

Gus G. Xia 夏光宇

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RESEARCH INTEREST

I design intelligent systems to *understand* and *extend* musical creativity and expression. To *understand* means to learn the musical representation conveyed through sounds, performances, and symbolic compositions. To *extend* means to use such an understanding to create artificial music partners, serving music lovers at all levels.

My team builds interactive music agents who 1) compose and arrange music via style transfer and analogy, 2) perform accompaniment and improvise expressively in concert with human musicians by learning from rehearsal experience, and 3) teach music beginners using multimodal feedbacks. Other projects include content-based music information retrieval, autonomous dancing robots, and bio-music computing using slime molds.

ACADEMIC APPOINTMENTS

- July 2023 – present* **Mohamed bin Zayed University of Artificial Intelligence (MBZUAI)**, Abu Dhabi, UAE
Assistant Professor, Machine Learning Department
- Sep 2017 – Jun 2023* **NYU Shanghai**, Shanghai, China
Assistant Professor, Computer Science
- Aug 2016 – Aug 2017* **Dartmouth College**, Hanover, New Hampshire, USA
Neukom Postdoc Fellow, Digital Music Center
- May 2013 – Aug 2016* **Carnegie Mellon University**, Pittsburgh, Pennsylvania, USA
Research Assistant, Machine Learning

AFFILIATIONS AND VISITING POSITIONS

- Sep 2017 – Present* **NYU Tandon**, New York, USA
Global Network Assistant Professor, Computer Science
- Mar 2020 – Present* **NYU Center for Data Science**, New York, USA
Affiliated Faculty, CILVR Lab
- Mar 2021 – Present* **NYU Steinhardt**, New York, USA
Affiliated Faculty, Music and Audio Research Laboratory (MARL)
- Jun 2022 – Present* **NYU Shanghai**, Shanghai, China
Affiliated Faculty, School of Engineering and Computer Science

EDUCATION

- May 2010 – Aug 2016* **Carnegie Mellon University**, Pittsburgh, Pennsylvania, USA
Ph.D., Machine Learning
— Thesis Topic: Expressive Collaborative Music Performance via Machine Learning
— Advisor: Prof. Roger Dannenberg
- Aug 2006 – Jul 2010* **Peking University**, Beijing, China
B.S., Information Management and Information System
B.S. (Minor), Psychology
- Aug 2004 – Jul 2010* **China Conservatory of Music**, Beijing, China
— Private DI (Chinese flute) performance study
— Teacher: Prof. Weiliang Zhang, master DI player and the Dean of Chinese Music Department

