

Ziyu Wang

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ACADEMIC EXPERIENCE

Research Interests

Music Generation, Interpretability, Self-Supervised Representation Learning, Foundation Models, Human-Computer-Interaction

Education

- Jun 2019–Present* **New York University**, New York, United States
Ph.D. Candidate, Computer Science
— Thesis topic: Structural Interpretability for Deep Music Generation
— Advisor: Prof. Gus G. Xia
— Thesis Committee: Prof. Gus G. Xia, Prof. Yann LeCun, Prof. Roger Dannenberg, Prof. Eric Xing, Prof. Cheng-Zhi Anna Huang
- Sep 2014–May 2019* **Fudan University**, Shanghai, China
B.S., Mathematics and Applied Mathematics

Research Experience

- Jun 2022–Present* **MBZUAI**, Abu Dhabi, UAE
Research Assistant in Machine Learning
— Advisor: Prof. Gus G. Xia
- Dec 2017–May 2019* **NYU Shanghai**, Shanghai, China
Research Assistant in Machine Learning
— Advisor: Prof. Gus G. Xia

PUBLICATIONS

- 2024* J. Zhao, G. Xia, **Z. Wang**, Y. Wang, “Structured Multi-Track Accompaniment Arrangement via Style Prior Modelling”, Submitted to *38th Conference on Neural Information Processing Systems (NeurIPS)*. Accepted. 2024.
- Y. Wu, **Z. Wang**, G. Xia, B.Raj, “Emergent Interpretable Symbols and Content-Style Disentanglement via Variance-Invariance Constraints”, *arXiv preprint*, arXiv:2407.03824 [cs.LG]. July, 2024.
- Z. Wang**, L. Min, G. Xia, “Whole-Song Hierarchical Generation of Symbolic Music Using Cascaded Diffusion Models”, in *Proceedings of the 12th International Conference on Learning Representations (ICLR)*. Austria, May 2024.
- K. Fang, **Z. Wang**, G. Xia, I. Fujinaga, “Exploring GPT’s Ability as a Judge in Music Understanding”, Submitted to *25th International Society for Music Information Retrieval Conference (ISMIR)*. Accepted. 2024.
- Y. Ma, *et al.*, including **Z. Wang**, “Foundation Models for Music: A Survey.”, *arXiv preprint*, arXiv:2408.14340v2 [cs.SD]. August 2024.

