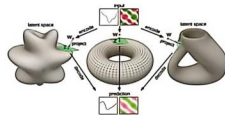


From SOM to Deep Learning

Variational AutoEncoder creating a Chord Latent Space



VAEs learn a probability distribution of the data in a latent space.



Compactness is the performance of the representation for representing objects **harmonically close as geometrically close**.



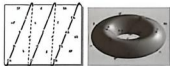
Compactness (TONNETZ) = .28



Compactness (VAE) = .42



Winner



Compactness (SOM) = .52

Not that bad, more ecological !

Results of a self-organizing map trained with 20 nodes (torus-like 2D map) and 12 nodes. The software on the left shows the map and the connections between nodes are represented parallel to each other. The software on the right applies the map to chord progression.

Figure 3.4: How latent spaces evolve with the training epoch

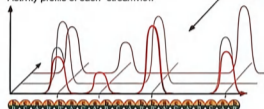
Somax2: reactive « music to music » AI system

NO PROMPT !!

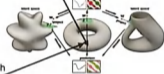
Perceive

Hot Spots

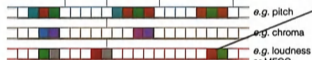
Activity profile of each "streamview"



Multimodal analysis of live inputs from musician



Multimodal annotation of memory

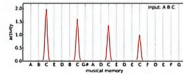
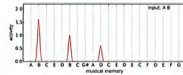
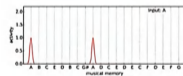
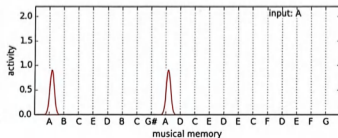
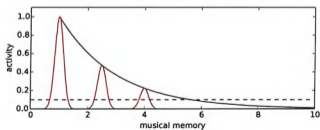


Map



OpenSource: Github and <http://repmus.ircam.fr/somax2>

Profile peaks evolve in time (echoic memory)



INTERNATIONAL
CONTEMPORARY
ENSEMBLE

Pierre Boulez 100 birthday: « Pliages » after « Pli selon Pli » (Jan 2025)



CARNEGIE HALL

BOULEZ
REBOOTED

CARNEGIE HALL
JANUARY 30

Reimprovising the tradition with
Live AI agents on stage

No. 3 Improvisation II
« Une dentelle s'abolit »
pour soprano et neuf instrumentistes (1957)

Pierre Boulez
(* 1925)

Andante - Alla breve
♩ = 68 - 68

Harp

Cloches

Vibr. \uparrow
normal

les petites notes
rapides



REACH:Somax2 a Music to Music RT AI for Live Interaction



Music Information Dynamics : Creative Interaction as Information Transfer Between Agents

Transfer entropy TE from signal X to Y is the degree to which X reduces the residual uncertainty about the future of Y after the past of Y was already taken into consideration.

$$T_{X \rightarrow Y} = I(Y_t; X_{t-1:t-L} | Y_{t-1:t-L})$$

TE is the amount of **Information transfer** or **Influence** between X and Y

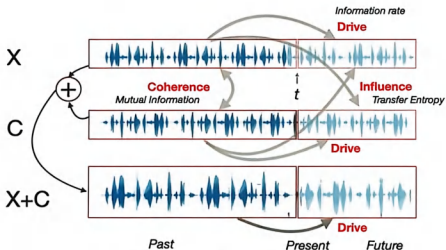
Information Rate IR is the mutual information between the past and the present in the same signal flow, it measures the level of **surprise** and innovation at each time t

IR is the amount of **Information transfer** or **Drive** between the **past** of X and its **present+future**

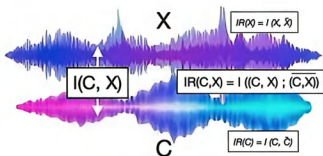
Symmetrical TE (SymTE) is a measure of **surprisal present in the joint stream** minus the surprisal of each of its component, plus the **mutual information (lack of independence)** between the individual components.

This is indeed **the added value of the interaction**, that we call « **Cocreativity** » as it favors both coherent behaviors and surprise formation.

CEI (Creative Efficiency of Interaction) coefficient based on SymTE will become the **objective function** for the training of Interactive Learning models



Syntagmatic and Paradigmatic Information Transfers contributing to global Information Flow



$$\text{SymTE} = \frac{IR(C, X) + I(C, X) - IR(X) - IR(C)}{\text{Drive}(X+C) - \text{Drive}(X) - \text{Drive}(C) + \text{Coherence}(X, C)}$$

Figure 1. Estimate of SymTE as a combination of Information Rate IR and Mutual Information I estimates from a generated X and control signal C.

Replacing Representation Learning by Interaction Learning (ILES)

Is basically 3 views

- A model of Co-generation of signal **content (what)**
- A model of Co-**Action** under behavioural policies (**when**)
- A **Formal** control of larger scale structure (**why**)

and 2 modalities

- Diachronic, auto-regressive : generates **the time** that moves forward
- Synchronic, considers **the environment** that is around

Collapsed in a common latent space

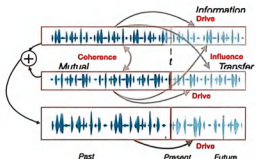


- encoding the **intertwining of content and action** involved in **creative interaction**

		Syntagmatic (S)	Paradigmatic (X)
Interaction Learning agent architecture	Phenomenological	PS: Signal streams prediction	PX: Signal shared information estimation
	Behavioral	BS: State / Decision / Action policies	BX: World model and Intrinsic motivation
	Formal	FS: Formal sequence models	FX: Structural and logical schemes

EV: Experimentation, Validation, Creation, Assessment, Dissemination

Create an IL Architecture that will bind the three views



Syntagmatic and Paradigmatic Information Transfers contributing to global Information Flow

Information transfer : symmetric (Paradigmatic) or directed (Syntagmatic)

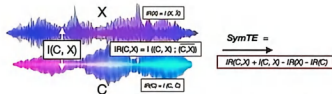


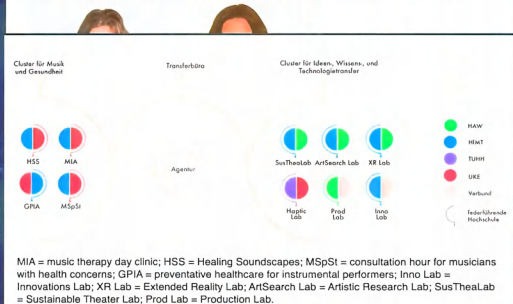
Figure 1. Estimate of SymTE as a combination of Information Rate IR and Mutual Information I estimates from a generated X and control signal C.