PUBLICATIONS

- 2022
- Y. Qu, Y. Qin, L. Chao, H. Qian, Z. Wang, **G. Xia**, “Modeling Perceptual Loudness of Piano Tone: Theory and Applications”, in *Proc. 23rd International Society for Music Information Retrieval Conference*, Online, Dec 2022.
- J. Jiang, D. Chin, Y. Zhang, G. Xia, “Learning Hierarchical Metrical Structure Beyond Measures”, in *Proc. 23rd International Society for Music Information Retrieval Conference*, Online, Dec 2022.
- J. Zhao, **G. Xia**, Y. Wang, “Beat Transformer: De-mixed Beat and Downbeat Tracking with Dilated Self-Attention”, in *Proc. 23rd International Society for Music Information Retrieval Conference*, Online, Dec 2022.
- J. Zhao, **G. Xia**, Y. Wang, “Domain Adversarial Training on Conditional Variational Auto-Encoder for Controllable Music Generation”, in *Proc. 23rd International Society for Music Information Retrieval Conference*, Online, Dec 2022.
- L. Yi, H. Hu, J. Zhao, **G. Xia**, “AccoMontage2: A Complete Harmonization and Accompaniment Arrangement System”, in *Proc. 23rd International Society for Music Information Retrieval Conference*, Online, Dec 2022.
- Y. Zhang, J. Jiang, **G. Xia**, S. Dixon, “Interpreting Song Lyrics with an Audio-Informed Pre-trained Language Model”, in *Proc. 23rd International Society for Music Information Retrieval Conference*, Online, Dec 2022.
- Z. Wang, D. Xu, **G. Xia**, Y. Shan, “Audio-to-symbolic Arrangement via Cross-modal Music Representation Learning”, in *Proc. 47th International Conference on Acoustics, Speech and Signal Processing*. Singapore & Online, May 2022.
- S. Wei, **G. Xia**, W. Gao, L. Lin, Y. Zhang, “Music Phrase Inpainting Using Long-term Representation and Contrastive Loss”, in *Proc. 47th International Conference on Acoustics, Speech and Signal Processing*. Singapore & Online, May 2022.
- D. Chin, **G. Xia**, “A Computer-aided Multimodal Music Learning System with Curriculum: A Pilot Study”, in *Proc. 22nd International Conference on New Interfaces for Musical Expression*, New Zealand, July 2021.
- Z. Piao, **G. Xia**, “Sensing the Breath: A Multimodal Singing Tutoring Interface with Breath Guidance”, in *Proc. 22nd International Conference on New Interfaces for Musical Expression*, New Zealand, July 2021.
- 2021
- J. Zhao, **G. Xia**, “AccoMontage: Accompaniment Arrangement via Phrase Selection and Style Transfer”, in *Proc. 22nd International Society for Music Information Retrieval Conference*, Online, Oct 2021.
- L. Lin, Q. Kong, J. Jiang, **G. Xia**, “A Unified Model for Zero-shot Music Source Separation, Transcription and Synthesis”, in *Proc. 22nd International Society for Music Information Retrieval Conference*, Online, Oct 2021.
- S. Wei, **G. Xia**, “Learning Long-term Music Representations via Hierarchical Contextual Constraints”, in *Proc. 22nd International Society for Music Information Retrieval Conference*, Online, Oct 2021.
- Z. Wang, **G. Xia**, “MuseBERT: Pre-training Music Representation for Music Understanding and Controllable Generation”, in *Proc. 22nd International Society for Music Information Retrieval Conference*, Online, Oct 2021.
- D. Chin, **G. Xia**, “Hyper-hybrid Flute: Simulating and Augmenting How Breath Affects Octave and Microtone”, in *Proc. 21st International Conference on New Interfaces for Musical Expression*, Online & Shanghai, June 2021.
- Y. Li, **G. Xia**, “A Wearable Haptic Interface for Breath Guidance in Vocal Training”, in *Proc. 21st*

PUBLICATIONS (continued)

Y. Zhang, **G. Xia**, M. Levy, S. Dixon. "COSMIC: A Conversational Interface for Human-AI Music Co-Creation", in *Proc. 21st International Conference on New Interfaces for Musical Expression*, Online & Shanghai, June 2021.

2020

Z. Wang, Y. Zhang, Y. Zhang, J. Jiang, R. Yang, J. Zhao, **G. Xia**, "PIANOTREE VAE: Structured Representation Learning for Polyphonic Music", in *Proc. 21st International Society for Music Information Retrieval Conference*, Montréal, Oct 2020.

Z. Wang, D. Wang, Y. Zhang, **G. Xia**, "Learning Interpretable Representation for Controllable Polyphonic Music Generation", in *Proc. 21st International Society for Music Information Retrieval Conference*, Montréal, Oct 2020.

Z. Wang, K. Chen, J. Jiang, Y. Zhang, M. Xu, S. Dai, X. Gu, **G. Xia**, "POP909: A Pop-song Dataset for Music Arrangement Generation", in *Proc. 21st International Society for Music Information Retrieval Conference*, Montréal, Oct 2020.

J. Jiang, **G. Xia**, T. Berg-Kirkpatrick, "Discovering Music Relations with Sequential Attention", in *Proc. of the 1st Workshop on NLP for Music and Audio (NLP4MusA)*, Montréal, Oct 2020.

Y. Zhang, Z. Wang, D. Wang, **G. Xia**, "BUTTER: A Representation Learning Framework for Bi-directional Music-Sentence Retrieval and Generation", in *Proc. of the 1st Workshop on NLP for Music and Audio (NLP4MusA)*, Montréal, Oct 2020.

D. Chin, Y. Zhang, T. Zhang, J. Zhao, **G. Xia**. "Interactive Rainbow Score: A Visual-centered Multimodal Flute Tutoring System", in *Proc. 20th International Conference on New Interfaces for Musical Expression*, UK, July 2020.

J. Jiang, **G. Xia**, D. Carlton, C. Anderson and R. Miyakawa, "Transformer VAE: A Hierarchical Model for Structure-Aware and Interpretable Music Representation Learning," in *Proc. 45th International Conference on Acoustics, Speech and Signal Processing*. Spain, May 2020.