- R. Yuan, *et al.*, including **Z. Wang**, “ChatMusician: Understanding and Generating Music Intrinsically with LLM.”, in *Findings of the Association for Computational Linguistics (ACL)*. 2024
- 2023 S. Wei, **Z. Wang**, W. Gao, G. Xia, “Controllable Music Inpainting With Mixed-level and Disentangled Representation”, in *Proceedings of 48th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Greece, Jun 2023
- 2022 Y. Qu, Y. Qin, L. Chao, H. Qian, **Z. Wang**, and G. Xia, “Modeling Perceptual Loudness of Piano Tone: Theory and Applications”, in *Proceedings of the 23rd International Society for Music Information Retrieval Conference (ISMIR)*. India, Dec 2022.
- Z. Wang**, D. Xu, G. Xia, and Y. Shan, “Audio-To-Symbolic Arrangement Via Cross-Modal Music Representation Learning”, in *Proceedings of 47th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. Singapore and online, May 2022.
- 2021 **Z. Wang**, and G. Xia, “MuseBERT: Pre-training of Music Representation for Music Understanding and Controllable Generation”, in *Proceedings of the 22nd International Society for Music Information Retrieval Conference (ISMIR)*. Online, Nov 2021.
- 2020 **Z. Wang**, D. Wang, Y. Zhang and G. Xia, “Learning Interpretable Representation for Controllable Polyphonic Music Generation”, in *Proceedings of the 21st International Society for Music Information Retrieval Conference (ISMIR)*, Canada and online, Nov 2020.
- Z. Wang**, Y. Zhang, Y. X. Zhang, J. Jiang, J. Zhao and G. Xia, “PianoTree VAE: Structured Representation Learning for Polyphonic Music”, in *Proceedings of the 21st International Society for Music Information Retrieval Conference (ISMIR)*, Canada and online, Nov 2020.
- Z. Wang**, K. Chen, Y. Zhang, J. Jiang, M. Xu, S. Dai and G. Xia, “POP909: A Pop-Song Dataset for Music Arrangement Generation”, in *Proceedings of the 21st International Society for Music Information Retrieval Conference (ISMIR)*, Canada and online, Nov 2020.
- Y. Zhang, **Z. Wang**, D. Wang, G. Xia, “BUTTER: A Representation Learning Framework for Bi-directional Music-Sentence Retrieval and Generation”, in *Proceedings of the 1st Workshop on NLP for Music and Audio (NLP4MusA)*. Online, Nov 2020.
- 2019 R. Yang, D. Wang, **Z. Wang**, T. Chen, J. Jiang and G. Xia, “Deep Music Analogy Via Latent Representation Disentanglement”, in *Proceedings of the 20th International Society for Music Information Retrieval Conference (ISMIR)*, The Netherlands, November 2019.
- M. Xu, **Z. Wang** and G. Xia, “Transferring Piano Performance Control Across Environments”, in *Proceedings of the 44th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. United Kingdom, May 2019.
- 2018 **Z. Wang** and G. Xia, “A Framework for Automated Pop-song Melody Generation and Piano Accompaniment Arrangement”, in *Proceedings of the 6th Conference on Sound and Music Technology*. China, Nov 2018.

TEACHING EXPERIENCE

Course Teaching

Spring 2024

ML711: Intermediate Music AI, MBZUAI
 Lab instructor/teaching assistant
 — Instructor: Prof. Gus G. Xia

Fall 2023

ML701: Introduction to Machine Learning, MBZUAI
 Guest lecturer/lab instructor/teaching assistant
 — **Guest lecture:** Hierarchical Generation in Deep Learning
 — Instructor: Prof. Samuel Horvath

Fall 2018, 2020-2021 **CSCI-SHU 188: Introduction to Computer Music**, NYU Shanghai
Guest lecturer/lab instructor/teaching assistant
— **Guest lecture:** Semantics of symbolic music, Deep Music Generation (2021)
— **Guest lecture:** MIDI & music notation (2020)
— **Guest lecture:** Algorithmic music composition (2018)
— Instructor: Prof. Gus G. Xia

Fall 2020 **SHBI-GB 7310: Advanced Topics in Machine Learning**, NYU Shanghai
Lab instructor/teaching assistant
— Instructor: Prof. Ming Liao

Student Mentoring

Oct 2024–Present Xiaoyu Yi, Undergraduate student at Peking University
Project: Multi-track music generation

Jul 2024–Present Songyan Zhao, Undergraduate student at UC Los Angeles
Project: Controllable harmony and lyrics generation

Mar 2024–Present Chenxi Bao, Research Assistant at MBZUAI
Project: Expressive performance rendering with diffusion models

Mar 2024–Present Qi He, Master student at National University of Singapore
Project: Whole-song music generation with hierarchical motif control

Apr 2022–Present Kun Fang, PhD student at McGill University
Project: Symbolic beat tracking & prompt engineering for music understanding

Jun 2021–Aug 2023 Yutian Qin, Master student at Carnegie Mellon University
Project: Modeling perceptual loudness of piano tone

Sep 2020–Aug 2023 Yang Qu, Master student at UC San Diego
Project: Modeling perceptual loudness of piano tone

Dec 2021–Aug 2023 Hangkai Qian, Undergraduate student at NYU Shanghai
Project: Modeling perceptual loudness of piano tone

Sep 2021–Sep 2022 Alan Lecheng Chao, Undergraduate student at NYU Shanghai
Project: Modeling perceptual loudness of piano tone