Train on CEI (Creative Efficiency of Interaction) and create embeddings of action and content

The *ligeti* center

- **Mission**
- **Mission:** Transdisciplinary research in M²T³: music, media, theater, therapy and technology
- **Knowledge translation via 4Ps:** products, projects, presentations, personal relations
- **Structure:** 12 projects: two clusters, an office for knowledge translation and an agency for knowledge translation and outreach
- **Music and Health (4 projects)**
- **6 Labs (see right-hand side)**
- **About 30 employees (research fellows and administrative personnel)**

Musiktherapeutische Instituts- und Lehrambulanz



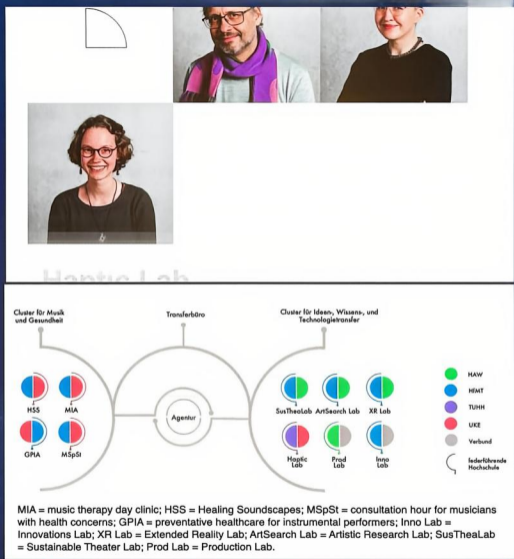
The *ligeti* center

- **History**
- **Hungarian composer György Ligeti (1923-2006), on faculty of HfMT between 1973 and 1989**
- **Establishment of a computer music center in Hamburg to be directed by John Chowning (1934) and others in the 1970s fell through. It took another 50 years for another opportunity to come up**
- **Highly competitive federal grant; funding for five years until 2027**
- **Consortium of four Hamburg-based universities: HfMT, HAW, TUHH and UKE**
- **Laboratories for Innovation and General-audience Edification through the Translation of Ideas**



The *ligeti* center

- **Mission**
- **Mission:** Transdisciplinary research in M²T³: music, media, theater, therapy and technology
- **Knowledge translation via 4Ps:** products, projects, presentations, personal relations
- **Structure: 12 projects:** two clusters, an office for knowledge translation and an agency for knowledge translation and outreach
- **Music and Health (4 projects)**
- **6 Labs (see right-hand side)**
- **About 30 employees (research fellows and administrative personnel)**



Co-Evolution I

From Bone Flute to Suno

- **Co-evolution of music and art in the development of musical instruments since the stone age.**
- **Fragment of a bone flute, estimated age ~55ka (referred to as *Neanderthal* flute)**
- **Toolmaking: an essential part of art and music creation**
- **Notion of *scaffolding* in artistic research theory. Scaffolds as facilitators of artistic production.**



Co-evolution II

From Musikalisches Würfelspiel to LLMs

- “Composition machines” in the era of the Mechanical Turk (a supposed chess robot around 1770) presage AI and robotic agents of the 21st century
- Serial composition methods since 1920
- Lejaren Hiller: Illiac Suite (1957)
- Adorno’s doubts in *Some Difficulties* (1964) about automated methods
- Barlow’s *Autobusk: Pandora* (1989)
- **Interface Convergence in the Interactive Era**
- **Have today’s AI systems overcome Adorno’s reservations?**

2.

ZAHLENTAFEL.
TABLE de CHIFFRES.

	A	B	C	D	E	F	G	H
2	20	29	141	41	104	112	11	20
3	29	4	198	62	167	67	326	91
4	62	28	128	53	162	42	310	26
5	47	37	112	67	161	7	139	100
6	148	76	162	42	80	37	38	107
7	106	167	87	167	146	66	118	21
8	168	60	171	42	29	29	122	91
9	119	94	116	20	140	66	169	66
10	29	142	42	122	52	169	69	169
11	2	67	162	61	122	47	167	29
12	26	169	10	112	86	27	106	2

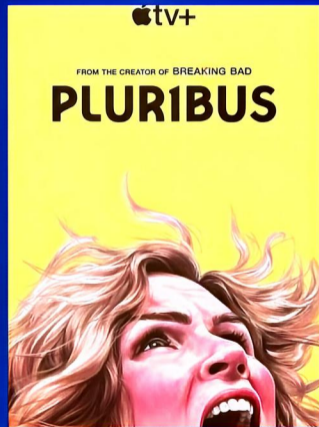
	A	B	C	D	E	F	G	H
2	70	161	66	2	116	62	162	16
3	117	29	169	67	126	16	116	62
4	69	169	12	122	72	26	162	72
5	29	126	7	26	67	140	26	170
6	67	162	66	162	76	166	1	29
7	128	71	140	62	101	167	69	161
8	16	162	27	112	62	166	66	179
9	162	66	66	166	21	112	72	111
10	62	17	16	67	127	29	162	6
11	116	6	21	166	166	29	112	76
12	62	69	166	29	12	166	66	161

“The decrease in effort, the relief, always means a preponderance of dead matter, of elements that have not passed through the subject, that are externally thing-like and ultimately alien to art.” (Adorno)



AI - A Double-Sided Sword

- **Positive**
 - Machine reasoning accessible to everybody
 - Highly evolved problem-solving capabilities
 - Digital companionship
 - Quick results
 - Focus on high-level tasks
 - ...
- **Negative**
 - Hallucinations
 - Output contingent on training data (bias)
 - Opaqueness
 - The Mean Machine (→ Hito Steyerl: Mean Images)
 - Model Collapse (akin to resonance catastrophe)
 - Overreliance and habit forming



Why Hybrid AI?