K. Chen, **G. Xia** and S. Dubnov, "Continuous Melody Generation via Disentangled Short-Term Representations and Structural Conditions," in *Proc. 14th International Conference on Semantic Computing (ICSC)*, USA, Feb 2020.

2019

R. Yang, D. Wang, Z. Wang, T. Chen, J. Jiang and **G. Xia**. "Deep Music Analogy Via Latent Representation Disentanglement," in *Proc. 20th International Society for Music Information Retrieval Conference*, Delft, Nov 2019.

J. Jiang, K. Chen, W. Li, and **G. Xia**. "Large Vocabulary Chord Transcription via Chord Structure Decomposition," in *Proc. 20th International Society for Music Information Retrieval Conference*, Delft, Nov 2019.

J. Jiang, **G. Xia**, D. Carlton, "Crowd annotation for audio key estimation", in *15th Music Information Retrieval Evaluation eXchange (MIREX)*, Delft, Nov 2019.

Y. Zhang, Y. Li, D. Chin, and **G. Xia**. "Adaptive Multimodal Music Learning via Interactive-haptic Instrument," in *Proc. 19th International Conference on New Interfaces for Musical Expression*, Brazil, June 2019.

R. Yang, T. Chen, Y. Zhang and **G. Xia**. "Inspecting and Interacting with Meaningful Music Representations Using VAE," in *Proc. 19th International Conference on New Interfaces for Musical Expression*, Brazil, June 2019

J. Jiang, **G. Xia**, R. Dannenberg. "Representing Music Structure by Variational Attention", in *International Workshop on Machine Learning for Music Discovery at ICML*, California, June 2019.

M. Xu, Z. Wang, and **G. Xia**. "Transferring Piano Performance Control Across Environments," in *Proc. 44th International Conference on Acoustics, Speech and Signal Processing*, UK, May 2019.

PUBLICATIONS (continued)

- K. Chen, W. Zhang, S. Dubnov, **G. Xia**, W. Li. "The effect of explicit structure encoding of deep neural networks for symbolic music generation," in *2019 International Workshop on Multilayer Music Representation and Processing (MMRP)*, Milan, Jan 2019.
- 2018 Z. Wang, **G. Xia**. "A Framework for Automated Pop-song Melody Generation with Piano Accompaniment Arrangement." *6th National Conference on Sound and Music Technology*, Oct 2018.
- G. Xia**, S.Dai. "Music Style Transfer: A Position Paper", *6th International Workshop on Musical Metacreation*, Spain, June 2018.
- G. Xia**, C. Jacobsen, Q. Chen, X-D. Yang, and R. Dannenberg. "ShIFT: A Semi-haptic Interface for Flute Tutoring." in *Proc. 18th The International Conference on New Interfaces for Musical Expression*, USA, June 2018.
- 2017 S. Dai, **G. Xia**. "Computational Models for Common Pipa Techniques", *best student paper*, the *5th National Conference on Sound and Music Technology*, Oct 2017.
- S. Dai, **G. Xia**. "Computational Models and MusicXML Definitions for Common Pipa Techniques", Late Breaking Demo, in *Proc. 18th International Society for Music Information Retrieval Conference*, Suzhou, Oct 2017.
- G. Xia**, R. Dannenberg. "Duet Interaction: Learning Improvisation Techniques for Automatic Accompaniment", in *Proc. 17th The International Conference on New Interfaces for Musical Expression*, Copenhagen, June 2017.
- 2016 **G. Xia**, M. Kawai, K. Matsuki, M. Fu, S. Cosentino, G. Trovato, R. Dannenberg, S.Sessa and A. Takanishi. "Expressive humanoid robot for automatic accompaniment", *The 13th Sound and Music Computing Conference*, Hamburg, Germany, September 2016.
- G. Xia**, "Expressive and Collaborative Music Performance via Machine Learning", *CMU-MLD Doctoral Thesis*, August 2016.
- 2015 **G. Xia**, R. Dannenberg "Spectral Learning for Expressive Interactive Ensemble Music Performance", in *Proc. 16th International Conference on Music Information Retrieval*, Malaga, October 2015.
- M. Fu, **G. Xia** R. Dannenberg "A Statistical View on Piano Rolled Chords", in *Proc. 16th International Conference on Music Information Retrieval*, Malaga, October 2015.
- G. Xia**, R. Dannenberg "Duet Interaction: Learning Musicianship for Automatic Accompaniment", in *Proc. 15th The International Conference on New Interfaces for Musical Expression*, Baton Rouge, June 2015.
- 2014 **G. Xia**, T. Huang, M. Yifei, R. Dannenberg, C. Faloutsos "MidiFind: Similarity Search and Popularity Mining in Large MIDI Databases", in *Music Sound and Motion*, pp. 259 -276.
- R. Dannenberg, N. Gold, D. Liang, **G. Xia** "Methods and Prospects for Human Computer Performance of Popular Music", in *Computer Music Journal*, 38 (2) (Summer2014).
- R. Dannenberg, N. Gold, D. Liang, **G. Xia** "Active Scores: Representation and Synchronization in Human-Computer Performance of Popular Music", in *Computer Music Journal*, 38 (2)
- 2013 T. Huang, **G. Xia**, Y. Ma, R. Dannenberg, C. Faloutsos "MidiFind: Fast and Effective Similarity Searching in Large MIDI Databases", in *Proc. 10th International Symposium on Computer Music and Multidisciplinary Research*, Marseille, October 2013.
- 2012 **G. Xia**, J. Tay, R. Dannenberg, M. Veloso "Autonomous Robot Dancing Driven by Beats and Emotions of Music", in *Proc. 12th International Joint Conference on Autonomous Agents and Multi-Agent Systems*, Valencia, June 2012, pp. 205-212.