Jun 2019–Aug 2021 Leyi Sun, Undergraduate student at NYU Shanghai
Project: Performance control transfer via player pianos

Jun 2019–Aug 2021 Ningran Song, Undergraduate student at NYU Shanghai
Project: Performance control transfer via player pianos

INDUSTRY EXPERIENCE

Jul 2024–Sep 2024 **Research Intern**, Music Foundation Model Team, Sony Research
Project: Fine-tuning LLMs for music generation
— Advisor: Dr. Wei-Hsiang Liao and Yukara Ikemiya

Jun 2022–Aug 2022 **Research Intern**, Research & Development Division, Yamaha
Project: symbolic score quantization and beat tracking
— Mentor: Dr. Akira Maezawa

Jul 2021–Oct 2021 **Research Intern**, ARC Lab, Tencent PCG
Project: audio-to-symbolic music arrangement
— Mentor: Dr. Shan Ying and Dejing Xu

MUSIC EXPERIENCE

Piano

- Feb 2024* **Music AI Concert:** [Leia Zhu, Violin Prodigy Visits MBZUAI](#)
Piano accompanist & music AI technician
Visitors Center, MBZUAI, Abu Dhabi, UAE
- May 2023* **Project:** [“Sing For Hope”](#) public performance
Impromptu performance of Bach’s *Goldberg Variations*
The Oculus at the World Trade Center, New York, United States
- July 2022* **Music AI Concert:** [Music from Far Lands and Near Future](#)
Piano solo, accompanist, & music AI technician
House of Pianos Concert Hall, Dubai, UAE
- May 2021* **Concert:** Symphonic Dances: End of Semester Piano Duo Concert
Piano duo with Prof. Meiling Chen, Rachmaninoff’s *Suite No. 2, Op. 17*
NYU Shanghai, Shanghai, China

Orchestra

- Dec 2017–Aug 2018* **Assistant Conductor**, Rainbow Chamber Orchestra, Shanghai, China
Performances: Dances (*Rumanian folk dances*) & Operas (*Voi lo sapete, o mamma, Quando m’en vo’*)
Rehearsals: Selected symphonies and piano concerti by Mozart & Beethoven
- Sep 2014–Aug 2016* **Chief Performer**, Fudan Chinese Music Orchestra, Shanghai, China
Gaohu, Erhu, Zhonghu player, and soloist

Musical Theater

- Sep 2018–May 2019* **Music Consultant** of *Dear Evan Hansen*
Fudan Musical, Fudan University, Shanghai, China
- Sep 2017–May 2018* **Music Director/Conductor** of *Chicago*
Fudan Musical, Fudan University, Shanghai, China
- Feb 2017–Nov 2017* **Director/Music Director/Conductor** of [Into the Woods](#)
Fudan Musical, Fudan University, Shanghai, China
- Sep 2016–May 2017* **Music Director/Conductor/1st Keyboard** of *Avenue Q* (in Mandarin)
Fudan Musical, Fudan University, Shanghai, China
- Feb 2016–Nov 2016* **Director/Music Director/Conductor** of [MAMMA MIA!](#)
Fudan Musical, Fudan University, Shanghai, China

Chorus

- 2014–2016, 2020–2021* **Conductor**, Student Chorus of the Math Department, Fudan University
Fudan Musical, Fudan University

Jazz Ensemble

- Sep 2020–March 2022* **Conductor & Pianist**, NYU Shanghai Jazz Ensemble
End of semester concerts (Fall 2020, [Spring 2021](#), Fall 2021)
Advisor: Prof. Murray James Morrison