- **Why use AI when results can be achieved with classic methods?**
- **Established systems for sound synthesis and composition that work without ML**
- **Transparent code instead of latent spaces**
- **NNs as interfaces between non-NN components and humans: few to many mapping**
- **Example: DJster as engine in the Healing Soundscapes project**



DJster

- Based on Clarence Barlow's 1980s real-time generative software Autobusk (a probabilistic aka stochastic AI model)
- Style-agnostic
- Coupling of several fundamental rules to generate predictable musical outcomes
- Max & Ableton Live implementation and further development by the author since 2008
- Introduction of novel modes of interaction and behavior
- Engine for the Healing Soundscapes project
- Open sound library with 12 GB of sampled and processed sounds



$$\Psi_2(n) = \sum_{r=0}^{2-1} \left\{ \left(\prod_{i=0}^{2-r-1} q_i \right) \Psi_{0, \dots} \left(1 + \left[1 + \frac{(n-2) \bmod \prod_{i=1}^c q_i}{\prod_{i=0}^r q_{2+1-i}} \right] \bmod q_{2-r} \right) \right\}$$

$$\xi(N) = 2 \sum_{r=1}^{\infty} \left\{ \frac{n_r (p_r - 1)^2}{p_r} \right\} \quad \text{where } N = \prod_{r=1}^{\infty} p_r^{n_r}, p \text{ is a prime, and } n \text{ is a natural number.}$$

$$h(P, Q) = \frac{\text{sgn}[\xi(P) - \xi(Q)]}{\xi(P) + \xi(Q) - 2\xi(\text{hcf}_{P, Q})}$$

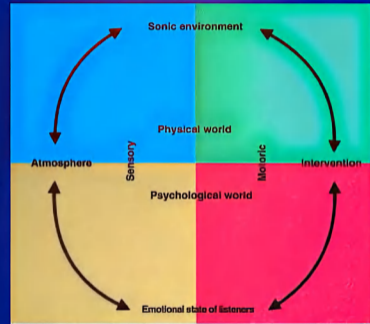
where $\text{sgn}(x) = -1$ when x is negative, otherwise $\text{sgn}(x) = +1$,

$\text{hcf}_{a,b}$ is the highest common factor of a and b , and $\xi(x)$ is indigestibility of x .



Healing Soundscapes™

- Result of a 12-years of research conducted by members of several Hamburg-based universities
- Currently a project within the ligeti center's Music and Health cluster
- Motivation:
 - Hospitals are noisy (frequently > 100 dB)
 - Musical Soundscapes Interventions in hospital waiting areas to increase well-being of patients and hospital personnel
 - Non-intrusive, neutral, not attention-seeking (manipulative), integrative
- **Atmosphere** as point of departure: object-pole and a subject-pole; relational in-between phenomena (G. Böhme)
- Definitions:
 - **Healing Soundscape:** a soundscape used in Musical Soundscape Interventions (MSI), particularly in the healthcare sector
 - **Musical Soundscape Intervention:** Sound interventions that modify the acoustic conditions of a room and thus influence the atmosphere therein



From Art to Function

How much art can we retain in the hospital

- **Healing sounds (for lack of a better word) don't heal but are an essential component of a healing soundscapes.**
- **Compositions need to obey the necessities of a hospital (sound, structure, length, loudness etc.)**
- **No New Age music or esotericism, but reflection of **multimodal** and **gestalt** perception**
- **Connection between sound and shape explored by Köhler (1929)**
- **Bouba/kiki effect: Ramachandran & Hubbard (2001)**
- **Bouba (voiced plosives and vowels with low to mid formants) and kiki (unvoiced plosives, low and high formants) manifest in temporal and spectral dimensions of sound (sound example)**
- **Gestalt qualities manifest themselves in the dimensions of frequency, time and space (spectromorphology)**



Köhler



Ramachandran & Hubbard



Neutral Music

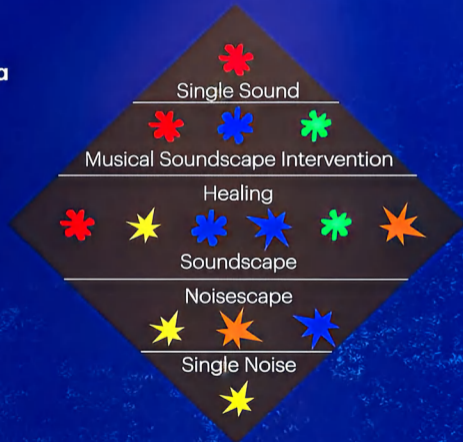
The Aesthetic of the Disjunct

- **Melody vs. Healing Sounds**
- **Melody:**
 - **Single sounds form the gestalt of a melody**
 - **Analogy to latin script: characters need to be stringed to together to form words that bear meaning**
- **Healing Sounds:**
 - **Every event is “beautiful” in itself. No expectation of another event to form a melody**
 - **Analogy to Chinese characters (every character bears meaning)**
 - **Biáng (character highly defined by the gestalt principles of proximity, similarity, symmetry, good continuation, closure: well-formedness)**
- **Musical References:**
 - **Satie, Feldman, Cage (“I don’t need sound to talk to me”)**