PUBLICATIONS (continued)

- 2011 **G. Xia**, D. Liang, R. Dannenberg, M. Harvilla “Segmentation, Clustering, and Display in a Personal Audio Database for Musicians”, in *Proc. 12th International Conference on Music Information Retrieval*, Miami, October 2011, pp.139-144.
- D. Liang, **G. Xia**, R. Dannenberg “A Framework for Coordination and Synchronization of Media”, in *Proc. 11th The International Conference on New Interfaces for Musical Expression*, Oslo, May 2011, pp. 167-172.

TEACHING EXPERIENCE

Instructor

Spring 2020

Class: CSCI-SHU 360: Introduction to Machine Learning. NYU Shanghai
Co-instructor: Prof. Ross

Spring 2018-2021

Class: CSCI-SHU 188: Introduction to Computer Music. NYU Shanghai

Fall 2017-2021

Class: CSCI-SHU 101: Introduction to Computer Science. NYU Shanghai

Winter 2017

Class: MUS102: Music, Mind, and Invention. Dartmouth College
Co-instructor: Prof. Casey

Guest Lecturer

Spring 2022

Music AI as Media Technology

Class: DES8820: Introduction of Event Exhibition, SJTU-USC ICCI
Instructor: Dr. Yan

Spring 2017

Computer Music and HCI

Class: CS67/167: Introduction to Human-Computer Interaction, Dartmouth College
Instructor: Prof. Yang

Fall 2014

Open Sound Control and its Applications in Music Performance

Class: 15104: Principles of Computing for Creative Practice, Carnegie Mellon University
Instructors: Prof. Dannenberg & Prof. Roberts

Fall 2014

The Design and Acoustic Properties of the Chinese Flute

Class: 57337: Sound Recording, Carnegie Mellon University
Instructors: Prof. Schulz

Fall 2013

The History and Future of Computer-aided Music Performance

Alumni Lecture Series of Information Science Department, Peking University
Host: Prof. Wang

Student Supervision

Core Members of Music X Lab:

April 2018 – present

Junyan Jiang, Ph.D. student in Computer Science, NYU

Project: Hierarchical Music Representation Learning and MIR

April 2018 – present

Ziyu Wang, Ph.D. student in Computer Science, NYU

Project: Interactive Music Arrangement via Deep Representation Learning

April 2018 – present

Tianyao Chen, Ph.D. student in Computer Science, NYU

Project: A Logic System for Music Structure Analysis and Music Theory Induction

Sept 2018 – present

Daniel Chin, Ph.D. student in Computer Science, NYU

Project: Multimodal Music Tutoring, Bio-music computing using slime mold

Feb 2020 – present

Shiqi Wei, Ph.D. student in Computer Science, Fudan University

Project: Long-term music representation learning and generation

May 2020 – present

Liwei Lin, Research Associate in Computer Science, NYU Shanghai

Project: A Unified Model for Source Separation, Transcription, and Controlled Synthesis

Sept. 2020 – present William Huang, Research Assistant, NYU Shanghai
Project: A Computer-aided Tutoring System of Chord Recognition

Sept. 2020 – present Xuanjie Liu, Research Assistant, NYU Shanghai
Project: Self-supervised Learning via Symmetry

Graduated Core Members:

Feb 2020 – May 2022 Ziyue Piao, Masters student in Computer Science, Shanghai Jiao Tong University
Project: Multimodal Vocal Tutoring System
Current position: Ph.D. student in Computer Music, McGill University.