ACADEMIC PROJECTS

Graduate Research Project

- Sep 2023–Present* **Project: Self-Supervised Content and Style Disentanglement**
Music X Lab, MBZUAI
- Designed a regularization method based on content-style variance and invariance.
 - Designed self-supervised model for pitch-timbre disentanglement.
- Jan 2021–Present* **Project: Hierarchical and Structural Music Generation**
Music X Lab, NYU Shanghai & MBZUAI
- Designed MuseBERT and PianoTree VAE to learn non-sequential music dependency.
 - Designed latent space Language Model for long-term flexible music inpainting.
 - Designed music compositional hierarchy for cascaded whole-song generation.
- Feb 2019–Present* **Project: Music Representation Learning**
Music X Lab, NYU Shanghai & MBZUAI
- Designed EC²-VAE for monophonic representation disentanglement.
 - Designed Poly-dis for polyphonic representation disentanglement.
 - Designed BUTTER for text-to-music generation based on cross-modal representations.
 - Designed an Audio-to-symbolic arrangement model based on audio representations.
- May 2018–Present* **Project: Music Understanding via Computation**
Yamaha & Music X Lab
- Collected POP909 dataset for MIR research.
 - Fine-tuned MuseBERT to achieve chord recognition and score quantization.
 - Designed Tonal Reduction Algorithm to extract a reduction of a lead melody.
- Apr 2019–Aug 2023* **Project: Performance Control Transfer of Player Pianos**
Music X Lab, NYU Shanghai & MBZUAI
- Measured equal-loudness curve of piano tone.
 - Proposed loudness model of piano tone under machine learning approach.
 - Proposed performance control transfer algorithm based on sound environment.

Undergraduate Research Project

- Dec 2017–Jun 2018* **Project: Rule-based Automatic Composition System**
Music X Lab, NYU Shanghai
- Proposed melody generation algorithms based on pitch contour decomposition.
 - Proposed rule-based arrangement algorithms comparable to deep learning models.
- Jan 2018–Jun 2018* **Project: Analyzing Angle-Based Multicategory Support Vector Machines**
Undergraduate Thesis, Advisor: Prof. Lei Shi, Fudan University, Shanghai
- Designed a kernel method for angle-based MSVM classifiers.

INVITED TALKS

- Jun 2024* **Topic:** Music Style Transfer via Representation Learning
 Nanjing University of the Arts, Nanjing, China
- May 2024* **Topic:** Learning Interpretable Concepts for Music AI
 Hong Kong University of Science and Technology (Guangzhou), Guangzhou, China
- May 2024* **Topic:** Learning Interpretable Concepts for Music AI
 Institute of Computational Perception, JKU, Vienna
- Nov 2022* **Topic:** Representation Learning for Music Generation
 Music+AI Reading Group, Mila, Montreal
- May 2022* **Topic:** Finer Control for Music Understanding and Generation
 9th Conference on Sound and Music Technology, Hangzhou, China

Jun 2020 **Topic:** Learning Controllable Representation of Polyphonic Music
Computer Music Reading Group, Carnegie Mellon University

COMMUNITY SERVICE

Conference and Competition Organization

2024 **Co-organizer**, Music Information Retrieval Evaluation eXchange (MIREX 2024) Competition, San Francisco, USA and online
Responsibilities: task captain of the symbolic music generation task and polyphonic transcription task

June 2021 **Student Volunteer Head**, The International Conference on New Interfaces for Musical Expression (NIME 2021), Online and NYU Shanghai
Responsibilities: volunteer training, hybrid mode technical support, keynote co-host

Conference Reviewer

2024–Present **Reviewer**, International Conference on Learning Representations (ICLR)

2023–Present **Reviewer**, Conference on Neural Information Processing Systems (NeurIPS)

2023–Present **Reviewer**, International Conference on Machine Learning (ICML)

2021–Present **Reviewer**, International Society for Music Information Retrieval Conference (ISMIR)

Student Development Service

Nov 2023 **Main Presenter/Organizer**, Personal Statement Workshop
Online & MBZUAI, Abu Dhabi

Nov 2022 **Main Presenter**, Personal Statement Workshop
Online & MBZUAI, Abu Dhabi

Nov 2021 **Main Presenter**, Personal Statement Workshop
NYU Shanghai, Shanghai

Oct 2021 **Main Presenter/Organizer**, Personal Statement Workshop
Fudan University, Shanghai