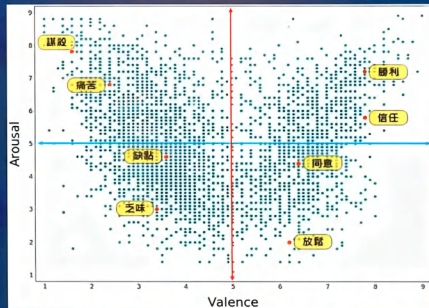
The Rhombus of the Healing Soundscape

- **Concept: integration of unpredictable noises into a texture of unpredictable sequence of pleasant sounds**
- **Reciprocal symmetry of stochastically generated sounds and incidental environmental noises (Hajdu/Sonntag)**
- **Single sounds form a**
 - **texture of sounds which integrate the noiscape to form the healing soundscape**
 - **the noiscape consisting of a texture of incidental single noise events**



Mapping Emotion Space

- Research by J.A. Russell (1980)
- Two-dimensional plot of human emotions (VAS)
 - valence (positive - negative)
 - arousal (high - low)
 - four quadrants and neutral point
- Points mapped to parameter space (four instances of DJster, spatializer and sampler with a total of 100 parameters)
- Five presets corresponding to mid point and corners of the VAS set by the composers
- Interpolation over a circadian trajectory set by the composers
- Gradient mapping instead of ML (for higher accuracy)

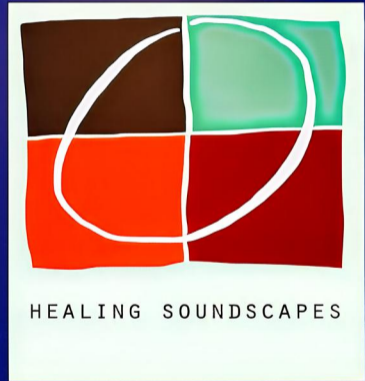


Chinese valence-arousal words (CVAW)
<https://dl.acm.org/doi/10.1145/3489141>



Environments

- **Healing Soundscapes realize a hybrid between playlists and continuous sound scape (patent pending)**
- **Currently three different site-specific environments with a total of 18 pieces:**
 - **Central emergency department**
 - **Radiation department**
 - **Operation theatre at University Heart Center (UHZ) at UKE**
 - **Location settings (for running the same environment in another location)**



The Soundscaper

Integrated solution

- **Choice between macOS and Windows-based solutions**
- **3D printed**
- **Automatic Loudness Adjustment**
- **4 / 6 channel spatialization via built in POE+ switch**
- **Dante network**
- **Easy installation**
- **10 spaces in University Heart Center at the University Medical Center Hamburg Eppendorf**
- **Interest by other clinics and institutions**



Future ideas

- **Project branching into**
 - **Commercial spin-off**
 - **University research project**
- **Use of AI to automate preset generation based on acoustic descriptors**
- **Addition of Markov chains and ML to stochastic music generation**
- **Integration with novel methods of music therapy by adding an improvising agent to therapy session**
- **More interactivity by adding sensors and cameras**
- **Creating an inverse model of the event generator**
 - **Currently: Parameter settings → structure**
 - **One day: Acoustic tokens → parameter settings**



University Heart center opening in May 2026



Conclusion

- **Healing Soundscapes: human-centered hybrid AI**
- **Flexible application for style-agnostic, neutral music generation**
- **Stochastic model based on “deep” musical rules rather than deep learning**
- **Mapping emotion space to sonic outcomes**
- **Focus on gestalt qualities of the sounds rather than trying to “mechanically” influence brain waves to induce states.**
- **Deployment in the health care sector but also related spaces to enhance relaxation and focus**
- **This project demonstrates how in the process of co-creative agency remains with the composer while manipulating a complex automated AI system**





中国·北京
2026 04.27

世界艺术与科技对话 音乐分会场

World Dialogue on Art & Technology Music Sub-Forum

指导单位 SUPERVISING ORGANIZATIONS 中国文联 China Federation of Literary and Art Circles | 主办单位 Hosts 中国音乐家协会 Chinese Musicians' Association / 中央音乐学院 Central Conservatory of Music

基于“音乐实践”的协同创作：音乐人工智能需要以人为中心的方法

Co-Creating Through Musicking (An Insider's Perspective): Why We Need a Human-Centered Approach to Music-AI

克雷格·威尔

Craig Vear

英国诺丁汉大学音乐与计算机科学教授

President and Deputy Professor of Music and Computer Science at the University of Nottingham

Awareness

Mutual perception

Responsivity

→ perception

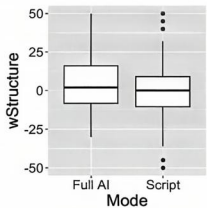
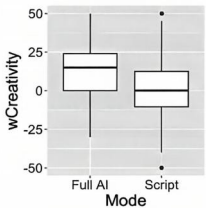
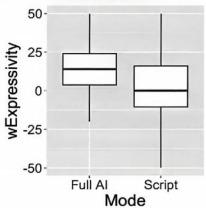
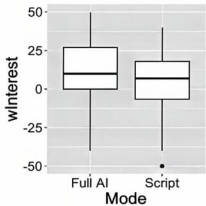
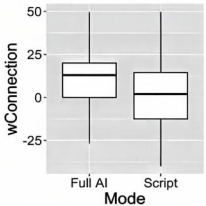
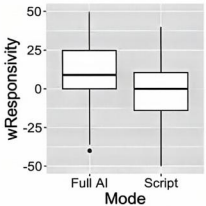
→ affect

→ belief →

Positive w/ high confidence

Neutral = 0

Negative w/ high confidence





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人机音乐合奏：会聆听与演奏的自动钢琴

Human-AI Music Ensemble: A Self-Playing Piano that Listens and Performs

南周汉

Juhan Nam

韩国科学技术院教授，文化科技研究生院音乐与音频计算实验室主任，ISMIR 2025主席

Professor at the Korea Advanced Institute of Science and Technology (KAIST)