May 2020 – May 2021 Jingwei Zhao, Undergraduate student in Computer Science, Shanghai Jiao Tong University
Project: Automatic Arrangement via Searching the Latent Space
Current position: Ph.D. in Computer Science, NUS

May 2020 – May 2021 Zehao Wang, Undergraduate student in Math, Peking University
Project: Representation Learning for Chord Progression
Current position: Ph.D. in Computer Science, UCSD

May 2020 – May 2021 Qinying Lei, Undergraduate student in Media Technology, Communication University of China
Project: An GUI for Automated Music Arrangement
Current position: Masters student in Music Technology, Georgia Tech

Sept 2018 – May 2021 Ian Zhang, Undergraduate student in IMA, NYU Shanghai
Project: Multimodal Music Tutoring
Current position: Masters student in Computer Science, Stanford University

May 2019 – Nov 2020 Yixiao Zhang, Research Associate in Computer Science, NYU Shanghai
Project: Multimodal music representation learning
Current position: Ph.D. student in Computer Music, C4DM, Queen Mary University of London

Dec 2018 – May 2020 Dingsu Wang, Undergraduate student in Data Science, NYU Shanghai
Project: Conditional VAE for music generation
Current position: MSRA researcher.

Dec 2018 – May 2020 Demi Li, Undergraduate student in IMA, NYU Shanghai
Project: Haptic guidance for flute on vocal training
Current position: Masters student in Human-computer Interaction, CMU; IMA Fellow, NYUSH

Dec 2017 – May 2019 Maoran Xu, Undergraduate student in Applied Mathematics and Data Science, Fudan University
Project: Performance Control Transfer
Current position: Ph.D. student in Statistics, University of Florida

May 2018 – Aug 2019 Ke Chen, Undergraduate student in Computer Science, Fudan University
Project: Conditional Deep Music Generation
Current position: Ph.D. student in Music, UCSD

Nov 2017 – Aug 2019 Yiyi Zhang, Undergraduate student in Finance, NYU Shanghai
Project: Automated Music Generation
Current position: Masters student in Data Science, NYU

Nov 2017 – May 2018 Han Su, Undergraduate student in Computer Science & IMA, NYU Shanghai
Project: Bio-music Computing using Slime Mold
Current position: Master student in Comparative Media Study, MIT

May 2018 – Aug 2019 Ruihan Yang, Undergraduate student in Computer Science, NYU Shanghai
Project: Representation Learning and Disentanglement for Symbolic Music
Current position: Ph.D. student in Computer Science, UCI

Thesis Committee Service

- Nov 2021 – present* Autumn Wu, Ph.D. thesis committee, NYU Shanghai
Dissertation: Improve Sample Efficiency in On-Line and Off-Line DRL
Committee members: Keith Ross (Chair), Gus Xia, Kyunghyun Cho
- Dec 2018 – Dec 2019* Jian Gao, Ph.D. thesis committee, NYU Abu Dhabi
Dissertation: Game-theoretic Approaches for Generative Modeling
Committee members: Edward Wong, Julian Togelius, Gus Xia, Tembine Hamidou (Chair)
- Other Previous Mentees*
- Nov 2016 – Oct 2018* Shuqi Dai, Undergraduate student in Computer Science, Peking University
Project: Expressive Performance Model for Pipa
Current position: Ph.D. student in Computer Science, CMU
- Oct 2016 – Aug 2017* Qianwen Chen, Masters Student in Computer Science and Digital Arts, Dartmouth College
Project: Haptic Guidance for Flute Tutoring
Current position: Designer, Apple.
- Feb 2017 – Aug 2017* Rohan Arora, Masters Student in Computer Science, Dartmouth College
Project: Haptic Guidance for Flute Tutoring
Current position: Data & AI Products Builder, Microsoft.
- Aug 2014 – Aug 2016* Mutian Fu, Masters Student in Music Technology, CMU
Project: Piano Rolled Chord Timing Analysis for Collaborative Performance
Current position: Software Engineer, Bloomberg
- Summer 2015* Peiling Lu, Undergraduate Student in Communication Engineering, CMU
Project: Piano Pedal Timing Analysis for Collaborative Performance
Current position: Graduate student, CCRMA, Stanford University.

