

Human-AI interaction and **music AI** are my primary research interests. Over the past three years of research experience in support tools for writing and music creation, I have observed how AI can transform creative processes—from concerns about AI replacing human creativity to exploring how AI can augment it. Building on my experience, I aspire to **shape and guide the future of AI music creation** as a Ph.D. student at Carnegie Mellon University.

1 Research Interests

Creativity is a journey—a dynamic process where creators communicate ideas, implement them, and refine through iteration. While AI holds the potential to assist musicians’ creative efforts by providing inspiration, I contend that its current trajectory leans toward *replacing* rather than *empowering* human creativity. The limited controllability of symbolic music models leaves musicians with outputs they cannot easily shape, and end-to-end text-to-music models generate complete audio tracks that are unsuitable for iterative refinement. Consequently, the current paradigm of human-AI collaboration in music creation risks AI outputs overshadowing the creative process. Addressing this gap drives my research question: **How can we facilitate meaningful interactions between human and AI, in a way that supports the iterative and interactive nature of music creation?** Concretely, my research interests include designing and building interactive AI systems that focus on two key areas:

Human-AI interaction design for music composition. With a variety of music AI models available, I aim to build interactive systems that empower musicians to intuitively control AI models within their iterative creative workflows. Fundamentally, my research vision is to develop a unified platform that enables personalized workflows for any stage or element of music creation within the same global context. This system would offer a modular interface where musicians can rapidly prototype and refine their ideas by flexibly selecting and switching between task-specific models. For example, a musician could input a chord progression, generate melody, and synthesize diverse audio renditions to explore different styles or moods.

Advancing co-creative music systems with human feedback. Interactive AI systems can further benefit from human feedback, both to understand co-creation processes and to improve model alignment with user intentions. I envision developing interactive systems that capture human-AI interactions: a trace of user inputs—such as prompts like “create a hopeful chorus” or chord progressions—and AI outputs like melodies, with implicit feedback recorded through user actions like accepting, rejecting, or editing. Analyzing and training with such data allows HCI and AI communities to inform and inspire each other, advancing both fields collaboratively.

2 Why PhD at CMU?

My pursuit of a PhD is driven by a desire to independently set and solve research questions that fuel my curiosity, alongside opportunities to collaborate with leading researchers. Studying in the United States offers a unique environment for music technology research due to its diverse musical culture and industry scale. I believe the US offers ideal environment for engaging with musicians and evaluating music systems in-the-wild, which are crucial aspects for the practical application of my research.

CMU stands out as my top choice with its exceptional collaborative atmosphere and strong foundation in both HCI and AI. The opportunity to work with faculty across departments like CSD and HCII is invaluable for my interdisciplinary focus on HCI, AI, and music. I particularly look forward to working with **Professor Chris Donahue** and **Professor Sherry Tongshuang Wu**. Having collaborated with Professor Chris Donahue before, I am confident that his guidance provides the most fitting environment for conducting my research. I believe working with Professor Sherry Tongshuang Wu will further enhance the depth of my research, whose focus in practical human-AI collaborative systems closely aligns with my research interests. In these respects, I am convinced that CMU is the ideal place for my research.

3 Research Experience

I worked as a undergraduate research intern and graduate student researcher at KAIST, as well as a visiting scholar at CMU, where I learned to be a collaborative and independent researcher. I believe I am an ideal candidate for interdisciplinary research in HCI, AI, and music, owing to my previous research experience with human-AI interaction in writing [1, 2, 3] and music [4, 5], alongside experiences in applied AI for mobile users [6, 7, 8].

Human-AI interaction in writing. As a master’s student at KAIST, I explored how non-native English speakers (NNESs) use AI writing tools [1, 2]. I gained **HCI research skills in building and evaluating human-AI interactive systems** through designing and conducting mixed-methods research with 22 users, as well as implementing a technology probe of AI paraphrasing tools. I further developed strong user interview skills, including designing, conducting, and analyzing interviews in both Korean and English, through studies with a total of 37 users in this project. I also **sharpened my writing skills** over four months of refining the paper draft, where I learned to present findings with a clear, well-structured narratives.

I collaborated with 35 researchers where I reviewed 30 among 115 HCI and NLP papers and contributed to developing a design space for writing assistants [3]. This experience has equipped me with a **comprehensive understanding of writing support system design**, which is valuable for developing human-AI music co-creation tools, as writing and music share iterative, creative processes. Additionally, I strengthened my **communication and organization skills** by participating and engaging in discussions during regular large team meetings, and setting up the paper coding environment and leading the writing process within a small team of seven.

Human-AI interaction in music. As a visiting scholar at CMU, I applied insights from research on writing assistants to develop a songwriting system that transforms multimodal inspirations into chord progressions [4]. Over this six-month project, I strengthened my ability to **define research questions and set design goals based on formative interviews**. By interviewing eight songwriters, I identified common practices and limitations in existing AI songwriting tools [5], particularly a need for better support in incorporating personal inspirations into the creative workflow. I also strengthened my abilities in **rapid web application development and testing**, managing both frontend design and backend algorithms for chord generation. In a user study involving 10 songwriters, I observed that the system enhanced their sense of agency and creativity in the creative process.

Applied AI for mobile users. I have developed strong skills in **implementing and testing AI algorithms and designing and conducting experiments in real-world scenarios** through three projects focused on efficient mobile AI frameworks. The first two, conducted during my master’s studies, involved creating domain adaptation algorithms for real-world data streams [6, 7]. My role involved designing and implementing real-world data streams and conducting observational studies in PyTorch to develop algorithms. Additionally, as an undergraduate intern, I reproduced and evaluated domain adaptation frameworks and developed an Android app, which enabled on-device model training for real-time computational cost analysis [8].

4 Career Goals

My long-term goal is to **become a Principal Investigator in an academic research lab**. I aim to **bridge the AI and HCI communities**, from interaction-centric AI algorithms to human-AI interaction methods, through shared insights that shape AI’s role in creative processes. I am equally **passionate about teaching and mentoring future researchers**. Teaching has always been a meaningful part of my journey; I have assisted in five undergraduate CS courses and served as head TA for a graduate course. As an undergraduate, I designed and led mentoring programs for over 130 students in science and computing. With the resources and mentorship at CMU, I am ready to take my next steps in human-AI interaction and music AI, making lasting contributions to CMU and the broader world.

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