Director of the Music and Audio Computing Lab at the Graduate School of Culture Technology, Chair of ISMIR 2025

Human-AI Music Ensemble: A Self-Playing Piano that Listens and Performs



Juhan Nam

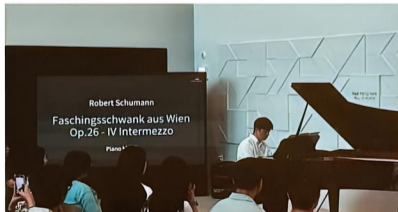
Introduction

- Korea Advanced Institute of Science and Technology



Introduction

- Professor @KAIST (2014 - Current)
- PhD in Music (Computer-based Music Theory and Acoustics) @CCRMA, Stanford University (2006-2013)
- Research Engineer @Qualcomm (2012-2014)
- Software/DSP Engineer @Young Chang / Kurzweil (2001-2006)



Current Research Topics

- **Human-AI Ensemble Performance**
 - Score following and auto-accompaniment
 - Audio-visual music cue detection
 - Real-time beat tracking for live performance
 - Piano transcription: real-time, audio-visual, and piano concerto
 - Piano fingering and pianist motion generation

- **Music Performance Analysis and Education**
 - Classical western music and traditional Korean music analysis
 - Music performance assessment for public music education
 - AI agent for music docent and vocal coaching

Current Research Topics

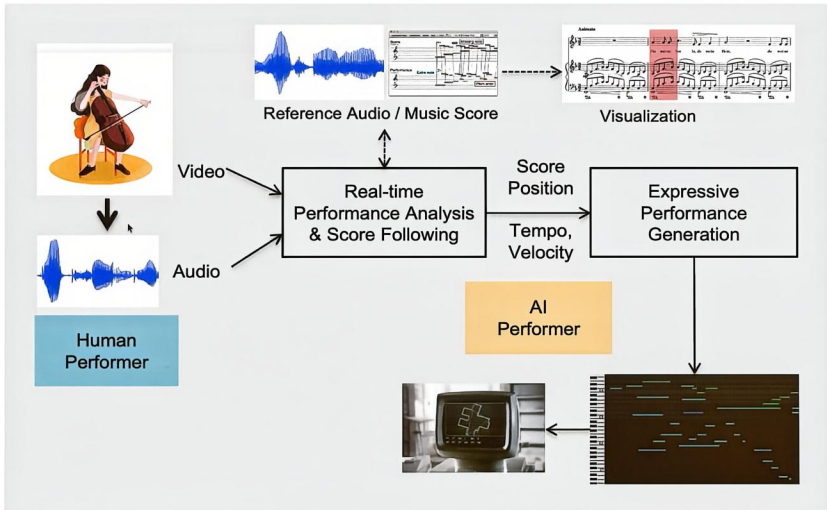
- **Music Making and Production**

- Symbolic piano music arrangement
- LLM-based synthesizer and effect parameter estimation
- Instrument timbre transfer
- Drum sample retrieval and generation
- Singing voice synthesis and editing

- **Sound Effect Generation and Audio Processing**

- Video-to-audio generation
- Car sound synthesis
- Neural speech codec
- Neural audio super-resolution

Human-AI Music Ensemble



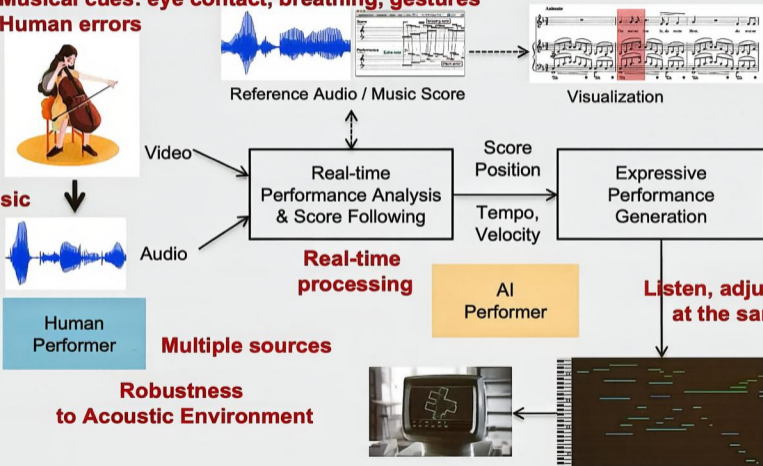
Human-AI Music Ensemble

Context-Aware

- Musical cues: eye contact, breathing, gestures
- Human errors

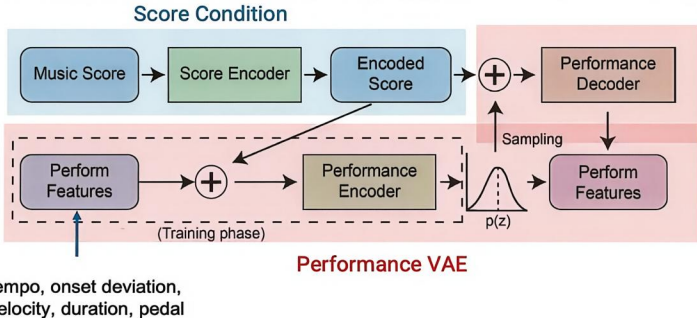
Multimodal

- Audio
- Visual
- MIDI
- Sheet Music
- Text



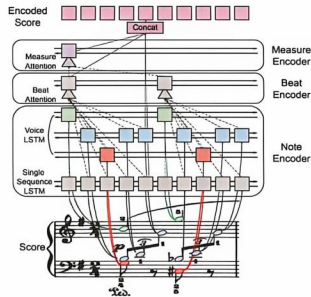
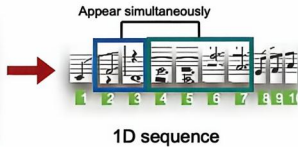
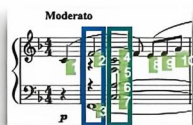