INDUSTRY EXPERIENCE

- Summer 2013* **Music Information Retrieval Research Intern**, The Echo Nest, Cambridge, MA
Project: Improvement on Echo Nest's Beat Tracking Algorithm
Mentor: Dr. Tristan Jehan
- Summer 2012* **Research Intern**, Gracenote Inc., Emeryville, CA
Project: Improvement on Gracenote's Music Fingerprint Algorithm
Mentor: Dr. Bob Coover

MUSIC RELATED EXPERIENCE

Music AI Concert:

July 2022 **Producer, Flutist, and Vocalist**, [*Music from Far Lands and Near Future*](#), House of Pianos, Dubai

Dizi and Xiao (Chinese Flute and Vertical Flute):

- Mar 2020 – Present* **Flutist**, NYU Shanghai Jazz Ensemble, Shanghai.
- Mar 2013 – May 2016* **Soloist**, Pitt Carpathian Ensemble, Pittsburgh, PA
- May 2010* **Solo Concert**, President Hall of Peking University, Beijing
- Dec 2006 – Jun 2010* **Leading Soloist**, Chinese Music Institute of Peking University, Beijing

Musical, Choral & Vocal:

- Feb 2022* **Vocal Solo**, "How can I help but think of you" & "Three wishes of Rose", Shanghai Science and Art Program Concert.
- Dec 2021* **Vocal Solo**, "The Song of the Yue Boatman" (越人歌) & "Great River of No Return" (大江东去), Faculty Concert, NYU Shanghai
- June 2021* **Vocal Solo**, "Three wishes of Rose"(玫瑰三愿), Post-NIME Celebration Concert, NYU Shanghai
- Dec 2020* **Vocal Solo**, "How can I help but think of you"(教我如何不想他), Faculty Concert, NYU Shanghai
- Spring 2018* **Choir Member**, NYU Shanghai Show Choir, NYU Shanghai.

Oct 2016 – Jun 2017 **Glee Club Member**, Dartmouth College
Apr 2014 **Role of Audrey 2**, in the musical “Little Shop of Horrors”, Carnegie Mellon University
Feb 2013 **Role of Phantom**, in the single “Music of the Night”, Carnegie Mellon University
Oct 2012 **Role of Teen Angel**, in the musical “Grease”, Carnegie Mellon University
Oct 2011 **Role of Simon Zealotes**, in the musical “Jesus Christ Superstar”, Carnegie Mellon University

Conducting:

Apr 2007 – Jun 2009 **Assistant Conductor**, Chamber Orchestra of Chinese Music Institute of Peking University, Beijing
Apr 2019 – Feb 2021 **Conductor**, Chamber Orchestra of Chinese Music Institute of NYU Shanghai, Shanghai

RESEARCH PROJECTS

NYU Shanghai & NYU Tandon, Shanghai & New York:

- Sep 2017 – present **Project: Deep Music Representation Learning**
- Designed EC²-VAE for representation disentanglement
 - Designed Transformer-VAE for context-sensitive representation learning
 - Designed hybrid models for deep music generation
- Sep 2017 – present **Project: Multimodal Music Tutoring System**
- Designed adaptive haptic feedback for flute tutoring
 - Designed adaptive visual feedback for sight-playing tutoring
- Dec 2017 – present **Project: Music Information Retrieval Using Deep Learning**
- Built the state-of-the-art chord recognition system (first place in MIREX 2018)
 - Built the state-of-the-art key recognition system (first place in MIREX 2019)
- Sep 2017 – present **Project: Performance Control Transfer via Player Pianos**
- Designed heuristics to build the mapping between performance control and sound
 - Enabled different player pianos to “adjust” performance in different environments

Neukom Institute, Dartmouth College, USA:

- Aug 2016 – Aug 2017 **Project: New Instrumental Interface for Flute Tutoring**
- Enabled machines to control human fingers in real time
 - Designed new flute infrastructure with motors
- Jul 2012 – May 2013 **Project: Biocomputing for music composition**
- Used live creature, slime mold, as a computational model
 - Enabled slime mold to sing

Humanoid Piano Robotics Lab, TeoTronica Inc., Italy (visiting collaboration):

- Sep 2015 – Aug 2016 **Project: A Humanoid Piano Robot for Human-Computer Music Performance**
- Enabled a piano robot to perform music interactively with a human musician
 - Enabled a piano robot to compose an accompaniment for a given melody
 - Designed algorithms generating natural facial expressions in music performance