- Based on conditional variational audio encoder (CVAE)
 - Condition: score embedding
 - Generate performance features given the score embedding



VirtuosoNet (2019)

- Score encoder
 - Regard score as an 1D sequence
 - Hierarchical attention RNN to learn context



VirtuosoNet: Media Art



Daejeon Museum of Art - Deep Space Music with NOS visuals (2019-2020)

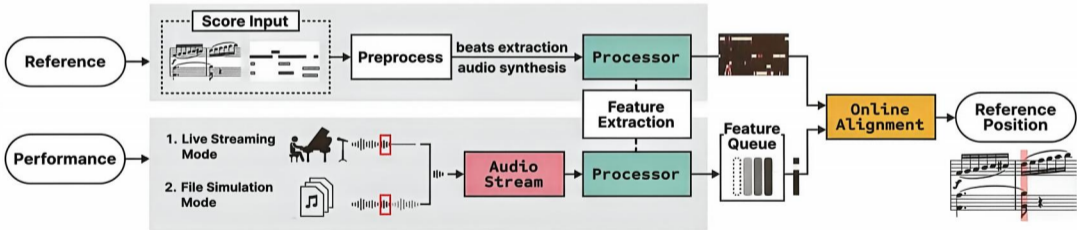
VirtuosoNet: Piano Duet



Opening concert for the 50th anniversary ceremony of KAIST (2021)

Matchmaker

- Open-source benchmark framework for score following research





Pianist Jong Hwa Park (Professor at Seoul National University)



SEOUL
NATIONAL
UNIVERSITY

KAIST



Ongoing Work

- Music education & practice
- Barrier-free music performance and accessibility
- Music engagement: knowledge and interactivity



SORI (music education start-up)



Yamaha Daredemo



Lyrics following and translation



Apple Music Listening Guide



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艺术家中心视角下的人工智能：作为音乐想象之镜像、媒介与延伸

The Artist at the Center: AI as Mirror, Medium, and Extension of Musical Imagination

乔纳森·怀纳
Jonathan Wyner

伯克利音乐学院教授，新兴艺术技术实验室（BEATL）艺术科技项目负责人
Professor at Berklee College of Music, Director of the Art & Technology Program, Berklee Emerging Art & Technology Lab (BEATL)



The Artist at the Center

The Student/Young Artist perspective:

AI as Mirror, Instrument, and Extension of Musical Imagination

BERKLEE COLLEGE OF MUSIC · BEATL

Jonathan Wyner, Head of Artistic Technology

AI Music Summit June 3-5, Hackathon June 6-7

Jonathan Wyner, Head of Artistic

jwyner@berklee.edu

Technology Initiatives



A Career at the Intersection

1

Early Digital Tools

Rescued Bowie and Kiri Te Kanawa recordings using digital interpolators and spectral subtraction

2

Stem Splitting

Repaired legacy live performances by Tom Petty and others

3

ML in Production

Applied machine learning to modern recordings in previously impossible ways

4

AI Advisory

Advising Moises and Suno; helping musicians navigate non-deterministic models

For the musician, technology - however breathtaking - would not be meaningful without the human steering the work.



OUR INSTITUTION

Berklee's Throughline

From Schillinger House to jazz education, from MIDI adoption to laptop-as-instrument — Berklee has consistently helped artists **bend new systems toward creative purpose** rather than allowing systems to define the terms.

Two Reactions. Neither Sufficient.

The Optimist View

AI as extraordinary breakthrough — a new frontier of creativity, productivity, and access.

The Anxious View

AI as a threat to authorship, labor, artistic dignity, and the economic foundations of creative life.

Both reactions are understandable. But neither is sufficient on its own. The more important question is: **what kind of relationship do artists to have with these systems?**

Technology Has Always Arrived With Disruption and Controversy

1

Mechanical Reproduction

Fear that live performance would lose its value

2

Recorded Music

Seen as cultural threat, not just technical novelty

3

Electronic Instruments

Viewed as artificial or insufficiently human

4

Sampling

Criticized as theft or a collapse of musicianship

In every case, these tools eventually became central to new forms of artistic expression. **In one sense, none of this is new.**

But AI Is Different



AI is different in **scale** and in **speed**. It touches ideation, production, distribution, authorship, labor, and economic value all at once.

This is not merely a new instrument or delivery format. It is an adaptive computational layer sitting **across the entire creative ecosystem**.

- ① The question artists ask: does this deepen expression, or flatten it?

**The artist remains at
the center**

BEATL: Berklee Emerging Artistic Technology Lab

BEATL was created to ensure the relationship between artists and emerging technology develops in a way that is **human-centered, ethically aware, and genuinely useful** to creative people.

It is both a space for innovation and a space for critical inquiry - building curriculum, convening dialogue, and creating practical pathways and relationship with industry

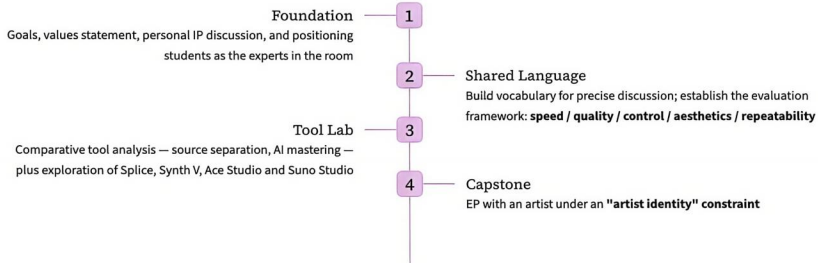
Bots and Beats

**AI in Music
Production**

**Machine Learning
for Musicians**

**AI Video for
Musicians**

Course Framework & Flow



The Central Question

Does this tool **accelerate** your vision, **slow** your process, or allow you to **achieve the otherwise inconceivable**?

What This Course Produces

Ultimately, MP-398 answers some questions — and deliberately raises more. Students leave not with certainty, but with a **sharper set of questions**, a personal values framework, and a body of work that reflects both.

- Finished EP with documented workflow
- Friction log capturing real creative tension
- Values retrospective on AI + personal IP

A NEW VOCABULARY

Three ways to engage AI in Creative Work



Mirror

AI reflects self and culture back to us revealing defaults, dominant aesthetics, and perceptual cues



Instrument

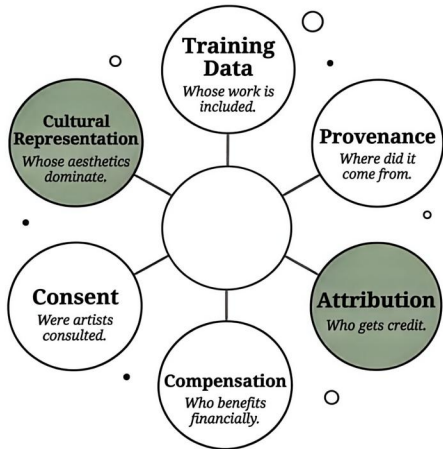
AI as a tool for intentional human interaction — creating a relationship between gesture, decision, and expression



Extension/Prosthesis

AI enlarges the field within which artistry can operate — without substituting for the artist's intention or judgment

The Ethical Questions Are Central



We are not only talking about tools. We are talking about who **benefits**, who is **visible**, and under **what terms** creative work is absorbed into systems.

If artists are to remain at the center, the systems themselves must be **answerable to artists** and to the cultural communities from which art emerges.

- The language of innovation must not become detached from responsibility.



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从生成到协同：AI音乐中的艺术与技术如何共同演化


From Generation to Collaboration: How Art and Technology Co-Evolve in AI Music

徐帆

Xu Fan


Suno公司软件工程师

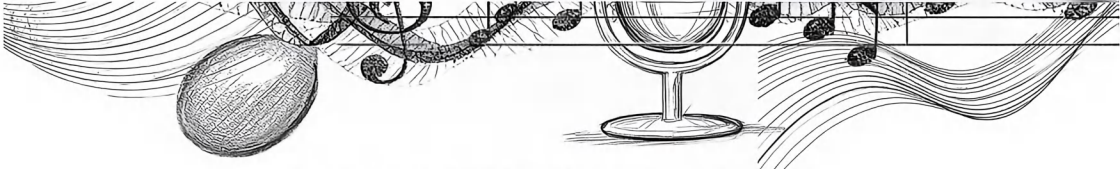
Software Engineer at Suno Inc.



AI音乐中的艺术与技术如何共同演化

徐帆 (Suno)





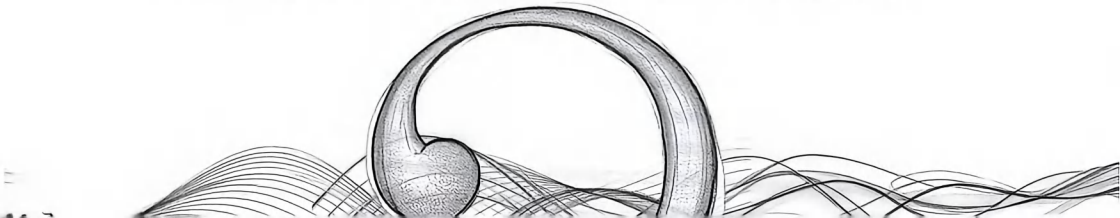
技术如何影响着现代音乐的发展

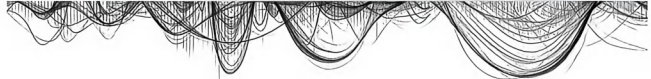
78转唱片（约3分钟时长限制） → 流行歌曲长度与结构标准化

黑胶LP（约40分钟容量） → 专辑作为表达单位

多轨录音（分层录制） → 创作从表演转向录音室制作

MIDI与数字制作（可编辑与模块化） → 音乐生产流程结构化





SUNO 经历了什么样的发展

2023.10 - V1 Discord

2023.12 - V2 + 网页端

2024.03 - V3

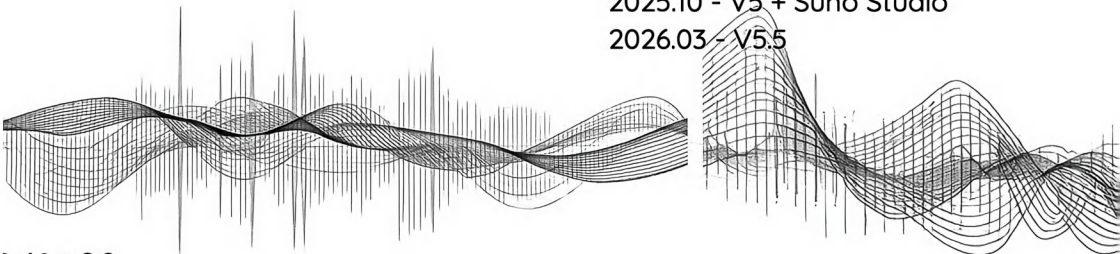
2024.07 - V3.5 + 苹果App

2024.11 - V4 + 安卓App

2025.05 - V4.5

2025.10 - V5 + Suno Studio

2026.03 - V5.5



Server Guide

Channels & Roles

INFO

- # announcements
- # mini-updates
- # welcome
- # mini-polls

GENERATE

- # chirp-beta-1
- # chirp-beta-2
- # chirp-beta-3
- # bark-beta

CHAT

- # general
- # off-topic
- # bark-technical
- # chirp-technical

SHOWCASE

- # liked-clips-feed
- # bark-showcase
- # chirp-showcase

Message could not be loaded

Suno Chirp Bot \$ 1000 Today at 2:11 PM

Finished (86.17s) - @JushinLiger Jr

Text

[verse 1]
 I like my Santa With Muscles
 the queen's speech bruises easily
 I like my dinner with Brussels easily
 the cold weather affects my knee