Takanishi Lab, Humanoid Robotics Institute, Waseda University, Japan (visiting collaboration):

- Sep 2015 **Project: A Humanoid Saxophone Robot for Human-Computer Music Performance**
- Enabled a saxophone robot to perform music interactively with a human musician
 - Designed algorithms generating natural body gestures in music performance

Machine Learning Department, Carnegie Mellon University, USA:

- Jul 2013 – Aug 2016 **Project: Expressive Collaborative Music Performance via Machine Learning**
- Enabled machines to learn musicianship from human rehearsals
 - Enabled machines to expressively perform music with human musicians
- Jul 2012 – May 2013 **Project: A Fast and Effective MIDI Search Algorithm**
- Aimed to search different performance MIDI files of the same composition
 - The algorithm is both effective (0.95 F-score) and fast (searching 10K files in 0.1 second)
 - Website: www.cmumidifind.com
- Jul 2011 – Jul 2012 **Project: Dancing Robots Driven by Music**

- Automatic music beats and emotion analysis
- Enabled physically based robots to dance with music according to the beats and emotion

Aug 2010 – Jul 2011

Project: A Framework for Coordination and Synchronization of Media

- Designed the GUI for interactive performance based on scanned sheet music
- Automatic page turning driven by music performance

Aug 2010 – Aug 2011

Project: Rehearsal Audio Stream Segmentation and Clustering

- Designed novel and robust representation of noisy music signals
- Achieved state of the art accuracy (0.98) by ADAboost-HMM classification frameworks

National Laboratory on Machine Perception, Peking University, China:

Aug 2009 – May 2010

Project: Automated Music Structure Analysis on a Symbolic Representation

- Designed a hierarchical music structure analysis framework
- Detected music phrases using Conditional Random Fields
- Detected music sections using NTRPs (Nontrivial Repeating Patterns)

Oct 2009 – Jun 2010

Project: Automated Composition Based on Music Structure Analysis

- Designed a structural model of music styles
- Automated composition by recombining and modifying extracted phrases

INVITED TALKS

Oct 2022

Music AI for New Arrangement and Performance Experience. *Culture Summit, Abu Dhabi*

July 2022

Hierarchical Representation Learning Approach for Source Separation, Transcription, and Music Generation. *ICML workshop on Machine Learning for Audio Synthesis*

May 2022

Small Tricks, Grand Design: Learning Interpretable Music Representations, *Music AI Online Forum, Center Conservatory of Music.*

Mar 2022

Music AI for New Arrangement and Performance Experience, *Carnegie Mellon*

Feb 2022

Small Tricks, Grand Design: Learning Interpretable Music Representations, *MBZUAI*

Nov 2021

Computer-aided Multimodal Music Learning, *TEDxNYUShanghai*

Oct 2021

From Human Stupidity to Artificial Intelligence: A Musical Perspective, *Tencent*

Apr 2021

Music AI and Computational Creativity, *ICCI, Shanghai Jiao Tong University*

Mar 2021

The Importance of Inductive Bias in Music Representation Learning, *Fudan University*

Mar 2021

Small Tricks, Grand Design: Learning Interpretable Music Representations, *Peking University*

Feb 2021

Small Tricks, Grand Design: Learning Interpretable Music Representations, *ByteDance*

Dec 2020

Webinar: Small Tricks, Grand Design: Learning Interpretable Music Representations, *CMU*

Dec 2020

My Research Journey on Music AI, *Seeds for the Future Year End Celebration*

Oct 2020

AI and Music Creativity, *Seeds for the Future Lecture Series*

Oct 2020

Music Representation, Creativity, and Buddhist Philosophy, *Donghua Temple*

Oct 2020

PianoTree VAE for polyphonic music representation learning, *ISMIR*

Aug 2020

Towards better music automation via representation learning, *Kwai Research Lab*

July 2020

Webinar: AI in Music, *Dartmouth College*

Mar 2020

Webinar: Music representation learning in AI and education, *Peking University*

Nov 2019

Better Music Representation Learning via Inductive Bias: Mind vs. Machine, *CDS, NYU*

Nov 2019

Deep Music Analogy via Representation Disentanglement, *ISMIR*

Oct 2019

Hierarchical Music Representation Learning Using Transformer VAE, *MARL, New York University*

Oct 2019

Better Music Representation Learning via Inductive Bias: Mind vs. Machine, *Carnegie Mellon*

Oct 2019

Better Music Representation Learning via Inductive Bias, *Dartmouth College*

Sep 2019

Interpretable Music Generation via Representation Disentanglement, *CILVR, New York University*

Aug 2019

Music Understanding and Generation via AI, *CCF Annual Conference*

Apr 2019

Music Style Transfer via Analogy-Making, *International Forum on Statistics, SUFE*

Apr 2019

Music Intelligence: Towards Creative AI Systems, *Zaojiu Talk*

Jan 2019

Explicit Structure Encoding for Music Generation, *MMRP*

Oct 2018

Towards More Expressive Artificial Music Intelligence. *Carnegie Mellon University*

July 2018

A Framework for Automated Popular Music Arrangement, *CSMT*

May 2018

Music Style Transfer: Some Important Concepts, *MuMe workshop, ICC*

Oct 2017

Computer Music as an Interdisciplinary Field, *Shanghai Science and Technology Museum*

Jun 2017

Turing Test for the Creative Arts, *MuMe workshop, ICC*

May 2017

Learning Improvisation for Automatic Accompaniment, *NIME*

Feb 2017

Expressive Human-computer Music Interaction, *Georgia Tech*

Aug 2016	Robot Embodiment for Automatic Accompaniment, <i>SMC</i>
Oct 2015	Spectral Learning for Expressive Interactive Ensemble Music Performance, <i>ISMIR</i>
Sep 2015	Modeling Piano Rolled Chords and Pedal Timing, <i>Carnegie Mellon University</i>
Jun 2015	Learning Musicianship for Automatic Accompaniment, <i>NIME</i>
Sep 2014	Improving Automatic Accompaniment by Machine Learning, <i>University of California, San Diego</i>
Dec 2013	A History of Automatic Accompaniment and its Future Directions, <i>Peking University</i>
Oct 2012	A Vision of Human-Robot Music Performance, <i>Carnegie Mellon University</i>
Jun 2012	Autonomous Dancing Robots Driven by Music, <i>AAMAS</i>
Dec 2011	Smart Music Displays and Autonomous Dancing Robots, <i>Peking University</i>
Jun 2011	Coordination and Synchronization of Media for Human-Computer Music Performance, <i>NIME</i>

SERVICE

- Space Use Committee, NYU Shanghai, 2017 – 2022
- Faculty Search Committee, Computer Science, NYU Shanghai, 2022
- Faculty Promotion Committee, Computer Science, NYU Shanghai, 2022
- Faculty Promotion Committee, Music Department, NYU Shanghai, 2021
- Undergraduate thesis program committee, CS & DS, NYU Shanghai, 2019 – 2022

HONORS and AWARDS

- Panelist of “Education in a digital world”, Berklee Abu Dhabi Summit, 2022
- Keynote speaker, The 4th IEEE Workshop on Artificial Intelligence for Art Creation, 2022
- Keynote speaker, DMRN+16: Digital Music Research Network One-day Workshop, 2021
- Keynote speaker, TechMe Week, Online & Tencent, 2021
- Panelist of “MIR for Human Health and Potential” ISMIR, 2021
- Panel Chair of “MIR Technology Across Culture”, ISMIR, 2021
- General co-chair for NIME Conference, 2021
- Keynote speaker, Seeds for the Future Year End Celebration, Online, 2020
- Music Co-chair for MuMe workshop, 2019
- Eastern Young Scholar, Shanghai Ministry of Education, 2017
- Panelist of “Future of MIR”, ISMIR, 2017
- Music Chair for ISMIR Conference, 2017
- Turing Test for Creative Arts Competition Organizer, Dartmouth College, 2017
- 3-Minute Thesis Presentation Competition Finalist, Carnegie Mellon University, 2015
- Graduate Student Assembly Representative, Carnegie Mellon University, 2013-2014
- Team Leader for OurCS Computer Music Group, Carnegie Mellon University, 2013, 2015
- Outstanding Society Leadership Award (2 out of 260), Peking University, 2009
- President and Music Director of Chinese Music Institute, Peking University, 2007-2009
- Volunteer for Olympic Games, Beijing, 2008
- Selected Student Delegation out of 2000+ candidates for BESETOHA Forum, Tokyo, 2007.
- 1st place out of 3000+ in the National Musical Instrument Proficiency Evaluation, China, 2006

REFERENCES

Available upon request.