[bridge]
 the nights get dark and the lights come out
 that's the time of year we're singing about

[chorus]
 it's Christmas
 and the season of advent
 it's Christmas
 and boxing day and new year
 to a lesser extent

[verse 2]
 I like Noel Edmonds Christmas present
 Noddy Holder tightly tonight

SUNO

+ Create

+ Create (Custom)

📁 My Clips

🕒 Turkey Time

📝 Manage Sub



Real vintage blues song about a boy catching santa in his moms bedroom while daddy was away

slow blues soulful

[Verse]

Late at night, mama's fast asleep
I heard a noise, my heart skipped a beat (oh, mama)
Went to her room, what did I find?
Santa Claus standing right by her side (oh, Santa)

(Oh yes, I did, baby

Caught old Saint Nick in the act
In my mama's bedroom, no less)

[Chorus]

Caught Santa in my mama's bedroom (oh, yeah)
Daddy's away, it was my little secret (oh, my my)
But now I know, things will never be the same
Caught Santa in my mama's bedroom, it's a shame (oh, Santa)
(I caught, I caught Santa Claus)



soulful gritty blues

[Verse]

Well, I'm goin' down to Louisiana
Gonna get me a mojo hand
Gonna raise some hell, gonna make some noise
Gonna make them people understand (ooh-yeah)

Down on the Mississippi, where the juke joints sway
I'll be singin' the blues, till the break of day
Gonna find that mojo, gonna bring it on back
Gonna heal my soul, get my life on track



110 credits left

📄 Use on Discord

isaac.king5050@gmail.com



A country song about Thanksgiving



0:01

0:53



Create 🎵



Lyrics

Enter your own lyrics or describe a song and click Generate Lyrics...

Home

Create

Library

Explore BETA

Search

Make Random Lyrics

0/3000

Instrumental

530 credits

Subscribe

Style of Music

male voice

What's New?

female voice pop rock

Help

About

guitar bass sad 10/120

Careers



Title

2024-07-01_06:21:53



Create



Rise and Shine v3

soulful uplifting r&g

1:29



Rise and Shine v3

soulful uplifting r&g

1:28



Mera Utsah v1

hindi soulful acoustic

2:00



Mera Utsah v1

hindi soulful acoustic

1:51



Rain in the Heart v3.5

psychedelic sertanejo dreamy acoustic

2:15



Rain in the Heart v3.5

psychedelic sertanejo dreamy acoustic

2:52



2024-07-01_06:21:53 Uploaded

(no style)

0:06



2024-07-01_06:21:53 v3.5

male voice



2024-07-01_06:21:53 v3.5

male voice



2024-07-01_06:21:53

AbstractTreble251

male voice

1 July 2024 at 11:53

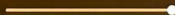


2024-07-01_06:21:53

AbstractTreble251



0:36



Search

Filters (3)

Newest

+ Audio

+ Voice

+ Inspo

> Lyrics
[Intro]

No songs found

Reset filters

> Styles

More Options

Exclude styles

Vocal Gender

Male Female

Lyrics Mode

Manual Auto

Weirdness



50%



Create



WHEN IT USED TO HURT YOU
KOVH Foundation



0:03

4:44



Song Description

我想做一首爵士音乐，中文歌词，女声

+ Audio

+ Lyrics

Instrumental



3:44

月光沙发 v5.5

Jazz swing with brushed drums, walking upright bass, muted piano comping, and smoky



3:54

月光沙发 v5.5

Jazz swing with brushed drums, walking upright bass, muted piano comping, and smoky



The interface features a central waveform visualization with a red-to-black gradient. Above the waveform are two red buttons labeled "VERSE" and "CHORUS". Below the waveform is a time axis with markers at 0.04, 0.08, 0.12, 0.16, 0.20, 0.24, 0.28, and 0.32. A red vertical line is positioned at the 0.04 mark, with a red box containing "0.04" below it. Navigation arrows are present on either side of the waveform.

Prompt
Contemporary R&B, Pop, Dance-Pop, Electropop, Alt-Pop, Teen Pop

Style Reference
upload an audio file to use it as a reference track.
Upload File

Lyrics
AUTO GENERATE CUSTOM INSTRUMENTAL

Extension Placement
INTRO SECTION **OUTRO**

Advanced Mode **↔ Extend**

Takes **Extend** Replace



我想做一首爵士音乐，中文歌词，女声

Thoughts >

Sound



Soul-Jazz, Hard Bop, gritty female vocal, smoky and authoritative voice, Hammond B3 organ swells, walking bassline, syncopated drum kit, mid-tempo groove, 100 BPM, G major, brass section stabs, soulful testimony style, earthy timbre, bluesy and resilient atmosphere.

Lyrics

[Intro]

(嘿 听见了吗)

(跟着这拍子走)



自个儿的拍子 (Take 1)

Soul-Jazz, Hard Bop, gritty female vocal, smoky and authoritative vo...



自个儿的拍子 (Take 2)

Soul-Jazz, Hard Bop, gritty female vocal, smoky and authoritative vo...



没问题，这就为你准备两首带点烟熏嗓音、很有个性的爵士曲。这两版《自个儿的拍子》走的是 Soul-Jazz 风格，配上了很有力道的爵士鼓点和现场感十足的铜管乐。听听看，哪一版更有你想要的那个味儿？


更慵懒的感觉

修改歌词细节

加入钢琴伴奏

Ask Producer...





AI音乐的交互的可能未来

可以完全理解你的需求的乙方

- 一句话帮我解决问题

可以和你很好合作的伙伴

- DAW+对话
- 